Impacts of Hydrogen on Public Health, Water, and Climate

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What is hydrogen?

Hydrogen (H_2) is the most abundant chemical element and a building block of common liquids and gasses like water (H_2O) and methane (CH_4). [1] To be useful as fuel, hydrogen has to be split from these molecules. Different energy resources can split the molecules. The type of energy used determines the impact it has on our communities. [2] A "Hydrogen rainbow" is often used to explain these types:

Green

Uses surplus solar & wind to split water into its molecular parts- hydrogen and oxygen.

Pink

Uses nuclear energy to split water into hydrogen and oxygen.

Blue

Uses natural gas to bring together methane & water to produce hydrogen and the by-product carbon dioxide, which is then captured and stored.

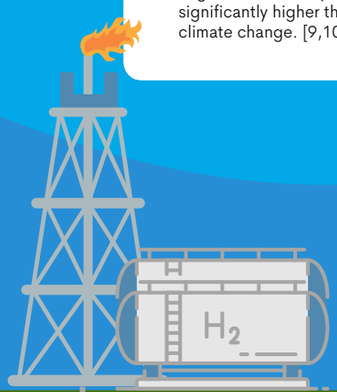
Gray

Uses the same methods as blue hydrogen **without effort to capture the carbon by-product.**

Gray is currently the most common form of hydrogen production. However, there is industry interest in bringing blue hydrogen into Appalachia to make use of the region's abundant natural gas and fossil fuel infrastructure. [3] The introduction of blue hydrogen will increase the demand for natural gas, and therefore, hydraulic fracking. The fracking process uses a mix of chemicals injected into the ground to fracture the geology and capture methane which generates a radioactive waste byproduct. Infrastructure for blue hydrogen would require the construction of hundreds of miles of pipelines to transport and sequester carbon underground. In addition to being free of emissions, green hydrogen will soon be less expensive than blue and can be manufactured in sufficient quantities to meet all likely needs. [4] From source to product, the blue hydrogen lifecycle puts our health, water, climate, and communities at risk.

Air & Climate Impacts

Blue hydrogen contributes to air pollution and climate impacts. Fracking releases methane, a potent greenhouse gas, which also leaks during the hydrogen production process. [5] The capture and storage of the carbon dioxide by-product uses unproven technology, would raise electricity costs, and produce additional pollution from leaks. [6] Research suggests that blue H_2 has a carbon footprint that is 20% larger than natural (shale) gas and coal and 60% larger than diesel oil when used for heat. Emissions from the oil and gas supply chain are significantly higher than those assumed by the Department of Energy. [7,8] Burning fossil fuels (i.e. coal, oil, and gas) is the primary cause of climate change. [9,10] To avoid the worst impacts of climate change, there can be no new fossil fuel infrastructure developed. [11]



Environmental Justice Impacts

Increased blue hydrogen production will exacerbate the health risks and damages to local economies [12] associated with fracking operations in our region. Communities in north-central WV are disproportionately impacted by public health concerns associated with exposure to gas production, waste and by-products. Post-hydrogen production, the carbon by-product must be captured and stored to be considered "blue." Carbon capture and storage (CCS) will drive up electric bills and pose direct pollution risks for the communities where hydrogen production occurs. [13,14] The most extreme impacts of fossil fuel infrastructure, from fracking to CCS are often localized to low-income communities and communities of color. [15,16]

Health Impacts

Blue hydrogen's dependence on natural gas leads to increased fracking and public exposure to dangerous chemicals. The chemicals used in fracking operations are considered proprietary, or trade secret, however studies show that these chemicals can include toxic substances such as PFAS and radioactive waste byproducts that are hazardous to public health. [17] These chemicals are known to be toxic and damaging to human health in even tiny concentrations, but currently industry isn't required to report the amount or types of PFAS used. Fracking also creates ethane – the building blocks of plastic production. Every stage of the plastics lifecycle is hazardous to human health, from exposure to chemicals involved in production to the plastic particles. Counties with fracking have higher cancer risks; 100% of counties with fracking (WV, OH, and PA) have a greater than one in one million cancer risk, while less than 8% of other US counties have that same risk level. [18]

Water Impacts

Fracking creates radioactive waste that is most often injected and stored underground or in landfills creating risk of leakage into the watershed. [19] Transport of fracking chemicals and waste products can lead to accidents and spills contaminating surface or groundwater. [20] Moreover, methane infiltration from hydrocarbon wells into aquifers can further degrade the local watershed and drinking water sources, pose a combustion risk, and precede the presence of volatile organic compounds in the leakage. [21] Large-scale hydrogen production, also known as a "hydrogen hub," would require extensive infrastructure, including pipelines and carbon injection wells, which causes significant earth disturbance and comes with a host of water quality threats, such as stream crossings and erosion during construction.

What can you do?

Before West Virginia volunteers to be the next hydrogen hub, we need to consider the potential impacts to our health, water, climate, and communities. We must advocate for increased protections for our communities as fracking is exempt from many environmental regulations. We can support public health initiatives such as the classification of fracking chemicals and waste as hazardous waste. We can also advocate for a just economic transition by supporting industries that create jobs in renewable energy. We will keep the public updated as plans for blue hydrogen development in West Virginia move forward.

Sources & Additional Reading:

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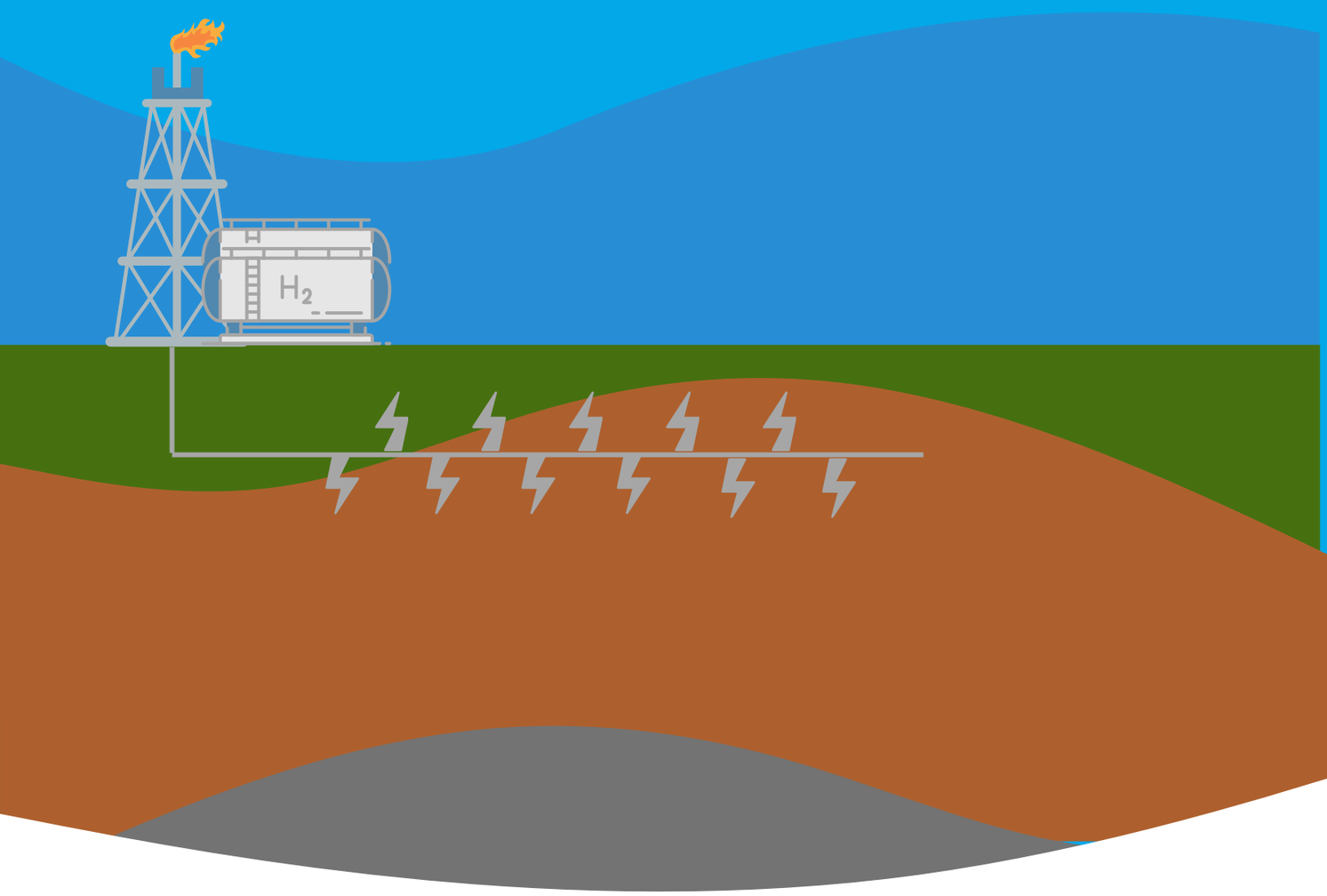

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