



Pennsylvania



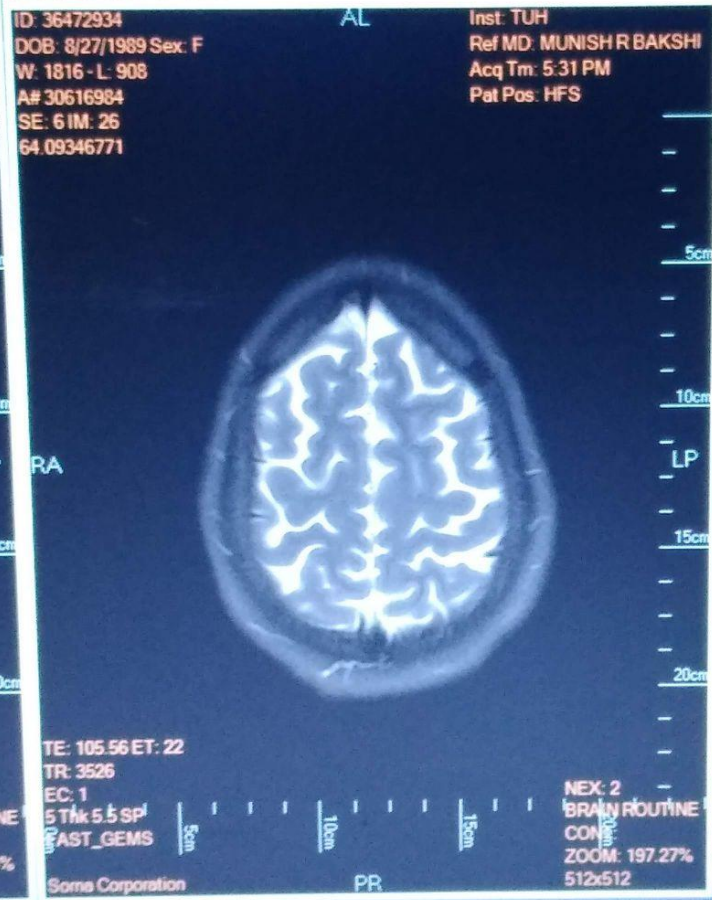
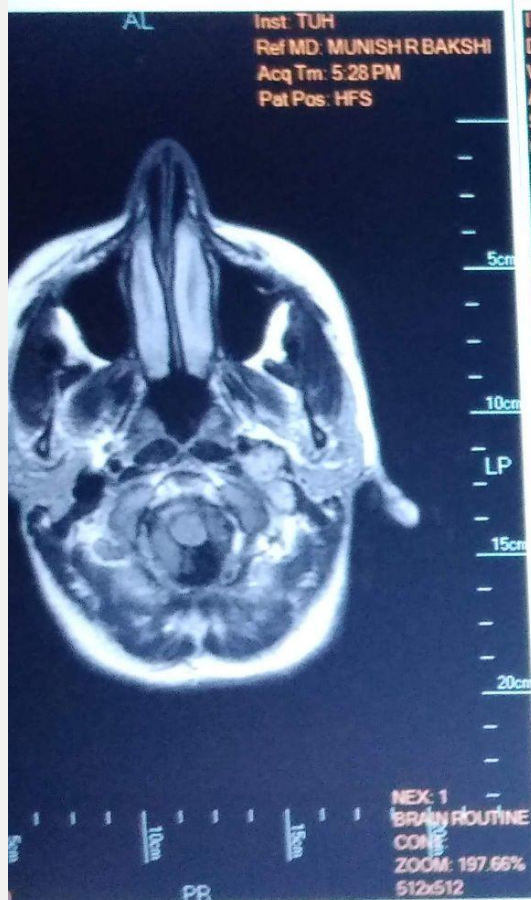
# Hydrogen Blending in Buildings: Effects on Health and Climate

---

**Linnea Bond and Chris DiGiulio**

**Physicians for Social Responsibility PA**

# The Right Intervention for the Right Problem

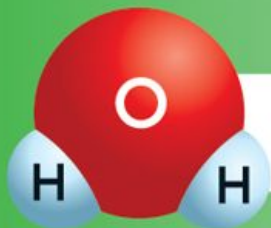


# Making Hydrogen

Feedstock

Energy

Product and  
Byproduct(s)



(Water)



(Hydrogen)



(Oxygen)

# An Ugly Rainbow



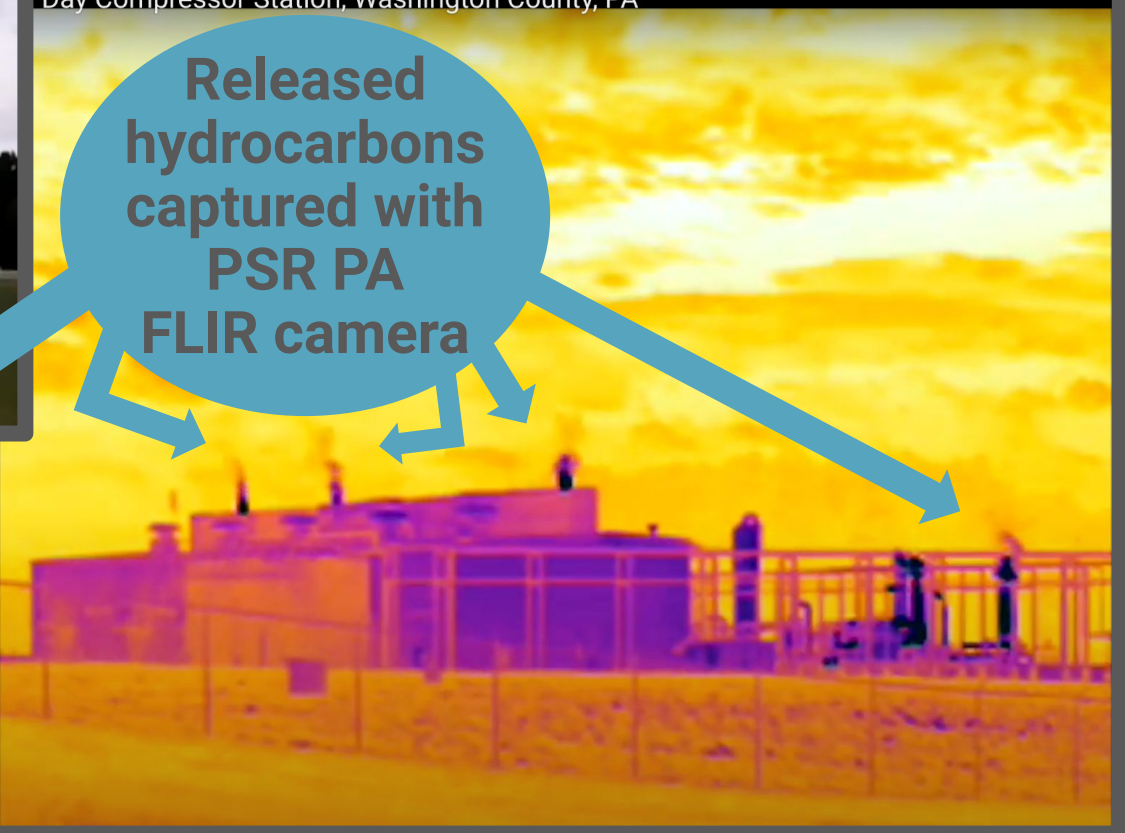
**99%** from fossil fuels

# Methane: The Thanos of GHGs



Day Compressor Station, Washington County, PA

Released hydrocarbons captured with PSR PA FLIR camera



# CCS Fails at Scale

**REUTERS** World Business Markets Breakingviews Video

ENVIRONMENT AUGUST 6, 2020 / 7:45 PM / UPDATED 3 YEARS AGO

## Problems plagued U.S. CO2 capture project before shutdown: document

By Nichola Groom 3 MIN READ

**SCIENTIFIC AMERICAN** Latest Issues Sign In | Newsletters

COVID Health Mind & Brain Environment Technology Space & Physics Video Podcasts Opinion

Go Digital! **Save 25%**

CLIMATE CHANGE

## Pipelines Touted as Carbon Capture Solution Spark Uncertainty and Opposition

Federal investment in carbon capture could help fight climate change, but this technology is facing fierce opposition

**Bloomberg** US Edition Sign In Subscribe

Live Now Markets Economics Industries Tech AI Politics Wealth Pursuits Opinion Businessweek Equality **Green** CityLab Crypto More

Green Zero

## Carbon Capture Desperately Needs a Reality Check After Lost Decade

The technology is held up as indispensable for meeting climate goals even as deployments continue to disappoint.

Analysis NRG Carbon Capture and Storage Energy Investment Trends Texas United States

## The ill-fated Petra Nova CCS project: NRG Energy throws in the towel

October 05, 2022

## Gas giant's \$3.2b effort to bury carbon pollution is failing

**Peter Milne**  
November 13, 2022 – 5:27pm

**POLITICO** Enter keyword

## Billionaire rethinking new UK green investment after Sunak backs 'failed tech' carbon capture

Andrew Forrest accuses government of 'putting Britain's hopes [on] failed technology.'

BBB Accredited Business Advertise With Us Shop Local - We're Open for Business Download our Apps

**FOX 8 LOCAL FIRST**

News Live Video Hurricane Center Saltwater Intrusion Crime Weather Sports Investigations Español



**NewScientist** Sign in Enter search keywords

News Features Newsletters Podcasts Video Comment Culture Crosswords | This week's magazine

Health Space Physics Technology **Environment** Mind Humans Life Mathematics Chemistry Earth Society

**Environment**

## Most major carbon capture and storage projects haven't met targets

The majority of 13 flagship CCS schemes worldwide, representing 55 per cent of captured carbon dioxide, have either failed entirely or captured much less CO2 than expected

By Adam Vaughan

1 September 2022

f x in e m

ADVERTISEMENT

**SARGENTO** ALWAYS 100% REAL NATURAL CHEESE

## Water district investigates well failure, points to carbon capture project in Lake Maurepas

The Tangipahoa Water District said an implosion at one of its wells was caused by outside sources.

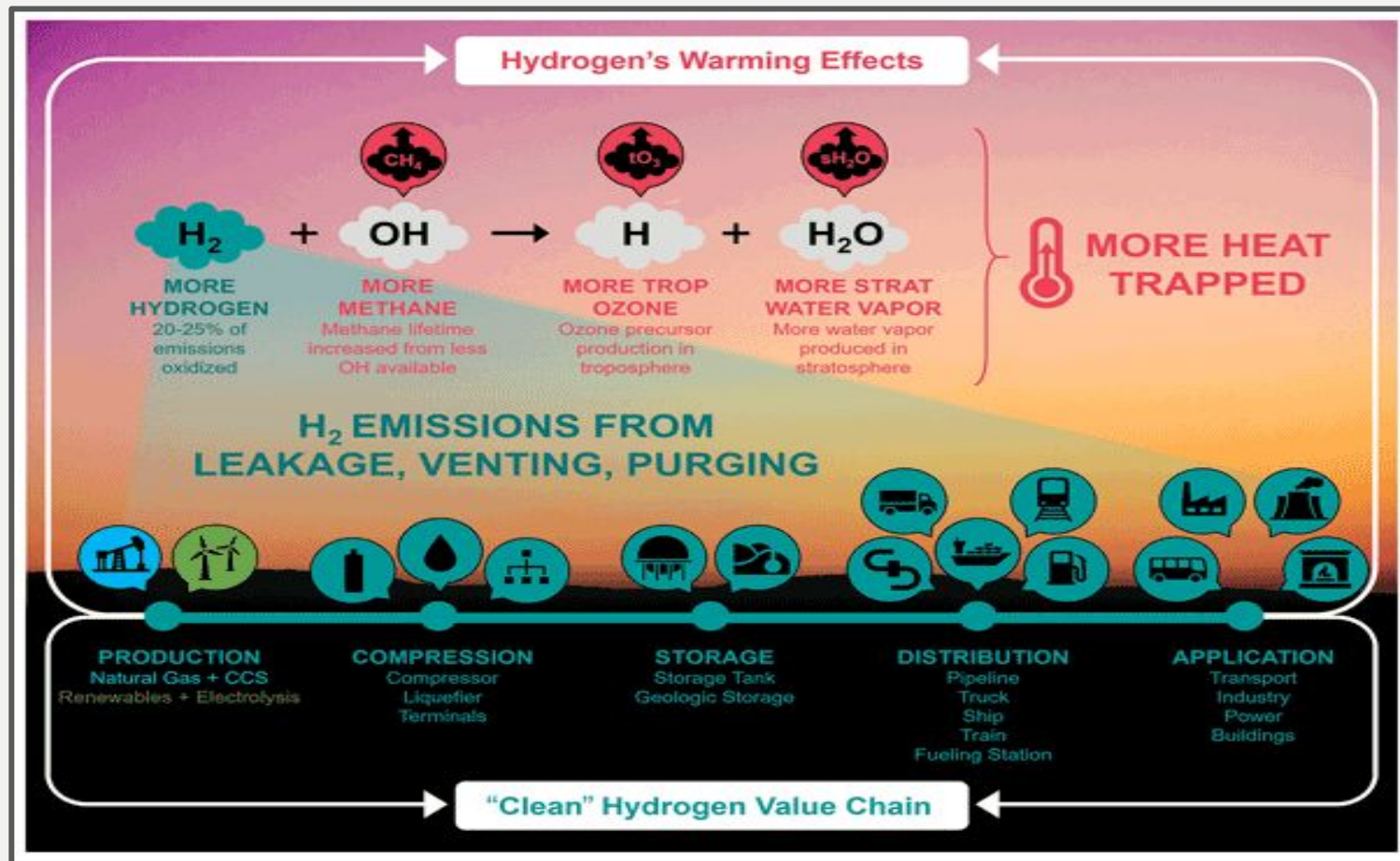
# Dangerous Tunnels



**Blue hydrogen  
is less efficient  
than just burning natural gas**



# An Indirect GHG



## CONCLUSION 1

**NO HYDROGEN  
PRODUCTION THAT  
INCREASES METHANE OR  
COAL DEPENDENCE**

## CONCLUSION 2

**ONLY GREEN HYDROGEN;  
ONLY FOR THE RIGHT  
INDUSTRIES, INCLUDING  
REPLACING CURRENT  
DEMAND**



# Hydrogen: The Ladder

Unavoidable



Uncompetitive

➔ **A**lready Dangerous

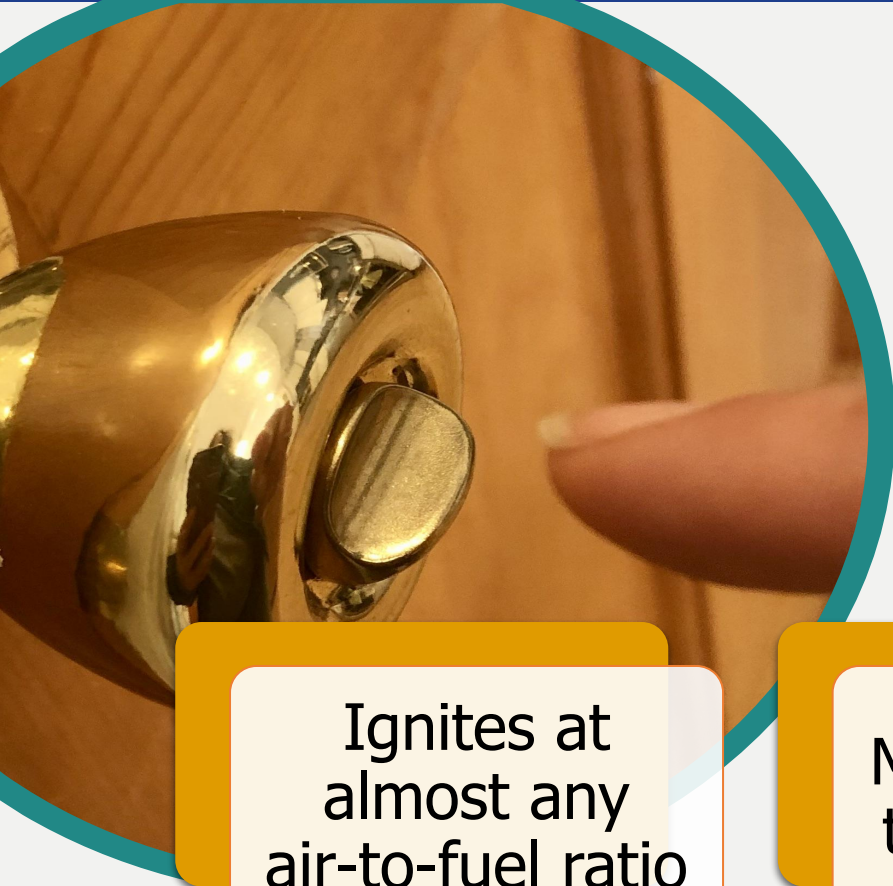
➔ **B**rittle Pipes

➔ **C**limate Backstep

➔ **D**elays Electrification

➔ **E**xpensive

## **Safety:** Hydrogen *SAFETY RISKS* Affect all Appliances:

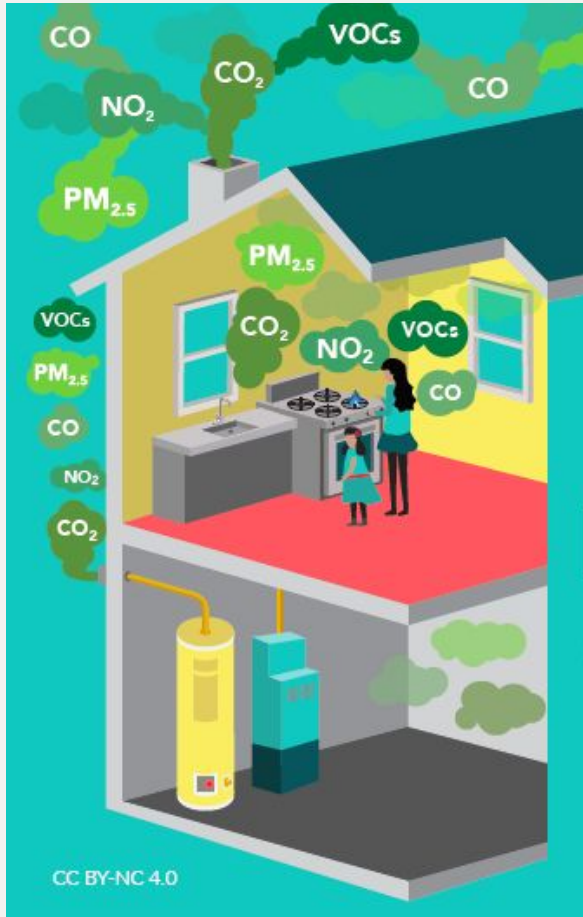


Ignites at  
almost any  
air-to-fuel ratio

More explosive  
than methane

Even a spark  
from static  
electricity or  
electronics

# 1. Already Dangerous



## Health: Hydrogen Blending Worsens Air Quality

- Production of hydrogen increases outdoor NO<sub>2</sub>
- Blending perpetuates indoor air pollution from gas stoves: Nitrogen dioxide, carbon monoxide, benzene.

# 1. Already Dangerous

## Fume Hoods and Gas Stoves Burning Fracked Gas

Improper ventilation with fume hoods are a danger to the health and safety of residents.

Fume hoods in kitchens with gas stoves should have efficient power to vent the toxins from uncombusted hydrocarbons and the toxins resulting from the combustion of hydrocarbons.

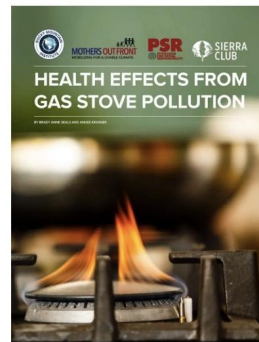
- Fumes should be vented to the OUTSIDE of the home.
- Fan driven vents under a microwave are not sufficient for gas stove use because they are not powerful enough to capture the emissions and they recirculate the toxins back into the home.
- What happens if they start blending Hydrogen into the gas stream?

## Health Effects from Gas Stove Pollution

May 5, 2020

A new report, coauthored by PSR, documents dangerous levels of indoor air pollution from gas stoves. The report presents scientific evidence that gas stoves release several hazardous pollutants, notably nitrogen dioxide and carbon monoxide.

Download



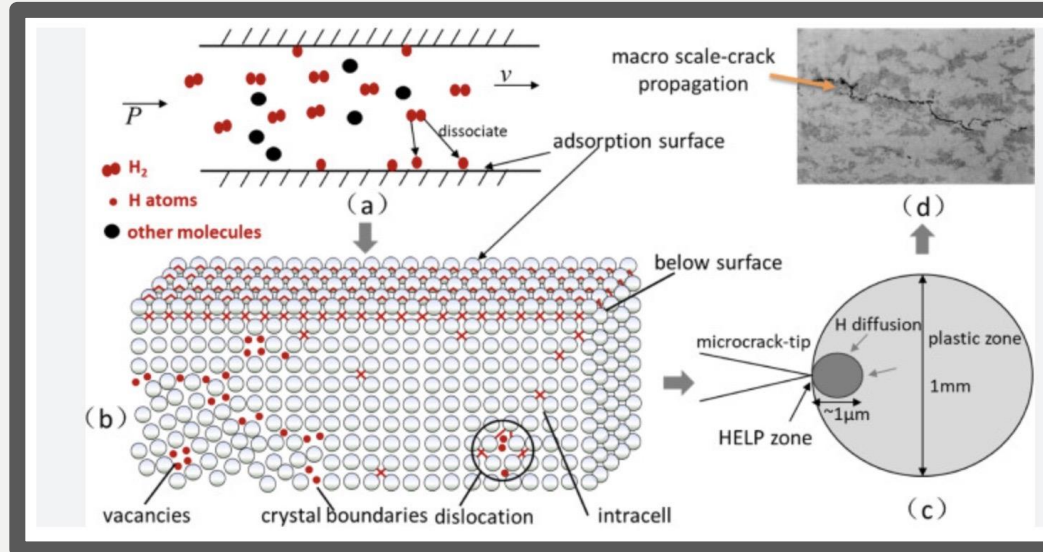
# 1. Already Dangerous

## Fume Hoods and Gas Stoves Burning Fracked Gas





# 2. Hydrogen Embrittlement



# 3. Climate Backstep

**20/80**

**Hydrogen/Methane  
blend**

**=**

**6-7%**

**GHG emissions  
reduction**

# 4. Delays Electrification

If you're an oil and gas company talking about hydrogen is kind of a two-way bet because if it works, then you're embedded in the hydrogen industry — but if it doesn't work, you've delayed the transition to the thing you don't make, which is electricity.

**So why wouldn't you promote hydrogen for inappropriate use?**



# 5. Expensive

Higher COSTS Magnify  
*Economic Injustice*

At blends above 20%, we must modify or replace all gas appliances:

Gas stoves, dryers, furnaces, water heaters, fireplaces...

# Philadelphia: A Case Study

**20/80**

**Hydrogen/Methane  
blend**

**=**

**6-7%**

**GHG emissions  
reduction**

# Health Disparities



Communities of Color continue to be exposed to more air pollution.



## Alternatives Exist: Use Your Electric Appliances

- Safer
- Healthier
- Reduce GHGs
- More efficient/less expensive to power
- Available now – you probably have many in your kitchen

# Key Takeaways

## Hydrogen in Pipes:

**A**lready Dangerous

**B**rittle Pipes

**C**limate Backstep

**D**elays Electrification

**E**xpensive

## Better Solutions:

1. **Build out renewable energy**
2. **Prioritize energy efficiency**
3. **Use green hydrogen only for hard-to-electrify industrial processes**
4. **Electrify homes: Use heat pumps for heating/cooling, and induction stoves for cooking**





# QUESTIONS?

Linnea Bond - [linnea@psrpa.org](mailto:linnea@psrpa.org)  
Chris DiGiulio - [chris@psrpa.org](mailto:chris@psrpa.org)

---

[www.psrpa.org](http://www.psrpa.org) | [info@psrpa.org](mailto:info@psrpa.org)