High Value Hemp Extraction

High Stakes Consulting

Olivia Clark, Perry Groves, Katherine Paul

Oregon State University

Project Information

- Sponsor: Vanguard Scientific Inc.
- Large scale extraction process
- Investigating the use of R-134a as a solvent

- Must be capable of processing 10,000 lbs per day of biomass feed
- Must be able to fit indoors
- Must have minimal release of R-134a, a potent greenhouse gas
- Must follow Green Chemistry Principles

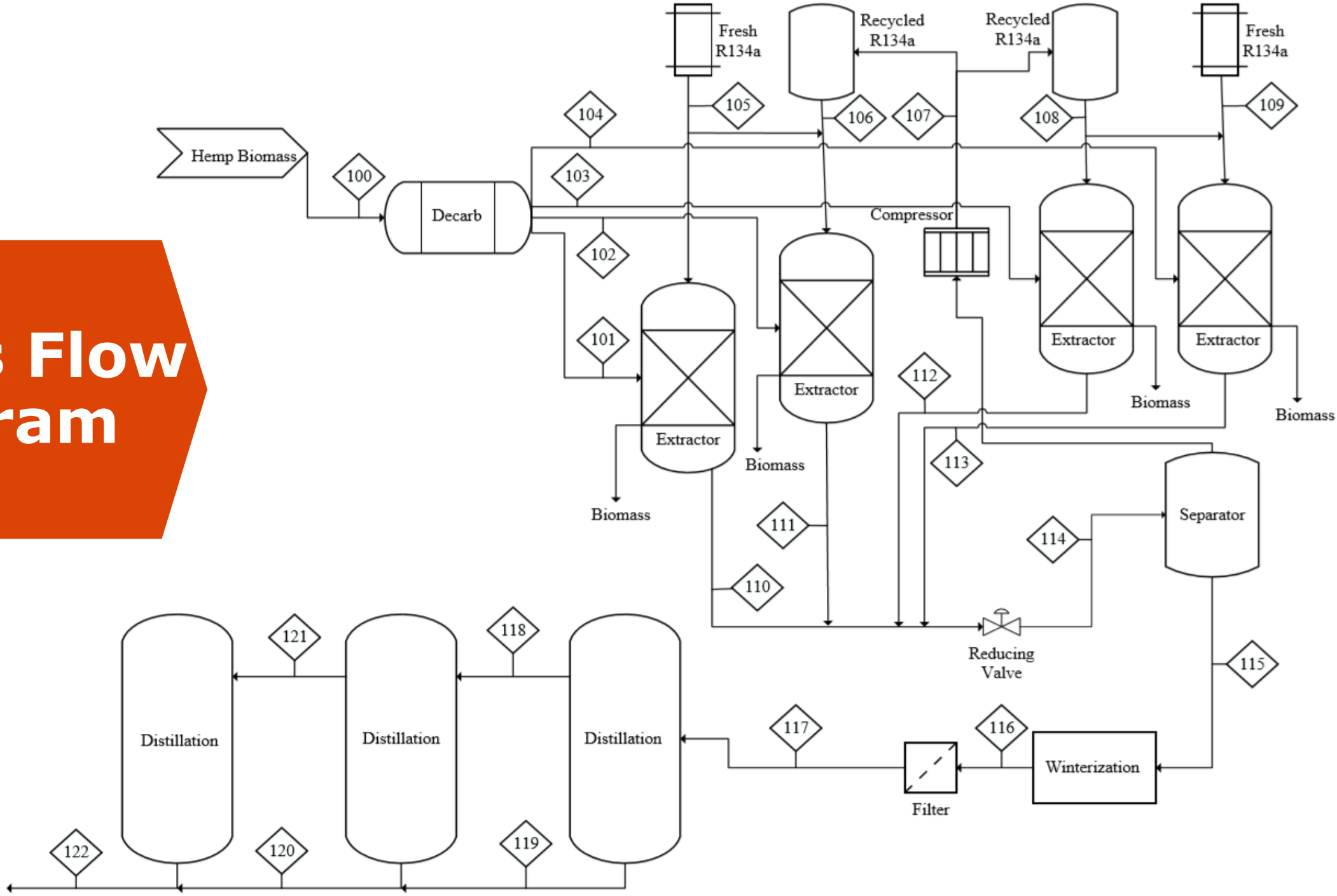
vanguard scientific

VALUE PROPOSITION

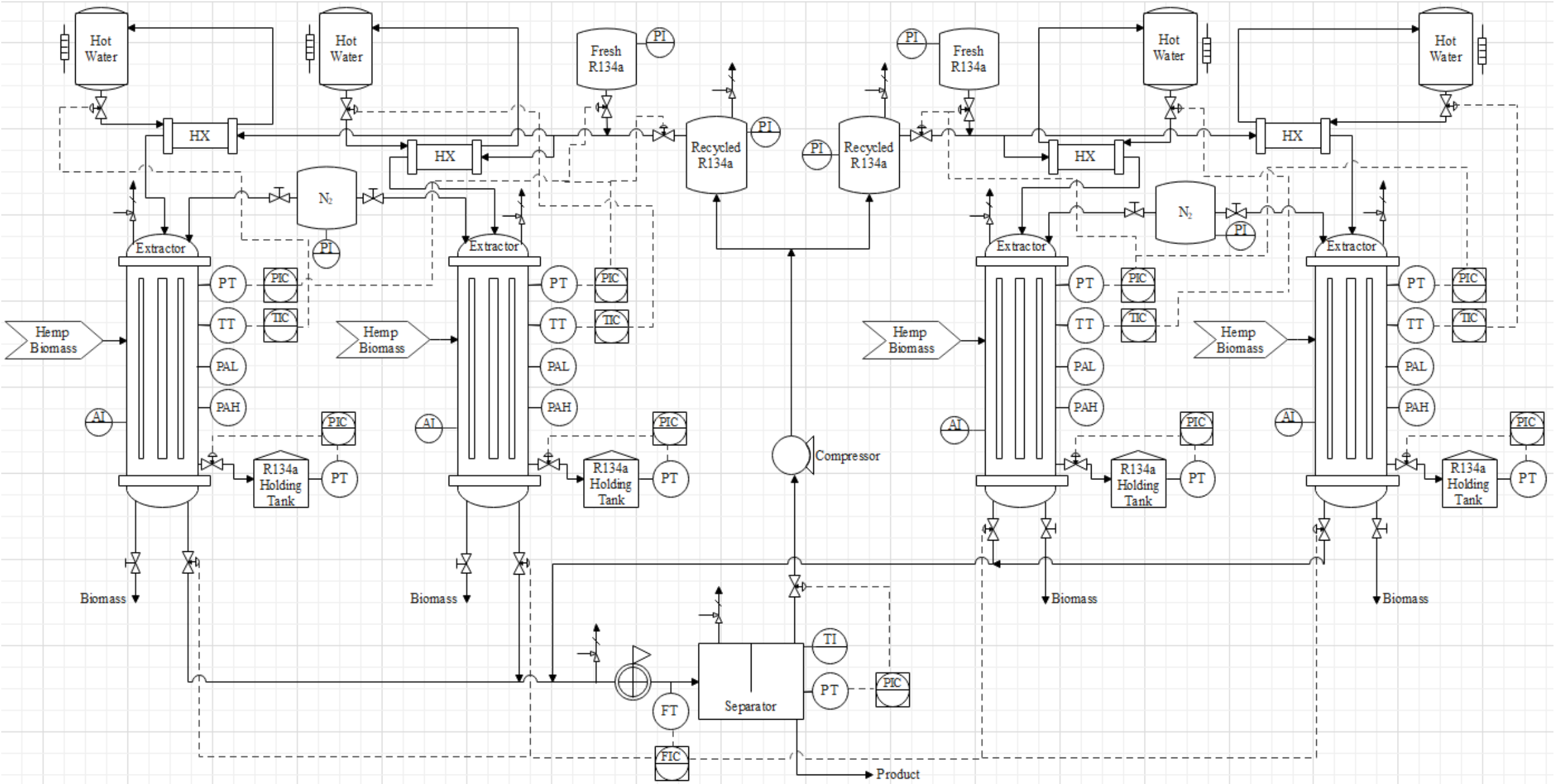
- Legalization in 2018
- Growing market for pharmaceutical, cosmetic, and food industries
- Projected $20 billion by 2024 in US*
- R-134a is an inexpensive organic solvent

*From Forbes.com

Process Flow Diagram



Extraction System P&ID



Extraction System Operating Conditions

Extractors

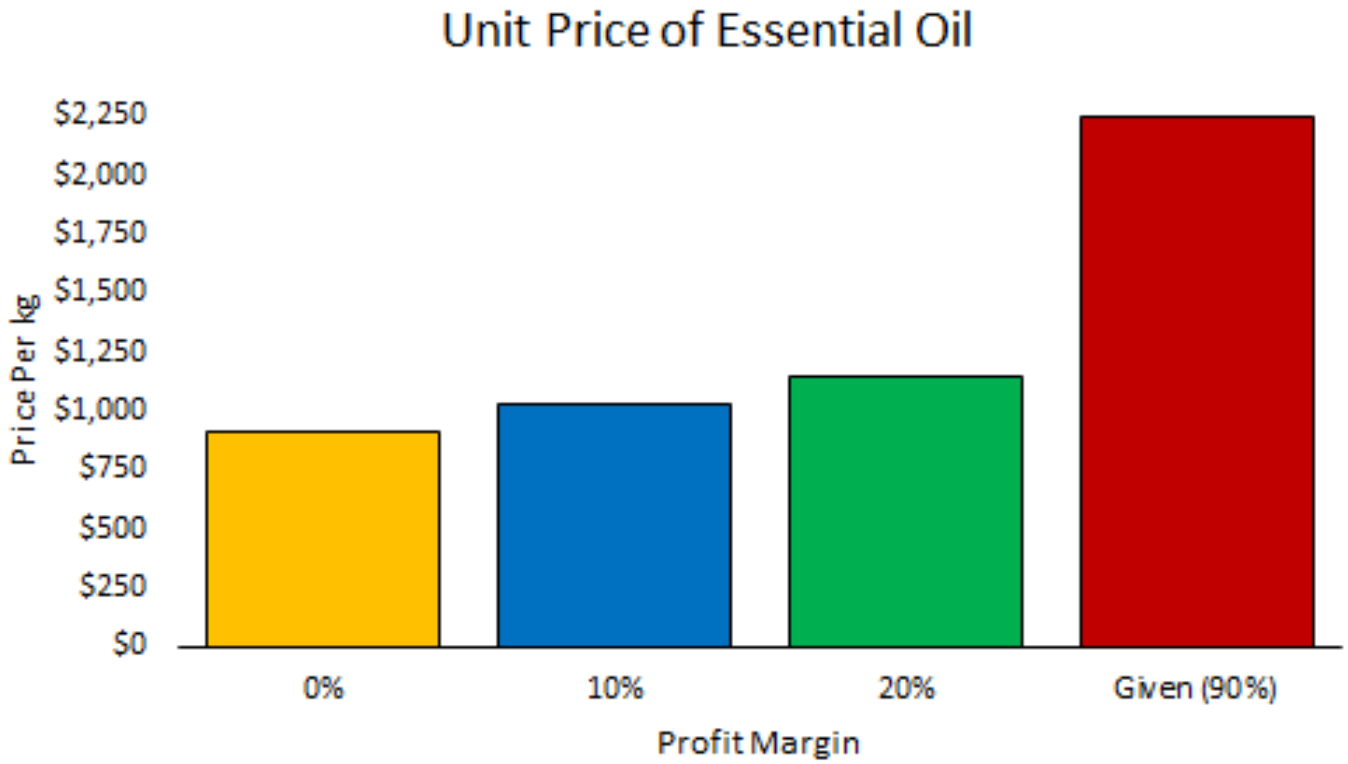
- P =100 bar, T = 80°C, V = 5 m^3
- 2314 lbs capacity
- Six hour run time
- 80% yield

Separator

- P = 24 bar, T = 80°C, V = 3 m^3
- Vapor R-134a to compressor for recycle
- Extracted liquid oil to winterization

Financial Evaluation

- Vanguard given value of $2250/kg oil
- Capital expense: $3.85M
- Net Present Value*: $321M



*Calculated using 5-year MACR depreciation schedule over ten years with 10% profit margin

Acknowledgements

- Vanguard Scientific – Project sponsor
- Dr. Nicholas AuYeung – Project guidance
- Dr. Natasha Mallette – Project guidance