Sustainable Development of Biofuels

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Overview

1. Sustainable Development
2. Biofuel Challenges
3. Legal Options to Address These Challenges

1. Sustainable Development

Sustainable development as necessary context for biofuels

- Sustainable development as framework for climate change and biofuels
- Climate change is a sustainable development issue, not “just” an environmental issue
- What this means for biofuels

Sustainable Development

- *The iconic definition: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

  - *World Commission on Environment and Development, Our Common Future (1987)*

Conventional Development

PROGRESS:

--Peace & security

--Economic Development

--Social Development/ Human Rights

--Supportive National Governance

PRICE OF PROGRESS:

--Environment & Natural Resources

Sustainable Development

PROGRESS:

--Peace & security

--Economic development

--Social development/human rights

--Environmental protection/restoration

--Supportive national governance

Climate change is sustainable development issue, not "merely" an environmental issue

- United Nations Framework Convention on Climate Change addresses climate change in terms of sustainable development
- Climate change affects/will affect most aspects of human life
- Biofuels are intended, among other things, to address climate change

"One dimensional" thinking won't work

- Dependence on foreign energy
- Balance of payments
- Security/availability of supplies
- Economic risks and opportunities (agriculture, forestry, land use, coastal development, water supplies and quality)
- Technological development
- Social well-being and human rights
- Need to think broadly about economic development

2. Biofuel Challenges

- Theory:
- 1. Ethanol is ethanol, regardless of how it is produced
- 2. Plant-based fuels are climate neutral because they replace fossil carbon with carbon that was just in the atmosphere.

Reality

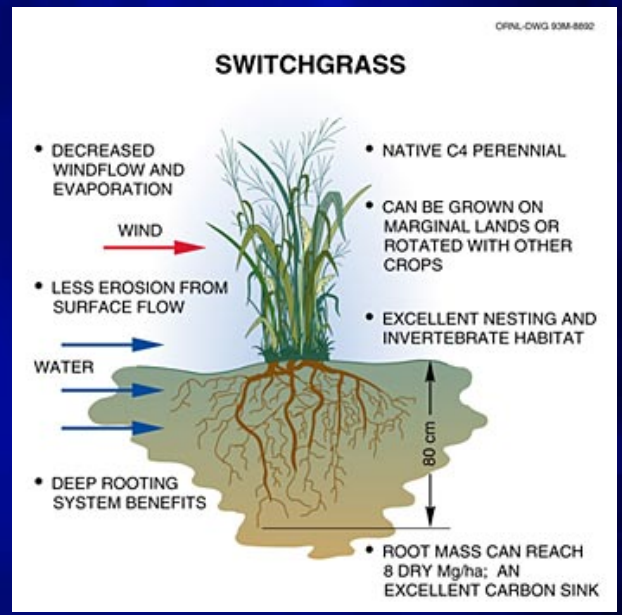
- Different methods of biofuel production have different environmental and social costs

Development of Biofuels Sources

- First generation (food crops):
  - Corn
  - Soybeans
  - Palm oil
  - Sugar beets
  - Wheat

Second Generation

- Non-food crops
  - Lignocellulosic sources
  - Switchgrass and other grasses
  - Jatropha
  - Used cooking oils



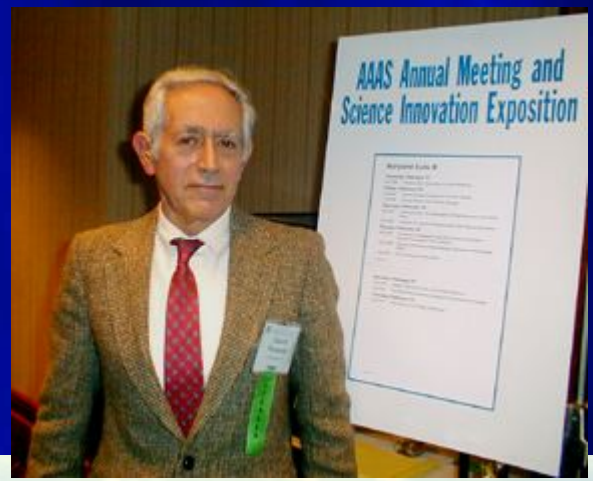
Fry Diesel
PHILADELPHIA FRY-O-DIESEL, INC

Third Generation

- Micro-diesel (from genetically modified bacteria)
- Algae

Negative impacts are of two basic kinds:

- 1. Energy mass balance (energy costs of processing biofuels vs. energy provided)
- 2. Environmental and social costs
  - Fertilizers/pesticides
  - Water
  - Land use/deforestation
  - Biodiversity
  - Food costs
  - People displaced



Recent studies

- Estimated average greenhouse gas (GHG) emissions from cellulosic ethanol derived from switchgrass were 94% lower than estimated GHG emissions from gasoline. Schmer et al. (2008)
- Land use changes due to biofuel production cause significant greenhouse gas emissions (more for corn than switchgrass). Searchinger et al. (2008)

Two contrasting conclusions

- Biofuels are not an appropriate response to climate change

- Because some biofuels are better than others, we should foster more sustainable production of biofuels

3. Legal Tools/Options to Address These Challenges

- A. Limits based on baseline lifecycle greenhouse gas emissions (Energy Independence & Security Act of 2007)

Renewable fuels—billions of gallons per year

- 2006 ..... 4.0
- 2007 ..... 4.7
- 2008 ..... 9.0
- 2009 ..... 11.1
- 2010 ..... 12.95
- 2011 ..... 13.95
- 2012 ..... 15.2
- 2013 ..... 16.55
- 2014 ..... 18.15
- 2015 ..... 20.5
- 2016 ..... 22.25
- 2017 ..... 24.0
- 2018 ..... 26.0
- 2019 ..... 28.0
- 2020 ..... 30.0
- 2021 ..... 33.0
- 2022 ..... 36.0

New renewable fuel facilities

- EPA has one year to write regulations ensuring that “renewable fuel produced from new facilities that commence construction after the date of enactment of this [Act], achieves at least a 20 percent reduction in lifecycle greenhouse gas emissions compared to baseline lifecycle greenhouse gas emissions.”

Advanced Biofuel

In general: The term ‘advanced biofuel’ means renewable fuel, other than ethanol derived from corn starch, that has lifecycle greenhouse gas emissions, as determined by the Administrator, after notice and opportunity for comment, that are at least 50 percent less than baseline lifecycle greenhouse gas emissions. (amending § 201(o)(1) of the Clean Air Act, 42 U.S.C. § 7545(o))

Advanced biofuels—billions of gallons/year

- 2009 ..... 0.6
- 2010 ..... 0.95
- 2011 ..... 1.35
- 2012 ..... 2.0
- 2013 ..... 2.75
- 2014 ..... 3.75
- 2015 ..... 5.5
- 2016 ..... 7.25
- 2017 ..... 9.0
- 2018 ..... 11.0
- 2019 ..... 13.0
- 2020 ..... 15.0
- 2021 ..... 18.0
- 2022 ..... 21.0

Cellulosic Biofuel

- The term ‘cellulosic biofuel’ means renewable fuel derived from any cellulose, hemicellulose, or lignin that is derived from renewable biomass and that has lifecycle greenhouse gas emissions, as determined by the Administrator, that are at least 60 percent less than the baseline lifecycle greenhouse gas emissions.

Cellulosic Biofuel—billions of gallons per year

- 2010 ..... 0.1
- 2011 ..... 0.25
- 2012 ..... 0.5
- 2013 ..... 1.0
- 2014 ..... 1.75
- 2015 ..... 3.0
- 2016 ..... 4.25
- 2017 ..... 5.5
- 2018 ..... 7.0
- 2019 ..... 8.5
- 2020 ..... 10.5
- 2021 ..... 13.5
- 2022 ..... 16.0

Biomass-based Biodiesel

- The term ‘biomass-based diesel’ means renewable fuel that is biodiesel…and that has lifecycle greenhouse gas emissions, as determined by the Administrator, after notice and opportunity for comment, that are at least 50 percent less than the baseline lifecycle greenhouse gas emissions.

Biomass-based Biodiesel—billions of gallons/year

- 2009..... 0.5
- 2010..... 0.65
- 2011..... 0.80
- 2012..... 1.0

B. Modify Incentives for Farmers/Producers

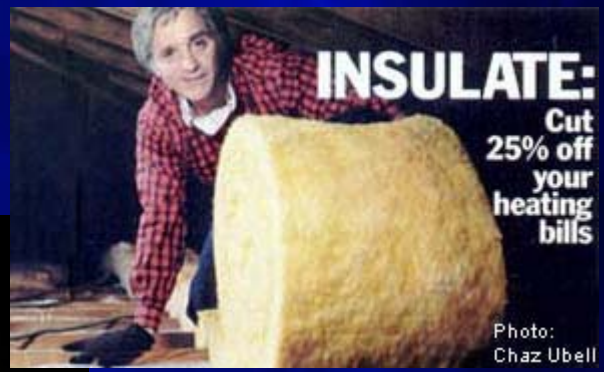
- Reduce or eliminate subsidies for production of certain biofuels, and create or increase subsidies for others
- Structure tax credits in a similar way
- Provide loan guarantees for “first of a kind” biofuel projects that are likely to be sustainable

  --Many of these issues are on the table in pending conference committee for farm bill

C. Sustainability standards for biofuels

- Proposed by European Commission
- Possible advantages:
  - Global problem
  - Reduce trade issues
- Challenge: precise definition on which all parties can agree
- Another option: standardized international certification for sustainable biofuels

4. Efficiency, efficiency, efficiency



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