JANUARY 2021

TEXAS
The University of Texas at Austin
Energy Institute

H2@UT

Hydrogen Research at UT

VARUN RAI
Director, Energy Institute at The University of Texas at Austin
rai@energy.utexas.edu

Texas Hydrogen Roundtable, 12 Jan 2021

Energy@UT: Changing the World

- ***Unparalleled diversity and depth of research across the energy spectrum***
  - 350+ faculty and researchers working on various energy research areas
  - Building blocks for truly interdisciplinary research and education
  - Global coverage of issues
- ***Over 30 active and established topical energy centers/consortia***
  - Keen awareness of key applied problems from the beginning
  - Enables a built-in applied focus in research activities
- ***Pioneering energy education and training***
  - Arguably the largest and most impactful footprint reg. energy professionals
  - Focus on an integrated, systems-oriented, holistic understanding of energy systems
- ***Complementary assets of outsized excellence and impact***
  - Bureau of Economic Geology (BEG), Texas Advanced Computing Center (TACC), Oden Institute for Computational Eng. & Sc., Texas Materials Institute (TMI), Center for Electromechanics (CEM), Institute for Machine Learning (IML), and more
- ***Connected across industry, foundations, government, and policy: High Impact***

Energy@UT: Changing the World

The depth and breadth of the research and innovation of our faculty and researchers enables UT to take a **balanced view of the global energy system.**

The **Energy Institute serves as a gateway to UT's world-class researchers** dedicated to solving the grand energy challenges facing society.

- The Institute leverages UT's breadth and depth of expertise to catalyze rigorous interdisciplinary research and foster innovation.
- Focuses on integrated solutions that have the best chance of penetrating at scale in Fueling a Sustainable Energy Transition. (FSET)

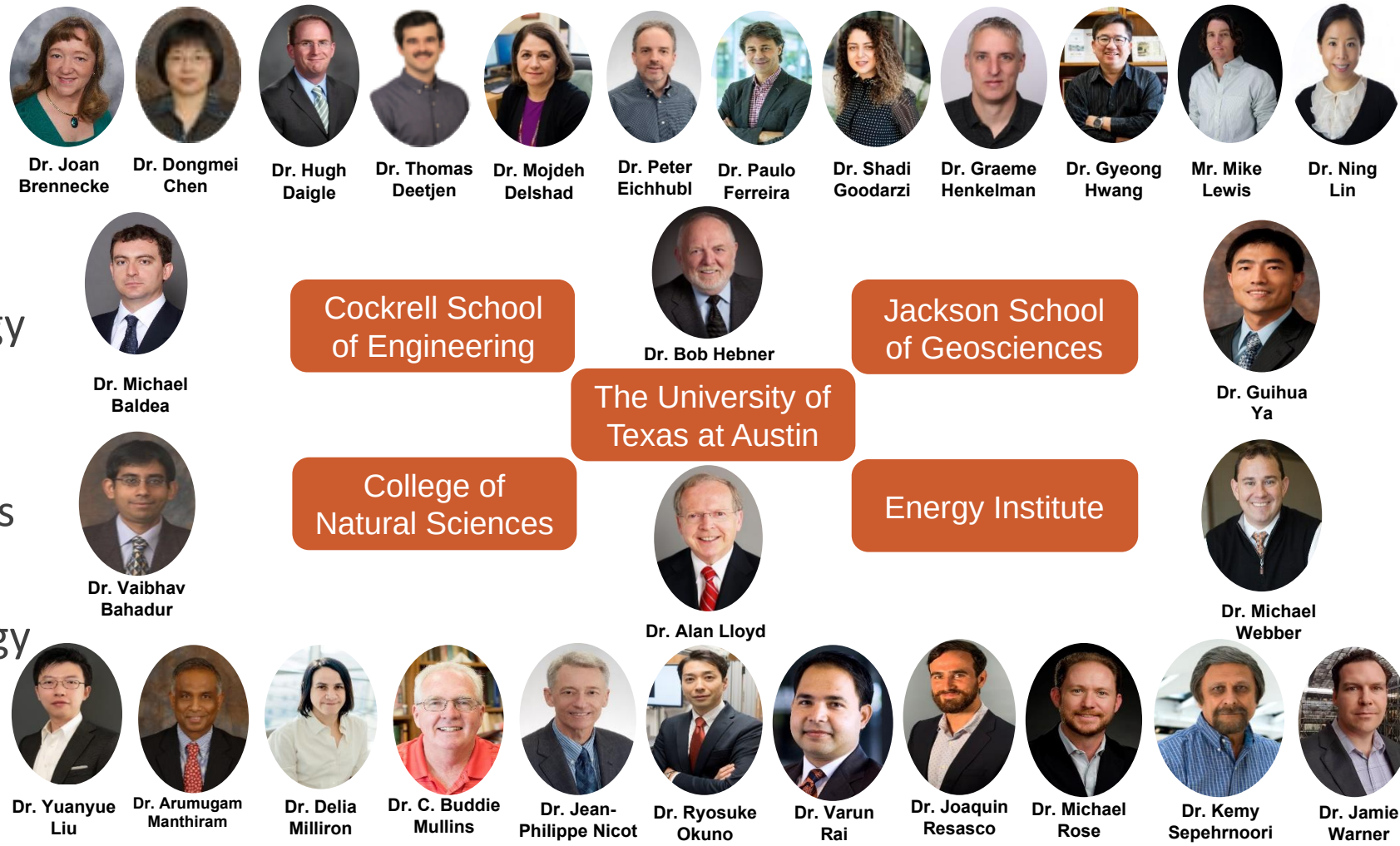
H2@UT: A research cluster at The University of Texas at Austin with the mission to help enable a hydrogen economy.

- ***The Hydrogen (H_2) Ecosystem of The University of Texas at Austin***
- UT Austin has a history of leadership in advancing the Hydrogen (H_2) Economy, from deploying Texas' first H_2-powered bus on the road to developing new materials to produce H_2 from sunlight and water.
- As one of the world's leading research institutions, H_2@UT brings together faculty and researchers from the Cockrell School of Engineering, the Jackson School of Geosciences, the College of Natural Sciences, and coordination from the Energy Institute.

http://sites.utexas.edu/h2/

H2 Experts at UT

- 25+ researchers
  - Catalysts
  - Membranes
  - Controls
  - Power electronics
  - Vehicle design
- Associated Centers
  - Bureau of Economic Geology
  - Texas Materials Institute
  - Oden Institute for Comp.
  - Center for Electromechanics
  - Center for Electrochemistry
  - Center for Subsurface Energy and the Environment



http://sites.utexas.edu/h2/

H2@UT: Thrust Areas

Materials and Devices | Storage and Distribution | System Integration | Implementation

Materials and Devices

Focus – Improving materials to lower the cost and raise the performance of fuel cells and electrolyzers.

Storage and Distribution

Focus – Developing subsurface H_2 storage reservoirs, novel vessels, and the distribution systems to fuel next-generation transportation.

System Integration – from Vehicles to Trains

Focus – Leading the development of future transportation systems by providing key engineering data today – from H_2 powered-trains, to vans, to buses.

Implementation – Supply Chain, Techno-economic Analysis, Infrastructure, and Policy

Focus – Driving technology adoption to create a sustainable supply chain and curb greenhouse gas emissions through techno-economic analysis, infrastructure development, and policy advancement.

H2@Scale Project Launched in Texas

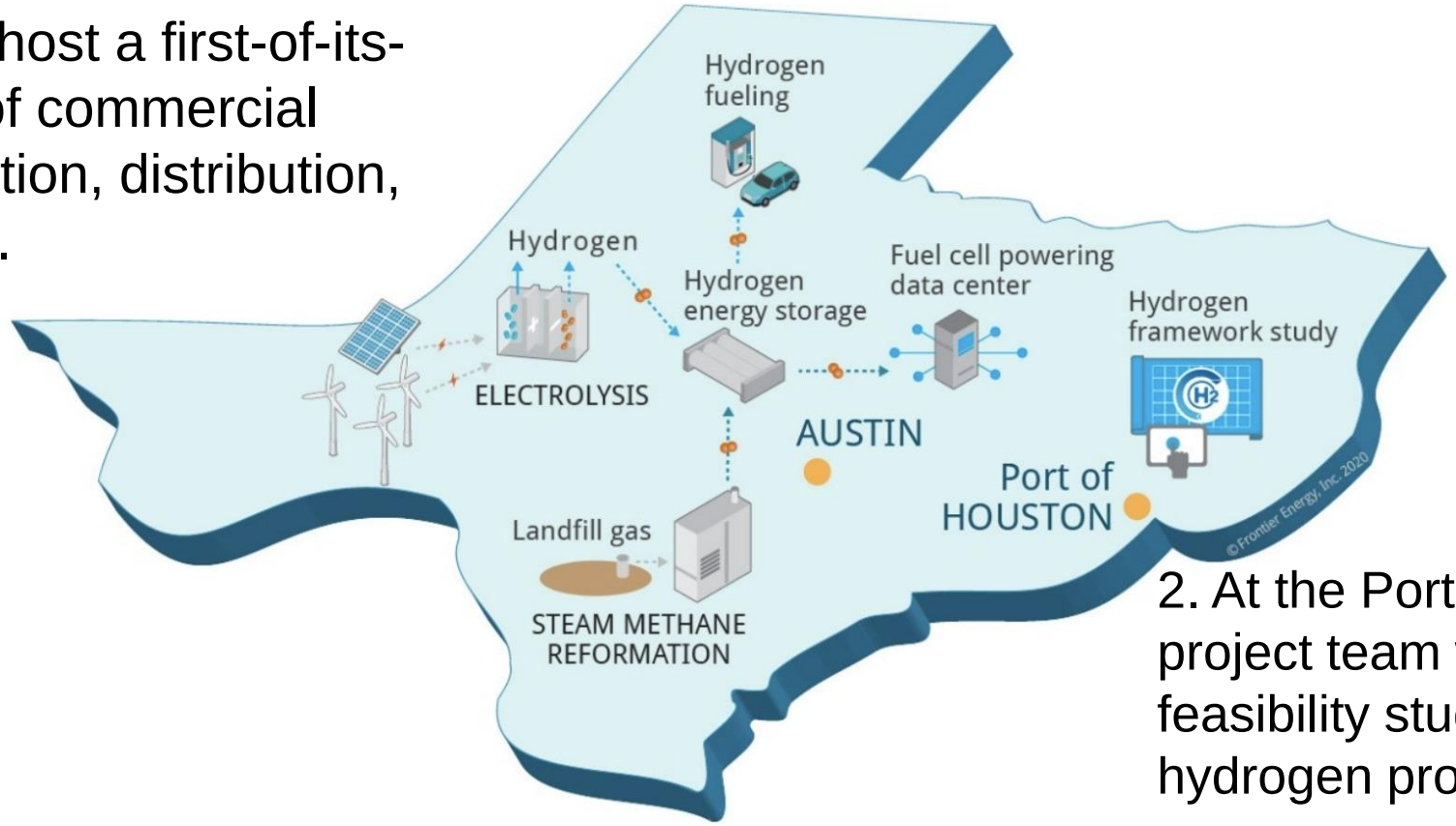
Sponsoring partner
U.S. DOE EERE HFTO

FOR IMMEDIATE RELEASE

September 15, 2020

Frontier Energy, Inc., in close collaboration with GTI and The University of Texas at Austin, announces the launch of a U.S. Department of Energy project, *Demonstration and Framework for H2@Scale in Texas and Beyond.* The project is supported by DOE's Hydrogen and Fuel Cell Technologies Office within the Office of Energy Efficiency and Renewable Energy. *H2@Scale in Texas and Beyond* intends to show that renewable hydrogen can be a cost-effective fuel for multiple end-use applications, including fuel cell electric vehicles, when coupled with large, baseload consumers that use hydrogen for clean, reliable stationary power.

1. UT-Austin will host a first-of-its-kind integration of commercial hydrogen production, distribution, storage, and use.



2. At the Port of Houston, the project team will conduct a feasibility study for scaling up hydrogen production and use.

TEXAS
The University of Texas at Austin
Energy Institute

H2@UT: Part of an Integrated and Comprehensive Energy Research Platform

WHAT STARTS HERE CHANGES THE WORLD

Energy Institute's Fueling a Sustainable Energy Transition (FSET) Initiative: 12 Project Teams with ~ 60 Faculty

Funding Priorities

Sustainable
Economic, Environmental, Social

Energy
Technologies, Systems, Policy

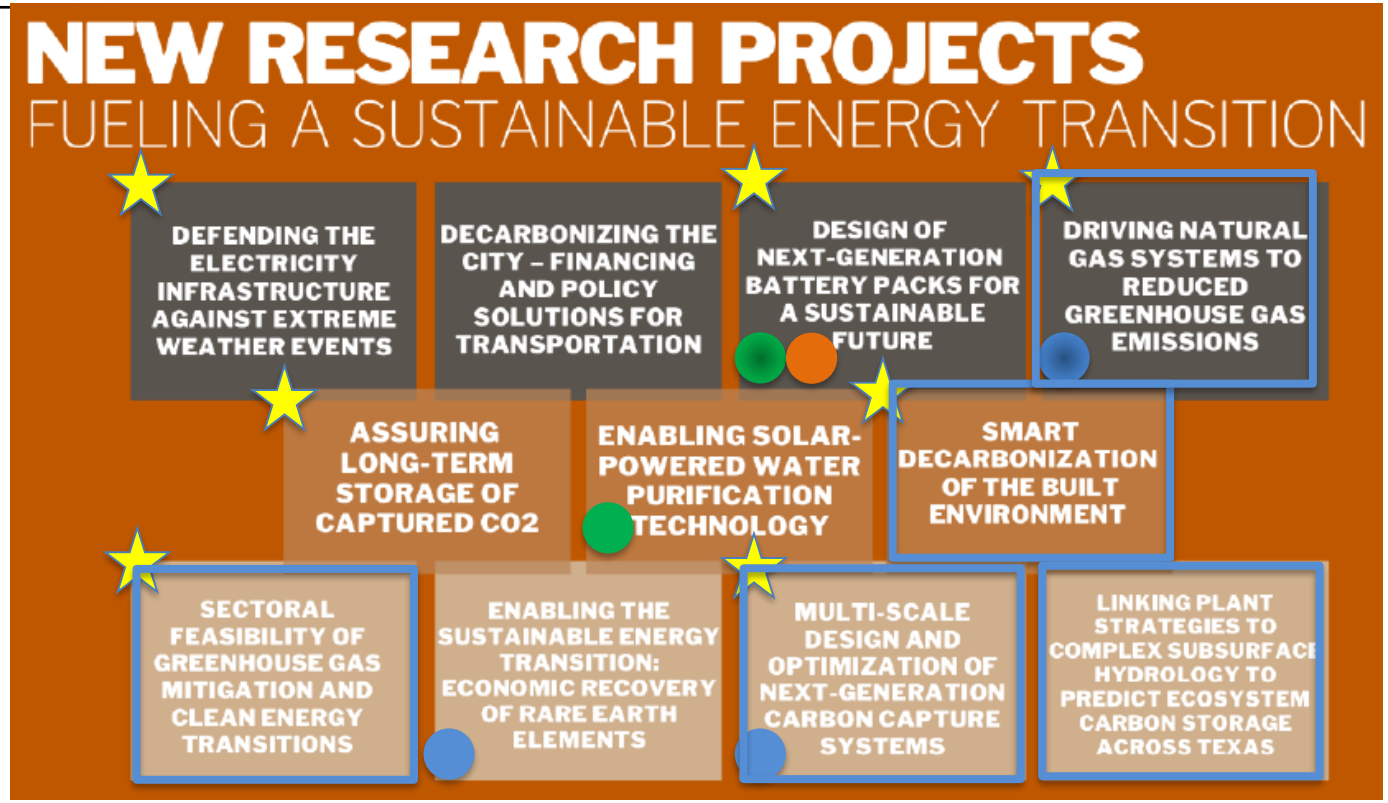
Transition
Shift in paradigm

Year One Overview (since Jan 2020)

The FSET program's about 60 supported researchers (across nine Schools) had a productive year in pursuit of critical, interdisciplinary energy research.

- The program's intentional team composition strategy yielded network and learning benefits program wide.
- Clear research objectives and timeline expectations brought to bear strong research productivity during the program's first year.
- **From grants to patents to startup companies, inventive and commercialization activities are an integral part of the FSET fixture.**

★ Major software/algorithm/data platform development



Partner funded

● Invention disclosure filed/expected
● Patent granted/filed
● Startup (DOE STTR)

Details about the teams and project webpages are at:
https://energy.utexas.edu/news/Energy-Institute-CFP-FSET-announcement-new-UT-collaborations