Technoeconomic Assessment of New Methanation Unit (CO_2 and Green H_2)

Challenge:

- Excess CO_2 from the Acid Gas Removal Unit (AGRU) at the Oman LNG plant in Sur is being vented or under-utilized, representing both an environmental liability and lost economic opportunity.

Objective:

- Harness and repurpose this excess CO_2 stream to produce high-value petrochemicals—namely methanol (MeOH), ammonia (NH_3) and urea—thereby turning a waste stream into a revenue-generating resource.

Insights:

- Phase 1: Comprehensive literature & technology review to benchmark existing CO_2 capture and conversion methods.
- Phase 2: Development & validation of a detailed process model for CO_2 utilization tailored to the Sur plant's conditions.
- Comparative techno-economic and life-cycle analysis of MeOH, NH_3 and urea production scenarios.
- Identification of the optimal product blend that maximizes both profitability and emissions reduction.

Impact:

- Demonstrated a pathway to both economic viability and environmental responsibility by valorizing a CO_2 waste stream.
- Bridged the gap between sustainability and profitability, setting a precedent for future CO_2-utilization projects in the region.
- Highlighted the importance of innovation in achieving Oman's ambitions for cleaner, more circular petrochemical production.

For more details, please refer to Oman LNG 2022 Sustainability Report (page 44):

https://omanlng.co.om/Style%20Library/assets/pdf/publication/Oman%20LNG%202022%20Sustainability%20Report.pdf

Dr. Nader Mosavat