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Hydrogen's Next Frontier... Underground

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In January 2025, the United States Geological Survey (USGS) published a map estimating the potential geologic hydrogen reserves nationwide. One of the brightest spots on that map was at the heart of America's manufacturing sector: Michigan. Before publication, geologic hydrogen was widely unknown in energy policy circles and had never even been mentioned in a Federal budget request or law. With the release of the USGS's modeling, geologic hydrogen was thrust into the spotlight – and policymakers in Washington and beyond began to take notice.

These newly discovered natural resources could have tremendous economic benefits for Michiganders, but state-level policymakers need support to understand the complexities of extracting and delivering geologic hydrogen and fully capitalize on estimated reserves. Since the release of the USGS map, Third Way has worked closely with Michiganders to help the state become a leading producer of this cheap, abundant, clean resource. That effort culminated in January 2026 when Michigan Governor Gretchen Whitmer signed a new executive directive to explore how the state can gain an early lead in the race to commercialize geologic hydrogen.

Geologic hydrogen could be hugely impactful in Michigan. And, at a more macro level, it offers a new opportunity to support America's economic growth and solidify US leadership as a global energy innovator and exporter.

What Is Geologic Hydrogen?

Like other forms of hydrogen, geologic hydrogen is more energy-dense than oil or natural gas but produces water as a byproduct instead of harmful greenhouse gases. It can provide a clean alternative to using fossil fuels in hard-to-electrify sectors, such as heavy industry and key transport sectors, including aviation and shipping. Geologic hydrogen is found naturally in underground rock formations, due to interactions between water and either iron-rich rocks or the Earth's natural radiation. Hydrogen can be simply extracted like other naturally produced gases, or its production can be stimulated using subsurface engineering techniques already used by geothermal and mining sectors, such as injecting water into the subsurface to trigger reactions with iron-rich rocks.

Today, geologic hydrogen is a largely untapped resource. However, if commercialized, geologic hydrogen would be the first new form of primary energy on the planet in nearly a century. But bringing this "new" resource to market doesn't mean developing an entire industry and workforce from scratch. Players in the emerging geologic hydrogen space could, following greater research into the viability of geologic hydrogen in US markets, leverage existing strategies, expertise, and data from the mining, geothermal, and fossil fuel industries to accelerate development and deployment. But going from an untapped

resource to commercial operations is costly. To cultivate geologic hydrogen as a marketable resource and as a viable industry in the United States, policymakers need to provide support, from research to commercialization and deployment.

Why Should Policymakers Care About Geologic Hydrogen?

Affordability

As mentioned earlier, the cost of commercializing geologic hydrogen may be steep and requires policymaker support. However, the potential dividends of investing in geologic hydrogen are enormous.

Hydrogen is a crucial feedstock for a range of processes and products, including ammonia for fertilizers, petrochemical refining for diesel and jet fuel production, critical mineral refining, plastics, pharmaceuticals, etc. Most of the hydrogen in the United States is made by combining methane with steam and producing hydrogen along with carbon dioxide and carbon monoxide through the ensuing chemical reaction. That process, known as steam methane reforming, is currently the cheapest method of hydrogen production, but it also produces a significant amount of harmful emissions. Geologic hydrogen could provide a cleaner source of hydrogen for synthetic fuels, agriculture, steel production and other industries. Studies show it could eventually be cost-competitive with steam methane reforming and help lower the cost of hydrogen-derived products made in the US.

Competitiveness

China and Russia have already begun exploring their domestic geologic hydrogen resource potential, signalling early interest in this resource as a ubiquitous industrial feedstock and a source of firm power. If their previous efforts to develop and deploy advanced nuclear and exploit critical mineral reserves are any indication, both countries are committed to aggressively expanding their foothold in next-generation energy technologies and, in turn, turning that energy dominance into global influence. Prohibiting the growth of Russian and Chinese influence in geologic hydrogen is paramount to protecting America's position on the global stage. While the US has its own geologic hydrogen ventures in both the private and public sectors, current investment isn't enough to secure US leadership.

On top of its domestic applications, geologic hydrogen could be a lucrative export for the US, given its potential to be cheap, abundant, and clean enough to compete in growing markets around the world. International demand for low-carbon hydrogen products, such as ammonia, is set to increase. For example, the implementation of a Carbon Border

Adjustment Mechanism (CBAM) in the EU is driving up demand for low-carbon ammonia as a fertilizer import. In South Korea and Japan, low-carbon ammonia is in high demand as a major energy carrier to be used to fuel and decarbonize their power and maritime shipping sectors. Should the United States fail to meet growing demand for cleaner hydrogen, we risk ceding lucrative markets and international influence to Russia and China.

While still in its infancy, these global demand signals indicate geologic hydrogen's potential as a billion-dollar industry at home and abroad.

Michigan's Geologic Hydrogen Initiative

To grow support for US investment in geologic hydrogen, Third Way hosted a small convening in Ypsilanti, Michigan, in September 2025, focused on the potential opportunities for geologic hydrogen exploration within Michigan. Participants, including subject matter experts from several state agencies, federal policy experts, and industry representatives, discussed coordination between stakeholders who would support near-term geologic hydrogen research. Everyone in attendance wanted to ensure that any geologic hydrogen pursuits in Michigan, and the US more broadly, maximize opportunities and minimize harms.

These conversations informed Michigan Governor Gretchen Whitmer's recently signed executive directive to establish the Michigan Geologic Hydrogen Exploration and Preparedness Initiative, which kick-started a statewide effort to explore the technicalities, economics, legal landscape, and opportunities for developing a thriving geologic hydrogen economy in Michigan.

Key takeaways from the Ypsilanti convening include:

- **Invest in pre-competitive research:** There is a wealth of mining and other forms of subsurface data at various state government departments that hasn't been looked at for decades and is not readily available, nor consolidated, in order to better characterize the subsurface for geologic hydrogen. In the near-term, Michigan can focus on collecting new geologic data in collaboration with public research institutions, as well as retooling existing geologic data from legacy industries and digitizing existing printed data. This data can then be made publicly available and used to funnel early-movers to build projects in Michigan.
- **Establish clear permitting and regulatory frameworks:** Venture capital, which is likely to play an outsized role in funding early projects, demands expedience and assurance when it comes to building a pilot project. Definitive guidance on topics

related to well classification, land leasing, and permitting will attract more private capital at a time when federal funding is limited.

- **Be prepared, not prescriptive, when it comes to offtake:** There are too many unknowns when it comes to geologic hydrogen in Michigan to accurately predict all offtake pathways. Factors such as the purity of geologic hydrogen in Michigan's subsurface, locations of natural hydrogen reservoirs, the most suitable spots to produce stimulated hydrogen, the environmental impact of extraction, etc., will determine which sectors will be the most suitable offtakers for Michigan's geologic hydrogen. While waiting for more data to isolate specific offtake pathways for geologic hydrogen, Michigan can still work on identifying industries where geologic hydrogen remains a high-value proposition regardless of its purity.

Third Way's convening played a critical role in moving the geological hydrogen conversation in Michigan from a theoretical map to a state government initiative. A significant amount of research, coordination, investment, and policy support will still be needed to unlock the potential of this new resource. But given the economic and security value a successful geologic hydrogen industry could bring to Michigan and the US, the effort is well worth it.

A more in-depth readout of our convening is available here.