

Lumadan Palm Oil Mill

Borneo Samudera SDN BHD
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It was a two hours drive from Kota Kinabalu, the capital of the State of Sabah in Malaysia. The road takes you south through suburbs, along the shores of the South China Sea and through agricultural land. While oil palm plantations are the dominant sight in the eastern parts of Sabah, they are somewhat away from the main traffic streams here at the west coast.



The reception at the Lumadan Crude Palm Oil Mill was warm. A tour through the factory was arranged. However, we were not allowed to take photographs. Later, coffee was served over a presentation of the mill, followed by a discussion about biofuels and environment in general and, of course, palm oil in particular. Oil palm plantation and villages of oil palm workers had been visited elsewhere.

This Lumadan mill for palm oil was built in 1998 and started full operations in 2000. It is government owned and its capacity is 20000 tons/year. The suppliers of the fruits (Fresh Fruit Bunch FFB) are private farmers (60%, over 1000, typically families with land of the order of 10 ha). The mill also has its own estate (40%, 10000 ha).

The palm bunches are harvested during the last 2 years of the 5 year growing cycle of the palms. Then the trees are replanted. The limited cycle is partially related to the fact that the trees grow to high and workers cannot or only with difficulty get to the fruits. The palms should be low for easy harvesting.



Harvest is done by hand. Harvest runs throughout the year with seasonal fluctuations of a factor two. One ton of FFB can be harvested in one hour, but this depends on distances. Typically 20 tons of FFB (raw fruit on the bush) per hectare and year are harvested. The fruits are not always ripe. Farmers get less (penalty) pay when they

deliver unripe fruit. This is checked by eye on samples taken from the truck's load. Although they say that 20 weight percent of ripe fruit converts into oil, the effective production per hectare is 2.5 tons of oil/year because unripe fruit is mixed.

The milling process is described elsewhere (a slide presentation was handed out). It involves crushing, steam boiling, pressing and separation. The products are palm oil (quality is monitored) and palm kernels (for kernel oil) which are also extracted in mill. The oil and kernels are shipped away as there is no refinery in the region.



The quality of the oil is crudely (probably sufficiently) monitored and saturated fatty acids are checked. The exhaust from the boiler is checked for soot particles, which are reported to the Malaysian DOE. No other checks or controls seem to be done.

There are eight competing (private and government owned) mills in the region. The farmers choose the mill with best price per ton of FFB. That was 275 M\$ at the time of the visit. The government mills fix the price once per month, while the private ones do that fixing more frequently. On top of this, the farmers are paid after oil extraction and suffer a price penalty if oil quality is low. This flexibility and price policy leads to the phenomenon that government mills can run at only 20% load. The Lumadan Mill people said that their load would vary between monthly averages from 20% (low season) to 80% (high season). The operational minimum required is 21%

The staff at the government mills is interested in the functioning of the mill, but basically they have little idea the business as the government cares for all. Staff gets some extras like health care and meals, and the housing is provided through the company. The staff is all locally trained and recruited; while the mill was built by experts from abroad and from the Malaysian peninsula. Entrepreneurial spirit is suppressed due to government rule.

The place smells, even into the next village, and inside the mill is a lot of dust from the fibre. We started coughing and got mouth/nose masks to wear during the visit. The workers in the mill did not all wear masks. The factory is also noisy, in some places it was impossible to talk.

Power for the mill comes from two boilers which make steam and furthermore drive two 1.2 MW turbines for electricity. The boilers burn the fibre from the bunches, and diesel when starting up. Energy consumption depends on load and quality of material.

Detailed numbers, in particular of energy efficiency and carbon balance were not available.

Water is drawn from the nearby river and is cleaned in the mill's own purification station. Wastewater is collected and can be recycled. It was left unclear whether they actually do so. Effluent (sludge) is not toxic. It is caught in an anaerobic basin, and released into the river. The basin is essentially a lake with a dam to the river. When asked about potential hazards if the basin would release into the river, no answer was given as this was considered an improbable event. Generally "accidents" were associated with falling down a staircase or getting a finger caught in a machine. Other solid waste (cake) is collected, decomposed and used as fertilizer in the plantations.

The mill sees once a year an internal audit for technical standards and once per year a control by the Malaysian DOSH for health and safety standards. The DOE (environment) checks monthly the recording of soot particles (carbon black) in the exhaust of the boilers.

The future looks like expansion. Rubber plantations and agricultural land is steadily being turned into palm plantations. Mangroves are also converted but the soil is less efficient. The mill has enough space for a second production line, doubling present capacity.