



## *2006 Agricultural Outlook Forum*



## *Improving Biodegradable Cafeteria Ware EarthShell Packaging*

*February 16, 2005*

# Improving Biodegradable Cafeteria Ware EarthShell Packaging

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- ◆ **Basic EarthShell Packaging Technology**
- ◆ **EarthShell Packaging Market Position and Properties**
- ◆ **Market Trends**
- ◆ **Products available and the Path Forward**



*Basic EarthShell Packaging  
Technology*



# What is EarthShell?

- ◆ **Totally new composite material that combine organics with inorganics**



*Annually Renewable  
Starch*

*Natural, Abundant  
Limestone,  
Biodegradable -  
Compostable  
polymers*

*EarthShell Packaging*



# The Making Of EarthShell Packaging®

## 1 Abundant and Renewable Ingredients

- Abundant limestone
- Renewable starches like potatoes
- Air and water
- A small amount of recycled fiber, protective coating, a thickener, and a manufacturing release agent make up the remaining ingredients.



## 2 Ingredients are Mixed Together



## 3 The Product is Formed

- Water turns to steam to expand the batter, which forms and sets the product
- Product trim is captured and put back into batter, or used for animal feed



## 4 Coating for Protection

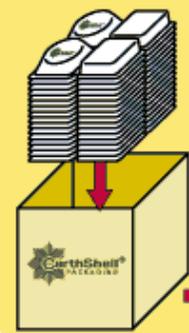


## 5 Printing

Logo and any additional graphics

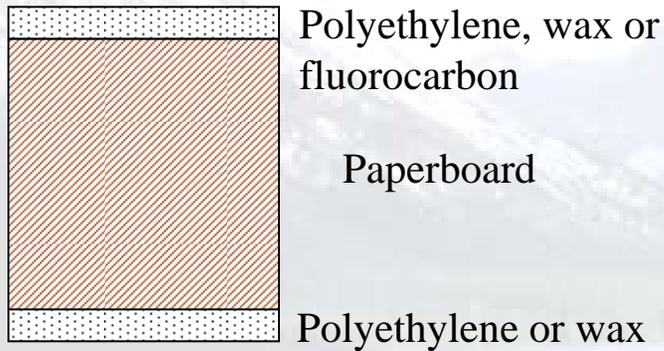


## 6 Packaging and Shipping

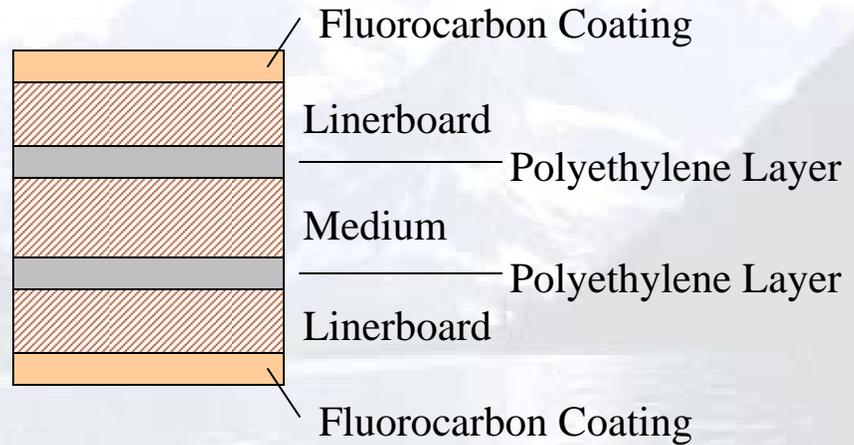


# Rigid Package Construction

## Paper



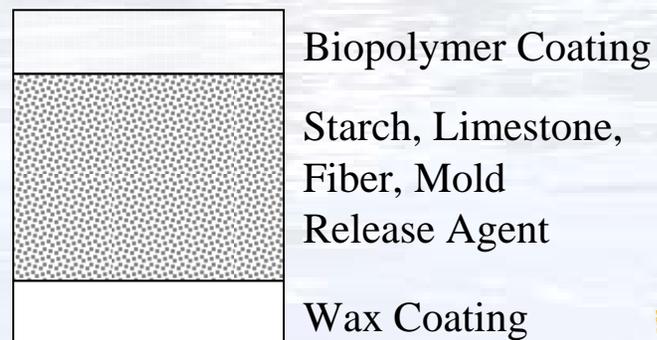
## F-Flute Container



## Polystyrene



## EarthShell Packaging



# USDA CRADA

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- ◆ **EarthShell and the USDA have been working under a Cooperative Research and Development Agreement (CRADA)**
- ◆ **The scientists at the USDA research center in Albany, California have been refining the technology to accelerate its market penetration**
- ◆ **Their accomplishments have helped to commercialize these products, expanding the use of agricultural materials**



# USDA-ARS Accomplishments

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- ◆ **Comprehensive Mixing and Molding Process Documentation**
- ◆ **Commercialization of Corn/Corn and Potato/Corn Starch Blends**
- ◆ **Mold Release Optimization and Reduction Studies**
- ◆ **Recycle/Regrind Studies, Procedure and Recommendations**
- ◆ **Two Joint Patents on Foaming Corn Pellets**



*EarthShell Packaging Market  
Position and Properties*



# Fundamentals of EarthShell Packaging®

## Brand Positioning and Identity

### Environmental Profile

- Made from primarily from natural starches and abundant limestone
- Manufacturing process uses less total energy, less fossil fuel and produces lower greenhouse gas emissions
- Recyclable and biodegradable through composting
- Takes up less space in a landfill
- Life Cycle Inventory as a tool
- Environmental Group support

### Performance

- Quality as good as or better than double laminated polystyrene, heavyweight paper and molded pulp
- Sturdy and rigid
- Microwavable
- Excellent insulation, grease and cut resistance
- Easy to stack, ship, store and use
- Performance proven with key customers, e.g., U.S. Dept. of the Interior, Sodexo, EPA, Aramark, Wal-Mart, etc.

### Cost/Price

- Products priced at a small premium (4%) to high end foam (double laminated) products and less than molded pulp
- Alternate raw materials vs petroleum based plastic and foam plates and laminated paper plates translate to cost stability
- Favorable and more stable raw material costs allow for immediate price competitiveness
- Premium performance justifies premium price
- Environmental advantages further justify premium price

# Quality and Performance

- ◆ **Premium quality**
- ◆ **Sturdy and rigid**
  - ◆ Stands up to high stacking of heavy foods
  - ◆ Confidence to carry with one hand
- ◆ **Easy to stack, ship, store and use**
- ◆ **Excellent insulation**
  - ◆ Comparable to polystyrene and superior to fluted paper



# Quality and Performance (cont.)

- ◆ **Microwavability**

- ◆ **Plates and bowls**

- Reheat foods
- Will not leak or soak through

- ◆ **Upscale look and feel**

- ◆ Attractive, natural white color
- ◆ Strength gives feel of high quality



# Awards

- ◆ **Best of the Best competition; Foodservice & Packaging Institute - First Place, Best Foam Packaging Category: EarthShell Hinged-Lid Sandwich and Salad Container**
- ◆ **15th Annual DuPont Awards for Innovation in Food Processing and Packaging - Silver Award**



# Environmentally Preferable - Life Cycle Inventory



## Manufacturing

- Uses less total energy
- Low greenhouse gas emissions
- Uses less fossil fuel

## Ingredients

- Abundant limestone
- Renewable starches like potatoes
- Air and water
- Small amounts of recycled fiber, protective coatings, and a manufacturing release agent make up the remaining ingredients
- Materials sourced close to plant – as a result, lower fuel emissions

## Product Life Cycle

## Usage

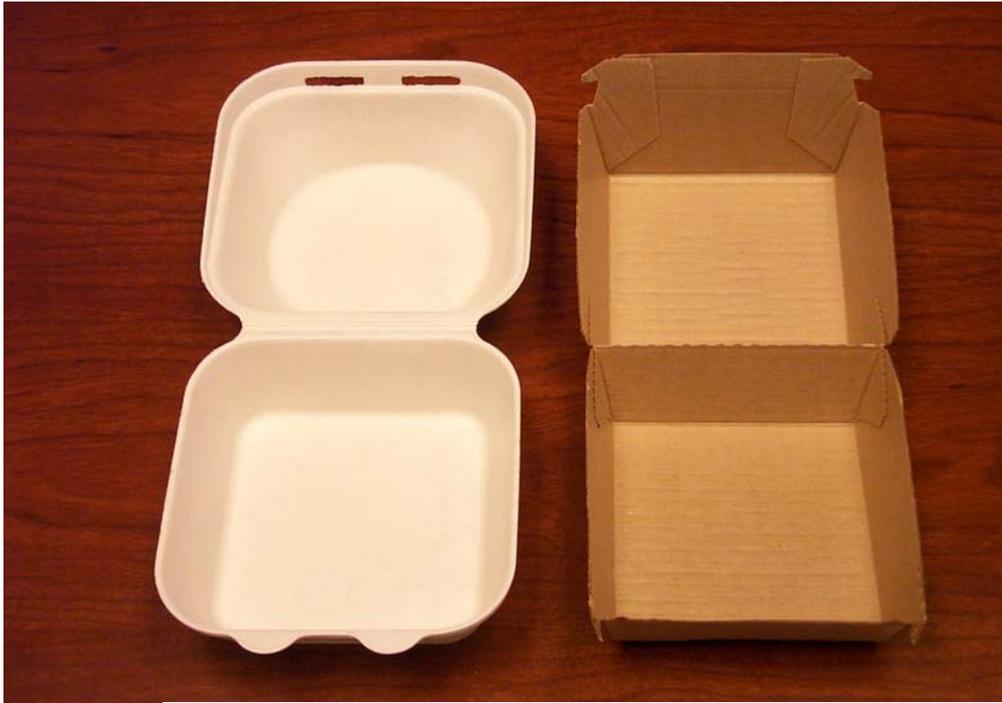
- Allows consumers to feel good about helping the environment
- Performs equal to, or better than, traditional food service packaging

## Disposal

- 100% Biodegradable – like leaves and grass, EarthShell Packaging biodegrades and is recyclable through composting
- Not harmful to marine life
- Takes up less space in landfills

**Environmentally Preferable from Start to Finish**

Life Cycle Inventory includes the environmental loadings from raw material extraction and production, manufacturing, use and final disposal



Outdoor Degradation - University of Maryland



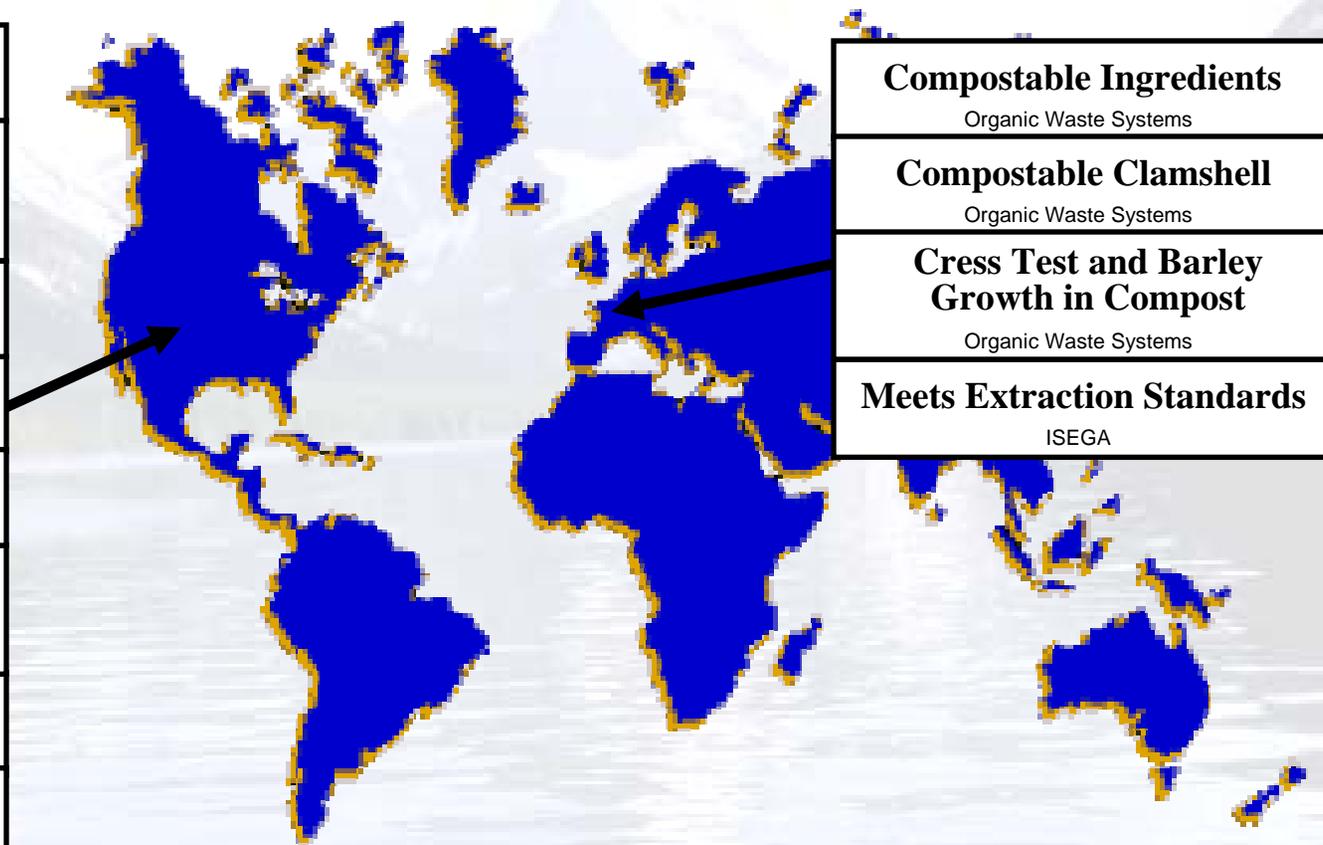
F-flute Paper - 90 Days



EarthShell Packaging - 90 Days

# The Environmental Profile is Confirmed by Independent Organizations

<b>Composts in your backyard</b> CalRecovery, Inc.
<b>Biodegrades in a Marine Environment</b> University of California, Los Angeles
<b>Less Space in a Landfill</b> University of Arizona
<b>Life Cycle Inventory</b> Franklin and Associates, Ltd.
<b>Green Seal Certification</b> Green Seal
<b>Composts Using a Variety of Methods</b> USDA
<b>Composts Commercially</b> State University of New York
<b>Outdoor Degradation</b> University of Maryland



<b>Compostable Ingredients</b> Organic Waste Systems
<b>Compostable Clamshell</b> Organic Waste Systems
<b>Cress Test and Barley Growth in Compost</b> Organic Waste Systems
<b>Meets Extraction Standards</b> ISEGA



# Environmental Support

- ◆ **Defenders of Wildlife**
- ◆ **Friends of the Earth**
- ◆ **World Resources Institute**
- ◆ **Green Seal**
- ◆ **U.S. EPA**
  - ◆ **Environmentally Preferable Purchasing Guidelines**
- ◆ **National Fish and Wildlife Foundation**



# Cost

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- ◆ **Made primarily from inexpensive limestone and starch**
- ◆ **Ingredients historically more consistent pricing**
  - ◆ less fluctuation compared to paper and petroleum
  - ◆ Abundant and renewable
- ◆ **Efficiency of manufacturing equipment is guaranteed by the producer**



# *Market Trends*



# Market Trends

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- ◆ **Consumers recognize the direct connection between the environment and their quality of life**
- ◆ **Consumer have become more environmentally aware and look for products with a lessor impact on the environment**
- ◆ **Awareness in the 1980's and 1990's has grown into action**
- ◆ **Businesses realize the opportunity this represents and are responding**



# Market Trends (cont.)

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## ◆ **Examples**

- ◆ Organic Foods - Now \$10.8 billion industry growing at 19.5% per year since 1997
- ◆ Hybrid Cars - Nine models now available with another ten coming in 2006, 2007
- ◆ Energy - Fossil alternatives gaining. BP Solar to post first profit
- ◆ Corporate reporting - Fortune 500
- ◆ Retail - Wal-Mart announces major environmental campaign



# Government Influence

- ◆ **Executive Order 13101 directing the government to consider the environmental attributes of a product during purchasing**

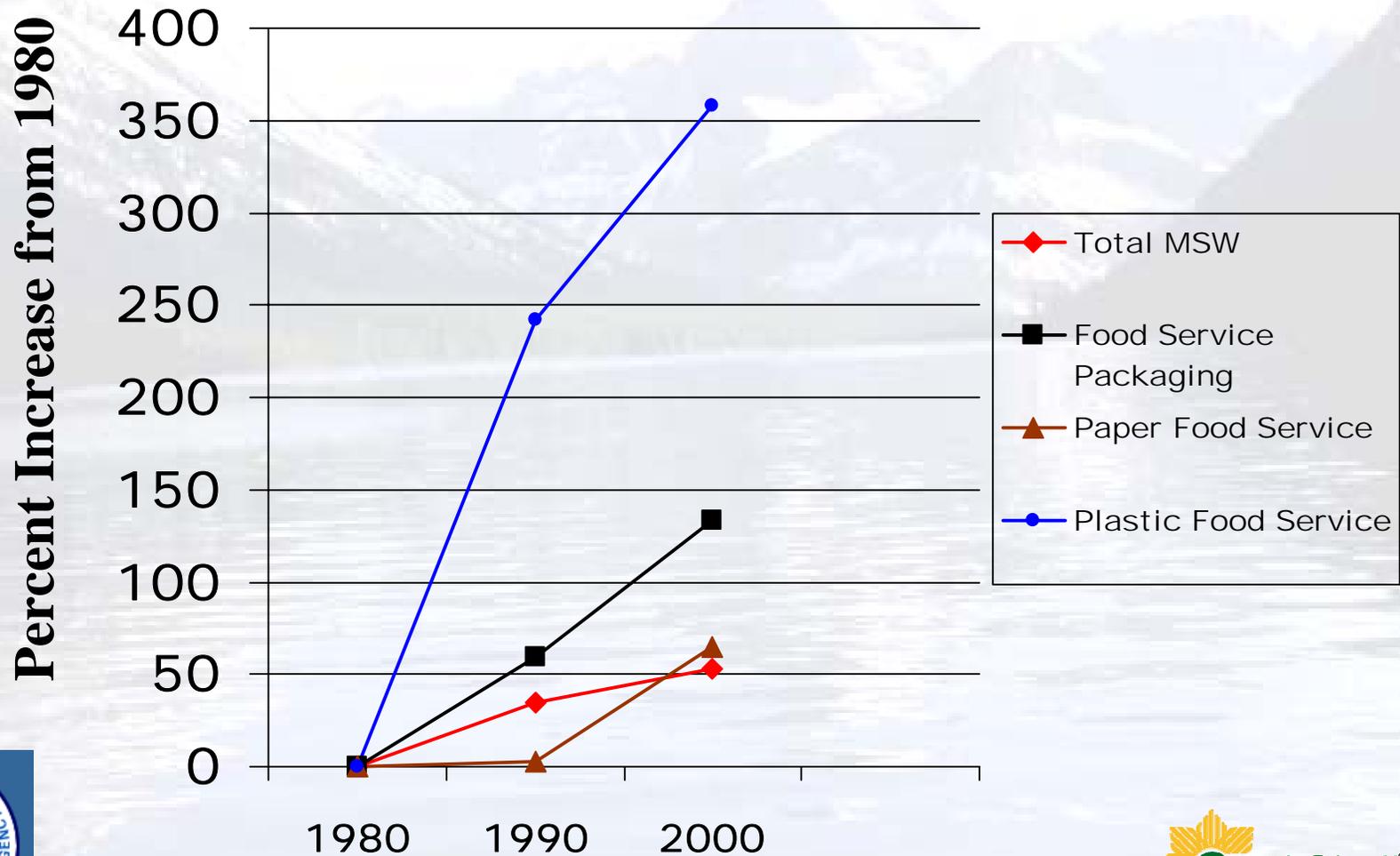
*Environmental attributes + Price + Performance = EPP*

- ◆ **Biobased Products (Title IX of the Farm Bill)**

- ◆ Government to preferentially purchase biobased products
- ◆ USDA to create criteria for biobased products by category
- ◆ USDA to create a list of biobased products and certify products as biobased
- ◆ Biobased products specially identified in government purchasing systems (GSA)



# Food Service Packaging Trends in Solid Waste



Source: U.S. EPA



*Products Available and the Path  
Forward*



# Manufactured Under License

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- ◆ **EarthShell Corporation is the technology company**
- ◆ **Renewable Products, Inc. (RPI) is the licensee that manufactures, sells and distributes EarthShell Packaging products**



# Products Available

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- ◆ **EarthShell Packaging products are now available to the U.S. market**
  - ◆ 9-inch plate
  - ◆ 12-ounce bowl
- ◆ **These are the most common dinnerware items**



# The Path Forward

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- ◆ **Expansion of the dinnerware line**
  - ◆ Larger and smaller plates, e.g. 10 1/4-inch plates
  - ◆ Larger and smaller bowls
- ◆ **Deep Draw Items - USDA CRADA Focus**
  - ◆ Hot beverage cups and lids
  - ◆ Noodle cups
- ◆ **Development of other EarthShell Packaging technologies**



# The Path Forward (cont.)

- ◆ **EarthShell Packaging is still very early in the learning curve**
  - ◆ Many new advances and refinements to be made
  - ◆ New products to be developed
  - ◆ New branches of the technology to be completed
- ◆ **Paper and plastic have both been in use since the 1960's - At the end of their learning curve**





**Packaging for Today,**

**Without Sacrificing Tomorrow**