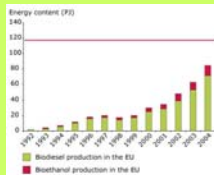


Policy Choice: Forest or Fuel?

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The demand for biofuels, driven by the desire to reduce fossil fuel use and CO₂ emissions, has resulted in increased deforestation of tropical rainforests, often replanted with palm oil trees, causing greatly increased CO₂ emissions (not accounted for in life-cycle analysis). In December 2007 in Bali, climate negotiators called for a plan to reduce deforestation. This, combined with the expanded demand for biofuels, will result in higher food prices, since less land will be used for food production.



1st Result: Deforestation in Indonesia

- Indonesia has a total forest area of more than 225 million acres, or about 10 percent of the world's remaining tropical forests
- 25% of the land being cleared for palm oil production occurs in peat bogs.
- Demand for timber is another cause of deforestation and peat-bog draining (2)
- Forests are clear-cut and replaced with Acacia or palm oil trees.



2nd Result: Increased CO₂ Emissions

In Indonesia, CO₂ released from deforestation, is equivalent to 7 percent of total annual emissions from fossil fuels. Indonesia is now the 3rd largest emitter of CO₂ in the world after the U.S. and China. Fires set by Indonesian farmers accounted for 40% of human CO₂ emissions in 1997.

- "Draining peat releases 30 times more CO₂ than will be saved by replacing fossil fuels with biofuels"
- "Clearing a hectare of tropical forest releases between 500-900 tons of CO₂
- For every meter of peatland water drained, an **additional** 130-180 tons of CO₂ are emitted per hectare.
- A hectares worth of palm oil refined into diesel saves approximately 6 tons of fossil CO₂ which means it takes 80 to 150 years of production to offset the CO₂ lost to deforestation.
- An increase in billions of metric tons CO₂ possible in decades ahead (4).

Sources for all above: (2)

Land Type	CO ₂ equivalent	Time to repay
Tropical lowland forest	~610 Mg of CO ₂ ha ⁻¹	86 years
Tropical peatland forest	+ ~55 Mg from drainage	423 years

Source: Fargione, et. al. "Land Clearing and the Biofuel Carbon Debt" Science Express, 7 February 2008

3rd Result: Bali conference seeks to save rainforests

- 20 percent of anthropogenic CO₂ emissions are from deforestation (2nd only to fossil fuel combustion).
- Forest protection could be a cost-effective way to address climate change.
- Reducing Emissions from Deforestation and Degradation (REDD) proposal would result in industrialized countries paying tropical nations to slow greenhouse gas emissions by reducing deforestation rates.
- "Of the 44 countries which collectively account for 90 percent of the world's forests, the country which pursues the highest annual rate of deforestation is Indonesia with 1.8 million hectares (4.4 million acres) of forest destroyed each year between 2000-2005." (5)
- The Indonesian government says it must be given incentives, including a payout of \$5-\$20 per hectare, to preserve its forests. (6)
- \$9-\$36 to avoid 900-1,620 tons of CO₂ [a back-of-the-envelope calculation]
- "As world leaders meet to devise new incentive schemes to save the forests and savannas, biofuel subsidies, and the resulting higher crop prices and land rents, will pose a major challenge. High farm prices may result from either 1) protection of the tropical forests which provide a sink for CO₂ emissions, or 2) biofuel subsidies which increase CO₂ emissions." (8)

4th Result: Policy Dilemmas - food, fuel, forest

"Biofuel demand pushes up food prices." (9)

- Oxfam warns Europe's biofuel goal could hurt world's poor, as land is taken out of production, causing the supply of food to fall as countries expand biofuel production. If limits are placed on deforestation at the same time, the problem is compounded. The result is that GHG trading will exacerbate the food vs. fuel vs. forest tradeoff.
- Europe sponsors activities that cause deforestation but, under the Kyoto protocol, they can take credit for reducing CO₂ emissions.
- Biofuel expansion to reduce CO₂ emissions drives crop prices higher.
- Saving forests drives crop prices higher, since land acreage is fixed.
- Farmers benefit either way - saving the forests or biofuel expansion.

Recent Actions

The Dutch apologized for promoting palm oil as a biofuel (Economist). Germany eliminated tax subsidies for biofuels.

Ten countries have delayed action on European Union biofuel mandates due to "pressures on the land" (12). "Indonesia's CO₂ emissions still remain below Europe and are half those of the U.S." (2)

Note: Life-Cycle vs. Live-Cycle Analysis

Life cycle analysis does not include emissions resulting from land use change. GHG due to deforestation is 30 times the "life-cycle analysis" GHG savings for palm oil (2). In contrast, corn ethanol's GHG from land use change is only twice the savings from the live-cycle analysis (10).

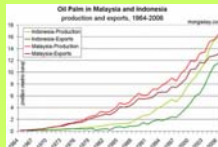
*Any views expressed are the authors' and do not represent the U.S. Environmental Protection Agency.

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I. The EU & U.S. promote biofuels

- to reduce the use of fossil fuels and decrease CO₂ emissions. Under the Kyoto protocol, Europe receives credits for reducing the emissions of CO₂ by using biofuels (vegetable oils). But the use of biofuels may not reduce CO₂ emissions, even when existing agricultural land is used, because it results in higher food prices, which cause new land to be cleared for food production, offsetting any emission reductions. This is what is now happening in Indonesia.
- EU plans to have 10% of its transportation energy to come from biofuels by 2020 or 15 billion gallons of ethanol and biodiesel.
 - The U.S. passed a 36-billion-gallon mandate for biofuels in 2007.
 - The EU offers farmers a subsidy of \$25 per acre to grow rapeseed.
 - The U.S. pays a 51¢ per gallon subsidy for ethanol, totaling \$3.3 billion in 2007



II. Palm oil is the cheapest biofuel to produce

when European drivers burn biodiesel (rapeseed or soybean oil), this increases the demand for all vegetable oils causing prices to rise (vegetable oils are substitutes for each other). Palm oil prices are projected to increase by about 50 percent, largely as a result of biofuel-related demands. China, one of the two largest markets for palm oil (the other is India) will meet its growing vegetable oil needs by importing palm oil. (1).

- Indonesia and Malaysia produce 88 % of the world's palm oil.
- Nearly half of a projected 57% increase in palm oil production is due to biofuel demand (3)
- Palm oil price is up 70% in 2007 (11).
- Biofuel demand, along with income growth in countries like China and India drives palm oil production in Indonesia (3).
- 57% palm oil production increase projected for Indonesia (1).
- Between 1980 and 2000, the global production of palm oil increased 4.6-fold from 4.5 million to 20.9 million tonnes per year, and is projected to increase to 30.4 million tonnes per year by 2010 (7)

The increasing global demand for products derived from palm oil, particularly in China and India, can be attributed to the oil's diverse uses. It can be used as a cooking oil, a food additive, and in cosmetics, industrial lubricants and biofuels (7)

Image Sources:

- <http://www.jci.doc.gov/education/bioenergy/co2cycle.jpg>
- <http://europa.europa.eu/pape.php?pid=551>
- logs on truck: www.carboncounter.info/deforestation.html
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