CAN FOSSIL GAS INFRASTRUCTURE BE CONVERTED TO EXTEND ITS LIFESPAN?

RECLAIM Finance

Converting fossil gas infrastructure to prevent stranded assets is a largely fallacious argument for maintaining an energy system dependent on fossil gas. Most fossil gas infrastructure is unsuitable for use with other gases, which means any conversion would require substantial investment, making it unrealistic. The only possible exception is the conversion to hydrogen of certain long-term geological storage sites and long-distance transport pipelines for use in the decarbonization of "hard-to-abate" sectors. But in all cases, no new gas infrastructure can be justified on the grounds of future conversion for use with other energies.

New fossil gas infrastructure could turn into stranded assets when gas demand falls. In light of this, the question arises as to whether these assets could be converted to run on other energy sources and still be useful for the transition. But what is the reality?

1. GAS INDUSTRY MYTHS

The gas industry currently presents hydrogen and biogas as credible solutions for the conversion of fossil gas infrastructure in order to justify the construction of new fossil gas developments.

However, no new fossil gas infrastructure should be built in anticipation of conversion to hydrogen or biogas. There are a number of reasons for this. Primarily, the energy volumes of hydrogen, biogas and biomethane projected for 2050 (6 Exajoules (EJ) for hydrogen and 15 EJ for gaseous bioenergy, i.e. biogas and biomethane) are very low compared with current fossil gas energy volumes (145 EJ). Consequently, the infrastructure requirements for these energies will be significantly lower.

The gas industry is also encouraging the development of "blending", i.e. the mixing of fossil gas with another so-called blended gas (most often hydrogen or biomethane, a biogas derivative). It presents this as a solution for gradual decarbonization, enabling existing infrastructure to continue to be used without major modifications.

In reality, the sole aim of blending is to perpetuate an energy system dependent on fossil gas. Greenhouse gas emissions are reduced less using this technique than through the construction of infrastructure running solely on blended gas (hydrogen or biomethane).[1] At the same time, in the case of hydrogen, it does not allow the gas used for blending to be directed towards priority uses.

1. Fraunhofer Institute, The limitations of hydrogen blending in the European gas grid, 2022

2. BIOGAS: THE UNNECESSARY CONVERSION OF GAS INFRASTRUCTURE

Biogas, produced by the fermentation of organic matter, can be used for heat, electricity, or purified into biomethane for applications similar to fossil gas.

But the industrial development of biogas is detrimental to agricultural land, human health, ecosystems, and biodiversity. It has no benefits in terms of climate change mitigation, and is not a sustainable energy source.[2] It is therefore pointless to convert existing gas infrastructure for use with biogas, and it is unjustifiable to build new gas infrastructure in anticipation of future biogas use.

3. HYDROGEN: ONLY LIMITED POTENTIAL FOR THE CONVERSION OF FOSSIL GAS INFRASTRUCTURE

a. A limited supply of sustainable hydrogen

Hydrogen is a gas with very different physical-chemical properties to fossil gas. This means that gas infrastructure will have to be substantially modified for use with hydrogen. Today, small volumes of "green" hydrogen are produced by electrolysis of water powered by electricity from renewable sources, which is the only sustainable hydrogen production method available. This "green" hydrogen will remain available only in small quantities by 2050,[3] and should be reserved for the decarbonization of "hard-to-abate" sectors such as steel production and shipping. Gas-fired power plants and fossil gas distribution networks not connected to these sectors should not be converted to hydrogen.

b. Conversion of long-term storage infrastructure

As part of the effort to decarbonize "hard-to-abate" sectors, certain conversions may be viable to address the issues of long-term storage and long-distance transport of hydrogen.

For instance, in sectors where hydrogen plays a crucial role in decarbonization, long-term hydrogen storage is essential to guarantee secure supply. Salt caverns and depleted oil and gas reservoirs used for fossil gas storage could be converted for use with hydrogen,[4] particularly if they are located close to hydrogen-intensive sites such as industrial complexes.

c. Infrastructure conversion for long-distance transportation

In the case of hydrogen, long-distance transportation will become crucial, as profitable production areas, such as sunny, windy regions, are often far from the demand centres located in industrialized and emerging countries.[5] Converting existing fossil gas pipelines for use with hydrogen between regions is the most economical method, and should be encouraged.[6] However, long-distance hydrogen transportation must not be co-opted by rich countries to import green hydrogen produced in emerging and developing economies (EMDEs) on a massive scale, to the detriment of these countries' energy security and energy transition.

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2. Reclaim Finance, Factsheet - Bioenergy, 2024
3. International Energy Agency, World Energy Outlook 2023, 2023
   See the NZE Scenario p.276: "Unabated natural gas" in 2022 vs. "Hydrogen" in 2050. Note that only 78% of the hydrogen produced in the NZE Scenario is by electrolysis of water, which reduces the energy volume of sustainable hydrogen produced in this scenario.
4. International Energy Agency, Global Hydrogen Review 2023, 2023
5. Ibid.
6. International Energy Agency, Global Hydrogen Review 2022, 2022

Lastly, the conversion of liquefied natural gas (LNG) terminals to transport liquefied hydrogen over long distances presents enormous technical challenges that translate into prohibitive costs, making this option economically unviable[7] – even when terminals are designed for easy conversion to hydrogen.

Neither is the conversion and reconversion of hydrogen into its derivatives[8] economically viable, since transforming hydrogen into its derivatives, and then its derivatives back into hydrogen, entails significant energy losses of 30-40%.[9]

7. Fraunhofer Institute, Conversion of LNG Terminals for Liquid Hydrogen or Ammonia, 2022
8. Ammonia, methanol, and liquid organic hydrogen carriers (LOHCs) are chemical derivatives of hydrogen with less restrictive physical and chemical properties that make them easier to transport and store.
9. International Energy Agency (IEA), Global Hydrogen Review 2022, 2022

RECOMMENDATIONS

Reclaim Finance calls on financial institutions not to present fossil gas as a transitional energy source and to commit to a complete short-term halt to all financial services that support fossil gas expansion across its value chain, including in the power generation sector. This includes an immediate halt to all support for new gas fields and liquefied natural gas (LNG) export terminals, as well as to the companies developing them.

Click here to consult our detailed recommendations for financial institutions.