Green Chemistry in the Plastics & Fibers Markets

Steve Davies
Director- Marketing & Public Affairs
NatureWorks LLC

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Who We Are . . .

- **World’s first and largest bioplastics producer**
- **World-Scale Plastics Facility**
  - 2002 Winner - Presidential Green Chemistry Challenge
- **Peer reviewed, strong eco-profile**
- **Global customer base and product adoption**
- **Ingeo applications breadth across markets, geographies, and retail applications**
Where it comes from…. Plastics & fibers from plants, not oil

Carbon dioxide and water → Plants → sugar (dextrose) → manufacturing → Our Customers

What We Do . . .
What These Bio-Based Credentials Mean.

Greenhouse Gases

<table>
<thead>
<tr>
<th>Material</th>
<th>Ingeo Current</th>
<th>Ingeo 2005</th>
<th>PVC (suspension)</th>
<th>Polypropylene</th>
<th>LD Polyethylene</th>
<th>PET (amorphous)</th>
<th>PET (SSP)</th>
<th>Polystyrene (HIPS/GPPS Avg)</th>
<th>Polycarbonate</th>
<th>Nylon 6</th>
<th>Nylon 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions of CO2</td>
<td>1.3</td>
<td>2.0</td>
<td>1.9</td>
<td>1.9</td>
<td>2.1</td>
<td>3.2</td>
<td>3.4</td>
<td>3.4</td>
<td>7.6</td>
<td>7.9</td>
<td>9.1</td>
</tr>
</tbody>
</table>

From cradle to polymer factory gate [kg CO2 eq. / kg polymer]

Continuous improvement process
Ingeo 2005 ➔ Ingeo Current ➔ Future Improvement
What’s Resulted in the Global Market

- **Rigids**
- **Nonwovens / Fibers**
- **Durables**
- **Films**
- **Lactides**
- **Bus. Dev.**
- **Incubator**
“It’s a win-win-win-win. It’s price-neutral, a big win on carbon, and a much stronger package. It’s not perfection, but it is a giant leap.”

Gary Hirshberg, Chairman, president, & “CE-Yo”
Danone and WWF launch sustainable Ingeo™ Activia Yogurt Cup in Germany

Improves packaging carbon footprint by 25% and use 43% less fossil resources
“Walmart Stores in 2010 has achieved a savings in fossil fuel usage of 25,971 barrels of oil per year, and a reduction in greenhouse gas emissions equal to eliminating the CO₂ emissions from driving a car 20,885,635 miles”
Ingeo in Food serviceware
Apple iTunes card

The Beatles Box Set

$149

Get the latest music, movies, TV shows, games, and more.

Apple iTunes

Plant-based card

Ingeo™
Ingeo™ in Nonwovens

Kimberly-Clark Diapers

Moms in the U.S. are choosing HUGGIES PURE & NATURAL, a new, hypoallergenic, fragrance-free super-premium diaper, described as “better for baby, with steps toward a better world.”

The breathable outer cover includes organic cotton, and the liner includes renewable materials along with natural aloe and vitamin E to provide gentle protection for babies. And like SCOTT NATURALS, the outer packaging is sourced from 20 percent post-consumer recycled materials.
Ingeo in Apparel

Fama Jersey

Saara Lepokorpi

Gattinoni
“Technical nutrients”
- basically inorganic or synthetic materials manufactured by humans—such as plastics and metals—that can be used many times over without any loss in quality, staying in a continuous cycle.

Source: Cradle to Cradle: Remaking the Way We Make Things by William McDonough & Michael Braungart

“Biological nutrients”
- Biological nutrients and materials are organic materials that can decompose into the natural environment, soil, water, etc. without affecting it in a negative way, providing food for bacteria and microbiological life.

Source: Cradle to Cradle: Remaking the Way We Make Things by William McDonough & Michael Braungart
A new paradigm for Cradle-to-Cradle materials recycle . . . “Feedstock Recovery”

*Ingeo is a biopolymer made from lactic acid*

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**Lactic Acid**

**Polymerization**

**Hydrolysis**

**Ingeo Polylactide**
A new paradigm for Cradle-to-Cradle materials recycle . . .
“Feedstock Recovery”

Ingeo Carpet in use at the COP—15, the UN’s Climate Change Conference
A new paradigm for Cradle-to-Cradle materials recycle . . . “Feedstock Recovery”

Ingeo™ cups in use - and collected for feedstock recovery at the June, 2011 Brussels Couleur Café music festival
Thank You

Steve Davies
Director- Marketing & Public Affairs
NatureWorks LLC
Steve_davies@natureworksllc.com

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