



# A Global Picture of Current and Future Biofuels Markets

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- Refining Studies
- Fuels Studies
- Etc.



# Outline

- Drivers for biofuels
- Trends in biofuels around the world
  - Production Capacity
  - Major Trade Flows
  - Feedstocks
  - Programs and Targets
- Future biofuels demand
- The “Next” Biofuels
- Challenges for the future market



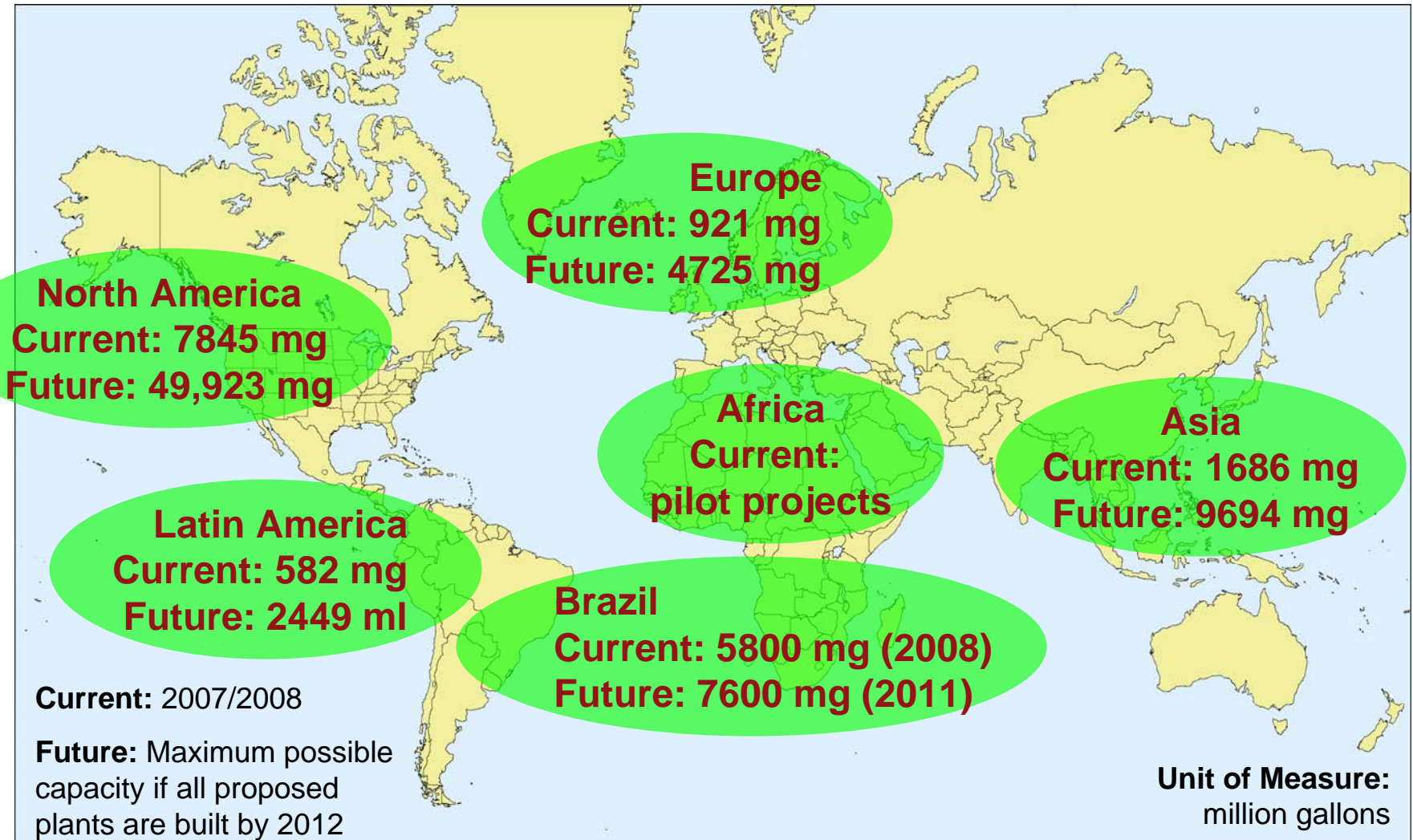
# *Drivers for Biofuels*

- Growing middle class with increased income
- Increased access to transportation -- vehicles and fuels
- High price of crude oil, and climbing
- Diversified energy mix
- Energy security
- Lower greenhouse gas emissions, address climate change, support sustainability



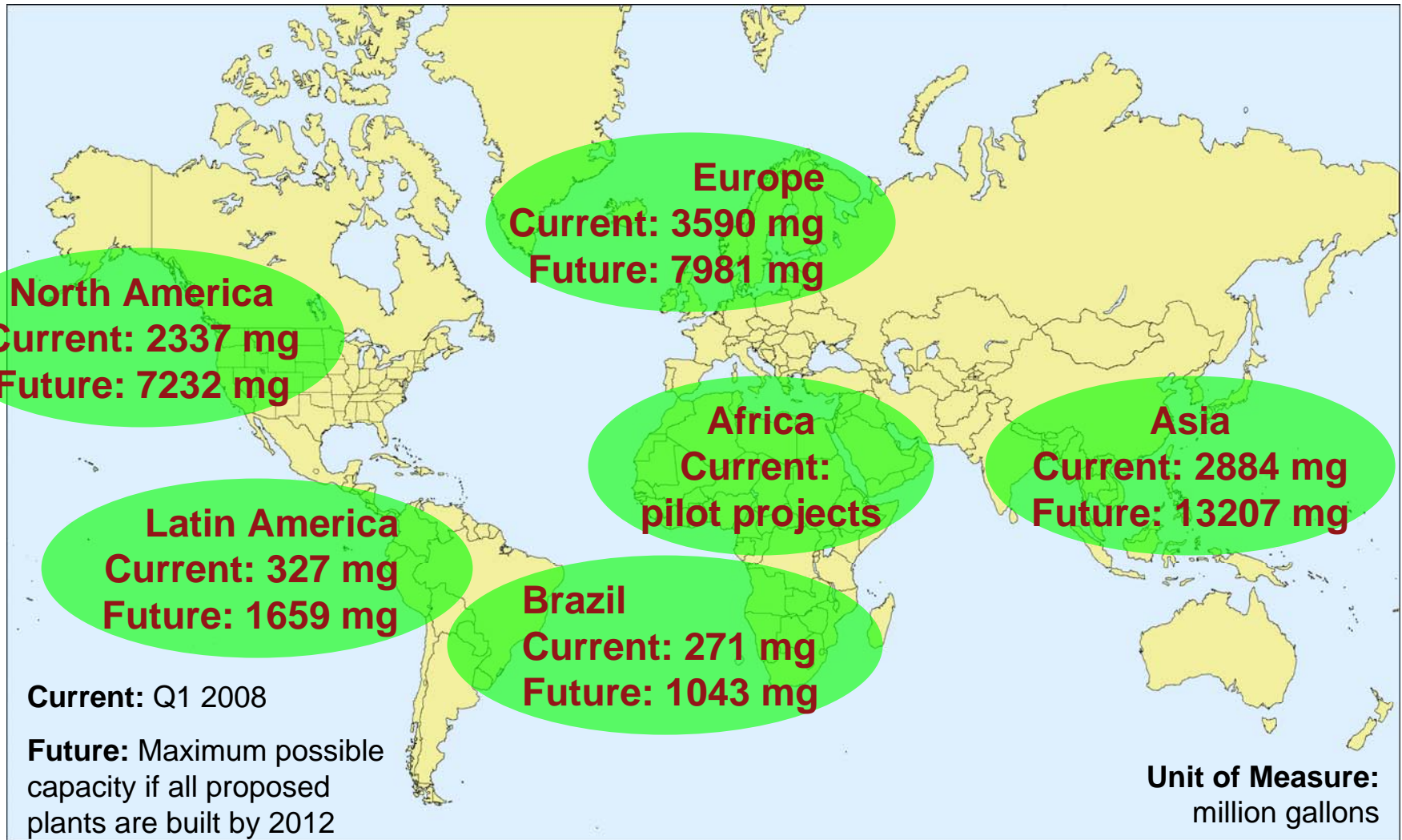
# Trends in Biofuels Around the World

## – Ethanol Production Capacity



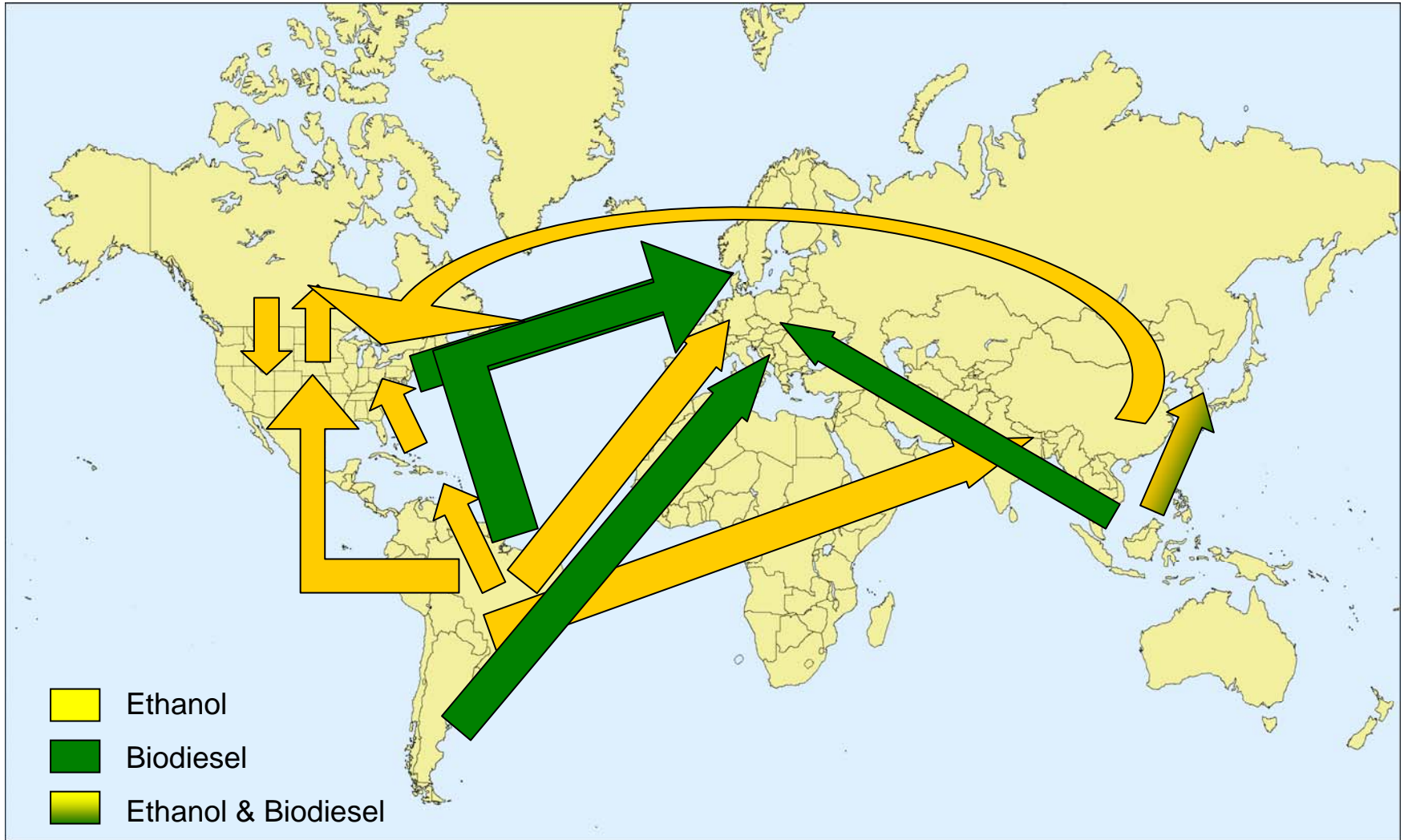


# Trends in Biofuels Around the World – Biodiesel Production Capacity





# *Trends in Biofuels Around the World – Major Trade Flows*





# Trends in Biofuels Around the World - Feedstocks

## North America

- E: Corn, barley, wheat
- B: Soy, rapeseed, waste oil

## Europe

- E: Sugarbeets, wheat
- B: Rapeseed, waste oil

## Prime Feedstock Growing Area

## Latin America /Caribbean

- E: Sugarcane, corn
- B: Soy, palm

## Africa

- E: Sugarcane
- B: palm, jatropha

## Asia

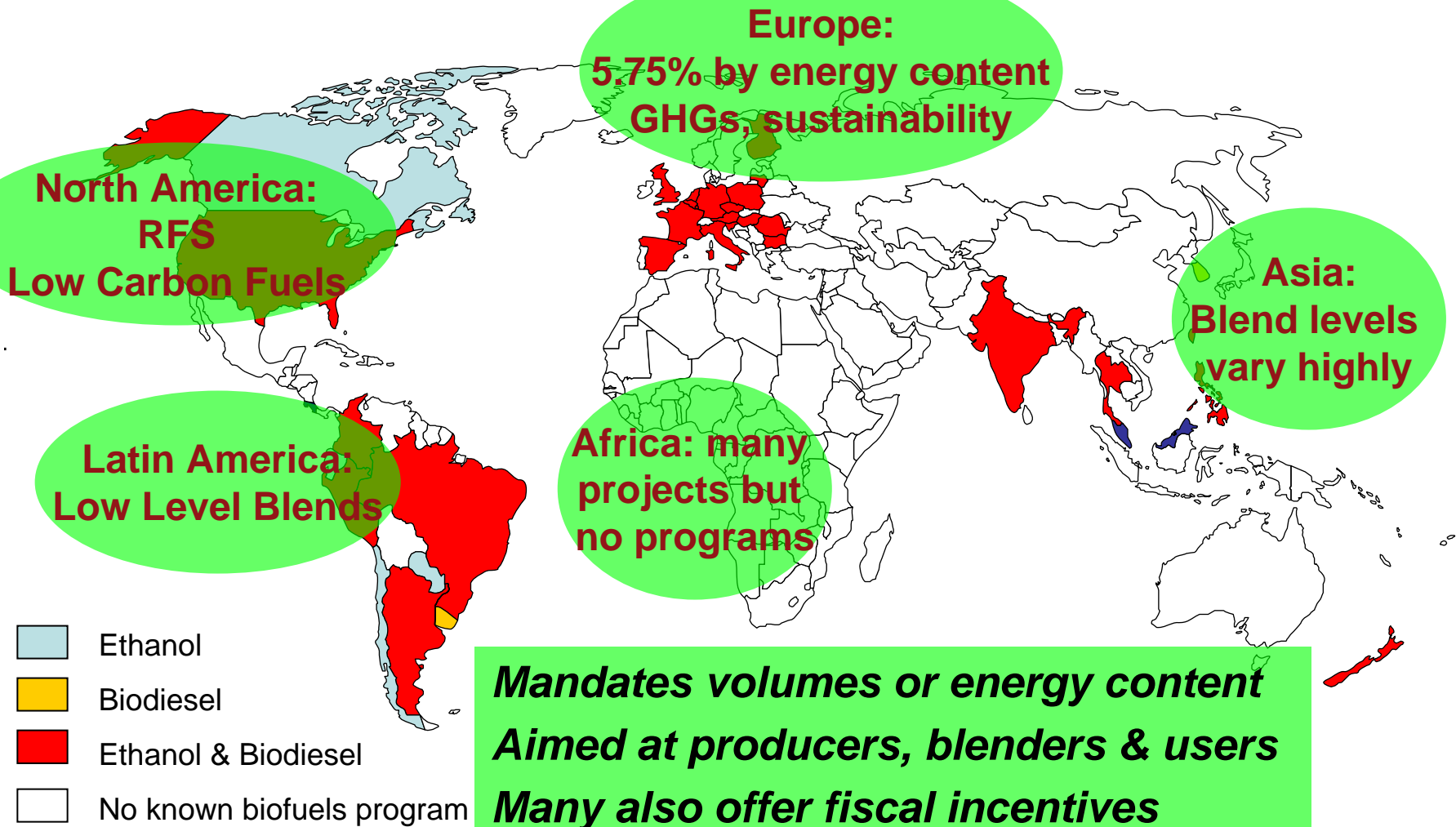
- E: Sugarcane, corn
- B: Palm, jatropha, waste oil, coconut, tallow

E = Ethanol

B = Biodiesel

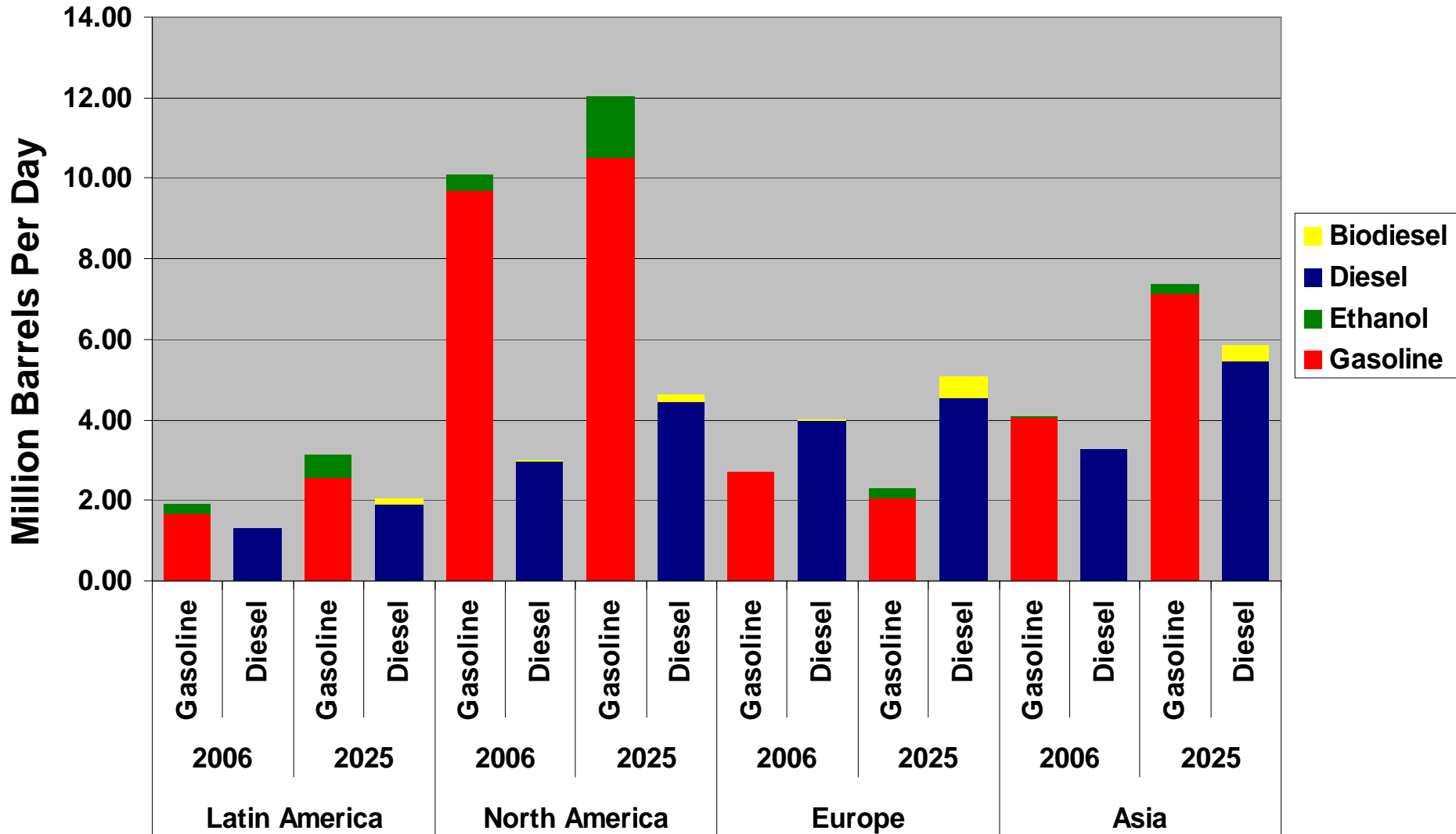


# Trends in Programs: Volumetric and GHG Targets by 2010



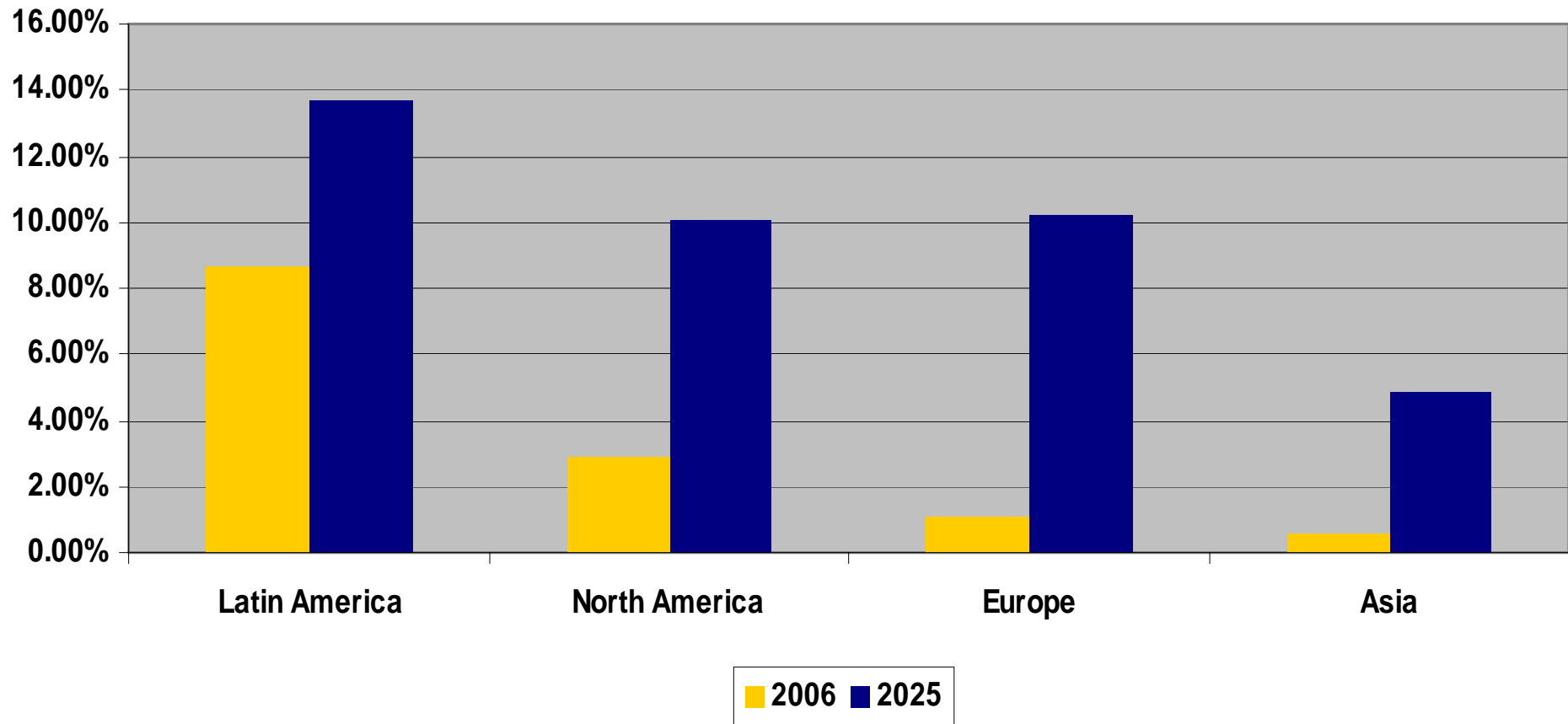


# *Future Demand – Conventional Fuel vs. Biofuel*





# *Future Demand – Percent Biofuel Penetration in Gasoline and Diesel Pools*





# *The “Next” Biofuels*

## **Different Feedstocks → Non-food sources**

- Cellulose
- Animal fats
- Algae
- Woody biomass

## **New Products**

- Cellulosic Ethanol
  - 9 mg now, 1422 mg by 2012
- Renewable diesel
  - 68 mg now, 1225 mg by 2012
- Bio-jet, Syn gas, Bio oil

## **Technology Development**

- Hydrotreating
- Thermal depolymerization (TDP)
- Co-processing
- Enzymes with fermentation
- Fischer-Tropsch
- Gasification

## **Improved Performance Attributes**



# *Challenges for the Future Market*

1. High price of feedstocks – soy, palm
2. GHG and sustainability requirements
3. “Food vs. Fuel” debate
4. Fuel Quality
5. Commoditization of biofuels in a maturing marketplace
6. Consistent, supportive policy framework to ensure investors
7. Consumer education



# *Thank You!*

# *Any Questions?*

*Ask me!*

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