Biofuels: Continuing Shifts in the Industry & Long-Term Outlook

Carbon, Land & Politics

April 6, 2010

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Emerging Issues For Biofuels: Land!

Regulations Calling For More Bio-Based Energy Use
U.S. Federal RFS, CA LCFS, Cap and Trade …

Emerging Concerns About Economy-Wide Impacts
Primarily in the form of land use, thought to jeopardize food and conservation objectives

Land Use Concern #1: Food Security
Spurred by 2008 agricultural commodity prices & perfect storm of business, ideological and political interests

Land Use Concern #2: Land Use Change (Conservation)
Spurred by concern about over-reliance on land for energy & perfect storm of business, ideological and political interests

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Is the "Land Use" Critique Valid?

Valid Claims About Land Use:

Land intensification creates impacts on the world economy

Land is a finite resource

Land is not treated dynamically in lifecycle carbon accounting

Misleading Claims About Land Use:

Using land for energy is a zero sum game

Land is a uniquely finite resource (rationalizing focus)

Indirect land use change "properly" addresses the problem

Indirect land use change is traceable to one factor (biofuels)

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Deconstructing "Land Use Change"

Step 1: What is indirect land use change (really)?
Current debate suffers from lack of accurate framing

Step 2: What are the problems with the current debate?
Questionable science, bad assumptions, skewed outcomes

Step 3: What is the right way to look at the land use issue?
Ignoring the problem is not a useful outcome either

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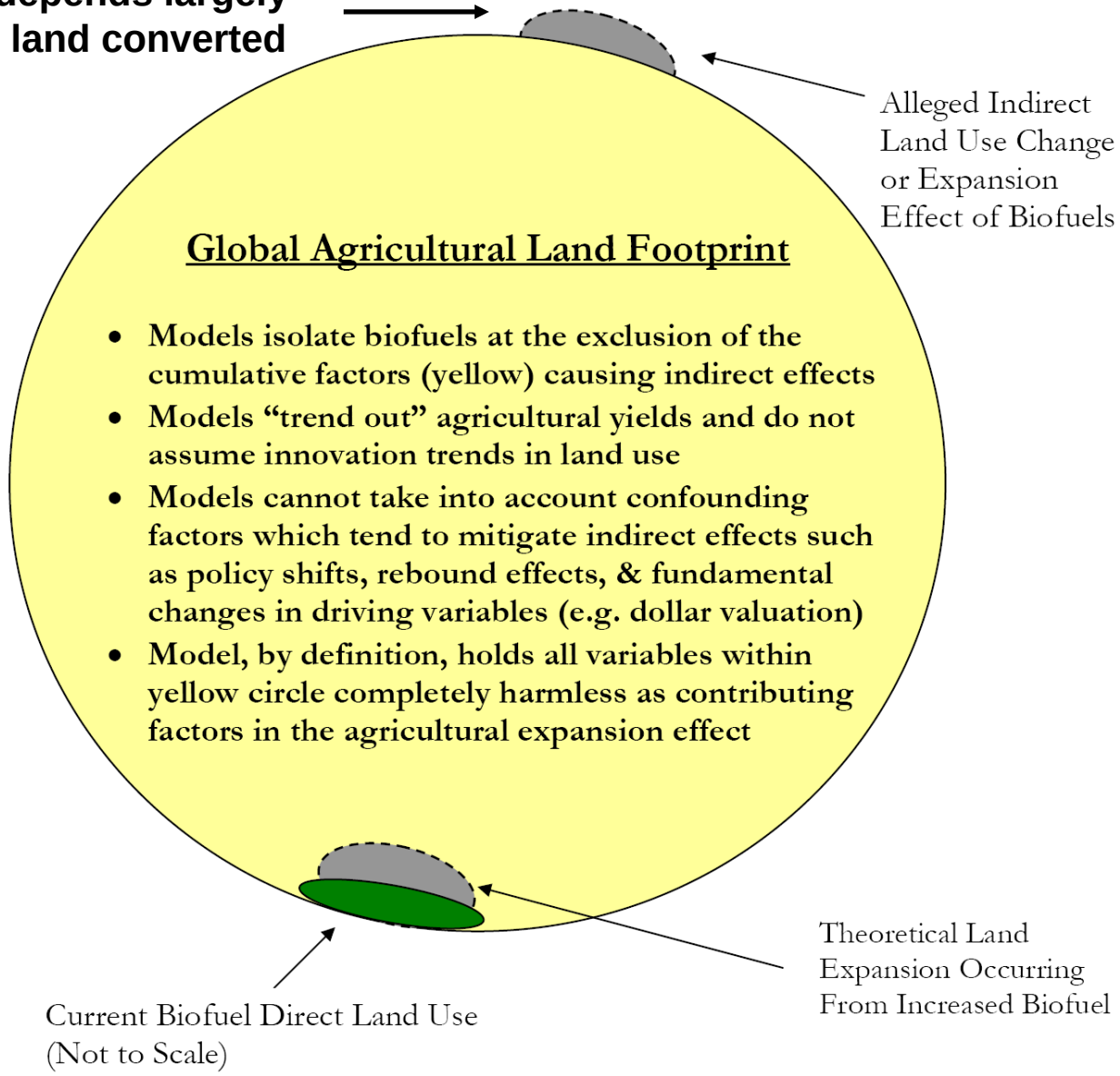
Step 1: What is Indirect Land Use?

Magnitude of effect depends largely on what type of new land converted



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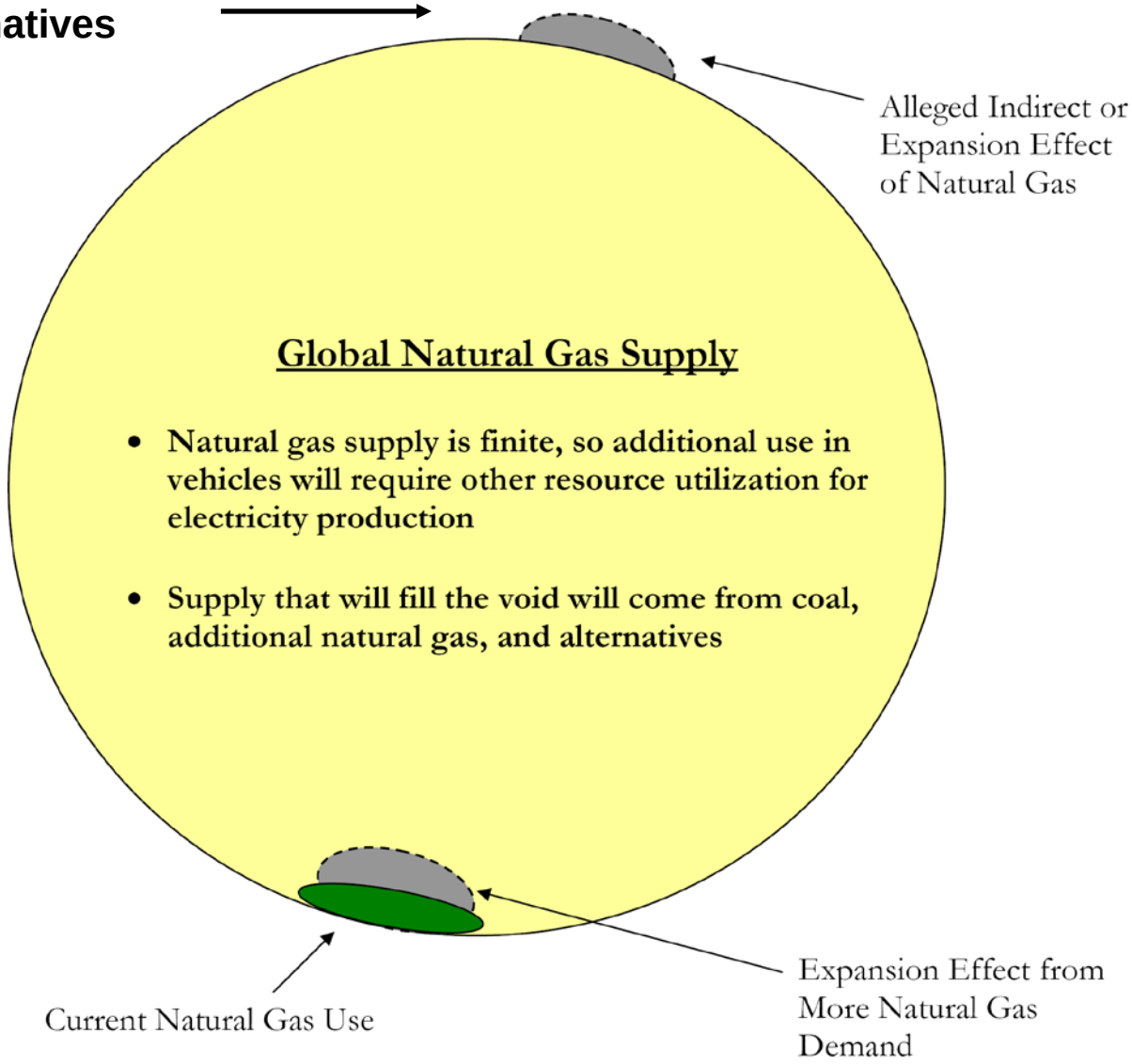
Natural Gas Expansion Effect

Power Production on the margin: coal, NG, alternatives



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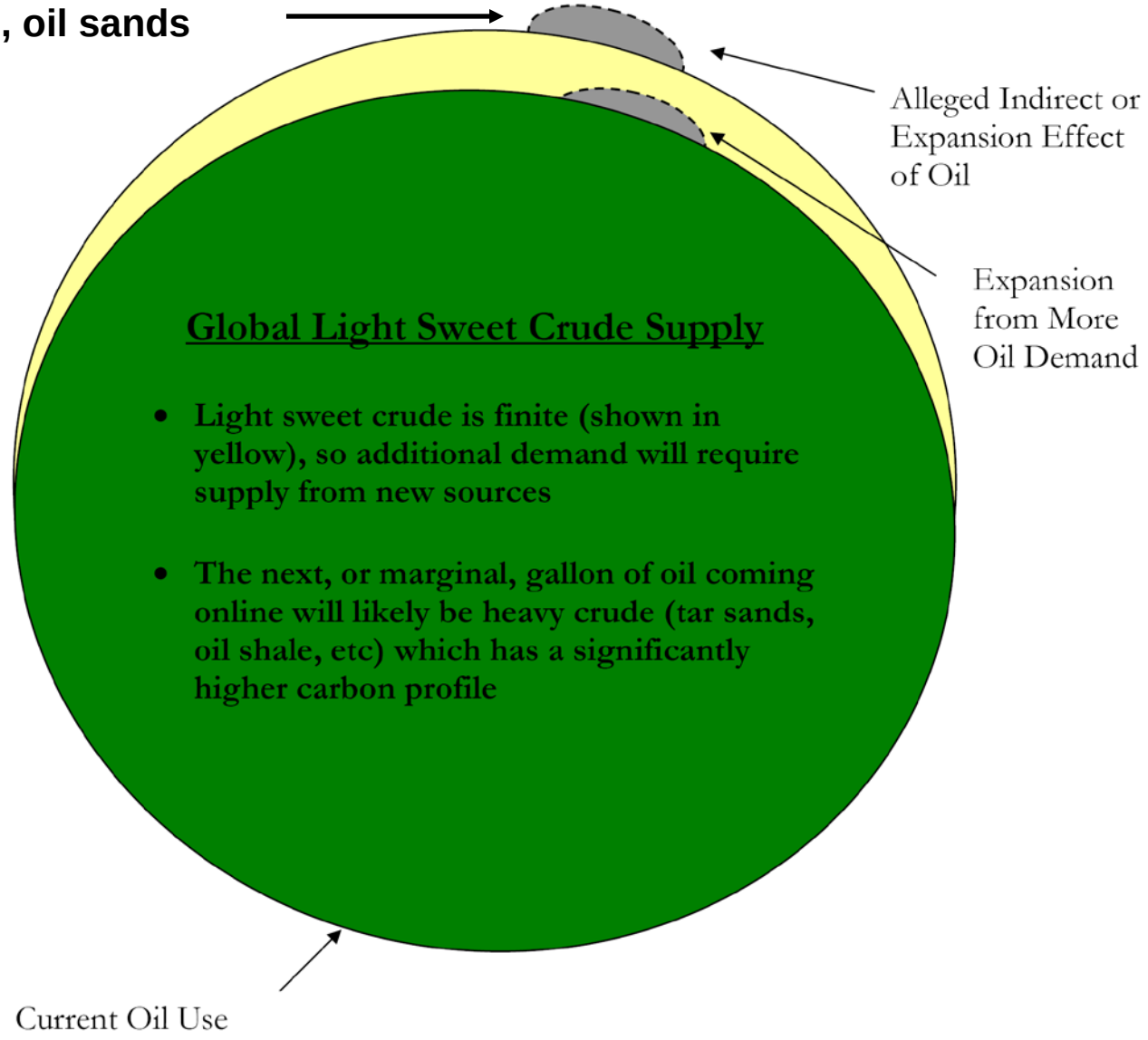
Petroleum Expansion Effect

Oil use on the margin: heavy oil, TEOR, tar sands, oil sands



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Bottom Line for Indirect Effects

Producing all forms of energy requires resource use
All resources (oil, natural gas, coal, land) are finite, and intensification will therefore produce impact on the margin!

Impact on the margin is the product's "indirect effect"
Indirect land use change is the theoretical impact on the margin of using more land for bioenergy

Policy decision: how do we account for resource use?
If you want to start importing marginal effects, you must do the same for all fuels (or comparison is not valid)

Marginal Impacts of Concern:
Driving more land, coal and high carbon intensity crude oil

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Step 2: Problems with Current Debate

Consideration of Indirect Effects is Misframed

Indirect land use change advocates are "consequentialists"
They are asking for a fundamental shift in how we "score" fuels
This is not a simple fix; it's a highly complicated problem

Consideration of Indirect Effects is Selective

Let's assume inquiry is valid … why only biofuels?
Wrong answer: "because other indirect effects are small"

Science is Nascent & Suffers From Major Problems

Derivates from ISO 14040
Single-factor causation not really defensible
Major "black box" issues; validation basically impossible
Entire premise is based on a series of critical assumptions …

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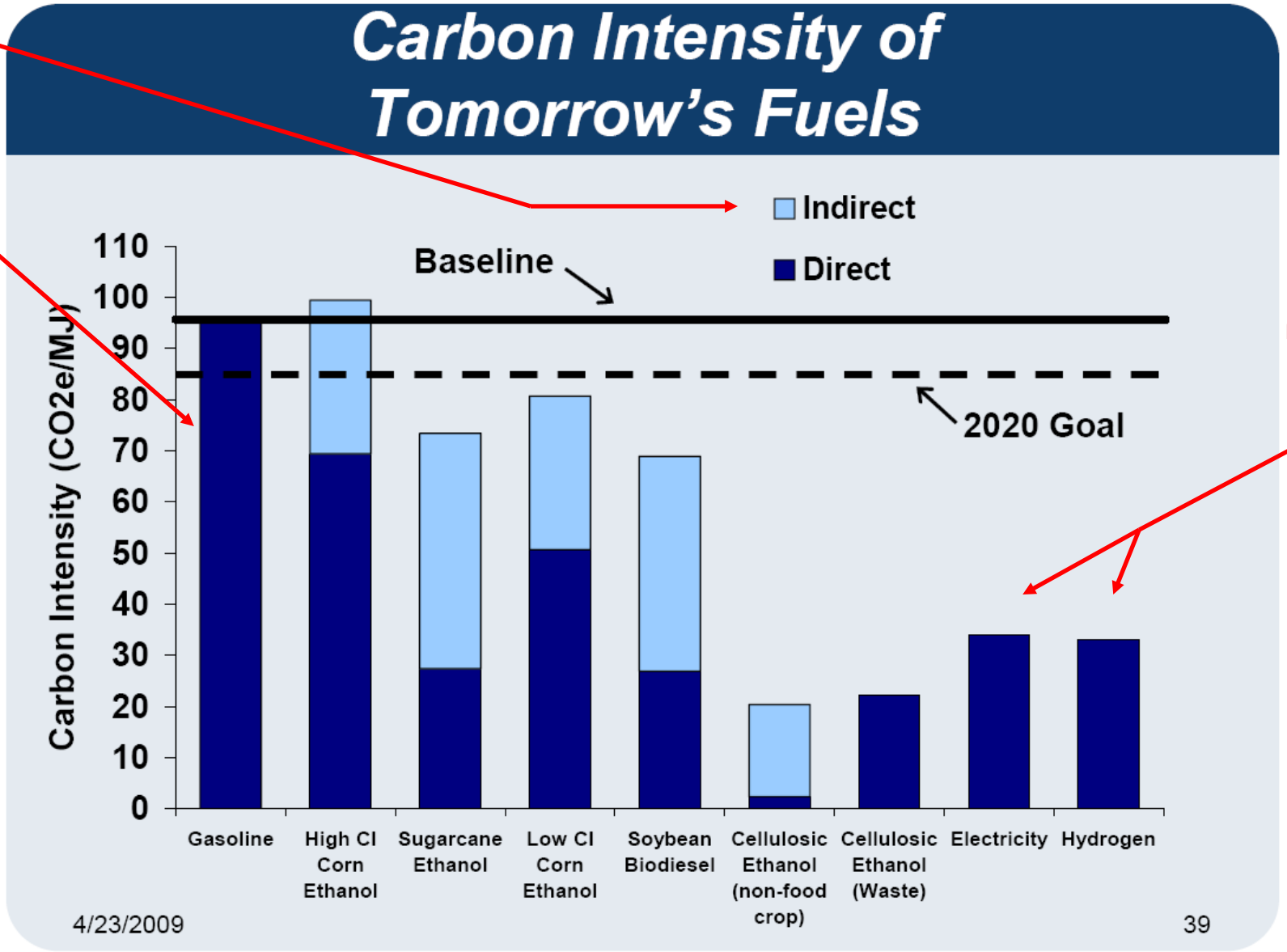
Selectively Applied Indirect Effects

Derived from economic modeling

No economic modeling conducted for petroleum or other alternative fuels

CI Intensity Driven Down by Policy Considerations



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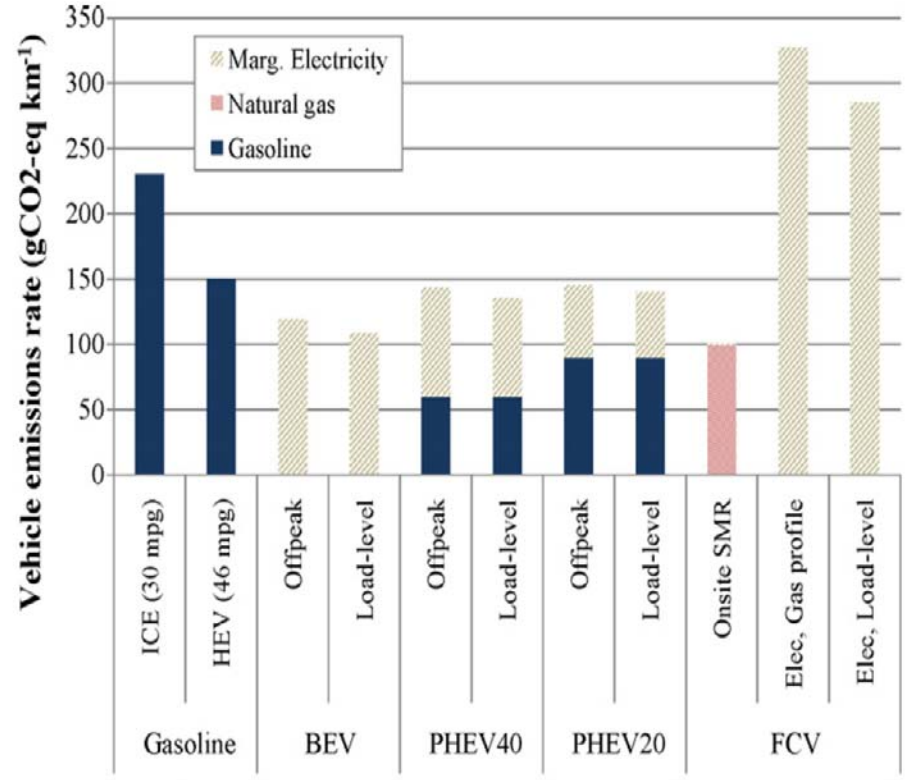
Proper Consideration of Marginal Electricity



MJ km^{-1}	2.39	1.57	0.68		1.10		1.25		1.03		
gCO_2 MJ^{-1}	96.0	96.0	174.0	158.7	130.0	123.1	115.9	111.8	97.2	317.1	276.2

Fig. 7. Well-to-wheels vehicle emissions (gCO_2 equiv. km^{-1}) by energy source, vehicle energy intensity (MJ km^{-1}), and fuel carbon intensity (gCO_2 equiv. MJ^{-1}) by vehicle pathway and timing profile.

R. McCarthy, C. Yang, J. Power Sources (2009), doi:10.1016/j.jpowsour.2009.10.024

"These findings counter the assumptions for marginal electricity included in the LCFS rulemaking."

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Problems with Current Debate (cont.)

2008 Searchinger Paper as "case in point"

- Compares biofuels with indirect effects to oil without them in violation of basic LCA system boundary rules
- Uses large initial model shock then back casts the results
- Depends on series of underlying erroneous assumptions that maximize the conversion of land overseas:
  - Most agricultural systems are operating at maximum capacity
  - The supply and demand for all agricultural products are in balance
  - Future increases in supply will equal the increase in demand from existing product users.
  - Yield increases are largely offset by lower yields abroad

Problems with Current Debate (cont.)

2009 Searchinger/Hamburg Paper …

- Properly characterizes the problem
  - Current system is based on national inventories and breaks down through the lens of international bioenergy use
- Improperly characterizes the solution
  - Offers land-based credits, but expects bioenergy to be held accountable for "leakage emissions resulting from changes in land-use activities to replace crops or timber diverted to bioenergy" (i.e. indirect land use change)
  - There is a strange principle at work here: "*bioenergy is escaping its true land impact … the solution is to hold bioenergy accountable for someone else's land impacts??!!*"

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Leakage and Carbon Accounting

Is Inclusion of "Leakage" in Carbon Score Correct?
Proponents of iLUC say yes …

But there is great potential for complications …
In reality, all impacts are direct
An indirect/leakage effect "adder" is carbon shifting
Sum of all parts is greater than the whole
Concept of supply-chain accountability abandoned

How would this "new lens" impact other policies?
All land conservation programs have iLUC effects
(P)HEVs reduce fuel prices and increase emissions

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Principles Moving Forward

Goal should be supply chain accountability
This means all effects are direct (dynamically treated)
Requires better reporting (but so will credit system alternative)

Establish consistent approach to resource utilization
Average for some fuels, marginal for others does not work
Should be based on ISO 14040

Stop calling leakage something else & address directly
An indirect carbon effect is leakage
The best solution to leakage is a direct solution
Some analysts (e.g. John DeCicco) have begun this process

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