



European Policies towards Palm Oil – Sorting Out some Facts

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The study – titled “*European Policies towards Palm Oil – Sorting Out some Facts*” – has been first published as a *Jena Economic Research Paper*. A revised and updated version has been published as a *GlobEcon Research Paper*

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► Introduction



- Climate change and strategies to tackle this global phenomenon the top issue on the national and international political agenda
- Biofuels as a possible contribution to the solution of the problem
- Recently: Doubts about the sustainability and environmental compatibility of biofuels
- Various campaigns against biofuels in general and palm oil in particular (Greenpeace, Friends of the Earth and Save the Rainforest)
- EU Renewable Energy Directive de facto discriminating against imports of certain biofuels, especially palm oil
- Question: What can be said about the efficiency, sustainability and the opportunities and risks of palm oil from an economic and ecological perspective?

► *The greenhouse-gas perspective*



- Basically, broad consensus about certain anthropogenic share of climate change, though far from clear
- Significant risks of climate change for some regions
- Proposed strategies to tackle the problem:
 - „greenhouse-gas brake“, especially reduction of carbon emissions
 - Measures to reduce the specific risks associated with global warming in the very regions
 - Geo engineering as „plan B“
- Biofuels as a substitute for fossil fuels
- To assess ecological advantages and sustainability in the context of reducing greenhouse gas emissions: life-cycle analysis and comparative analysis on a global scale
- Surprising differences in the assessment of the greenhouse gas balance of different biofuels

► *The greenhouse-gas perspective*



- EU Renewable Energy Directive calls for a reduction of GHG emissions by at least 35% compared with the use of fossil fuels, so that one biofuel is classified as "sustainable" and therefore meets the objectives and requirements
- Discriminatory element: typical value ("state of the technology") vs. default value ("worst case scenario") in the "calculation" of GHG substitution:
 - EU members may use the typical value in the assessment of biofuels
 - For biofuels from non-EU countries default value

Biofuel / source	Typical value	Default value
Ethanol / sugar-beet	61%	52%
biodiesel / rapeseed	45%	38%
biodiesel / sunflower oil	58%	51%
biodiesel / palmoil <i>(full methane capture)</i>	36% <i>(62%)</i>	19% <i>(56%)</i>

► *The greenhouse-gas perspective*



- Note:
EU-reference value of GHG emissions reduction by substitution of fossil fuels (83.8 gCO₂eq/MJ) on the lower end of the scientifically proven range (83.3 – 87.3 gCO₂eq/MJ)
- GHG emissions of production of conventional fossil diesel:

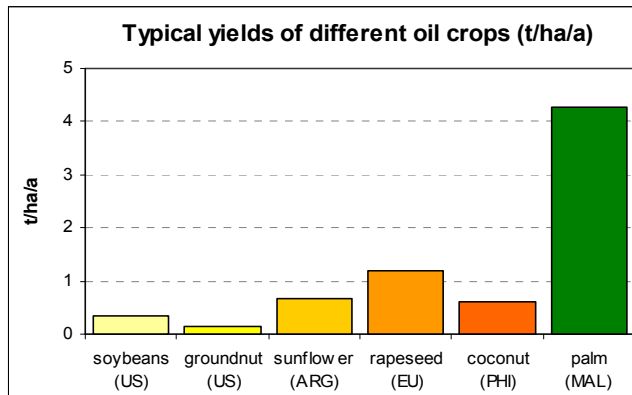
	Silva et al. 2006	CONCAWE and EUCAR 2006	GM et al. 2002
gCO ₂ eq/MJ diesel	14.2	14.2	10.2

- The production of „next generation“ fossil fuels (bituminous / oil sands etc) will create much more GHG emissions

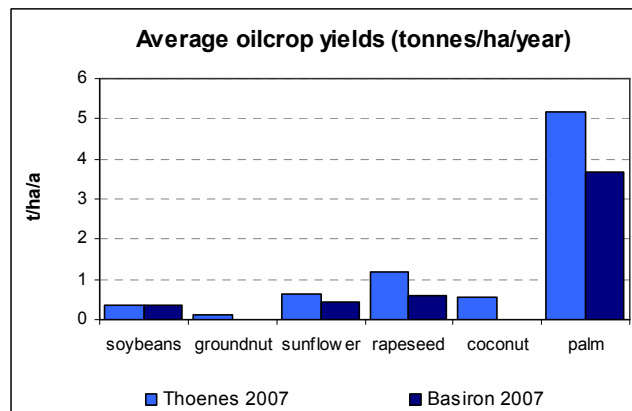
► The greenhouse-gas perspective



- With respect to output per hectare, palm oil more efficient than other oil crops:



Source: Thoenes 2006



Source: Basiron 2007, Thoenes 2007

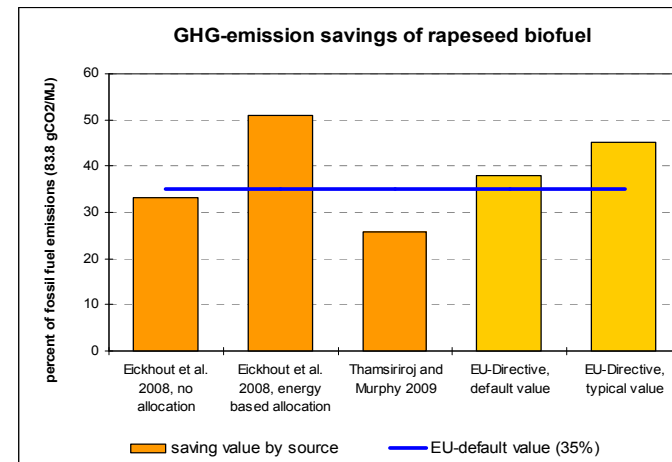
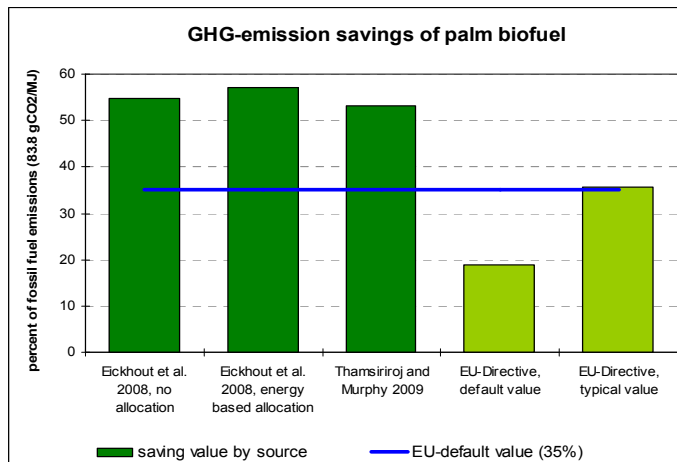
	Rape seed	Palm oil
Yield of seed, fruits	4.11 t/ha/a	18.35 t/ha/a
Oil available from process	30%	17.7%
Yield of plant oil	1.23 t/ha/a	3.25 t/ha/a*
Yield of biodiesel	1 L/L oil	0.944 t/t oil
Yield of biodiesel	1.19 t/ha/a	3.07 t/ha/a
Gross energy of biodiesel (biodiesel energy value: 39 GJ/t)	46.5 GJ/ha/a	119.6 GJ/ha/a
Total parasitic energy	21.21 GJ/ha/a	45.35 GJ/ha/a
Net energy of biodiesel	25.29 GJ/ha/a	74.23 GJ/ha/a

- Energy balance of palm oil better than other oil crops, e.g. rapeseed
- Palm oil lowest land use and lowest cost per output unit

► The greenhouse-gas perspective



- Taking these figures into account, GHG reduction associated with palmoil based biodiesel much higher than other oil crops and higher than „EU-values“:
 - rapeseed: 25-30% (note: does not even reach the values of the RE directive)
 - Palmoil (e.g. Thailand) incl. transport: 53-55%
- Palmoil easily reaches the threshold of 35% – even with rather conservative assumptions regarding transport (1.000 km per truck in South-East Asia and 14.000 km per ship to Europe)



► The greenhouse-gas perspective



- Life-cycle analysis and energy input not sufficiently covered by some studies and the EU. The issue of fertilizers is not covered at all by many studies and the EU
- Especially the latter dramatically affects the eco-balance of annual crops grown in temperate zones
- Rapeseed – for instance – is relatively energy- and fertilizer intensive and offers yields every 3-5 years due to crop rotation
- Oil palms offer the first yield after 5-8 years and then for another 20-30 years every year
- Fertilizer use per hectare or output unit in the case of palmoil is usually much lower than for other oil crops:

Oil plant	Fertilizer use (N in kg/ha)	Yields of plant oil (t/ha/year)	Yields of biodiesel (t/ha/year)	Fertilizer use per produced unit of biodiesel (N in kg/t)
Palm oil	95.00	3.25*	3.07	30.9
Rape	147.00	1.23	1.19	128.0

- Fertilizers (nitrogene) contribute to GHG emissions: nitrous oxide (N₂O) is much more climate relevant than CO₂ or methane: 1 kg N₂O has – over a period of 100 years – the same climate effect as 295-300 kg CO₂

► *The greenhouse-gas perspective*



- parasitic energy associated with the production of biofuels not sufficiently taken into account by many calculations
- Extraction and production of vegetable oil / biofuels can be very energy intensive: in the case of some oil crops (e.g. rapeseed) – power from the grid
- In the case of palmoil: parasitic energy can be provided by the residuals palm press fibre (PPF), palm kernel shell (PKS) & empty fruit branch (EFB)
- Even without biogas use from EFB, renewable energy from PPF and PKS alone could account for about 50 GJ per hectare and year which is more than the actual milling process needs

	Palm Press Fibre (PPF)	Palm Kernel Shells (PKS)
Quantity available from mill	140 kg/t FFB	65 kg/t FFB
Quantity/ha (EFB = 18.35 t/ha/a)	2.57 t/ha/a	1.19 t/ha/a
Energy value	11,324 kJ/kg (65% dry)	17,516 kJ/kg (90% dry)
Energy credit provided	29.09 GJ/ha/a	20.89 GJ/ha/a
Total energy credit provided	49.98 GJ/ha/a	

► *The greenhouse-gas perspective*



- Summary and conclusion of the GHG perspective:
 - Palmoil offers significantly higher yields per hectare than other oil crops
 - Energy output significantly higher
 - Energy and fertilizer input in the case of palmoil much lower than for other oil crops; not sufficiently taken into account by some calculations
 - Parasitic energy and use of residuals not sufficiently taken into account by some calculations
 - From an efficiency and GHG emissions perspective, a fair and unbiased evaluation shows that palmoil is much more efficient than many other oil crops and easily reaches the GHG saving ratio of the EU RE Directive
 - Note: The issue of peatland has to be taken into account.

► *The biodiversity perspective*



- 2nd criteria of the RE Directive aims at ecosystems:
“...there should be no damages to sensitive or important ecosystems while cultivating energy feedstocks.”
- Destruction of natural habitats, deforestation and burning down forest shall be avoided
- Definitions in the EU Directive are rather vague and there is considerable scope for discretionary and discriminatory interpretation:
“wetlands”, “continuously forested areas”
- The biodiversity issue right now in the focus of public interest not least due to certain campaigns of environmental organizations. Discussion on this issue necessary and could/should be useful and productive – but often it is not.
- As a matter of fact, almost any human activity associated with land use causes a loss in biodiversity and affects habitats and ecosystems
- What can be said about oil palm plantations in this context?



- **Example Indonesia:**

- Between 1990 and 2005 new oil palm plantations on an area of about 4.4 million hectare; total loss of tropical forest in this period: 28.1 million hectares
- That means total loss of primary rainforest due to oil palm plantations 16% at max and only if every single oil palm would have been planted on formerly forested land !
- The latter is not the case since a significant proportion of new oil palm plantations have been established on previously cleared land or agricultural areas
- Reliable estimation suggest that during the last 20 years just about 1.7 to 3 million hectares of tropical rainforest have been converted into oil palm plantations
- The actual loss of tropical forest in Indonesia due to palmoil in the last two decades accounts for about 3.9% to 10.5% of total forest loss
- In comparison, since 2000 almost 10 million hectares have been used for housing development, streets, industrial areas etc.



- **Example Malaysia:**

- Since 2000, approximately 1.1 million hectares of new oil palm plantations
- In the face of the large increase in demand for palm oil and the boom of the sector, the annual increase of approximately 130,000 hectares seems to be far less dramatic than sometimes claimed.
- A significant proportion of new oil palm plantations in Malaysia were established on former agricultural land. The area under cultivation of cocoa and rubber trees, for example, has been reduced by about 260,000 hectares since 2000. Much of this land is now used for oil palm plantations
- Parts of the new plantings took place in previously cleared land that has not been used in a productive manner. These plantings have therefore contributed to a corresponding carbon sequestration.
- Note: Details of land use is associated with significant uncertainty. Some areas released for oil palm plantations have been used otherwise and vice versa.

► *The biodiversity perspective*



- Eco-balance or biodiversity studies (as well as economic studies) must always be in comparison with the relevant alternatives if they are to be scientifically robust (key word: opportunity cost approach)
- In the case of global issues (e.g. biodiversity and climate change) it must be an assessment that is made from a global perspective.
- As a matter of fact, oil palm plantations are relatively rich in biodiversity compared to most monocultures in temperate climates and other agricultural areas in tropical regions. On average, 15% of all species occurring in tropical primary forests, and even about 50% of species in secondary forests are found in oil palm plantations.
- Despite the – without question – significantly reduced biodiversity compared to primary rain forest, oil palm plantations can be referred to be as still relatively rich in species compared to European agricultural land and other monocultures (soy bean, sugar cane etc), especially if one takes into account that tropical rain forest is one of the most biodiverse habitats in the world.

► *The biodiversity perspective*



- In some countries in Southeast Asia, there is by far more area reserved as natural habitats than in the EU, both in absolute and relative terms (Malaysia >40% of the total area vs. EU about 25%)
- The intensive cultivation of many crops in Europe was associated with a shift away from traditional farming methods and affects the habitats of species that are adapted to these traditional methods
- Besides ground-living species (ground beetles etc) vertebrates are also affected
- German Federal Office for Nature Conservation: 207 vertebrate species in Germany (43 percent) are currently endangered and 28 percent of all vertebrates are heavily endangered. Together with the 32 species that have already disappeared, there is a risk that Germany will lose one third of the domestic terrestrial vertebrate species.
- Although many of these species (e.g. beetles and worms) are not as cute and prominent as orang-utans, they are most certainly ecologically valuable. A fair and unbiased discussion on biodiversity and human activities in general must consider these facts. This does not seem to be always the case right now.

► *The biodiversity perspective*



- **Summary and conclusion of the biodiversity perspective:**

- Oil palm plantations are not the primary and most important cause for the loss of natural forest in tropical countries
- Due to higher yields per hectare, the trade-off between efficient (intensive) land-use and the loss of biodiversity can be better handled in tropical areas since less area has to be used to get the same output as in temperate zones (keywords: less land-use, higher biodiversity, less fertilizer etc)
- There are measures and regulations in place to protect natural ecosystems and habitats. However, there are still reports on violations of these rules and enhancing institutions and the enforcement of existing rules should be in the focus of governments in the very regions.
- Initiatives for reforestation and environmentally sound land use and the sustainability of agricultural development in tropical countries in general should be supported by the EU.

► *The development perspective*



- Although environmental degradation and climate change are among the most important challenges in these days, the most important and urgent problem is still widespread poverty in the world.
- According to the current UN Millennium Development Goals Report, 1.5 billion people are living in extreme poverty (<U.S. \$ 1.25 per day).
- During the global financial and economic crisis, the hunger in the world reached new highs. About one billion people are malnourished and suffer from chronic hunger. In Asia and the Pacific region almost 650 million people are affected by hunger, and in Sub-Saharan Africa 265 million people are suffering from hunger.
- Poverty, hunger and hopelessness are not only incompatible with a sustainable peaceful development and our understanding of human dignity and justice but are also germ cells for irresponsible behavior, environmental destruction, and not least war and terrorism.
- In the author's opinion, effective and sustainable anti-poverty strategies are therefore considered as the most important goal in the years to come.

► *The development perspective*



- Most poor and hungry people live in rural areas of tropical and sub-tropical latitudes and are themselves small farmers.
- Basically there is the potential that they can not only take care of themselves, but also contribute significantly to solving the food problems in the growing urban areas in developing countries.
- To use this potential, effective and sustainable strategies for economic development in general and agricultural development in particular are required.
- The particular advantages of palm oil can make a significant contribution to economic development.
- Palm oil is already an integral part of the food supply in many developing countries.
- Palm oil is a raw material for the manufacture of margarine and other edible vegetable fats and spreads, and directly used for the preparation of food as well as sweets and prepared foods.
- One-third of global output of edible vegetable oil comes from palm oil.
- By the way, not even 10 percent of palm oil produced worldwide is used for biodiesel!

► *The development perspective*



- Apart from the outstanding importance of palm oil in the food industry, the cultivation of oil palms offers more opportunities for income generation and economic development in tropical countries.
- Palm oil is used in the manufacture of detergents and soap, and is an input in the cosmetics industry. In addition, palm oil is a resource for technical fats
→ very diversified portfolio and good opportunities; not dependent on one market
- Palm oil offers certain advantages as a raw material for biodiesel. The production of biodiesel from palm oil is much cheaper than for other types of biodiesel (just about 20-40 percent of total cost per output unit compared to other oil crops).
- The potential of palm oil in biodiesel production is far from being exhausted:

Biodiesel produced from (worldwide)	
- palm oil	1-3 %
- rapeseed oil	80-85 %
- sunflower oil	10-15 %
- soybean and other oil	2-3 %

► *The development perspective*



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- Palm oil production worldwide has doubled since 2000
- Palm oil industry a major employer in South-East Asia
- Malaysia: just under one million people directly or indirectly in the palm oil sector
- Growing importance in Indonesia and Thailand.
- In Indonesia, more than a million workers
- Opportunities especially for small farmers in poor rural regions
- Important source of export revenue in South-East Asia
- Huge potentials in other tropical regions
- The palm oil industry could be an engine of economic development in rural areas in Sub-Saharan Africa, Pacific States and the Caribbean.

► *Summary and Conclusion*



- The EU Renewable Energy Directive (or its interpretation) is discriminating against palm oil.
- Some assessments of palm oil are simply wrong and unjustified from an economic and ecological perspective.
- We need a fair and objective assessment.
- Palm oil as a base for biodiesel is more efficient than other vegetable oils.
- Oil palm cultivation is not primarily responsible for forest loss in South-East Asia, though new oil palm plantations are associated with a loss in biodiversity as any other form of human land use.
- The biodiversity issue seems to be much more significant for other oil crops or sources of biofuels.
- There are tremendous development opportunities through sustainable development of the palm oil industry.
- Therefore, a change of the current EU policy is needed...

► *Summary and Conclusion*



- The de facto discriminatory trade policy has to be adjusted as well as other discriminatory policies such as huge subsidies for European oil crops
- Effective property rights, efficient institutions and good governance in developing countries must be enhanced and supported.
- Meaningful initiatives for the protection of eco-systems should be supported (Note: Strict no-conversion policy does not help at all!)
- Protectionism and distorting trade policies have never been and will never be appropriate means to address environmental problems.
- The high demand for environmental goods in post-materialistic societies must be appropriately “translated” into meaningful measures including technical and financial support for developing countries. The willingness to pay in OECD countries must be identified and somehow channeled.
- Decent certifying and labeling will help – consumers, producers and not least the environment
- If you the mandatory blending of fuels with biofuels in the EU shall be further enhanced, palm oil biodiesel should play a greater role.



Thank you for your attention

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Literature:

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GlobEcon Research Paper 01-2010.

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