

Techno-economic comparison for productions of hydrogen and synthetic methane from Australian wheat straw

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One in six deaths worldwide in 2019 was related to pollution, according to the most recent review in The Lancet [1]. Air pollution is entwined with climate change because the emissions driving both development problems come largely from the same sources --- fossil fuel or biofuel burning [1]. The annual global production of agricultural biomass residues is around 140 Gt, predominantly stalks, leaves, roots, fruit peels, hulls, and shells, are normally discarded or burned. Only in the financial year of 2019-2020, Australia produced 17.55 Mt of wheat and approximately 22.82 Mt of wheat straw [2]. The current utilization of agricultural crop residues and wastes presents significant environmental and management issues [3]; however, they are potential feedstocks for a variety of products ranging from the production of fuels to new materials. The present project utilizes techno-economic assessment (TEA) tools to explore the economic feasibility for productions of hydrogen and methane from Australian wheat straw biomass based in Victoria, via the comparison of costs in construction, operation, and taxes, etc. to fulfill the requirements of clean and renewable energy. Preliminary results will be presented.

- [1]. Fuller, R., et al., *Pollution and health: a progress update*. The Lancet Planetary Health, 2022.
- [2]. Song, J., et al., *Quantitative Estimation of Biomass Energy and Evaluation of Biomass Utilization - A Case Study of Jilin Province, China*. Journal of Sustainable Development, 2013. **6**(6).
- [3]. Tripathi, N., et al., *Biomass waste utilisation in low-carbon products: harnessing a major potential resource*. npj Climate and Atmospheric Science, 2019. **2**(1): p. 35.