

Pipeline Research Council International

Hydrogen Network Workshop: *PRCI Emerging Fuels Institute*



LEADING PIPELINE RESEARCH

Jeff Whitworth
PRCI Program Manager, EFI

PHMSA R&D Forum
November 30, 2021



Pipeline Research
Council International
LEADING PIPELINE RESEARCH

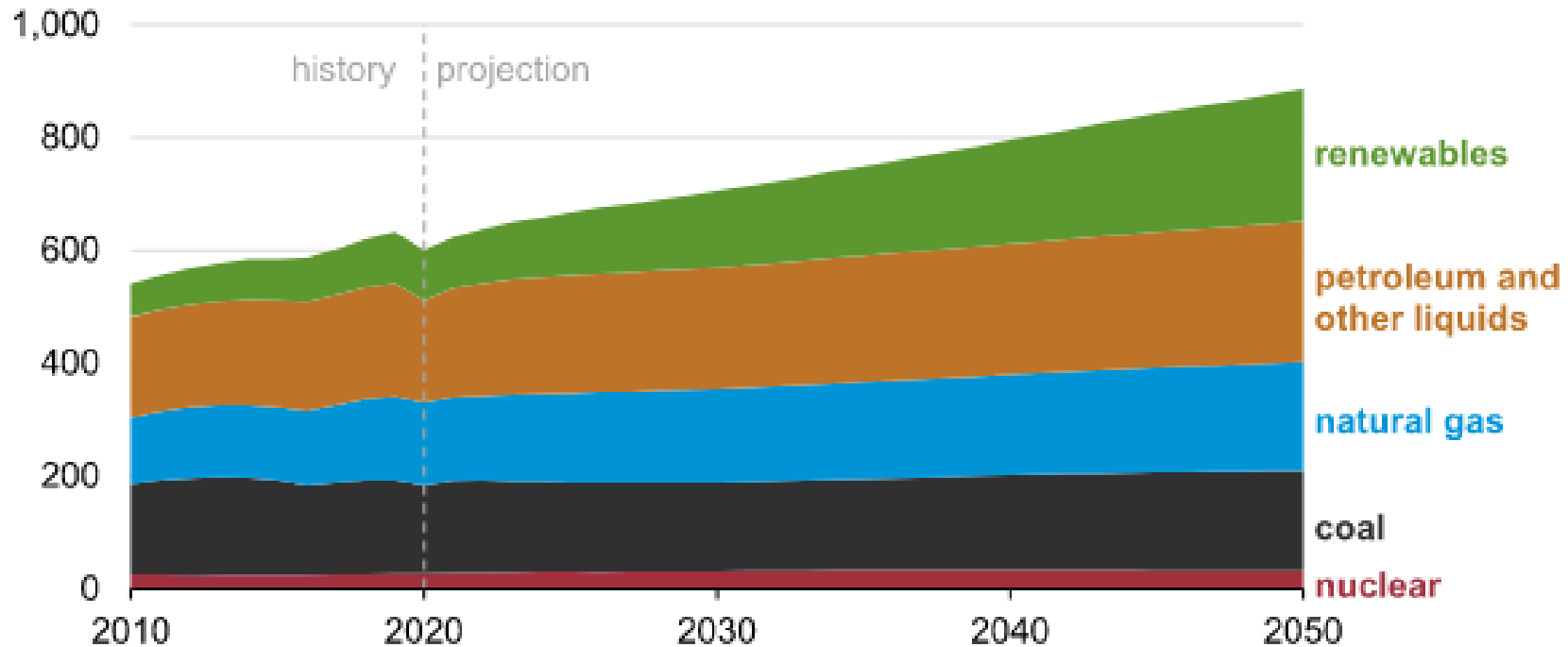
Our Mission

To collaboratively deliver relevant and innovative applied research to continually improve the global energy pipeline systems.

U.S. Energy Information Administration

The [US EIA](#) projects a nearly 50% increase in world energy usage by 2050, led by a growth in renewables.

Global primary energy consumption by energy source (2010–2050)
quadrillion British thermal units



Next Generation of Fuels



Hydrogen

- A non-carbon gaseous fuel.
- Ignoring water vapor, it does not contribute as a greenhouse gas.
- Can provide a means of storing surplus electrical power in the form of a clean chemical energy.



Renewable Natural Gas (RNG)

- Offsets methane emissions that would have otherwise gone into the atmosphere.
- Methane is many times more potent as a greenhouse gas than CO₂
- Is generally similar to conventional natural gas in combustion characteristics.

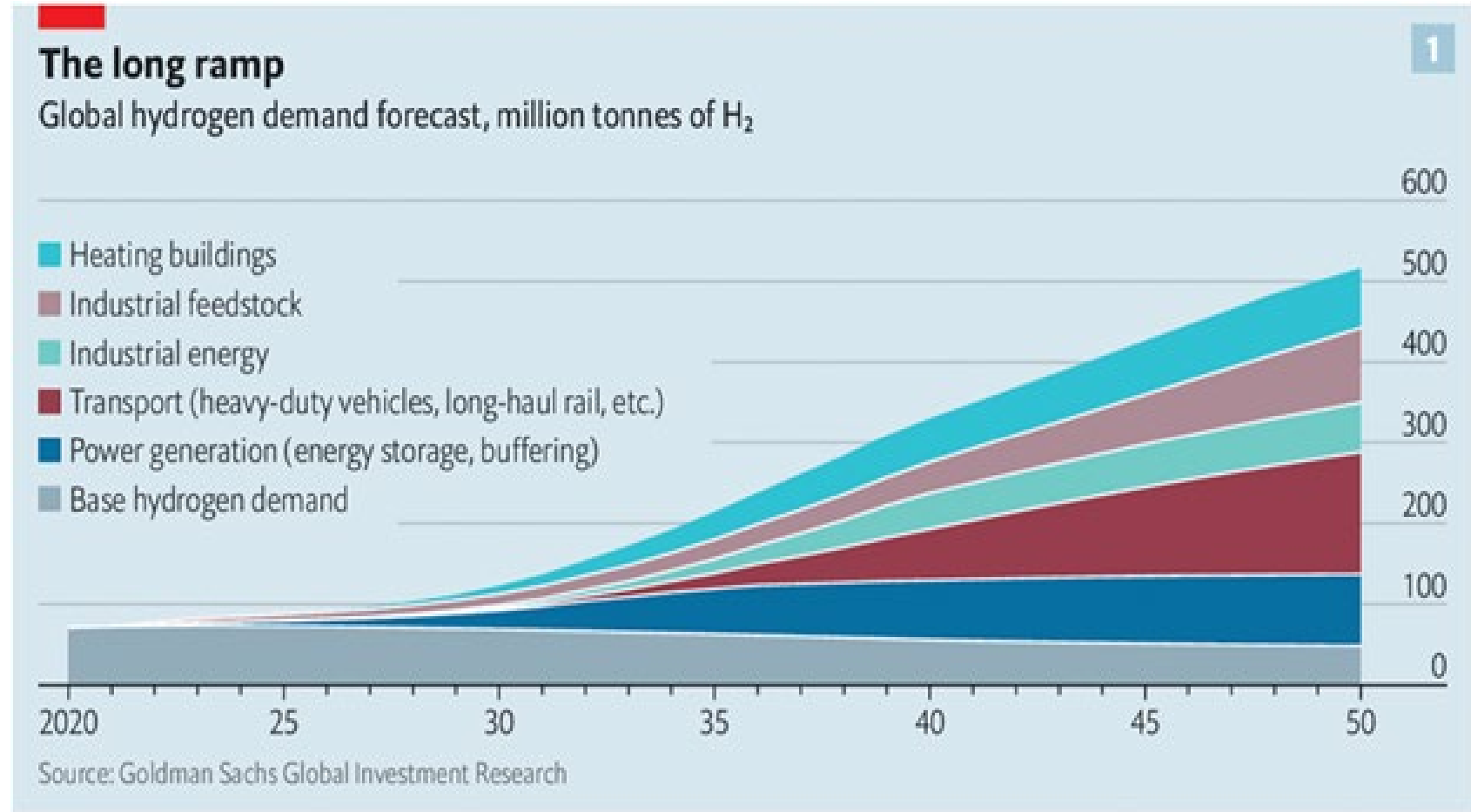


Other

- Other products that could be transported via the pipeline infrastructure that can offset greenhouse gas emissions.
- Gases with high concentrations of CO made from renewable sources still produce CO₂ emissions, but those CO₂ emissions are subsequently reabsorbed by vegetation used to make CO and synthetic methane.
- Not necessarily limited to gases:
 - Ethanol
 - Bio-diesel
 - Ammonia
 - CO₂ for sequestration

Hydrogen Demand 2020-2050

- Hydrogen, when blended with natural gas, is a key component of a sustainable energy society.
- Many governments are planning and / or mandating a transition to renewable energy sources in order to achieve their stated goals of stabilizing the climate.



The Economist

Emerging Fuels Background

- **2020 PRCI State -of- the- Art Report on transportation and storage of emerging fuels.**
- **Research to safely transport and store fuels to support a sustainable global energy strategy.**
 - Hydrogen
 - Renewable Natural Gas
 - Biofuels
 - Ammonia
 - Carbon Capture and Sequestration
- **PRCI created the EFI in March 2021 to provide a platform for PRCI members/non-members to conduct specific research related to the decarbonization transition.**

Opportunities for the Emerging Fuels Institute

- **Develop a guide to safely convert and operate pipeline systems for the next generation of fuels.**
 - Address the technical challenges and gaps in the storage and transportation elements of the emerging fuels transition.
 - Manage an evergreen roadmap for the ongoing industry work across all continents.

Collaboration

8

Partnering with peer research associations :

- Australian Pipeline and Gas Association (APGA)
- European Pipeline Research Group (EPRG),
- European Gas Research Group (GERG)
- Future Fuels Collaborative Research Center (FFCRC)
- Gas Technology Institute (GTI)

Coordinates efforts with governmental agencies :

- Canada Energy Regulator (CER)
- U.S. Department of Energy (DOE)
- U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA)

Coordinates efforts with industry associations:

- Association of Oil Pipelines (AOPL)
- American Petroleum Institute (API)
- Interstate Natural Gas Association of America (INGAA)
- Canadian Standards Association (CSA)
- American Society of Mechanical Engineers (ASME)

Project Focus

The EFI's current priorities are following market focus in the storage and transportation of hydrogen and RNG.

Project emphasis areas:

- Integrity of pipeline system steel and non-steel components
- Safety (e.g. electrical classification and fire safety)
- Network & End Use Equipment
- Metering & Gas Quality
- Network Management & Compression
- Inspection & Maintenance
- Hydrogen-Natural Gas Separation
- Underground Gas Storage

Active Projects

Integrity of pipeline system steel and non-steel components

- NREL HyBlend Project on operational and performance impacts of blending hydrogen into the existing natural gas infrastructure
- DNV Guidelines for Integrity Management of hydrogen pipelines
- ASU/PHMSA Competitive Academic Agreement Program (CAAP) development of knowledge-based system for integrity management of aging pipelines

Network Management & Compression

- GMRC analyzing compression system changes with hydrogen blending
- Solar, in partnership with UC Irvine, CSU, SWRi, and ERC to develop a turbine retrofit solutions for hydrogen blend pipelines.

Metering & Gas Quality

- NewGasMet project to identify the impact of renewable gases on accuracy and durability of meters in the market today
- GTI development of a centralized RNG database to track gas quality

Safety

- PROPOSED Cooperative Research and Development Agreement (CRADA) b/w SNL and PRCI to address risks associated with H2 leak scenarios for H2 blends >20%.

QUESTIONS