

# *Smart, Sustainable Growth*

## **DuPont's commitment:**

*Creating shareholder and societal value while decreasing the environmental footprint along our value chains*

*“Environmental footprint” = injuries, illnesses, incidents, waste and emissions, and depletable forms of raw materials and energy*

# DuPont Applied BioSciences Strategy

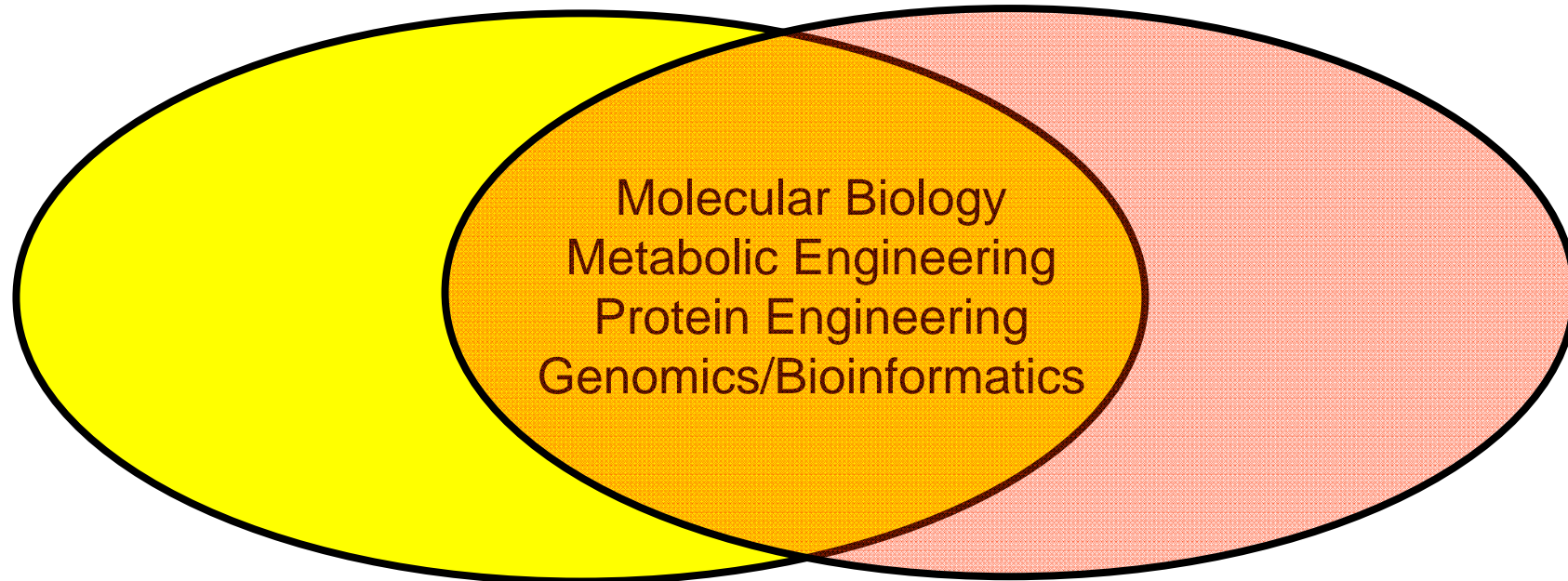
*Focus on large, market driven opportunities* enabled by the integration of chemistry and biology . . .

- Target areas with existing and emerging unmet needs where our integrated science creates *unique advantage*
- *Transform the targeted industries* with our integrated knowledge base
- *Use partnerships* to expand market opportunities, accelerate speed to market and maximize value capture

# Biotechnology at DuPont

DuPont Ag & Nutrition

DuPont Applied BioSciences™



**Common Core Technologies**

# DuPont Biofuels

3 Segments



Seed & Crop Protection Solutions

Agricultural Inputs  
Seeds & Crop Protection



Biobutanol

Advanced Biofuels

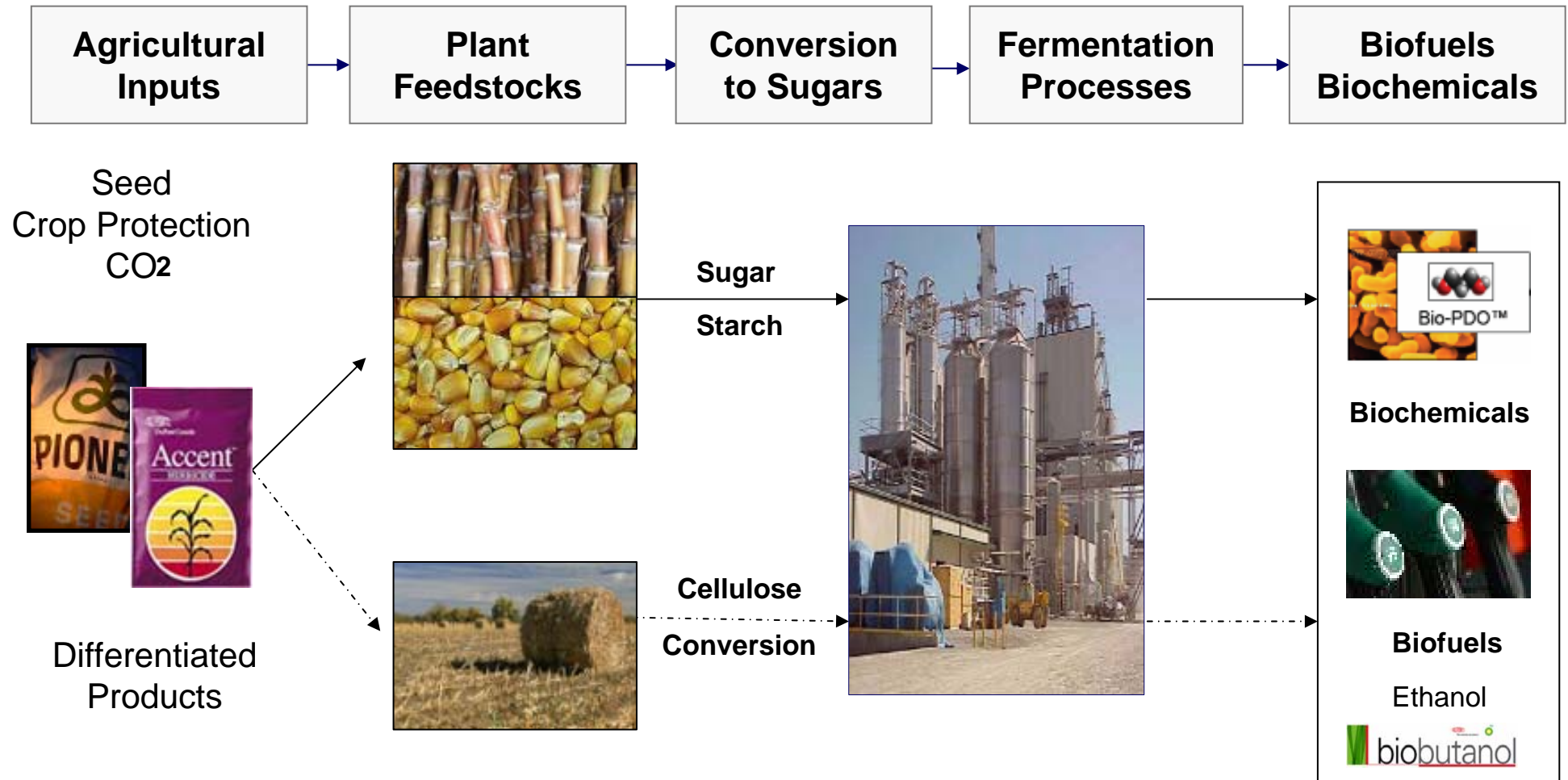


Cellulosic Fuels

Biofuels from Biomass

# Biorefinery Value Chain

Carbohydrates to Fuels & Chemicals

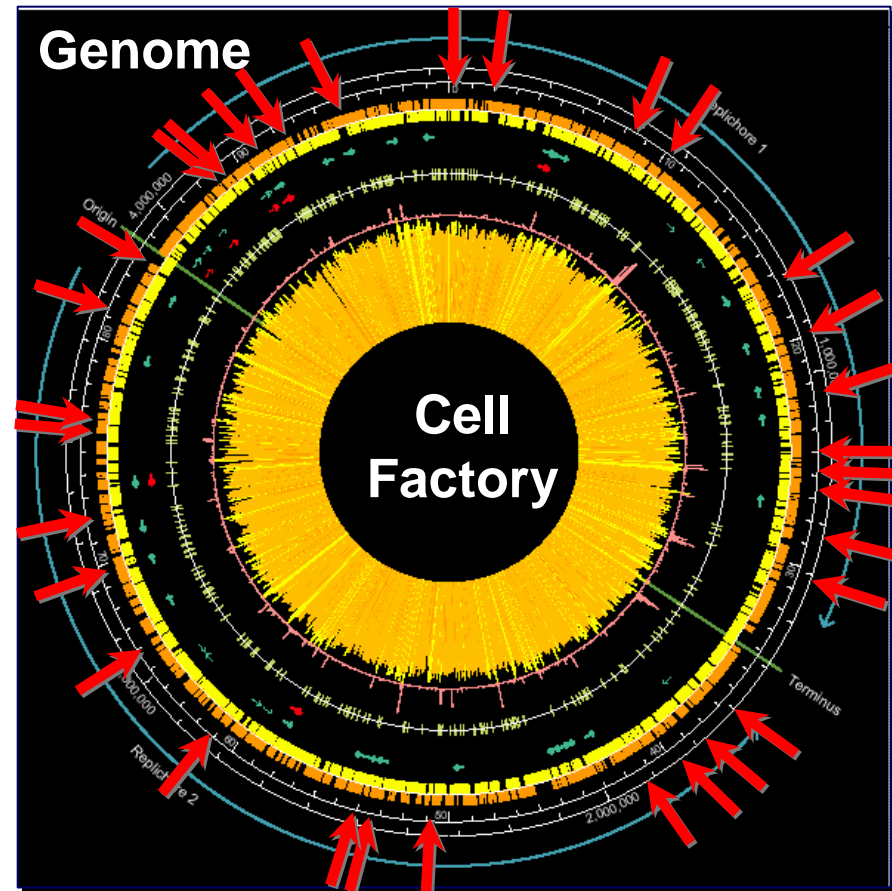


# DuPont Science: Building a Better Biofuel

*Enabling Technology – Cell “Software”*

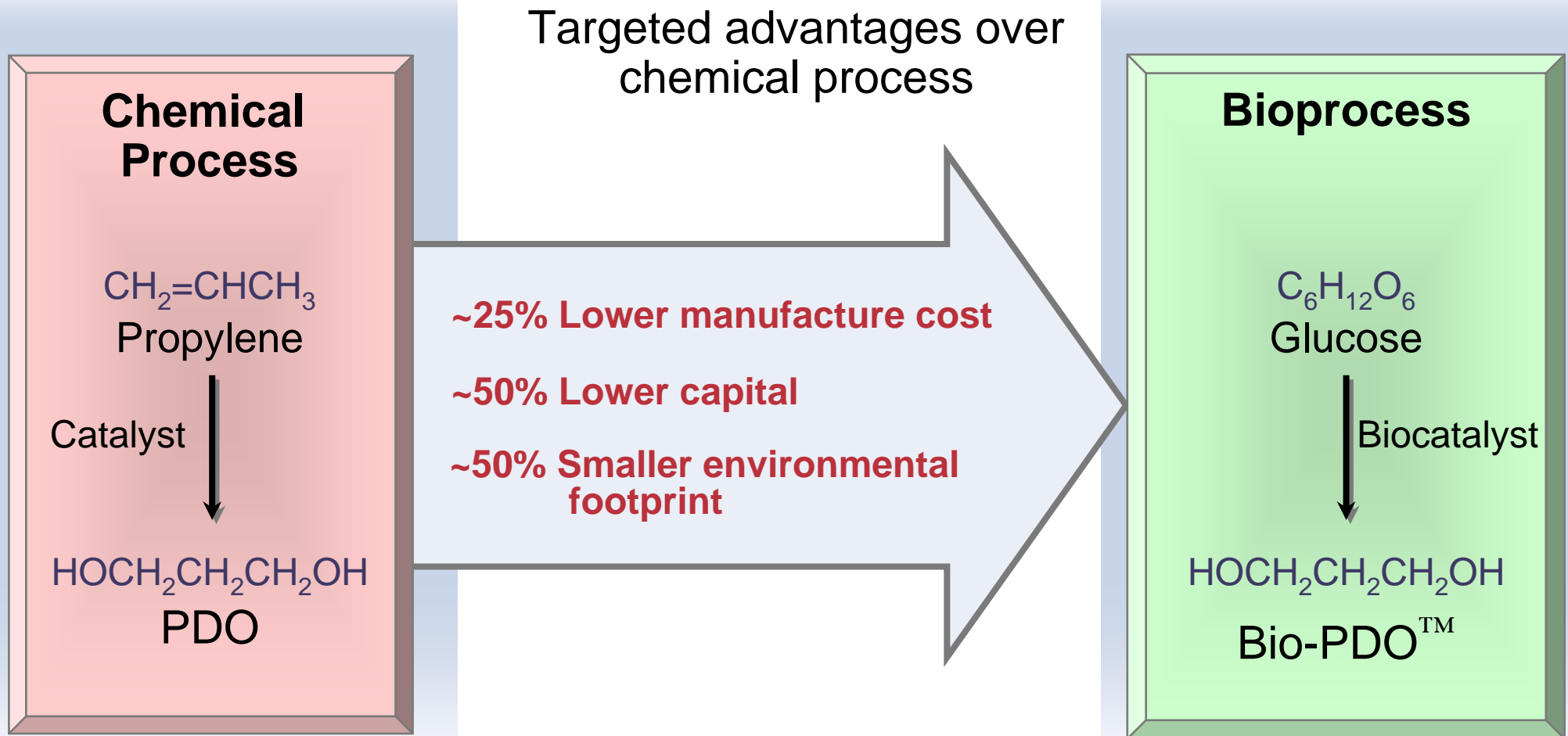
## Metabolic Engineering

- Technology leader
- Leveraging our Bio-PDO™ success
- Engineering the cell to economically produce products of choice



*The miracles of science™*

# Why a Bioprocess?



# DuPont BioFuels

- World is undergoing an historic change
  - Sustainable energy is society's biggest challenge
  - Greatest economic opportunity over the next decade
  - New wave of innovation is needed
  - Movement towards biofuels is an economic reality
- DuPont in the lead
  - Technology is validated
  - Commercialization plan is solid & on track
  - Uniquely advantaged to win

# Biofuel Imperatives

## Upstream



### Feedstock

Adequate Regional Supply

## Downstream



### Refinery & Pipeline

Compatibility With Existing  
Infrastructure



### Retail & Consumer

Uncompromised Fuel Performance

**Current biofuel solutions are inadequate to meet global needs**

# DuPont Answer

## Deliver Innovations that Transform the Market

### Upstream



#### Feedstock

Adequate Regional Supply

## Cellulosic Ethanol

### Downstream



#### Refinery & Pipeline

Compatibility With Existing  
Infrastructure



#### Retail & Consumer

Uncompromised Fuel Performance

## Biobutanol

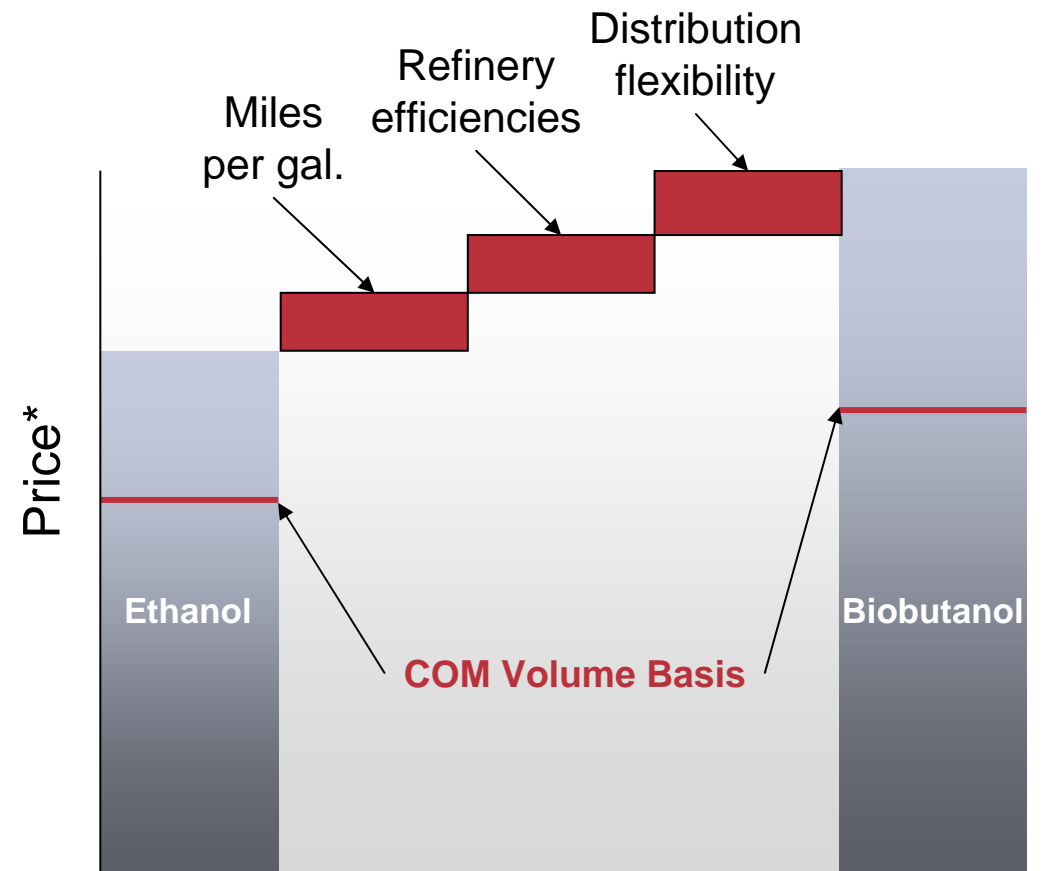
# Biobutanol - Economic Value

## *Value proposition:*

Biobutanol delivers significantly improved logistics & fuel performance across the value chain

## Attributes Price

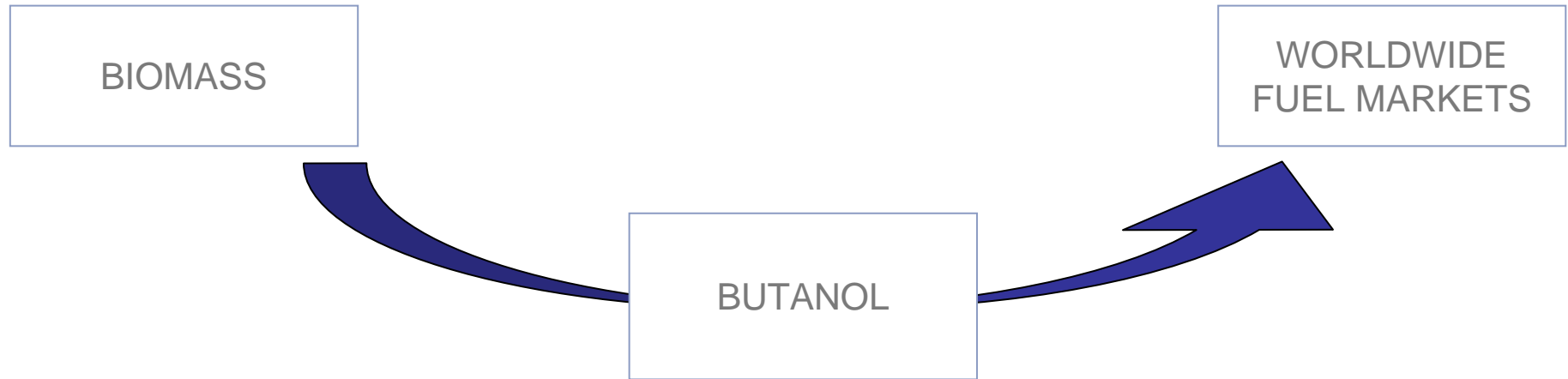
- Lower Distribution Costs / Refinery Blending
- Higher Blending Value and Higher Blend Levels
- Infrastructure compatibility
- Higher energy density (26%)
- Greater compatibility with existing engine designs and other materials
- Synergistic with Ethanol



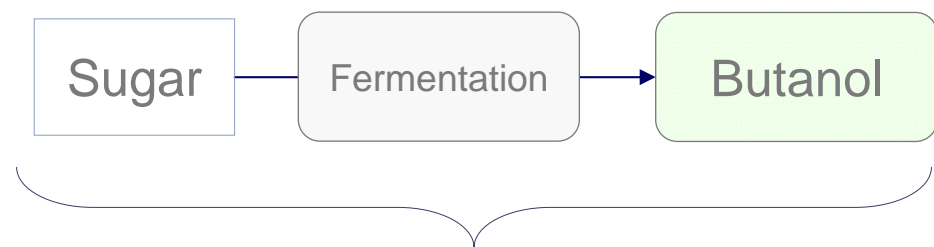
\* Normalized ethanol price / Graph illustrates sources of value / Not to scale

# DuPont - BP Partnership

## Resolving Ethanol Constraints



Plant Feedstocks



Metabolic Engineering



Performance Fuels



# Cellulosic Ethanol - Low Cost Carbon

- **Value proposition vs. grain-based ethanol:**
- **DuPont technology delivers lower-cost production by extension to cellulosic feedstocks**

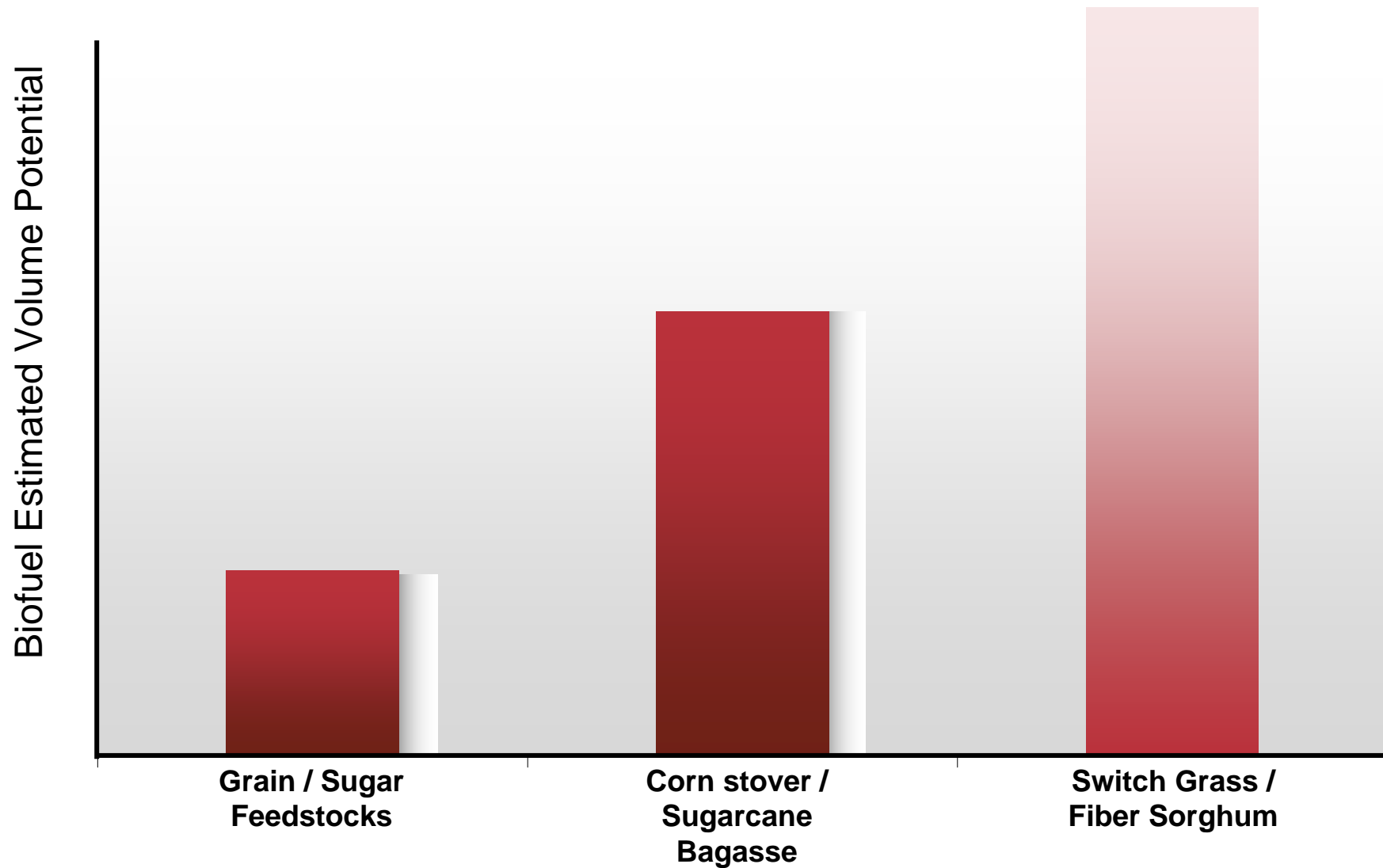
## Upstream



- **Increase biofuel output per acre**
  - e.g. corn stover, bagasse, wheat straw
- **New feedstocks**
  - e.g. fiber sorghum, switchgrass

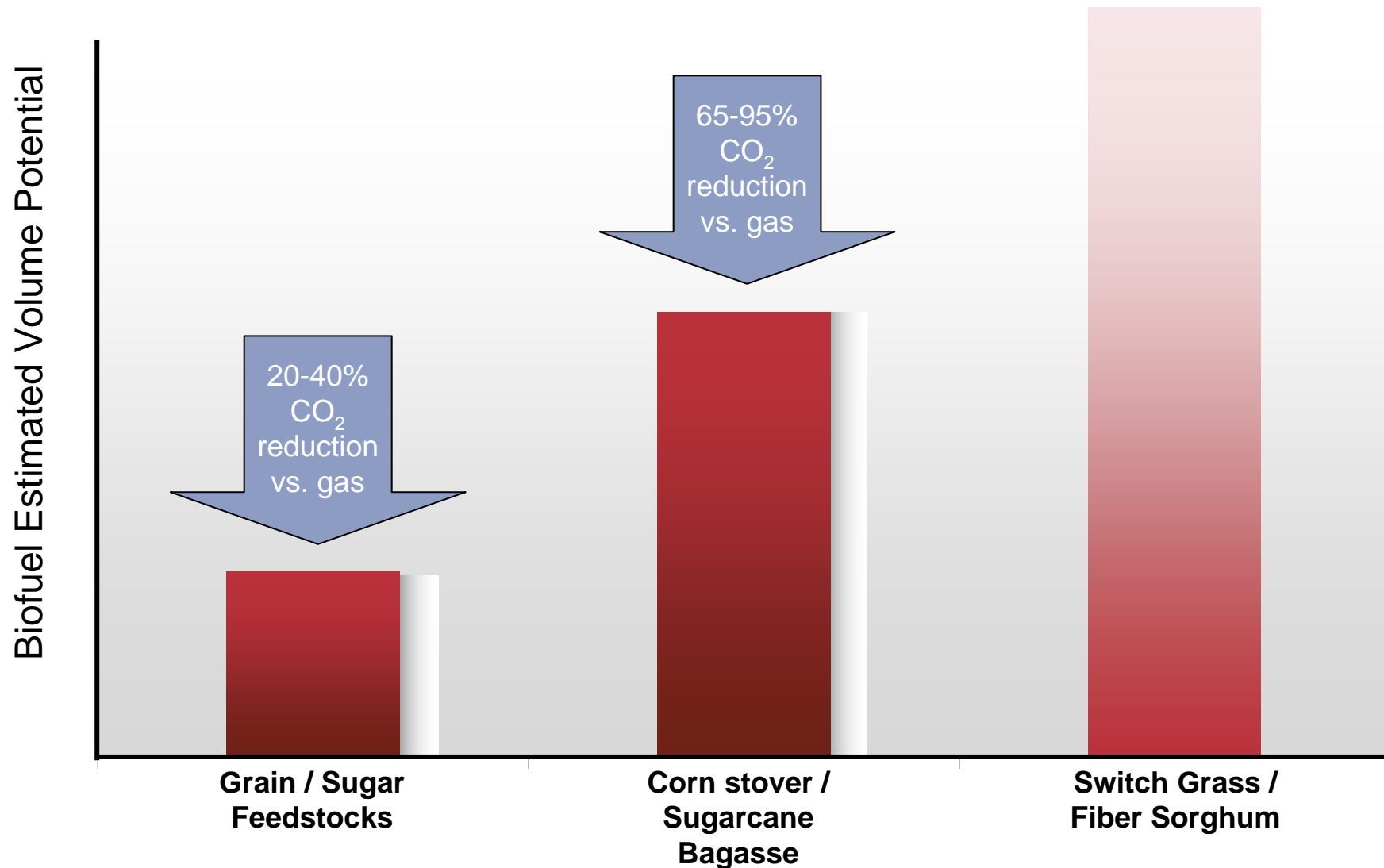
# Cellulosic Ethanol

## Substantial market growth



# Cellulosic Ethanol

Substantial market growth and CO<sub>2</sub> reduction



# Cellulose to Ethanol

## Low Cost Integrated Process



### Cellulose Conversion



### Ethanol Production



# Cellulose - Regional Market Execution

Low cost carbon

## First Targets

### North America

- corn stover

### Europe - Asia

- corn stover

### Brazil

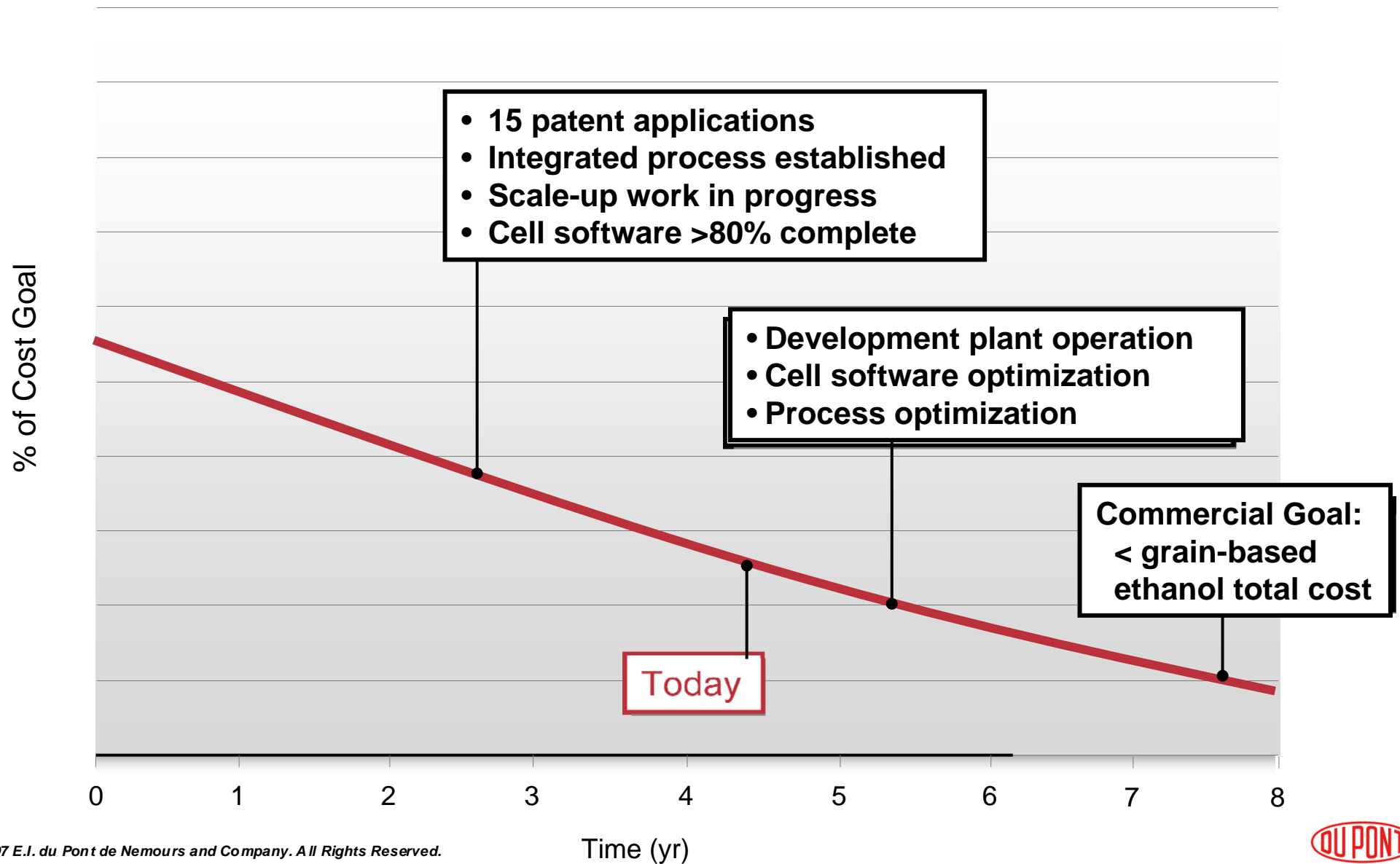
- sugarcane bagasse

## Next Cellulosic Feedstocks:

- Switchgrass
- Cavasse
- Sorghum
- Wheat Straw

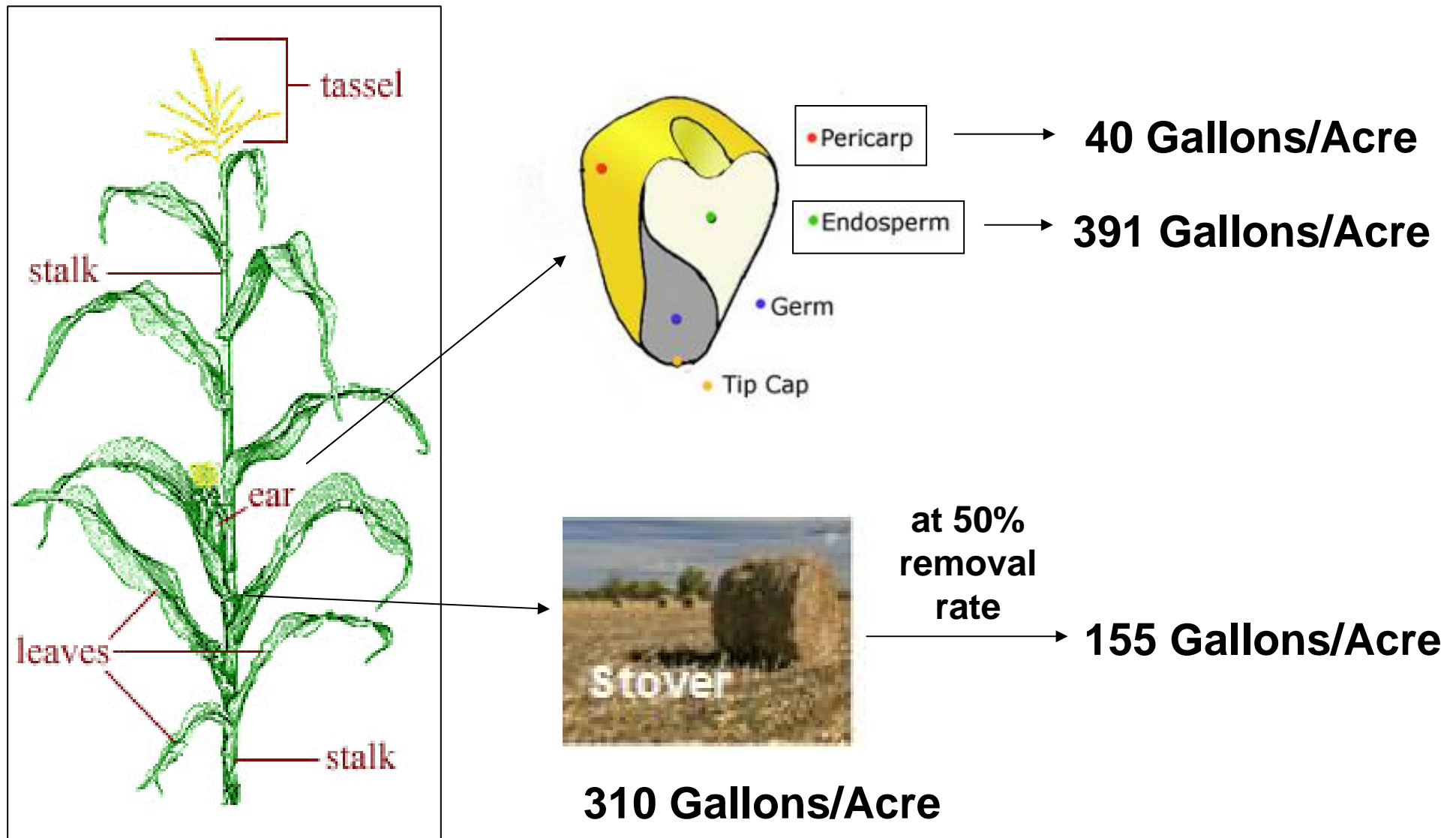
# Cellulosic Ethanol Process Performance

## Integration of key process elements



# Cellulosic Ethanol: Initial Focus on Corn Stover

## *Developing Enabling Technology*



# Commercialization



Biomass Raw Material



Retail Sale

- ✓ Corn cob & stover
- ✓ Sugarcane bagasse
- ✓ Wheat straw
- ✓ Rice straw
- ✓ Energy crops

DuPont Partnerships



# Summary

- **Integrated approaches are necessary**
  - Large volumes and cost constraints require optimization through all process steps
  - Must balance needs for process flexibility with needs for low cost
- **Partnerships are essential**
  - Technology is complex
- **Governmental support required**
  - High risk/high investment
  - Value externalities
- **Geographic specific strategy**
  - Regions will require customized technology and business approaches

# DuPont Biotechnology

