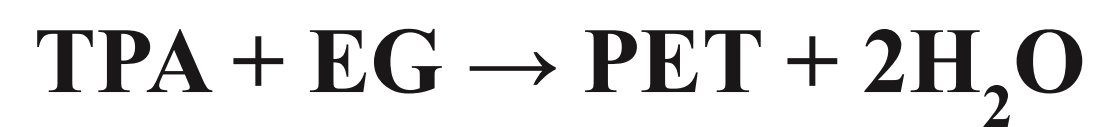


Motivating Objectives

- Design greenfield polyethylene terephthalate (PET) facility with 450,000 metric ton annual output
- Determine project feasibility based on economic analysis and process modeling

Background



Bottle grade PET (IV= 0.70 - 0.78 dL/g) market expected to reach **59 billion USD** by 2030

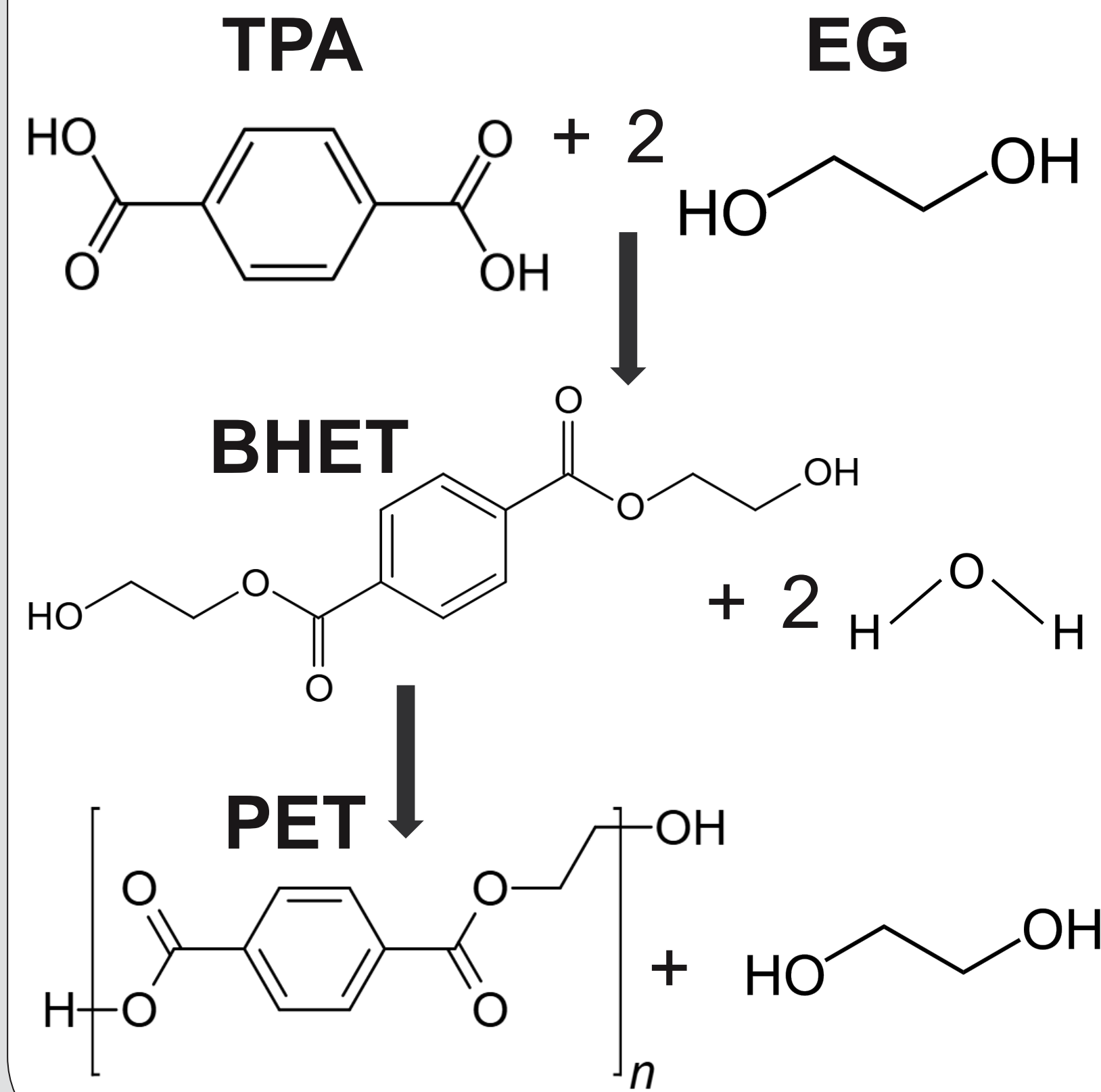
TPA selected over DMT reactant

- Non-hazardous byproduct
- Cheaper
- No catalyst in esterification

Major Steps

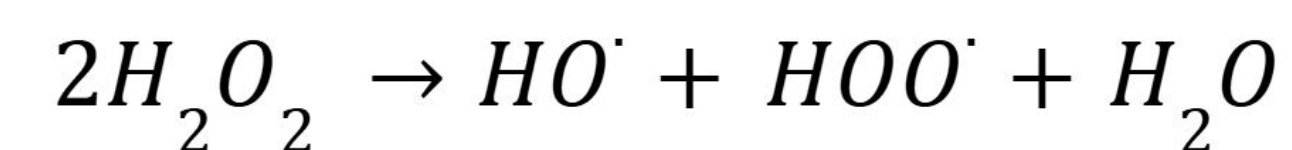
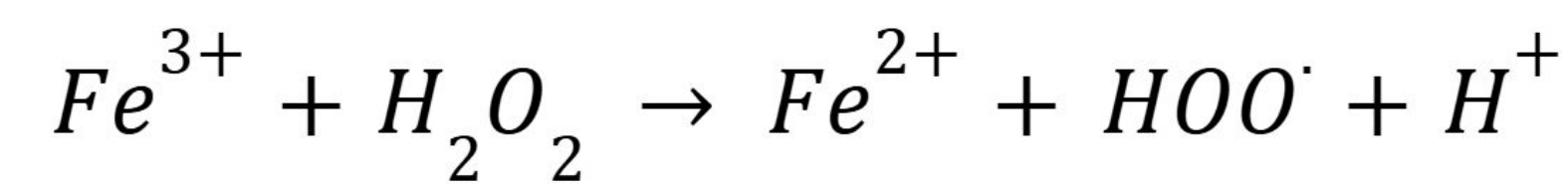
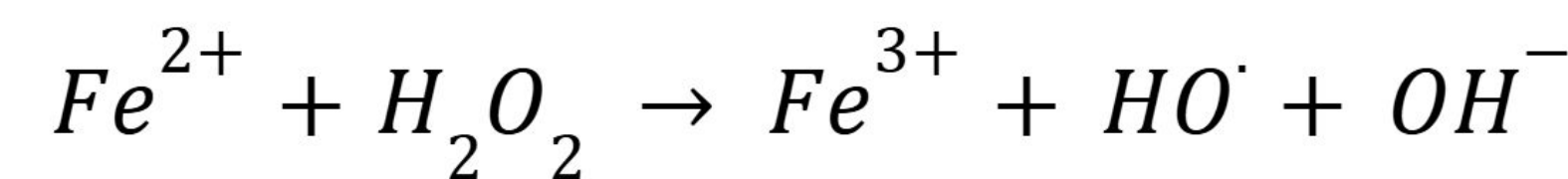
- Esterification
- Polycondensation
- Crystallization
- Condensation/Distillation

Chemistry



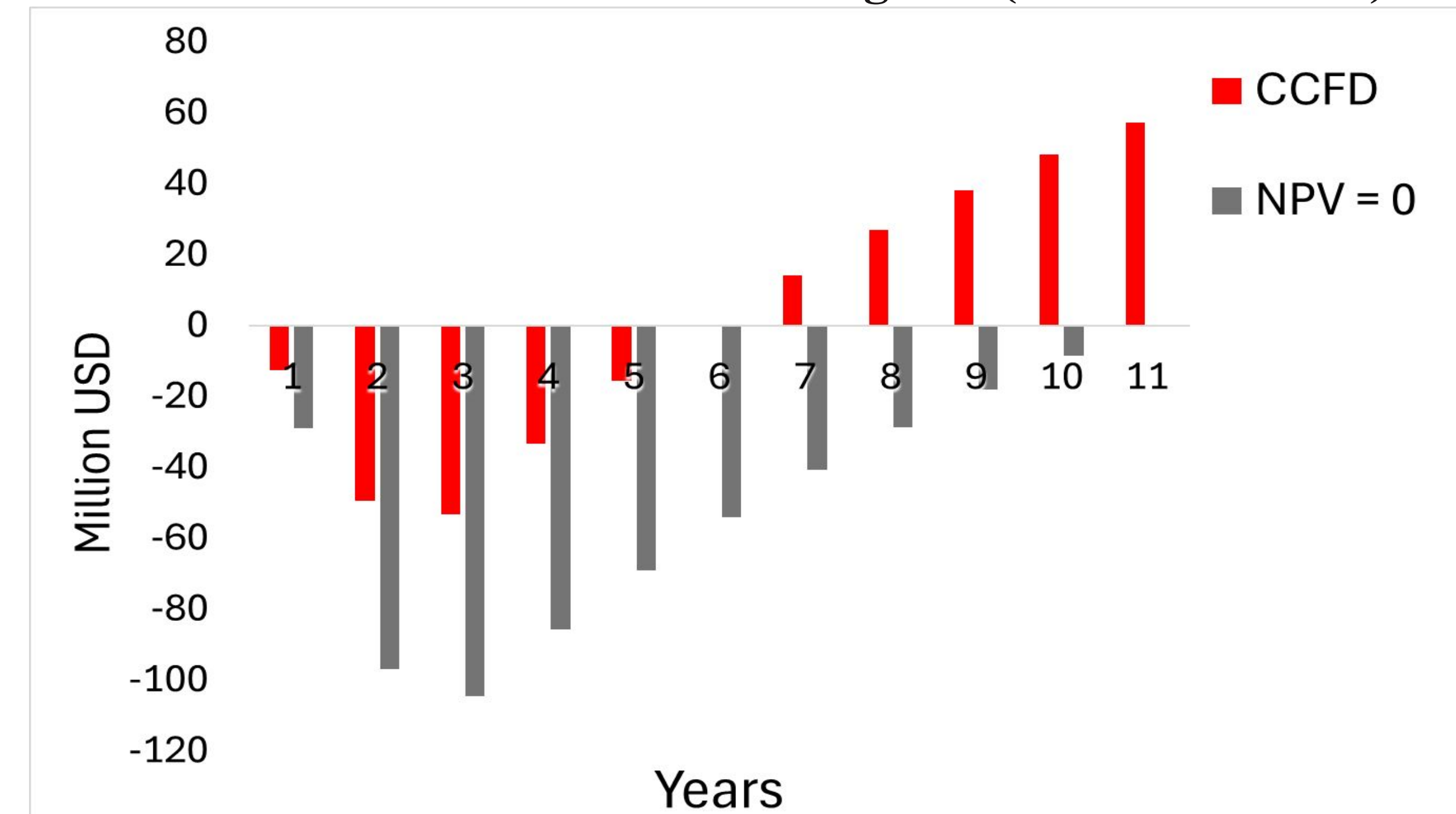
Environmental

- Focused on eliminating EG from wastewater
- Complied with OSHA standards
- Utilized Fenton's reaction to convert EG into water
- Separation estimated to cost **10MM USD/year**



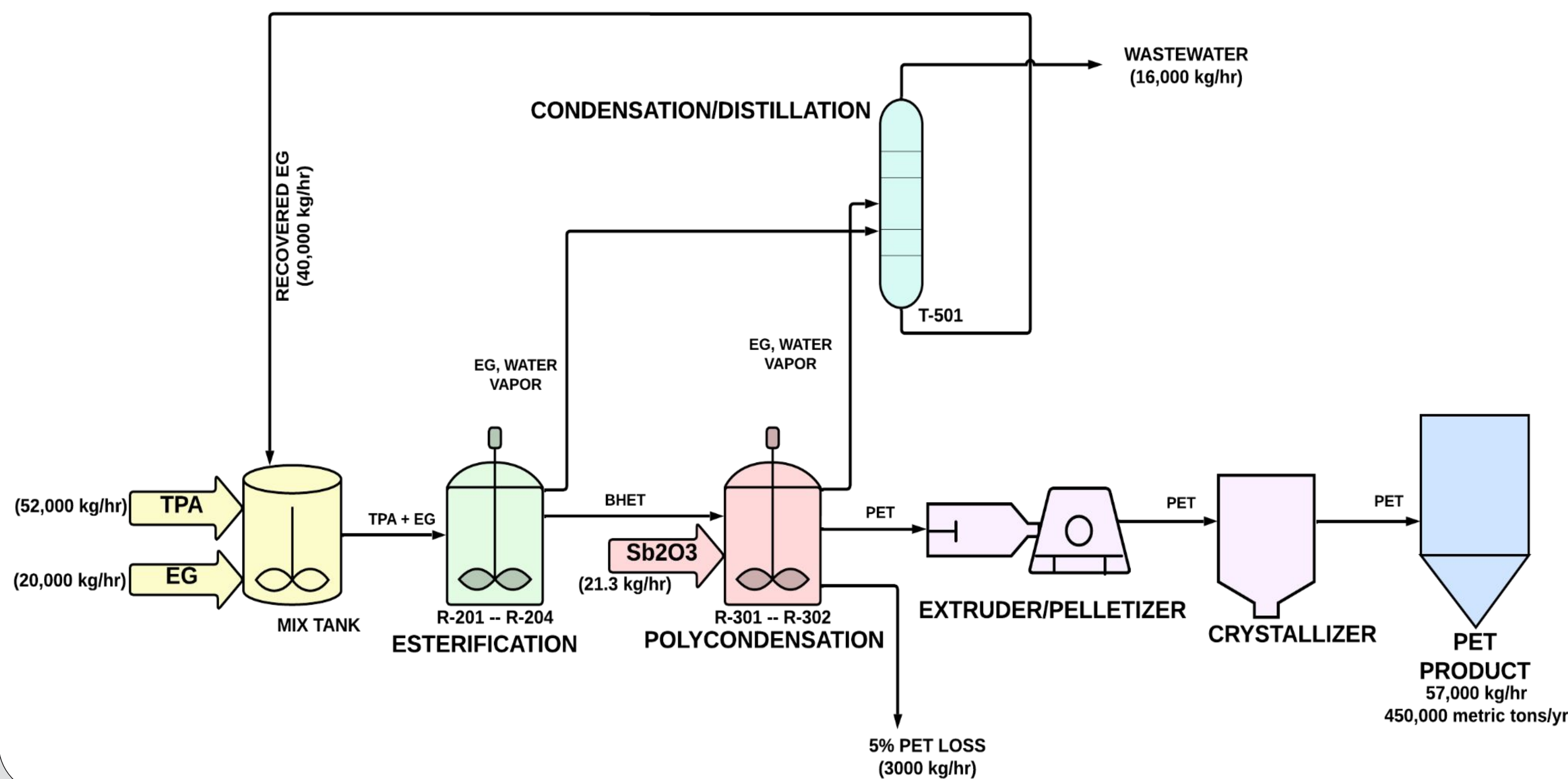
Economic Analysis

Cumulative Cash Flow Diagram (DCFROR = .12)



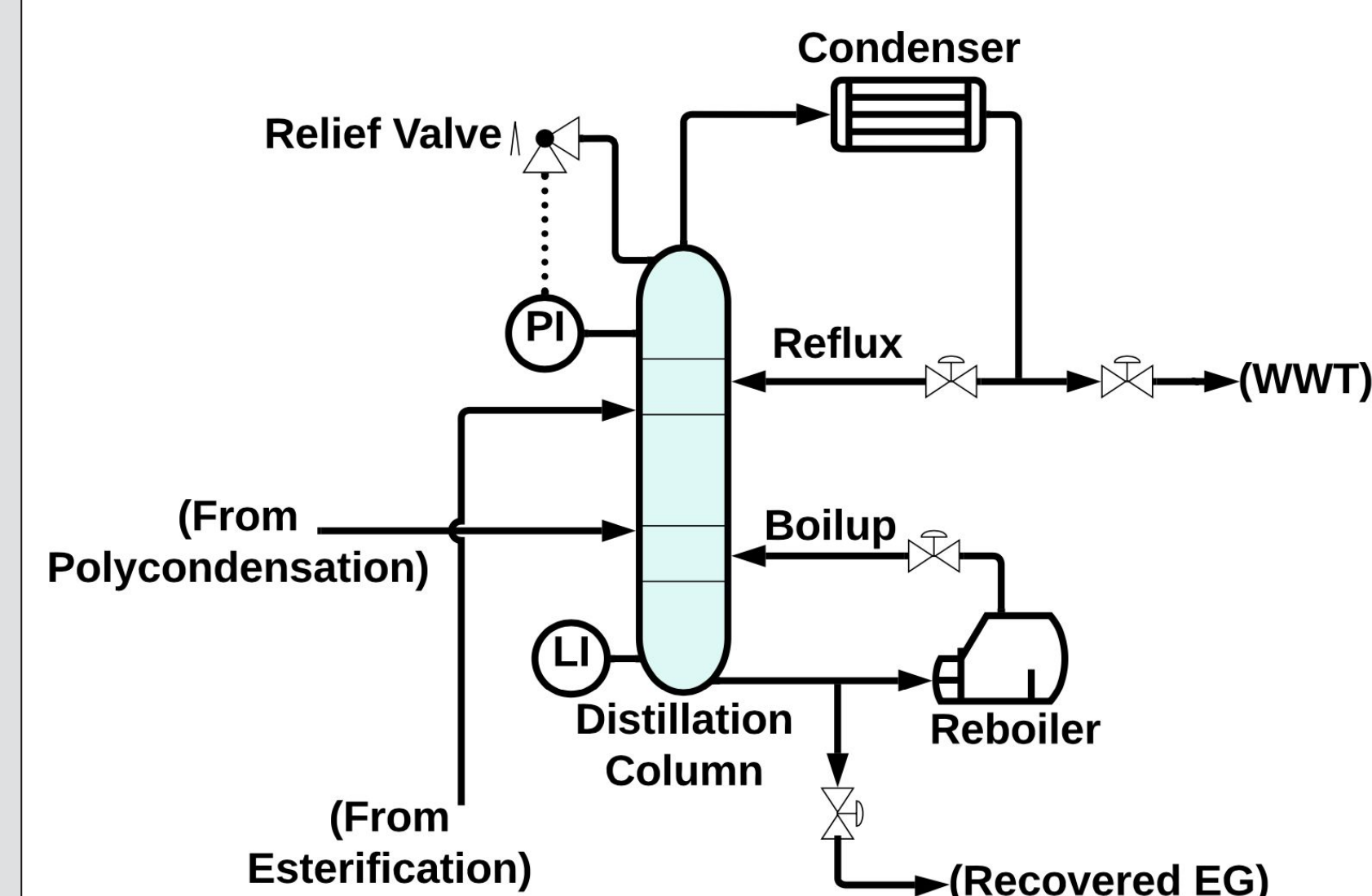
Initial Cost=50MM USD IRR=31% NPV=57MM USD

Process Flow Diagram



Safety

- Performed HAZOP analysis around distillation column
- Additional safety features estimated to cost **70,000 USD**



Recommendation

The manufacturing plant **should be considered** due to:

- High market profitability
- High rate of return
- High net present value
- Make profit early in project life
- Low safety risk of HAPs and VOCs

Acknowledgements

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