

# Advanced and Cellulosic Biofuels and Biorefineries: *State of the Industry, Policy and Politics*

BIOMASS 2013



Brent Erickson, EVP

July 2013

# Some BIO Industrial and Environmental Section Member Companies



INDUSTRY ORGANIZATION



# Example of Rapid Technology Evolution



Dial Phone  
Landline



Brick Phone  
Mobile



I Phone  
Multi-media

# Biorefinery Evolution No Different



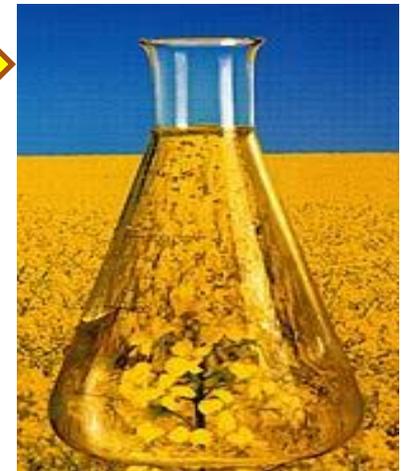
Conventional  
Ethanol



Cellulosic Ethanol



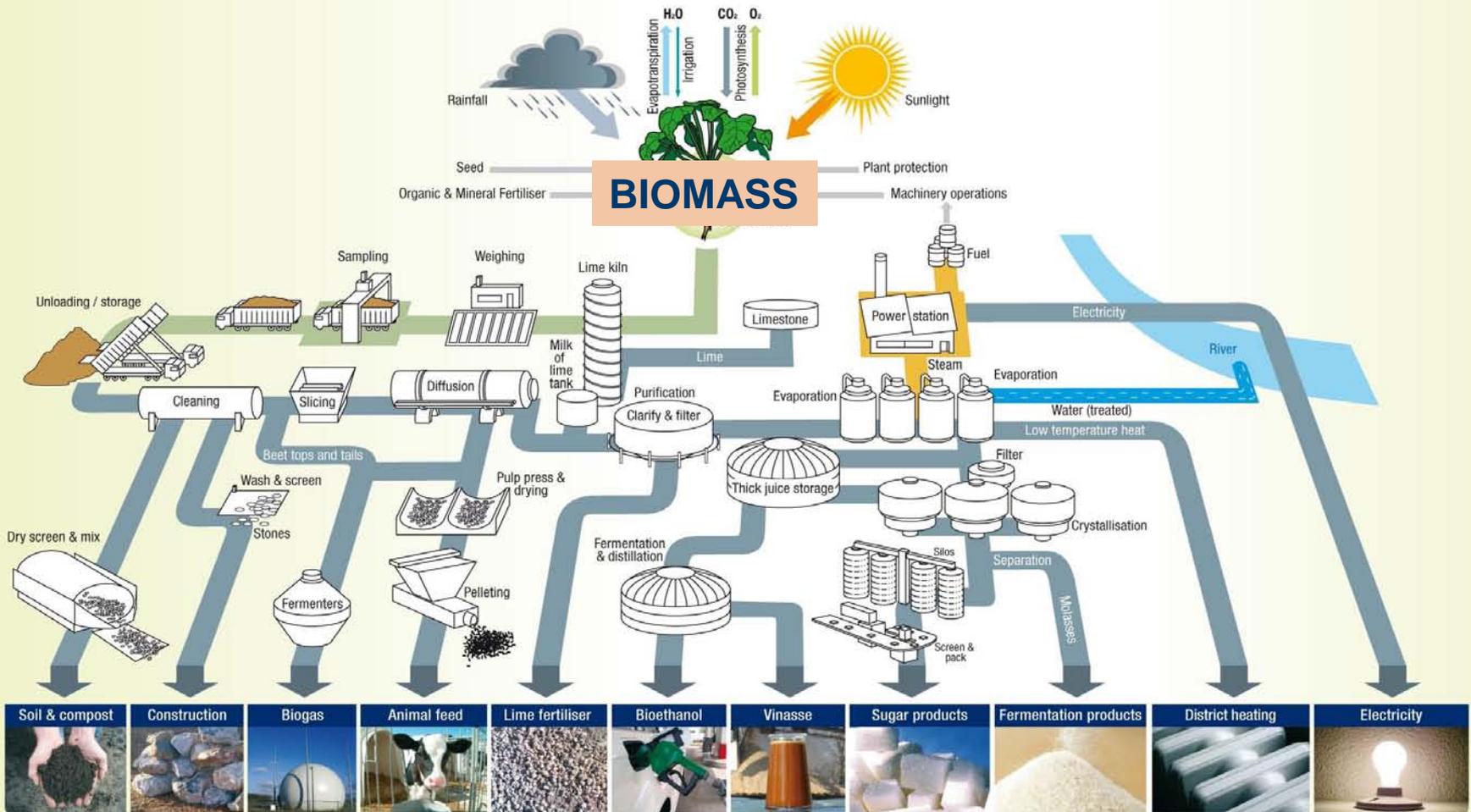
Drop Ins and  
Green Gasoline



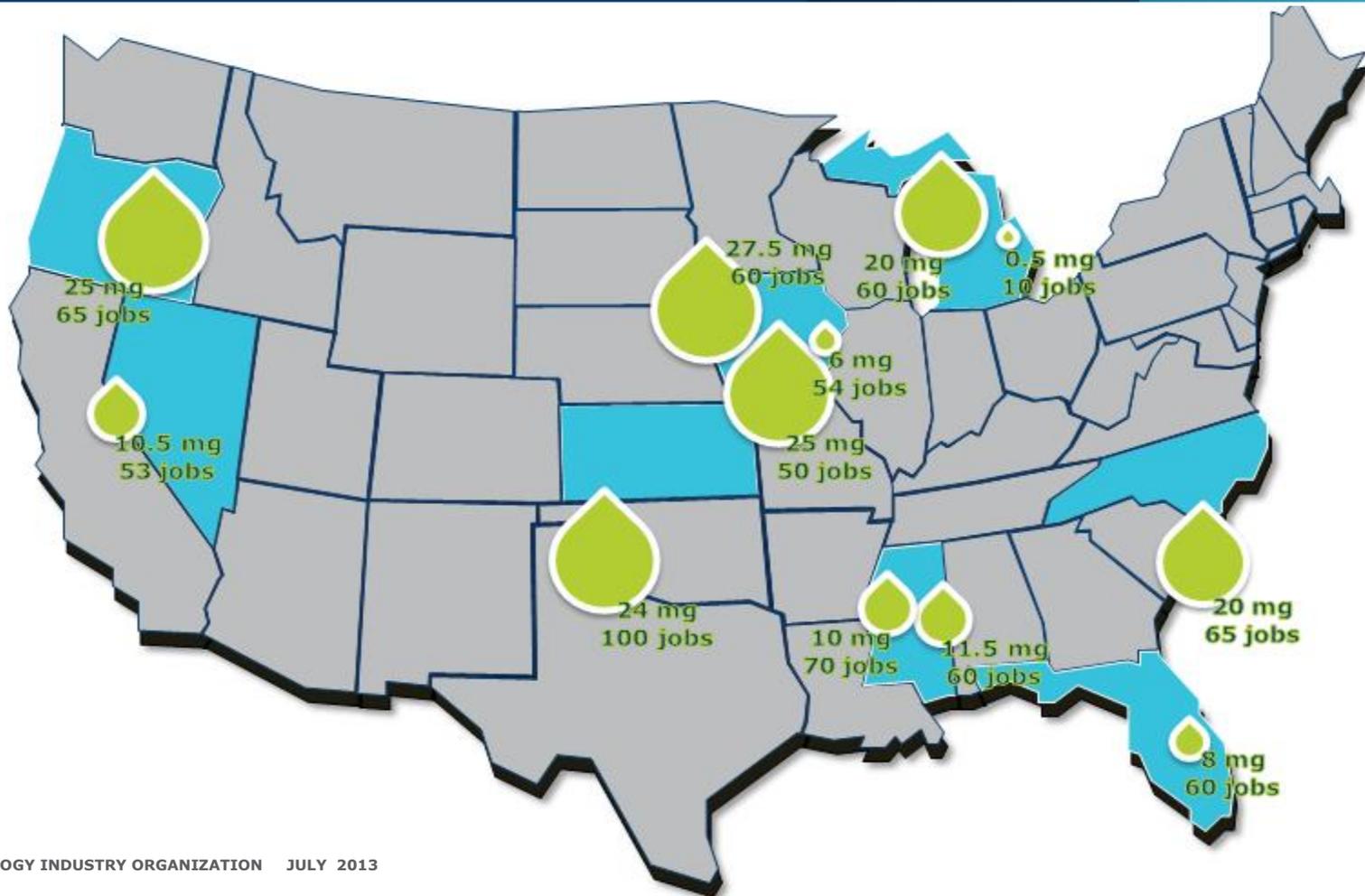
Renewable Chemicals

*Biotech and the RFS are driving innovation*

# It is Not Just About Ethanol ! It's About Building Biorefineries and Creating a Biobased Economy



# Progress on Cellulosic Ethanol Commercialization is Real



# U.S. Biofuels Industry

## Advanced Biofuels: Commercial Deployment

- Sapphire Energy Green Crude Farm, Columbus NM

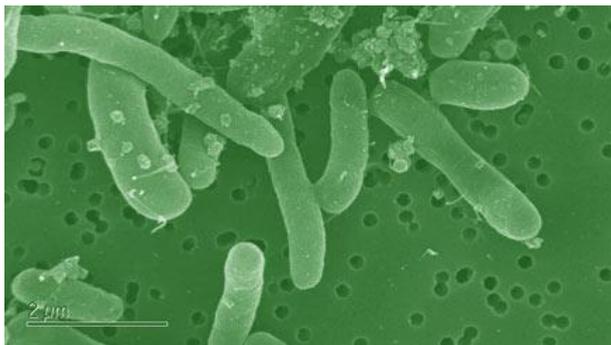


# Advanced Biofuels

## New Molecules, New Markets

### 3) Next Generation “Drop-in” Molecules

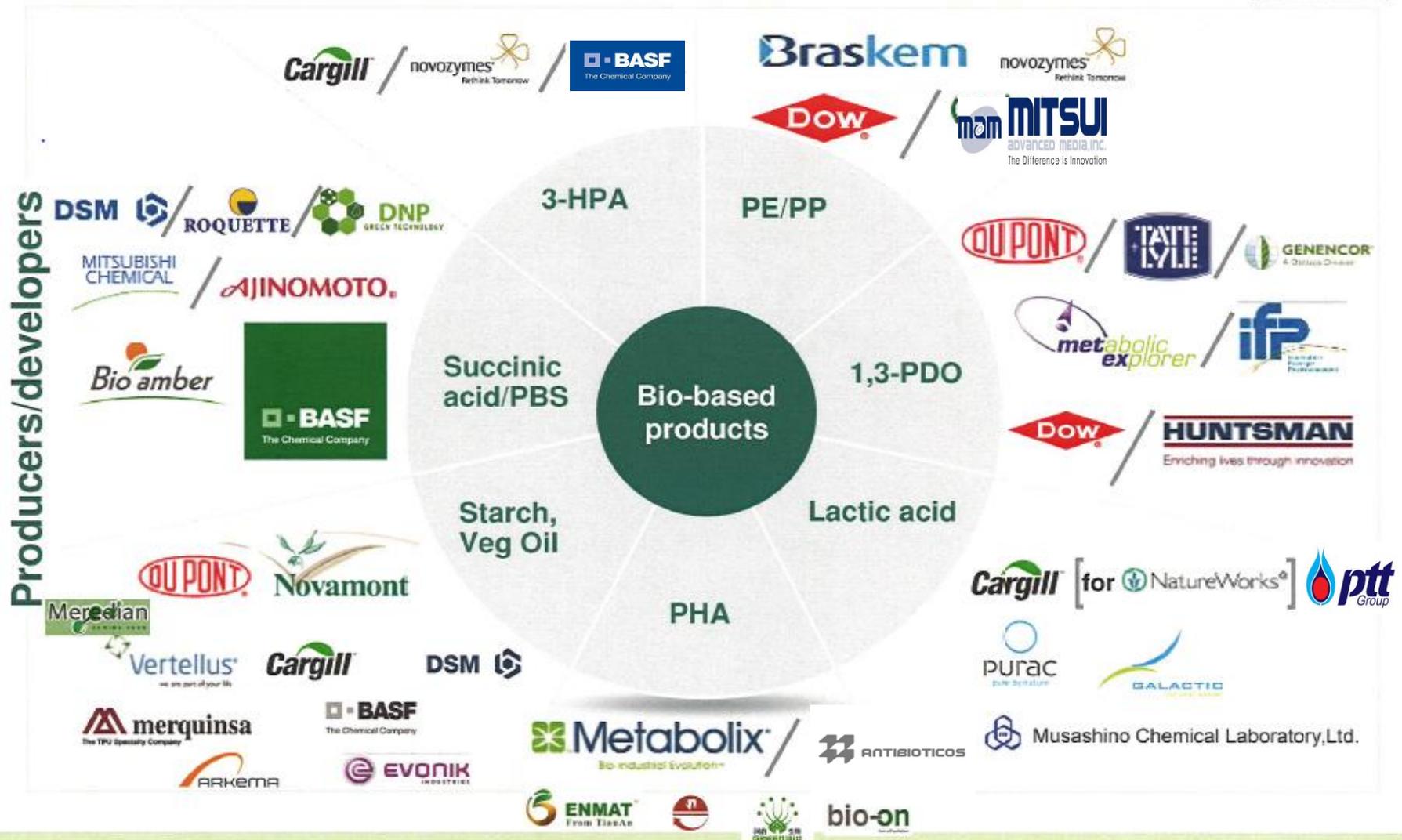
- Biodiesel
- Advanced alcohols (bio-butanol)
- Green gasoline
- Bio-crude, bio-jet





# Leading chemicals, fuels, and commodities players are building green chemicals and plastics into their portfolios

EXAMPLES



# Advanced Biofuels are Facing Challenges That are Also Being Overcome

- Need improved and more transparent implementation of the RIN credits & markets (EPA can fix)
- Availability and accessibility to ligno-cellulosic feedstocks at attractive costs
- Scale up risk of new technologies for cellulosic biofuels
- Access to sufficient capital for continuous development and wide scale deployment
- New logistics and infrastructure
- Continual R&D for enzyme and other technical improvements

# Federal Biofuels Policy



Brent Erickson, EVP

July 2013

# The Government Plays An Important Role: To Drive the Creation of a Bio-Based Economy

Vision & Stable  
Policies



*E.g. specific renewable targets/mandates, policies to promote investments in the relevant bio-based sectors*

Capital  
Investments



*E.g. financial incentives like tax credits, loan guarantees*  
*E.g. investments in R&D, translational sciences*

Infrastructure



*E.g. infrastructure necessary for the aggregation of 2<sup>nd</sup> gen biomass feedstocks and biorefinery construction*

# U.S. Federal Policy (work together) as a Big Investment Driver

## ■ **Farm Bill Energy Title**

- Biorefinery Loan Guarantees
- Biomass Crop Assistance Program
  - Establishing new purpose-grown energy crops
- Biomass R&D

## ■ **Tax Policy**

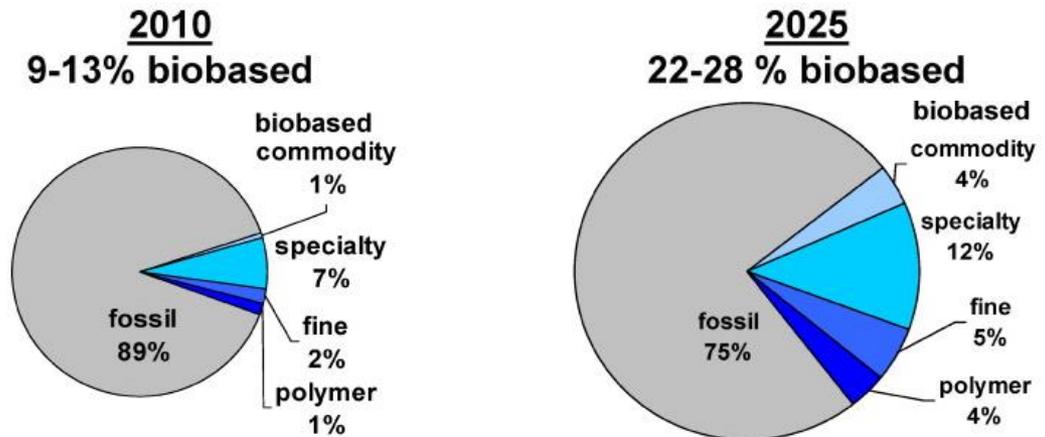
- Next Generation Biofuel Production Credit

## ■ **Department of Defense Biofuel Program**

- **Renewable Fuel Standard (RFS)** the bedrock policy for all biofuels

# The RFS Impacts More Than Just Biofuels –it Also Drives Biotech Innovation

- Synthetic biology technology developed for fuels created new markets for bio-based chemicals
- 1<sup>st</sup> gen. ethanol fermentation capacity provides infrastructure for next-gen technologies and feedstocks



# Biofuels Politics



Brent Erickson, EVP

July 2013

# RFS and the U.S. Biofuels Industry

## Political Headwinds

### ■ Attacks on the Renewable Fuel Standard

#### – Oil industry

- Lawsuits
- Repeal Legislation

#### – Poultry and some food groups

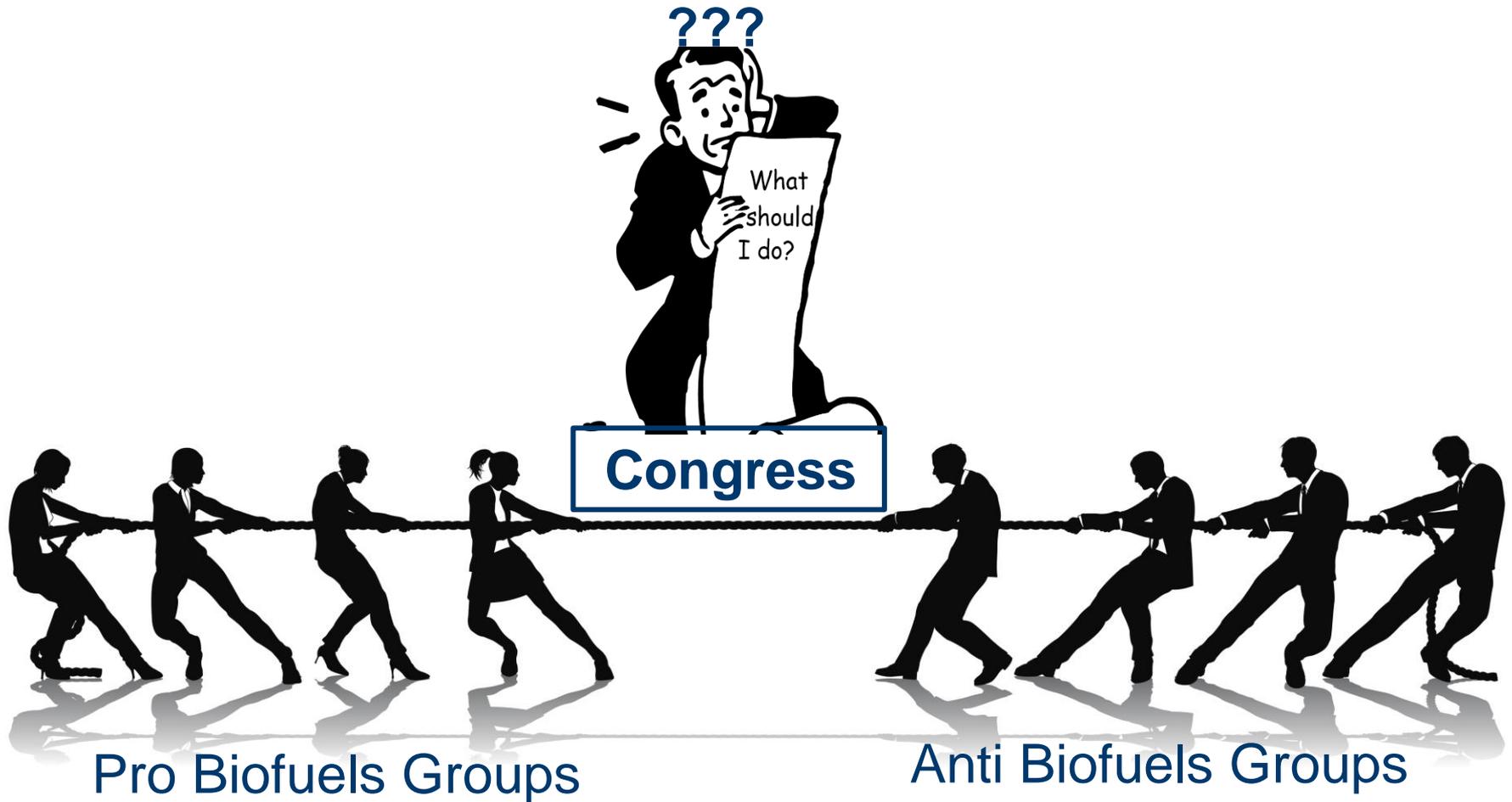
- Waiver requests
- Anti-RFS PR campaigns

#### – Small engine and boat users

- E15 pushback



# RFS: The Political Tug of War Continues



# RFS: EPA has Adequate Regulatory Flexibility

- **Annual Renewable Volume Obligation (RVO) Percentage:** flexibility to set
- **Cellulosic Biofuel Waiver Provisions:** EPA has the authority to reduce the annual statutory cellulosic biofuel requirement to the projected volume available during the calendar year.
- **Advanced Biofuel Standard Adjustment:** EPA may also reduce the annual advanced biofuel requirement by an amount commensurate with the cellulosic biofuel waiver.
- **Total RFS Adjustment:** EPA also has the authority to reduce the total annual RFS requirement by the amount of the cellulosic biofuel and advanced biofuel waivers.
- **Total RFS Waiver Authority:** EPA is empowered by the statute to waive any part of the RFS if the Administrator determines the program is causing “severe harm” to the economy or environment, or if there is “inadequate domestic supply.”
- **Future Modification of Applicable RFS Volumes:** If the Administrator waives at least 20 percent of the applicable RFS volume requirement set forth in the statute for 2 consecutive years, or at least 50 percent of such volume requirement for a single year, EPA must modify the applicable statutory volumes for 2016 and beyond.

# RINsanity

- The rising price of these RINs will provide a strong motivation to the market to find new ways to solve the blend wall.
- It makes no sense for the refining industry to try to game the RIN system with carryover volumes from past years. RINs were meant to change behavior not perpetuate E10.
- The obligated parties are separating the RINs – particularly from ethanol – and trading among themselves.
- The RIN system is not broken but some refiners are trying to break it.

# Oil Refiners - Crocodile Tears?

## Hess Enjoys \$17 Million After-Tax Benefit from RIN Sales

Hess Corporation executives said on Wednesday that the company has enjoyed a \$17 million after-tax benefit from Renewable Identification Number (RIN) sales in the second quarter, and this **RIN benefit is expected to rise to about \$35-\$40 million in the third quarter.** \*



\* Source Oil Price Information Service 07/31/13

# Don't Mess With the RFS

- ❑ RFS regs allow banking and trading of RIN credits
- ❑ Obligated parties have extraordinary flexibility to ensure compliance with annual RFS requirements.
- ❑ EPA has wide latitude in administering the RFS program on a year-to-year basis.
- ❑ Combination of compliance and regulatory flexibility ensures obligated parties can meet RFS requirements even in the face of unusual market situations.
- ❑ Result--flexibilities render legislative reform of the RFS program unnecessary and imprudent.

# Protecting the RFS

- We must continue to protect the RFS to insure continued infrastructure development and investment in advanced biofuels
- We should remind lawmakers that the Renewable Fuel Standard (RFS) program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders
- The best defense is often a good offense
- **Fuels America** was formed to help the biofuels industry change and refocus the debate.

# FUELS AMERICA

IT'S ALREADY GROWING

LEARN MORE ABOUT FUELS AMERICA

## Steering Committee



ABENGOA BIOENERGY



# Fuels America Communications

- **Multi-discipline, integrated campaign**
- **Major interventions**
- **Surround audiences and take the fight to the opponents from all sides**
- **Deliberate use of diverse voices**
- **Combines Communications and Government Relations**

# Fuels America Telling the Biofuels Story

- Ensure public and policymakers get the truth about biofuels



**RENEWABLE FUEL**  
IT'S ALREADY GROWING

**WASTED POTENTIAL**      **BIODIVERSITY**

The US supports over 400,000 jobs from the energy and farm sectors to other sectors.

The US supports over 400,000 jobs from the energy and farm sectors to other sectors.

85% and the renewable fuel sector have delivered a \$500 billion increase in America's farm assets since 2002 and are managed sustainably to fuel communities across the country.

The US spends approximately \$50 billion in imported fuel costs in 2011 thanks to renewable fuel.

**\$50 BILLION**

**FUELS AMERICA**  
IT'S ALREADY GROWING  
WWW.FUELSAMERICA.ORG

**DON'T BE TRICKED**

Renewable fuel like ethanol is not made from the same corn (or candy corn) that Americans eat. And it does not contribute to rising food costs. Food prices are actually driven by expenses for things like packaging, marketing and energy.

**SO WHAT MAKES UP EVERY DOLLAR THAT YOU SPEND ON FOOD?**

3¢ — Corn

84¢ — Transportation, Oil, Packaging, Labor, Other Costs

13¢ — Other Commodities

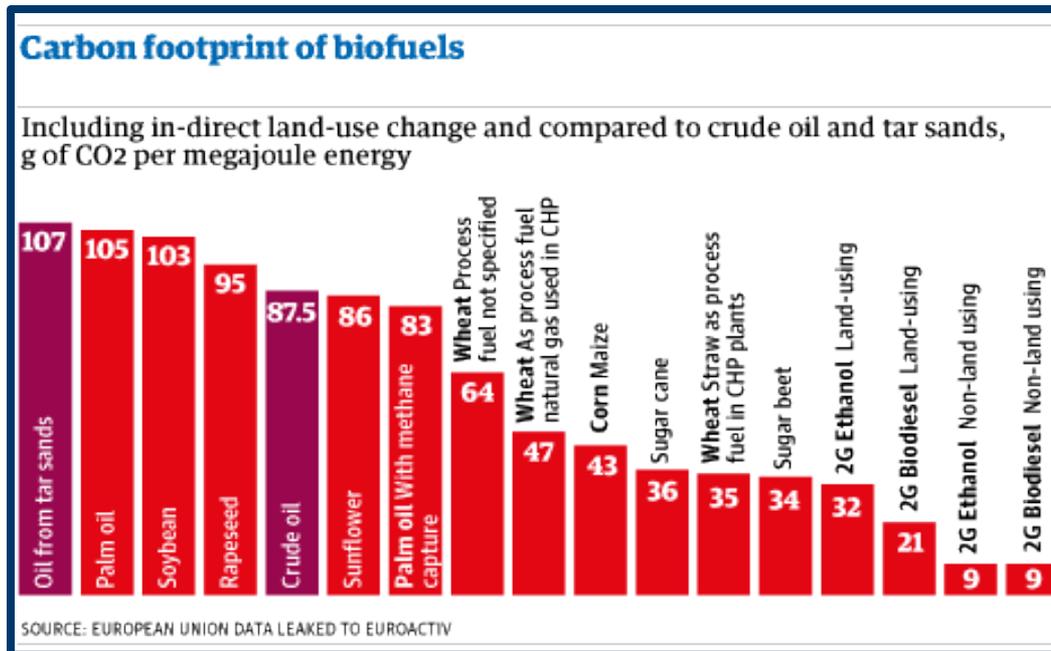
**FUELS AMERICA**  
IT'S ALREADY GROWING  
fuelsamerica.org

[www.fuelsamerica.org](http://www.fuelsamerica.org)

# If Not the RFS then What?

## RFS is Reducing GHG emissions

- 31 million tons CO<sub>2</sub> emissions averted today; from 1 to 2.5 billion tons potentially averted by 2030
- RFS is the only congressionally authorized climate program currently operating.
- If the RFS goes away Congress may replace with with a **National Low Carbon Fuels Standard**



# The Future for Biorefineries Still Looks Bright

- Cellulosic Biorefineries **coming on line** in 2013-2014-- success will breed more success.
- **Renewable Chemical facilities** rapidly coming on line-- biorefinery platforms becoming more robust and diverse.
- Synthetic biology is supporting new Industrial **Biotech innovation.**
- Overall **policy environment** should remain supportive for some time into the future.
- Companies that are early adopters of industrial biotech will prosper as the **global biobased economy continues to develop.**

**Bio Pacific Rim**  
Summit on Industrial  
Biotechnology and Bioenergy



December 8, 2013

**December 8-11, 2013**

San Diego, California  
The Westin Gaslamp Quarter

**Call for Papers Now Open! [bio.org/pacrim](http://bio.org/pacrim)**

*Building Innovative Collaborations Across the Pacific*

The eighth annual BIO Pacific Rim Summit is the original conference dedicated solely to the growth of the industrial biotechnology and bioenergy sectors in North America and the Asia-Pacific Region.

- **Algae**
- **Advanced Biofuels**
- **Biomass Production**
- **Bioplastics**
- **Dedicated Energy Crops**
- **Renewable Chemicals**
- **Marine Bio-resources**
- **Synthetic Biology**

Conference Organizer



**Biotechnology  
Industry  
Organization**

Co-Organizer





**Biotechnology  
Industry  
Organization**