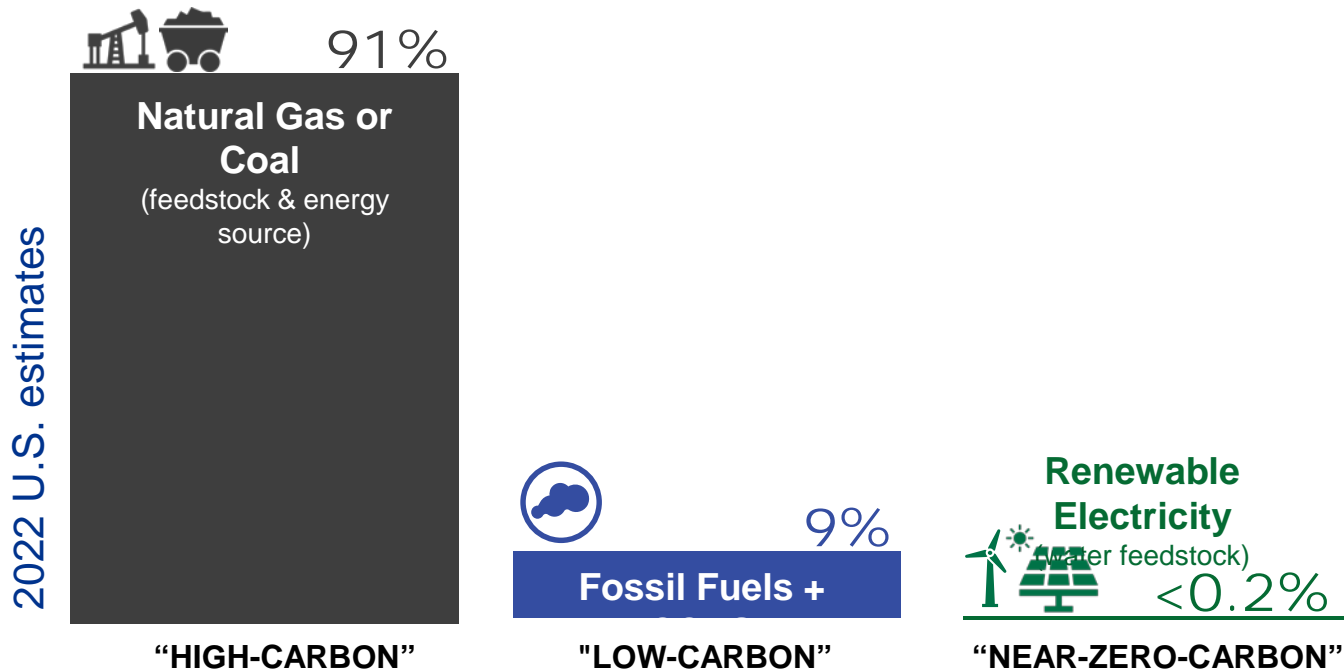


# Climate Impacts of Green Hydrogen

Morgan Rote, Senior Director, Energy Transition, EDF  
[mrote@edf.org](mailto:mrote@edf.org)

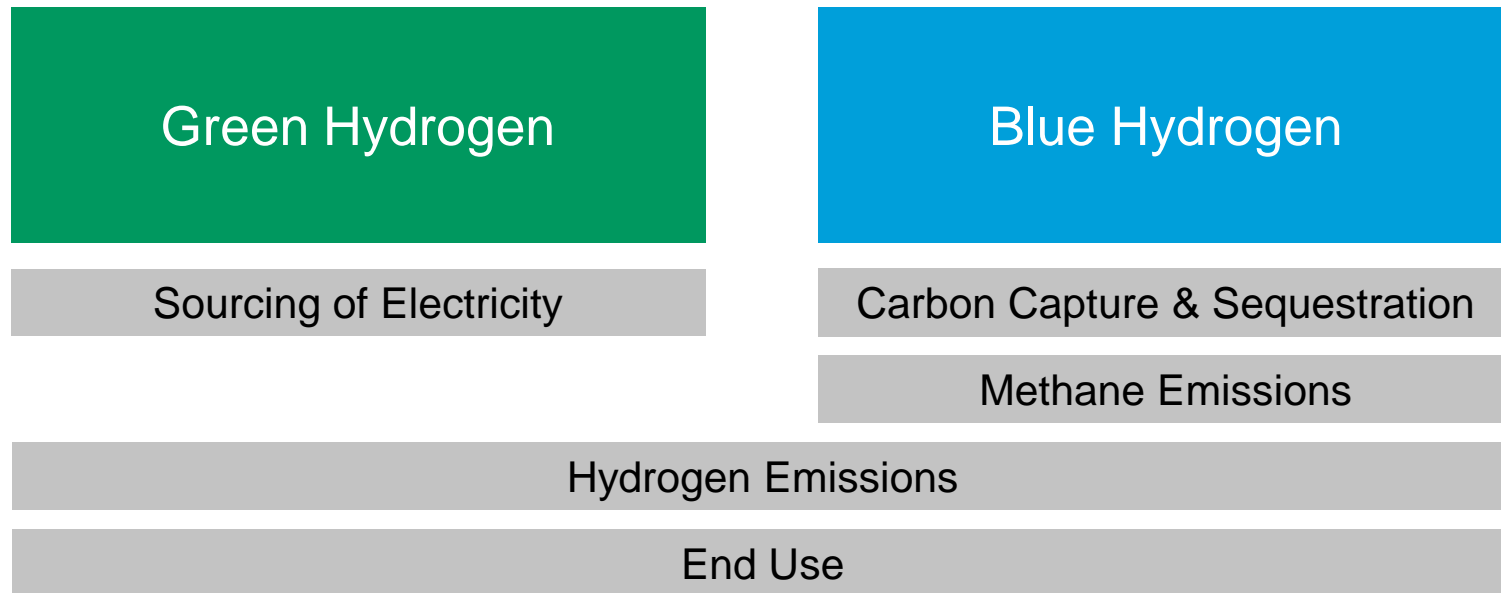
# Hydrogen production methods

Fossil fuel pathways make up 99% of today's H<sub>2</sub> production in the U.S. (and world).



# Climate impacts of 'clean' hydrogen

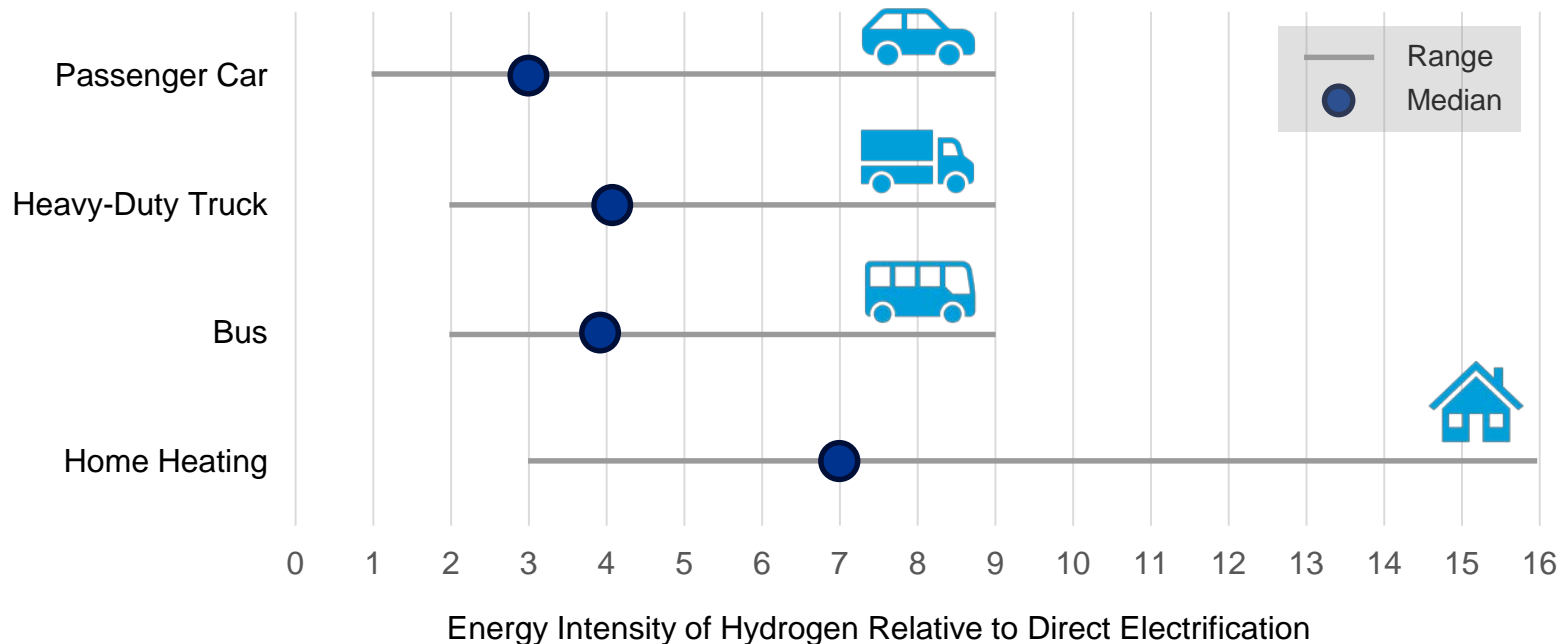
The climate impacts of hydrogen depend on several factors.



# Green Hydrogen: Sourcing of Electricity

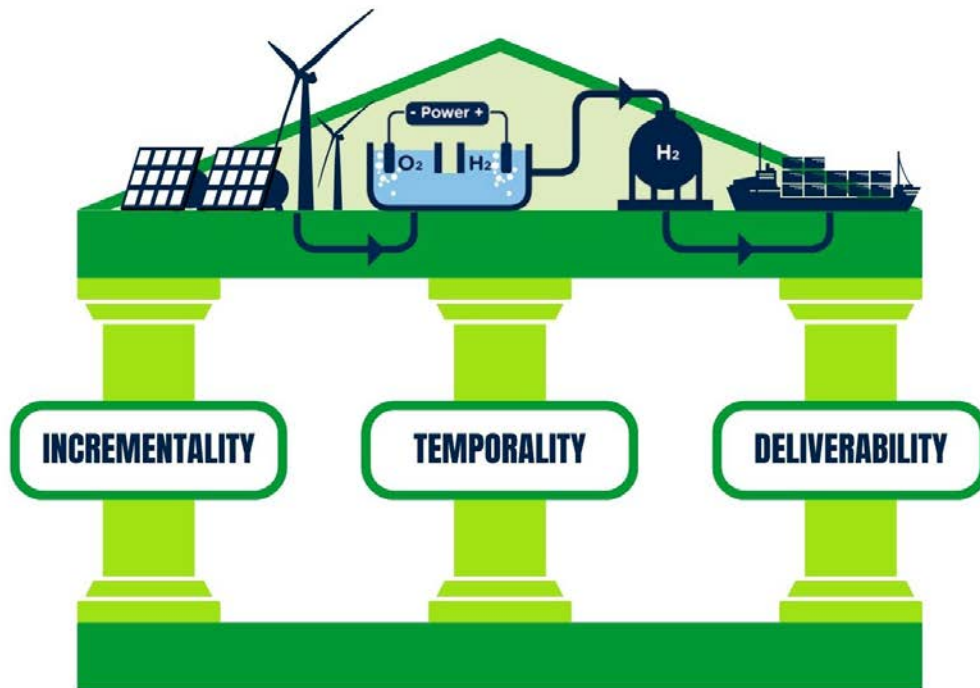
# Hydrogen energy intensity

Hydrogen can be 3-7x as energy intensive as direct electrification.



# Sourcing of electricity for green H2

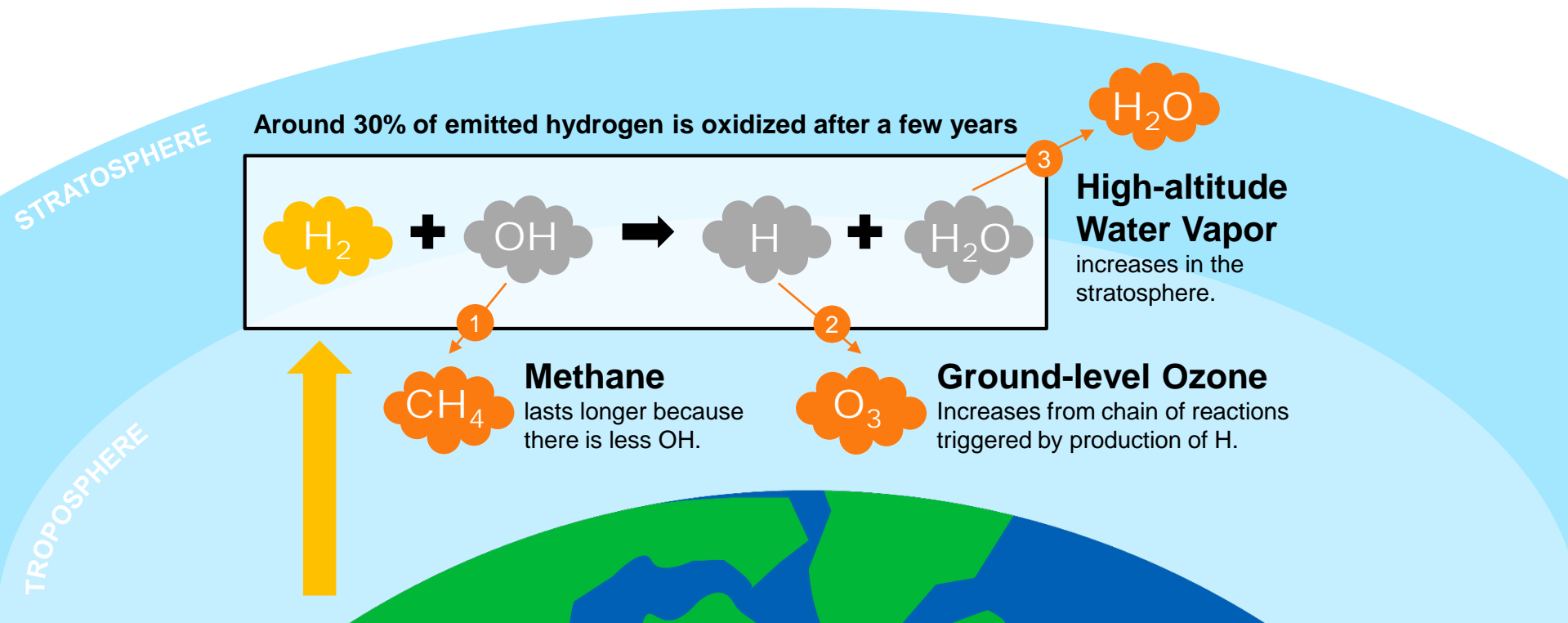
The 3 pillars are critical to the long-term success of the H2 industry.



# Hydrogen Emissions

# How hydrogen warms the climate

There is scientific consensus that hydrogen is an indirect greenhouse gas.



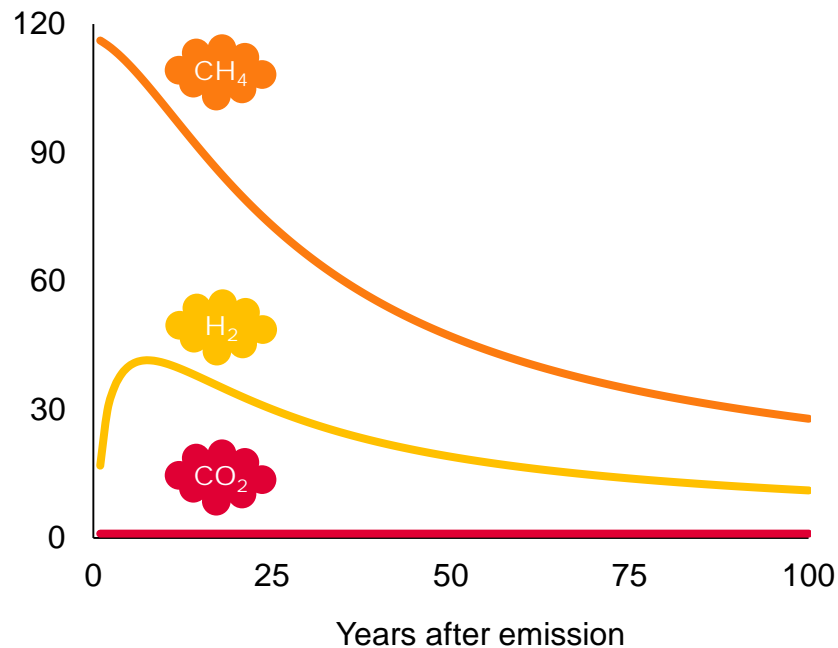


# Short-term impacts of methane and hydrogen

Hydrogen and methane have high warming potency over the first 20 years.

**Warming potency  
relative to CO<sub>2</sub> over  
time from a pulse of  
equal emissions**

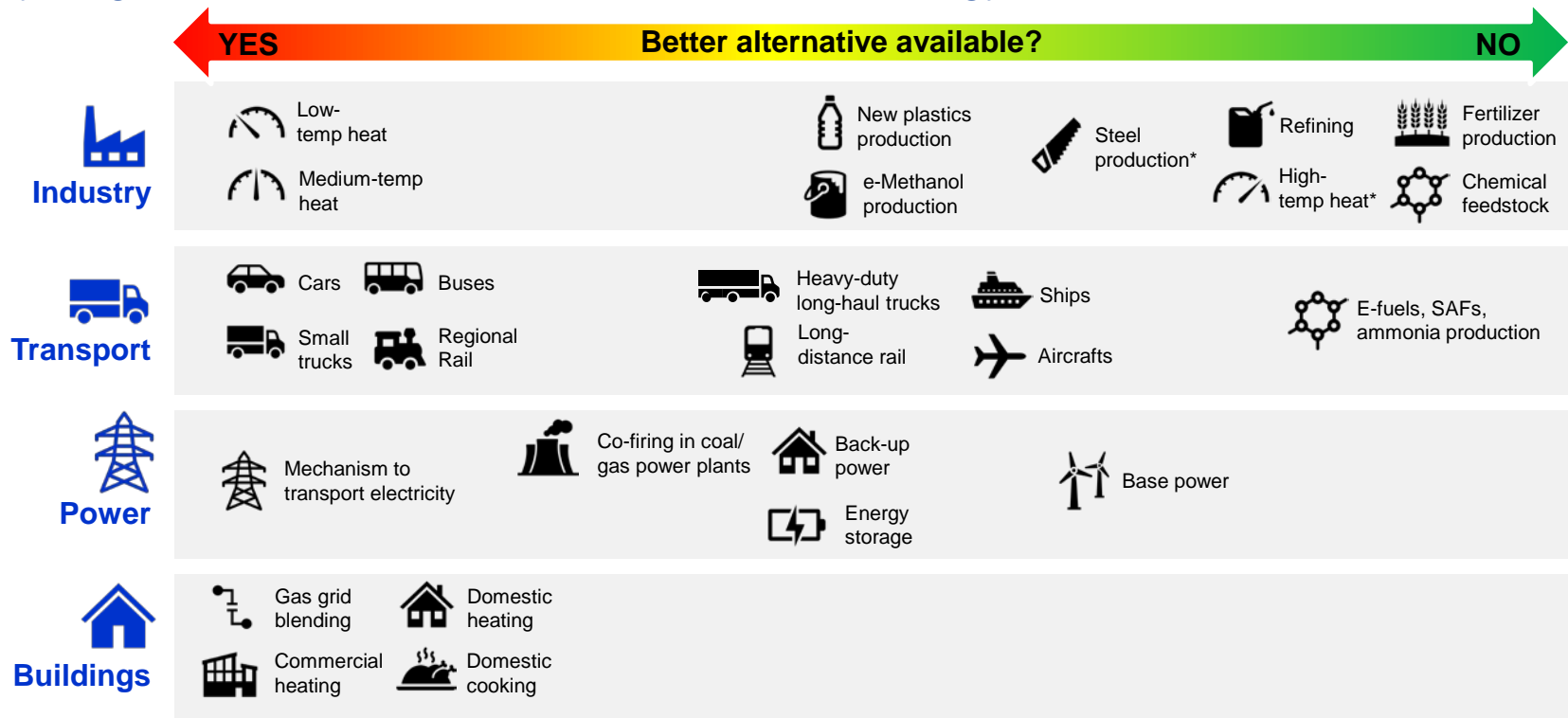
(Global Warming  
Potential)



# Transport & End Use

# Hydrogen end users

Hydrogen can be an inefficient use of clean energy if better options are available.



\*Electrification may eventually be possible




# Using existing natural gas system for H2

Many H2 proponents assume that H2 can be easily injected into existing natgas networks.

**But most networks today can't accommodate H2**, raising serious concerns:

- **Safety** – Causes cracks & fractures
- **Energy supply** – Requires 3x as much energy input as methane
- **Climate** – H2 leaks increase near-term warming
- **Cost** – More energy input and increased pipe maintenance add to consumer costs

Energy Science & Engineering Open Access

CHALLENGES TO INDUSTRY |  Open Access |  

**A review of challenges with using the natural gas system for hydrogen**

Paul Martin, Ilissa B. Ocko, Sofia Esquivel-Elizondo, Roland Kupers, David Cebon, Tom Baxter, Steven P. Hamburg 

First published: 18 August 2024 | <https://doi.org/10.1002/ese3.1861>

<https://doi.org/10.1002/ese3.1861>

# Recommendations

- **Uphold the 3 pillars for green hydrogen**
- **Include hydrogen emissions in climate impact assessments (with both near- and long-term warming impacts)**
- **Require hydrogen leakage prevention plans**
- **Reserve hydrogen for the highest-value end uses**
- **Require dedicated, well-regulated hydrogen infrastructure**
- **Conduct more research around emerging issues – e.g., water availability, PFAS use**

Thank You!

[mrote@edf.org](mailto:mrote@edf.org)