

NEW MEXICO WATER AND RESOURCES COMMITTEE: GREEN HYDROGEN



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Natural Resources Defense Council

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Outline

1. Federal policy context
2. Hydrogen Production
3. End Uses
4. State-level hydrogen policy

NRDC

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Massive federal support for hydrogen

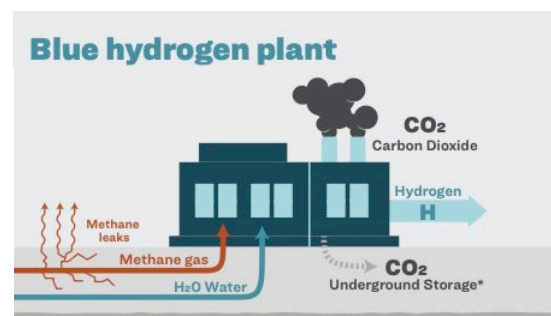
- Green Hydrogen Shot: \$1 per 1 kilogram in 1 decade ("1 1 1").
- IRA Production tax credit:
 - Up to \$3/kg for green hydrogen
 - \$0.60 - \$1 for blue depending on carbon intensity
- Hydrogen hubs
 - \$7bn for 6 -10 regional hubs
 - De-risking first-of-a-kind projects
 - At least 1 blue + 1 nuclear hub
- \$1bn Electrolyzer R&D funding
- NEW: \$1bn for demand-side measures



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Fossil-fueled Hydrogen Production

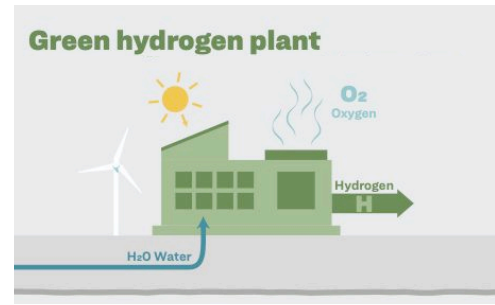
- >95% of hydrogen is currently made by Steam Methane Reforming (SMR) - converting natural gas and water to hydrogen, CO₂, and other local pollutants.
- **BLUE** hydrogen is SMR with Carbon Capture.
- Methane leaks, CO₂ capture rates, and local pollution must be monitored and controlled.
- Even in best case, not zero GHG emissions and prolongs fossil fuel pollution



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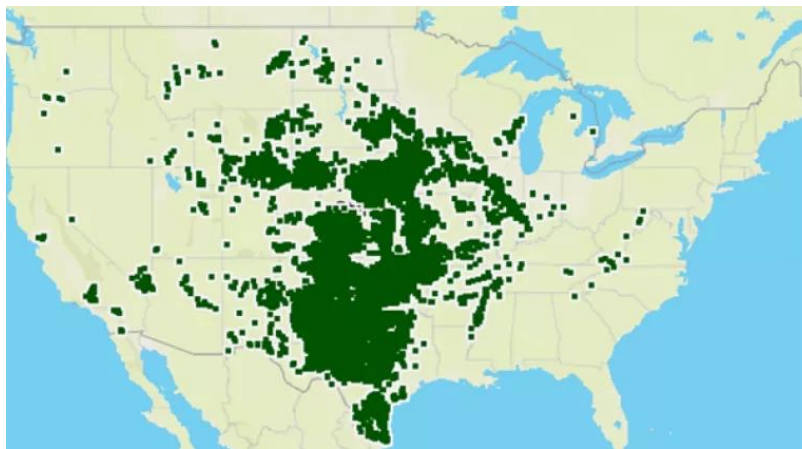
Electrolytic Hydrogen Production

- Electrolysis of water produces hydrogen and oxygen:
 - **GREEN** (renewables)
 - **PINK** (nuclear)
- Zero emissions *IF* powered by zero-carbon energy that meets **3 pillars**:
 - New (or curtailed)
 - Hourly Matched
 - On-site or delivered to the same load balancing area
- Risk of taking renewables from more efficient applications



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Green hydrogen already cost-competitive with fossil



Energy Innovation map showing U.S. locations where wind and solar prices average \$25/MWh or less, and where three-pillar compliant green hydrogen projects may be financially viable from day one. Credit: Energy Innovation

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Hydrogen can fuel nearly everything fossil fuels can

BUT
Just because you CAN doesn't mean you SHOULD – electrification is more efficient where possible

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Hydrogen is a potential solution for sectors with no better alternatives

Long-Distance Aviation

Long Distance Marine Shipping

Iron & Steel

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Hydrogen may stall climate progress and increase costs for Americans if it's not strategically deployed.

Green hydrogen takes over five times more energy to produce heat compared to electrification

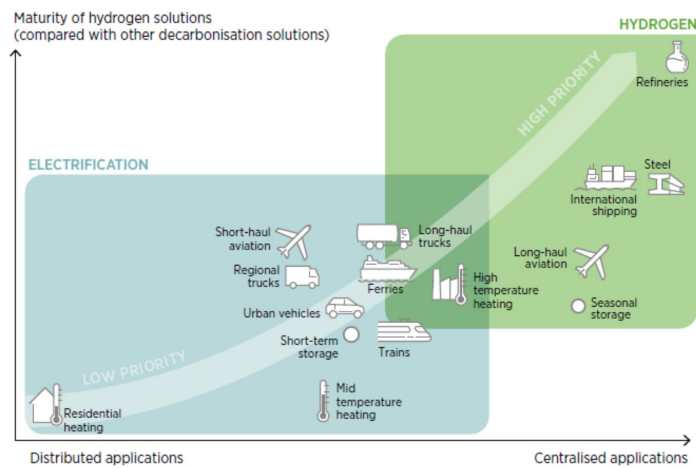
Number of wind turbines needed to cover heating demand in the UK where one symbol = 1,500 turbines



Source: Energy Monitor analysis of [Committee on Climate Change](#) and [Renewable UK](#) figures. This is illustrative for the UK assuming all gas used for heating is substituted with green hydrogen or using heat pumps. In reality not only wind power would be used to provide the electricity.

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There's strong consensus around "good" and "bad" hydrogen uses.



Source: International Renewable Energy Agency

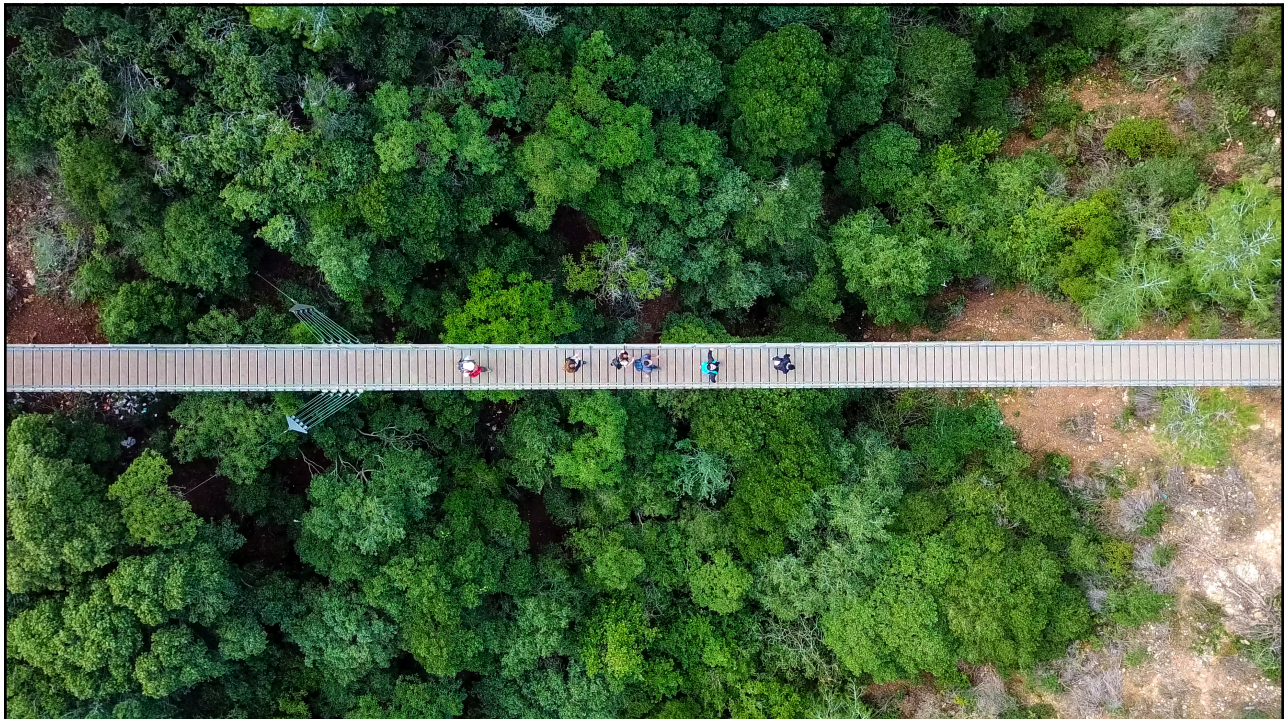
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State hydrogen policies



- Some states, such as CO, are passing their own incentives to encourage climate-aligned hydrogen development:
 - Aligned with 3 pillars by 2028 at the latest
 - Only high-value end uses (no cars or buildings)
 - Cumulative impacts studies to protect communities
- States must prioritize climate and community impacts when designing hydrogen policy

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Water use for hydrogen production

- Electrolytic hydrogen requires 9-10L of water per 1kg of hydrogen.
- SMR (gray) requires 4.5L water per kg for the chemical reaction, but taking into account processing, evaporation and steam losses, generally uses 15-40 L per kg. Increases to 18-44 L per kg with CCS (blue)
- Could potentially purify/desalinate brine or seawater for small incremental cost
- Water use is another reason not to use hydrogen in NM where we could use electricity
- 30 ton/day electrolyzer would use 0.5% of the water of San Juan Generating Station coal plant



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Hydrogen Leakage

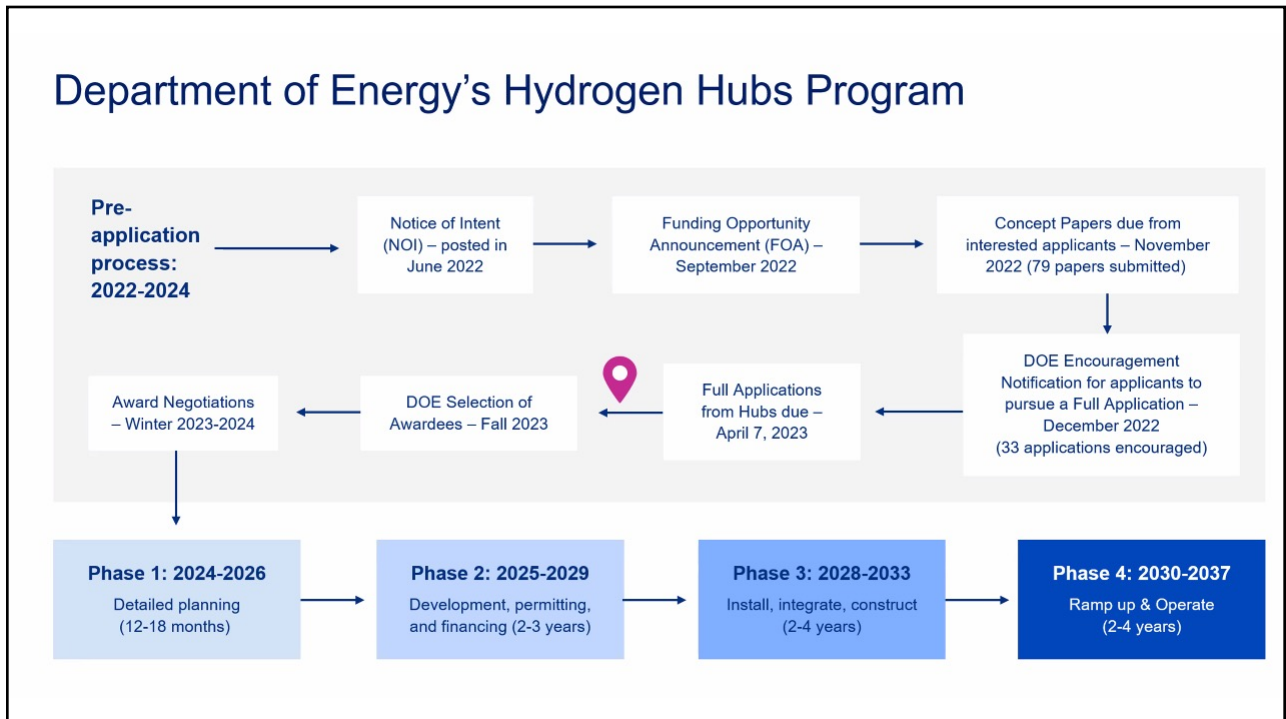
- Hydrogen leakage must be monitored and controlled along the full value chain due to both safety and climate concerns.
- Hydrogen has an indirect global warming effect, approximately **30-40 times** more potent than CO₂ per kg on a 20 year timeframe.
- If leakage is high, it will offset some or all of the climate benefit of using hydrogen at all.
- Appropriate infrastructure must be used to transport and store hydrogen - must account for how it can embrittle steel



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