Gas Systems in a Net Zero Future

Working Together Towards a Sustainable and Resilient Energy System

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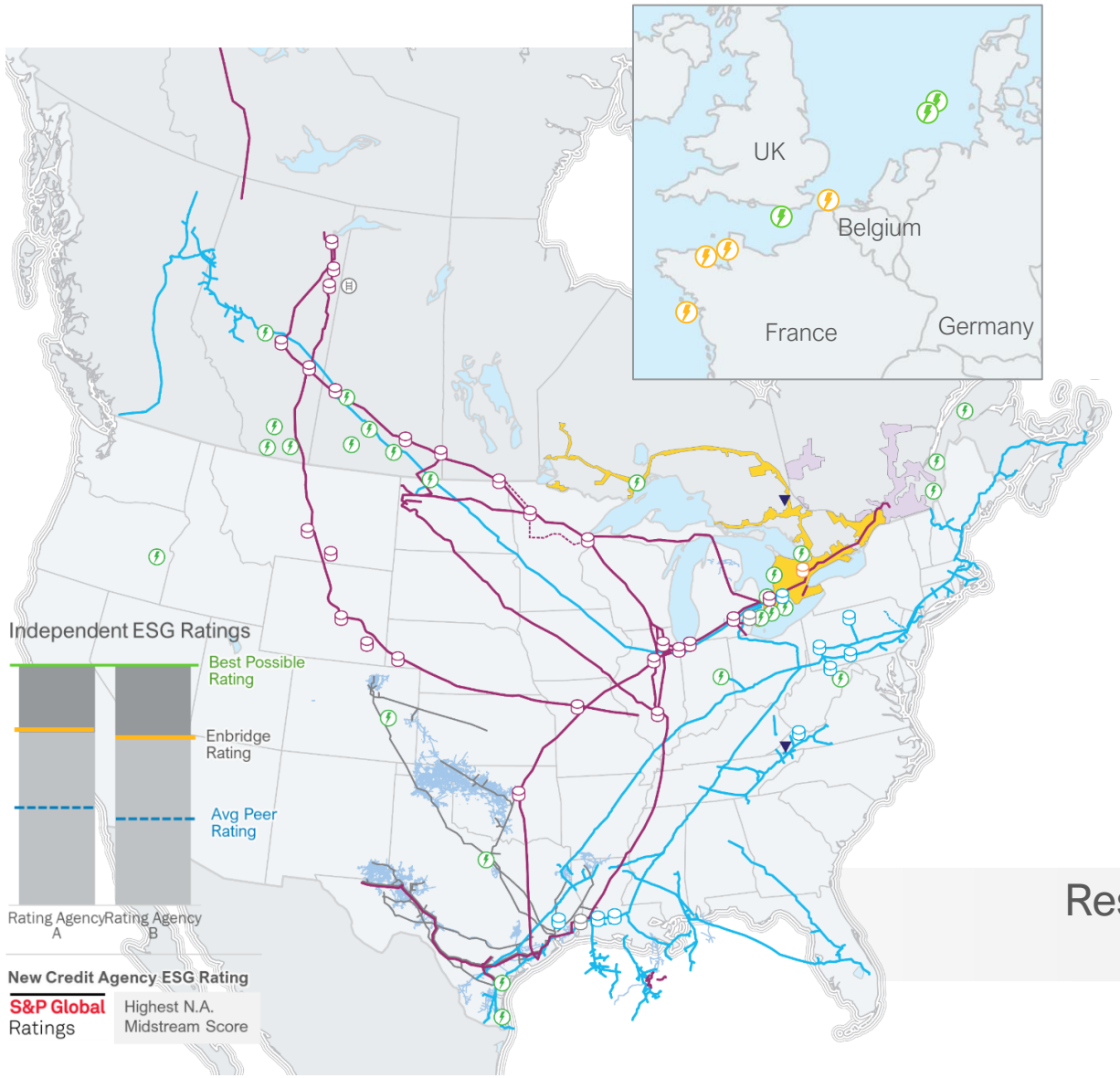
ENBRIDGE

North America's largest infrastructure co.



Premium energy infrastructure essential to N. America's energy needs

Liquids	**25%** of N. America's crude oil transported • #1 by miles of pipe
Gas Transmission	**20%** of natural gas consumed in the U.S • #2 by miles of pipe
Gas Distribution	**~1 tcf** of natural gas delivered annually • #1 by volume
Power	**1.8 GW**[1] of contracted renewable energy • 12th by GW

1. Reflects net ownership of renewable capacity.

Resiliency driven by markets, commercial constructs and positioning for the future

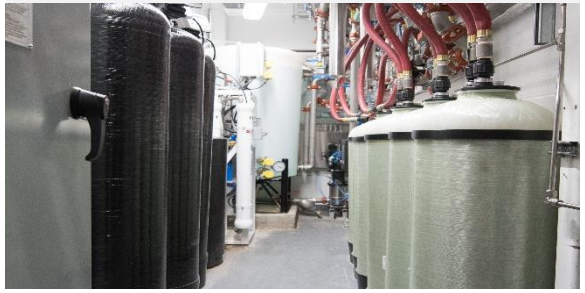
At the forefront of low carbon developments

Renewable Natural Gas

- Technology and business model well-advanced
- Operating two projects in Ontario; several in construction/development

Hydrogen Power-to-Gas

Blending Hydrogen



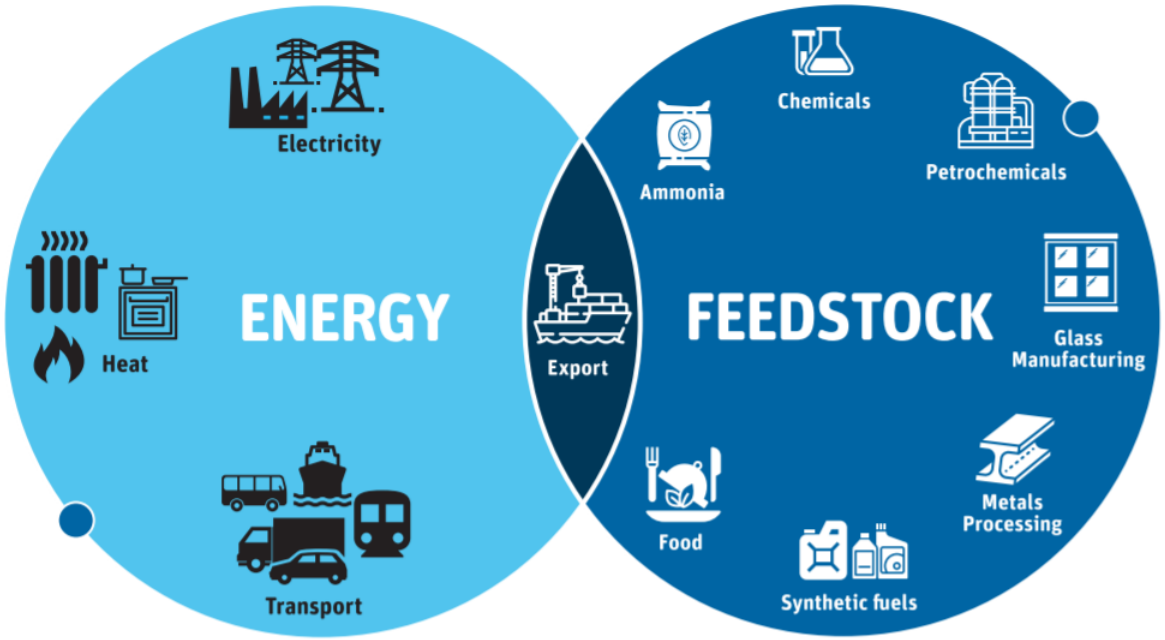
Capitalizing on future of hydrogen through gas distribution and transmission businesses

- Operating first N.A. utility-scale power-to-gas facility
- Pilot project to blend hydrogen into gas distribution system
- Potential for blending into gas transmission systems

Carbon Capture & Storage

- Leverages liquids pipeline and storage capabilities
- Evaluating potential opportunities

Hydrogen's role in the energy transition

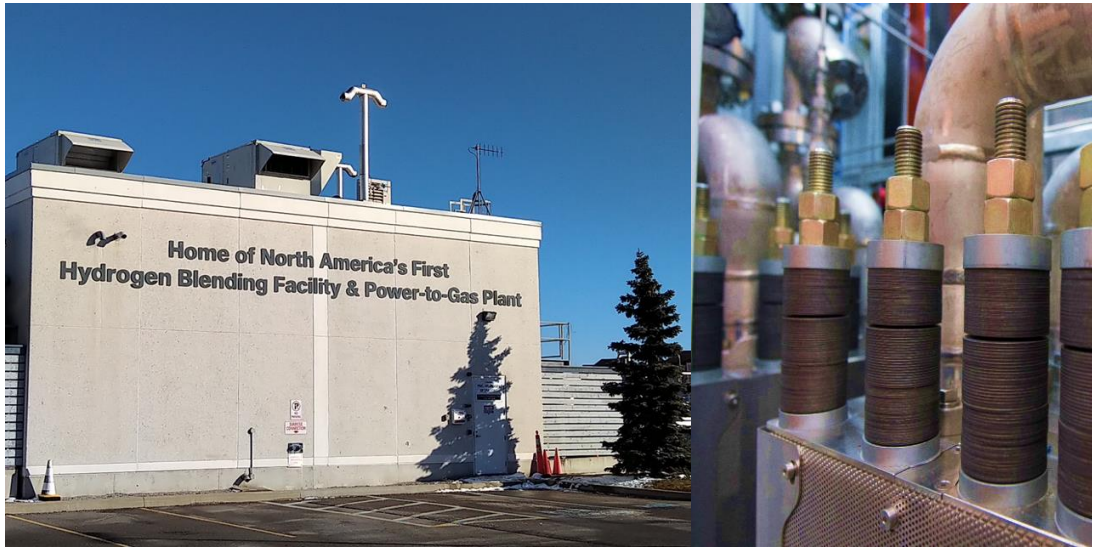


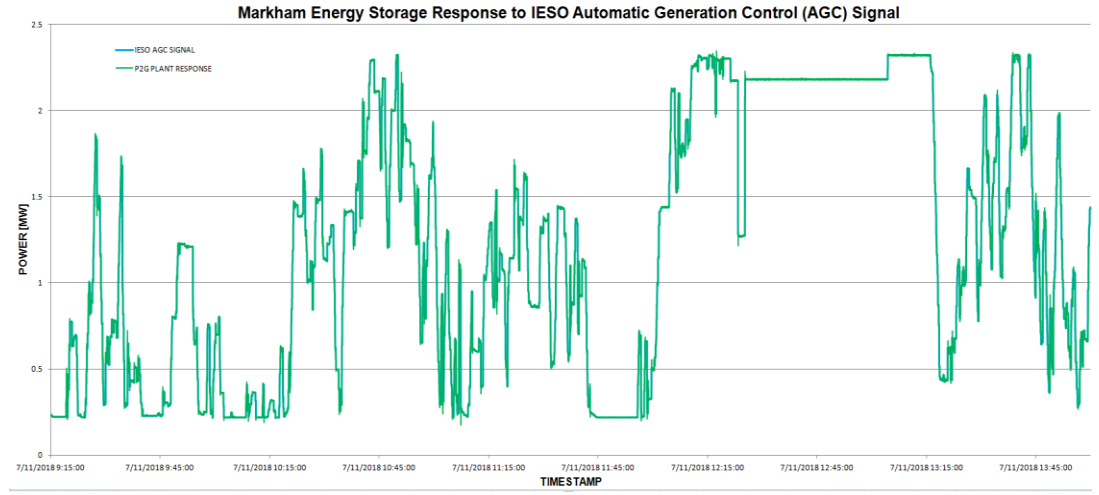
- A clean-burning solution for the hard to electrify
- Can be used as a store for renewable electricity to minimize curtailment or for seasonal demand variation
- Can help decarbonize a range of sectors including space heating, heavy-haul transport, high-temperature industrial heat, chemicals, refining
- Can be converted to replace fossil-derived fuels and feedstock (methane, jet fuel, ammonia, methanol, etc)

Hydrogen’s versatility provides an effective mechanism to transfer energy across sectors, time and place

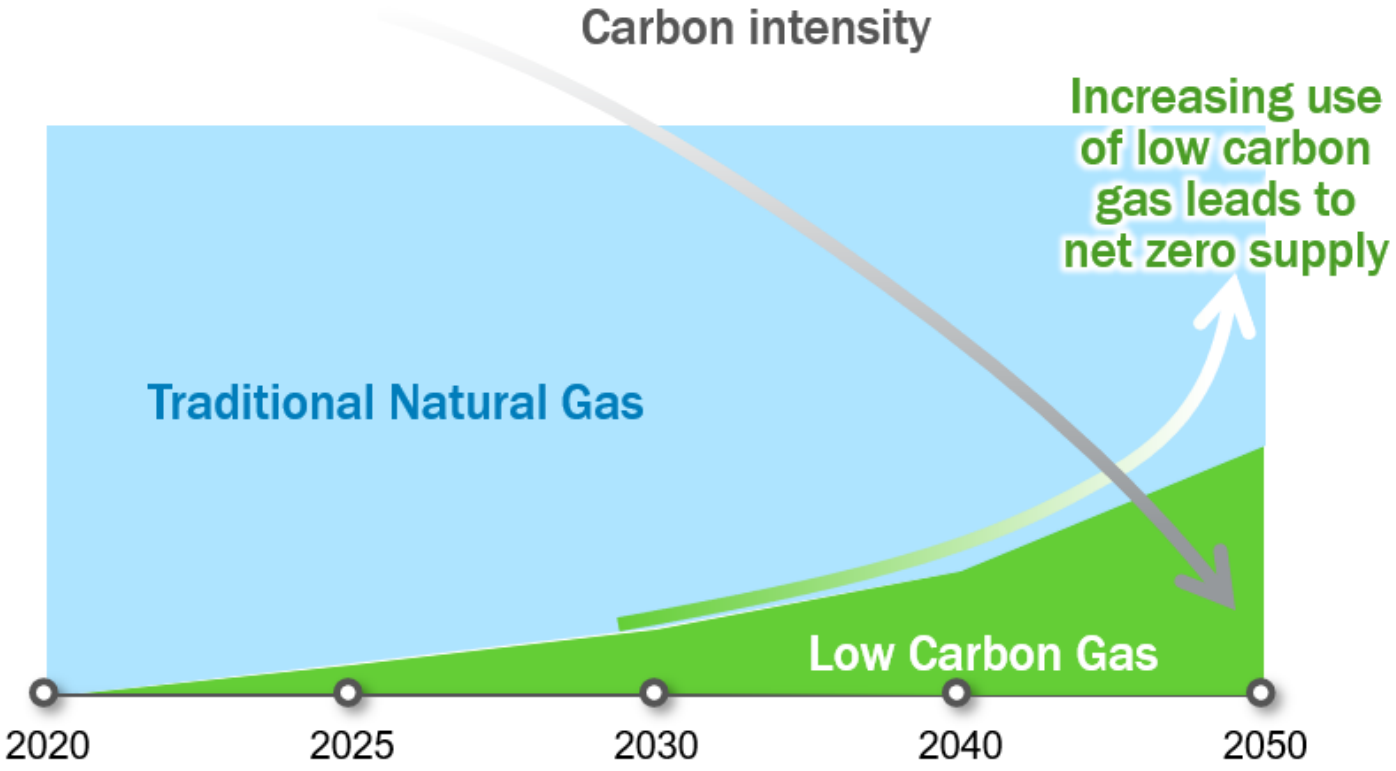
Markham Project - Sector coupling through power-to-gas

- Joint venture between Enbridge and Hydrogenics (Cummins)
- 2.5MW Energy Storage Project
  - Commissioned in 2018
  - Can produce 1080 kg H2/day
  - Can store 8MWh on site
- Provides rapid response frequency regulation service to the province's IESO
  - AGC signal sent every 2 seconds from IESO
- Constructing bridge to natural gas network with hydrogen blending to start in late-Q3

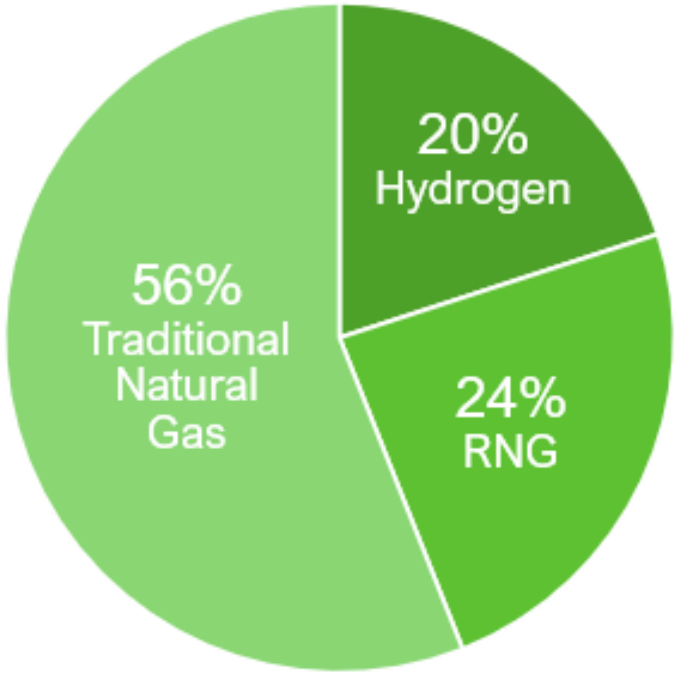




Low carbon gas in today's energy system



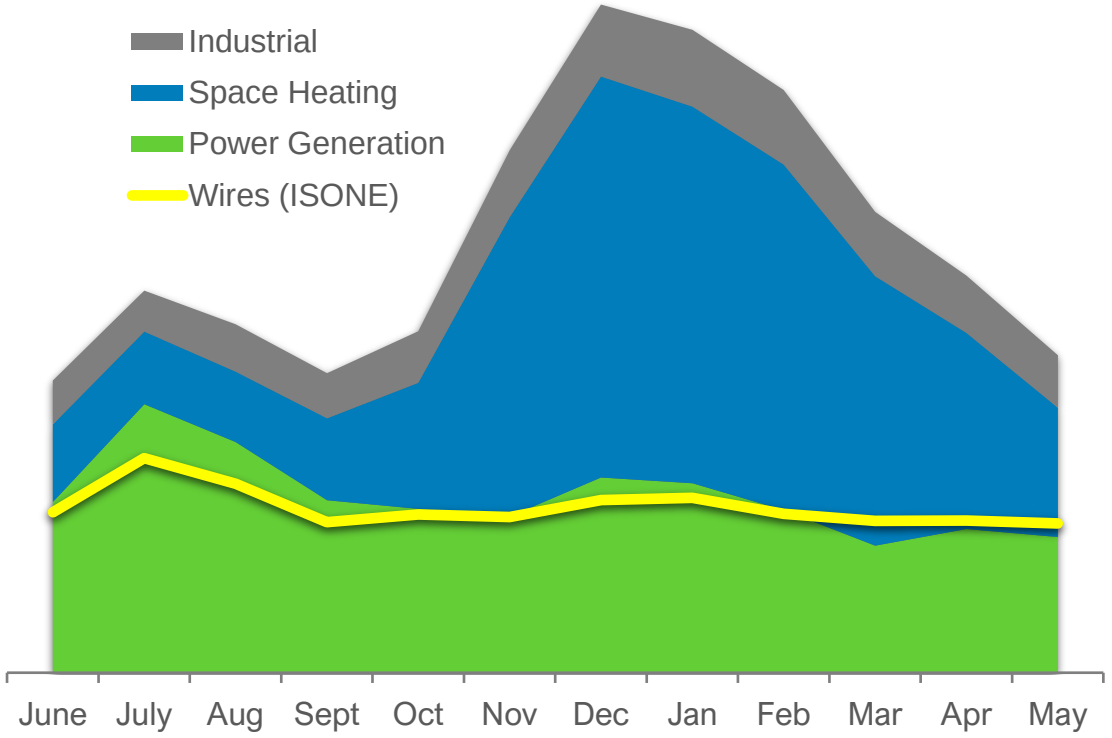
A Carbon Neutral Fuel Mix for New England



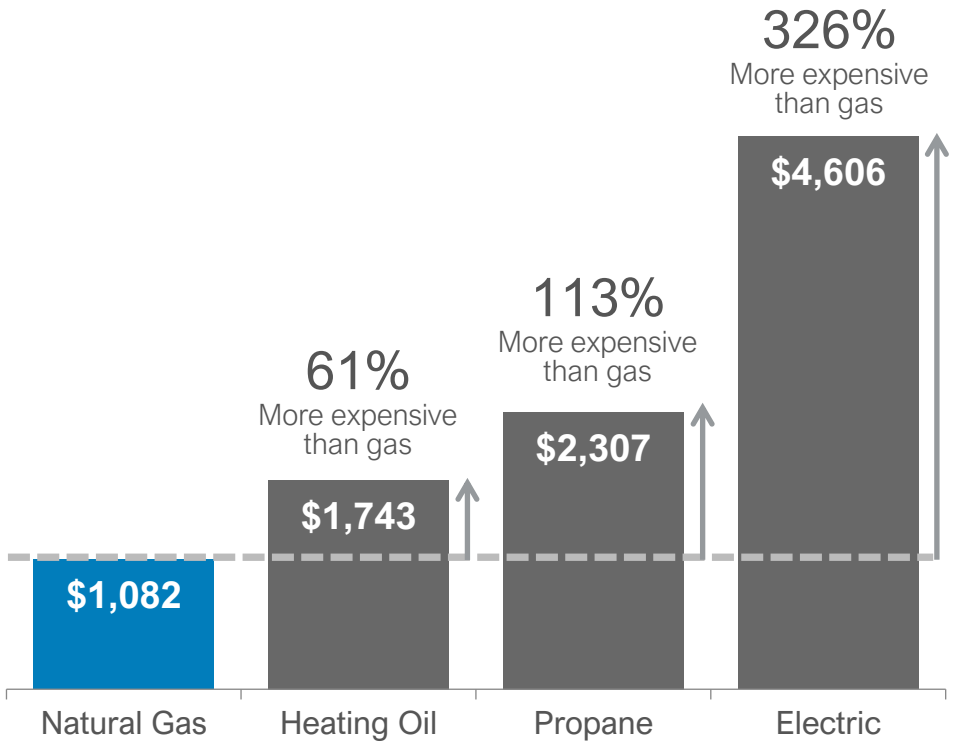
Leveraging existing infrastructure can help achieve climate goals while limiting increases to delivered costs

Why this is important

Delivered energy in New England



Relative cost of heating an average home in New England



Gas plays a critical role in ensuring the delivery of affordable, flexible and resilient energy

Delivered Energy Sources: ISONE Electricity Profile 2019-20 - https://www.iso-ne.com/isoexpress/web/reports/operations/-/tree/daily-gen-fuel-type
, New England Natural Gas Use- https://www.eia.gov/dashboard/newengland/naturalgas

The impact of hydrogen blending extends beyond pipes

2 BCF/d Capacity Pipeline	1% Blend	5% Blend	Investment Unlocked
H2 Production (/year)	16,000 tons	80,000 tons	$100 million to $2 billion
Renewable Power Needed (30-95% use factor)	100-300 MW	500-1600 MW	$200 million to $4 billion+
End Use Equivalents (/year)	○ 30,000 homes heated ○ 65,000 FCEV fueled	○ 140,000 homes heated ○ 325,000 FCEVs fueled	Significant

Even a nominal blend in existing natural gas infrastructure could enable hydrogen at scale

Kickstarting low-carbon hydrogen

Government Policy	• Net-zero **climate targets legislated** • Global **carbon pricing** mechanisms/trading schemes set • **Mandates** and markets **for low-emission products** • Industrial **decarbonization policies and incentives** • Augment **support for research & development** in emerging technologies and the repurposing of existing infrastructure
Regulatory Framework	• **Rules** of regulatory engagement are **clear and stable** • **Standards for use** and equipment are **developed where needed and harmonized** within and across jurisdictions (eg. Hydrogen concentration limits on gas systems)

Policy will be a critical catalyst to drive the emergence of low-carbon hydrogen

Thank You