



Upcycled Aromatics
University of Alberta
iGEM Entrepreneurial 2012

Problem

- Paper recycling plants produce a waste sludge composed of paper fibres too short for further processing
- Costs associated with responsible disposal of sludge
- Lignocellulosic material abundant and available – but not economically viable

Problem

- Roche produces the majority of the world's supply of shikimic acid
- Isolating the compound from Chinese star anise introduces risk of a poor harvest
- Tamiflu shortages announced by Roche in 2005
- Thousands of tons of cinnamic acid demanded per year as aromatic “platform chemical”
- Current production is expensive, wasteful, dirty

Solution

- Production of aromatics from cellulose
- High price per unit mass and a sustainable market

Solution

- Cellulose from waste sludge from recycling plants is converted into glucose;
- Glucose from the first part is used as a feedstock for the production of aromatic chemicals through fermentation by genetically engineered *Pseudomonas putida*

Competitive landscape

- Major producers of **cinnamic acid** include Bayer (Germany), DSM (Netherlands), and Kay Fries (USA)
 - Produced by a condensation of benzaldehyde and acetic anhydride
- Roche monopolizes supply of **shikimic acid**
 - Extracted from Chinese Star Anise in 10 stage process

Upcycled Aromatics

- Insert team picture + names here

Competitive Advantage

- Upcycled Aromatics' main competitive advantage lies in our feedstock
- We eliminate transport costs by converting cellulose to glucose **on-site**
- Clean, innovative approach enables us to tap into the ever-expanding green market

Business Model

- Insert figure here



Risks

- Low yield
- Production costs $>$ revenue
- Variable feedstock quality
- Regulatory risks (FDA, DoT, Environment Canada, etc)
- Price volatility of product
- Competition for market share

Risks

- We will assemble a team of the scientists from academia & industry
- We will recruit an advisory board with a broad range of expertise to address regulatory and market issues

Input Milestones

- Strain developed (Bench-scale proof of concept)
- Pilot-scale proof of concept
- Patent(s) granted
- Supplier contracts signed
- Regulatory approval
- First commercial scale plant
- Marketing agreements signed
- Additional commercial plants

Funding requirements

Exit scenario