DEACETYLATION OF NANO-CHITIN

Group P7: Zaid Alsekri | Lateefat Buraimoh | Keaton Goosen | Tshegofatso Mbanga | Kaarnesh Rajamurugan | Kristina Vorona | Mike Zheludev

INTRODUCTION

- Produce Nanochitin and extract astaxanthin from shrimp shell waste
- A feasibility analysis was conducted to determine if the greenfield project is economically viable on a large scale

Input:
43830 tonnes / year shrimp waste shells

Products
10,950 tonnes/ year nano-chitin
135 tonnes/year astaxanthin

Applications of Nano-chitin:
Food emulsifying agent, drug delivery, pesticide, cholesterol control, water treatment, Vandium batteries

LOCATION

Richmond, BC, Canada

- Convenient transportation of shrimps via land and sea

PROCESS DESCRIPTION

1. **Supercritical Extraction**
   Shrimp shells are mixed with supercritical CO2 and ethanol to remove oils and extract astaxanthin

2. **Chemical Extraction**
   NaOH, HCl, and NaOCl are used to remove proteins, minerals, and pigments from the shells

3. **Deacetylation**
   The purified shells are immersed in NaOH to remove acetyl groups from the chitin polymer and produce chitosan

4. **Mechanical Treatment**
   The chitosan slurry is subjected to high shear forces in a microfluidizer, and dried to obtain nanochitin powder

ENVIRONMENTAL ASSESSMENT

0 CO_2

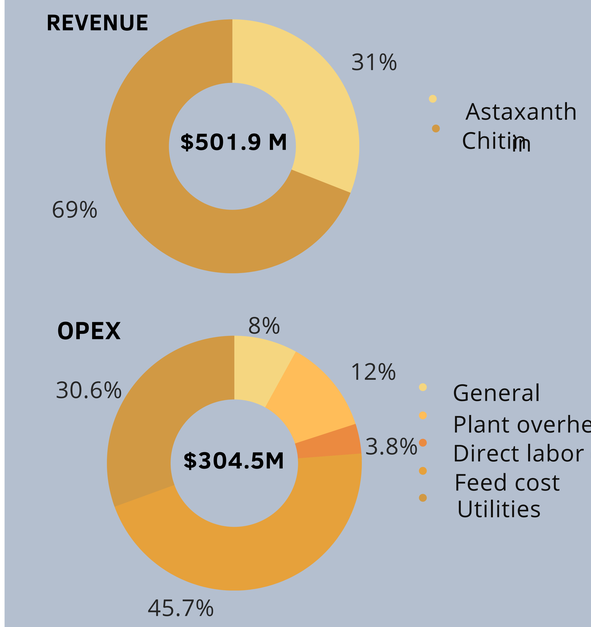
Onsite CO2 Emissions

90% of Wastewater Recycled

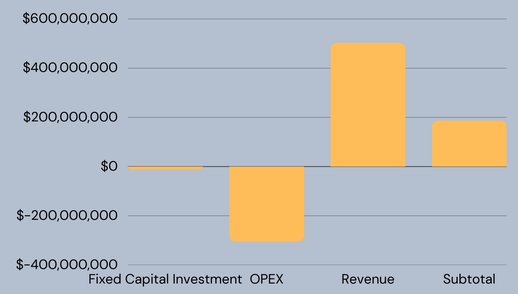
TSS < 10mg/L
BOD < 10mg/L

<1 ppm ClO2 Gas Emitted

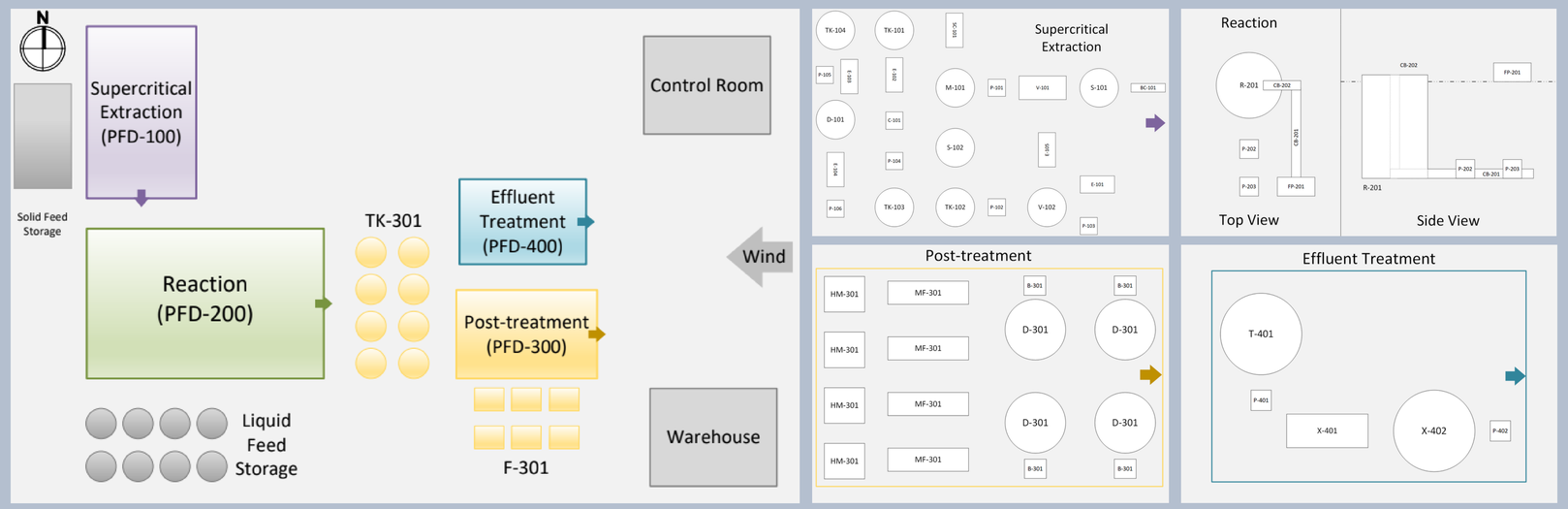
ECONOMIC ANALYSIS



OVERALL ANALYSIS



PLANT LAYOUT



ACKNOWLEDGMENTS

P7 is grateful for the invaluable assistance provided by Xiaoya Su (Coco), Sergio Berretta, Dr. Englezos, Dr. Lim, and to Dr. Rojas for sponsoring this project