

Impacts of policy mechanisms on biofuels and agriculture

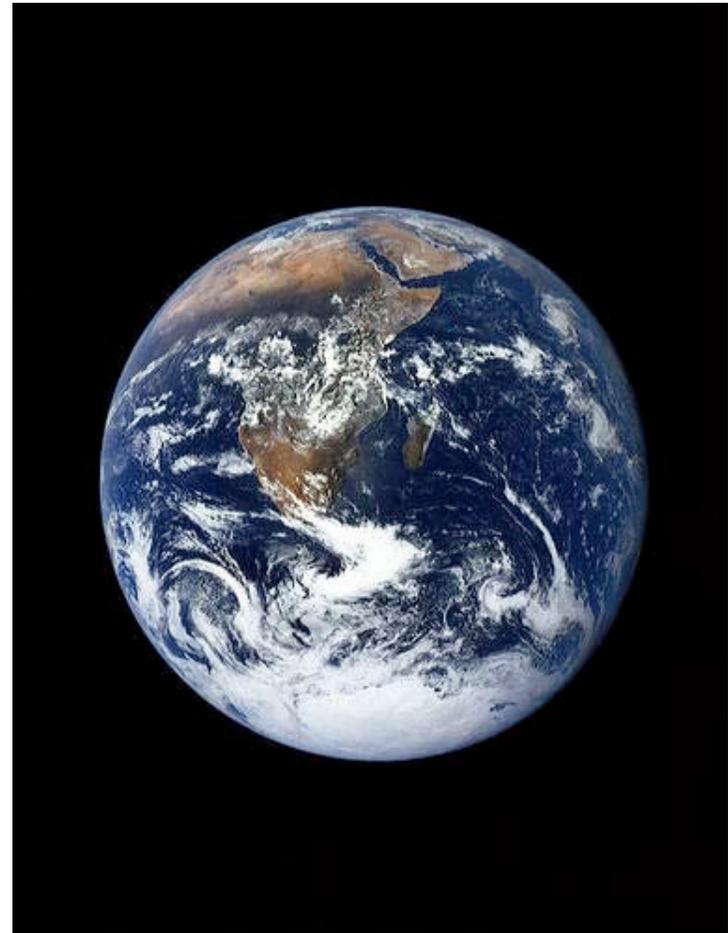
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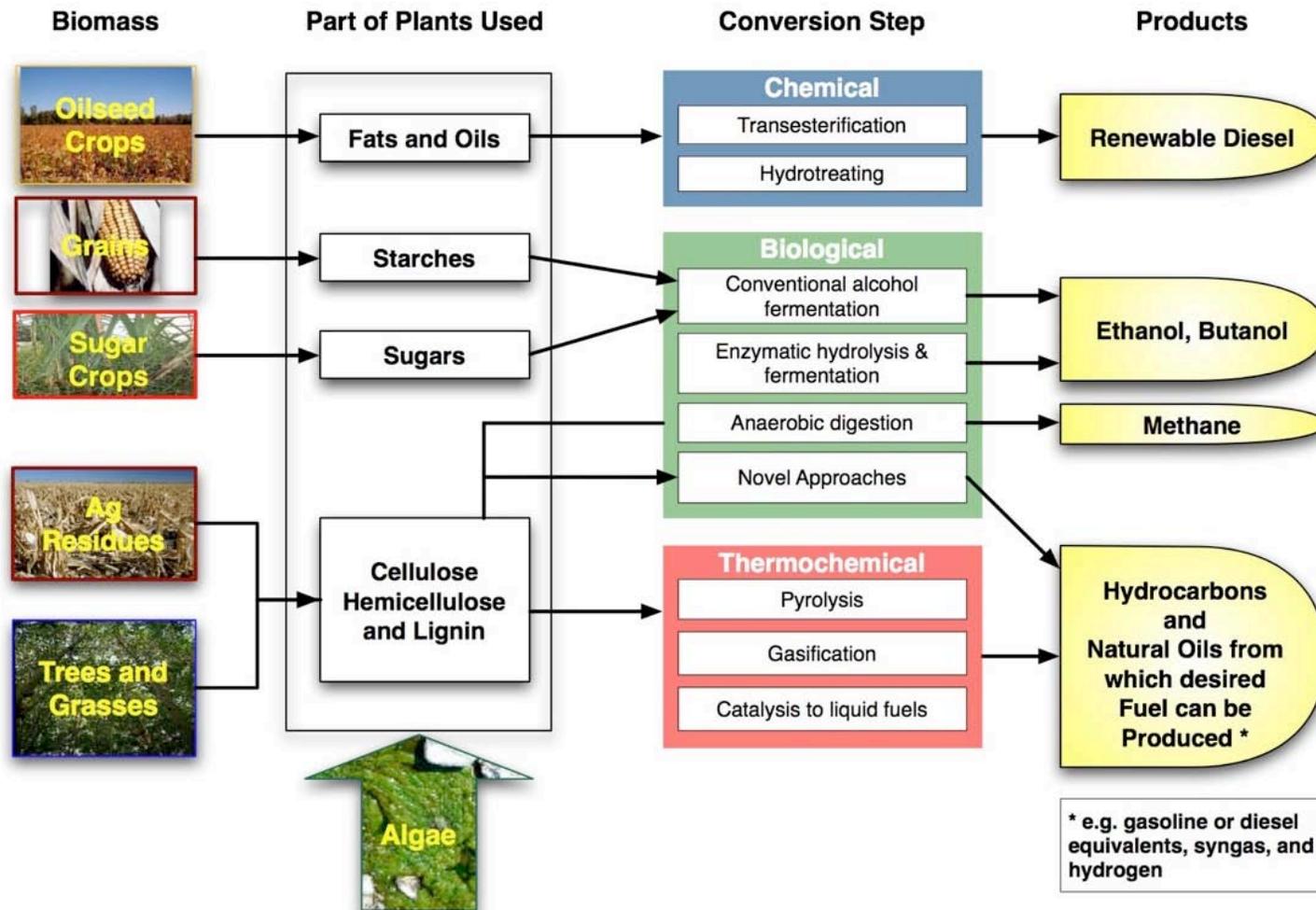


Outline

- What are biofuels?
- Misguided policy
- Purposeful policy
- Measuring sustainability
- Policy and risk
- A new face for agriculture
- Recommendations



What are biofuels?



Misguided policy

Most of the attempts at
renewable fuel policy in the
U.S. are failures



Ethanol blenders' tax incentives

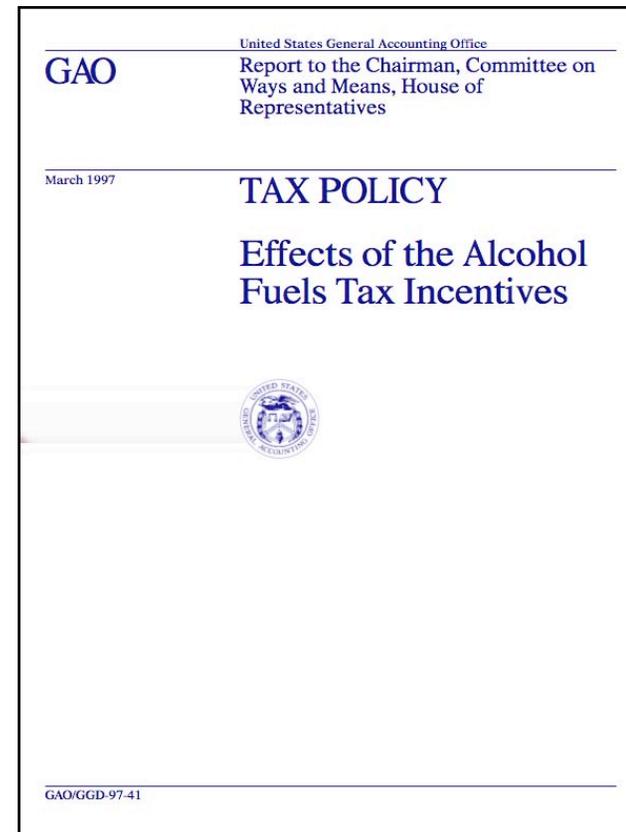
Worth roughly \$0.50 per
gallon of ethanol blended into
gasoline



Ethanol blenders' tax incentives

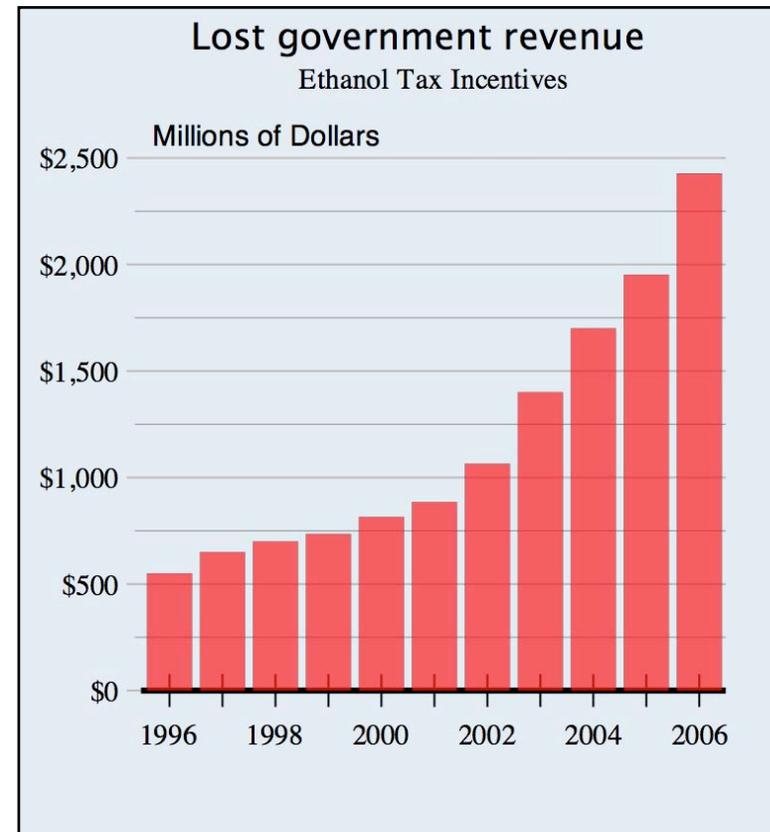
“We estimate that the partial exemption for alcohol fuels reduced motor fuels excise tax revenues by about \$7.1 billion from fiscal years 1979 to 1995.”

GAO 1997



Ethanol blenders' tax incentives

By 2006, that total cost had come to around \$20 billion—with almost \$2.5 billion lost in 2006 alone.



Ethanol blenders' tax incentives

One of the goals of this policy
has been to promote so-called
2nd generation technology
based on cellulosic

Actual result: 0 gallons of
cellulosic ethanol sold in the
U.S.



Biodiesel tax credit

It is incredible how history repeats itself

1 cent per 1 percent of biodiesel blended in petroleum diesel

Worth \$1 per gallon



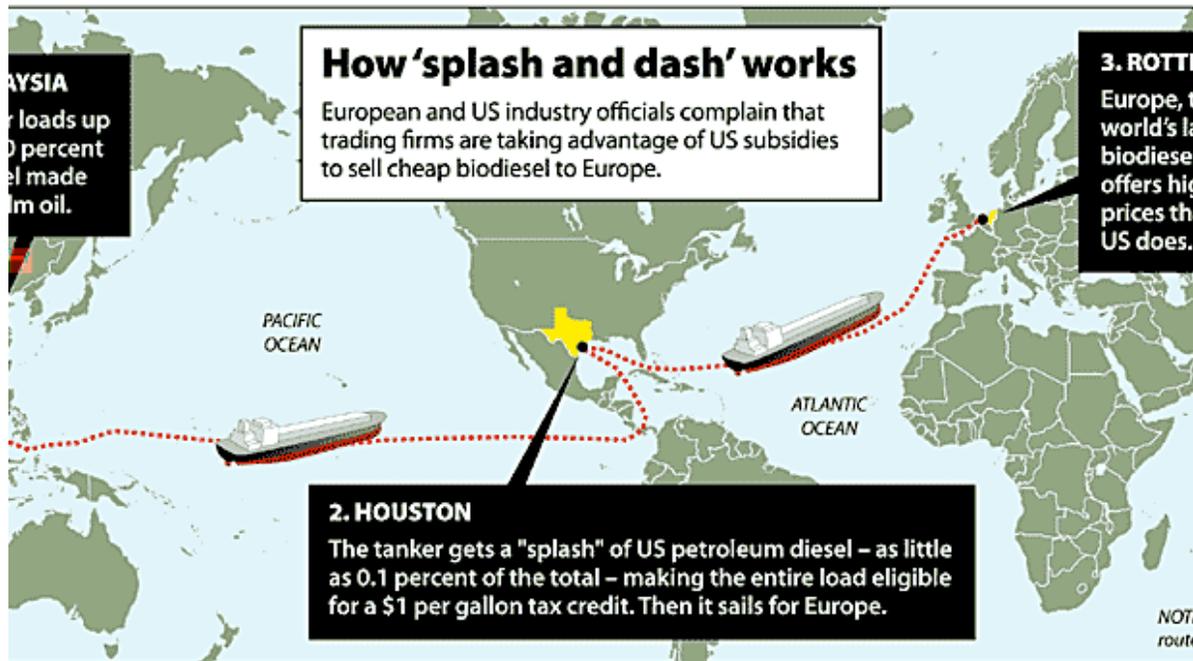
Biodiesel tax credit

Ridiculous special interest fight over who gets to be called “biodiesel”

(a.k.a. who gets to luxuriate in this windfall)

“Big Oil” as a victim?
The case of renewable diesel





“Splash and Dash”



E85 CAFE credits



Policy *post mortem*

- _ Narrowly defined incentives lead to special interest politics of the first order
- _ Without a measurable societal benefit, policies will surely not deliver any
- _ Without a holistic system-wide approach, loop holes and perversions of the policy are inevitable



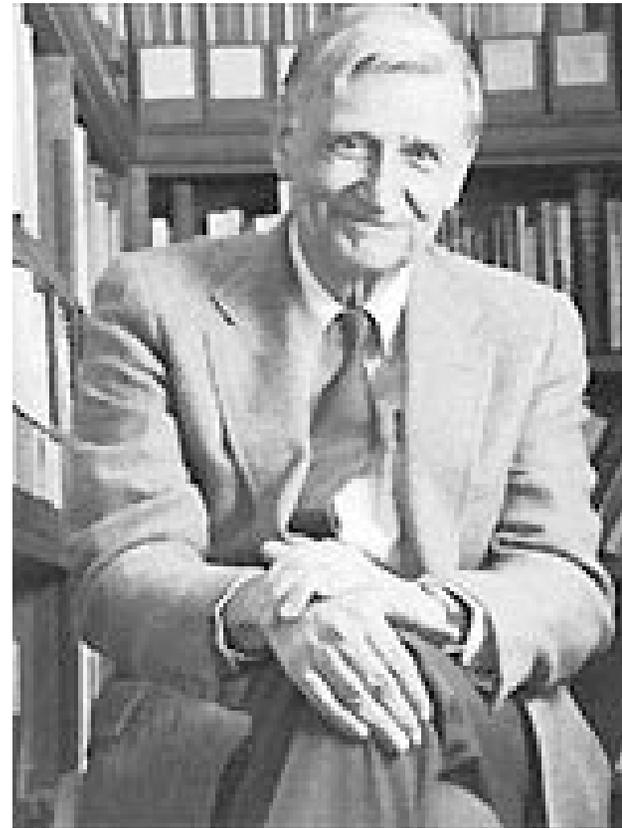
Purposeful policy

Energy security?
Climate change?
Economic well-being?
Public health?

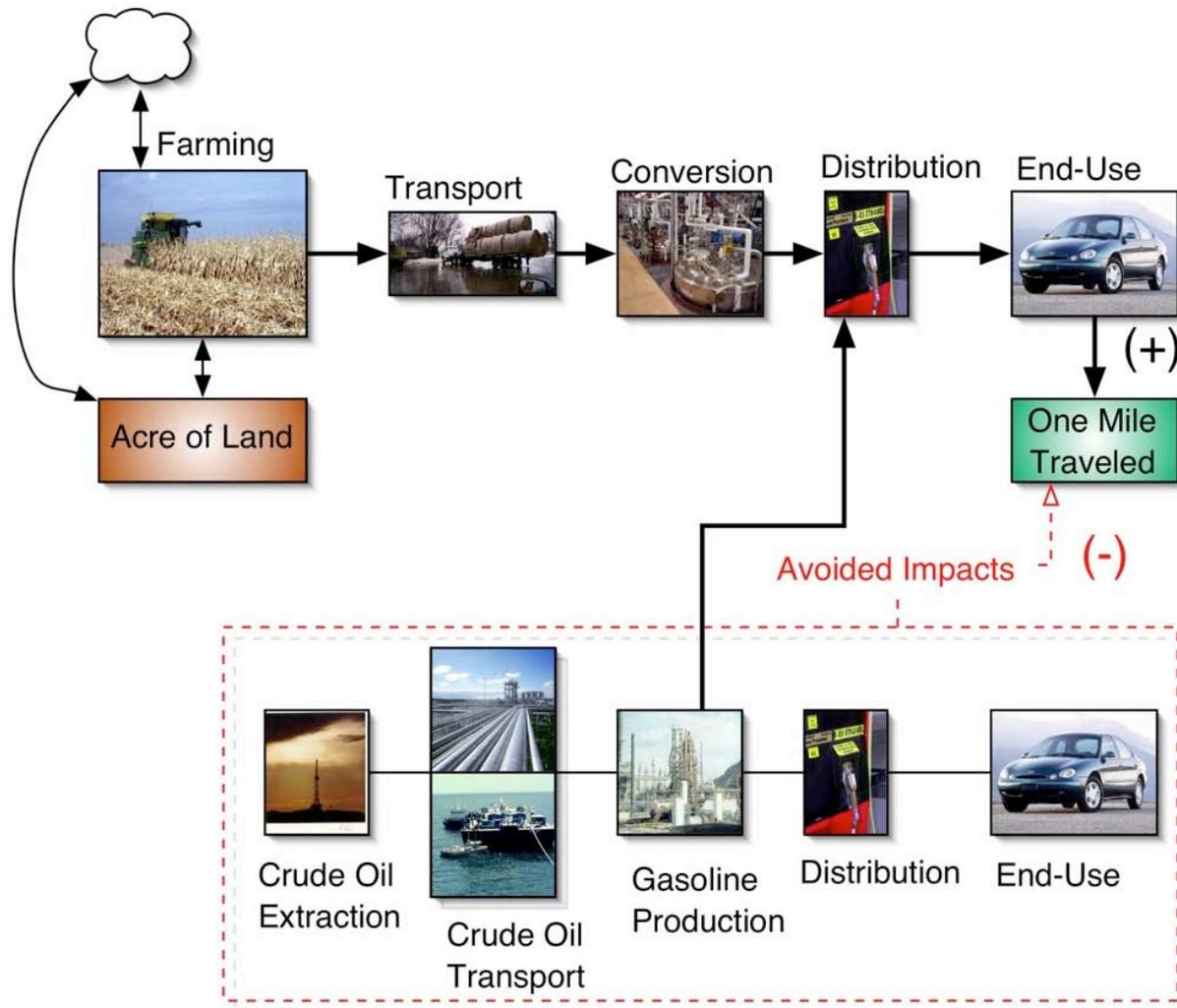


Measuring sustainability

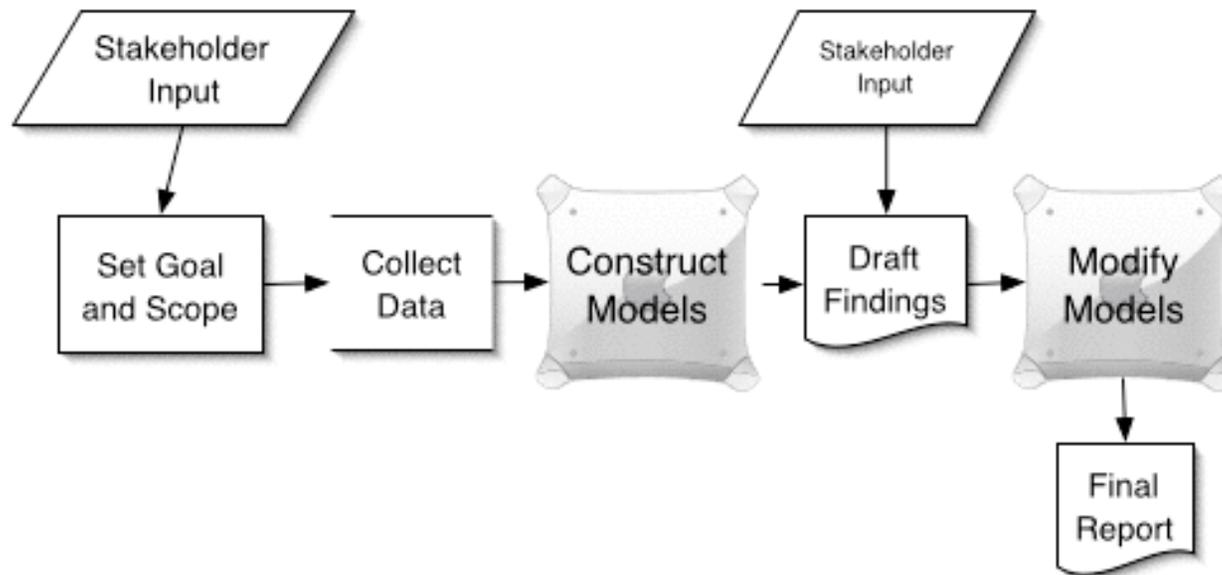
"The common aim must be to **expand resources** and improve **quality of life** for as many people as heedless population growth forces upon **Earth**, and do it with **minimal prosthetic dependence**. That, in essence is the ethic of sustainable **development**."



E.O. Wilson Consilience (1998)



Measuring sustainability



Measuring sustainability

“We need an LCA
process that addresses
all sustainability issues
and is accepted
worldwide”

Paraphrased from talk by Dean Simeroth, CARB, commenting on
hurdles facing implementation of a low carbon fuel standard in
California



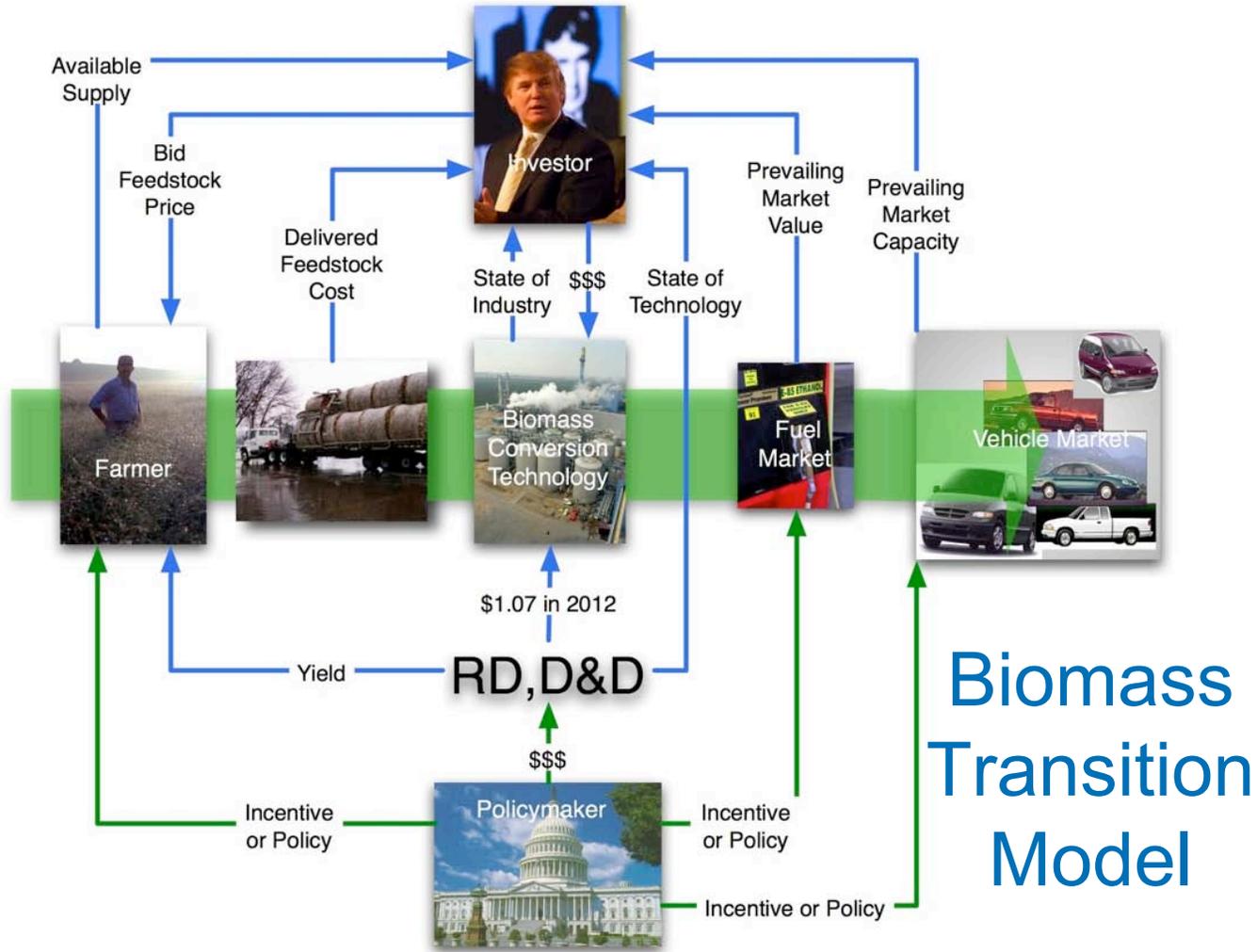
Water

The 800-pound gorilla



Biofuels production can use on the order of 5 to 7 gallons of water for each gallon of fuel produced—and that doesn't count water for irrigation

Policy and risk

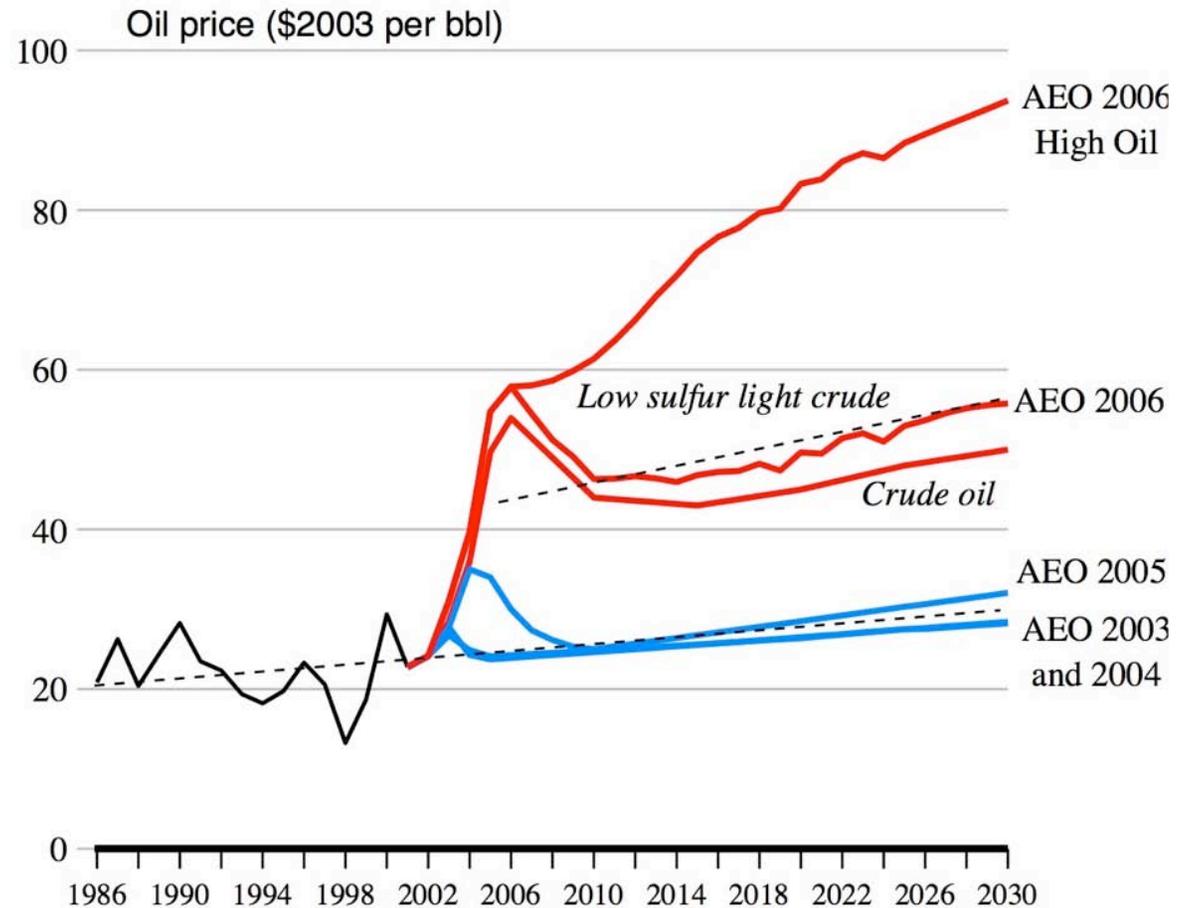


Caveats

- _ I haven't been involved with this modeling in many months
- _ I'm sure it has improved a great deal (email robert_wallace@nrel.gov)
- _ There are many things I would now do differently

Caveats

Most results are based on AEO 2006 reference oil prices



Caveats

- _ This model focuses on risk and how investors and farmers respond to risk
- _ If you don't buy our approach, you won't buy our results
- _ Risk is captured by raising the cost of capital as a function of technology risk
- _ The examples shown are technology specific—ethanol from corn, switchgrass and ag residues on primary ag land



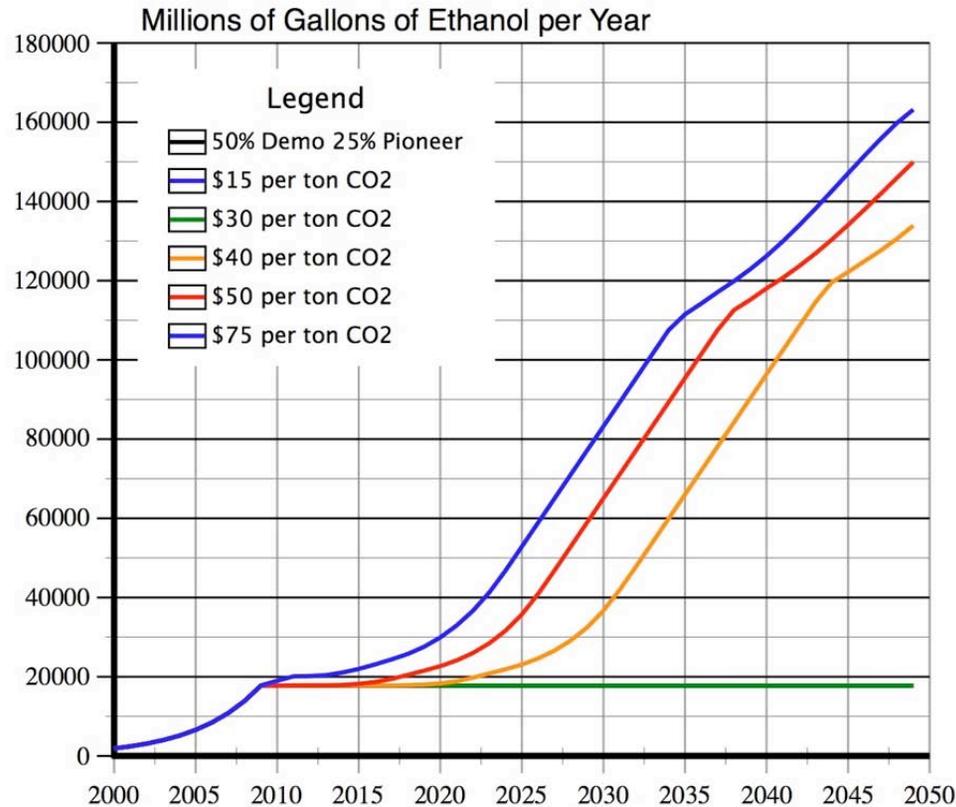
Caveats

- _ If you begin to believe your own models, you are in BIG trouble



Carbon taxes don't address risk efficiently

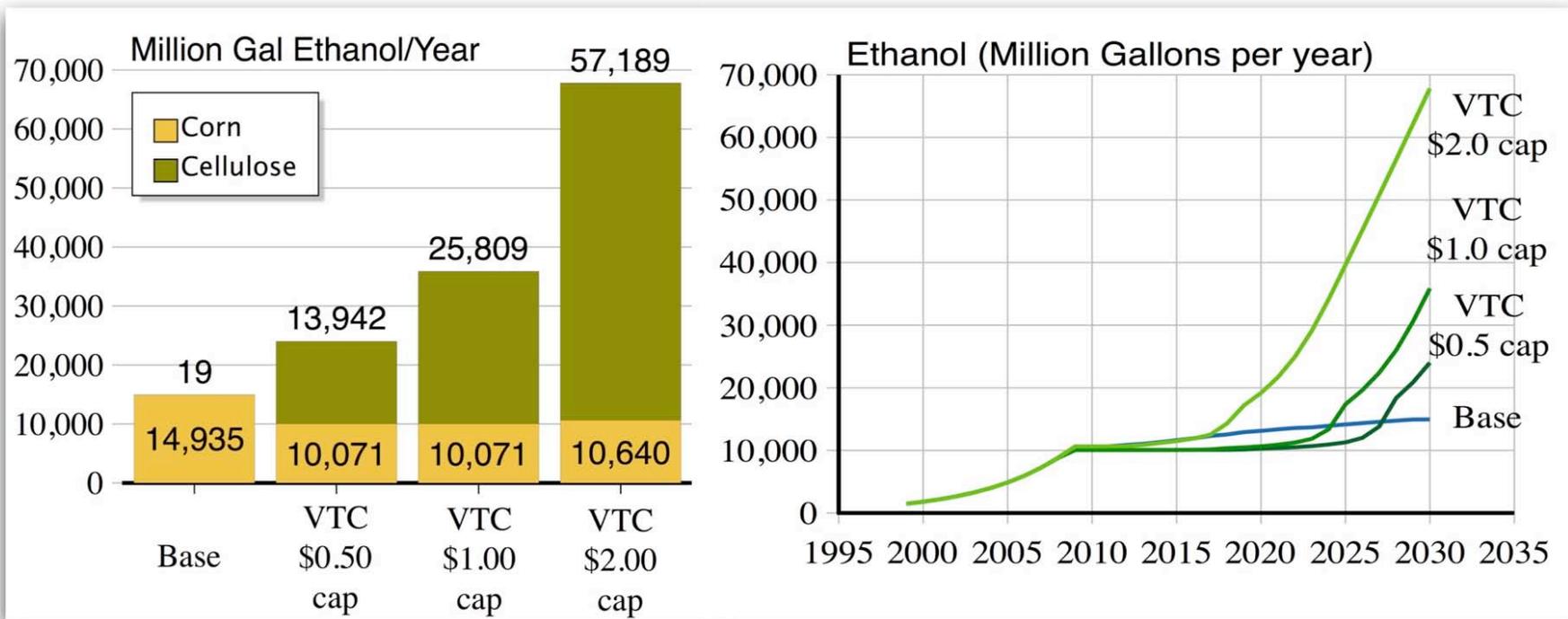
Effect of Carbon Tax
Dollars per ton CO₂



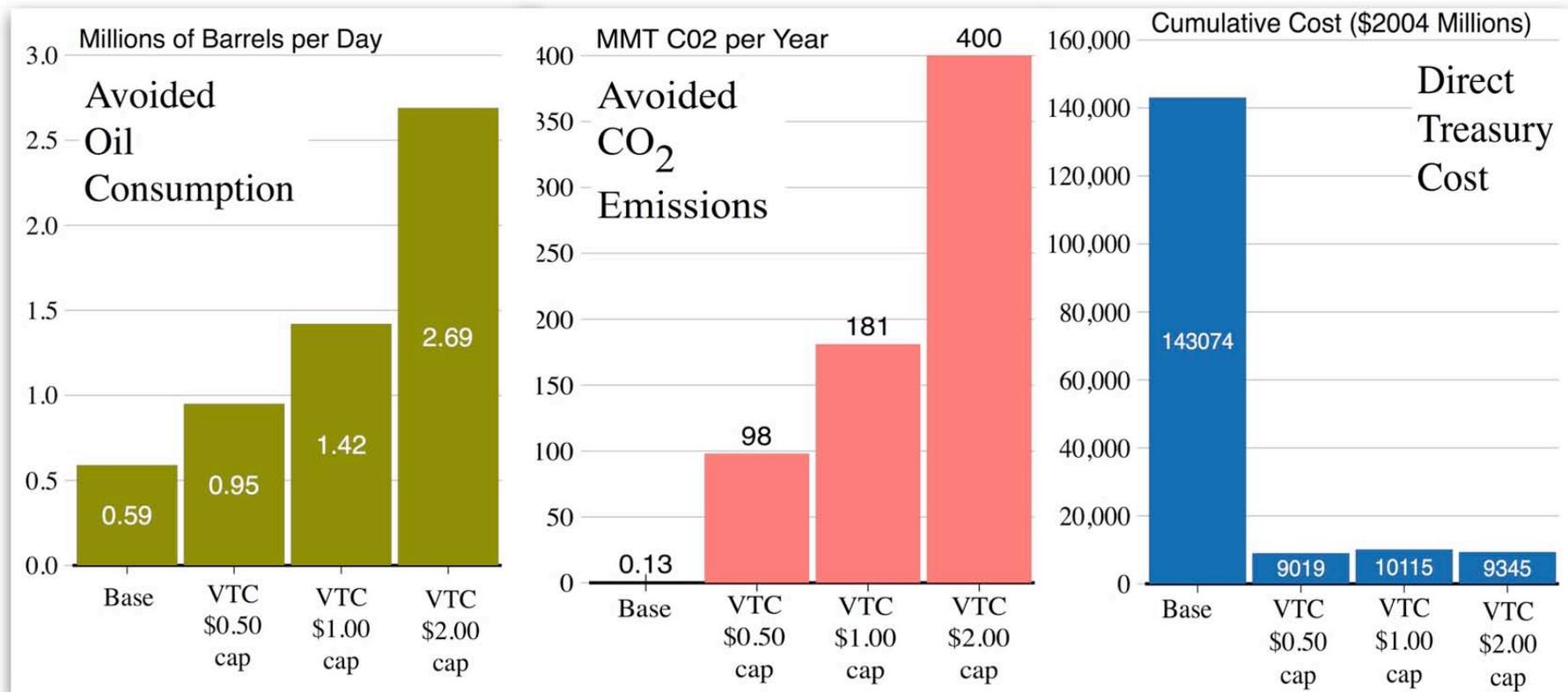
Addressing risk

- _ A variable tax credit designed to accommodate the differential in cost between existing petroleum refining technology and new technology—mostly due to risk-inflated capital
- _ Not a practicable policy
- _ Results are instructive about how efficiently manage new technology risk

Addressing risk



Addressing risk

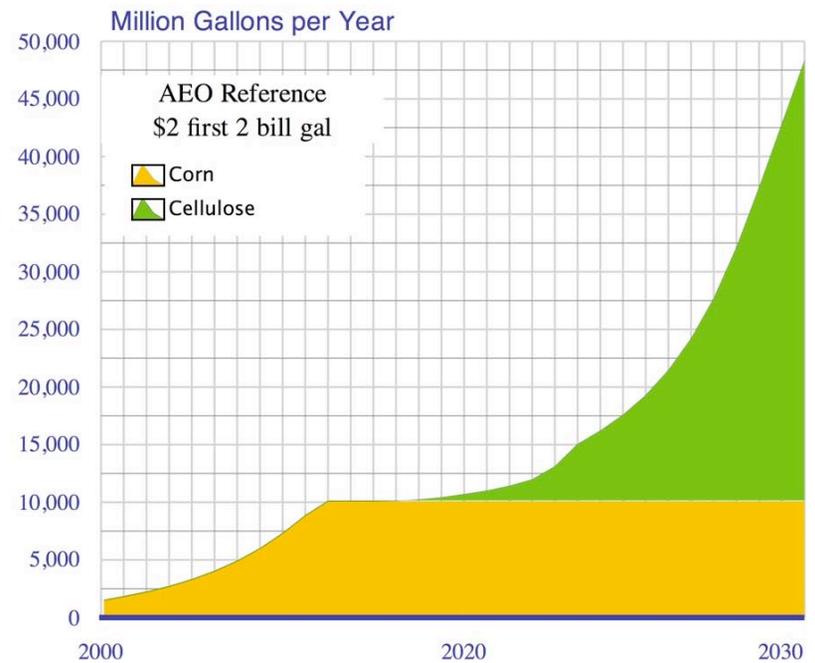
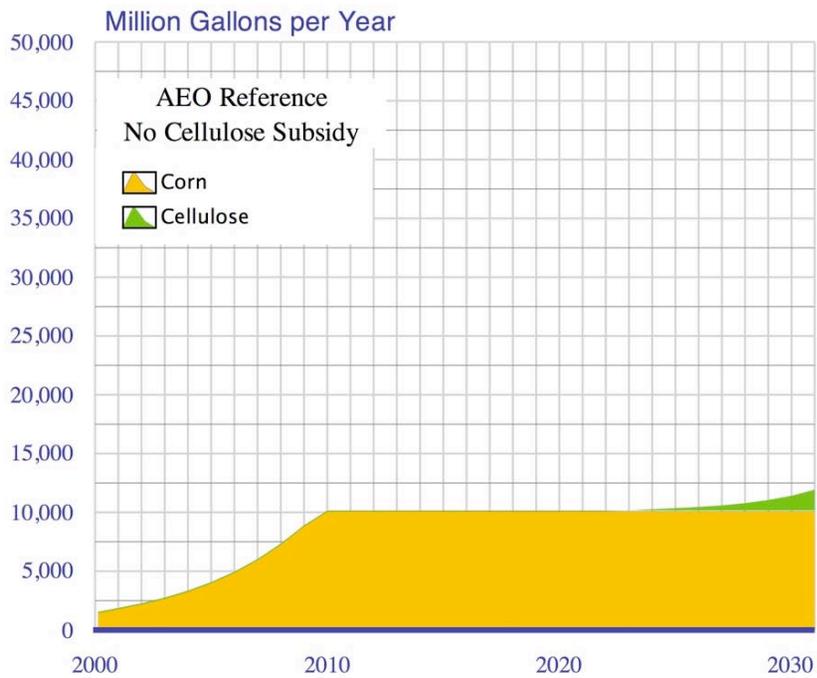


Addressing risk

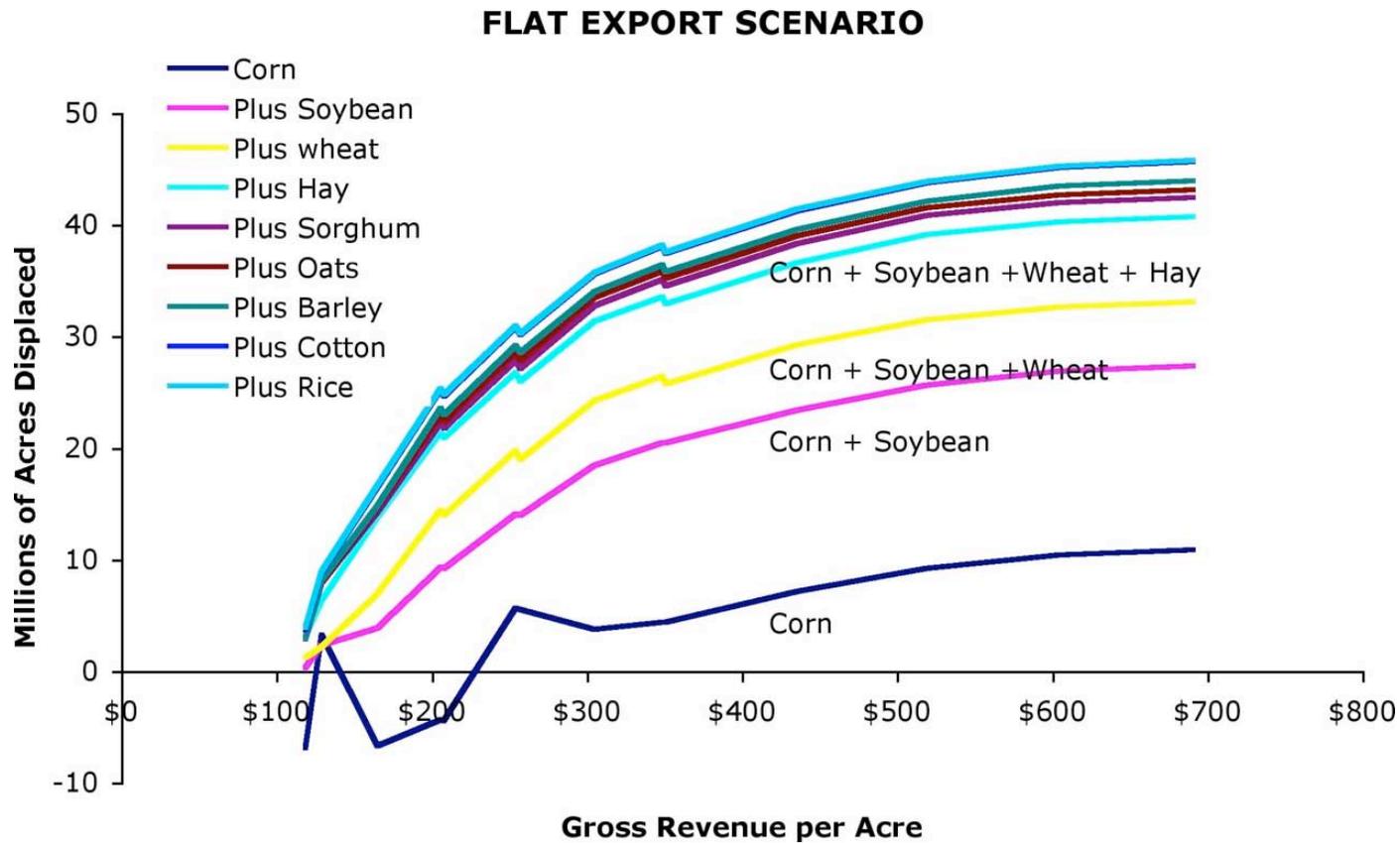
- _ Reward the early risk takers
- _ First come first serve incentives. An idea we got from GM.
- _ \$2 per gallon incentive that sunsets after the first 2 billion gallons



Addressing risk



Changes to agriculture food vs fuel



Changes to agriculture and quality of life



Protests in Mexico
City over the price of
corn January 31,
2007

“The tortilla effect”

Changes to agriculture Worldwide effects

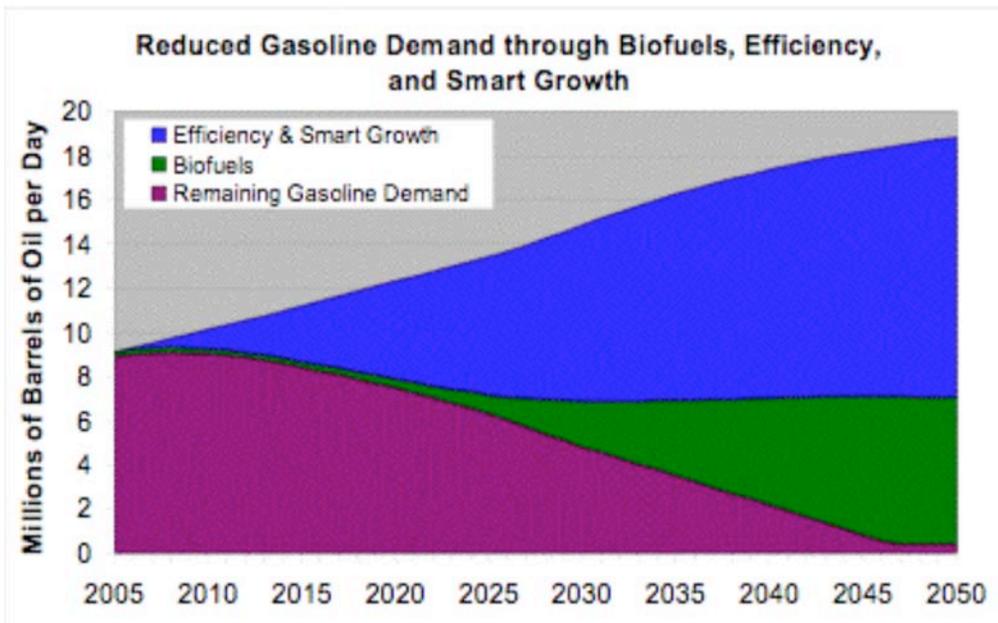


Brazilian rain forest

So where do we think
corn and soy
production will go?

Demand is the biggest lever we have

Our NRDC/NREL study demonstrated that—under the most aggressive conditions for biofuels success, 2/3 of our gasoline demand will have to be met through demand side reductions



Recommendations

- _ Think holistically
- _ Focus on societal needs, not technology-specific solutions, and not special interest needs
- _ Manage risk
- _ Don't repeat our past mistakes
- _ Aim for transparency in the process