

Background Information

Objectives

Design a facility capable of annually producing 85 million pounds of nylon 6,6 in Kentucky, USA

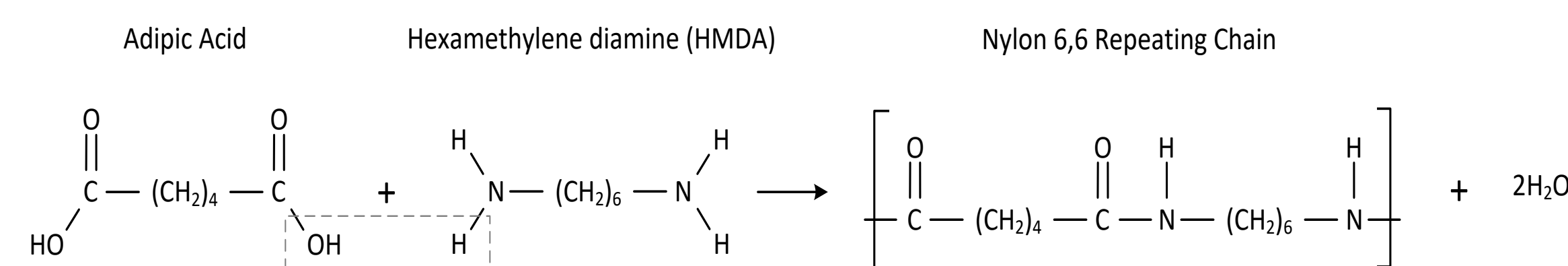
Target Markets

Automotive industry
Films and Coatings industry

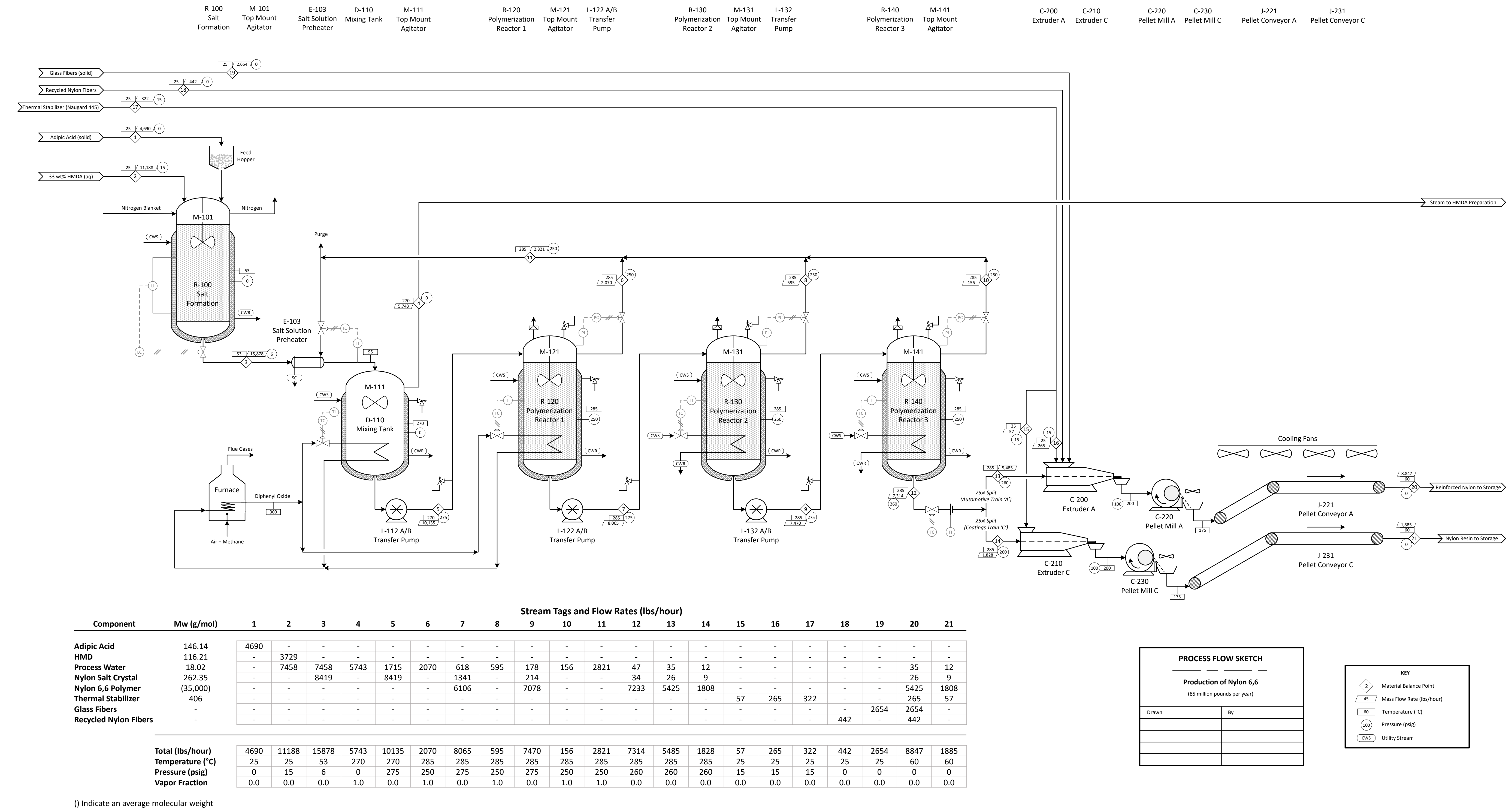
Critical to Quality Variables

Strength (tensile) ⇔ Glass fibers
Thermal stability ⇔ Naugard 445 stabilizer
High molecular weight ⇔ Step-growth kinetics

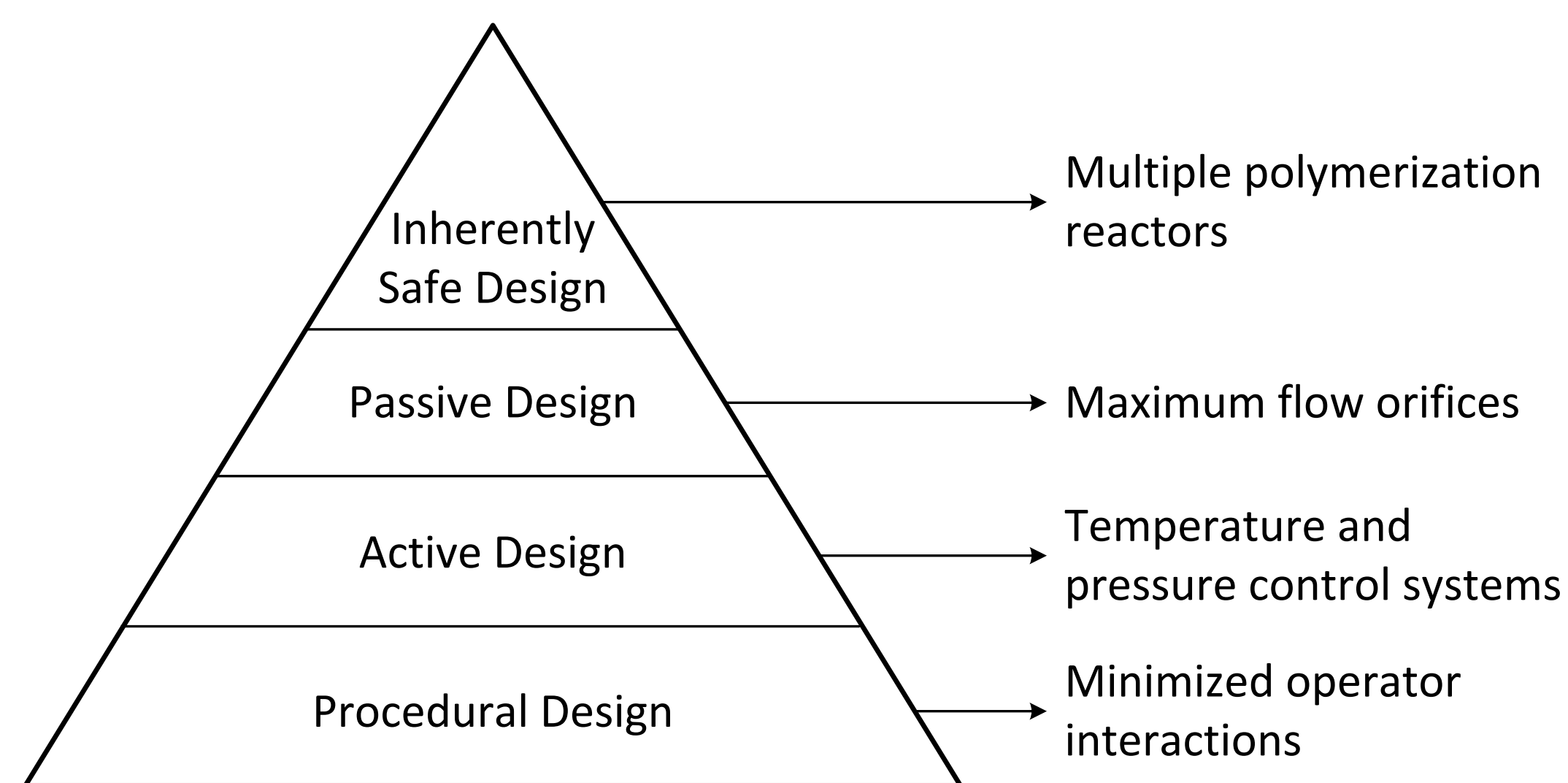
Polymerization Chemistry



Process Flow Diagram and Material Balance



Safety and Sustainability



Sustainability

- Recycle steam for HMDA preparation
- Recycled nylon addition (5%) to final product
- Eventually switch to raw materials developed by Rennovia – fully bio-based nylon 6,6

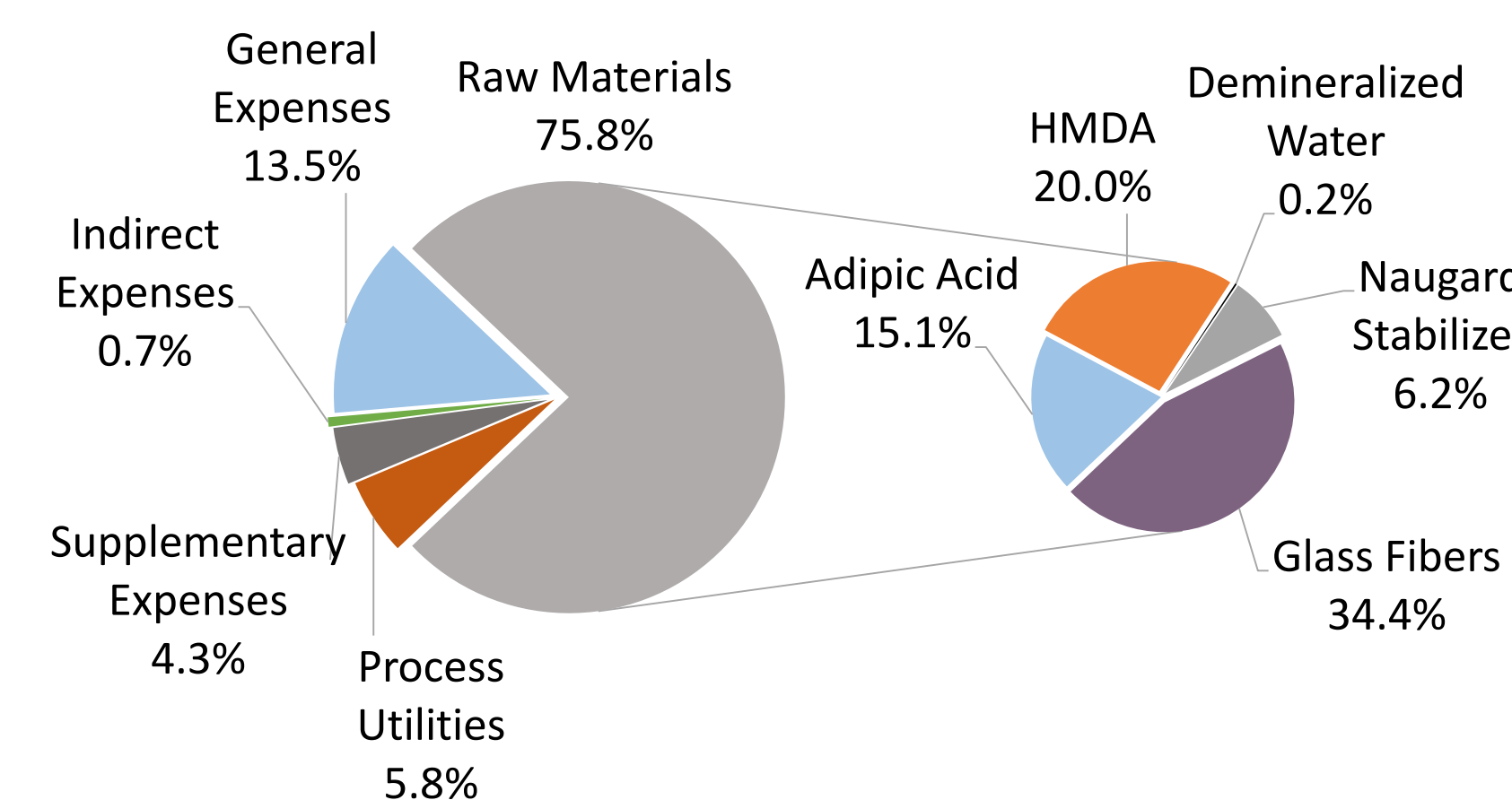
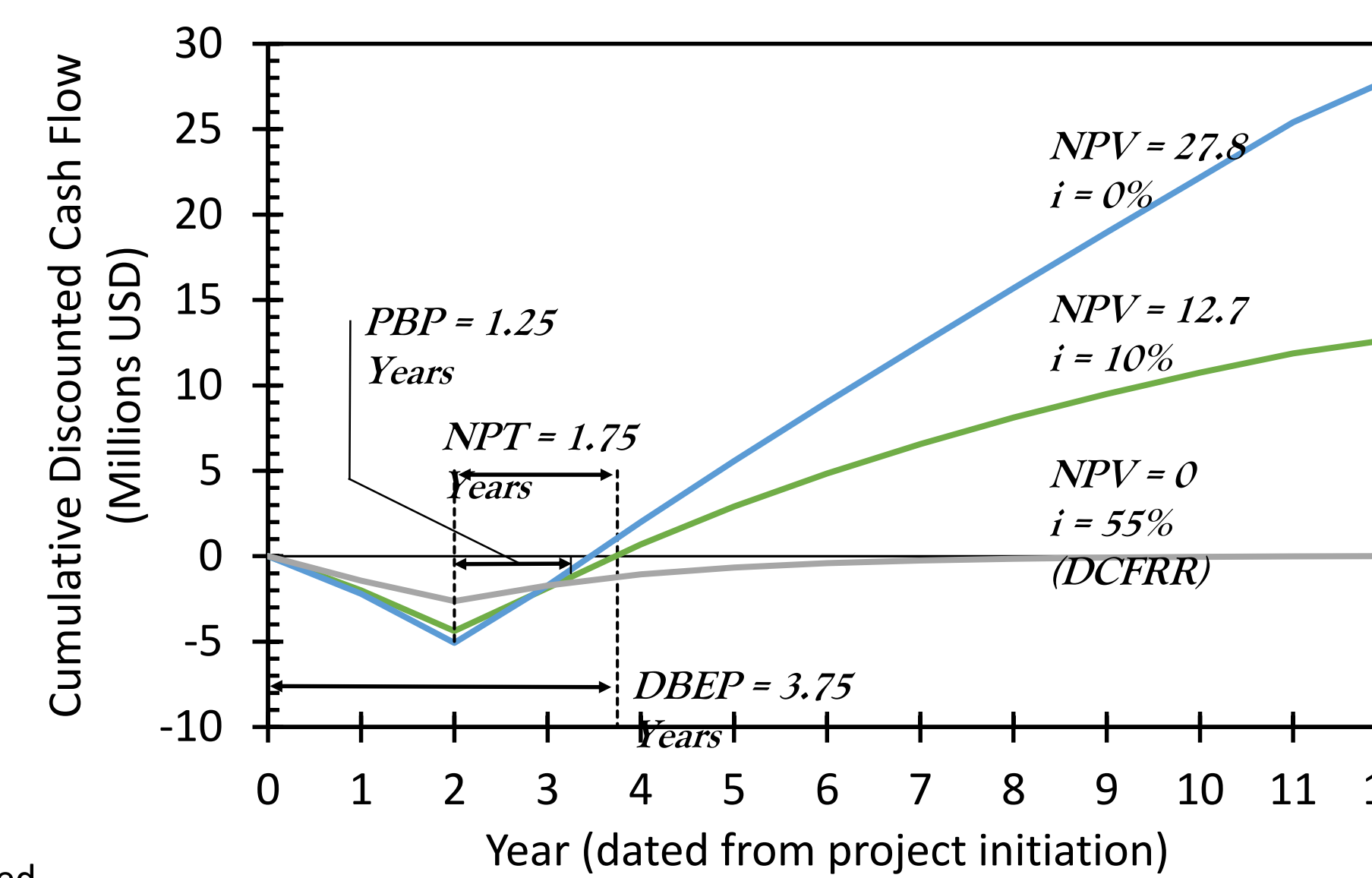
Economic Analysis

Total Capital Cost – 5.1 million USD

Annual Expenses – 165 million USD

Sale Price – 2.00 USD/pound

Net Annual Profit – 2.9 million USD



NPV (i = 10%) = 12.7 million USD

DCFRR = 55%

DBEP = 1.75 years

Conclusions

- Designed nylon 6,6 facility is profitable
- Inherently safe design minimized potential for runaway reactions
- Heat and materials recycled to increase sustainability

Recommendations

The project should continue to the next stage of development

Acknowledgements

Thank you to the chemical engineering staff, our friends, and most importantly our families for their help and support through four years at UNH