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Agricultural Outlook Forum Presented: February 16, 2006

# IMPROVING BIODEGRADABLE CAFETERIA WARE

John Nevling
Vice President
EarthShell Corporation

EarthShell PACKAGING

# 2006 Agricultural Outlook Forum

# Improving Biodegradable Cafeteria Ware
# EarthShell Packaging

February 16, 2005

# Improving Biodegradable Cafeteria Ware EarthShell Packaging

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

# Basic EarthShell Packaging Technology

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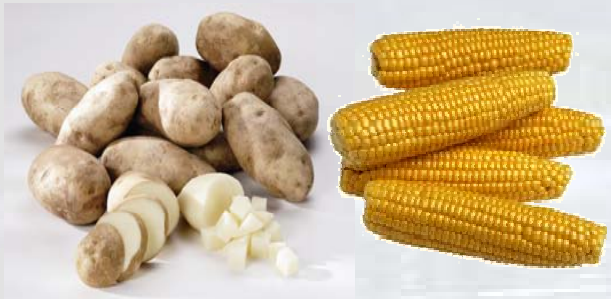
# What is EarthShell?

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



*Annually Renewable Starch*

+

*Natural, Abundant Limestone, Biodegradable - Compostable polymers*

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*EarthShell Packaging*

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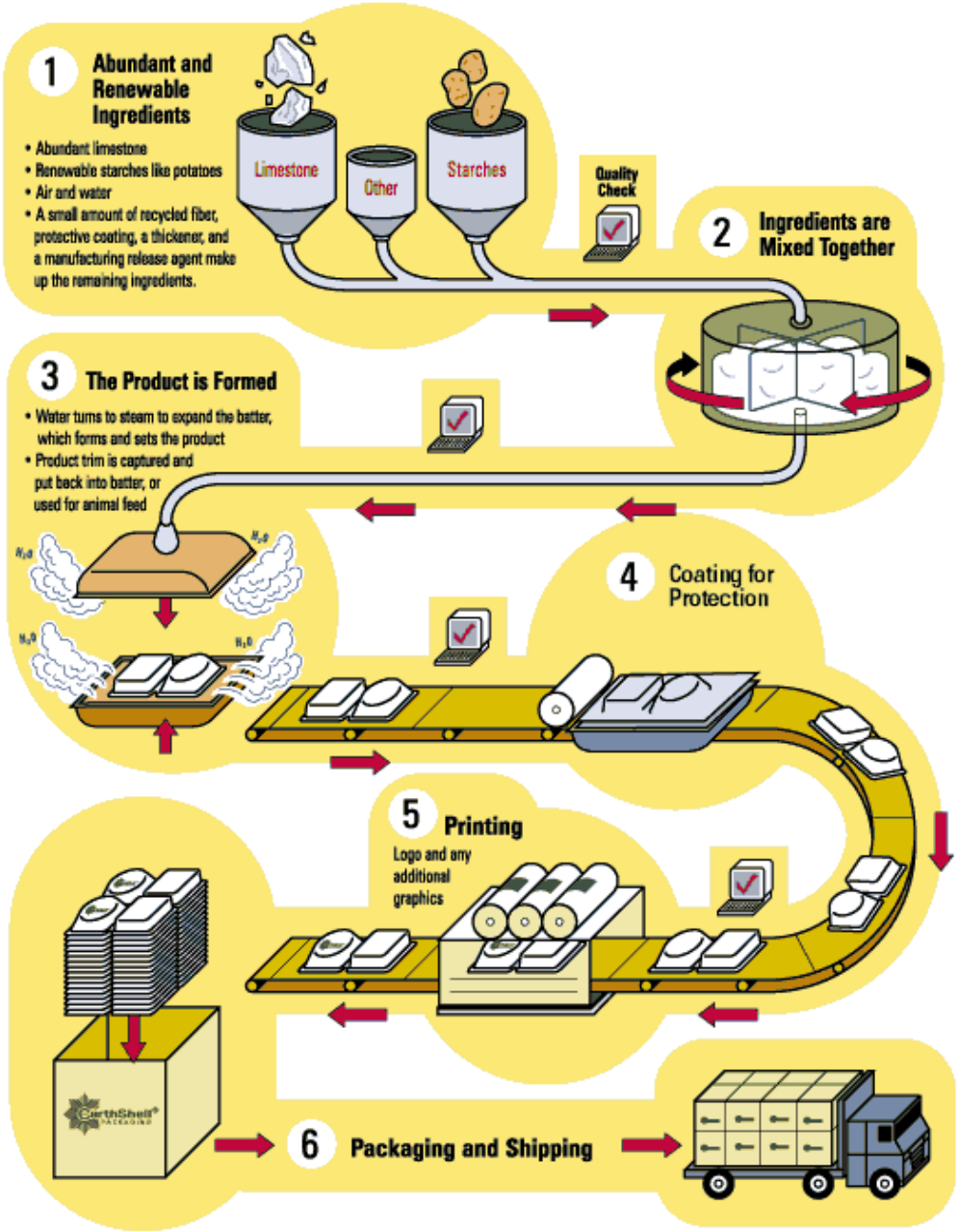
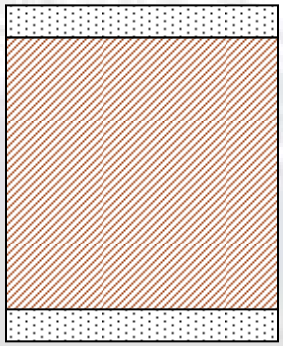
# The Making Of EarthShell Packaging®



# Rigid Package Construction

**Paper**

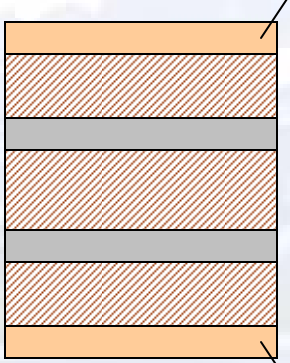


Polyethylene, wax or fluorocarbon

Paperboard

Polyethylene or wax

**F-Flute Container**



Fluorocarbon Coating

Linerboard

Polyethylene Layer

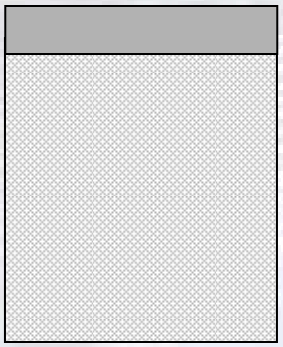
Medium

Polyethylene Layer

Linerboard

Fluorocarbon Coating

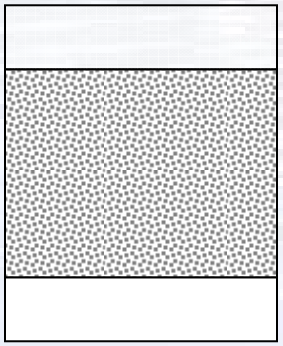
**Polystyrene**



Film

Foam

**EarthShell Packaging**



Biopolymer Coating

Starch, Limestone, Fiber, Mold Release Agent

Wax Coating

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# USDA CRADA

- **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

- **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**

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# EarthShell Packaging Market Position and Properties

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# 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, Sodexho, 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

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# 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

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# 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**

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# Environmentally Preferable - Life Cycle Inventory

**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

**Composts in your backyard**
CalRecovery, Inc.

**Biodegrades in a Marine Environment**
University of California, Los Angeles

**Less Space in a Landfill**
University of Arizona

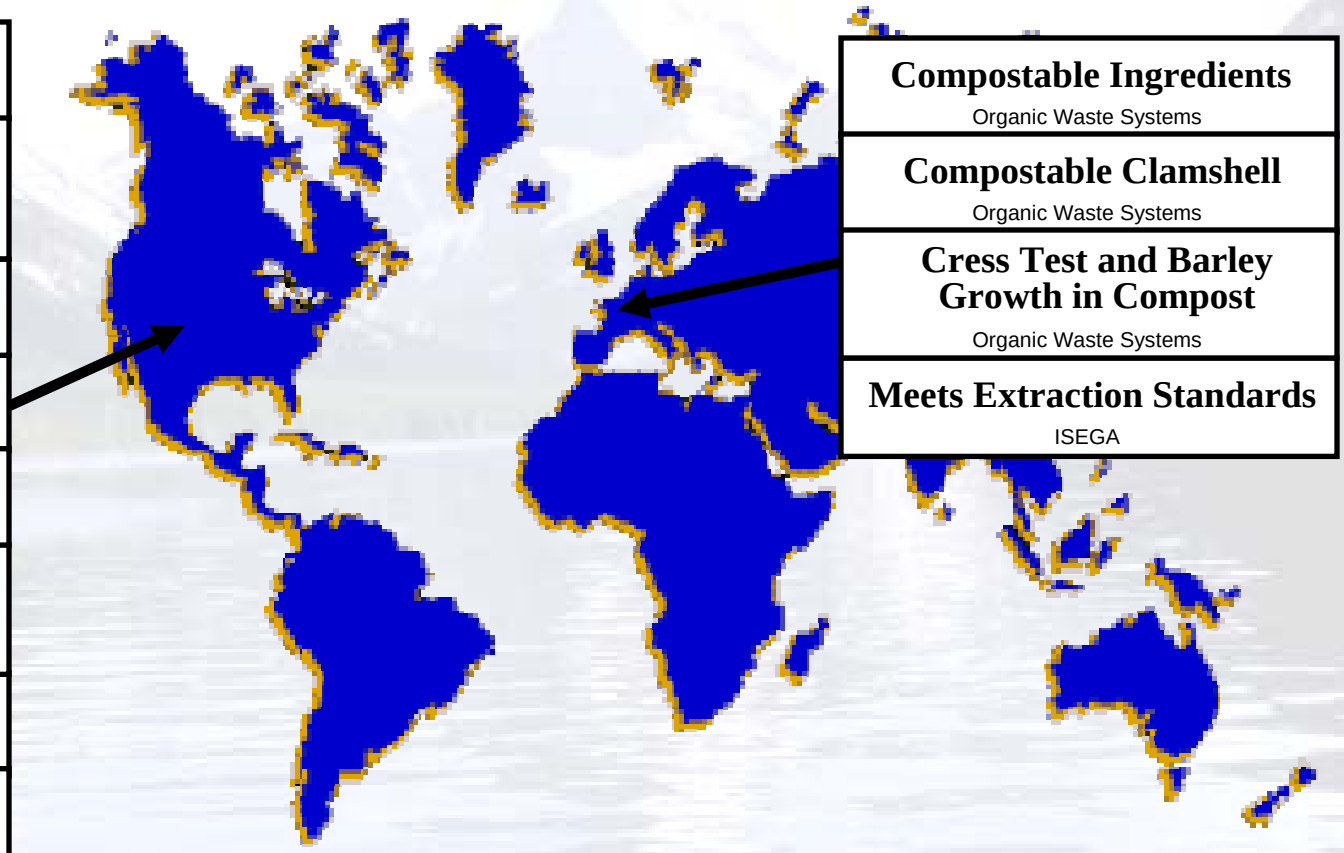
**Life Cycle Inventory**
Franklin and Associates, Ltd.

**Green Seal Certification**
Green Seal

**Composts Using a Variety of Methods**
USDA

**Composts Commercially**
State University of New York

**Outdoor Degradation**
University of Maryland



**Compostable Ingredients**
Organic Waste Systems

**Compostable Clamshell**
Organic Waste Systems

**Cress Test and Barley Growth in Compost**
Organic Waste Systems

**Meets Extraction Standards**
ISEGA

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# 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

- **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**

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# *Market Trends*

# Market Trends

- **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**

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# Market Trends (cont.)

- **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

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# 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)

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

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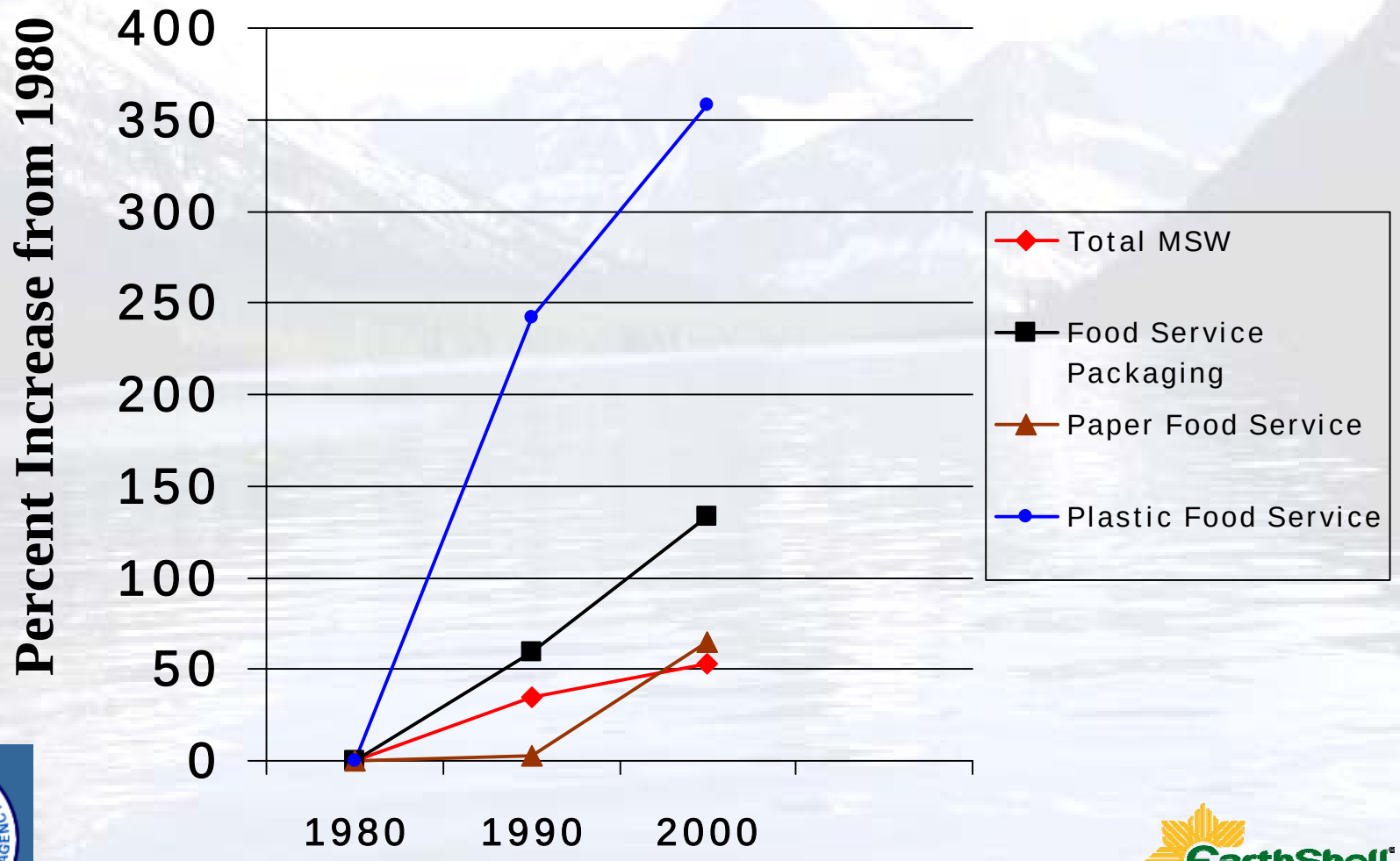
# Food Service Packaging Trends in Solid Waste




Source: U.S. EPA

# *Products Available and the Path Forward*

# Manufactured Under License

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

ReNewable
PRODUCTS, INC.

EarthShell
CORPORATION

# Products Available

- **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

- **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**

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# 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**

EarthShell®
PACKAGING
Packaging for Today,
Without Sacrificing Tomorrow