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Industrial Products from Renewable Resources -- Sustainable Solutions

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NatureWorks

Cargill Dow LLC -- Background

- Focus is on building a platform of *sustainable* products made from renewable resources
 - Polymers for **packaging and fibers**
 - Chemical Intermediates
- Stand Alone Company
- 200 People
- \$750 million committed (so far)



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**PLA Plant
Blair, Nebraska
October 2001**

Starting up right now!



What is PLA?

- A **polymer** material suitable for Packaging and Fibers
- A **polymer** material made from **lactic acid**
- **Lactic acid** is made from fermentable **sugars**
- **Sugars** are made from **CO₂** via **Photosynthesis**



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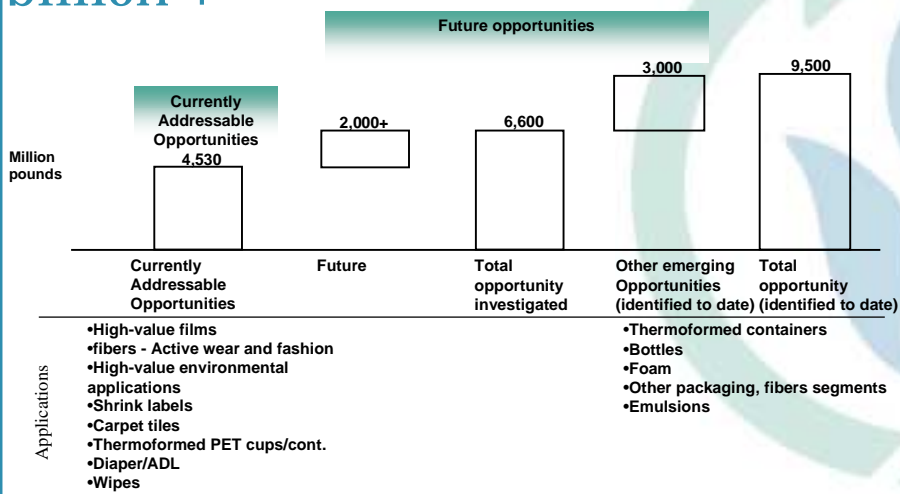


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PLA Market Opportunity-\$10 billion +



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Global Market

- Europe
 - Ahead of the US in sustainability thinking
 - Value renewable resource based products
- Asia
 - Acute waste disposal issues
 - Developing infrastructure
- South America
- North America



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Why is there a Market for PLA?

Sustainability



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“Triple Bottom Line”

John Elkington-SustainAbility 1996

- Economic Impact
- Environment Impact
- Social Impact



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Sustainability-Triple Bottom Line

- Economic Impact
 - Must be economically viable
 - Without economic viability the business doesn't exist
- Environment Impact
 - Products be better than alternatives
 - Reduce impacts with intent of eliminating
- Social Impact
 - Products improve quality of life
 - Can't take disproportionate advantage of others



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The case for sustainability:

Is it better? How do we know?

Consumer Question



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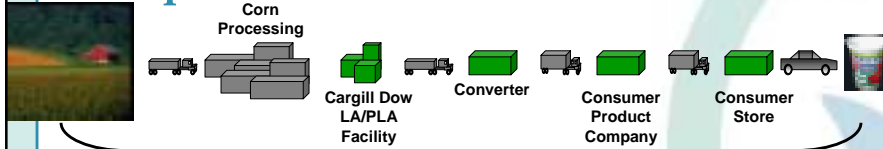
Life Cycle Inventory/Analysis

A systems approach




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We investigate and account for all potential environmental impacts



Why?

We want to understand so that we can reduce any impacts over time. We work across the business system with our suppliers and customers

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What do we do with LCI Results?

Decide what is important across the business system, then work on reducing it.

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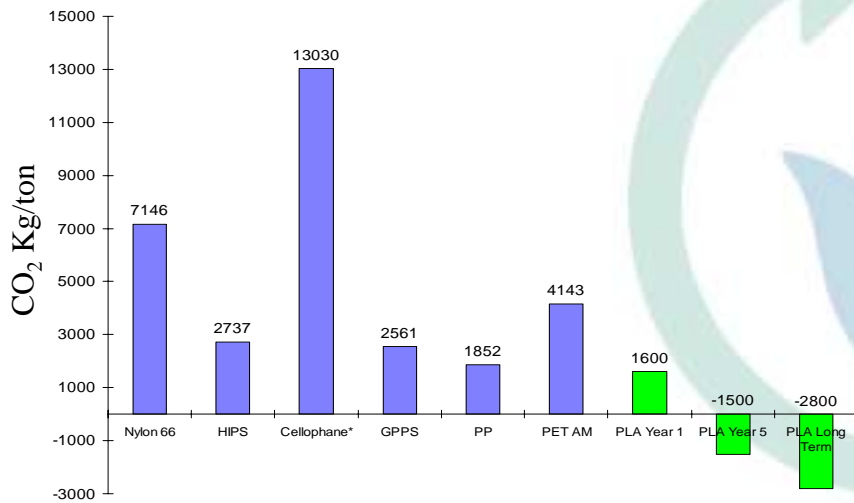
Greenhouse Gas Emissions

Sustainability Issue



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Net Green House Gas Emissions: Cradle to Pellets



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Raw Material Source

Sustainability Issue



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Renewable Resource Raw Material Success means:

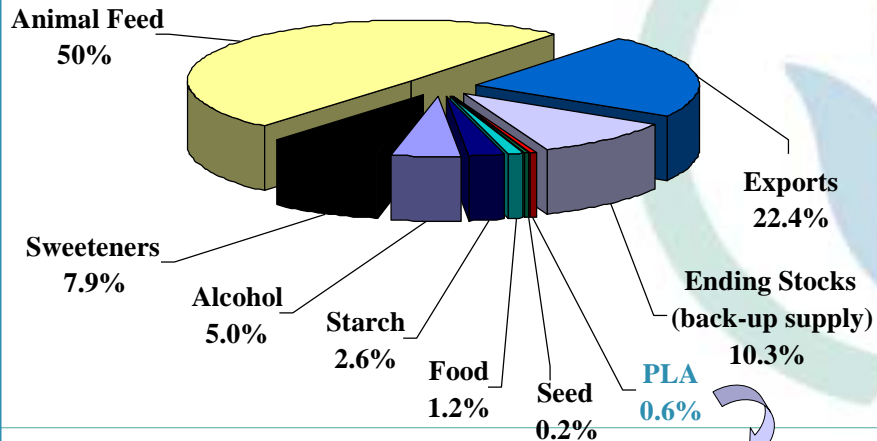
- Available in sufficient quantity
- Economical, for us and for the farmer
- Not create any other “deficits”
 - Impact on food
 - Impact on land, water
 - Pollution
 - Persistent chemicals



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What is impact of PLA on Corn Supply and Uses?

Assumes 7 billion bushel crop



If a billion pound/yr Business

Can we create a economic business system which meets the needs of *sustainability*?

- Yes. To do it we will need to integrate information and use Life Cycle Principles across the whole system.
- Pay attention to the broader sustainability issues
- We will also need to create an economic system to value good farming practice
- We will also need green energy sources



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