Heavy Fuel Oil Upgrade

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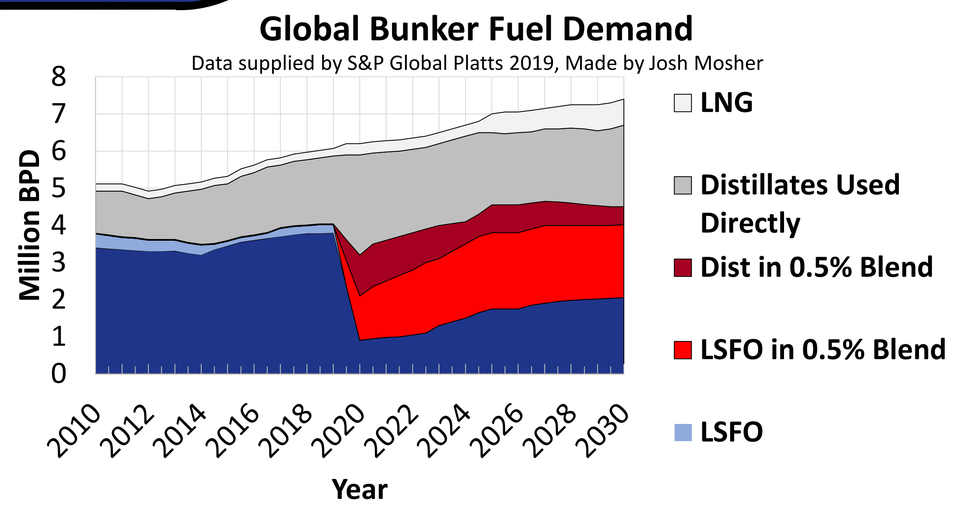
IRVING

Background

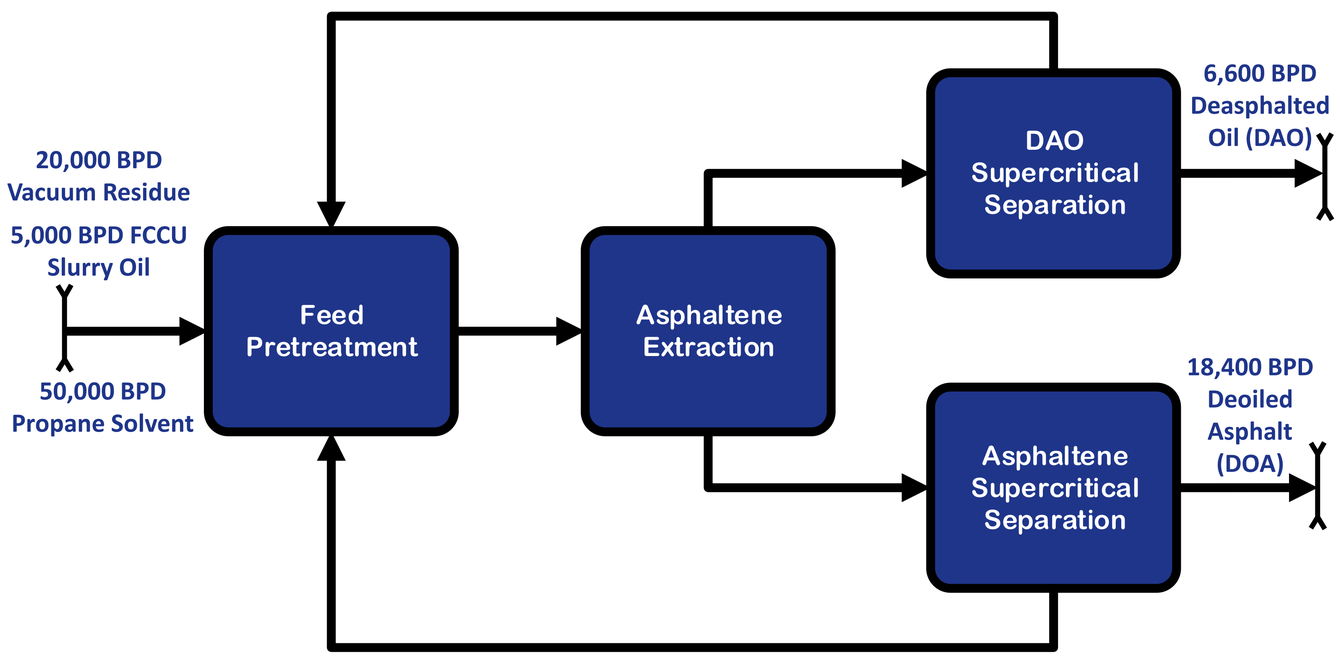
- The International Maritime Organization (IMO) is imposing new global regulations reducing the sulphur content of heavy fuel oil used by ships from 3.5 wt% sulphur to 0.5 wt% sulfur.
  - Expected decrease in heavy fuel oil demand, directly affecting oil refiners.
- The Irving Oil Refinery would like to explore the option of shifting the processing of their heavy petroleum counterparts towards asphalt.
  - Will allow the Irving Oil Refinery to meet upcoming regulations while also maintaining maximum economic efficiency.



Objective

- Replace the existing visbreaker at the Irving Oil Refinery in Saint John with a design that will produce more asphalt for the company, rather than high sulphur heavy fuel oil.

Proposed Design - Supercritical Solvent Deasphalting



Propane Solvent
> 99% Solvent recovery through supercritical solvent recovery.

Capacity
9.2 MM barrels/year of vacuum residue and fluid catalytic cracking slurry oil.

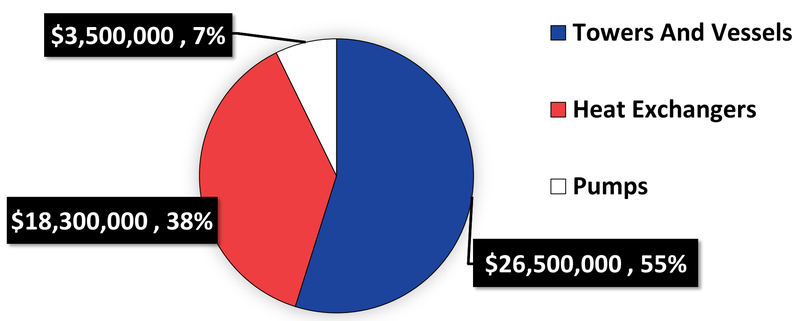
Production Rate
2.41 MM barrels/year of DAO & 6.73 MM barrels/year of DOA/asphalt binder.

Rotating Disc Contactor
Uses a rotating disc contactor for liquid-liquid extraction.

Aspen HYSYS Simulation
Simulated in Aspen HYSYS.

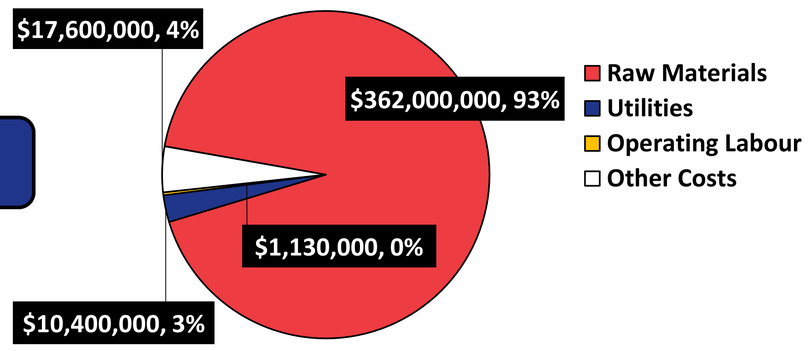
Economic Analysis

Capital Cost Distribution (CAD)



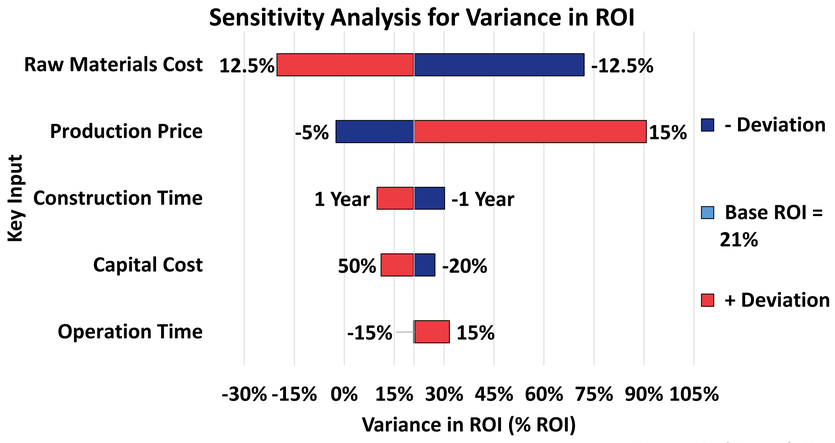
$72 MM Total Capital Investment

Direct Annual Operating Cost Distribution (CAD)



$379 MM Direct Annual Operating Costs

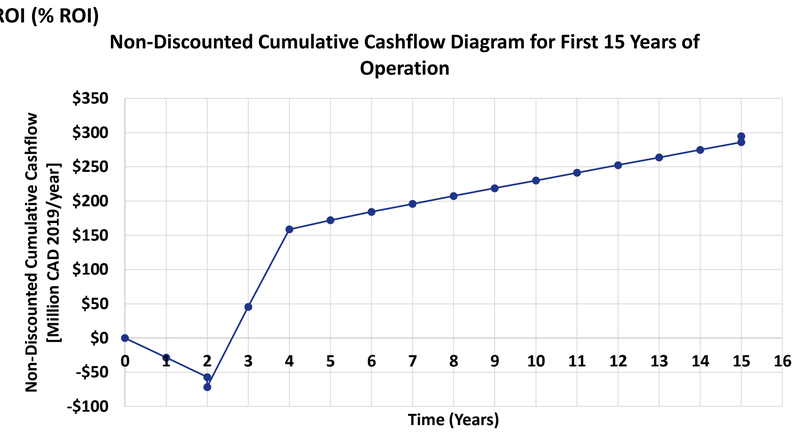
Sensitivity and Profitability Analyses



220 Days Payback Period

21% Return on Investment (ROI)

90% Internal Rate of Return (IRR)



Conclusions

- 18,400 BPD of the 25,000 BPD of residual feedstocks were successfully converted into asphalt.
- Proposed design is deemed to be economically viable.

Recommendations

- Conduct a detailed market analysis.
- Evaluate a potential production shift for 2024-beyond.
- Integrate proposed design with current FCC unit.

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