Longwood Gardens
Greenhouse Plastic Films
EGR 7111 Life Cycle Assessment
Advisor: Bill Lorenz
Team: Sushmita Arjyal, Krystal Hamilton Case, David Soltesz

Project Overview

Overview
Use a Life Cycle Assessment (LCA) as a tool to investigate what greenhouse covering is least harmful to the environment while still maintaining performance and price.

Considerations
- Ability to withstand elements and use
- Financial cost over lifetime
- Maintenance
- Environmental impact over lifetime

Primary Options
Polyethylene (AC/IR)
- Outstanding Durability
- UV Block & Anti Dust
- Easy Installation
Ethylene Tetrafluoroethylene
- Self Cleaning
- Recyclable
- Extremely Stretchable

Analysis

Goal
- Analyze the environmental effects of varying materials for use in production greenhouses.
- Develop a basic understanding of the level of impact of each potential solution from “cradle to grave”.

Scope
- Three potential options; includes manufacturing, to use, to disposal.

Functional Unit
One production greenhouse: 42’x100’

Polyethylene film process flow diagram.

Conclusions & Recommendation

Conclusions
- ETFE is most viable option
- Key advantages include durability, heating cost, and light transmissivity.

Recommendations
- Install ETFE on production greenhouse.
- Measure light transmission, heat transmission, and plant growth and use as metric.

Further Study
- Water consumption and chemical use for cleaning plastic.
- Use of bio-based plastic instead of petroleum-based.