

# The U.S. Industry Perspective on Assessing Sustainability of Bio-based Products

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**Rina Singh, PhD**  
**Director Policy**  
**Industrial and Environmental Section**

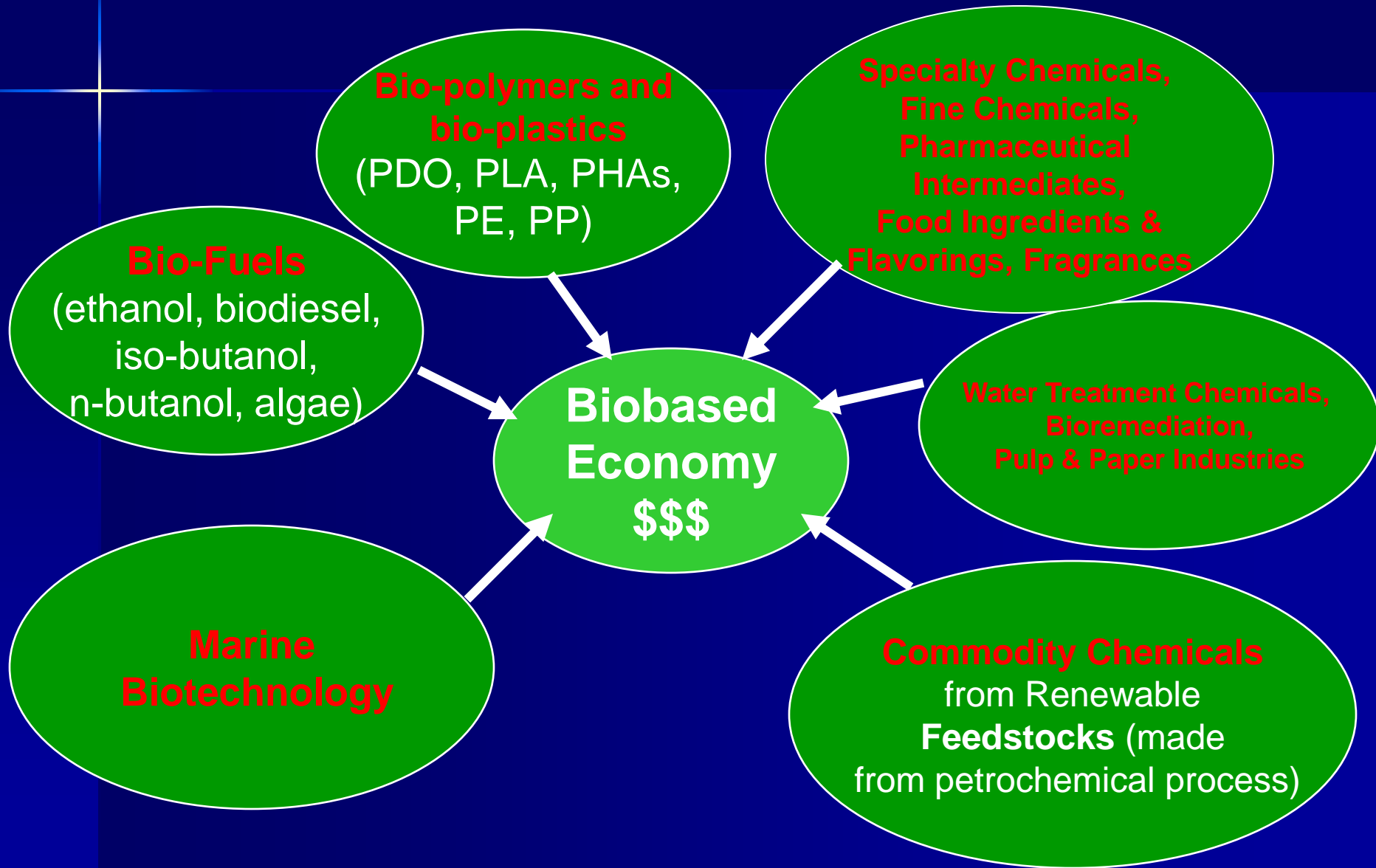
# Bio-based Chemicals and Products

## A New Driver of U.S. Economic Development

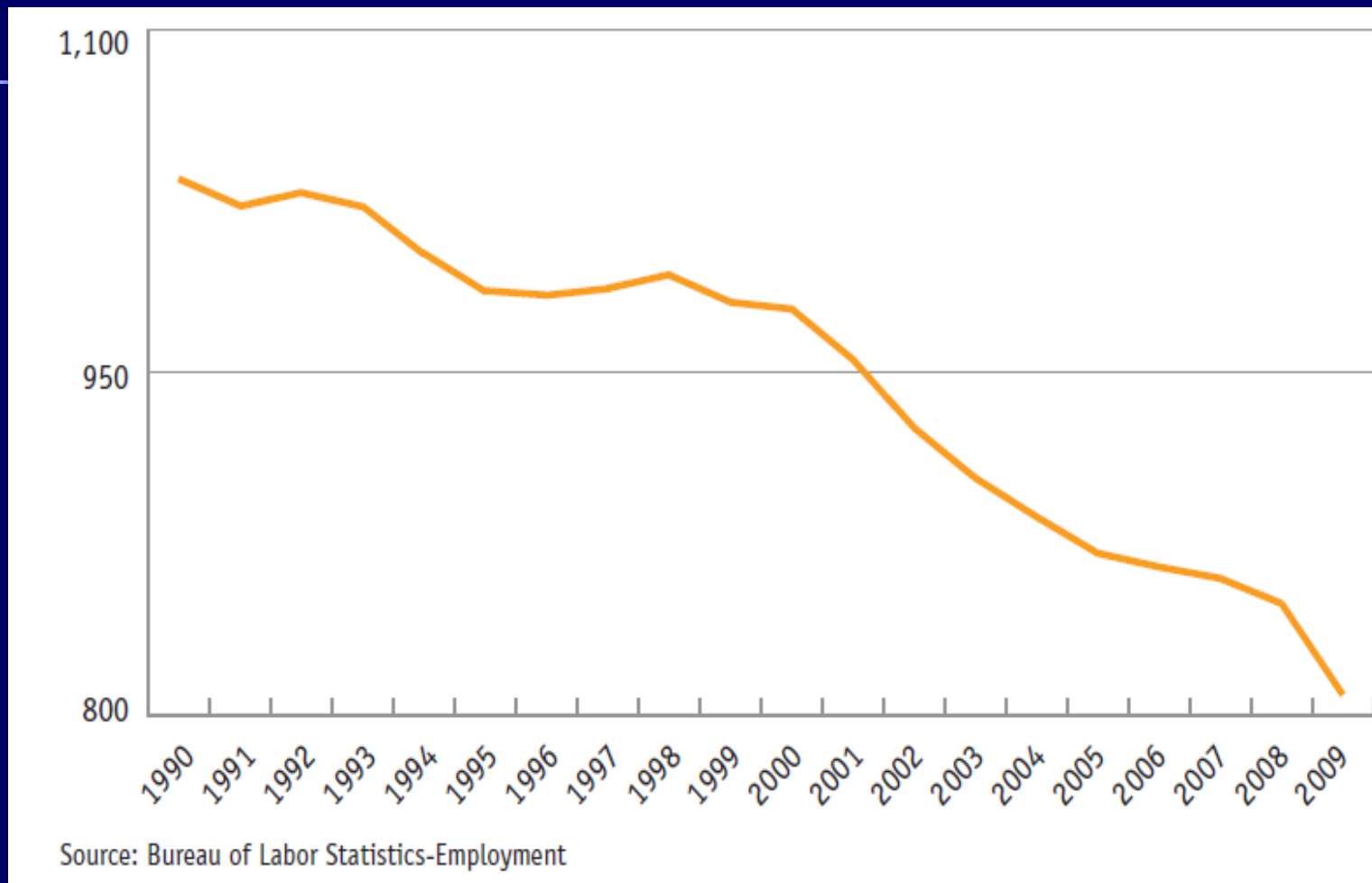


- Historically U.S. chemicals and plastics industry was responsible for 5 million U.S jobs and \$20B positive trade balance
- Over last two decades, competitive advantage for chemicals and plastics manufacturing has moved to the Middle East and Asia
- Bio-based chemicals and plastics represents a historic opportunity to reverse these trends through:
  - ❖ creation of new generation of renewable chemicals and plastics
  - ❖ sustainable bio-products developed and produced in the U.S.
- Federal policies could impact the growth of the bio-based products sector in the U.S.

# Key Components of a Bio-based Economy

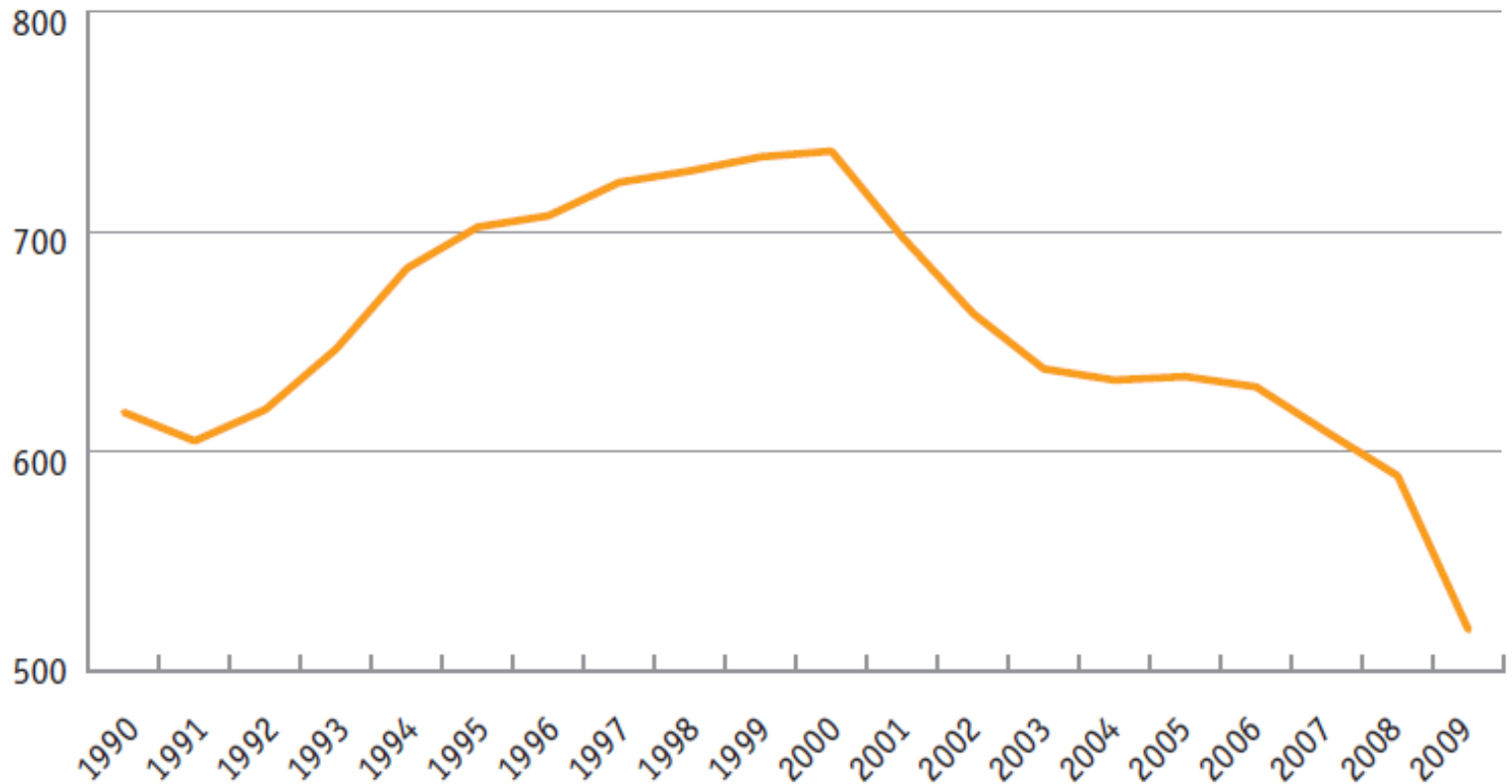


# The Decline of the U.S Chemicals Industry



**Chemical Jobs In The U.S (in thousands)**

# The Decline of the U.S Plastics Industry



Source: Bureau of Labor Statistics-Employment

**Plastics Jobs In The U.S (in thousands)**

# The Decline of the U.S Chemicals and Plastics Industry



## ■ Chemicals Industry:

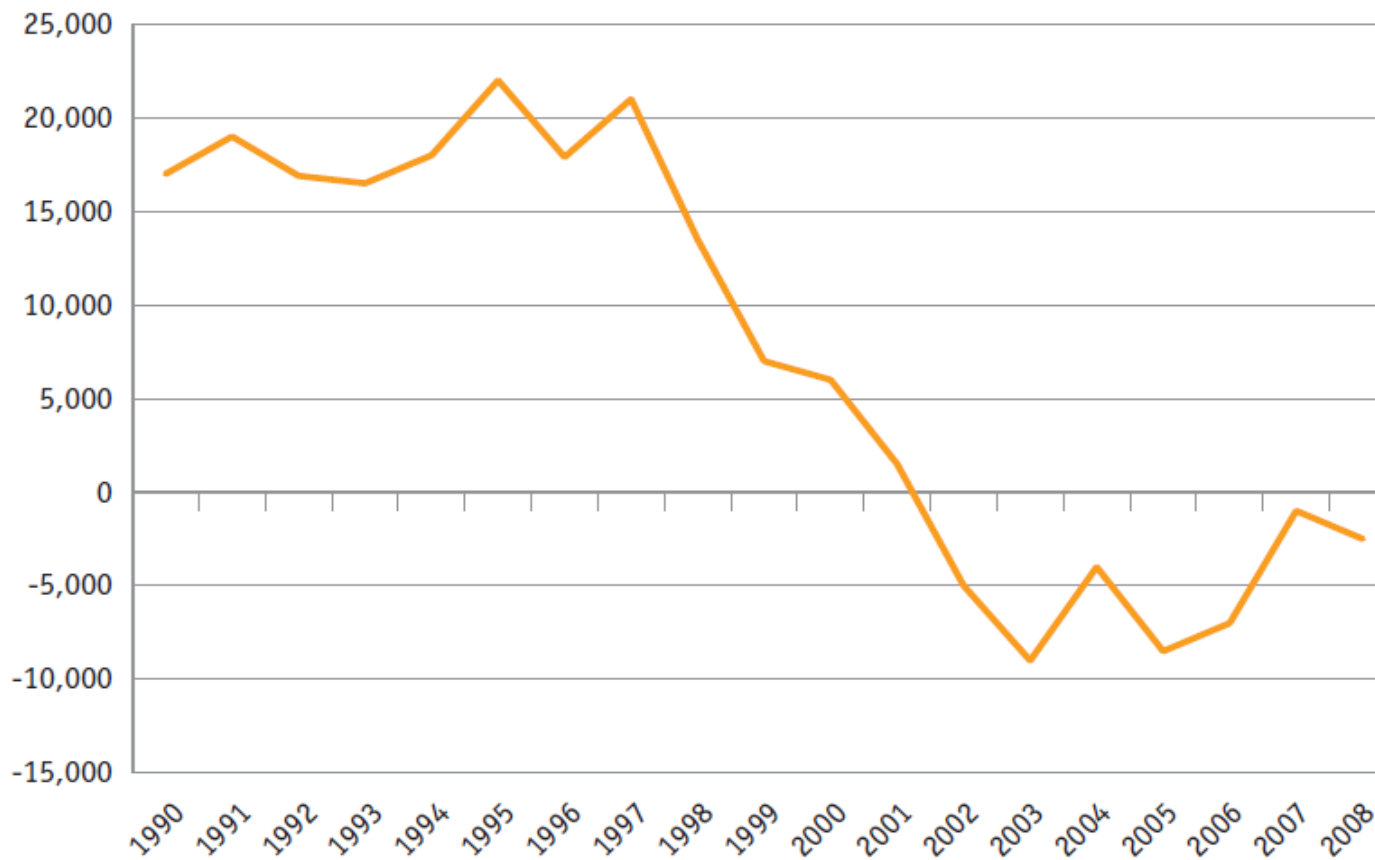
- ❖ Once a primary source of U.S export earnings, the industry began to erode during the 1980s - due to oil rich countries
- ❖ Production moved to other countries, so did jobs
- ❖ Total U.S employment in the chemicals industry declined by over 20% in last two decades (1 MM in 1990 to over 800,000 in 2009) – further decrease projected

## ■ Plastics Industry:

- ❖ Similar trend as chemicals – 116, 000 fewer employees since 2002 (12% decrease) – plastic jobs decreased 500,000
- ❖ Number of plastic manufacturing facilities has declined by 13%
- ❖ Many have declared bankruptcy



# Chemicals and Plastics Export Earnings Drop

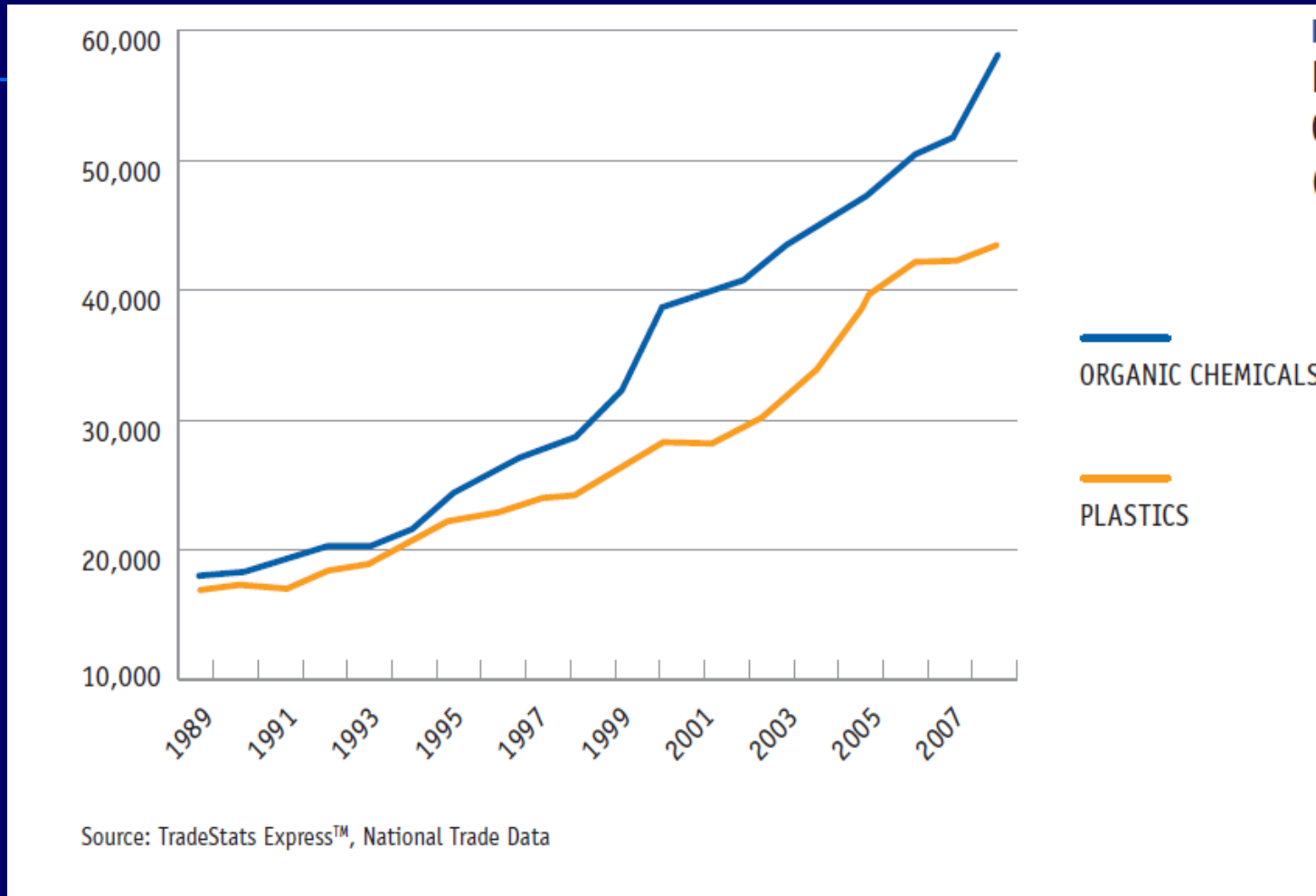


Source: TradeStats Express™, National Trade Data

**Chemical market trade balance (in millions of USD)**



# Chemicals and Plastics Increase Imports



**Plastics and Chemical Imports (in millions of USD)**



## Competitive Advantage Shifting from U.S

- Chemicals and plastics industry has been a driver of export earnings for the U.S (between 1997 to 2003 balance trade dropped from \$20B surplus to \$10B) – overall deficit
  - Middle East and Asia have increased their chemicals and plastics exports at higher rate than U.S
- U.S chemicals and plastics imports have steadily risen (\$10B in 1989 to \$35B for plastics and for chemicals is \$50B)
- Data most concerning for the U.S industry has been with new capital investment
  - Period of 1998-2009, an increase of 32% in new petrochemical capital investment outside of U.S by U.S companies <sup>1</sup>
  - 2% increase in petrochemical investment by U.S companies within U.S
  - Most large deals and investments are being made by Middle Eastern countries

1 Beacham, W. (2009, February 23). White biotech is catalyst for chemical industry growth. Retrieved from ICIS.com: <http://www.icis.com/Articles/2009/02/27/9196506/white-biotech-is-catalyst-for-chemical-industry-growth.html>

# Potential for Bio-based Products

- Bio-based products industry employed over 5,700 Americans at 159 facilities in 2007
  - ❖ Every new job in the chemical industry creates 5.5 additional jobs elsewhere in the economy
  - ❖ Recent bio-refinery openings are likely responsible for 40,000 jobs
- Less than 4% of U.S chemical sales are bio-based, recent USDA analysis puts the potential market share in excess of 20% by 2025 with adequate Federal policy support
  - ❖ This growth could save tens of thousands of additional jobs in the next five years

# Potential for Bio-based Products: World Bio-based Market Penetration 2010-2025

CHEMICAL SECTOR	2010	2025
Commodity Chemicals	1-2 percent	6-10 percent
Specialty Chemicals	20-25 percent	45-50 percent
Fine Chemicals	20-25 percent	45-50 percent
Polymers	5-10 percent	10-20 percent

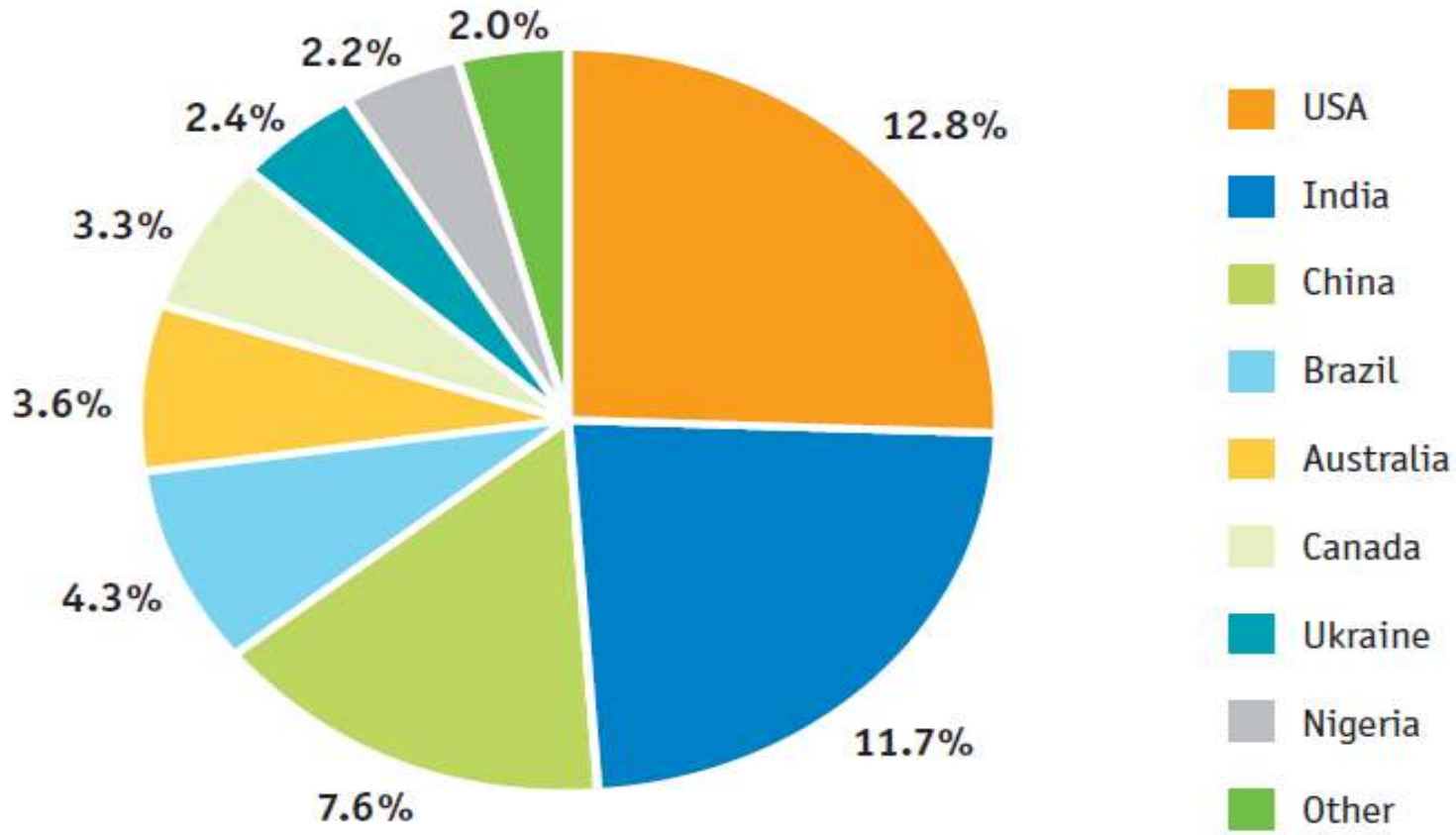
Source: USDA, U.S. Biobased Products Market Potential and Projections Through 2025

# Bio-based Products Building the U.S Economy



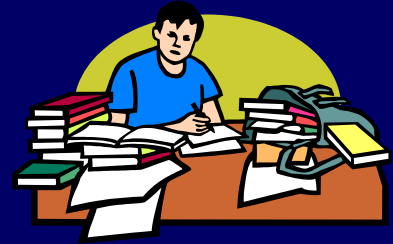
- U.S is well positioned to capture share of the bio-based market
  - ❖ We are home to the world's leading industrial biotechnology, which enables creation of bio-based products
  - ❖ We have a strong agricultural sector with the largest arable land in the world
  - ❖ We are largest chemicals and plastics market in the world
  - ❖ Downstream infrastructure (warehousing, converting, manufacturing) already in place

# Arable Land Around the World



Source: NationMaster.com, Arable Land hectares by country





## Key Findings: Societal Benefits from Bio-based Products

- Products made from renewable resources offer
  - Lower CO<sub>2</sub> emissions
  - Reduction of waste to landfills
  - Reduced reliance on fossil resources
- Studies have shown biofuels can reduce CO<sub>2</sub> emissions by 123.5 million tonnes <sup>2</sup>
  - Bio-based products can have a similar beneficial effect by using less fossil fuels
  - WWF report shows reductions by 1B to 2.5B tonnes by 2030 through bio-based products and other industrial biotechnologies

# What are the Policy Actions for Growing Bio-based Products?

- Provide product parity and early stage support in bio-renewables tax policy
  - Enact a production tax credit (PTC). This will promote investment, production and adoption of bio-based products – similar to biodiesel and cellulosic biofuels
- Increase funding through grants and other programs for bio-based products
  - Financial assistance programs are needed to stimulate innovation and demonstration of new biological conversion of agricultural feedstocks to bio-based products – like the DOE and USDA programs directed towards next generation biofuels development
  - Establish grants and loans to help struggling biorefineries add high value chemical production which can provide vital stability to biorefineries – through DOE and USDA programs
- Ensure biobased products are incentivized in climate change/carbon legislation
  - Most bio-based products are carbon negative on a lifecycle basis by sequestering atmospheric carbon within the product itself
  - Legislation does not distinguish between fossil based and bio-based products
  - In doing so, would provide market facing opportunities and investment
- Timely implementation of renewable chemical intermediates in USDA Biopreferred voluntary labeling and procurement programs





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