

# **Bioproducts: Research and Development**

**Brent Shanks**  
**Director, CBiRC**  
**Iowa State University**  
**November 20, 2014**



# New Processes and Products

## ***Costs***

1. Research and development
2. Process operating costs
3. Process capital costs

## ***Revenues***

1. Market size (lbs)
2. Market prices (\$/lbs)



# Need to Leverage All Costs

## ***Research and development***

1. Platform technology
2. Multiple products
3. Development infrastructure
  1. Scaling equipment
  2. Process integration
  3. Value chain integration

## ***Process operating costs***

1. “Learning” curve
2. Feedstock utilization (*matching market size*)

## ***Process capital costs***

1. Incremental investment
2. Feedstock utilization

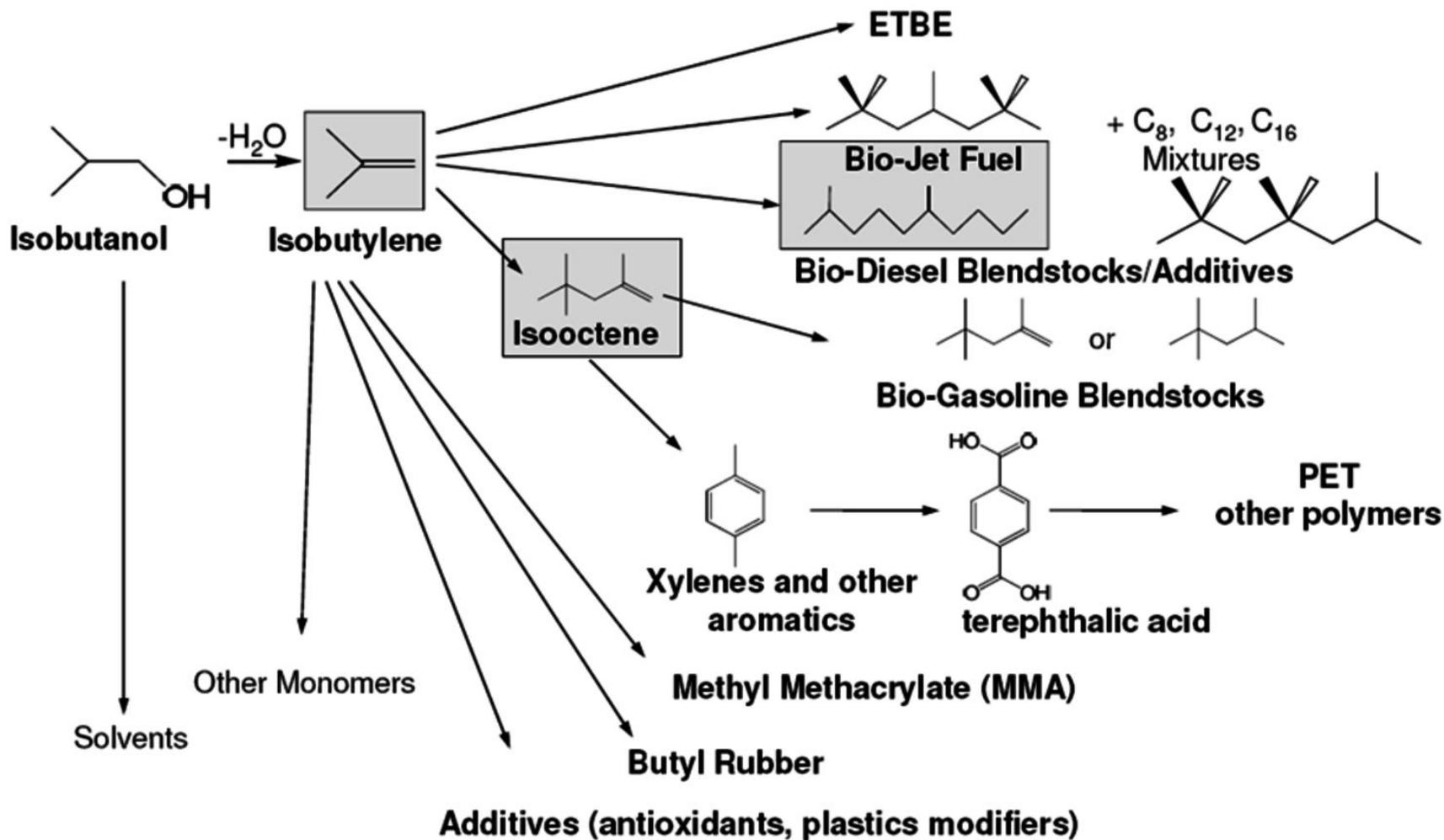


# Commercialization Path

- 1. Higher value products (minimum viable product)***
- 2. Process learning curve***
- 3. Alternative feedstocks***
- 4. Lower value products\****

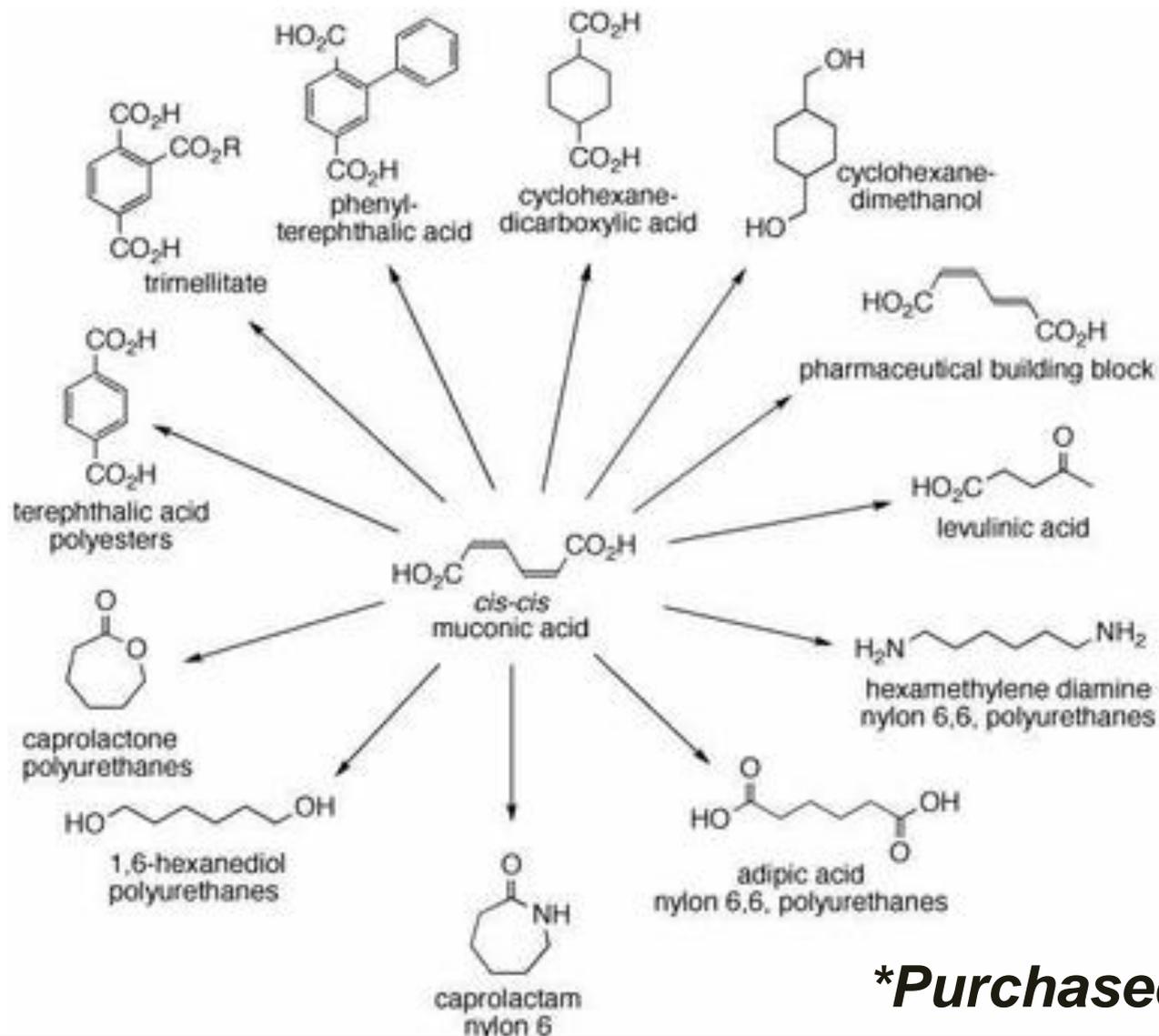
\* Market (revenue) potential has to be sufficiently large

# Isobutanol Platform



\*Catalysis for the Conversion of Biomass and Its Derivatives, Behrens and Datye, eds., 2013

# Draths Corporation Platform\*



*\*Purchased by Amyris*

# Triacetic Acid Lactone Platform

