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Pacific Ethanol, Inc.

Driven by Demand™

California Energy Commission Presentation

Tom Koehler

April 6, 2009

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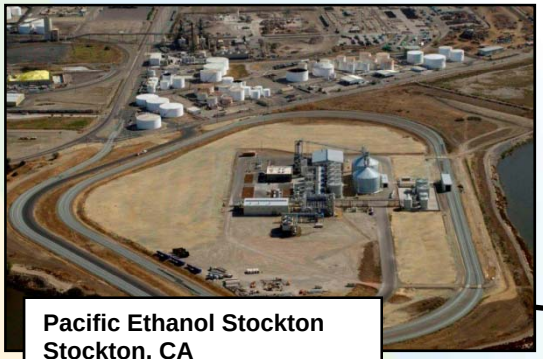
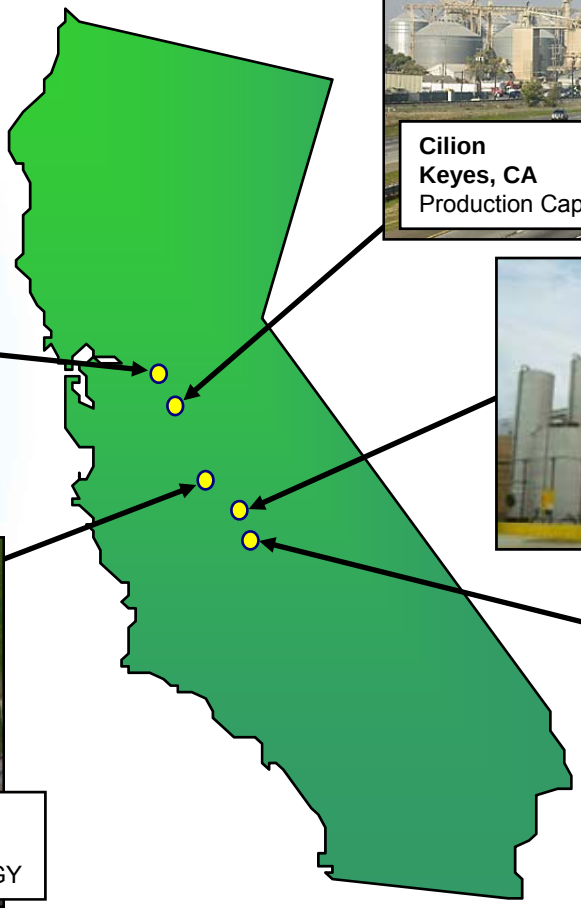
Ethanol Industry in California

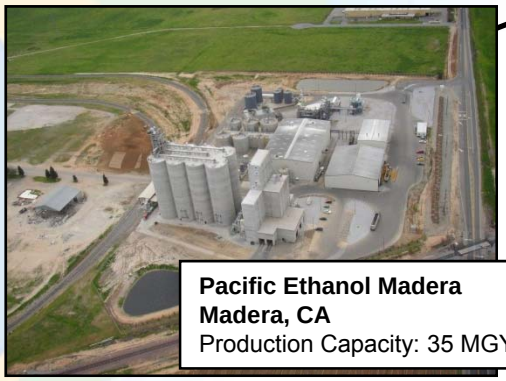


Pacific Ethanol Stockton
Stockton, CA
Production Capacity: 50 MGY

Cilion
Keyes, CA
Production Capacity: 55 MGY



Altra (Phoenix Biofuels)
Goshen, CA
Production Capacity: 25 MGY



Pacific Ethanol Madera
Madera, CA
Production Capacity: 35 MGY

Calgren Renewable Fuels
Pixley, CA
Production Capacity: 55 MGY

- 5 Plants → 220 million gallons annual ethanol production capacity

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Economic Impact

- $500+million in investment
- 3,500 jobs economy wide
- Net tax proceeds to local, state, and federal treasuries
- New diversified fuel production base in state
- Infrastructure for current and advanced fuels

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Current Market Conditions

- Currently all plants are idled
- Supply/Demand imbalance
- Oil price decline
- Credit crunch
- Older plants in other states with producer incentives policy have debt paid off and are operating

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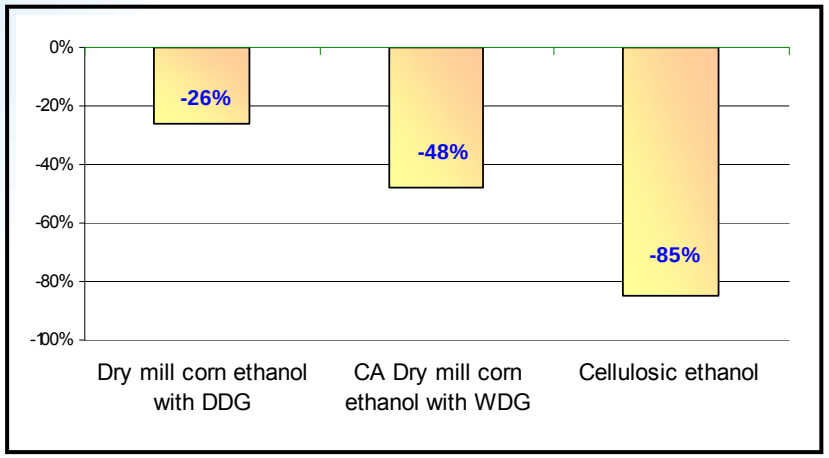
Low Carbon Fuel

- California ethanol plants are the lowest carbon producers in the nation
  - 48% reduction in CO2 compared to gasoline according to GREET model
- Provides foundation for advanced fuels in the near future
- Excellent Renewable Feedstock for Hydrogen

Reductions in Per-Mile GHG Emissions



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Report Confirms GHG Reduction from Ethanol Use

"An Examination of the Potential for Improving Carbon/Energy Balance of Bioethanol"

International Energy Agency (IEA)
February 15, 2009

- Ethanol projected to cut greenhouse gas (GHG) emissions up to 55% over gasoline by 2015
- Projected increased reductions are due primarily to efficiency gains in both feedstock production and ethanol manufacturing
- GHG performance and energy balance of ethanol continues to improve while gasoline and petroleum declines

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Our Cellulose Plan

- $24.3M grant from DOE to build the first cellulose ethanol plant in the Pacific Northwest
- 2.7 MGY demonstration scale plant
- Integrated model with Columbia corn-ethanol plant
- In partnership with BioGasol ApS and Joint Bio-Energy Institute
- Technology specializes in pre-treatment and C5 fermentation

BioGasol Pilot Plant
Denmark

PEI Future Market Prospects: Cellulosic Ethanol Plants

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Schedule	Entity	Location	Ethanol Capacity (M G/Y)	Feedstock dry M T/yr currently available in 80 miles
2008 – 2012	West Coast Biorefinery	Boardman, OR 25-acre site on the Columbia River, 160 miles east of Portland, OR	2.7	400,000 dry MT/yr Wheat Straw Corn Stover Hybrid Poplar
2012-ongoing	West Coast Biorefinery	As above		100,000 dry MT/yr Softwood Residues Orchard Prunings Green Waste
2013	Pacific Biorefinery Columbia (PBC)	As above (additional sites available from the Port of Morrow)	27	400,000 dry MT/yr Wheat straw Corn Stover Hybrid Poplar
2014	Pacific Biorefinery Madera (PEM)	Madera, CA a 137-acre site north of Fresno, CA	40	1,500,000 dry MT/yr Forest thinnings Orchard prunings **California energy crops**
2015	Pacific Biorefinery Stockton (PBS)	30-acre site in Stockton, CA at the Port of Stockton	40	1,000,000 dry MT/yr Forest thinnings Orchard prunings **California energy crops**
2016	Pacific Biorefinery Idaho (PBI)	Burley, ID 160-acre site 160 miles from Boise, ID and 185 miles from Salt Lake City, UT	27	400,000 dry MT/yr Wheat & Barley Straw, Corn Stover **Idaho energy crops**

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State Producer Incentive

- Truly a performance based incentive
  - Buys lowest carbon in the country and begins transition to cellulose
  - LCFS does not kick in until 2011
  - Incentive can transition to cellulose after first year – remains performance based
  - Many models out there – the simpler the better

Is it the Oil, or the Ethanol?

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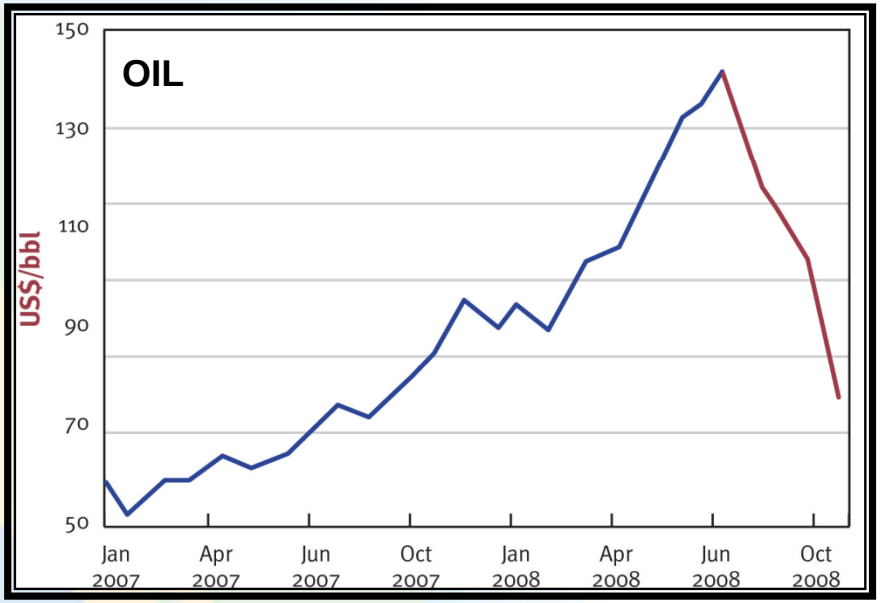
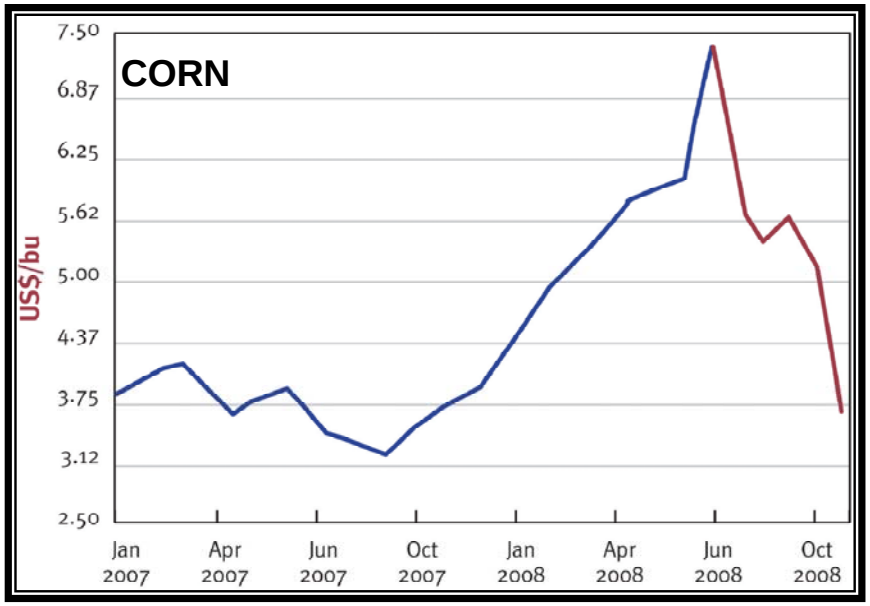
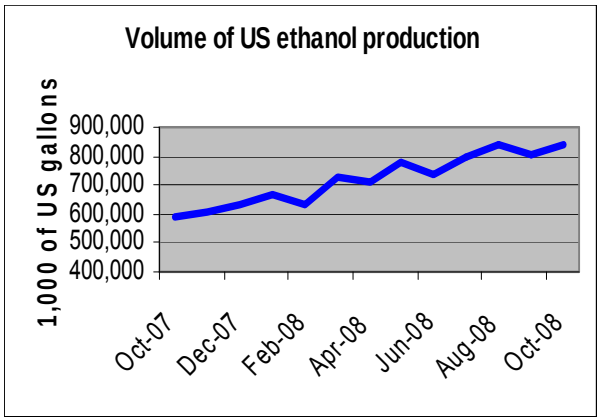




Higher commodity prices (like corn) are correlated with OIL prices, not ethanol production volumes



Sources: NYMEX, USDA, RFA

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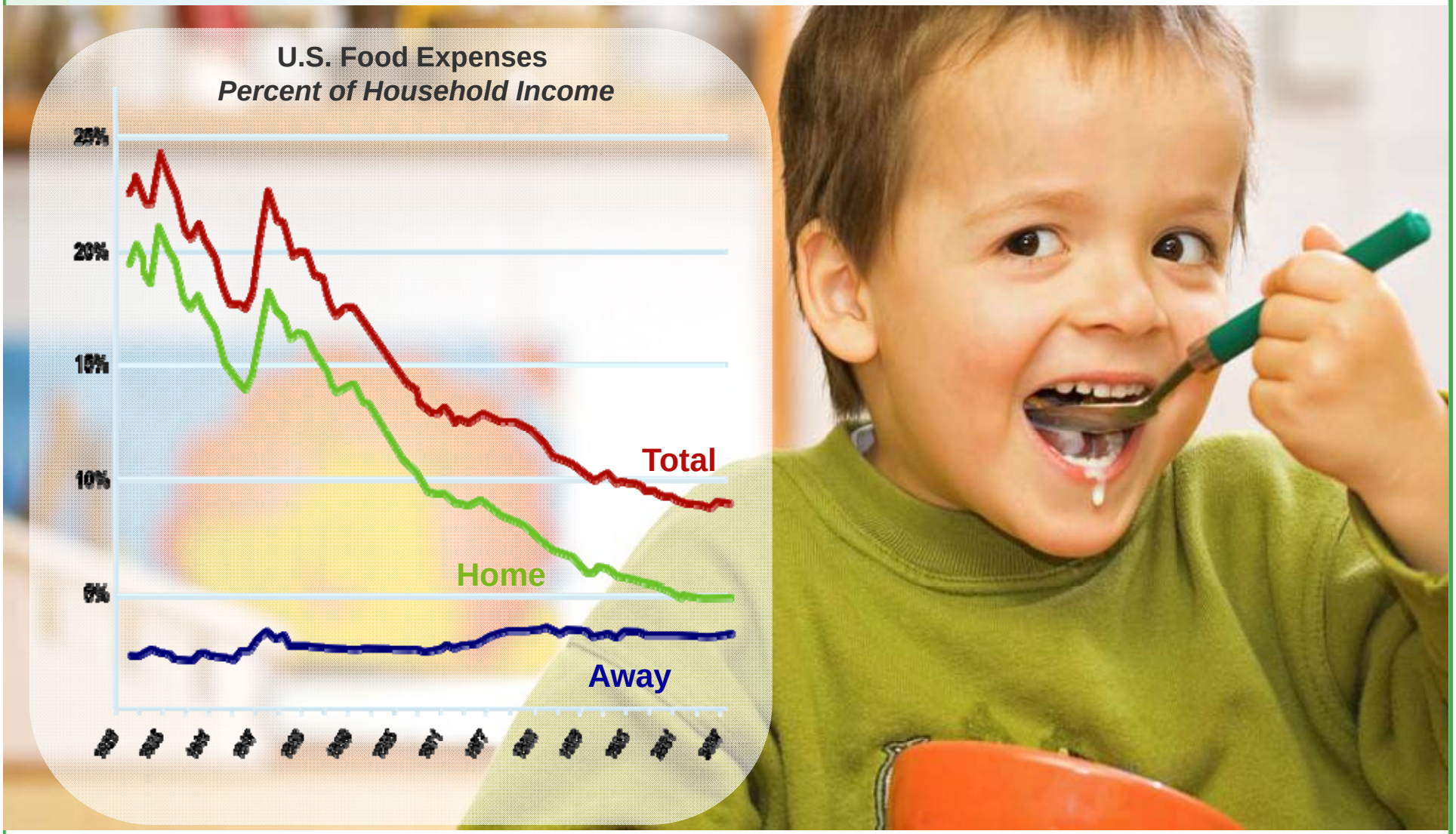
Is Food Too Expensive?



Not Enough Food in the World?

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- **Clinically obese (>30%) outnumber malnourished by 2:1 margin (1.6B to 0.8B)**
- **Only 60% of global corn acres are hybrid varieties**
- **Less than 50% of global rice acres are hybrid varieties**
- **Increased yield is the answer for both food and fuel crops**

Incentives, innovation and technology can make it more sustainable

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The Real “Crime Against Humanity”?

Corn Yield Trends (Bushel Per Acre)			
	1990	2000	2005
World Average	59	70	75
USA	113	137	149
Argentina	60	93	109
China	74	78	80
Brazil	33	47	54
India	23	29	31
Sub-Saharan Africa	22	24	25

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Indirect Land Use Conversion (ILUC)

Are U.S. Farmers….

…Responsible For Tropical Deforestation?

Indirect Land Conversion?

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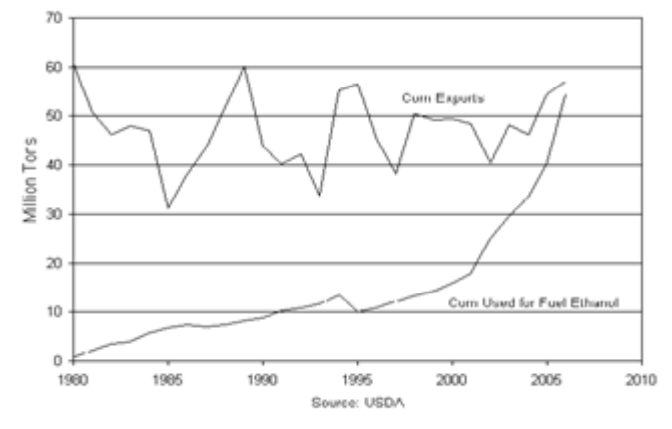
U.S. Corn for Ethanol and for Exports



U.S. Soybean Exports

Is U.S. biofuel production leading to a decrease in corn or soybean exports?

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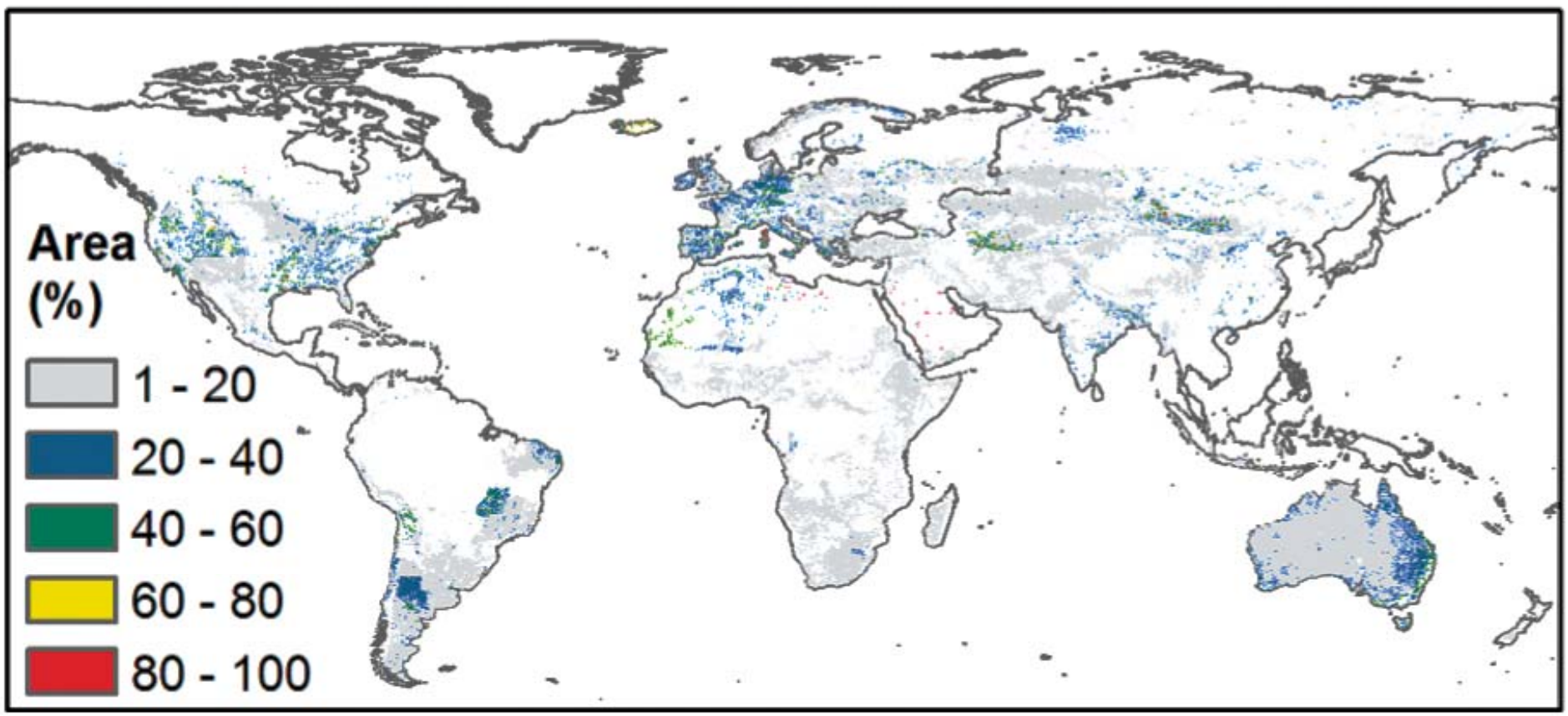
Bringing >1 Billion Acres Of Abandoned Agricultural Land Back Into Production?



Campbell et al., Env. Sci. Technol. (2008) **ASAP Article**, 10.1021/es800052w

A Few Questions on ILUC Models….

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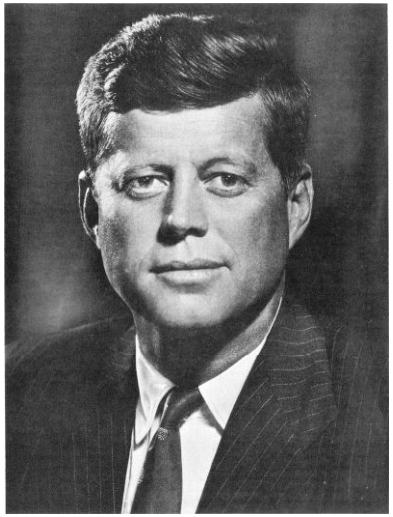
- **Is conventional wisdom correct?**
  - CW on food versus fuel has proven to be wrong. Current biofuel production volumes are not driving up food prices; oil prices drive food prices.
- **Is "the Science settled"?**
  - Science is generating hypotheses, testing them against the available data and choosing those that best fit the data. Can ILUC models (hypotheses) fit the historical data? Can they hindcast or backcast previous trends in agriculture?
- **Will ILUC penalties slow deforestation?**
  - How will penalizing U.S. biofuels producers change the decisions made by illegal timber operations in the Third World?
- **Yield, yield & yield**
  - Do ILUC models correctly estimate potential increases in global agricultural yield and productivity e.g. 700% corn yield increases in Africa? Do they account for new high yielding biomass feedstocks e.g. switchgrass or miscanthus?
- **Are they politically feasible?**
  - Will U.S. producers be economically responsible for foreign land owner's use decisions?
- **Perhaps all land use change is direct?**
  - By holding governments and land owners directly responsible, can we begin to define a more predictable, transparent carbon playing field that will drive efficiencies in tillage and sequestration practices?

"For the great enemy of the truth is very often not the lie – deliberate, contrived and dishonest, but the myth, persistent, persuasive, unrealistic. We enjoy the comfort of opinion without the discomfort of thought."

- John F. Kennedy



Not Enough Land For Biomass?

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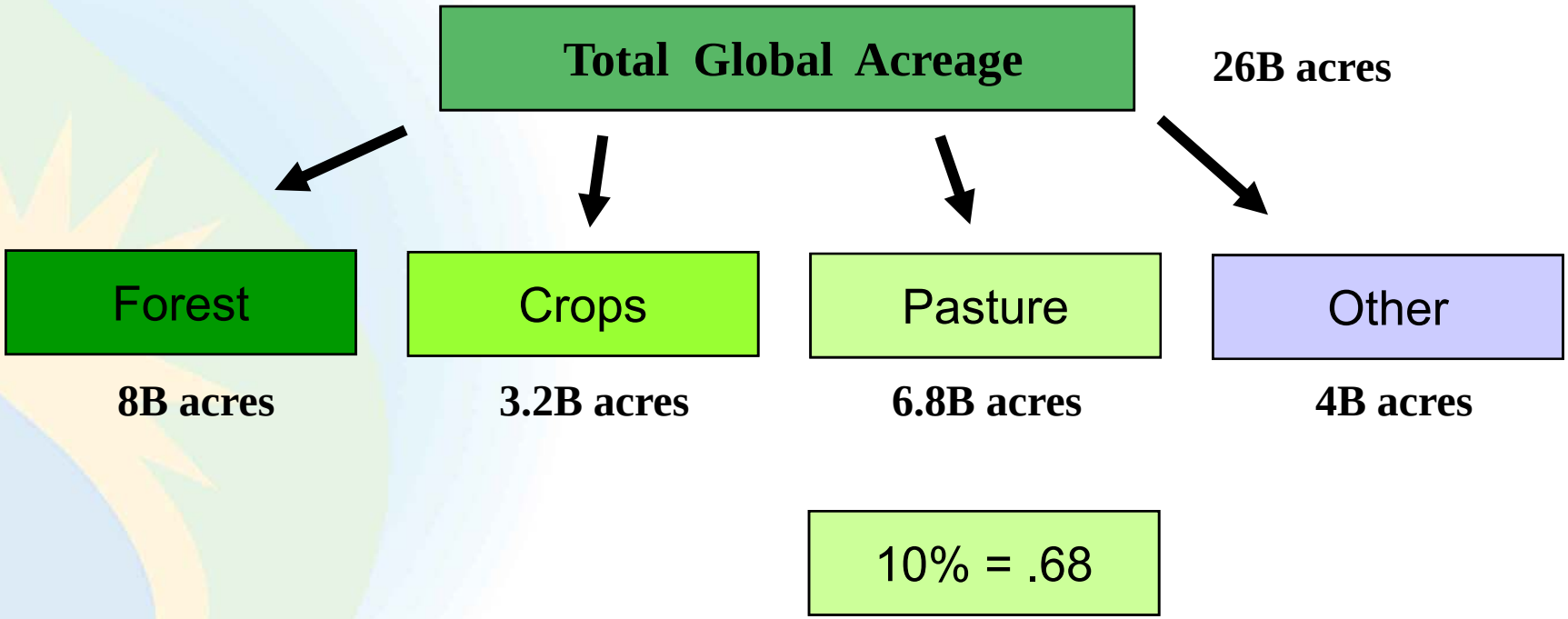

0.68B acres X 20t/ac X 2.38B/t = 88M barrels per day

Source: FAO Stat database

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Status of ARB Proceedings:

Major Sins of Omission in Terms of Analysis

A new study by Informa and Air Resources Inc. using a "top down" approach shows ZERO land use change with 15 billion gallons of corn ethanol. ARB staff has not responded to the new analysis.

New Paper by Keith Kline (1/26/09) –

Expert on international development and land use change at Oak Ridge National Laboratory :

> **“Lack of evidence that biofuels are significant cause of indirect LUC.”**

ARB staff has not responded to report. A request for a workshop for Oak Ridge to present has been ignored.

Land-use change and associated carbon emissions are complex

- Driven by interactions among cultural, technological, biophysical, political, economic, and demographic forces
- Not singular events
  - Shifting land-use mosaics
  - Recurring anthropogenic fires in agricultural frontiers; increasing extent and intensity
- Essential to understand the forces behind degradation, land clearing and fires to reduce emissions
  - Measurement challenges and data complexity: land cover in constant flux; multiple uses overlap and change with time

Analysis of threats to tropical forests: poverty, corruption, lack of governance, insecurity

Solutions involve support for:

- Sustainable rural livelihoods – improve prices for products (and sustainable land practices that reduce fire)
- Improved land tenure
- Inventory & protect key conservation areas
- Improved governance, local capacity, enforcement
- Land-use plans and management

Source: USAID – FAA Sec. 118/119 Reports 2000-2008

Alternate hypothesis: Could biofuels help reduce first time land-use change?

- Can increased crop prices create incentives to…
  - Invest in previously cleared land?
  - Increase yields, efficiency and rural employment?
  - Reduce pressure to clear 'new' land?
  - Reduce recurring use of fire and GHG emissions?
  - Improve soil carbon (depending on situation, crops)?
- Would biofuels address threats (prior slide) if they:
  - Promote "best practices"?
  - Bring sustainability issues to forefront?
  - Draw attention to long-standing needs for change?
- Effects of biofuel policies could be positive or negative.
  - Difficult to measure or generalize at global scale
  - Estimates of net impacts, including land use, depend on many assumptions

Zero economic equilibrium modeling for Oil, Electricity, Natural gas, Hydrogen etc…

New study by LifeCycle and Associates (3/2/09) shows petroleum carbon score to be way too low, suggests many direct effects are not included. Study concludes that indirect effects *should* and *can* be studied and analyzed. ARB staff has not commented or incorporated into analysis.

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111 nationally renowned scientists from the best laboratories and institutions (3/2/09):

"The science is far too limited and uncertain for regulatory enforcement."

"Enforcing different compliance metrics against different fuels is the equivalent of picking winners and losers, which is in direct conflict with the ambition of the LCFS."

"We know very little about the indirect effects of the fuels, and therefore cannot establish a proper relative value among the various compliance fuels and petroleum under the LCFS."

Sandia National Laboratories

Berkeley UNIVERSITY OF CALIFORNIA

BERKELEY LAB

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

NATIONAL ACADEMY OF SCIENCES
THE NATIONAL ACADEMIES

UCLA

jbei Joint BioEnergy Institute

UCDAVIS UNIVERSITY OF CALIFORNIA

UF UNIVERSITY of FLORIDA

Issues with Staff-Proposed Regulation

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Issue 1

2010 is “reporting only” – so refiners have no incentive to use lowest carbon fuels until 2011. This has significant negative impact on California facilities.

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Issue 2

Science currently too controversial and nascent to regulate on indirect. No data to support modeling. Conflicting information, no backscasting to determine accuracy, no scientific consensus.

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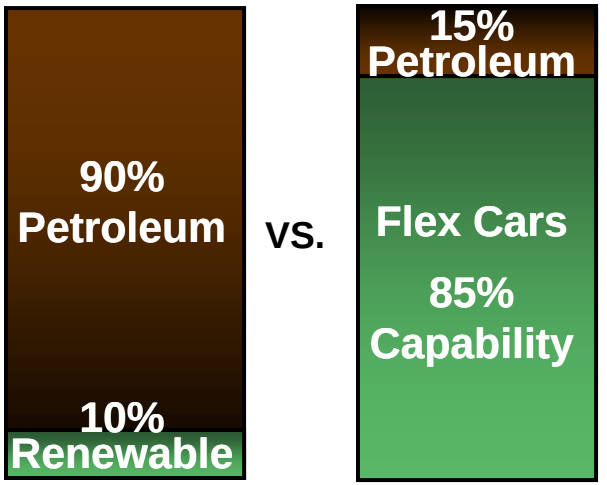
Issue 3

LCFS is being constructed as a regulation of subtraction instead of addition because of the fundamental issue of only dealing with 10% of the car fuel tank. Governor's goals of five fold increase in renewable fuels will not happen unless a flex fuel mandate is part of this regulation. Staff has ignored this issue.

Vehicle Fuel Tank



Corn, soybeans, sugarcane, cellulose:

All competing for this small portion

vs.

All renewables playing an additive role in filling the tank

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Issue 4

Schedule for LCFS is too anemic in first five years and does not incent refiners to use lowest carbon fuels.

Proposed Solutions

Proposed Solutions

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1. **Move ahead with regulation based on direct effects only in April. This will incent efficient direct land use efficient behavior.**
2. **Effective date of regulation should be 2010.**
3. **Participate and lead a truly international 24 month effort to come to a consensus on indirect impacts of all fuels, determine the best ways to eliminate or reduce international deforestation and the best policies to mitigate indirect emissions, sync up with EU.**
4. **Increase compliance schedule in early years.**
5. **Flex fuel performance requirements.**

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Proposed Solutions

<u>Good Policy:</u> Insures regulation is not biased or asymmetrical. Focuses on what land owners and producers have control of and provides real incentive for the lowest carbon fuels.

<u>Good Politics:</u> California needs a national LCFS to be truly successful. Rushing to judgment will pit agriculture against national LCFS and teamed up with big oil will be sure to kill any attempt to nationalize the program. Taking some time now to get the science right will also get the politics right.

<u>Good Economics:</u> California will continue to reap economic benefits of current industry on the ground and will send positive signal to new investment in next generation fuels.

Visit our website: www.pacificethanol.net