

Supplementary Methods

I. Pollutants taken into consideration:

GTP100: Bromopropane, butane, carbon dioxide, chloroform, dinitrogen monoxide, ethane, hydrogen, methane, monochloroethane, nitrogen fluoride, propane, sulfur hexafluoride, tetrachloroethylene, trichloroethylene

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II. Calculations

1. Carbon Sequestration electricity input

Based on Case 2 from the finding of Lewis et al (2022)

Total H₂ = 20125 kg/hr

Total CO₂ = 54593 kg/hr

Total CO₂ captured = 52,502 kg/hr (96.2%)

CO₂ capture electricity input = 6,710 kWe

CO₂ compression electricity input = 16,460 kWe

Total power used for carbon capture and compression kWe

= CO₂ Capture/ Removal Auxiliaries + CO₂ compression

= 6,710 kWe + 16,460 kWe = 23170 kWe

Power required for CO₂ capture per kg of H₂

= Total power used for carbon capture and compression KWe/ hydrogen production kg/hr

= 23170/20125

= **1.15 kWh/kgH₂**

Supplementary References

Lewis, E., McNaul, S., Jamieson, M., Henriksen, M.S., Matthews, H. S., Walsh, L., Grove, J., Shultz, T., Skone, T. J., Stevens, R. Comparison of Commercial, State-of-the-Art, Fossil-Based Hydrogen Production Technologies. National Energy Technology Laboratory. <https://doi.org/10.2172/1862910> (2022).