Large Scale, Low Emission Production of Hydrogen Fuel

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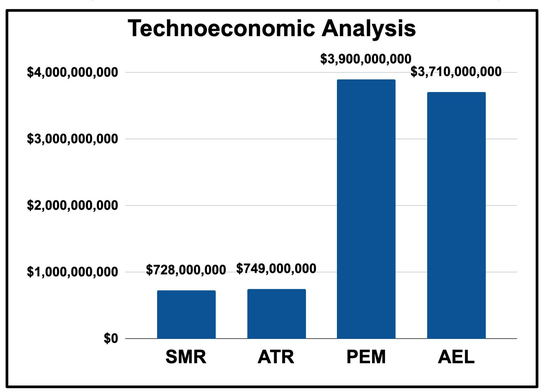
1. Motivation and Goals

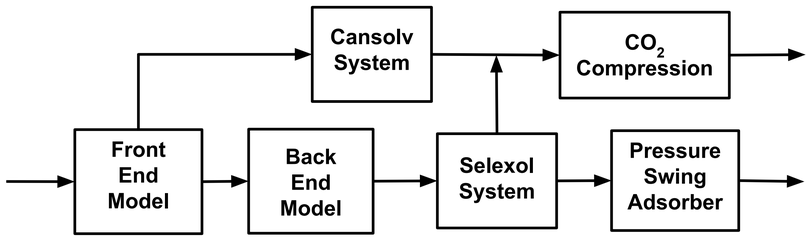
- Replace the fuel for an ethane cracker to lower emissions by 90%.
- Design a hydrogen plant to produce 1,800 MT H_2/day.

2. Initial Research

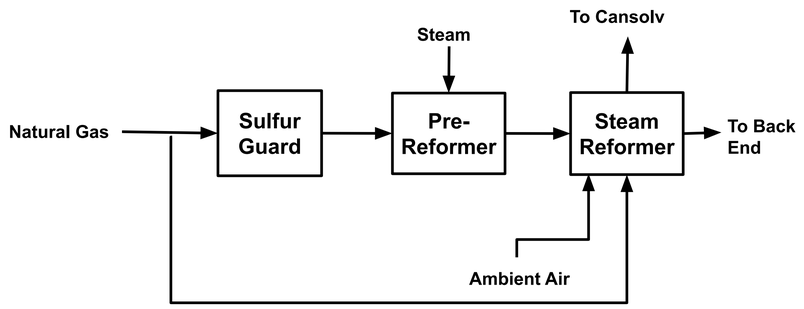
- 4 Hydrogen Production Methods
  - Steam Methane Reforming (SMR)
  - Autothermal Reforming (ATR)
  - Alkaline Electrolysis (AEL)
  - Permeable Membrane Electrolysis (PEM)
- Production Method Capability
  - SMR can meet goals
  - ATR can meet goals
  - AEL and PEM cannot reach 1,800 MT/day
- Why Choose SMR Method?
  - Costing, Research, and Capability!



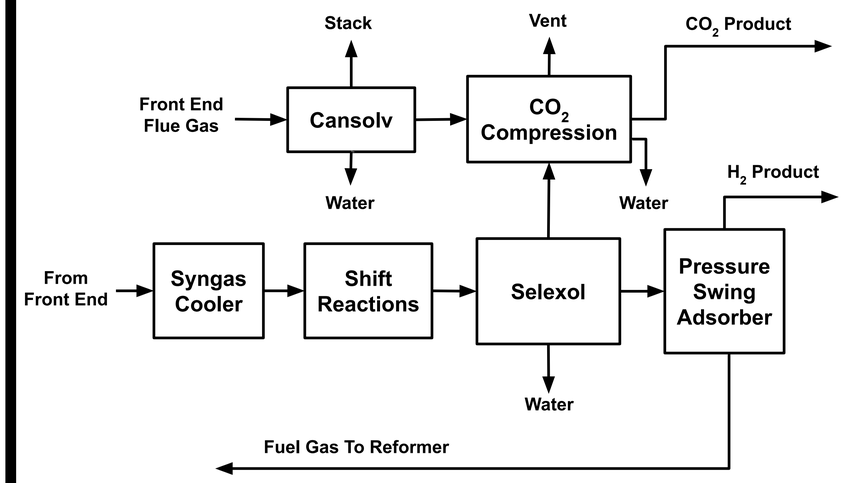
3. Process Overview



Front End Model

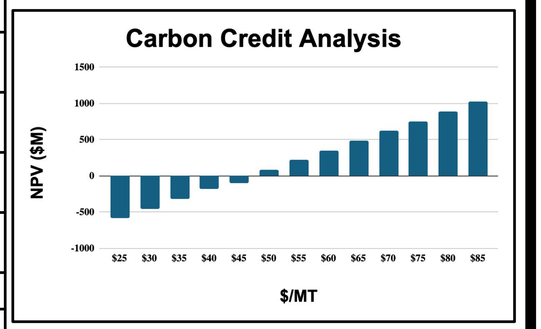


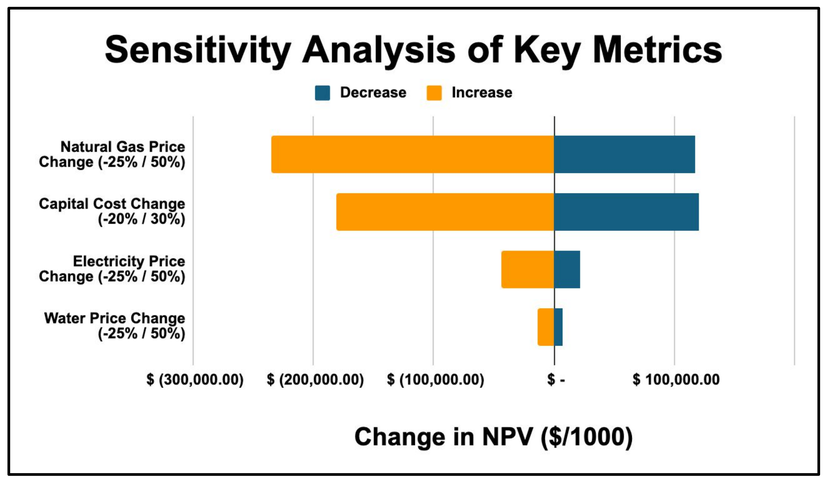
Back End Model



4. Economics

Effective Revenue	$523,427,109.00
Operating Expenses	$441,646,224.65
Non-Discounted Cash Flow	$81,780,884.34
Capital Cost	$1,404,190,948.96
NPV	-$118,200,740.03
Discount Rate	7%
Rate of Return (Disc/Non)	2.74% / 1.74%





5. Conclusions

- Achieved >90% CCUS and 1,805 MT H_2/day.
- Negative Net Present Value.
- Profitability would increase with a higher carbon credit.