**Introduction**

- Due to the COVID-19 pandemic, there is excess production of Isopropyl Alcohol (IPA) and Propylene.
- Global requirement for Acetone (solvent and common feedstock) with 7.7% CAGR
- **Objective**: design an Acetone production plant (currently no production in Canada)
- **Location**: Saint John, NB (near Irving Oil Refinery which produces propylene as a byproduct)

**Safety and Environmental Assessment**

- HAZOP Deviations Controlled:
  - Pressure
  - Temperature
  - Abnormal flow
- **Environmental Impact**:
  - Hydrogen production contributes to global sustainability
  - Uses unused propylene from refinery
  - 264 MT of CO₂ produced
  - Wastewater stream treated and discharged meeting provincial regulations

**Process Overview**

- **First product**: 95.5% Acetone

**Economic Assessment**

- **Revenue**: $42.68 Million
- **OPEX**: $40M
- **Profit**: $2.1M

- **Source of funding**: BDC + Big 5 Joint Loan at 9.8% for 25 years (longer than traditional corporate loan, R adjusted for risk)
- **PBP**: 7.88 yrs
- **IRR**: 13% (IRR>Loan R)
- **NPV**: $84M

**Conclusions and Recommendations**

- Established global market for Acetone of $4.7B with expected growing domestic demand of ~20,000 tons by 2030
- Rapid growth expected in H₂ markets due to Net Zero Emissions Goal
- Production plant is profitable at $2.1M annually
- Pathways to offset carbon emissions and waste discharge
  - Waste Minimization Program and NaOH packed bed column for carbon credits

**References**


**Plant Layout**

- **KEY**: **Blue** = IPA Synthesis and Separation, **Orange** = Acetone Production, **Yellow** = H₂ Separation, **Purple** = Acetone Separation, **Green** = Storage Vessels = Acetone and H₂ storage.