Hydrogen! The Forgotten Energy Source?

Hydrogen does not appear on the list of energy sources available to generate electricity from the U.S. Energy Information Agency as shown on the table below; and yet, hydrogen is coming to the fore. The level of interest and the variety of explorations brings to mind – where there's smoke there's fire. Someone will figure this out.

The four articles that follow report the resurgence of interest in hydrogen as an energy source.

- **"A 'fairly simple' breakthrough makes accessing stored hydrogen more efficient" …**Science Daily, 2.10.2022.
- **"Clean Energy Breakthrough: Making Hydrogen Is Hard, but Researchers Just Solved a Major Hurdle"** …Science Tech Daily, 1.25.2021.
- **Hydrogen Brings New Hope to an Old Industry Titan…** The Wall Street Journal, 1.13.2022.
- **The biggest green hydrogen hub in the US could be coming soon to Mississippi**… CANARY MEDIA, 10.19.2021.

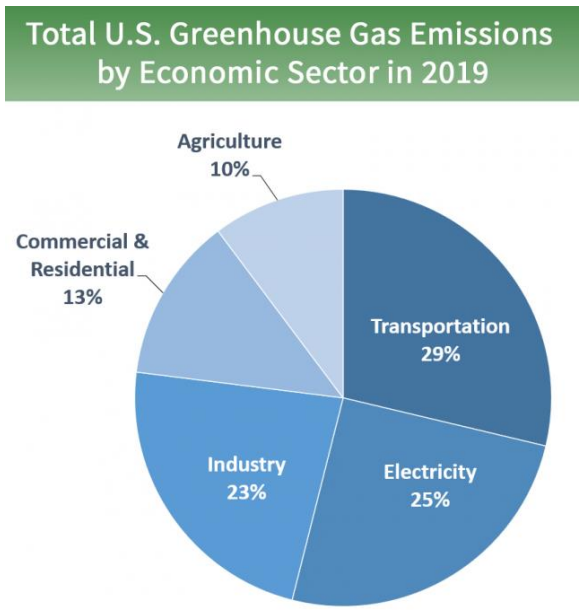
The conclusions from these four sources are:

- "A new catalyst from the U.S. Department of Energy's Ames Laboratory and collaborators extracts hydrogen from hydrogen storage materials easily and efficiently."
- "Hydrogen fuel is one potential solution in the nationwide effort to decrease reliance on fossil fuels."
- "One of the ways to store hydrogen is chemically."
- "There are currently several other dehydrogenation methods, but each has its challenges."
- "Thyssenkrupp Nucera has long been making chlorine electrolyzers, which generate hydrogen as a byproduct. A product redesign means its existing facilities can now crank out one gigawatt annually of green-hydrogen electrolyzers at competitive costs to be installed and serviced by its existing network."
- "For decades, researchers around the world have searched for ways to use solar power to generate the key reaction for producing hydrogen as a clean energy source — splitting water molecules to form hydrogen and oxygen. However, such efforts have mostly failed because doing it well was too costly, and trying to do it at a low cost led to poor performance. Now, researchers from The University of Texas at Austin have found a low-cost way to solve one half of the equation, using sunlight to efficiently split off oxygen molecules from water."
- "The United States could see its biggest green hydrogen hub by far up and running in Mississippi by 2025 — if a team of former natural-gas storage developers and a major Canadian energy infrastructure developer can pull off their plans. On Tuesday, Hy Stor Energy announced that it intends to build a green hydrogen production and storage complex that could match the large size of such projects being constructed in Europe. By 2025, the first phase of the project could be making 110,000 metric tons of green hydrogen per year and storing more than 70,000 metric tons of it in underground salt caverns. "

wck.

A Reminder…The sources of greenhouse gases can be grouped into five categories:

- **Transportation** is the biggest, perhaps electric vehicles will reduce this number, over time. Hydrogen is still on the list.
- **Electricity generation** is second. The chart below shows the contribution of renewable sources to the generation of electricity.
- **Industrial greenhouse gas emissions** primarily come from burning fossil fuels for energy, as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials.
- **Commercial and residential construction** accounts for 13% of GHG emissions. Local codes addressing materials, methods and waste can reduce this number.



Source: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

- **Agriculture** greenhouse gas emissions come from livestock such as cows, agricultural soils, and rice production. Human dietary changes such as the shift to plant based "meats" makes a difference.

Local actions, actions by small cites and towns can affect all five sources of greenhouse gas emissions.
Source: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

Energy Sources of Electric Generation 2020

- **Natural Gas:** about 40% - of U.S. electricity generation in 2020.
- **Nuclear:** about 20% of U.S. electricity generation in 2020.
- **Coal:** the third-largest energy source for U.S. electricity generation in 2020 -about 19%.
- **Petroleum:** less than 1% of U.S. electricity generation in 2020.
- **Renewables:** the source of about 20% of total U.S. electricity generation in 2020.
  - **wind:** 8.4%
  - **hydroelectric:** 7.3%
  - **solar:** 2.3%
  - **biomass:** 1.4%
  - **geothermal:** 0.5%

Source: www.EIA.gov

WHAT ABOUT HYDROGEN?