



Shareholder's plantation visit April 2016

The Connection to the world of
Sustainable Tropical Agriculture



World agriculture

The world of palm oil

Bukit Maradja oil palm estate

Bukit Maradja palm oil mill

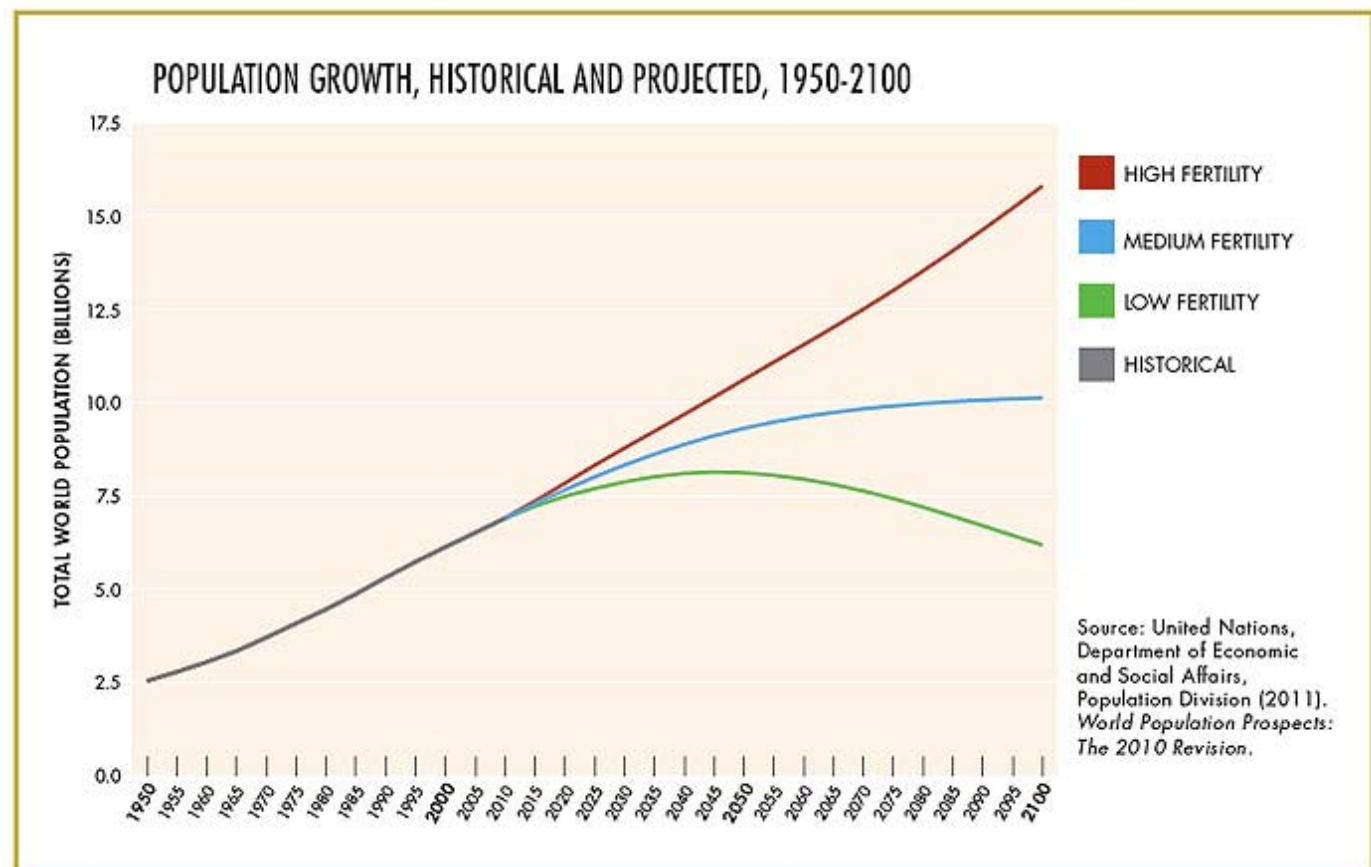
Drivers behind agriculture

Population growth



- In the coming 40 years, mankind will have to produce more food than in the previous 10 000 years put together

- Population growth will have a huge impact on future food demands
- Rising middle class is causing diet changes in developing countries
- Agricultural land is increasingly becoming scarcer



Drivers behind agriculture

Meat consumption

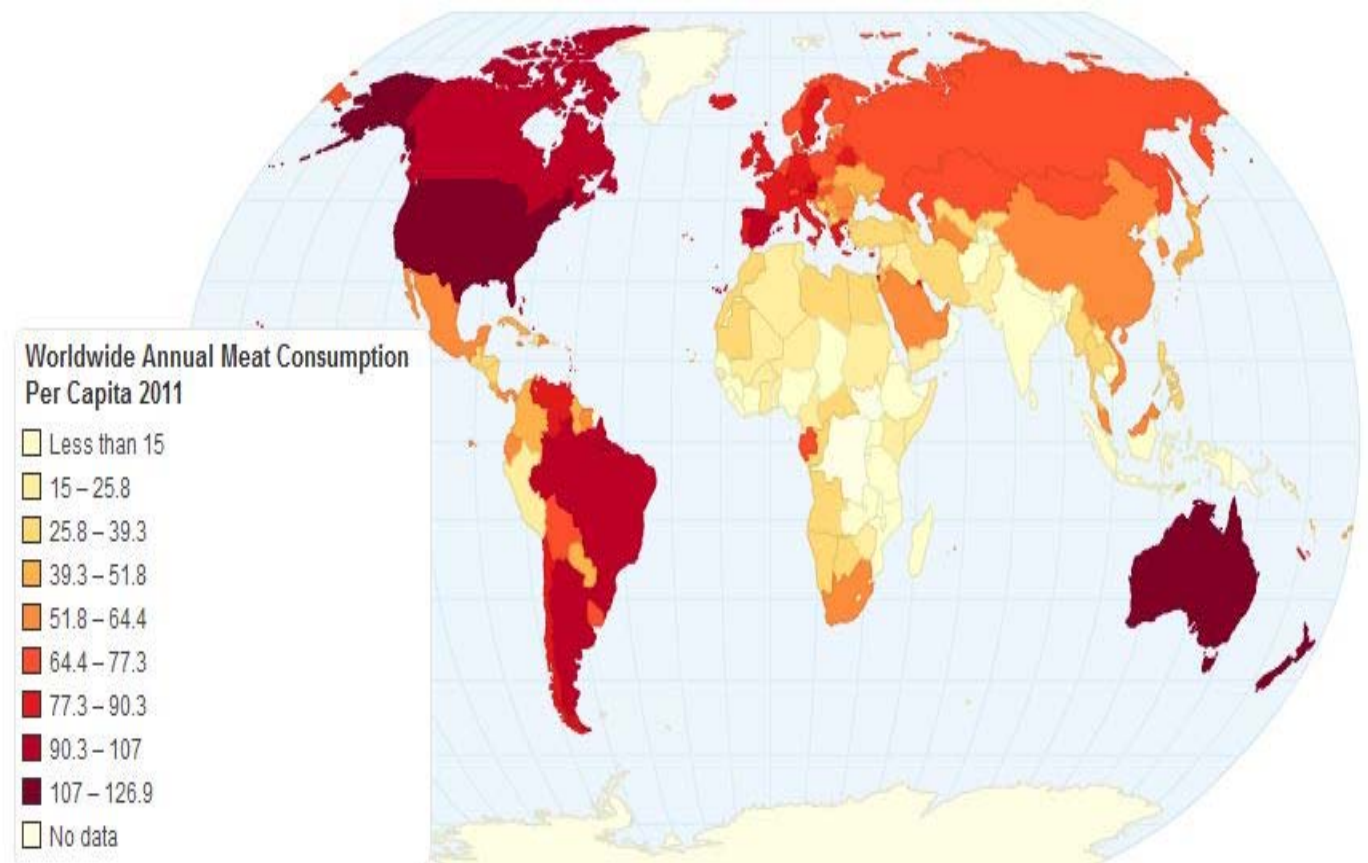


Meat consumption per capita is increasing worldwide due to the disposable income growth in developing countries.

Kg of grains used to produce 1kg of:

Beef	7kg
Pork	4kg
Poultry	2kg

Any change in meat consumption patterns will have a major effect on the demand for meal, grain and corn.



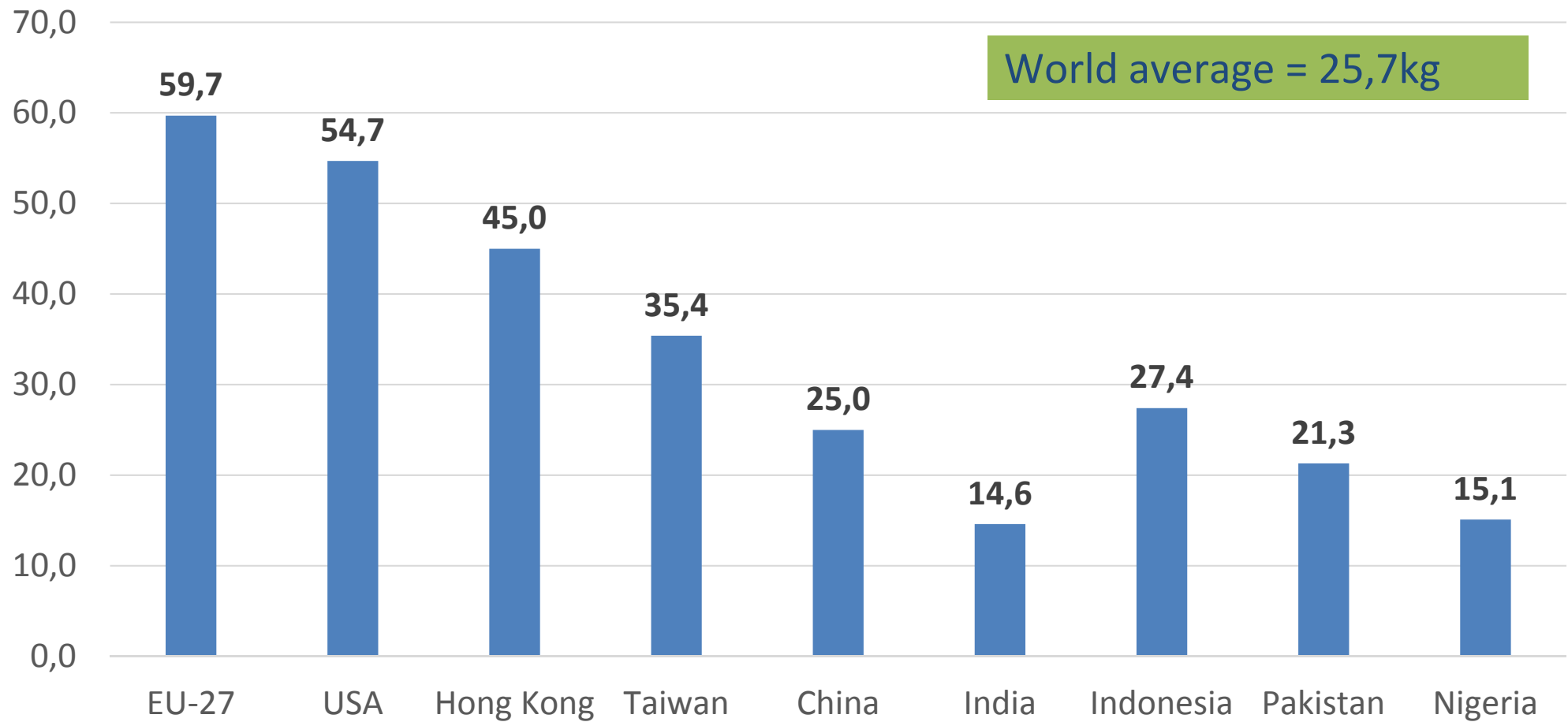
Source: Food and agriculture organization of the UN

Drivers behind agriculture

Oil and fat consumption



Oil and fat per capita consumption (in Kg)



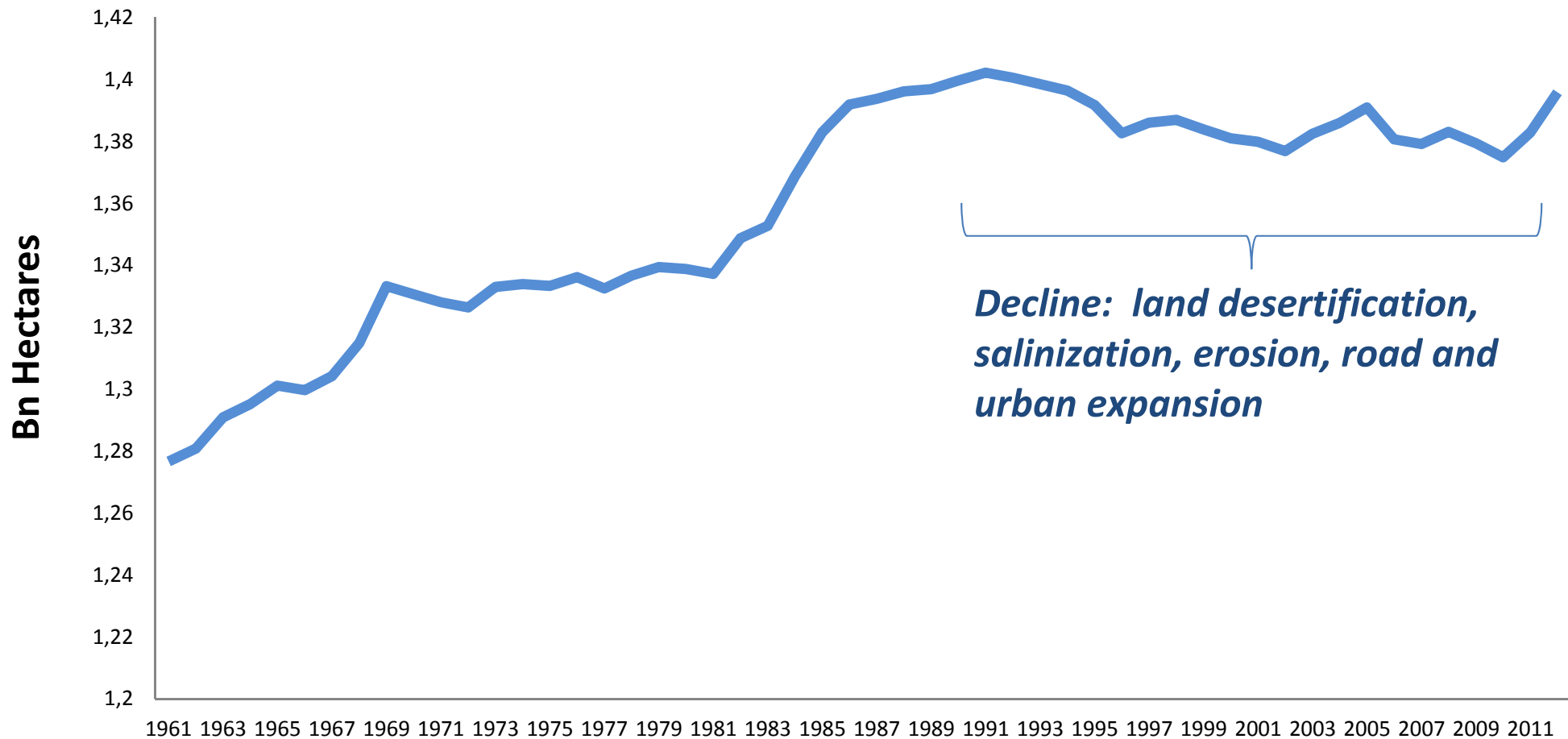
Source: Oil World 2012; Foreign affairs 2011

Drivers behind agriculture

Land input



Available land

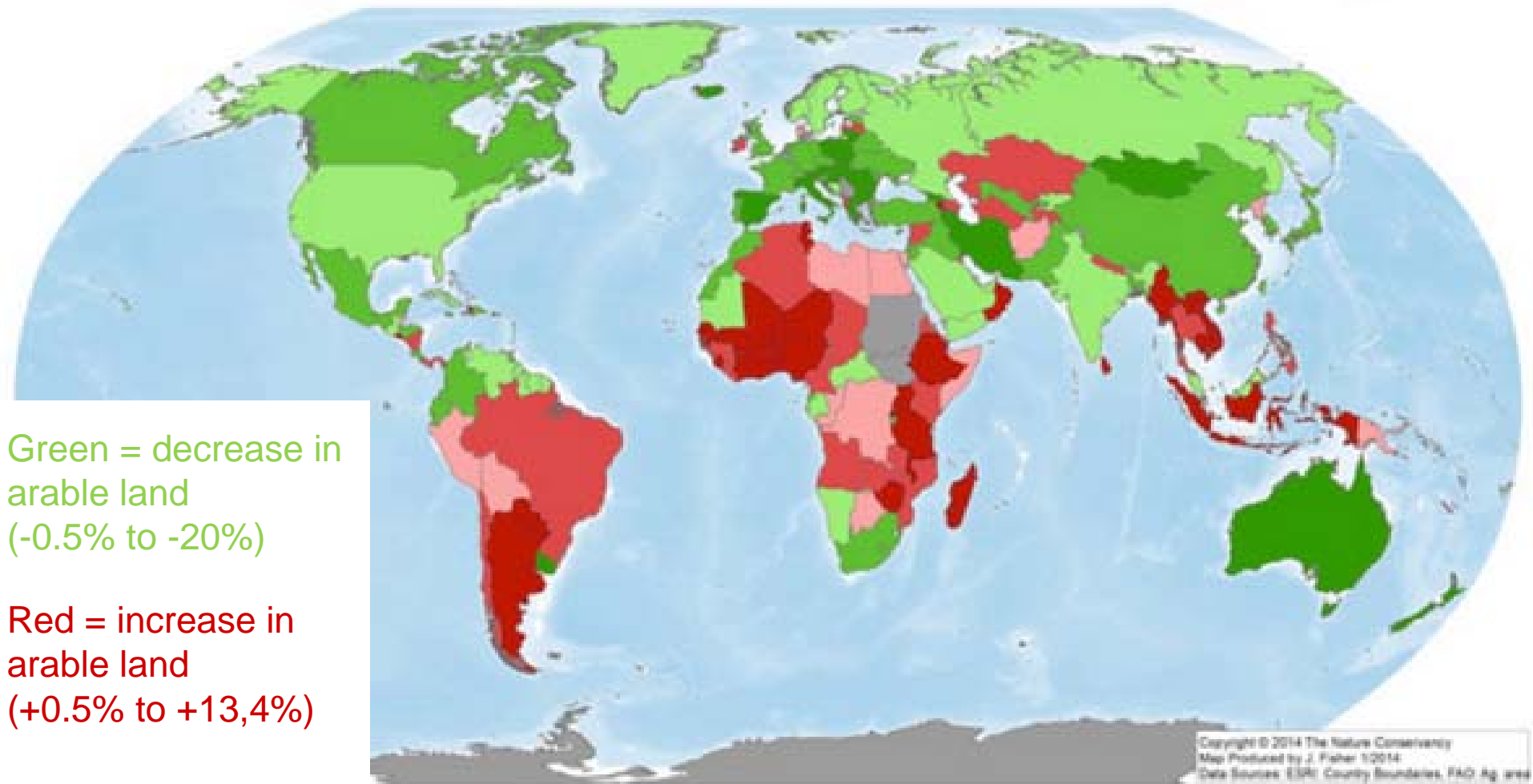


Drivers behind agriculture

Land input



Change in Agricultural Area 1998-2011 by Country

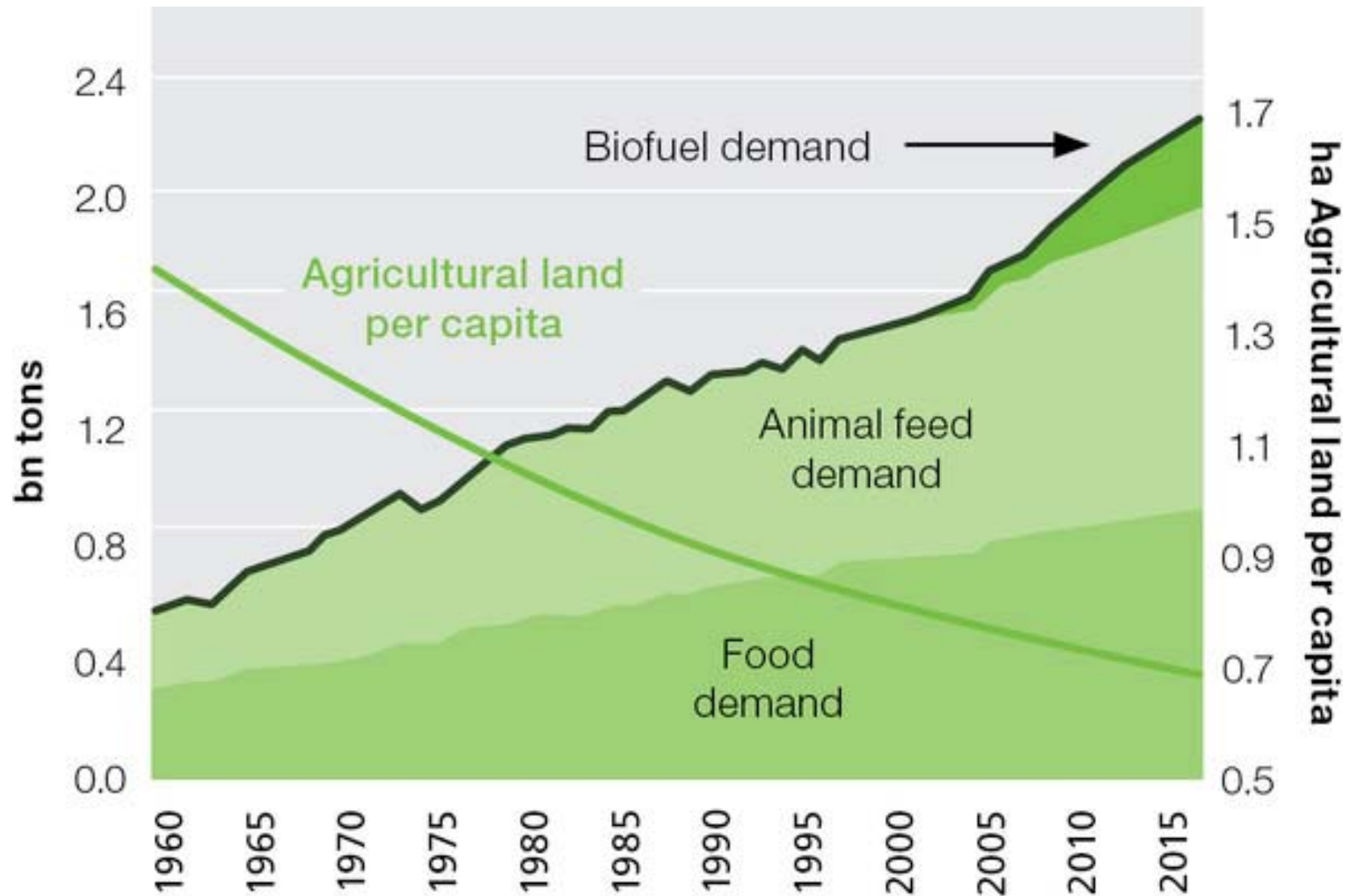


Drivers behind agriculture

Land input



- Increased demand for meat/fat/processed foods
- Increased demand for biofuel
- Decreasing Agricultural land per capita
- Disposable income growth in developing countries

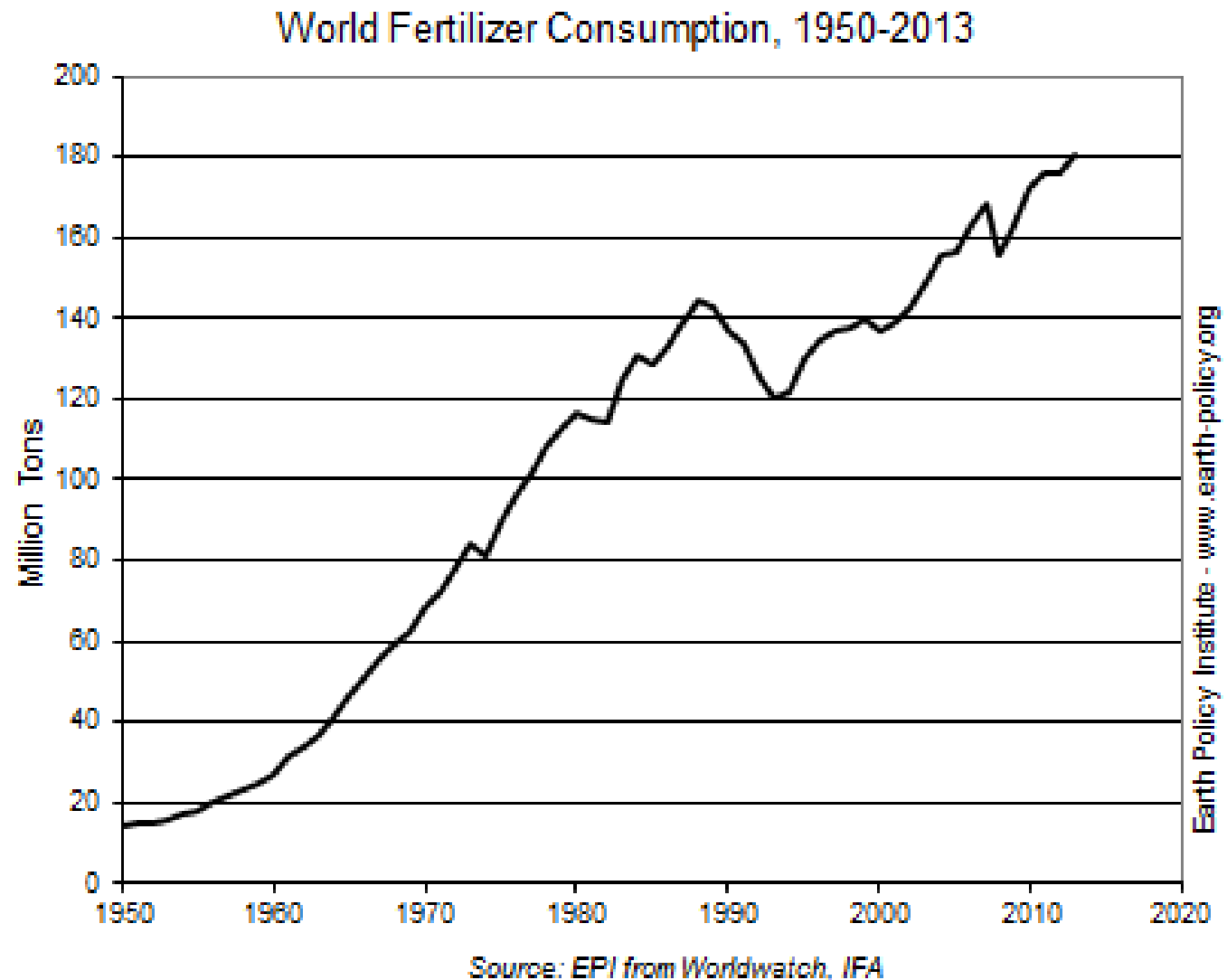


Drivers behind agriculture

Fertilizer input



- Fertilization is necessary
- All nutrients that are taken out of the soil as food/harvest, has to be resupplied as fertilizer
- Fertilizer is also in limited reserves:
 - Nitrogen can be made but has very high production costs
 - Phosphates has very limited reserves and is only possible by mining;
 - Potash (Kalium) has limited reserves and is only possible by mining



Drivers behind agriculture

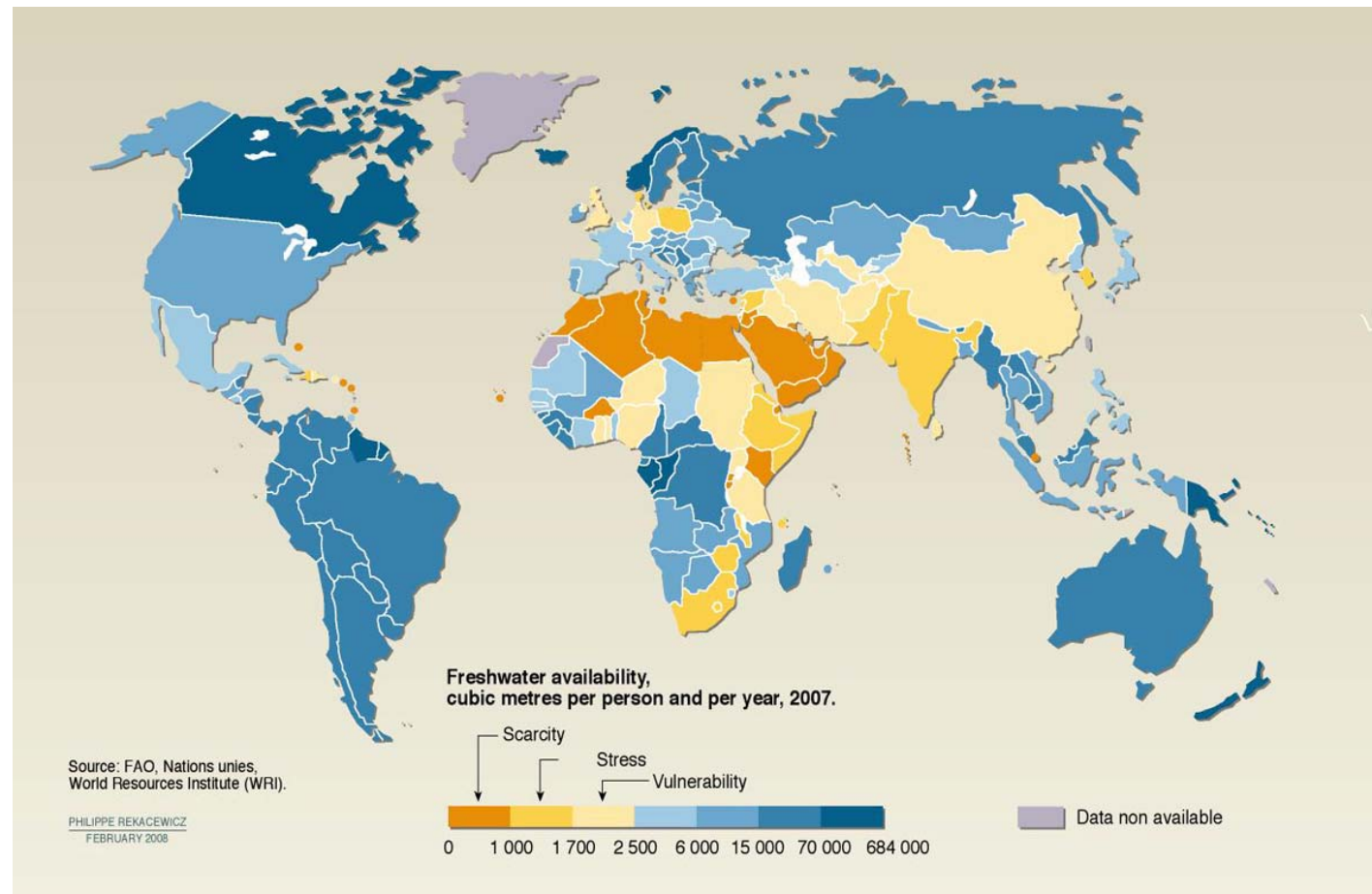
Water input



- Global fresh water supplies are under stress
- Roughly 70% of global water consumption is for agricultural usage

Liters of water used to produce 1kg of:

Chocolate	17 000 L
Beef	15 500 L
Cotton	10 000 L
Butter	5 500 L
Cheese	3 200 L
Bread	1 608 L





- **Historically, agriculture was a family business**
 - Still approximately 9/10 farms are family owned
 - Agriculture is relatively closed from capital markets
 - Heavy governmental support and regulations
- **Demographic and economic shift**
 - Increasingly hard to find successors for farmers (no family successor or too expensive to “buy out” family members)
 - Many old (+/- 60 years of age) farmers in the west
 - Capital markets are finding more and more entrance in the sector
 - Efficiency increases due to increased capital

Drivers behind agriculture Investments in innovation



More efficient input allocation and management practices are needed



Drop irrigation





- Agriculture is increasingly becoming a new and alternative investment
- Additional capital is needed to tackle the sectorial challenges of feeding (and fueling) the world in an efficient and sustainable manner
- Agriculture is highly diverse and is fairly resistant to inflation and crisis (people will always need food)



- World agriculture
- **The world of palm oil**
- Bukit Maradja oil palm estate
- Bukit Maradja palm oil mill

The world of palm oil

Vegetable oils



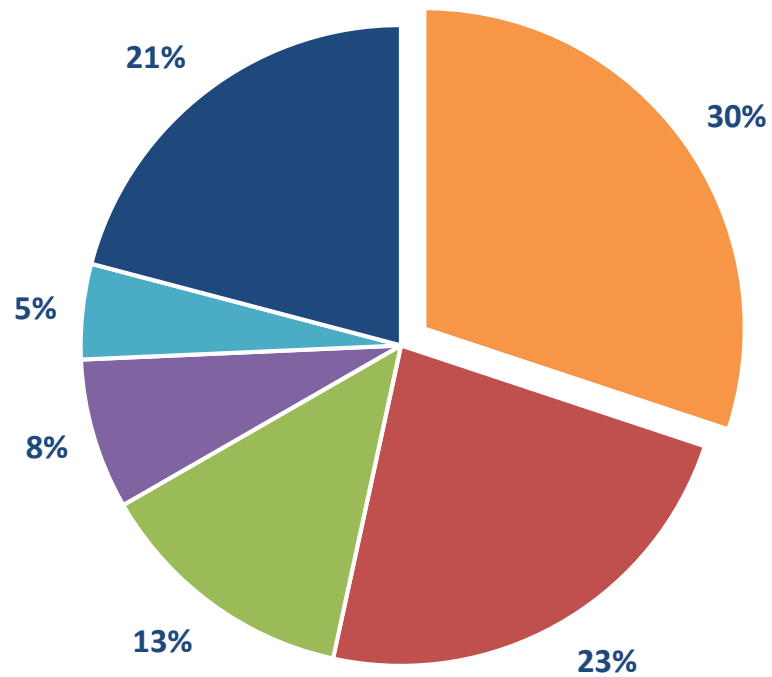
- Vegetable oils are oils or fats extracted from a plant. Their texture can be described as liquid, oily and fatty
- Most vegetable oils can either be used as cooking oil, be used for food and cosmetics or for fuel and diesel production
- The most common oil types include palm oil, soybean oil, canola (rapeseed) oil and sunflower oil

The world of palm oil

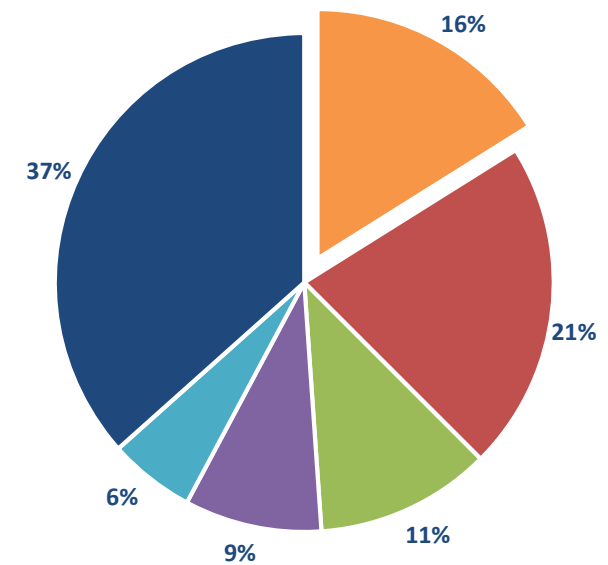
Vegetable oils



2014/15: 201,7 million tonnes



1994/95: 93,1 million tonnes



- Palm oil
- Rape oil
- Palm kernel and coconut oil
- Soya oil
- Sunflower oil
- Other oils/animal fats

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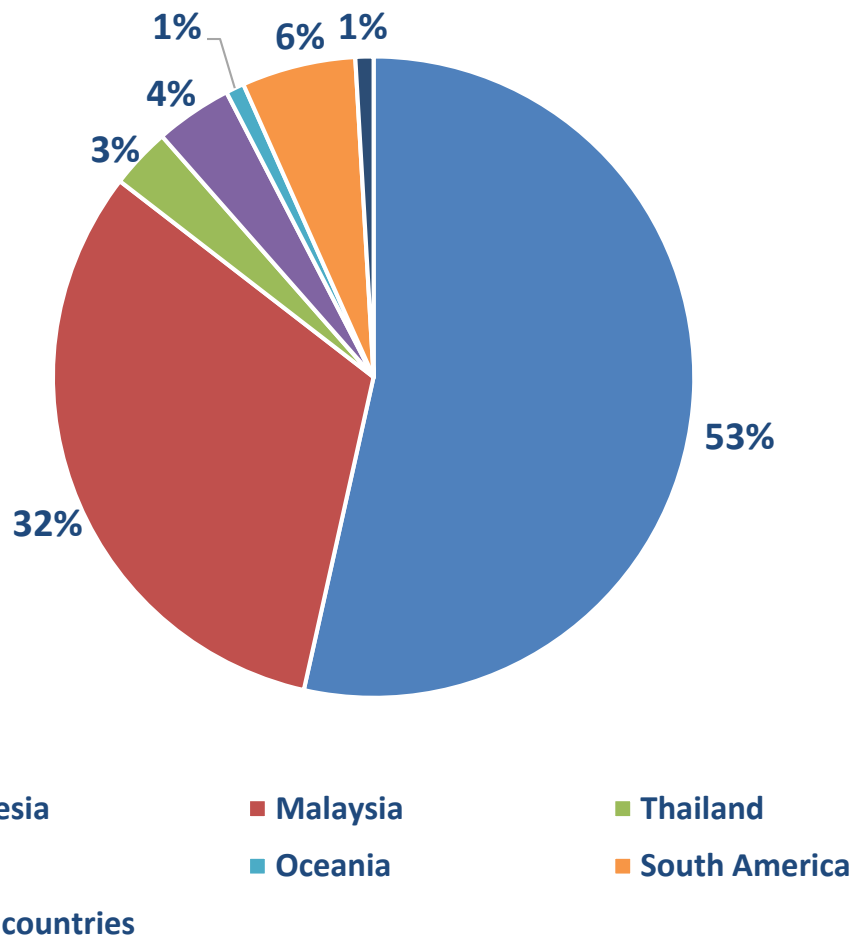
Source: oilworld.de, May 2015

The world of palm oil

Palm oil production



2014/15 - Palm oil world production



Palm oil production is primarily done in Asia:

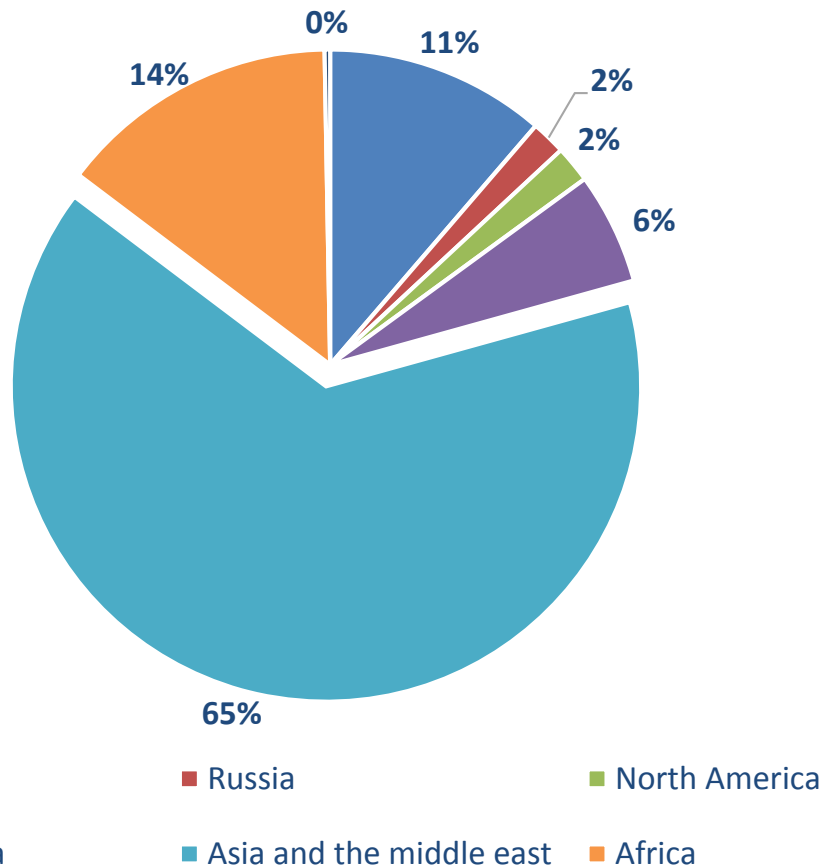
- Indonesia and Malaysia represent 85% of the world's palm oil production
- Oceania includes our subsidiary Hargy Palm Oils Ltd
- Total Sipef production represents 0,44% of the world production.

The world of palm oil

Palm oil consumption



2014/15 World consumption



- Asia and the Middle-east consists mainly of China, India, Indonesia, Malaysia and Pakistan
- Africa consists mainly of Nigeria, Egypt, Ghana and Kenya
- Very limited CPO consumption in North and South America

The world of palm oil

Palm oil prices



Historical palm oil price (CIF Rotterdam)



The world of palm oil

Palm oil fruit



Palm oil is extracted from the flesh of the palm fruit:



84 % of palm oil production is used in food and cosmetics, 16 % is used in biofuels and energy



Palm oil has many advantages:

- Highest-yielding vegetable oil crop: less than a third of the land required compared to other crops
- Usable in a wide range of products, from margarine and chocolate to ice cream, soaps, cosmetics and fuel
- India, China, Indonesia and Europe are the main consumers, while Indonesia and Malaysia are the main producers -> relatively close to the consumer market

The world of palm oil

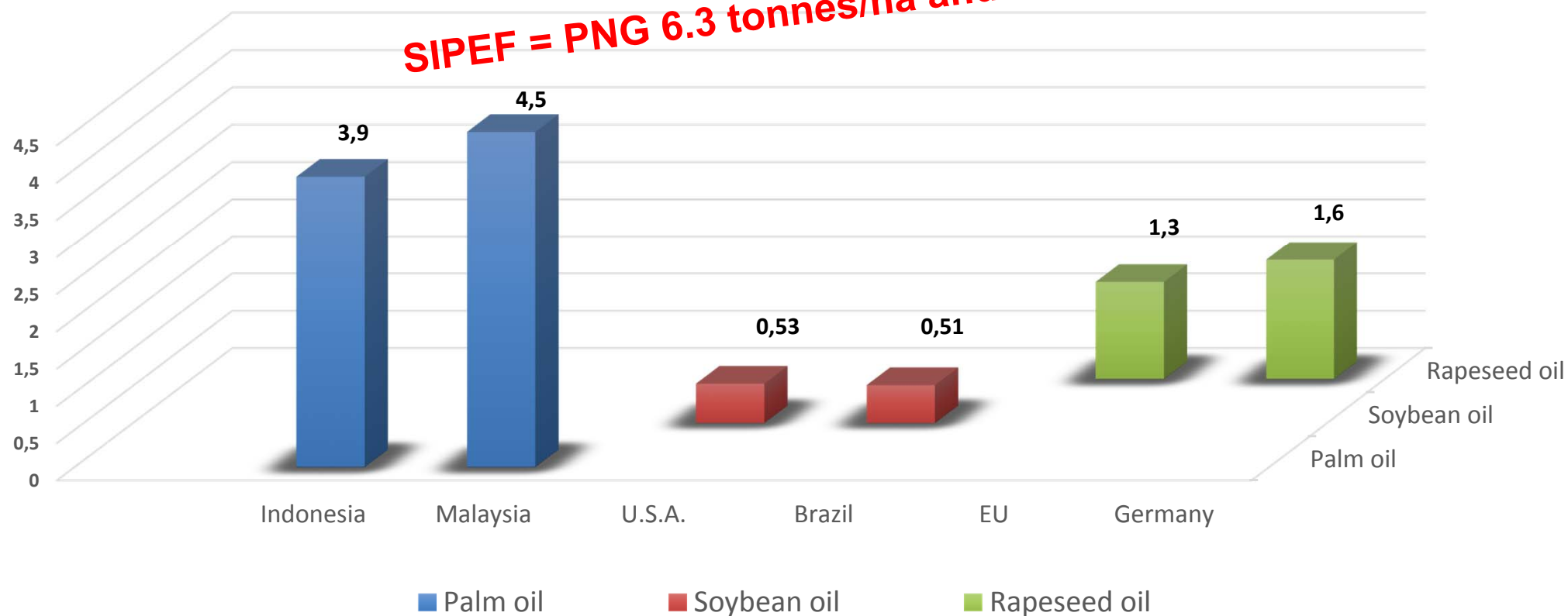
Comparison to other oils



Palm oil yields per Ha are much higher than other vegetable oils

Tonnes per hectare

SIPEF = PNG 6.3 tonnes/ha and Indonesia > 5 tonnes/ha

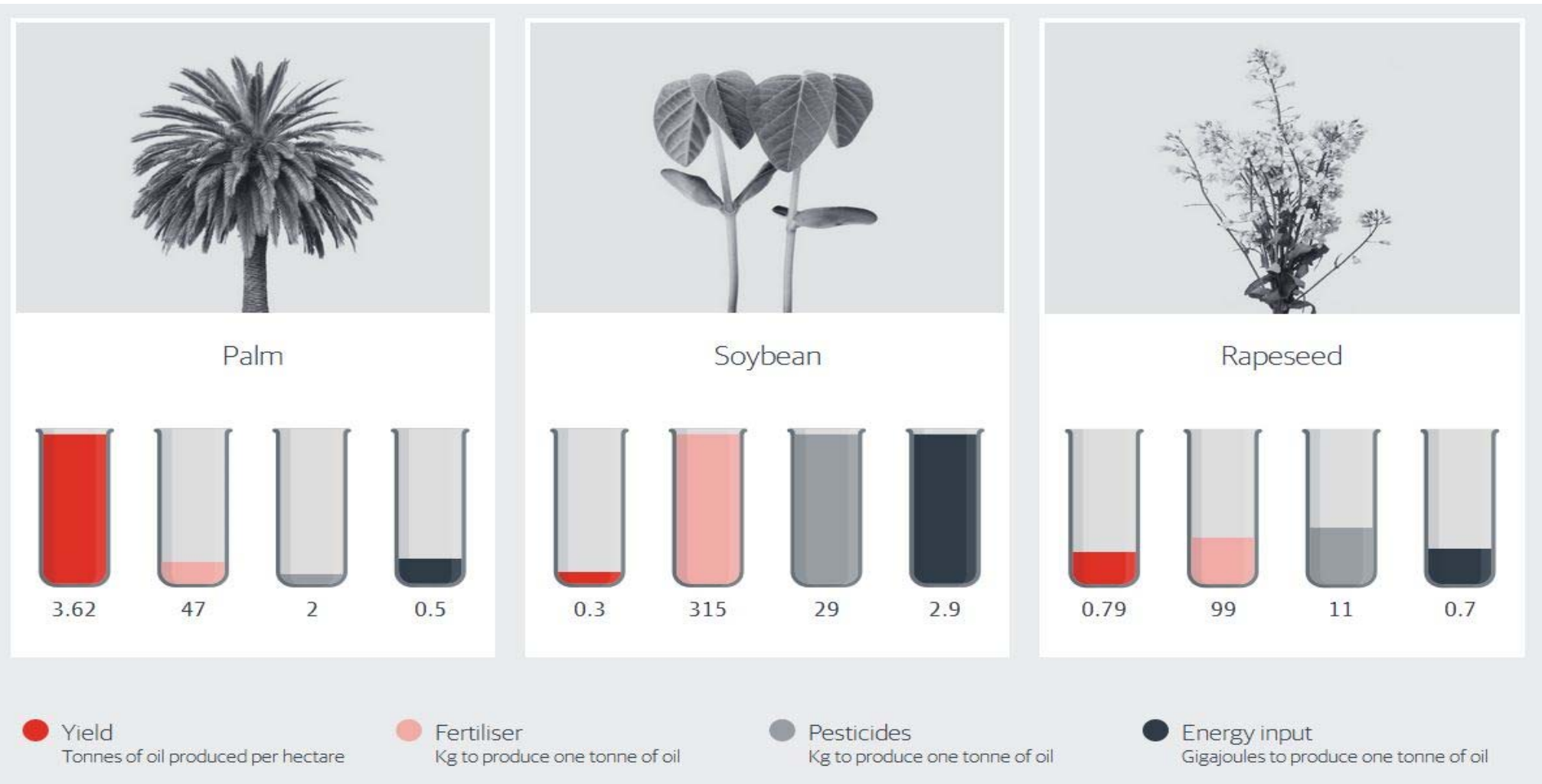


The world of palm oil

Comparison to other oils



Resources used per vegetable oil



The world of palm oil

Sustainability - Health



- Most vegetable oils (such as canola oil and Soy oil) need to be hydrogenated to produce a **solid** fat;
- During this hydrogenation process, **trans fats** are created as well;
- In humans, consumption of trans fats increases the risk of coronary heart diseases by increasing “bad” cholesterol and decreasing “good” cholesterol. Trans fats are therefore **removed from all processed food** in the USA by the FDA (within a three-year time limit);
- Palm oil is by nature a non-liquid vegetable oil, which makes it versatile in its use and more importantly: there is no need to hydrogenate and therefore there are **no trans fats** in palm oil!

The world of palm oil CO₂ sequestration



Oil Crop	Total Global Planted Area in 2006 (mil ha)	O ₂ Released (mil tonnes)	CO ₂ Absorbed (mil tonnes)	Average O ₂ Released (t/ha)	Average CO ₂ Absorbed (t/ha)
Oil Palm	9.24	196.8	270.7	21.3	29.3
Soybean	92.40	236.5	325.2	2.56	3.52

The world of palm oil

Sustainability issues



- **RSPO = Roundtable on Sustainable Palm Oil**

- **Expansion :**
 - No fragile soils
 - No deforestation
 - Free Prior and Informed Consent



- **Social :**
 - Housing
 - Education
 - Medical care
 - Remuneration
 - Child labour
 - Gender practices

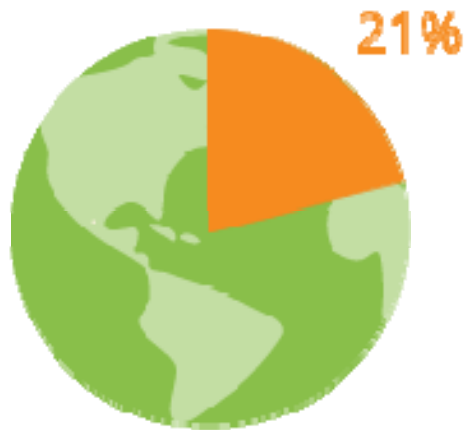
- **Environmental :**
 - Fertilisers
 - Pesticides
 - Waste Management

The world of palm oil

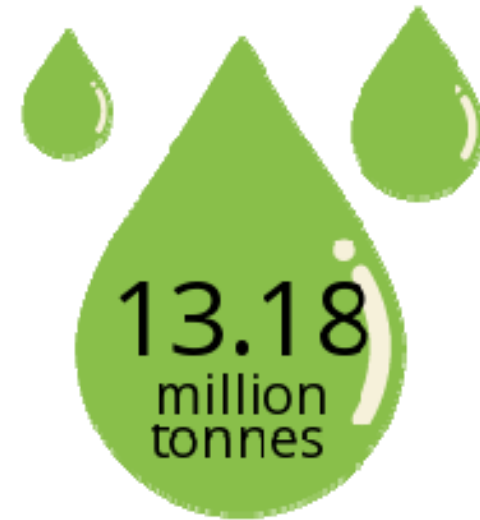
Sustainable palm oil



SIPEF = 100% certified and > 250.000 tons 'segregated'



Proportion of palm oil globally certified by the RSPO



Volume of Certified Sustainable Palm Oil

The world of palm oil

Continuing process



To accompany and support its growth, SIPEF continues to fulfil its sustainable development obligations:

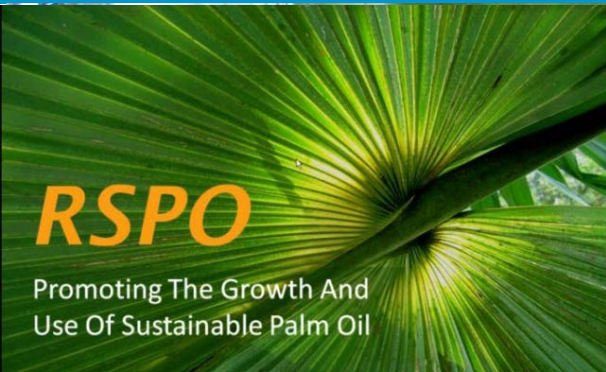
- ISO 9001 and ISO 14001 certified
- RSPO certified
- ISCC certified
- ISPO certified
- EurepGAP/GlobalGAP
- United Nations clean Development Mechanism
- Rainforest Alliance



Q&A



Source : <http://www.rspo.org/> and Sipef NV





Bukit Maradja oil palm estate

April 2016

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- **Bukit Maradja oil palm estate**
- Bukit Maradja palm oil mill

Bukit Maradja oil palm estate

From seed to FFB: Nursery



Objectives: To produce healthy, vigorous, uniform seedlings that will give maximum returns of palm products over their lifetime in the field.



Germinated palm oil seeds, sourced from reputable suppliers with proven track record.



Seedlings are grown in a pre-nursery for 3 months, allowing close management.



Seedlings remain in the nursery for 12 months until they are ready for field planting. We allow for 180 germinated seeds to enable us to plant 143 healthy palms per hectare.

Bukit Maradja oil palm estate

From seed to FFB: Harvesting young palms



Objectives: To obtain rapid and uniform growth of palms with the aim of commencing harvesting 24 months after field planting.



Newly planted oil palm seedlings into a bed of leguminous cover crop.



Immature palms require regular weeding & fertilizer applications as well as monitoring for pests & diseases.



Palms are castrated (removal of male and female flowers) up to 6 months prior to harvesting, allowing strong vegetative palm growth and high early yields.

Bukit Maradja oil palm estate

From seed to FFB: Harvesting young palms



Objective: To harvest all ripe bunches on palms and collect all detached loose fruits within and outside the circles.

Ripeness: Young palms 1 x loose fruit in the weeded circle, then cut the bunch.

Tools: A chisel on the end of a short pole.

Productivity: 1,700kgs – 2,500 kgs per harvester per day.

Daily Earnings: USD 8.00 – USD 10.00 per harvester per day.



- Harvested bunches together with collected loose fruit in the white bags awaiting collection.
- Fruit should be sent to the mill within 24 hours of harvesting.

Bukit Maradja oil palm estate

From seed to FFB: Harvesting tall palms



Ripeness: Tall palms 5 x loose fruit in the weeded circle, then cut the bunch.

Tools: A sickle on the end of a long pole.



Productivity: 1,400kgs – 2,500 kgs per harvester per day.

Daily Earnings: USD 8.00 – USD 11.00 per harvester per day.



- Harvested bunches together with collected loose fruit in the white bags awaiting collection.
- Fruit should be sent to the mill within 24 hours of harvesting.

Bukit Maradja oil palm estate

From seed to FFB: Replanting



Objective: To replace old & tall palms, often with reduced stands per hectare and falling yields, with high yielding, vigorous new palms.



Replanting is carried out every 23-25 years or when yields decline to below 18 MT FFB/Ha/Yr. Young plantings are able to achieve 18 MT FFB/Ha in the first year of harvest.

Replanting involves a process of land preparation, felling of the old palms and chipping to prevent pest & disease incursions. This is then followed by the planting of a leguminous cover crop and a period of fallow.

Bukit Maradja oil palm estate

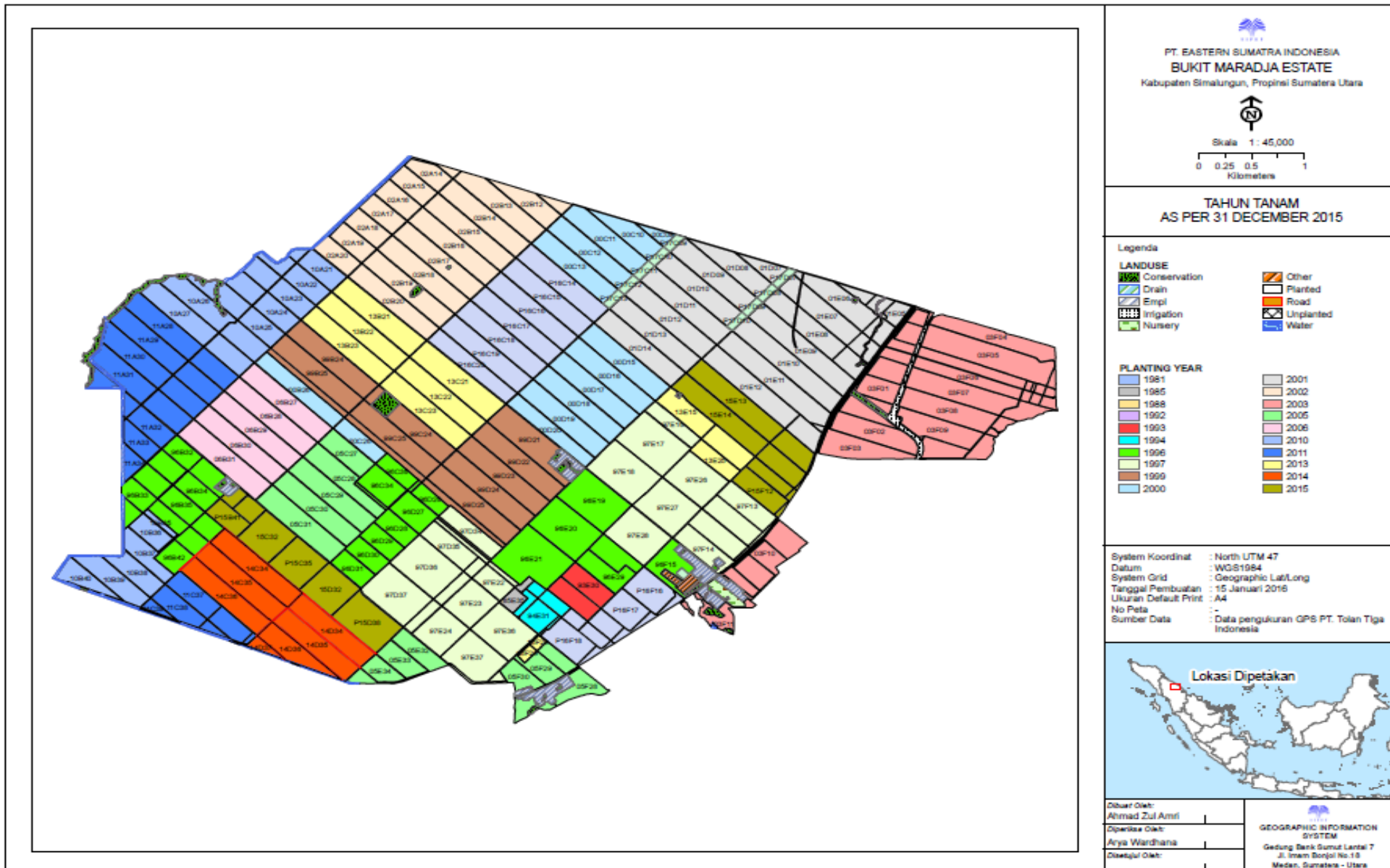
From seed to FFB: Crop collection



Objective: Bunches and loose fruit are spike loaded by hand into trucks and the fruit is delivered to the mill as soon as possible after harvesting (within 24 hours).

Bukit Maradja oil palm estate

The estate map



Bukit Maradja oil palm estate

The estate team



Pol Ginting

Senior Manager Operations & Estate Manager



Indari Ardani

Senior Assistant



S. Duhkita
Office Asst



A. Harahap
Utility Asst



Ir Preseilla
Asst Div 1



Z.A. Munthe
Asst Div 2



D. Febriansyah
Asst Div 3



R. Siregar
Asst Div 4



Usman
Tech Asst (WS)



This is a working estate, please be aware of the following potential hazards:

- Always be aware of your surroundings, particularly in the tall palms.
- Mind your footing at all times and be careful of footbridges.
- Watch out for vehicles.
- Be sun smart and keep hydrated.
- Be aware of machinery and hot steam pipes in the factory.



Bukit Maradja palm oil mill

The Connection to the world of
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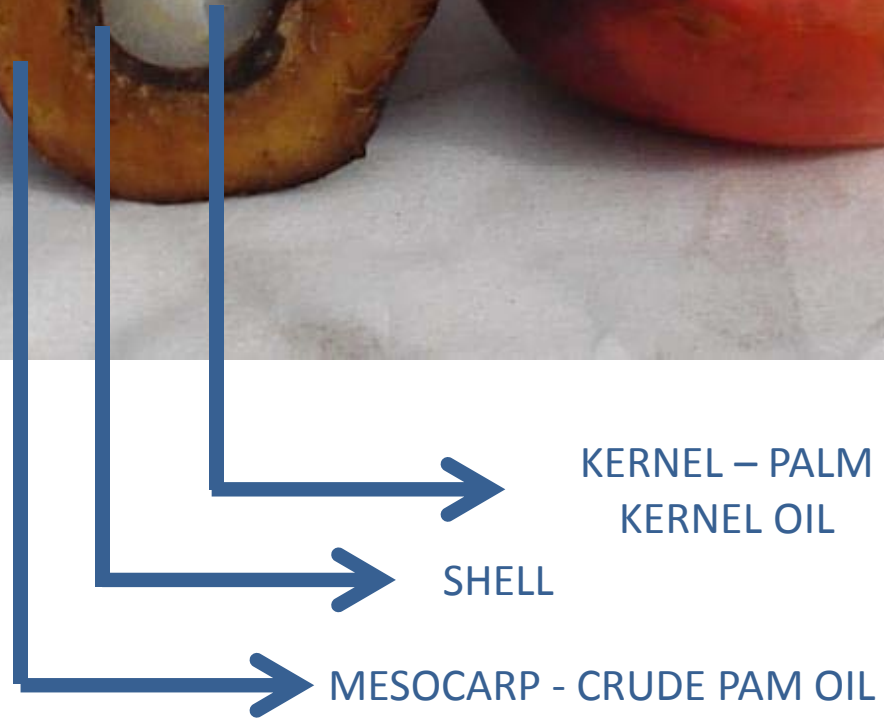




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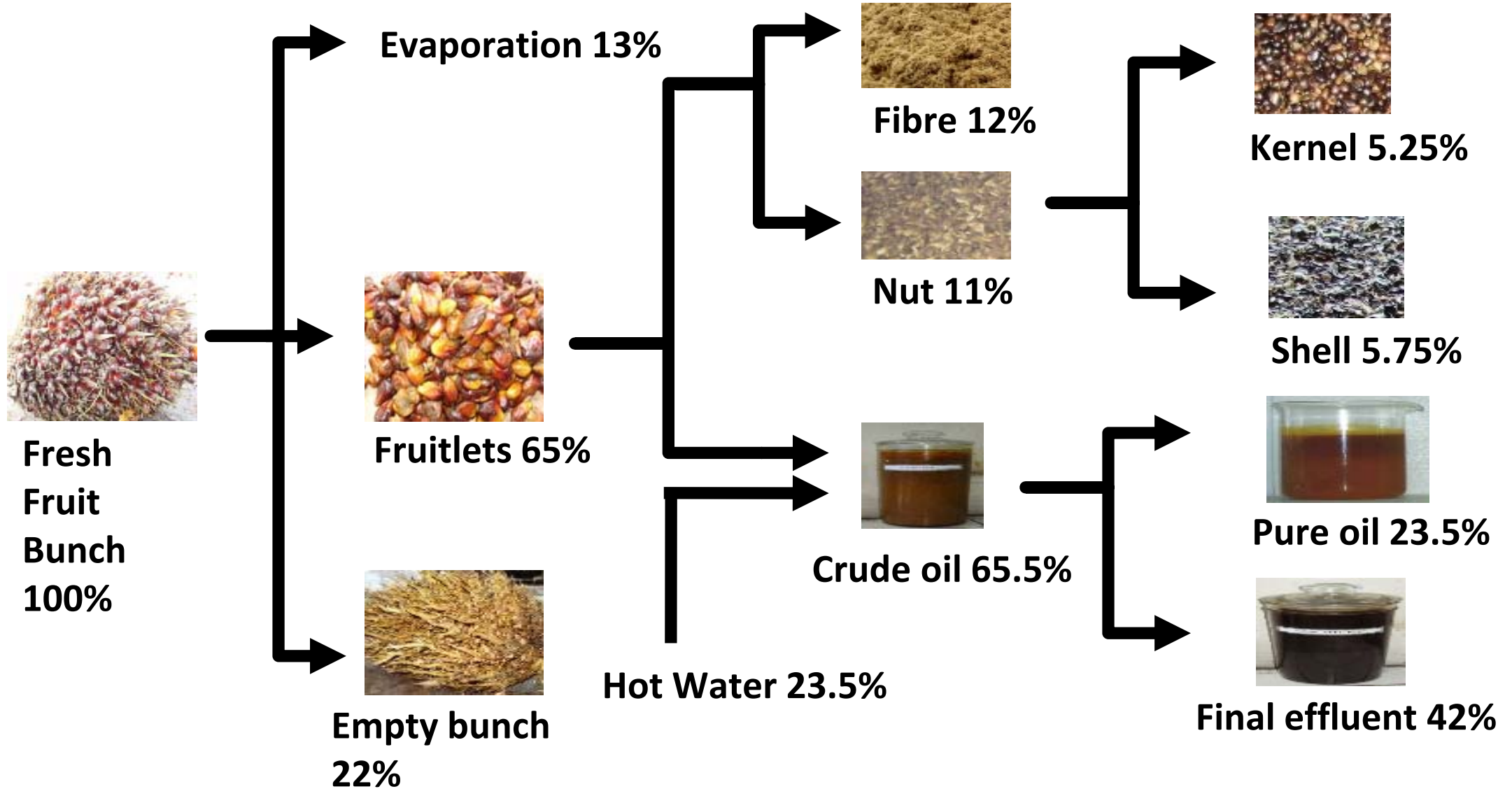
Bukit Maradja palm oil mill

From FFB to export: introduction to milling



Bukit Maradja palm oil mill

From FFB to export: material balance

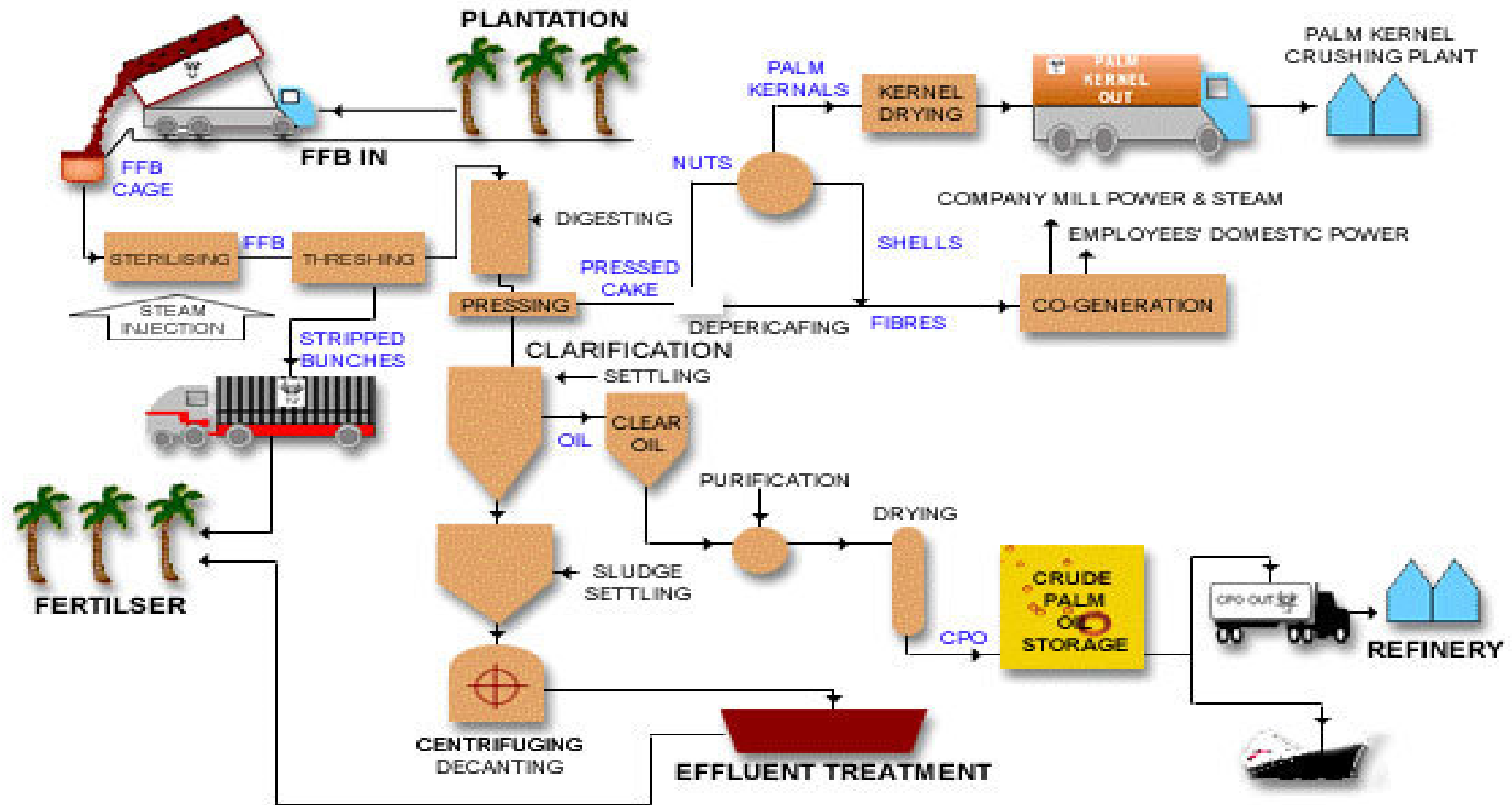


Bukit Maradja palm oil mill

From FFB to export: palm oil mill process flow



Crude Palm Oil Milling Process



Bukit Maradja palm oil mill

From FFB to export: FFB reception



WEIGHBRIDGE:

- Weigh raw materials.
- Prepare agronomic production data.
- Dispatch palm products and monitor weight variance.



LOADING RAMP:

- Perform random FFB quality checks.
- Temporary FFB storage.
- Facilitate consistent FFB feeding to sterilisers.

Bukit Maradja palm oil mill

From FFB to export: Steriliser station



- Sterilises FFB to inactivate enzymes that cause deterioration (build up of FFAs)
- Conditions the fruits to separate from FFB
- Uses steam at a pressure of up to 3 bar (44 psi)
- Time 90 minutes
- Temperature up to 140 °C.

Bukit Maradja palm oil mill

From FFB to export: Threshing station



- The thresher drum in the threshing station separates the empty bunches from the sterilized fruitlets.
- The sterilized FFB is fed evenly into the thresher drum, which rotates at a fixed speed.
- The empty fruit bunches after the threshers are used for fuel, composting or as mulch in the field.

Bukit Maradja palm oil mill

From FFB to export: Pressing station



DIGESTER:

- The process of releasing the palm oil in the fruit through the rupture or breaking down of the oil-bearing cells.
- Separates the mesocarp from the nut using temperatures of up to 95°C.

PRESS:

- Extract crude palm oil from the mesocarp.
- Separate the press cake.

Bukit Maradja palm oil mill

From FFB to export: Nut and kernel recovery station



- Separates press cake to fibre & nuts.
- Transport fibre to boiler (fuel).
- Crack and separate nuts to shell & kernel.
- Transport shell to boiler (fuel).
- Dried kernel (temp. up to 65°C).
- Transport kernel to kernel storage.



Bukit Maradja palm oil mill

From FFB to export: Oil clarification station



- Separate, purify and dry the palm oil.
- Transfer palm oil to storage tanks.
- Transfer liquid waste to effluent treatment.

Bukit Maradja palm oil mill

From FFB to export: Boiler station



- The boiler uses the fibre and palm kernel shell from the process as fuel to produce heat energy in the boiler furnace. This heat energy converts the water in the boiler to steam.
- The steam made available is supplied to the turbines (800 kw/unit – 2 units) in the powerhouse for generating electricity. Steam produced from the boiler is also used for various processes in the mill namely for sterilisation and for heating purposes in the factory.

Bukit Maradja palm oil mill

From FFB to export: Power station



Turbines to generate and distribute electric power for processing and domestic use.

Bukit Maradja palm oil mill

From FFB to export: Raw water treatment



The functions of the water treatment plant are:

- To treat the water from the source so that it is suitable for industrial and domestic use (60 MT/Hr).
- To distribute the treated water to the consumers.
- To demineralise the water for use in the boilers.
- Water usage ratio: 80% to FFB.

Bukit Maradja palm oil mill

From FFB to export: Raw water treatment



	RAW EFFLUENT	FINAL EFFLUENT
• pH	< 4.5	6.0 – 9.0
• BOD ppm	~ 33,000	< 100
• COD ppm	~ 85,000	~350

The functions of the effluent treatment system are:

- To reduce effluent discharge parameters to within legal limits.
- Technologies to capture methane (covered ponds or large storage tanks)
- Combination of effluent and EFB to make compost.
- Water usage ratio : 60% to FFB.

Bukit Maradja palm oil mill

From FFB to export: Quality control



Our Company wide,
independent laboratory
facilities:

- Monitor losses and quality parameters for CPO & kernel.
- Feedback FFB quality to the estates management teams.
- Raw water and boiler water analysis.
- Monitor final effluent parameters.



Bukit Maradja palm oil mill

From FFB to export: Product quality



Crude Palm Oil (CPO):

FFA	< 3.0 %
Moisture	< 0.15 %
Dirt	< 0.015 %

Kernel:

Broken Kernel	< 15 %
Moisture	< 7 %
Dirt	< 6 %

Bukit Maradja palm oil mill

From FFB to export: Products storage and dispatch



- Crude Palm Oil (CPO) Storage tanks with a 1,500 MT capacity.
- CPO dispatch facilities with a 30 MT/Hr capacity.



- Kernel storage bins with a 450 MT capacity.

Bukit Maradja palm oil mill

From FFB to export: Mill to customer

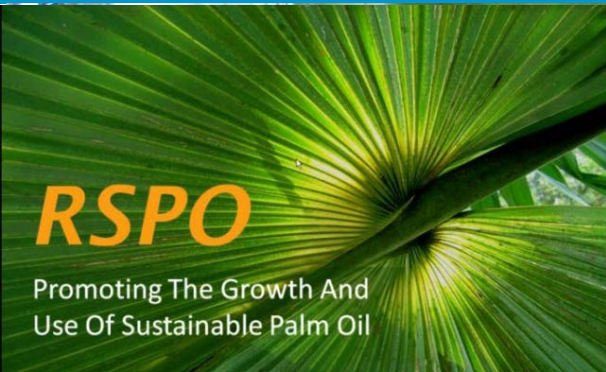


THANK YOU: We'll visit the factory now, please bear the previous safety instructions in mind as you go through the factory, PARTICULARLY REGARDING HOT PIPES.

Q&A



Source : <http://www.rspo.org/> and Sipef NV



ISPO