

Session: What are the environmental impacts of
biofuels development in the Americas?

Bio-Ethanol as a Transportation Fuel

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Background

- Co-author on summary paper.
- Literature search on bio-ethanol as fuel.
- Covered 1996 – 2004.
- Initial focus on energy balance and the effect of geographical location.
- Found 47 references to studies.
- Only seven included limited life cycle impacts.

Growing Demand for Information

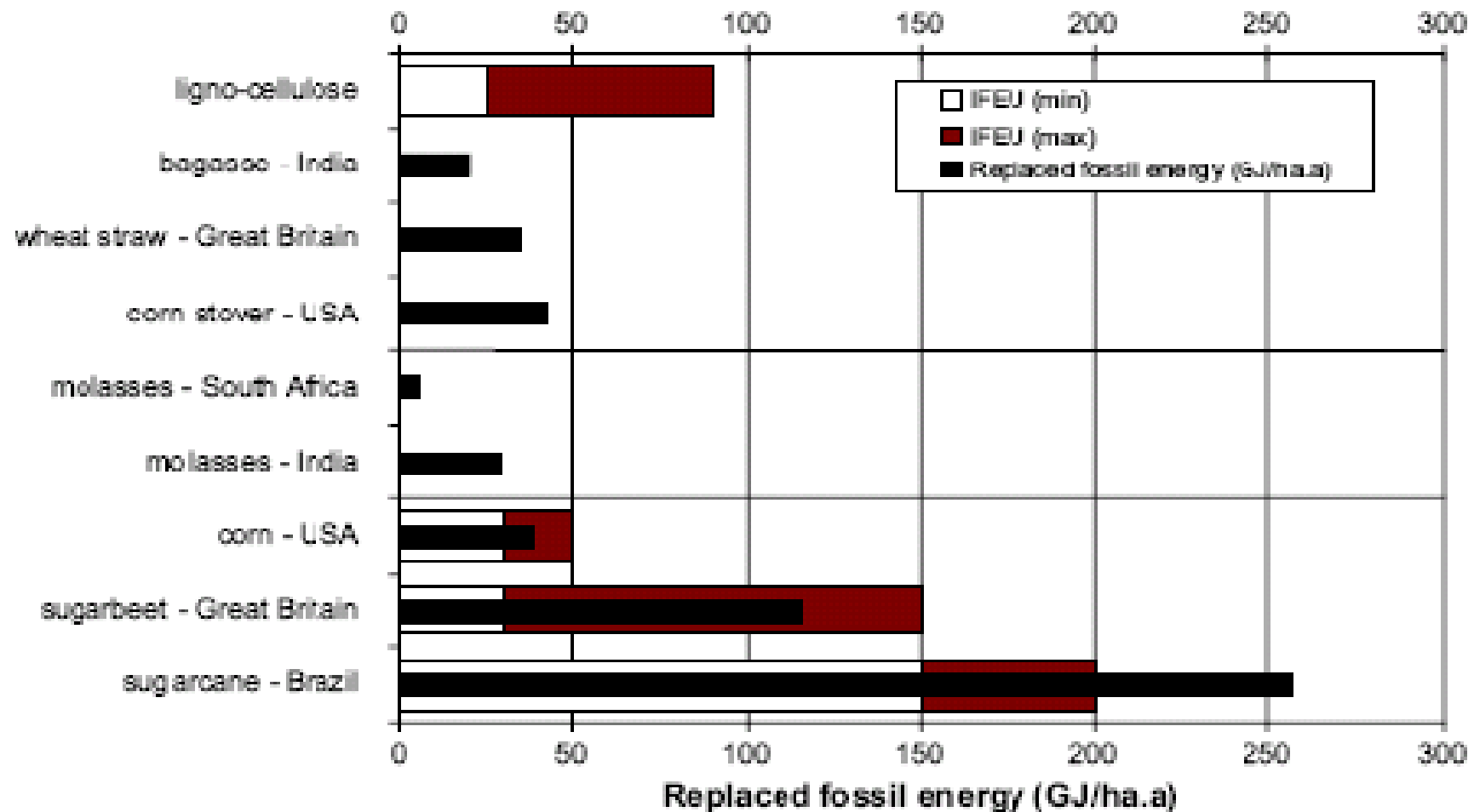
- In 2005, this was new stuff; everyone was ready to jump on the bandwagon.
- By 2007, the popular literature frequently addresses the unintended consequences of bio-fuels, e.g. *National Geographic*, Oct 2007, “Green Dreams: Making fuels from crops could be good for the planet after a breakthrough or two.”

Citation

Harro von Blottnitz and Mary Ann Curran,
“A Review of Assessments Conducted on
Bio-Ethanol as a Transportation Fuel for a
Net Energy, Greenhouse Gas, and
Environmental Life Cycle Perspective”

Journal of Cleaner Production, 15 (2007) 607-619.

Replacing Fossil Energy



RESEARCH & DEVELOPMENT

Building a scientific foundation for sound environmental decisions

LCAs on Bio-Ethanol

- Kaltschmitt, 1977: wheat/potato
- Puppen, 2001: sugar beet/wheat/potato
- Reinhardt, 2001: sugar beet/wheat/potato
- Hu, 2004: cassava

- Kadam, 2002: waste bagasse
- Sheehan, 2004: corn stover
- Tan, 2002: agricultural cellulosic waste

General LCA Results

- Bio-ethanol resulted in net energy gain.
- Resource demand and GHG emissions compared more favorably.
- Acidification, human toxicity and ecological toxicity during the harvesting and processing of the bio-mass were more often unfavorable than favorable.

Summary of Findings

- No additional energy studies are needed.
- Fill critical information gaps:
tropical sugar and 2nd generation crops
- Assessments must be cradle-to-grave and multi-media.
- Corn to bio-ethanol in the US should be studied in detail.

Final Thoughts

The assumptions applied in any assessment have a large impact on the results, but may be hard to tease out:

- System expansion to include avoided burdens from by-products.
- Allocation of impacts to bio-mass (e.g., are bagasse and corn stover by-products?)