

Biokerosene: Take-off in the wrong direction

Trends and consequences of the rapid development of aviation biofuels, as shown by the impacts of jatropha cultivation on local people in Central Java



Milieudefensie - Friends of the Earth Netherlands



Green flights: a dangerous myth

Foreword by Berry Nahdian Forqan, Executive Director WALHI, Indonesia



In January 2012, Lufthansa said they were very satisfied with their six-month trial of biokerosene, 'Burn Fair', which had gone smoothly. The use of biokerosene made from jatropha and other oils was celebrated as a technical and environmental success.

Not a single word was said about the Javanese farmers and workers, who have converted some of their land from food to fuel crops, in return for ridiculously low payments. For them, the introduction of jatropha has led to a fall in income, conflict and frustration.

As Lufthansa calls for biokerosene production to be expanded to a commercial scale, it looks once again as though the lifeblood of Indonesia will be tapped for the benefit of wealthier people in Europe and elsewhere.

Faced with rising fuel prices and the changing climate, the aviation industry is looking for a license to grow. They claim that in future large quantities of biofuels will be able to replace kerosene from fossil fuel. They claim that flying on biofuels will substantially reduce emissions. Plans have been drawn up to switch from fossil kerosene to biokerosene, while continuing to increase levels of air traffic.

But the idea that using biofuels for aviation on a large scale can be green is a dangerous myth:

Growing crops for biofuels such as biokerosene needs land and this comes at the cost of food production. Like fossil fuel, biokerosene emits high levels of greenhouse gases, particularly during flight at high altitudes. Pushing the use of biofuels will make the global food and climate crises worse.

The only solution to the problem is to reduce air traffic, foremost in Europe. This might not be a welcome message for the aviation industry or for frequent fliers, but it is a blessing for poorer people in the South who suffer twice: from the effects of climate change and from the loss of valuable land which is used to grow fuel instead of food.

We hope that this report will inspire policy makers, business people and consumers alike to look for sustainable alternatives to air travel and – by cutting the amount of miles they spend up in the air – to contribute to a world that is both more just and sustainable.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

Credits

Author: Geert Ritsema, Milieudefensie
Research: Claudia Theile, Milieudefensie; Arief Zayyin,
Fitri Anya, Friends of the Earth Central Java
Editing: Helen Burley, Agnes de Rooij
Design: Ruparo (Ivo Sikkema), Amsterdam
Print: Ruparo
Paper: Reviva Print, 100% recycled
Photo cover: WAHLI Central Java



Milieudefensie, Friends of the Earth Netherlands
Nieuwe Looiersstraat 31
1017 VA Amsterdam
The Netherlands
Phone: (00 31) (0) 20 5507 300
Email: service@milieudefensie.nl



WALHI, Friends of the Earth Indonesia
Jl. Tegal Parang Utara No.14
Jakarta Selatan 12790
+62 21 791933 63 - 65
informasi@walhi.or.id
www.walhi.or.id

Amsterdam, February 2012

Don't take off in the wrong direction
**Stop
BioKerosene** 

Contents

Foreword	3
Executive summary	6
Part 1: the push for aviation fuels	8
Biokerosene: a false solution	10
The aviation lobby	13
Part 2: Case study: Jatropha cultivation in Indonesia and the impact on the people in the Grobogan district	16
Conclusions and recommendations	24
Notes	26

Executive Summary

The aviation sector's response to its growing greenhouse gas emissions

As climate change becomes more and more urgent, aviation's ever-increasing contribution to greenhouse gas emissions is under scrutiny. The aviation industry has primarily responded by promoting and investing in what they see as the solution: biofuels. In Europe, the aviation industry plans to use about two million tonnes of biokerosene in 2020, representing some three percent of the kerosene used in Europe. Airline companies frame the use of biofuels as a way of decreasing fuel and CO₂ costs in the future. It also gives them a green image. However, this study shows that the industry's plans for new 'green' fuels are triggering effects that harm the climate, people and nature.

Biofuels: false solution

Despite the rhetoric on advanced technologies such as algae, by 2020 most aviation biofuels in Europe are still expected to come from vegetable oils, such as palm, jatropha and camelina oil.

Recent investments in biofuels for road transport have already taught us several lessons, which the aviation industry does not seem to have taken into account in its push for more biofuels: most biofuels compete with food, cause land grabs and lead to deforestation. They need a lot of land: the aviation industry's projected goal of using biofuels for three per cent of fuel by 2020 in Europe could require an area of land the size of Belgium. And if we take the full lifecycle of the crops into account, as well as the greenhouse effect of emissions at a higher altitude, greenhouse gas (GHG) emissions from biofuels do not differ much from the emissions caused by conventional kerosene. Certainly, the claim that aviation biofuels are a "zero emission" technology has no basis in fact.

Trends

Because the European Union (EU) does not fully take the negative impacts of biofuels into account, emissions from biofuels are not included in the Emissions Trading System (ETS), which was extended to include the aviation industry on January 1st 2012. The EU has also provided airlines with a number of subsidies for the development of biofuels. Big players, including several airlines such as KLM and Lufthansa, and refineries such as Neste Oil are developing a new industry, setting up alliances, and running test flights. Although these companies claim their biofuels will be sustainable, they are not transparent about how they can reach their two million tonnes target in a sustainable way.

Real impact in Indonesia

The aviation industry, supported by both the EU and by national governments, is scaling up the production of biofuels in countries such as Indonesia, leaving local people to feel the impacts on the ground. This report focuses on the Grobogan district in Java. Indonesia, and in particular Java, is already suffering a land and fuel crisis. Jatropha has been promoted by industry and by the government as the "new money tree", luring many farmers into changing from food crops such as maize to jatropha. In Grobogan, the Dutch Waterland Group has invested in jatropha production and provides aviation fuel for the airline Lufthansa. Just a few years into the project, testimonies recorded in the area have revealed the negative effects being felt on the ground:

- There is a negative impact on food security as jatropha has replaced foodcrops, in particular corn.
- Farmers and pickers face severe economic losses. A day of picking jatropha nuts earns a picker only €0.68, with other food crops they could earn two or three times as much.
- Jatropha is triggering conflicts within



communities, e.g. between angry farmers and cooperative leaders who have promoted jatropha on behalf of Waterland.

- It is difficult for the farmers on state land to refuse to grow jatropha
- Negative effects of jatropha particularly affect women

Despite these negative effects, companies such as the Waterland Group and Lufthansa want to expand jatropha production in the region, and claim their practices are sustainable.

The report argues that **the aviation industry** should be completely transparent about the origin of their products and should abstain from using biofuel that has been directly or indirectly produced at the expense of food security, the climate or biodiversity. Given the current state of biofuel technology, this would mean in practice that they should stop using crop based fuels, such as palm and jatropha oil. They should also withdraw their biofuel targets and

replace them with emissions reductions targets based on actual reductions that can be proved.

Governments should work out measures to limit aviation growth. A lot of flights within Europe could be substituted with other forms of transport. 40 Percent of all flights from and to Amsterdam – for example - fly within a range of 1000 km. **European governments** should invest in smarter forms of transport such as high speed trains, and they could easily reduce a substantial amount of CO₂ and other GHG emissions. They should also put an end to the privileges enjoyed by the industry and make sure that tax exemptions for kerosene and airline tickets are abolished. The EU and its Member States should also withdraw funding subsidies for the development of aviation biofuels.

Only by looking at real alternatives to growth in the aviation sector can we halt climate change and prevent flying at the expense of people in the South.

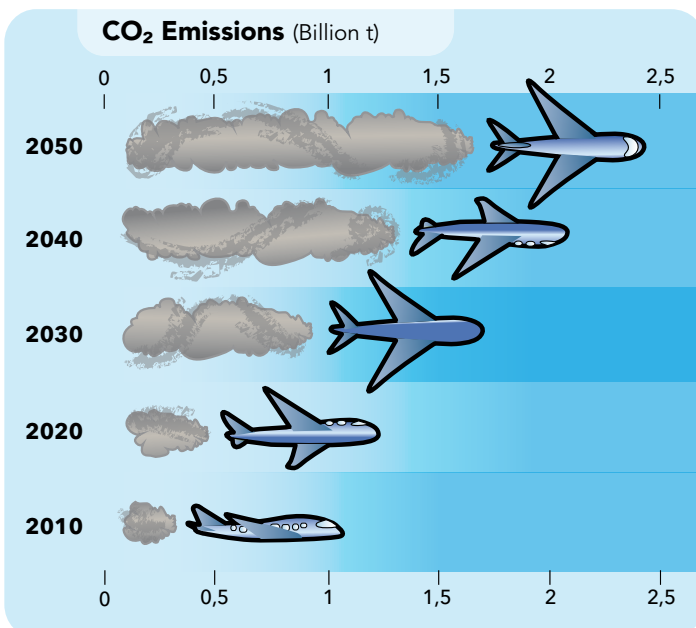
PART ONE: THE PUSH FOR AVIATION BIOFUELS

Introduction

The consequences of climate change are becoming more evident day by day, with the poorest people hit the hardest by droughts, floods and other natural disasters, as 2011 has shown. Despite this, greenhouse gas emissions are still rising, and in some sectors, including aviation, projections suggest they will increase rapidly in the next ten to twenty years. This report will show that the biofuels being promoted by the industry as the best way of dealing with this problem can be just as damaging as what they replace. **The rapid development of a biofuel industry may cause more greenhouse gas emissions, threatens food security and human rights and increases deforestation.**

In the first part of this report we will focus on the drivers behind the growth of biofuels and - more specifically - on the problems being caused by the development of biofuels in the aviation sector. In the second part we highlight the impact on people in Indonesia of the introduction of jatropha which is being grown for fuel for Lufthansa's planes.

Projected CO₂ emissions in the aviation sector in a business as usual scenario



Source: Booz & Company, WEF, Davos 2011

Aviation's growing role in climate change

Aviation's current global contribution to climate change is estimated to be five percent, although the industry claims it is just two per cent. Besides generating CO₂ emissions, aviation contributes to climate change via a cocktail of other gases and this effect is intensified because the bulk of aircraft emissions occur at high altitude.¹ These double the climate effect of planes relative to CO₂ emissions alone.

The global aviation sector is growing rapidly and is expected to grow by four to five percent annually in the period up to 2050.² Despite the economic crises, the EU aviation sector is expected to grow at an average rate of three percent in the next 40 years. Twenty five million passengers are envisioned by 2050, compared to 9.4 million in 2011. Taking into account expected efficiency gains, this would imply that the EU aviation sector will emit twice as much CO₂ by 2050, compared to present levels.³ This is in sharp contrast with the EU's emission reduction target of minus 80 percent by 2050 compared to 1990, which is needed in order to keep the global average temperature increase below 2°C.⁴

The solution according to the industry

The aviation industry, policy makers and the producers of agricultural commodities see biofuels as the solution. They plan to use some two million tonnes of biokerosene per year by 2020 in Europe, compared to practically none at the current time. European kerosene consumption was 53 million tonnes in 2010, and is expected to increase to about 64 million tonnes by 2020.⁵ This means that about three percent of all the kerosene in Europe would be biokerosene by 2020.

Biofuels are portrayed as essential by airlines in terms of:

- Growth: using biofuels is presented as the



only way the companies can continue to grow, the only potential source of liquid fuel. Christoph Franz, CEO of the Lufthansa Group, acknowledged: "Fossil raw materials are finite."⁶

- Costs: as fossil fuels become more scarce and prices rise, biofuels may become cheaper than conventional oil. And because airlines will have to pay for the CO₂ they emit under the EU ETS from 2012 on, and because biofuels are classed as having zero emissions, using biofuels will reduce costs. The International Air Transport Association (IATA) has estimated that the ETS will cost the industry €3.5 billion in the first year alone. Using biofuels will bring huge potential savings in the future.⁷
- Image: promoting the use of biofuels

will enhance airlines' green credentials and make them look better than their competitors.

However, the industry's plans for new 'green' fuels which will reduce the costs of expansion while appearing socially acceptable, will trigger damaging consequences for the climate, people and nature.

1

BioKerosene: a false solution

Despite the industry's green claims, the increasing use of bioKerosene might be causing more harm than good. There is a lot of rhetoric on advances in biofuel technologies, but the major share of European aviation biofuel⁸ is expected to still come from vegetable oil such as palm oil and jatropha oil by 2020, both of which compete with food production and cause considerable climate impacts.

When the European Union announced its ten percent target for biofuel use for road transport in 2007, it triggered a boom in investment and subsidies to build biofuel refineries, and increase supplies. It created new on-going demand for vegetable oils, grains and other sugar and starch rich feedstocks, often sourced from the South,

at the expense of local communities. The recent push towards aviation biofuels reveals that the lessons have not been learned from the devastating effects from biofuel promotion in other transport and energy sectors so far.

Biofuels compete with food

The overwhelming majority of biofuels today are produced from food crops, directly competing with human consumption. In April 2008, the UN secretary-general, Ban Ki-moon, called for a comprehensive review of biofuels policy as a crisis in global food prices unfolded. In 2011, the World Bank, the G20 and EU advisory bodies, along with major food companies including Unilever, called for an end to public biofuel mandates and fiscal subsidies. According to the UN Special Rapporteur on the Right to Food, Olivier de Schutter, market speculation and biofuels caused an additional 100 million of people to go hungry in 2011.⁹

Which kind of biofuels are currently used for aviation?

Used cooking oil (UCO): used cooking oil is a good candidate for aviation biofuel, but the volumes available are limited. Formerly used as pig feed, most UCO from Europe currently is used to make biofuel for cars. Within the EU, biofuel from UCO counts double towards the 10% target for renewables in the transport sector.

Camelina (an oil grain, also known as false flax): camelina has been grown for the aviation sector in Montana, US, but farmers switched back to wheat when the price for food grains went up. With yields in dry and cold areas uncertain, the US has been subsidising farmers to grow camelina under its renewables' regulations. In Europe, investors are trying to persuade the Ukraine and Romania to use part of their farm land for camelina.

Jatropha (a succulent shrub producing seeds containing 30% oil): is claimed to be sustainable because it is not edible and so does not compete with food. While jatropha can survive in dry areas, a decent and economically viable harvest requires nutrients, water and care, just like any other agricultural commodity. Jatropha has been used to justify land grabs in Africa, and investors have also promoted jatropha in India and Central America, often without success.

Animal fat comes in different qualities from slaughter houses and is produced in limited quantities.

Biofuels use a lot of land

Most biofuel feedstock requires land. To produce two million tonnes of bioKerosene, according to a recent study from Friends of the Earth Europe, requires up to 3.5 million hectares of land, roughly the size of Belgium.* This would produce just three percent of the total aviation fuel requirements projected for Europe annually by 2020. This comes on top of even more ambitious targets for biofuels for road transport by 2020. The extra demand for agricultural areas has led to land conflicts, and drives the phenomenon of 'land grabbing'.¹⁰

* Flying in the face of facts, Friends of the Earth Europe report, June 2011, http://www.foeeurope.org/publications/2011/FoEE_Flying_in_the_face_of_facts_June2011.pdf

Land use for production of biofuels for aviation in different scenarios



RUPARO, IVO SIKKEMA

Source: calculation Friends of the Earth



Biofuels for Aviation Europe as planned for 2020

2 million tons fuel
3.5 million hectares of biofuels



Biofuels needed to replace all aviation fuel usage in Europe, 2020

53 million tons fuel
35 million hectares of biofuels



Biofuels needed to replace aviation fuel usage worldwide, 2050

567 million tons fuel
378 million hectares of biofuels

Biofuels major force behind land grab

Small-scale farmers, indigenous people and pastoralists have found themselves confronted by large-scale takeovers of their land, referred to as a 'global land grab'. Their livelihoods, land rights and way of life are threatened by demand for land from plantation, mining and carbon trading companies. The most comprehensive study of large land acquisitions in developing countries to date, published by the International Land Coalition in December 2011, found that of 71 million hectares of documented land deals, 78 percent were for agricultural production, of which three quarters were for biofuels.¹¹

Biofuels cause deforestation

The emerging biofuels market is a major driver of deforestation and the conversion of other ecosystems, such as grass lands and wetlands. The main players are large-scale plantation companies that directly or indirectly (by pushing former land users into new habitat) replace biodiversity rich areas with monocultures such as soy, oil palm, sugar cane or industrial eucalyptus plantations. This causes the loss of biodiversity and ecosystems services, as well as substantial greenhouse gas emissions from methane, fertilizer-use and carbon loss from soils and vegetation.¹²



PHOTO: ACTIONAID, WWW.ACTIONAID.ORG

“Market speculation and biofuels caused an additional 100 million of people to go hungry in 2011”

Olivier de Schutter, UN Special Rapporteur on the Right to Food

Emission savings from biofuels are small or non-existent

Biofuels have been promoted by mandatory targets and subsidies, with the explicit intention of reducing emissions. But a growing body of evidence questions whether there are in fact any reductions in emissions at all.¹³ Estimates fail to count emissions from indirect land use change yet in the case of the EU’s biofuel targets, indirect land use change could cause emissions equivalent to an extra 14-29 million cars by 2020.¹⁴ There is also an important difference between the greenhouse effect of biofuels used

for road transport and those used for aviation because emissions at high altitude have a bigger impact.^{15 16 17}

Zero emissions?

In spite of the growing evidence about the negative climate impact of biofuels, under the EU’s Emissions Trading Scheme (ETS) airlines are set a limit of CO₂ emissions but emissions from kerosene made from biomass count as zero under the ETS rules.¹⁸ This politically driven but scientifically unjustified measure creates an incentive for airlines to use biofuels for aviation. It assumes that no climate emissions are produced during the production of the fuel, yet that is not the case. Using biofuels could therefore deliver no benefits at all concerning climate emissions.

The problem with certification

The EU has introduced a limited set of sustainability criteria, intended to ensure biofuels are sustainable, but these do not include social criteria, and may be vulnerable to challenge through the World Trade Organisation. Certification systems have many limitations, such as weak law enforcement mechanisms and vulnerability to corruption. While in theory at least, they lead to some improvements at a farm or plantation level, but fail to address the indirect effects and larger impacts, such as rises in food prices. Therefore, wider policy measures which control demand and go beyond certification need to be introduced if the negative social and ecological impacts of biofuels are to be controlled.¹⁹

2

The aviation lobby

A joined up lobby for expansion

The European Commission, aviation industry and biofuel producers are working together to expand the biofuel sector. The big European players' biofuel plans are set out in the European Commission's Strategic Energy Technology Plan (SET plan). The proposals, which include a wish list for the finance and policies needed, are the result of joint lobby and PR efforts by the European Commission, major industry players (e.g. Airbus, Lufthansa, KLM, Air France, British Airways) and biofuel producers (e.g. Neste Oil, BTG, UOP and Choren Industries).²⁰

The plans were unveiled at the International Paris Airshow in July 2011 and a number of biofuel trials were carried out around that time, putting biofuels in the headlines.²¹ Boeing flew from Seattle to the airshow using a 15% camelina blend.²² KLM announced flights from Amsterdam to Paris using a fuel blended with used cooking oil²³ and Lufthansa started trial flights between Hamburg and Frankfurt using a mix of jatropha, camelina and animal fats.²⁴ Thomson Airways

flew customers on "sustainable biofuel" (used cooking oil) from Birmingham to Mallorca in October 2011.²⁵

Marketing a green myth

Behind the headlines, these trials appear to have used very small amounts of the less controversial biofuels (non-palm oil, non-food), for trials by a number of airlines, creating the impression of a green industry. This is of course intended to help win public and political support for the biokerosene industry. Only '**sustainable**' biofuels are mentioned, with the emphasis on used cooking oil (UCO), jatropha oil, and algae oil, which have an as yet unproven reputation for being less destructive.

Aware of the potentially damaging publicity around the negative impacts of biofuels, airlines are competing to secure some of the less controversial feedstocks to boost their green credentials and promote aviation biofuels as sustainable. But even the aviation industry concedes



that animal waste fat and used cooking oil, have only limited availability and no real potential for growth.²⁶

In fact, KLM had to import used cooking oil from the US for its biofuel trials. And Lufthansa, having 'chased even the last jatropha nut on the market' could only source 15% of its biokerosene trial from jatropha. Algae oil, often promoted as the solution for future biodiesel needs, is at least a decade or two away, and that is if production proves to be commercially viable and ecologically justified. Supplies of camelina are also limited for at least the next decade, and competition with food grains can not be excluded.²⁷

This PR campaign does not highlight the dangers connected with scaling-up biofuel use for aviation. But if aviation generates large-scale demand for biofuel, it will inevitably turn to the agricultural commodities produced cheaply and in large volumes in the South, just as the road transport sector is doing.

Subsidies

Taxpayers' money is already being spent on developing biokerosene and supporting the airlines. EU Member States are subsidising airlines' biofuel trials. In April 2010, KLM secured a subsidy of 1.25 million euro from the Dutch minister for transport.²⁸ The German Federal Ministry of Economics and Technology has provided Lufthansa with 2.5 million.²⁹

The EU's Strategic Energy Technology Plan (also known as "Flightpath") document envisages that € 3 billion is needed to deploy two million tonnes of aviation biofuels by 2020.³⁰ Financial support is sought in the form of credit guarantees from EU Member States, ETS revenues, and from the European Investment Bank's Risk Sharing Financial Facility (RSFF).

Who's who in the aviation



SkyNRG

The Dutch pressure group SkyNRG was set up by KLM in November 2009 with Air France KLM Group, the Dutch oil company North Sea Group and a consulting firm called Spring Associates the founding members. SkyNRG, wants "to lower the entry barriers for airlines to embrace biofuels, driving the industry towards a real tipping point for the commercialization of bio-kerosene on the market".³¹ The company would provide a one stop shop for airlines sourcing sustainable feedstocks, as well as dealing with refining contracts, distribution, quality assurance, insurance and marketing. SkyNRG aims to trade 100,000 tonnes in the next three to five years, and realise a \$100 million turnover.³² So far, SkyNRG says it will focus on waste, but it has not excluded any feedstock and says that they will be assessed on a case-by-case basis.³³

NESTE OIL

Neste Oil

Neste Oil, a Finnish oil company which has a large refinery in Rotterdam, prides itself on being one of the two possible big suppliers of biokerosene worldwide.³⁴ It has signed up to the European Flightpath.³⁵ Currently the overwhelming majority of Neste Oils' feedstock comes from palm oil. More recently, Neste Oil announced it was expanding its raw material base to jatropha and camelina.³⁶

biofuels industry



KLM

KLM, a SkyNRG partner/member, plans to bring up to 100,000 tonnes of bio-kerosene on the market by 2015. Last year (June 2011), KLM announced more than 200 flights operating on biokerosene between Amsterdam and Paris from September 2011 onwards. The flights are fuelled with biofuel made from used cooking oil.³⁷

KLM CEO Eurlings praised the trial flights between Amsterdam and Paris, saying flying on waste was the future, adding that Dutch people would continue eating fried croquettes from time to time.³⁸

It is estimated that 42 litres of cooking oil per person are needed to make a return flight from Amsterdam to Paris. People use on average five litres a year.³⁹

Eurlings has recognised the problems with other feedstocks: "[with used cooking oil] you do not have all the disadvantages of standard biofuels, that deforestation takes place, that there is too little water in those developing countries where biofuels are grown, there is not enough food, etc."⁴⁰ KLM has however failed to explain how it intends to meet its biofuel ambitions in a sustainable way.



Lufthansa

In July 2011, Lufthansa launched a six-month biofuel trial between Frankfurt and Hamburg. One of its two Lufthansa Airbus A321 engines runs on a 50/50 mix of regular fuel and biokerosene. The 800 tonnes of biokerosene are made



Lufthansa en Neste Oil visiting the jatropa plantations of Waterland International in Grobogan (source: website Waterland International)

up of 80 percent camelina (from the US), fifteen percent jatropa and five percent animal fats.⁴¹

The jatropa used for Lufthansa's biokerosene was sourced from Indonesia and Mozambique.⁴² In July 2011, the director of Sun Biofuels Mozambique announced the company had sold 30 tonnes of jatropa oil to Lufthansa.⁴³ A further 200 tonnes were bought from Jatenergy Limited/PT Waterland International in Indonesia.

The impacts of this minor use of jatropa oil for aviation in Indonesia are described in the next part of the report. Lufthansa recently declared the trial flights a success, but the airline said it "would not take it further unless production of the fuel - a synthetic based on vegetable oil essentially using a plant grown in Indonesia - is stepped up. Lufthansa will cooperate with producers in Africa and Asia to stimulate production".⁴⁴

Lufthansa needs around 530,000 tonnes of biofuel a year to meet its IATA goals for 2020.⁴⁵ One of Waterlands CEOs has advised: "The most reliable way for any airline to secure sufficient alternative feedstock and long-term supply is to grow your own fuel and invest into jatropa plantations - today."⁴⁶

PART 2: CASE STUDY

Jatropha cultivation in Indonesia and the impact on the people in the Grobogan district

Introduction

The Grobogan district in Central Java, Indonesia is, like most of Java, densely populated with many small farmers struggling to survive on small plots of land (0.3-0.4 hectares – half the size of a football field). Many of those who survive by farming do not have their own land, and work on others' land.

Money Tree Dreams: the Jatropha hype

Since 2005, jatropha has been promoted as a 'pohon uang', or money tree as part of a larger national government programme for energy self-sufficiency. Jatropha, it was promised, would grow well on marginal and waste lands, was

inedible and so would not compete with food production. It would help with reforestation, and prevent further soil erosion, even enriching the soil with nutrients. Jatropha would not require a lot of attention once planted, no fertilizers, herbicides or any significant amounts of water. Farmers would be able to lie back and watch the money grow in the form of jatropha oil seeds. Jatropha would also help to cool the planet⁴⁹ generating carbon credits or carbon money. Jatropha would bring cheap energy to the villages.⁵⁰ It would lift remote areas out of poverty and create a million jobs in Indonesia. At the peak of the hype, many local governments felt obliged to implement jatropha planting programmes, and many peasants invested land and money to harvest the "wonders" of jatropha.

Jatropha in Grobogan District

Plans for large-scale jatropha plantations in Grobogan were unveiled in 2007, making national news and creating high expectations among the local farmers. A village in Grobogan had been selected to become the first energy self-sufficient village (DME) as part of a national programme to provide electricity, create jobs and lift the poor out of poverty in rural areas. On 21 February 2007, the Indonesian president Susilo Bambang Yudhoyono inaugurated the DME programme in Tanjungharjo and promised a ten billion rupiah investment for jatropha development in Grobogan. The president said he was so enthusiastic about the potential of jatropha that he was considering changing the State Oil Company's logo from a seahorse to a jatropha leaf.

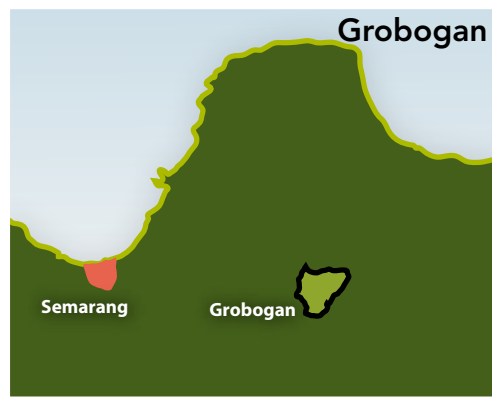
A feasibility study for the Ministry of Agriculture and German Kreditanstalt für Wiederaufbau, carried out in three other provinces in 2007, had previously warned that the potential for bioenergy production and consumption from jatropha was not viable within and for villages. Jatropha would potentially be grown at the expense of food production and risked encroaching onto

The new bio-colonialism

By importing ever increasing amounts of biological resources from the global South, industrialised countries are enlarging their ecological footprint, harming biodiversity and food security while increasing greenhouse gas emissions. The relationship between the Netherlands and Indonesia is a clear example of such "bio-colonialism".

The Netherlands, as a main logistic hub in the European region, is importing ever-increasing natural resources from Indonesia. Indonesian timber, palm oil and solid biomass are imported via Rotterdam and Amsterdam, and then processed and redistributed for consumption throughout Europe. In future, these imports are expected to grow, as wood chips and rice husk are imported to fuel our cars and power stations, and jatropha oil becomes a new feedstock for our energy needs.

The Indonesian government plays a complicit, if at times contradictory role in this process. While stressing the importance of food security, it promotes the export of raw materials for biofuels, grown at the expense of food production, tropical forests and biodiversity.



forest land. But the programme went ahead, extending into Grobogan and many other places.

Growing jatropha for European aircrafts – The Waterland Group

One of the companies that invested in jatropha production in Grobogan was the Netherlands-based Waterland Group, a consortium of companies established to support a joint investment initiative to secure biomass feedstock for biomass power plants in the Netherlands.⁵⁴

One of the Group's target markets is the European market for aviation biofuels. The Waterland Group has established a joint venture with Australia-based Jatenergy Ltd called Jatoil Waterland, which is responsible for trading the feedstock on the world market.⁵⁵

On 8 September 2011, Jatenergy Limited announced it had sold 200 tonnes of crude jatropha oil at USD 1,000 per tonne from its joint venture operations with Waterland. The oil had been refined into biojet fuel for Lufthansa by Neste Oil.⁵⁶ Waterland's CEO William Nolten told journalists that there were also contracts with KLM and other European Airlines.⁵⁷

Jatoil Waterland's activities in Grobogan are based on a partnership with the State Forest Company,⁵⁸ which officially holds 35 percent of the land in Grobogan. This area belonged to the former Dutch colonial teak estates. The local people have always struggled to retain access to the land and forestry resources in the area.⁵⁹ While some farmers without land titles secured



Agriculture is the most important economic activity in Central Java

A farmer in Tirem interviewed by a German newspaper in September 2011, said that the jatropha in his field was an offer from Waterland that he could not refuse. If he hadn't replaced half of his food crops with jatropha, the State Forest Company which owns the land he farms might not have allowed him to use his plots anymore.⁶⁰

Land, food and fuel crises in Indonesia

Indonesia spent twenty percent of its foreign exchange reserves on importing five major food commodities in 2010.⁴⁷ There is a severe shortage of land in Central Java, one of the most densely populated provinces of Indonesia with 35 million inhabitants.

The Indonesian government has however developed special domestic programmes to overcome what are called the krisis pangan (food crisis), the krisis lahan (land crisis) and the krisis energi (fuel crisis).

Pangan - Food

Rising food prices are a major concern in Indonesia, which aims to be self-sufficient in food. The urban and landless rural poor struggle to pay for basic food, with a kilo rice now already at 6000 rupiah (€0,52). If more and more land is used to produce plant-based fuel, it can be expected that food prices will rise even further.

Lahan - Land

The shortage of land has led to an expansion of agricultural areas into areas which were once forest. Small farmers rarely benefit from access to new land, with big estates and plantations usually the main beneficiaries. Widespread calls for agrarian reform in favour of small farmers and landless peasants, have not led to concrete change.⁴⁸

Demand for plant-based fuel is adding to the already high pressure on land.

access to the land, they have no real rights and state authority over the land can be (re) enforced, especially when seemingly lucrative economic opportunities appear.

Unfulfilled promises

"The "Waterland" fully developed and meticulously recorded farming model was selected for commercial scaling in 2006, after conducting many pilot projects utilizing various models over several years. Not only has this model proved to be viable for the Waterland stakeholders, the farmers' income have increased up to 400%. and this is enabling the development of small farming communities in Central Java, solving a significant social issue."

(Source: website Waterland International)

Waterland's website makes a number of misleading claims regarding the profitability and sustainability of jatropha, promising a Garden Eden to farmers, high returns to investors, and a perfect sustainability record to European buyers for renewable energy uses.

Field visits to the area reveal that these promises have by no means been fulfilled. In addition to thorough desk research, Friends of the Earth made two trips to Grobogan in July and December 2011. An independent film crew commissioned by FoE also interviewed farmers participating in Jatoil Waterlands Grobogan jatropha projects. This footage - which is available from Milieudefensie/Friends of the Earth Netherlands - reveals a very different view of Waterland's commitment to sustainable biofuels.

The Dutch company Waterland claims that jatropha offers a golden investment opportunity for farmers. But farmers in the Gobrogan have a different opinion and have started to cut down the jatropha trees.





Farmers testimonies

NAME: MR. SUWARTO

WHO: LEADER OF THE LOCAL FARMERS COOPERATIVE

FROM: TIREM VILLAGE

PROBLEMS WITH JATROPHA: HAD TO DEAL WITH CONFLICTS, LOST PART OF HIS INCOME AND LOST PART OF HIS FOOD PRODUCTION

Mr. Suwarto, a leader of the local farmers cooperative in Tirem village and a contact person working for Waterland, claims to have lost two third of his income after cultivating jatropha.

In the village of Tirem we met Mr. Suwarto, the leader of the local farmers' cooperative LMDH "Wono Rejo". He has planted all of his fields - which total 0.8 hectares - with jatropha plants delivered by Waterland. He said he has earned only 200,000 rupiah (€17) from growing jatropha, whereas he would have easily earned three times

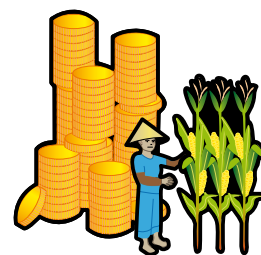
Jatropha does not guarantee high returns

Analysing jatropha projects in Africa and India, Friends of the Earth International concluded in 2010 that jatropha doesn't guarantee high returns, especially not on marginal lands, where it needs water and other inputs. As a result, most projects used arable land, competing with food production and at times leading to displacement of the local population. Jatropha plantations were found to be prone to pests and to affect biodiversity. Many projects failed because jatropha proved not to be feasible, with investors pulling out, leaving communities and farmers in disarray.⁵¹

The German GTZ and the Dutch Agency NL – both government agencies - concluded that export-oriented jatropha projects and jatropha plantation developments were ill-advised for the foreseeable future.⁵²

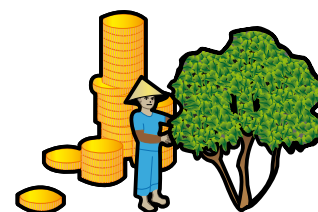
more if he had planted corn. Corn leaves would also have provided fodder for animals and the young corn cobs would have made excellent food for children. Jatropha nuts are inedible. In Tirem, approximately 150 farmers have been growing jatropha. According to Mr. Suwarto they are facing similar falls in income. However, as Mr. Suwarto is employed by Waterland as a supervisor, he is in an impossible position. "I stood at the company's side, when tension was running high. I tried so hard to convince the farmers not to cut down their jatropha bushes." The farmers' anger about the crop failure was also directed against him, as he had endorsed and promoted jatropha to them. "At one point they got so mad, that they even turned their sickles on me. I asked Waterland, what they would do to help, when things turned violent and people were being physically threatened. Would they be there to protect me? Waterland could not give me an answer to that." Waterland said that it was "not responsible for these conflicts."

According to Mr. Suwarto, Waterland delivered seedlings to the farmers, but has repeatedly refused to buy back the harvested jatropha nuts. He says that the jatropha nuts have been "rotting away" in his shed, attracting flies. "Waterland should not do that to us. They should pay for the nuts."



Maize

15.000 rupiah per day



Jatropha

8.000 rupiah per day

Income differences for local pickers between maize and jatropha, based on testimonies

Women pay the price of jatropha's downsides

Women have been affected by the arrival of jatropha in Grobogan in several ways. Women collect most of the fodder (leaves of banana, teak, fruit trees, hedges, grass) for goats and sometimes cows. This can be time consuming, especially in the dry season. Now that jatropha has replaced some of these plants, women either have to spend longer collecting feed, or they can feed fewer animals. Goats kept in a shed are a form of savings, sold when the family needs to pay the doctor, school fees, or has to bridge a period of income loss. Jatropha cannot be fed to animals.

Jatropha competes with teak and acacia, both of which are sources of fuel for the poorest households, and again this is usually gathered by women. Jatropha produces very little wood. Waterland International has provided cooking stoves, as part of their CSR policy, which might help alleviate this problem and also reduces the damage to health caused by smoke*. Both men and women complain about the low prices paid by Waterland International for jatropha seeds. But women do most of the harvesting work. Their labour is very badly paid, even in comparison with other agricultural work locally. The maximum they have been able to earn in a day collecting jatropha seeds for Waterland International has been 8,000 rupiah (€0.68), while

the typical rate for women hired for a morning's agricultural work locally is around 15,000 rupiah. But the biggest disadvantage of the switch to jatropha is probably the loss of extra income generating activities. Women who have access to land are able to benefit from household-based industries to process harvested food crops for the local market. Crops grown on moderate to poor soils, like cassava, soy, mung beans, peanuts and tubers are turned into tahu and tempeh, into chips and other snacks, and are packed for sale. This gives added value to the harvest, informal employment and gives women a certain degree of autonomy. Because jatropha only allows limited intercropping, these extra cash options are reduced. Working more hours for less money, losing the opportunity for other income generating activities, and having less access to fodder (and fuel) affects the economic position of women who live close to the jatropha fields. To what extent this affected their position within the household was not clear from the field visits.

* Waterland provided free Protos stoves to households that joined the jatropha programme. After the first year, the families have to pay for the jatropha oil for the cooker, which is processed by Waterland. Many families have returned to using kerosene stoves which are cheaper and simpler to operate.

NAME: MRS. RUMIYATI

WHO: PICKER

FROM: TIREM VILLAGE

PROBLEMS WITH JATROPHA: LOST HALF OF HER INCOME

Like many other farmers without access to land, Mrs Rumiya tries to make a living as a daily labourer working on land owned by others. She says: "If we go to help in other people's rice or corn fields, we get 15,000 rupiah (€1,30) for half a day's work, and we get a free breakfast. Picking jatropha for Waterland just earns us 7,000 rupiah (€0,60) at best, and no breakfast. This is really very, very low."

NAME: MR. WARSIMIN

WHO: HEAD OF THE FARMERS' COOPERATIVE

FROM: KLAMBU VILLAGE

PROBLEMS WITH JATROPHA: FARMERS LOOSE A SUBSTANTIAL PART OF THEIR INCOME AND JATROPHA REPLACES FOOD CROPS

Getting badly paid for as daily labourer is one thing, failing to grow a crop on land which was previously profitable is another. "Farmers are losing money when they grow jatropha on their fields," says the head of the farmers' cooperative LMDH 'Jurang Jerg'. "You get easily 2,500 rupiah for a kilo of corn," Mr. Warsimin explained, adding that he used to grow more food before, and that jatropha now replaces some of his former crops. His corn plants struggle between the jatropha trees, with the jatropha taking more space and sunlight as it grows, competing with the food crops.



Mr. Warsimin in his corn field. Jatropha plants are growing above his corn, blocking out the light and "strangling" the corn.

NAME: MR. WARSITO
WHO: FARMER AND FORMER SUPERVISOR FOR WATERLAND
FROM: KLAMBU VILLAGE
PROBLEMS WITH JATROPHA: DID NOT RECEIVE SALARY FROM WATERLAND FOR THREE MONTHS

Mr. Warsito works as a farmer and was previously a supervisor for Waterland but left his job after he says he was not paid for three months. His job was to organise jatropaha planting and guard the jatropaha trees. He had to ensure that the farmers did not cut back the trees to make the maize grow better.

Another employee, Mr. Suwanto from Tirem village claimed not to have been paid in the last three months for his work as a supervisor for Waterland.

NAME: MRS. MUSAROFAH
WHO: FARMER
FROM: GUNDIH VILLAGE
PROBLEMS WITH JATROPHA: HEAVILY IN DEBT AFTER INVESTING IN JATROPHA

Mrs. Musarofah and her family became interested in cultivating jatropaha after the Indonesian President announced the nationwide biofuels programme in February 2007.

The jatropaha seedlings were offered to the family by the PT. Pusaka Pura Group, an Indonesian company. Pak Muslihin - the oldest brother - explained that he borrowed five million rupiah to invest but could not sell the jatropaha nuts he harvested. His sister also borrowed the same amount, and because she could not sell the jatropaha nuts, she was unable to repay the bank.



Mr. Warsito used to work for Waterland as a supervisor but quit, saying he had not been paid.

As a result, the debt has now doubled, including interest. She has sold her land to repay the debt. Her brothers may have to do the same. According to Mrs Musarofah around 20 families in Gundih are in the same position.

Mr. Supriyanto, another of her brothers, said he was worried he would not be able to pay for his children's education when his children leave elementary school because of the debts.

Jatropaha cultivation in Java: An ambitious dream for Waterland and Lufthansa?

"With unparalleled access to suitable land banks in excess of hundred thousand hectares all across Asia, Waterland pursues the large scale commercialization of energy crop plantations in multiple locations."

(Source: website Waterland International)

While it is not possible to know exactly how much jatropaha Waterland has grown in the Grobogan district, it is clear that the crop does not bring the exciting opportunities for farmers that have been promised by Waterland and the Indonesian government. On the contrary: looking at prices for pickers and farmers, for the local population in the Grobogan district the economic benefits from jatropaha are extremely low and in many cases constitute a serious economic loss. Friends of the Earth has calculated that a farmer in Java needs to pick seeds for 18 days in order to enable one person to fly from Frankfurt to Hamburg, a route that can be travelled by train in 3.5 hours.

Furthermore, it has been demonstrated that - even with limited production - at several loca-

Peasants under pressure: the Jatropha Cooperation Agreements

Under the Jatropha Cooperation Agreements, the local farmers cooperatives (LMDH) are put both under the supervision of the State Forest Company and Jatoil Waterland. The LMDHs are obliged to plant "until the number of survival is at least 90% of the jatropha"⁶¹. Having witnessed the failure rate for jatropha plants, everybody knows that the farmers and the cooperatives have been given responsibility for an impossible task. Under the Jatropha Cooperation Agreements, Jatoil Waterland is obliged to purchase the farmers harvest and to pay the agreed price for dry seeds (currently 1300 rupiah/ 0.11 per kg). The profits earned on the international market, however, are shared between the State Forest Company (30%) and Jatoil Waterland (70%), after deducting costs.⁶²

In an update to investors in March 2011, the business case for the Grobogan project is advertised by the company as a project that "could handpick its workers" who could also be "disciplined by the State Forest Company", if yields are down, etc. Since the land would belong to the State Forest Company, who will get a small part from the profits in exchange for a 20+5+5 year land lease agreement with Waterland, the costs of land would really be low. In summary, yield security and low capital entry would be secured via the 'forestation mode'.⁶³ However this is at a heavy cost for the local farmers.

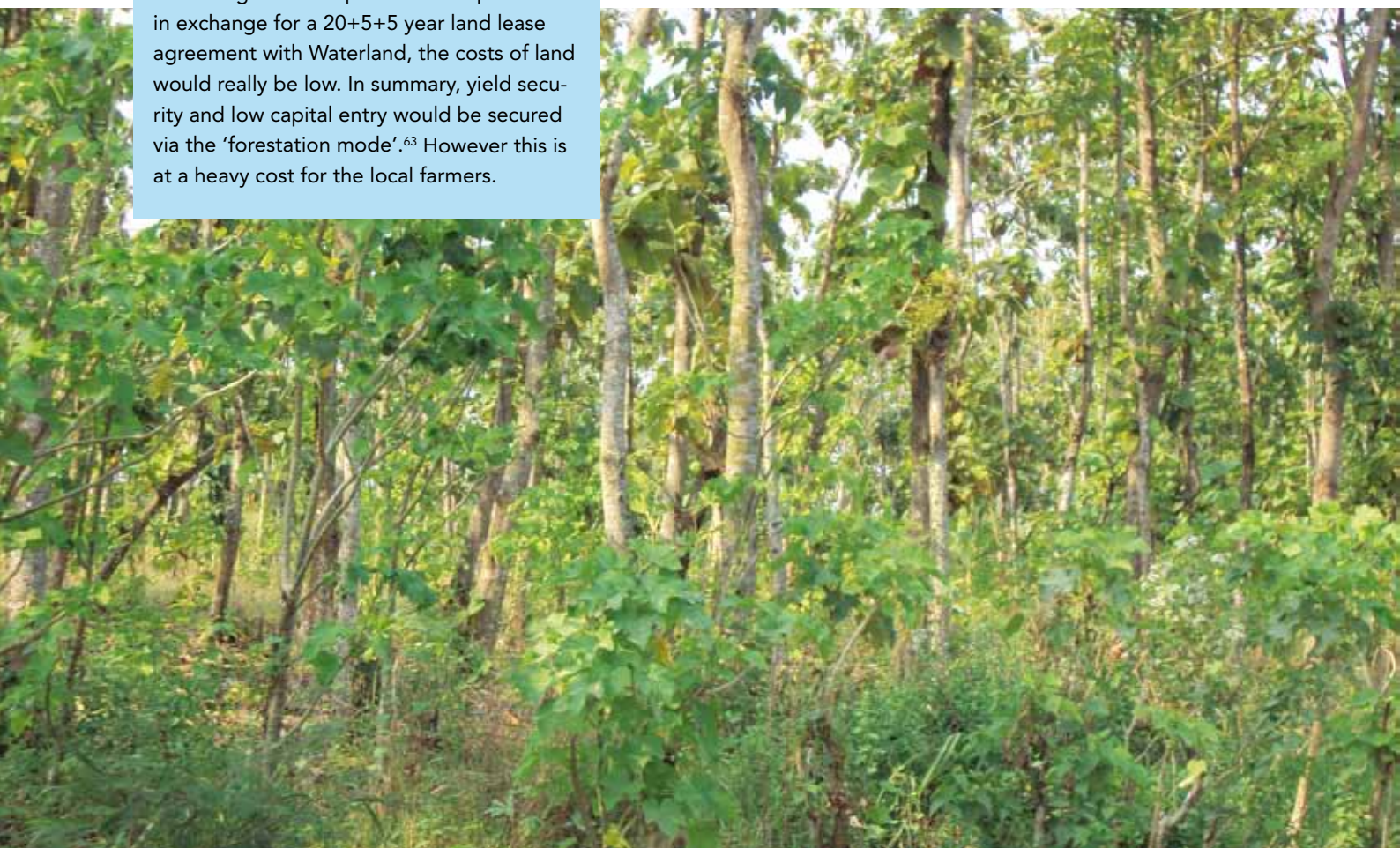
tions in the region the cultivation of jatropha is already at the expense of food production.

Nevertheless, the company continues to promote the future opportunities for jatropha in Indonesia online and in its material for prospective investors. It claims it has secured exclusive access to land via the State Forest Company, saying it will expand its operations to cover 100,000 hectares in the province, with the prospect of access to 3.1 million hectare across Indonesia.⁶⁶

Lufthansa is interested in increasing the production of future biofuel supplies from Indonesia. In January 2012, it announced it was stopping the commercial biofuel trials, which had used jatropha sourced from Grobogan as part of the biokerosene mix. Lufthansa claims the trials were a great success, saving up to 1,500 tonnes of CO₂ emissions, without any technical problems. Lufthansa mentioned nothing about the farmers and workers in Grobogan when describing the trials to the media.

Lufthansa's CEO said that the use of biokerosene "has had a positive result from which we want to continue to work."⁶⁷ He said the airline would not take it further unless production of the fuel was stepped up.⁶⁸

In the shadow of the teak trees jatropha will not bear much seed



Lufthansa is to initially focus on cooperating with producer countries in Africa and Asia to stimulate production, for example by committing to buy certain quantities, he explained. Lufthansa wants to make the production of jatropha commercially interesting within four to seven years.

So far, only limited amounts (200 tonnes) from the Grobogan jatropha projects have been used, but the effects on the rural population are already visible. Lufthansa needs 530,000 tons to fulfill its part in the EU's aviation biofuel plans for 2020.

It is hard to imagine how this would impact farmers livelihoods, food security, biodiversity or climate change, but the effects are likely to be devastating.

The good news, however, is that it is still possible to prevent the industry from taking off in the wrong direction. Airlines are still at the test stage and are only using limited amounts of vegetable oils. Viable alternatives are available, both for genuine transport needs in Europe and for Indonesian small farmers, who can benefit from diverse, sustainable agro-ecological cultivation methods to grow food and cash crops, according to their needs.

In the conclusions and recommendations-section we will elaborate on the measures needed to bring these solutions closer.



Neglected jatropha plants in Grobogan district

Jatropha in Grobogan is not viable without subsidies

Jatropha seems a bad deal on all levels. For the landless people that harvest the jatropha it provides a low paid job, even compared with other work in the sector. Farmers with access to land can realise much better returns from other crops. The guaranteed price (JatOil Waterland pays around 1300 rupiahs, other companies pay up to 2000 rupiahs per kilo), hardly covers the cost of

hiring a picker, let alone production costs. In the neighboring district of Kebumen, the local authorities have asked the Central Government to add a subsidy of at least 3000 rupiah to the price paid per kilo, in order to convince farmers to plant jatropha.⁶⁴ Despite paying next to nothing for the use of the land and keeping labour costs extremely low, JatOil Waterland is

desperate for more investors. Joint venture partner Jatenergy is now opening up coal mines in Borneo's forests "to provide stronger cash flows to advance our Indonesian jatropha activities."⁶⁵ Experiences from other regions show that a number of jatropha companies have gone bankrupt after a couple of years, for example Sun Biofuels and Dutch company Bioshape in Tanzania.

3. Conclusions and recommendations

Jatropha is not the answer for the growing demand for aviation fuel

Clearly, the jatropha “money trees” have not made the farmers in Grobogan rich. On the contrary, our research in the field showed that growing jatropha in Grobogan threatens **food security** as jatropha is replacing food crops, in particular corn. Furthermore:

- Growing jatropha does not benefit farmers and can lead to **economic losses**, compared to food crops.
- The failure of jatropha is triggering **conflicts** within communities, e.g. of angry farmers against cooperation leaders who have promoted jatropha on behalf of Waterland.
- It is **difficult** for the farmers to **refuse** to grow jatropha on land that is owned by the State Forest Company. As a result they have to forego growing other, more profitable food crops on this land, which they had previously been able to use.
- The effects of jatropha are particularly affecting **women**.

If the aviation sector’s plans for biofuels go ahead, replacing all aviation fuel with biofuels by 2050, would take as much land as 378 million hectare (see graphic, page 11). At the same time in this scenario greenhouse gas emissions from aviation biofuels will grow massively. Companies and governments should stop hiding behind false solutions and start taking measures to reduce the staggering growth in greenhouse gas emissions from the aviation industry.

Corporate Responsibility

European airlines and their passengers should ask themselves how ethical it is to have farmers work for 68 cent per day to enable cheap flights between European cities. This question is particularly relevant for Lufthansa, given that it has already used Waterland’s jatropha oil for flights between Frankfurt and Hamburg. A farmer in Java needs to pick seeds for 18 days in order to enable one person to fly from Frankfurt to Ham-

burg, a route that can be travelled by train in 3.5 hours. Yet it seems that Lufthansa and the other airlines are not open to the serious downsides of aviation biofuels. On the contrary, they claim that tests using aviation biofuels have been hugely successful and that they want to increase the use of these harmful fuels.

Friends of the Earth is urging airlines to:

- be completely **transparent** about the origin of their products.
- abstain from using jetfuel that has been produced while, directly or indirectly, damaging food security, the climate or biodiversity. In practice this means they should not use crop based fuels, such as palm oil and jatropha oil.
- withdraw their biofuels targets and replace them with emissions reductions targets based on actual reductions in emissions.

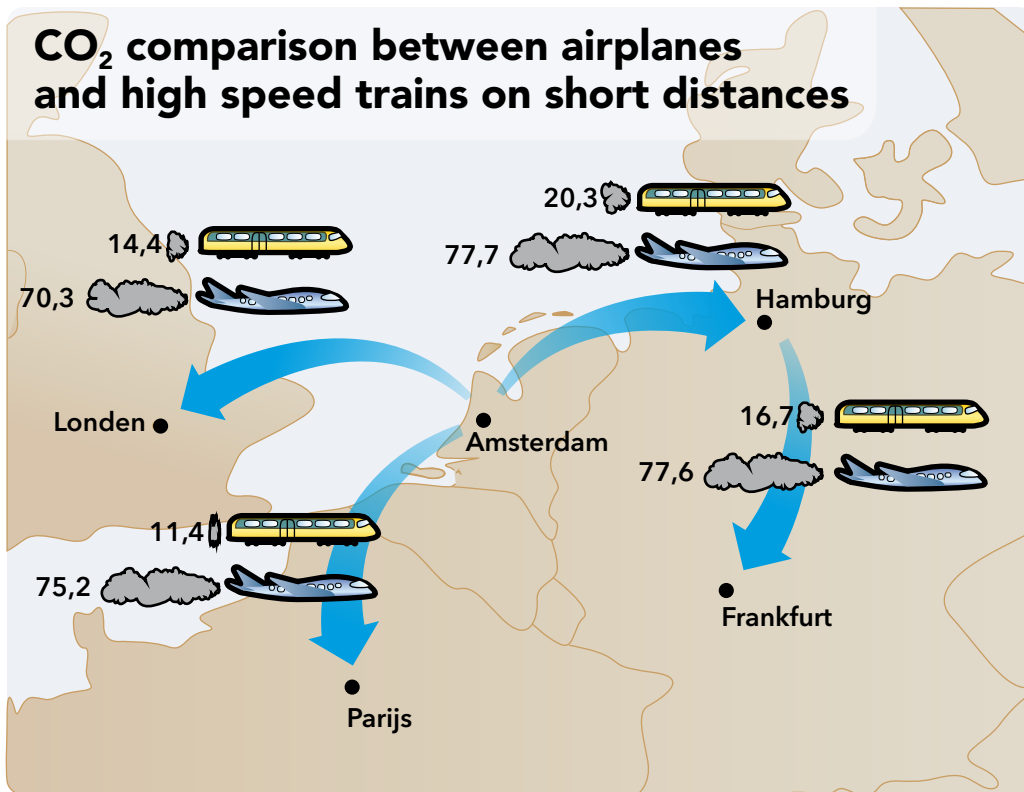
Governments responsibility

Europe

European politicians will have to face the question as to whether they really want a future in which their citizens’ flights are contributing to increased demand for land and rising food prices. If they do not, they should consider replacing as much European air traffic as possible with sustainable alternatives and make aviation less attractive. Air traffic is a notorious climate killer and the possibilities to cut greenhouse gas emissions by reducing air traffic are enormous. For example, they can:

- eliminate inefficient and unnecessary short-haul flights and replace them with smarter transport alternatives, such as high-speed trains which generate roughly a quarter of CO₂ emissions compared to planes (see graphic, page 25) This will provide plenty of opportunities to achieve considerable cuts in greenhouse gas emissions. For example, **forty percent** of all air traffic from and to Amsterdam- Schiphol airport flies within a range of 1000 kilometers.
- In order to discourage flights, European policy-makers should end the **unjustifiable**

CO₂ comparison between airplanes and high speed trains on short distances



Emissions based on conventional fuel, in kg per person.
Source: <http://www.bahn.de>, using UmweltMobilCheck

privileges enjoyed by the aviation industry and make sure kerosene and air travel are no longer exempt from tax. Measures they should take include:

- abolishing the “zero emission factor” for kerosene made from biomass under the EU’s Emissions Trading System (ETS) and incorporate all the climate impacts from planes in the ETS.
- charge VAT on air tickets and fuel duty on jetfuel, as on other products. Revenues raised by abolishing these tax exemptions could be used to make Europe more energy efficient, for example by insulating affordable homes or by supporting a better and more affordable railway system
- Remove subsidies for the development of biokerosene

In short: the EU should bring its policies on aviation in line with its ambitions to tackle climate change and end world hunger.

The Indonesian authorities should:

- avoid promoting or imposing commodities which threaten local farmers’ income, food production and community cohesion
- thoroughly evaluate failed national and local jatropa programmes in an open, comprehensive and inclusive manner and readjust plans, employing the precautionary principle

- prioritise the food, land and energy demands of the local rural population over export-oriented activities, especially when allocating land-use rights on state land.

The State Forest Company Perhutani Central Java should

- put on hold and not expand Jatoil Waterland’s Grobogan experiment growing jatropa with vulnerable small-scale farmers
- not support land grabs or subsidise a private company such as Jatoil Waterland or European aviation customers by handing out land-use rights for practically nothing, impeding land use by local subsistence farmers
- prevent food crops being replaced by inedible, low-return cash crops such as jatropa, and support the cultivation of food crops, employing local knowledge and experience in agro-ecological practices
- revitalise former forest land with wood, fruit and fodder trees together with and for the benefit of local communities. Planting jatropa is not reforestation
- compensate (together with Waterland) the communities for their losses in income and cropland, taking care that the compensation is organised such that it benefits all affected social layers within the communities and does not create or aggravate gender imbalances.

NOTES

- 1 Manchester Metropolitan University, "Aviation now contributes 4.9% of climate change", 28 May 2009, <http://www.mmu.ac.uk/news/articles/1066>
- 2 DG ENER European Commission, Choren Industries, Lufthansa, and based on contributions from DG Move, DG ENER, DG RTD from the European Commission, Neste Oil, UOP/Honeywell, BTG, British Airways, Air France, KLM and Airbus, technical paper "2 million tons per year: A performing biofuels supply chain for aviation", June 2011, http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf
- 3 DG ENER European Commission, Choren Industries, Lufthansa, and based on contributions from DG Move, DG ENER, DG RTD from the European Commission, Neste Oil, UOP/Honeywell, BTG, British Airways, Air France, KLM and Airbus, technical paper "2 million tons per year: A performing biofuels supply chain for aviation", June 2011, http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf
- 4 European Commission, "Roadmap for moving to a competitive low-carbon economy in 2050", 8 March 2011, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011DC0112:EN:NOT>
- 5 DG ENER European Commission, Choren Industries, Lufthansa, and based on contributions from DG Move, DG ENER, DG RTD from the European Commission, Neste Oil, UOP/Honeywell, BTG, British Airways, Air France, KLM and Airbus, technical paper "2 million tons per year: A performing biofuels supply chain for aviation", June 2011, http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf
- 6 Lufthansa, "Lufthansa launches first scheduled flights using biofuel", 15 July 2011, <http://presse.lufthansa.com/en/news-releases/singleview/archive/2011/july/15/article/1980.html>
- 7 IATA Press Release, European ETS Vote: The Wrong Answer July 2008. <http://www.iata.org/pressroom/pr/Pages/2008-07-08-01.SPX>
- 8 According to the Flightpath Document, around 1,2 million tonnes (60% of 2020 target) will come from vegetable oil, probably via Neste Oils installations. A smaller share of European aviation biofuels is planned to come from synthetic Fischer-Tropsch based kerosene, but the use of lignocellulosic biomass as feedstock for this process still needs to be demonstrated at any remarkable scale. The third option envisioned in the paper, kerosene based on pyrolysis oils from lignocellulosic biomass, needs several processing steps for upgrading, and is still in an early research phase.
- 9 Investment in Biofuels is Irresponsible -UN Advisor, September 2011, <http://business.myjoyonline.com/pages/news/200805/15953.php>
- 10 For example: data from Oil Palm Watch shows there have been 630 conflicts regarding oil palm plantations and 200 monoculture plantation conflicts up to 2010, 30 May 2011 <http://www.antaranews.com/en/news/72111/walhi-calls-on-president-to-evaluate-oil-palm-plantation-development>
- 11 Land Rights and the Rush for Land – Findings of the Research Project: Global Commercial Pressures on Land, International Land Coalition, December 2011, http://www.landcoalition.org/sites/default/files/publication/1205/ILC%20GSR%20report_ENG.pdf
- 12 Achten, W. M. J., and L. V. Verchot. 2011. Implications of biodiesel-induced land-use changes for CO2 emissions: case studies in tropical America, Africa, and Southeast Asia. *Ecology and Society* 16(4): 14. <http://dx.doi.org/10.5751/ES-04403-160414> Errors found in EU's Biofuel Carbon accounting, September, 2011, <http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas>
- 13 Opinion of the EEA Scientific Committee on Green House Gas Accounting in Relation to Bioenergy, September 2011, <http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas>
- 14 Anticipated Indirect Land Use Change Associated with Expanded Use of Biofuels and Bioliquids in the EU - An Analysis of the National Renewable Energy Action Plans. Catherine Bowyer and Bettina Kretschmer, IEEP, http://www.foeeurope.org/agrofuels/ILUC_report_November2010.pdf
- 15 IPCC, 1999: Aviation and the global atmosphere - A special report of IPCC working groups I and III. Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, NY, USA, 365 pp.
- 16 Meteorologische Zeitschrift 2005, Robert Sausen, Ivar Isaksen, Volker Grewei, Didier Hauglustaine, David S. Lee, Gunnar Myhre, Marcus O. Köhler, Giovanni Pitari, Ulrich Schumann, Frode Stordal and Christos Zerefos
- 17 Milieudefensie/Friends of the Earth Netherlands. Agrofuels in planes: heating the climate at a higher level. Published on February 7th 2012
- 18 Official Journal of the European Union, "Directive 2008/101/EC of the European Parliament and of the Council, amend-
- ing Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community", 19 November 2008, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:008:0003:0021:EN:PDF>
- 19 Sustainability as a smokescreen, the inadequacy of certifying fuels and feeds, FoE Europe report, april 2008
- 20 DG ENER European Commission, Choren Industries, Lufthansa, and based on contributions from DG Move, DG ENER, DG RTD from the European Commission, Neste Oil, UOP/Honeywell, BTG, British Airways, Air France, KLM and Airbus, technical paper "2 million tons per year: A performing biofuels supply chain for aviation", June 2011, http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf
- 21 Climate Progress, "Biofuels are Big at the Paris Air Show: But When Will They Truly Meet Demand from the Global Aviation Industry?", June 2011, <http://thinkprogress.org/romm/2011/06/21/249282/biofuels-paris-air-show-aviation>
- 22 Boeing, "Boeing 747-8 to fly historic biofuel flight to Paris", 15 June 2011, http://www.boeing.com/Features/2011/06/bca_biofuel_06_15_11.html
- 23 KLM, "KLM launches commercial flights Amsterdam – Paris on biofuel", 22 June 2011, http://www.klm.com/corporate/en/newsroom/press-releases/archive-2011/KLM_launches_commercial_flights_Amsterdam.html
- 24 Lufthansa, "Lufthansa launches first scheduled flights using biofuel", 15 July 2011, <http://presse.lufthansa.com/en/news-releases/singleview/archive/2011/july/15/article/1980.html> <http://verantwortung.lufthansa.com/file-admin/downloads/de/LH-Biofuel-Flyer.pdf>
- 25 Thomson Airways, "Thomson Airways today makes aviation history with its first flight for customers on sustainable biofuels", 6 October 2011, <http://www.tuit-ravelplc.com/investors-media/news-press-releases/news?ref=228&dtype=2>
- 26 SkyNRG reaction to airportwatch/biofuel-watch statement, http://www.greenaironline.com/photos/SkyNRG_reaction_to_AirportWatch.pdf
- 27 RAND, Alternative fuels for military applications, January 2011, http://www.rand.org/content/dam/rand/pubs/monographs/2011/RAND_MG969.pdf
- 28 Rijksoverheid, "Minister Eurlings investeert € 1,25 miljoen in biokerosine", 21 April 2010, <http://www.rijksoverheid.nl/nieuws/2010/04/21/minister-eurlings-investeert-1-25-miljoen-in-biokerosine.html>
- 29 Lufthansa, "Lufthansa launches first

- scheduled flights using biofuel", 15 July 2011, <http://presse.lufthansa.com/en/news-releases/singleview/archive/2011/july/15/article/1980.html>
<http://verantwortung.lufthansa.com/file-admin/downloads/de/LH-Biofuel-Flyer.pdf>
- 30 DG ENER European Commission, Choren Industries, Lufthansa, and based on contributions from DG Move, DG ENER, DG RTD from the European Commission, Neste Oil, UOP/Honeywell, BTG, British Airways, Air France, KLM and Airbus, technical paper "2 million tons per year: A performing biofuels supply chain for aviation", June 2011, http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf, page 22.
- 31 As quoted in: SkyNRG to supply KLM and several other airlines with sustainable jet fuel in 2011, http://wotnews.co.uk/like/skyng_skyng_to_supply_klm_and_several_other_airlines/3966844/
- 32 ... Vicieuze cirkel op markt voor biokerosine, 2 Oktober 2011, <http://www.nuzake-lijk.nl/duurzaam/2630665/vicieuze-cirkel-markt-biokerosine.html>
- 33 Finnair to start flying on sustainable jet fuel out of Amsterdam, <http://skyng.com/2011/07/finnair-to-start-flying-on-sustainable-jet-fuel-out-of-amsterdam-schiphol/>
- 34 Matti Lehmus in Lufthansa takes off towards a new era of sustainably fuelled regular commercial flights, <http://www.greenaironline.com/news.php?viewStory=1299>
- 35 Neste Oil commits itself to 2020 targets for aviation biofuels, June 2011, <http://www.nesteoil.com/default.asp?path=1;41;540;1259;1260;16746;17727>
- 36 Neste oil expands its renewable raw material base with jatropha and camelina oils, July 2011, <http://www.nesteoil.com/default.asp?path=1,41,540,1259,1260,16746,17863&output=print>
- 37 KLM, "KLM launches commercial flights Amsterdam – Paris on biofuel", 22 June 2011, http://www.klm.com/corporate/en/newsroom/press-releases/archive-2011/KLM_launches_commercial_flights_Amsterdam.html
- 38 Het Parool, Herman Stil, "Op oud frituurvet vliegen naar Parijs", 30 June 2011, <http://www.parool.nl/parool/nl/106/SERVICE/integration/nmc/frameset/archief.dhtml>
- 39 De Standaard, "Te weinig frituurvet voor KLM", 24 June 2011, <http://www.standaard.be/artikel/detail.aspx?artikelid=6A3BQMJO>
- 40 Radio interview, August 2011, source: NOS radio, "Eurlings: frituurvet heeft niet de nadelen van andere bio-brandstoffen", 22 juni 2011, <http://nos.nl/audio/250191-eurlings-frituurvet-heeft-niet-de-nadelen-van-andere-biobrandstoffen.html>
- 41 Greenaironline, "Lufthansa takes off towards a new era of sustainably fuelled regular commercial flights", 18 July 2011, <http://www.greenaironline.com/news.php?viewStory=1299>
 Lufthansa, "HVO Biokerosene", <http://www.puresky.de/en#/all-about-biofuels/hvo-biokerosene>
- 42 Lufthansa, "Jatropha", <http://www.puresky.de/en#/all-about-biofuels/jatropha>
- 43 Diário de Moçambique, "Primeira produção vendida à Lufthansa", 23 July 2011, http://www.diariomoz.com/index.php?option=com_content&view=article&id=10860:primeira-producao-vendida-a-lufthansa&catid=34:sociedade&Itemid=53
- 44 Joachim Buse, as quoted in <http://www.thelocal.de/national/20120111-40047.html>, 11 January 2012
- 45 The International Herald Tribune and New York Times, October 26 2011, Flying with Biofuels Gets One Step Closer, as quoted on <http://www.jatrofuels.com/778-0-NYT+JATRO+referenced+in+Special+Report+on+Aviation+Fuel+Market.html>
- 46 as 40
- 47 Indonesia is a net importer of a.o. rice, maize, cassava, soy and sugar. In 2010, US\$ 5,2 billion of Indonesia's foreign exchange reserve went into the import of five major food commodities, 'Towards food self-sufficiency, starting now', January 2011, <http://www.thejakartapost.com/news/2011/01/19/towards-food-self-sufficiency-starting-now.html>
- 48 Agrarian Reform, Village Reform and Ecological Justice: Indonesia's Way for Social Justice, Declaration of Indonesia's Movement for Recovering people's rights, 12 January 2012, <http://www.walhi.or.id/en/ruang-media/pernyataan-sikap/1989-reforma-agraria-pembaruan-desa-dan-keadilan-ekologis-jalan-indonesia-berkeadilan-sosial.html>
- 49 Jarak Pagar Atasi Pemanasan Global, date, <http://www.alpensteel.com/article/108-230-pemans...check>
- 50 Pengadaan Energi Nasional dan Prospek Agribisnis Jarak Pagar, Gumbira Said, Agrimedia, Juni 2006
- 51 Jatropha: money doesn't grow on trees, Friends of the Earth International, December 2010
- 52 Jatropha Reality Check, GTZ - Regional Energy Advisory Platform, (East Africa), Nairobi, 2009 <http://www.worldagroforestry.org/downloads/publications/PDFs/B16599.PDF> and Report Jatropha Assessment, Agency NL, December 2010, <http://www.agentschapnl.nl/en/node/93400>
- 53 See notes 'Development of Jatropha Curcas Oil for Bio-Energy in Rural Areas' Indonesia, Gol MoA/KfW, 23 November 2007, Feasibility Study Team of GFA Consulting Group and DGPMAP, the study included the provinces Central Sulawesi, Nusa Tenggara Barat, Nusa Tenggara Timur;
- 54 Profundo, May 2011, Investors behind Waterland International
- 55 Jatoil Limited, "Prospectus", Jatoil Limited, March 2011, available at <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=100&rm=200&sp=nrm&clsPage=1&docID=GCA01159195JAT&f=pdf>.
- 56 Jatenergy, "ASX/media announcement "Australia's Jatenergy Supplies Fuel for Lufthansa's Pioneering Biojet Flights, 8 September 2011, <http://www.asx.com.au/asx/statistics/announcements.do?by=issuerId&issuerId=6627&timeframe=Y&year=2011>
- 57 as quoted in: Die Kocher-Show -Mit Pflanzenoel die Welt retten? Schoen waer's, Joerg Schindler, Berliner Zeitung, 6. September 2011
- 58 Prospectus, Jatoil Limited, March 2011, available at <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=100&rm=200&sp=nrm&clsPage=1&docID=GCA01159195JAT&f=pdf>
- 59 Nancy Lee Peluso, Rich Forests, Poor People – Resource Control and Resistance in Java, 1994
- 60 <http://futurezone.at/future/4441-mit-dem-oelkocher-auf-bauernfang-in-indonesien.php>; and Die Kocher Show, Joerg Schindler, <http://www.berliner-zeitung.de/archiv/mit-pflanzenoel-die-welt-retten-schoen-waer-s-wie-bosch-und-siemens-mit-einem-fragwuerdigen-projekt-in-indonesien-ih-image-aufpolieren-die-kocher-show,10810590,10931906.html>
- 61 Jail Limited, "Prospectus", Jatoil Limited, March 2011, available at <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=100&rm=200&sp=nrm&clsPage=1&docID=GCA01159195JAT&f=pdf>, see page 114 under Jatropha Cooperation Agreements
- 62 Jatoil Limited, "Prospectus", Jatoil Limited, March 2011, available at <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=100&rm=200&sp=nrm&clsPage=1&docID=GCA01159195JAT&f=pdf>, see page 115 under Profit Sharing Provisions
- 63 Jet Fuel from Oil Seeds - A working Business Model, JatEnergy, All-Energy Australia Conference - 2011, <http://www.petani-jarak-pagar-butuh-subsidi-pemerintah>, Jatropha farmers need government subsidies, November 2011, <http://www.bisnis-jateng.com/index.php/2011/11/petani-jarak-pagar-butuh-subsidi-pemerintah>
- 64 "Prospectus", Jatoil Limited, March 2011, available at <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=100&rm=200&sp=nrm&clsPage=1&docID=GCA01159195JAT&f=pdf>, page 44
- 65 Jatoil – An Energy Company Growing Crude Oil, <http://newsstore.fairfax.com.au/apps/viewDocument.ac?page=1&sy=nstore&kw=roads&pb=asx&dt=selectRange&dr=1month&so=relevance&st=ca&sf=text&sf=headline&rc=150&rm=200&sp=nrm&clsPage=1&docID=GCA01095650JAT&f=pdf> page 18 http://www.waterlandinternational.com/index.php?option=com_content&view=article&id=38&Itemid=91
- 67 <http://www.thelocal.de/national/20120111-40047.html>
- 68 http://atwonline.com/eco-aviation/news/lufthansa-biofuel-vp-eco-flights-will-be-standard-seven-years-0116?cid=nl_atw_dn&YM_RID=encarnacion-ezcurra%40hotmail.com



Milieudefensie – Friends of the Earth Netherlands
Postbus 19199
1000 GD Amsterdam
servicelijn: 020 6262 620

service@milieudefensie.nl
www.milieudefensie.nl

Don't take off in the wrong direction

**Stop
Bio
kerosene**



**Milieudefensie
Friends of the Earth Netherlands**

