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# BACKGROUND STUDY: REPLICABLE AND SUSTAINABLE USE OF PALM OIL WASTE BY-PRODUCTS FOR EMPLOYMENT CREATION, RESOURCE CONSERVATION, AND BIOFUEL PRODUCTION IN ACEH




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# EXECUTIVE SUMMARY

This study provides background data and justification for the development of biofuel feedstocks and a pilot project utilizing palm oil industry waste by-products in Aceh. This initiative is directly tied to key components of Governor Irwandi Yusuf's Aceh Green Economic Development and Investment Strategy, commonly known as "***Aceh Green***"—development of clean renewable energy sources and promoting sustainable smallholder plantation crops. ***Aceh Green*** sets out the dual objectives of achieving sustainable economic growth and sustainable environmental management as means to assure the province's post-Tsunami, post-conflict recovery.

The study provides a general overview of the palm oil industry in Indonesia with a specific focus on Aceh Province. Indonesia has become the world's largest palm oil producer with over 20 million tons crude palm oil (CPO) and annual growth rates of 10-12%. This has provided economic benefits for agribusiness companies and several million smallholders. However, this growth has often come at a cost of conversion of tropical forests and peat swamps, generating major concerns about habitat loss for endangered species and the reduction of biodiversity. The Acehnese palm oil industry is now still recovering from the conflict era, with very low yields and limited expansion. Multistakeholder efforts involving the government, private sector and NGOs are seeking to promote sustainable palm oil in Aceh within the Roundtable on Sustainable Palm Oil (RSPO) framework.

In recent years, mandates to develop biofuels have increased globally and in Indonesia. The main Indonesian crops of palm oil and jatropha for biodiesel and cassava and sugarcane for bioethanol are making uneven progress, and facing criticism for using food crops as fuels. A potential alternative feedstock source with significant availability has emerged—non-food grade by-products of palm fruit and palm oil production. These by-products are relatively abundant in Aceh, and could potentially contribute to sustainable biofuel production for Aceh's household energy, rural industrial fuel, and power generation needs. Fortunately, these mills are not dependent on nor drivers for palm oil industry expansion.

The report identifies specific small-scale processing plant designs for these palm oil by-products based on existing plants in North Sumatra that could create direct and indirect employment for over 1,500 people in Aceh. The report also provides a preliminary summary of 12 potential small-scale mill sites and projected workplaces created in 10 kabupaten. The annexes contain: 1) maps outlining non-forested areas suitable for palm oil production and potential sites for mills, biodiesel plants, and biofuel-powered generators; 2) descriptions of 1-5 ton per hour palm oil "micromills" and 5-20 ton per hour "minimills"; 3) three small-scale palm oil mill potential field survey reports from Aceh Jaya, Aceh Utara, and Nagan Raya kabupatens; and, 4) data summary of rated capacities and fuel consumption of national electrical company PLN power generators in Aceh.

Finally, the report includes an annex that presents a potential pilot smallholder cooperative palm oil and cacao production and processing project located in Aceh Utara kabupaten. The project is requesting partial funding from USAID Serasi Project to promote economic reintegration of 3,000 excombatants and conflict victims. The project area consists of degraded, non-forested lands and will include a High Conservation Value (HCV) assessment, spatial planning, and the first RSPO smallholder certification in Indonesia.

# 1. ACEH GREEN ECONOMIC DEVELOPMENT AND INVESTMENT STRATEGY ("*ACEH GREEN*")

This initiative seeks to assess the potential and create a pilot protoype for developing biofuel feedstocks from palm oil industry waste by-products in Aceh. It is directly tied to Governor Irwandi Yusuf's Aceh Green Economic Development and Investment Strategy, commonly known as "Aceh Green". The Governor launched Aceh Green in December 2007 with the support of a number of local and international advisors, including the author of this paper. The author helped organize the Governor's September 2007 trip to the USA.

According to the Aceh Green summary document, "Biofuels will be based initially on palm oil and branch out to include other products such as jatropha, sago palm, and sugarcane. A framework for Aceh's biofuels industry based on avoided deforestation, carbon credits, and strict sustainability standards will be set up. This will serve to distinguish Aceh from other parts of Indonesia and regions of the world and boost investor and consumer confidence in the province. The overall strategy for Sustainable Biofuels in Aceh – including financing, investments, infrastructure, and business development – will be developed within the next year." This section is largely excerpted from the summary.

"Aceh Green articulates Governor Irwandi Yusuf's development vision, setting out the dual objectives of achieving sustainable economic growth and sustainable environmental management ("environmentally sound economic development"). These objectives are to be accomplished through the development of key sectors and implementation of initiatives such as:

- grass roots agriculture (short-term)
- land reform and estate crop development (mid- and longer-term)
- green, renewable energy (mid- and longer –term)
- avoided deforestation and carbon markets (short-, mid- and longer-term)"

"The Aceh Green strategy consists of eight main components designed to generate revenue for the province and employment for rural communities. The first two components, under the over-arching theme of energy security, form the core of an innovative, renewable green energy category. The next three components, grouped under a theme of food and livelihood / income security, fit into the commercial-oriented Sustainable Economic Development category of investment requirements, which also reflect a sector and a physical planning zone. Finally, three components, combined under the theme of environmental security, fit into the Land use, Land Use Change and Forest Management category of activities which may be understood as both an investment sector and physical planning zone."

This ESP-supported initiative combines two of the eight Aceh Green components:

1. Component 2: Hydropower and Other Sources of Renewable, Green Energy, part of Theme 1: Targeting Energy Security through Renewable, Green Energy Development

2. Component 3: Grassroots Agriculture and Smallholder Estate Crop Development in Partnership with Private Sector and Parastatal Estate Crops & Associated Infrastructure, part of Theme 2: Achieving Food and Livelihood/Income Security through Sustainable Economic Development

The document asserts that "there is a significant opportunity to replace Aceh's unreliable, increasingly expensive and polluting diesel-based energy with reliable and renewable sources of energy. Such a move will provide the foundations for the province's future economic growth and prosperity, and draw international attention to the sustainable growth of Aceh. With a well-defined green energy strategy, Aceh could become one of the world's first provinces with a majority of its power needs generated by renewable energy. It seems highly likely that the province can generate efficiently and economically much more energy than its current needs."

The document continues that "the private sector is being encouraged to develop a biofuels industry in Aceh. During the Governor's trip to the U.S. in September 2007, two of the largest biodiesel producers expressed solid commitments in sourcing verified and/or certified sustainable palm oil from Aceh. These companies expressed strong interest in partnering with Indonesian and Malaysian companies to secure long-term product sourcing needs. This might include co-investment in existing and new plantations, supporting biofuel technology transfer, and underwriting long-term offtake (supply) agreements. With the likely conversion of most of the liquid fuels in Hawaii to biofuels by 2010, the market needs for sustainable palm oil in the U.S. will rise substantially. The EU's mandate to increase biofuel content of overall engine fuels to 10% by 2020 and consumer preference for sustainable sourcing can help create a strong market opportunity for Aceh."

Moving on to Component 3, the Aceh Green summary states that "Smallholder estate crop development on land suitable for specific priority commodities is a major component of Aceh Green. Development of oil palm plantations is considered to be a central element of plans to deliver livelihood opportunities for rural communities and economic development of the province. Oil palm would be developed through smallholder out-grower plantations working in partnership with private and government plantations. Participating families would own (e.g., have title to) and achieve secure employment and incomes through the out-grower plantations."

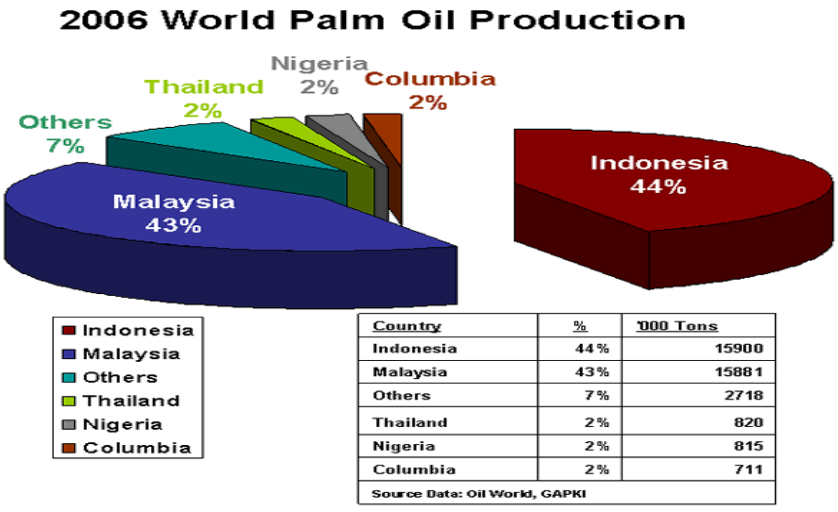
"The Governor is keen to ensure that both existing and new oil palm development in Aceh - whether government, private, or smallholder - will closely follow the principles and criteria of the Roundtable on Sustainable Palm Oil (RSPO), based in Kuala Lumpur, Malaysia. This global initiative of businesses, government, and civil society is creating high standards and strong incentives for environmental and social responsibility in the global palm oil industry. It is important to stimulate cooperation among the various stakeholders in Aceh in order to maximize compliance with RSPO and to minimize major problems with oil palm expansion common in Indonesia and elsewhere. These problems include forest conversion and land tenure conflicts. If RSPO principles and criteria are instituted, Aceh could become a model for sustainable palm oil production worldwide."

As stated, Aceh's total annual production of crude palm oil (CPO) is currently about 400,000 metric tons, which falls well below the national average per hectare output. In response, "the Governor envisions a substantial increase in smallholder production combined with anticipated increases in land devoted to private and government estates. Site selection and planning will be conducted through a participatory landscape-planning process that combines sophisticated land-use analysis and mapping technologies with grassroots organizing."

# 2. BACKGROUND ON THE INDONESIAN AND ACEH PALM OIL INDUSTRIES

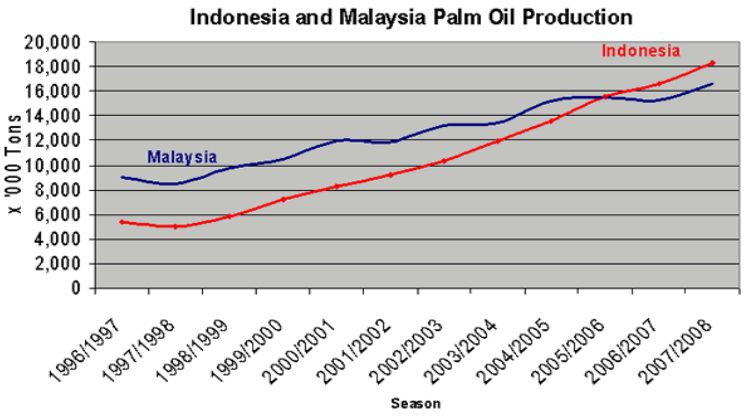
## A. INDONESIAN PRODUCTION

Palm oil comes from the fruit of the oil palm tree (Elaeis guineensis), a tropical species that originated in West Africa, but now grows as a hybrid in many parts of the world, including Southeast Asia and Central America. . Palm oil became the leading internationally traded edible oil in the year 2007. As shown in the graphic below, Malaysia and Indonesia accounted for about 87% of world production in 2005, a figure which has now risen to about 90%. The relatively low priced oil is used for a wide variety of purposes. The world demand for palm oil has soared in the last two decades, first for its use in food, soaps, and other consumer products and more recently as a biofuel raw material feedstock. The growing affluence of India and China, the world's top two importing nations, will increase demand of palm and other edible vegetable oils for a variety of applications




| Country | % | '000 Tons |
|---|---|---|
| Indonesia | 44% | 15900 |
| Malaysia | 43% | 15881 |
| Others | 7% | 2718 |
| Thailand | 2% | 820 |
| Nigeria | 2% | 815 |
| Columbia | 2% | 711 |

Source Data: Oil World, GAPKI



A significant change in the oil palm industry has taken place during the past decade, as Indonesia surpassed Malaysia as the world's top producer. Indonesia will continue to lead the world in palm oil production for years to come, due primarily to the wide availability of suitable land in Indonesia, coupled with recent years of high vegetable oil demand and record energy prices. Consequently, Indonesia's percentage share of production will continue to increase from the figures reported above. Indonesia produced an estimated 18.3 million metric tons of palm oil in 2008, and is expected to continue expanding its production at between 8-10% per year. While Malaysia's production is expected to grow only marginally, Indonesia's 2009 production is estimated to exceed 20 million metric tons.

The Government of Indonesia's development of palm oil production through land concessions to large companies, government plantations, and small holder programs has been clearly successful in pushing the expansion and generating foreign exchange. According to Indonesia's Bureau of Statistics (BPS) in 2006, 45 percent of total palm area was owned by private companies, followed closely at 43 percent by smallholders, and government parastatal companies (PTPN) comprising the remaining 12 percent. Based on IPOC data, the total area planted in oil palm in Indonesia increased tenfold from just about 600,000 hectares in 1985 to 6.07 million hectares in 2006. At current growth rates of about 10-12% per year, the total is expected to increase to 10 million hectares by 2010.

The island of Sumatra has long been the largest palm oil production area in Indonesia. The oldest large-scale plantations were first established in 1911 in Aceh and North Sumatra provinces. One of the pioneers is the international company Socfindo, which is currently still very active in Aceh. Since those early days, palm plantation development spread south and to the other areas of Indonesia. The highest producing provinces on Sumatra are North Sumatra and Riau, with 28% and 24% of total production, respectively, according to the Indonesian Palm Oil Board (IPOB, 2007). Even though the bulk of Indonesia's production remains on Sumatra (about 70-80%), rapid expansion is occurring in Kalimantan, particularly in Central and West Kalimantan. Important, but secondary areas of expansion are Sulawesi and Papua. Even with the expansion areas, Sumatra will continue to be the leading production center for the foreseeable future.

Although essentially an estate crop, oil palm has been successfully adapted to suit the needs of smallholders and has made tangible contributions to poverty alleviation in Indonesia, affecting about 3.5 million smallholders. Significant improvement in living standards, including income, education and health levels are among the economic development benefits of oil palm cultivation in areas where projects have succeeded. Many of the smallholders are part of "inti-plasma" collaboration schemes with large private companies. These schemes have also generated landuse conflicts between local communities and outsiders, particularly within the transmigration schemes of the 1980s and 90s.

The dramatic rise in palm oil production has also resulted in significant losses of tropical forests and peat swamps, and generated major concerns about the effect of palm oil production on habitat loss for many endangered species and the reduction of biodiversity. Therefore, the Indonesian government and a number of private palm producers and NGOs are actively participating in developing sustainability standards and practices under the auspices of the RSPO Indonesia National Office. Several active working groups focusing on biodiversity conservation, smallholder certification, and other key issues are underway.

# B. ACEH PALM OIL INDUSTRY

Much of the data and information in this section is excerpted from the author's February 2009 Aceh Green Sustainable Palm Oil Strategy report for the International Finance Corporation (IFC). This report contains an analysis of the current status of the palm oil industry in Aceh and provides a series of issues to be addressed and recommendations for dealing with them in a practical and cost-effective way. The report summarized the situation as follows, "Despite its pioneering status in Indonesia, Aceh is a relatively minor palm oil producer with less than 3 percent of national production. As of 2007, Aceh contained about 261,000 hectares in large private and governmental palm oil estates and smallholder farms, which constitute about 3.8% of the national plantings. This consists of approximately 89,000 hectares of smallholder oil palm producers, 39,000 hectares of government-managed estates (PTP), and 132,000 hectares in private estates. These collectively produced about 2 million tons of fresh fruit bunches (FFB) in 2007."

From the report, the following table, based on composite 2007 data compiled by the provincial Forestry and Plantations Department (Dishutbun) and the national Plantations Department, provides a succinct summary of the current status of Aceh's palm oil sector. These figures are based on data obtained from the local kabupaten (district) level Dishutbun offices. Also based on local data, Table 2 in the following page itemizes the distribution of Aceh's palm oil plantations by kabupaten. These data sets contain very similar overall plantation hectare data for large estates and smallholders, although the fieldwork indicates that their accuracy cannot be validated at the kabupaten (district) level.

**Table 1: Total Palm Oil Plantations in Aceh Province 2007**

| | Total Hectares | Productive Hectares | Unproductive Hectares | Total FFB | Average FFB/Ha. | Estimated CPO/Ha. |
|---|---|---|---|---|---|---|
| **Perkebunan Rakyat (Smallholders)** | 89,199 | 58,520 | 30,679 | 589,700 | 10.08 | 2.02 |
| **Perkebunan Besar (Estate Plantations):** | | | | | | |
| **- Private Plantations** | 132,392 | 97,705 | 34,687 | | | |
| **- BUMN (State-Owned Plantations)** | 39,353 | 29,043 | 10,310 | | | |
| **Total Estate Plantations** | 171,745 | 126,758 | 44,987 | 1,432,254 | 11.30 | 2.26 |
| **Totals** | 260,944 | 185,278 | 75,666 | 2,021,954 | 10.91 | 2.19 |

Total Palm Oil Plantations (2006/2007)
Source: Dishutbun NAD

The overall data above indicates that Aceh's average yields per hectare of 10.08 tons for smallholders and 11.30 tons for large plantations are well below the Indonesian average of 14-17 tons/ha for smallholders and 18-20 tons/ha for large estates. This data confirms that the Acehnese oil palm sector has not recovered from the effects of the conflict era of the 1990s up through the Peace Accords of 2005. Many of the smallholders and large estates have not had the financial or labor resources to replant or rehabilitate their plantations. Most are unable to afford inputs and best practices for improved fertility, weed, and pest management in order to increase yields.

The industry is concentrated in five kabupaten along the western and eastern coasts, Aceh Utara, Aceh Timur, Aceh Tamiang, Nagan Raya, and Aceh Singkil (including the newly-established municipality of Subullusalam). These six kabupaten and municipalities constitute over 84% of the total planted hectares and production, and have been the focus of most proposed new concessions and smallholder expansion schemes. Four other kabupaten

(Aceh Jaya, Aceh Barat, Aceh Barat Daya, and Bireun) are also considered solid growth candidates, while five additional kabupaten and municipalities have less potential.

**Table 2: Distribution of Aceh's Palm Oil Plantations (2007)**

| Kabupaten | Large Estates (Kebon Besar) Ha | Smallholder (Kebon Rakyat) Ha | Subtotals | % |
|---|---|---|---|---|
| | | | | |
| Aceh Besar | 1,140 | | 1,140 | 0.44% |
| Aceh Jaya | 1,720 | 5,311 | 7,031 | 2.73% |
| Aceh Barat | 11,202 | 3,892 | 15,094 | 5.86% |
| Nagan Raya | 36,525 | 13,112 | 49,637 | 19.26% |
| Aceh Barat Daya | 4,968 | 1,250 | 6,218 | 2.41% |
| Aceh Selatan | 3,842 | 2,410 | 6,252 | 2.43% |
| Singkil (Incl. Subulussalam) | 24,522 | 19,046 | 43,568 | 16.90% |
| Aceh Tenggara | | 1,253 | 1,253 | 0.49% |
| Pidie | 10 | 81 | 91 | 0.04% |
| Bireun | 382 | 3,138 | 3,520 | 1.37% |
| Aceh Utara | 14,353 | 14,834 | 29,187 | 11.32% |
| Lhok Seumaweh | | 90 | 90 | 0.03% |
| Bener Meriah | | 2 | 2 | 0.00% |
| Aceh Timur | 44,153 | 4,493 | 48,646 | 18.87% |
| Aceh Tamiang | 30,128 | 15,876 | 46,004 | 17.85% |
| | | | | |
| **Totals** | 172,945 | 84,788 | 257,733 | 100.00% |

Distribution of Palm Oil Plantations by Kapubaten
Aceh Province
Source: Eye-on-Aceh/Dishutbun (2007)

During the conflict era, an estimated total of 85,000 hectares or 33% of the total plantings (52,712 hectares of smallholder and 32,316 hectares of large plantations) were essentially abandoned or neglected (Eye on Aceh, 2007). Many smallholders, especially transmigrants from outside Aceh, were unable to stay on the plantations. Most of the palm oil production areas were impacted to some degree by the conflict, while an additional about 21,000 hectares were partially or significantly affected by the Tsunami. As the data indicates, about 75,666 hectares or about 29% of total plantations are considered unproductive or still unrehabilitated from the conflict era.

According to data obtained from a national-level Department of Plantations survey team in May 2008, Aceh's palm oil post-harvest facilities include 23 crude palm oil (CPO) mills (PKS or pabrik kelapa sawit). These facilities have a composite capacity of 715` ton/hr or an average mill capacity of about 31 tons/hour. The team indicated that 494 tons of these mills are currently in use, or about 69% capacity. This apparent excess capacity is in fact not the case in many areas as plantations go unharvested or output is trucked long distances due to logistical issues such as lack of available local mills, manpower, access roads and harvest infrastructure.

Due to inconsistent quality, smallholder and some larger estate FFB production is frequently discounted in price or purchased in limited quantities by the large mills. This can result in price reductions of Rp 200-300/kg for trucking, handling, quality discounts, and trader margins. Over the last several years, CPO price fluctuations, combined with inefficient and inequitable supply chain pricing mechanisms have severely dampened the prospects for palm oil industry and smallholder expansion in Aceh.

There are currently no secondary processing plants for palm kernel oil (PKO) or refineries in Aceh. Feeder ports or tank farms for storage are virtually nonexistent. This is in sharp contrast to the vast array of post-harvest infrastructure in nearby North Sumatra and Riau, including palm-based food industries, biodiesel, oleochemical and surfactant plants, and extensive port facilities. Consequently, Aceh remains primarily a raw material producer, with local prices relatively depressed due to the previously mentioned logistical and resultant quality constraints. As a result, virtually all of current production is sold as a domestic product and indirectly exported through the port of Belawan in North Sumatra.

Despite the Total Logging Ban enacted by Governor Irwandi in June 2007, conservation of residual forests and fragile peat ecosystems remain as issues in some of the existing and proposed new palm oil concessions (HGUs) in Aceh. The Governor's unilateral action has succeeded in halting existing logging concessions (HPH) throughout Aceh and in significantly reducing though not halting illegal logging by most accounts. Although most established concessions logged over most of their areas in the 1990s or previously, there are residual natural forests in some concessions that were not converted due to slope, inaccessibility, or the conflict.

A significant challenge exists within concessions located in the three major peat swamp areas along the West coast of Aceh, the Kuala Tripa in Nagan Raya/Aceh Barat Daya (30,000 hectares), Bakongan swamp in Aceh Selatan, and Singkil swamp (100,000 hectares). These areas are some of the largest carbon storage areas in Sumatra, with up to 3,000 tons/hectare carbon sequestered versus 150-300 tons/hectare for above ground vegetation. All three constitute a large portion of the critical habitats for the highly endangered Sumatran orangutan population of 4,500 individuals. In his IFC study, the author recommend setting up a Working Group on Sustainable Palm Oil (Pokja Sawit Berkelanjutan Aceh), which will work to address this matter in the coming months.

As previously stated in Section 2, the palm oil industry is viewed as one of the leading sectors for providing broad economic opportunities and supporting the peace process under Aceh Green. Overall, it appears that the palm oil industry provides direct and indirect employment & income impacts to over 200,000 people in Aceh, or about 5% of the population. This includes smallholders and their families, plantation and mill managers and workers, and transport and other service industry members located in areas representing over 50% of the land mass of Aceh.

Despite the considerable challenges and constraints, my previous IFC study found rays of hope for the future for Aceh's depressed palm oil sector throughout the province. Whereas most smallholders and a number of large estates are still lagging behind in productivity and income, several of Aceh's leading private companies, most notably Socfindo, Astra Agro, Mopoli Raya, and Minamas/Sime Darby, have well-run plantations producing over 20 tons of FFBs per hectare and efficient, well-run mills. Socfindo, the largest purely international company which has been in Aceh since 1911, produces an average of almost 7 tons of CPO and over 28 tons FFB per hectare in its long-standing Nagan Raya plantations.

As a rough personal estimate, five of the leading companies in Aceh appear to produce about 65% of total production on about 25% of the land devoted to palm oil. Two of these companies, Socfindo and Minamas/Sime Darby, are members of the RSPO and are in the process of pursuing certification for their plantations and mills in Aceh and Indonesia as a whole. Also, several of these and other companies are actively pursuing partnerships with smallholders (plasma) as part of their expansion schemes

Somewhat paradoxically, the challenging circumstances of the palm oil industry in Aceh also present unique economic development opportunities. This background paper will explore a promising approach to creating value-added products that can create employment, protect biodiversity, and support unlocking the latent potential of the palm oil industry in Aceh.

# 3. BIOFUEL FEEDSTOCK DEVELOPMENT IN INDONESIA AND ACEH

Since 2005, the Government of Indonesia has created a major push on the development of biofuels to meet domestic energy consumption needs and boost export earnings. This has included setting up a joint government-private sector biofuel team (Tim Nasional Bahan Bakar Nabati) to boost research, innovation, and commercialization. These efforts have culminated in creating national targets and mandates for biofuel content in vehicle fuels and power generation (p. 27). The major feedstocks and endproducts are summarized below, followed by a hypothetical geographic distribution of various options in Indonesia:

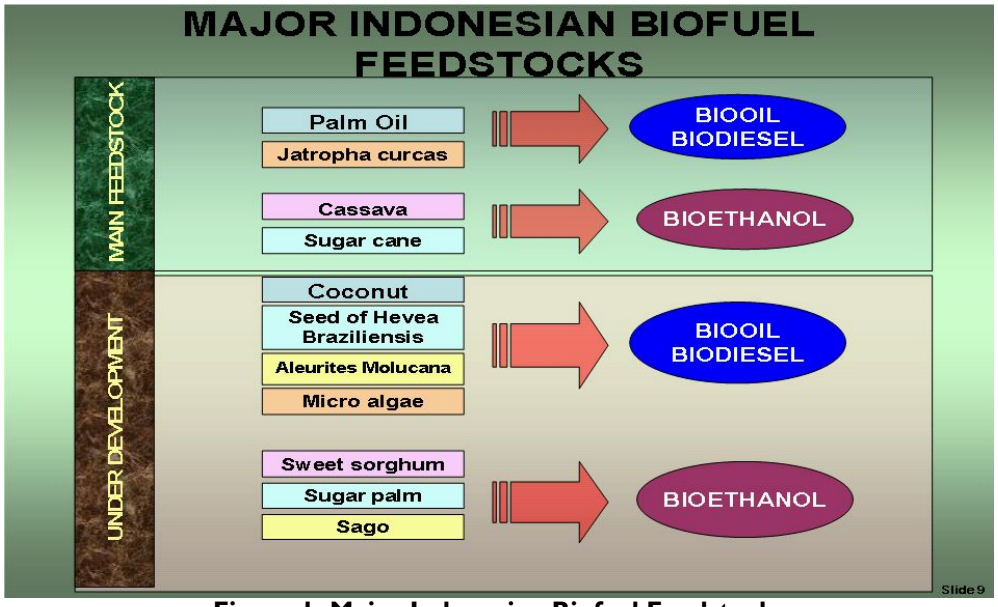



**Figure 1: Major Indonesian Biofuel Feedstocks**

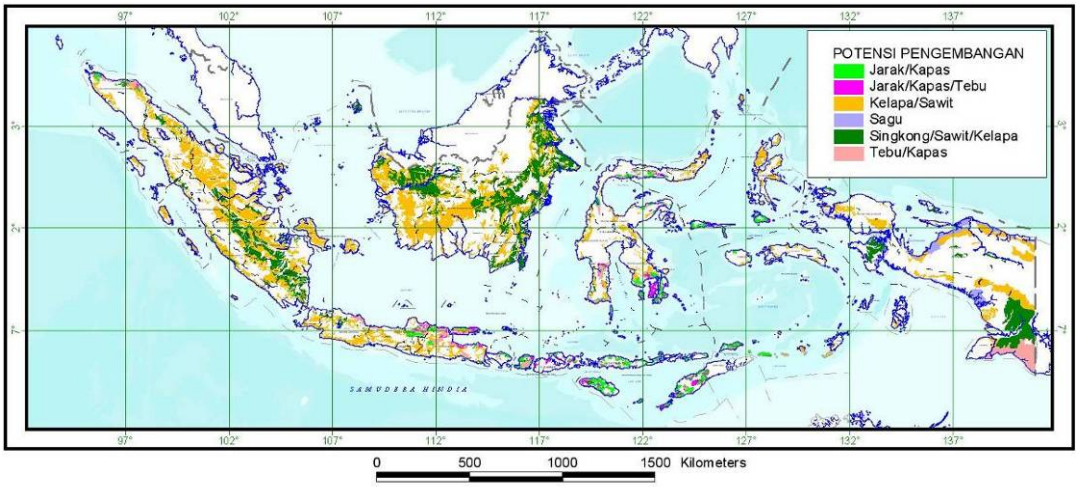
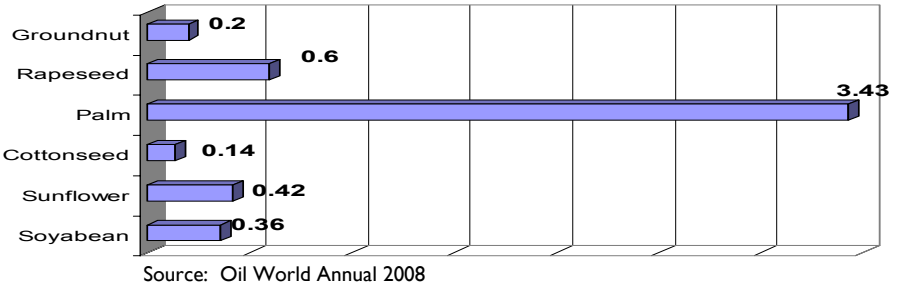



**Figure 2: Potential product development for Bio-energy in Indonesia**

As indicated, the major designated feedstocks for producing biodiesel and bio-oil in Indonesia are palm oil and jatropha, while cassava and sugarcane are primary feedstocks for bioethanol. The map needs to be correlated with spatial planning and land use suitability assessments. Currently, all of the major feedstocks are experiencing difficulties in achieving financial viability due to their higher costs compared to fossil fuel energy prices. With the exception of palm oil, none of the other feedstocks have established a critical mass of production such as has been achieved in Brazil with their highly successful national sugarcane bioethanol initiative. Except for jatropha, all of the feedstocks are mainly edible products, thus facing criticism around the world for using food crops as fuels. Despite attractive social and environmental attributes, the jatropha industry in Indonesia and other countries has not reached an adequate stage and scale of development.

Oil palm is the world's most productive vegetable oil crop, yielding more oil per hectare than any other major oilseed commodity. As shown in the graphic below, the oil yield on a per unit area basis from properly maintained oil palms is significantly greater than oil yields from commercially grown rapeseed and soy, the two currently most utilized biofuel feedstocks. In terms of energy balance it takes less sunlight to produce a unit of palm oil. Over most of the last decade, palm oil has consistently traded a discount to soy, rapeseed, and other edible oils. These conditions favor palm oil as a major renewable biofuel energy option for the near future, until cellulosic technologies advance to an operational level.




Source: Oil World Annual 2008

**Figure 3: Productivity of Key Major Global Biofuel Oilseeds (Tons/Hectare/Year)**

Due to its lower cost and widespread availability, palm oil began to gain attention in sustainable energy and biofuel campaigns around the globe in the last decade. Palm oil, like other vegetable oils, can be used to create biodiesel for internal combustion engines and bio-oil for household and industrial energy applications. Biodiesel has been promoted as a form of biomass that can be used as a renewable energy source to reduce net emissions of carbon dioxide into the atmosphere. Therefore, biodiesel was seen as a way to decrease the impact of greenhouse gases and as a way of diversifying energy supplies to assist national energy security plans. Scientists have found that biodiesel made from palm oil grown on sustainable non-forest land and from established plantations can effectively reduce greenhouse gas emissions.

The biodiesel industry in Indonesia began with several smaller biodiesel refineries around 2003. The first large refinery was set up in Gresik near Surabaya, in eastern Java owned by PT Anugerahinti Gemanusa, subsidiary of the chemical business PT Eterindo Wahanatama. Production is primarily for export, to Asia, Australia and also Germany. In Jakarta, biodiesel has been sold since 2004 at several petrol stations. The distributor is PT Energi Alternatif Indonesia.

The chart on the following page presents a summary of current and pending biodiesel plants in Indonesia. Based on data for the Investment Coordination Board (BKPM), it projects 3,000,000+ metric ton installed capacity in 2010 going forward. This growth is spurred by pending Government targets for 10% biodiesel content in the nation's fuel supply by 2010, requiring about 2,410,000 metric tons. At least fifteen companies are planning new (including far larger) biodiesel refineries. BKPM is considering plans for a total of 1 million tonnes per year, not all of which have been granted. Eight smaller government-owned refinery plants are also planned. The first two refineries, which should start production late 2009, are being built by Wilmar Holdings and Bakrie Group. There is one company with roots in Aceh in the list, PT Nusantara Bio Energy, which is planning to build a 100,000 ton biodiesel plant in Kuala Tanjung, North Sumatra. Not included in this list are the over one hundred plants which refine crude palm oil.

Over the last decade, European countries have promoted the use of local (rapeseed and grains) international (soy and palm oil) biofuel feedstocks by injecting hundreds of millions of dollars into national subsidies towards bio-diesel and bioethanol. Europe is now the third leading importer of palm oil after China and India. Through the subsidizing of biofuels, European governments have accelerated the demand for palm oil in Europe. As a direct and indirect consequence, the EU has contributed to accelerating the conversion of forest land and draining of peat swamps in South East Asia, especially in Indonesia.

However, NGOs such as Greenpeace have concluded that the current "first generation" biodiesel extracted from new palm oil plantations are not a genuine counter to global warming. If forests are cleared for palm plantations, and the wood is not used for bioenergy but burned, it may take decades before biodiesel from palm oil reduces as much carbon dioxide as the pristine forests originally sequestered in the form of carbon. This is termed the "carbon payback period". However, if the wood is used for the production of bioenergy on a sustained yield basis, the palm plantations as well as the biodiesel from palm oil starts to sequester and reduce greenhouse gas emissions from the first year onwards.

**Table 3: Existing and Planned Biodiesel Refineries in Indonesia**

| **Company** | **Location** Comment | **Annual production in 1,000 tonnes** | | | | |
|---|---|---|---|---|---|---|
| | | 2006 | 2007 | 2008 | 2009 | 2010+ |
| **PT Anugerahinti Gemanusa** First large biodiesel plant | Gresik (Surabaya) | 70 | | | | 200 |
| **PT Wilmar Bioenergi Indonesia** Subsidiary of Wilmar Holdings, Singapore, building the first biodiesel refineries in 2007. Production starts 2008 | Dumai (Riau) | | | 300 | 300 | 300 |
| **PT Bakrie Rekin (Rekayasa Industri)** | Lampung | | | | 100 | 100 |
| **PT Indobiofuels-Hiswana** | Dumai (Riau) | | | 150 | | |
| **PT Asianagro Agungjaya** Raja Garuda Mas Subsidiary owned by Sukanto Tanoto (APRIL), one of Indonesia's richest men | Marunda (Jakarta) | | | 100 | | |
| **PT Sari Dumai Sejati** | Bengkalis (Riau) | | | | 100 | |
| **PT Nusantara Bio Energy** | Kuala Tanjung (Sumut) | | | | | 100 |
| **Darmex Oil** Subsidiary of the US American Fuchs Lubricants Co., one of largest producers | Planned | | | | | 85 |
| **PT Sumi Asih**, large Asian oleochemical producer | Bekasi (West-Java) | | 36.0 | | | 200 |

| | | Annual production in 1,000 tonnes | | | | |
|---|---|---|---|---|---|---|
| English Companies<br>**PT Indo Biofuel Energi**<br>**PT Sinar Alam Permai**<br>**PT Mentari Subur Abadi**<br>**PT Swadaya Bhakti Negara Mas**<br>(southern Sumatra) | Several refineries planned with a total capacity of 695,000 tonnes per year | | | | | 695 |
| **PT Permata Hijau Sawit**<br>Medan<br>**PT Musim Mas,** Medan | (Medan) | | | 200<br><br>200 | | |
| **PT SMART (Sinar Mas Agro Resources and Technology)**<br>Nine CPO mills and two refineries, main product margarine and vegetable oil | Biodiesel refinery planned as part of the cooperation with CNOOC, probably in Papua | | | | | 200 |
| **Annual Totals** | | 70 | 36 | 950 | 500 | 1580 |
| **Cumulative Totals** | | 70 | 106 | 1056 | 1556 | 3136 |

Data according to Badan Pengkajian dan Penerapan Teknologi (BPPT) and Badan Koordinasi Penanaman Modal (BKPM), Bisnis Indonesia and other sources, 2008

# A. EMERGENCE OF A NEW BIOFUEL FEEDSTOCK SOURCE

A potential alternative feedstock source with significant availability has emerged—non-food grade biomass by-products of palm fruit and palm oil production. This entails going beyond merely using the oil from oil palm fruit to converting the entire biomass captured from oil palm plantations into renewable energy resources. By using both the biomass from the plantation as well as the processing residues from palm oil production (fibers, kernel shells, palm oil mill effluent, residual oil, etc.), bioenergy from palm plantations can have an effect on reducing greenhouse gas emissions. Examples of these production techniques have been registered as projects under the Kyoto Protocol's Clean Development Mechanism (CDM). The products include the following:

- High Fatty Acid Crude Palm Oil = by-product non-food grade oil produced from loose fruit and overripe fresh fruit bunches.
- Sludge and Effluent Oil = Oil from the sterilizer Process, residual oil in the waste water & Oil from the Filter Press cake or Decanter Sludge.
- Palm Fatty Acid Distillate (PFAD) = a low grade byproduct of CPO refining.
- EF = Empty Fibres from the current Palm Oil Mill process after separating the Palm Kernels.
- EFB = Empty Fruit Bunch from the current Palm Oil Mill process after separating the Palm Oil Fruits from the Fruit Bunch behind the thresher.
- Palm Kernel Shells from cracking the palm kernel nuts before expelling Palm Kernel Oil, useful as a solid biomass fuel
- Storage Tank Waste Oil which accumulates below heating coils.
- Used Cooking Oil from restaurants, hotels, and institutional kitchens.

Oil palm fresh fruit bunches must be milled within 24-48 hours of harvest to avoid deterioration in quality. If milling doesn't occur on a timely basis, the product no longer meets food grade requirements of about 5-6% Free Fatty Acid (FFA) content. Compared to Malaysia, given the rapid expansion of oil palm hectarage in Indonesia in the last two decades, investments in industry infrastructure especially oil milling have been struggling to catch up with fresh fruit bunch production. This has been especially the case as planting is

extended further eastwards from Sumatra towards the more logistically challenged areas of Kalimatan, Sulawesi and Papua. The road networks are poor and in certain remote areas most transport for fruit bunch delivery is limited or riverine. As a direct result, there is a high incidence, largely unreported officially, of fresh fruit bunches not harvested in time and delivered to the mill within 24-48 hours to avoid the build up in the FFA levels.

In addition, mill capacity is sometimes not sufficient to cater to the smallholder production as priority is given to the production from the plantation which usually owns the mill. Even then, within these plantations, during certain peak seasons occasioned by excessive rainfall, complete evacuation of the overproduction of fresh fruit bunches become impossible and they are practically discarded and buried. This state of affairs has resulted in the emergence of mini-mills sometimes operating on barges, which process oil palm fruit bunches that are less than day fresh resulting in High Free Fatty Acid Crude Palm Oil (HFCPO). The practical time limit for crushing fruit bunches is about two weeks before they deteriorate due to fungus and decompose into a soggy mass unsuitable for oil expelling. As such they are considered waste products from oil palm plantations which do not enter the food processing chain. Additionally, loose fruit (brondol) that accumulate at the collection points of the supply chain are frequently wasted or not purchased.

In addition to HFCPO, there are other sources of waste oil from the palm oil production process at the milling phase. The process yields sludge and effluent oil as well as storage tank waste oils. These products are already being collected throughout Sumatra, notably in Medan, Padang, and Palembang, and sold domestically and internationally to soap, detergent, and occasionally biofuel feedstock buyers. These waste oils are typically stored in used oil drums and have very high FFA levels and variable moisture and impurity contents.

Solvent based extraction has never been deployed for oil palm as it is too expensive and there is residual oil in the Empty Fibres (EF) as well as the metacarpal Empty Fruit Bunches (EFB). Oil palm mills currently use the EF and the EFBs as boiler fuel, which helps reduce operating costs. The mills use diesel as an additional fuel for boilers as well as for transport and generators. With the utilization of new expeller designs it is possible to extract from the EFB and EF a minimum of a further 1% of residual oil by Fresh Fruit Bunch weight which is of a sufficient quality to provide biodiesel suitable for use in the mill and in fleet transport. There is little calorific loss as moisture levels are also lowered and the pressed EFB and EF will burn efficiently as usual.

As smallholders are often affected by such issues, they stand to benefit from the mopping up of such waste products to be processed as HFCPO and sludge oil to be further processed into biodiesel for domestic and export markets. In as far as the smallholders or plantations comply with sustainable land use criteria, such products should meet international sustainability requirements. When the FFA levels rise beyond what is acceptable for food, the feedstock can still be used for biodiesel production.

These waste by-products are also available to various degrees in other Southeast Asian countries. In Malaysia, the use of other waste products such as PFAD from CPO refining, residual oil from the EF and EFB, sludge oil, storage tank oil remain viable investment options. In a number of locations worldwide, waste cooking oil has always been an attractive feedstock for biodiesel processing; its only limitation being collection and availability. In Thailand, mini-mills are also established to press the whole oil palm fruit including both the mesocarp and the kernel to produce a high FFA combined palm and palm kernel oil which is used for both food and biodiesel production. Opportunities exist to invest in dedicated oil palm plantations in Thailand and neighbouring countries fulfilling sustainability criteria.

In Indonesia, the opportunity presented by these waste by-products is largely made possible by logistical and operational impediments to optimal on-farm production and food processing requirements in Indonesia. The logistics exercise of organizing collection of HFCPO and sludge oil from mini-mills or even the processing of waste fruit bunches itself for pressing represent an opportunity for conversion of this waste resource into a biofuel feedstock. In this case, the food or fuel argument does not apply and the obvious solution would be to install sufficient modern milling capacity but that would take at least a decade before efficiency in Indonesia reaches the level of that in Malaysia.
The author's estimates of available quantities of these palm waste by-products in Indonesia are as follows, discounted for access restrictions and alternative uses:

| **Estimated Available Quantities Palm Oil Feedstocks – 2008** | **MT/year (in million tons) Bio-oil or Bio-diesel Feedstock** |
|---|---|
| | |
| Crude Palm Oil (CPO) | 18.50 |
| Palm Kernel Oil (PKO) | 3.78 |
| | |
| High Fatty Acid Crude Palm Oil (HFCPO) | 0.67 |
| Sludge Oil | 0.22 |
| Palm Fatty Acid Distillate (PFAD) | 0.30 |
| Waste Fiber Oil | 0.28 |
| Empty Fruit Bunch Oil | 0.37 |
| Storage Tank Waste Oil | 0.11 |
| Recycled Cooking Oil | 0.45 |
| | |
| Total Waste Palm Oil Feedstocks | 2.40 |
| Estimated Recoverable from Unharvested FFBs | 1.16 |

As a result of the constraints previously described (degraded farms, inadequate processing plants, and various supply chain inefficiencies) these waste by-products are relatively abundant in Aceh. In the author's estimation, these products have good potential to contribute to sustainable biofuel production for Aceh's household energy, rural industrial fuel, and power generation needs. By using small-scale plants which are primarily geared to waste feedstocks from existing production, Aceh can avoid the spectre of deforestation and peatland conversion that is present in other parts of Indonesia.

# B. CORE PRINCIPLES AND PRACTICES FOR SUSTAINABLE BIOFUELS IN INDONESIA AND ACEH

The author has been actively involved over the last four years with the RSPO in Indonesia and the Roundtable on Sustainable Biofuels (RSB) based in Lausanne, Switzerland. He recommends that the following core principles and practices be applied for the development of sustainable biofuel feedstocks in Indonesia and Aceh:

- Non-food grade feedstocks should be given priority over food grade materials.

- Maximize the collection and utilization of waste materials with positive impacts on smallholders, cooperatives, and small and medium enterprises.
- Optimize the use of existing facilities and established production bases in order to avoid destructive palm industry expansion in forested areas and peatlands.
- Select strategic locations to collect feedstocks and develop infrastructure.
- Install proven technologies that are cost-effective and can use multiple feedstocks.
- Create viable financial incentives for feedstock production and subsidies for biofuel utilization at household, rural industry, power generation, and vehicle fuel distribution levels. The incentives and subsidies should apply for private as well as public companies.

# 4. SMALL-SCALE PALM OIL PROCESSING PLANT DESIGN OPTIONS

## A. SMALL-SCALE PALM OIL PROCESSING PLANTS FOR ALTERNATIVE FEEDSTOCK PRODUCTION

In 2008, Indonesia's palm oil sector produced over 18 million tons of Crude Palm Oil (CPO) predominately in processing mills with a capacity of 30 tons per hour or greater. Between 80-90% of palm oil is used as food and 10-20% is used in non-food applications such as oleochemicals & biofuel. Recently, two other scales of palm oil mills have emerged for the latter application—the so-called "mini-mills" with a capacity of 5-20 tons raw material per hour and the smaller yet "micro-mills" which typically process 1-5 tons per hour and around 500 tons per month. The small-scale mills are well-established in North Sumatra Province, filling local infrastructural gaps where large mills are unavailable or inaccessible, or are unequipped to handle low-grade raw materials.

The small-scale mills focus on converting low-grade over-ripe tandan buah segar (fresh fruit bunches) (TBS/FFBs) and loose fruit (brondol) into "asem tinggi" or high free fatty acid (HFCPO) or non-food grade CPO as a biofuel or soap/detergent feedstock. Accordingly, these plants are not dependent on nor drivers for palm oil industry expansion. This market segment is expected to grow significantly in the next two years as the Indonesian government has set ambitious biofuel content mandates of 5-10%. In order to rise to this opportunity as well as stay price competitive, the Indonesian biodiesel industry will need to source lower-cost feedstocks such as the HFCPO and install technologies that can use them. The Indonesian palm oil industry, widely criticized for unsustainable practices such as conversion of natural forests and peatlands, and vulnerable on the "food versus fuel" issue, can potentially present a "win-win" solution by utilizing this waste stream.

## B. PALM OIL MICRO-MILL AND MINI-MILL DESIGNS

The palm oil micro-mills are essentially a lower cost, lower level of efficiency processing technology for palm oil industry substandard raw materials and waste by-products. They can be built for about $90,000-100,000 per metric ton processing capacity per hour, based on using some recycled or reconditioned equipment rather than all new equipment. This compares to price averages of Rp 1.25 billion-3.0 billion (US$120,000-280,000 per metric ton input for the larger mini-mills or Rp 2.0-2.5 billion (US$190,000-240,000) mt/hr for the conventional 30+ mt/hr designs. The unit processing costs for standard food grade FFBs are

higher for the micro-mills. However, this is more than offset by the higher overall oil content and yields of the lower-grade loose fruit and overripe FFBs.

The micro-mill palm oil processing facilities have the capacity to process between 1-5 tons per hour of substandard raw materials and waste by-products from the palm oil industry at the local level. The primary origin of the raw materials will be independent smallholders, who suffered significant losses during the conflict area in Aceh. These facilities can provide direct and indirect employment for 100-200 people each, including skilled workers, laborers, collectors, and transport workers. The estimated annual turnover of a typical plant is around Rp7.5-25 billion (US$720,000-2,350,000) per annum.

The most common designs for the micromills primarily utilize a batch rather than a continuous processing mode. Many of the components of the designs that are installed are similar to the larger mills. For a more detailed technical description of the bottom and top end of the micro-mills, please refer to the attached Annex 2: Description of 1 Ton/Hour Palm Oil Micromill and Annex 3: Description of 5 Ton/Hour Palm Oil Micromill (both in Bahasa Indonesia). The energy efficiency and waste management systems of these mills can be improved and streamlined, by securing appropriate engineering expertise from parties actively engaged in the small-scale processing sector in North Sumatra.

These facilities can be designed and constructed so as to be running at zero-waste and to the fullest extent powered by renewable energy sources. For example, the mills can utilize locally available palm industry waste such as kernel shells (cangkang sawit) and loose fiber as fuels for the boilers, sterilizers, and digestors. To address environmental waste issues, the plants can incorporate new and expanded palm oil mill waste (POME) pond systems. This system will recover all of the nutrients as well as recirculate the solid and liquid waste components to nearby plantations and deliver the waste products as needed.

The palm oil mini-mill designs frequently are scaled down versions of the large-scale palm oil mills with normal capacities of 30-60 tons/hour that are widespread through Southeast Asia. In recent years, these mills were being phased out in Indonesia as they were widely considered to contain obsolete and inefficient technologies. In the last decade, there has been an effort by some Indonesian and international companies to create technical breakthroughs by designing more efficient and cost-effective component parts and overall designs.

An example of this approach is the PalmPro Minimill developed by Dutch engineering company Zebra Special Products BV and a local partner in Palembang, South Sumatra (please refer to Annex 4: Description of 5-20 Ton/Hour Palm Oil Minimill) co-financed by the Dutch Government. This design uses a modular concept that allows for scaling up the production volumes from 10-20 tons per hour FFBs. The quoted price tag of Rp28 billion (US$2.7 million) or Rp1.4 billion (US$ 135,000) per ton per hour capacity is about 60-70% of the unit costs of most large scale mills. This mill is geared to small and medium enterprises and cooperatives, and focuses on maximizing energy efficiency through solid biomass waste utilization and biogas conversion of liquid waste. The company is committed to working only in areas and with producers where wastelands rather than forests are converted into palm oil plantations. The author of this study and his field assistant were able to visit the Palembang site on their own resources and were quite impressed by the plant's design and construction.

# C. ESP SUPPORT TO A SMALL-SCALE PALM OIL PILOT PLANT IN ACEH

ESP will support the expansion of an existing or the construction of a new small-scale processing plant for palm oil by-products in a designated location of Aceh Province, Indonesia. The plant will produce two feedstocks for the domestic and international biofuels, soap, and surfactant industries—High Fatty Acid Crude Palm Oil (HFCPO) and Sludge Oil. The plant will be designed, constructed, and commissioned with the support of engineering consultants with extensive experience in setting up similar plants in Jakarta or nearby North Sumatra Province. ESP anticipates that this investment will provide a stimulus for further construction of such facilities in other locations in Aceh that have surplus raw materials and are unserved or underserved by large-scale palm oil mills.

Through competitive bidding, ESP-Aceh seeks to create a viable pilot project that will show how using oil palm waste streams from small-scale oil palm cultivators can produce feedstock for the local and international biodiesel market in a proven, non-food-rival and market-oriented way. In this initial bidding process, the consultant expects that ESP and the potential grantee will collaborate on a cost sharing basis. An approximate 50/50% basis is recommended to gain the optimum level of commitment from the project implementer. This consultant recommended that the existing expertise and track record of the bidders and their management and technical assistance teams be given the highest priority by the ESP reviewers. Their existing capacity to run similar businesses and create employment will greatly enhance the likelihood of success and sustainability of the project.

In June-July, ESP conducted a competitive invitational bidding process to select a market-oriented small-scale processor that uses waste from production of palm fruit and palm oil to produce biofuel feedstock. Three candidates presented proposals from Aceh Tamiang, Bireuen, and Aceh Jaya. As described by Project Supervisor Chris Bennett, the present front-runner candidate, a private palm oil processor, is located in Kabupaten Tamiang and will use palm waste and low-grade fruit from long-established mostly smallholder oil palm plots. This bidder's operations do not pose a threat to existing natural forests. Even though the company's current plant has an UPL/UKL environmental impact assessment approved by the local environmental safeguards agency Bappedalda, it will be also assessed by ESP for environmental impacts.

# 5. PROPOSED LOCATIONS OF SMALL-SCALE PALM OIL PROCESSING PLANTS AND BIODIESEL PRODUCTION FACILITIES IN ACEH

From April-July 2009, the author and his field research assistant conducted interviews and field surveys with key stakeholders in the government, private sector, and NGO community in Aceh. The team met with members of the Aceh Green Secretariat and the formative Working Group on Sustainable Palm Oil to get updates on current trends and thinking on palm oil and biofuels development. The author met with key private sector companies interested in pursuing biofuel opportunities in Aceh, including PT Nusantara Bio Energy in Medan and PT Dynea Mugi in Langsa. He also met with entrepreneurs, engineers, and traders in Langkat District in North Sumatra where a number of existing small-scale mills are currently located. He also met with the principals of a Dutch-Indonesian joint venture that has built an innovative prototype 5-20 ton per hour mini-mill in the vicinity of Palembang, South Sumatra. The results of this technology assessment and field data collection are contained in Annexes 2, 3, and 4 at the rear of this report. Therefore, the author has achieved a fairly comprehensive understanding of the different technologies and scales of operations available, including their advantages and limitations.

Research assistant Eko Aprianto conducted three field surveys on the potential of small-scale palm oil mill development in three kabupaten with independent smallholders and processing facility shortcomings—Aceh Utara, Aceh Jaya, and Nagan Raya. The results of his efforts are contained in Annexes 5, 6, and 7 which follow. These field surveys were useful in developing the data and decision-making criteria for the preliminary identification of prospective locations of small-scale processing plants in the key palm oil production areas of Aceh province. The basic selection criteria that were developed are as follows:

- Lack of adequate large-scale processing facilities within 1-2 hours of active mature smallholder or large plantation production sites.
- Reasonable road access to raw material sources within 1 hour of the proposed location.
- Availability of at least 1,000 hectare clusters and a minimum of 3,000 hectares in total smallholder and medium-sized plantations in a contiguous area.
- Availability of an average of 25-50 tons per day of loose fruit (brondol) or low grade FFBs, based on minimum volumes of 7,500 tons/year for a 25 ton/day plant and 15,000 tons/year for a 50 ton/day plant.
- Existence of raw material collection systems and entrepreneurial capacity.

With these criteria in mind, the team pooled the available data by kabupaten and results of the surveys conducted during this assignment and during the IFC Aceh Green Sustainable Palm Oil Strategy assignment in 2008. First, kabupaten that did not match two or more of the criteria above, such as Aceh Besar, Aceh Tenggara, Pidie, and Bener Meriah, were culled. Then total annual production of fresh fruit bunches (TBS) from smallholders and large

estates based on provincial averages were estimated for kabupaten that had minimal milling capacity and for smallholders only for kabupaten with some or adequate capacity. The team thereafter extrapolated available loose fruit (brondol) as a percentage of TBS with figures for each kabupaten assigned based on interviews with informants and observations made during field surveys. The findings of this initial exercise were as follows:

| **Kabupaten** | **Estimated Potential Mills by Mill Size** | |
|---|---|---|
| | **25 T/day** | **50 T/day** |
| Aceh Jaya | | 1 |
| Aceh Barat | 1 | |
| Nagan Raya | 1 | 1 |
| Aceh Selatan | 1 | |
| Singkil (Incl. Subulussalam) | | 2 |
| Bireun | 1 | |
| Aceh Utara | | 2 |
| Aceh Timur | 1 | |
| Aceh Tamiang | | 1 |
| **TOTALS** | 5 | 7 |

The following page contains a summary of the data analysis for all kabupaten in Aceh and includes additional data on potential employment impacts per area. After compiling these results, the team identified approximate geographic locations for these mills in each of their corresponding kabupaten and placed these on the provincial map contained on Page 30 in Annex 1. These areas were identified during the field surveys conducted for ESP or through our previous work with IFC. This effort was also helpful in identifying the three candidate bidders from Bireuen, Langsa, and Aceh Jaya for the ESP-funded pilot plant.

**Table 4: Preliminery Estimate Potential Number of Small-Sclae Palm Oil Mills Aceh Province 2009**

| Kabupaten | Large Estates (Kebon Besar) Ha | Smallholder (Kebon Rakyat) Ha | Estimated Production Ton TBS/Year | Estimated Production Ton Brondol/Year | Estimated Potential Mills by Mill Size | | Estimated Oil Production per Year | Estimated Workplaces Created |
|---|---|---|---|---|---|---|---|---|
| | | | | | 25 T/day | 50 T/day | | |
| Aceh Besar | 1,140 | | 12,540 | 2,508 | | | | |
| Aceh Jaya | 1,720 | 5,311 | 70,310 | 14,062 | | 1 | 4,693 | 110 |
| Aceh Barat | 11,202 | 3,892 | 39,231 | 7,846 | 1 | | 2,346 | 110 |
| Nagan Raya | 36,525 | 13,112 | 132,169 | | 1 | 1 | 7,039 | 270 |
| Aceh Barat Daya | 4,968 | 1,250 | 12,600 | 26,434 | | | | |
| Aceh Selatan | 3,842 | 2,410 | 65,646 | 1,890 | 1 | | 2,346 | 110 |
| Singkil (Incl. Subulussalam) | 24,522 | 19,046 | 191,984 | 9,847 | | 2 | 9,386 | 320 |
| Aceh Tenggara | | 1,253 | 12,630 | 28,798 | | | | |
| Pidie | 10 | 81 | 816 | 2,526 | | | | |
| Bireun | 382 | 3,138 | 36,960 | 163 | 1 | | 2,346 | 110 |
| Aceh Utara | 14,353 | 14,834 | 224,740 | 33,711 | | 2 | 9,386 | 320 |
| Lhok Seumaweh | | 90 | 907 | 136 | | | | |
| Bener Meriah | | 2 | 20 | 3 | | | | |
| Aceh Timur | 44,153 | 4,493 | 45,289 | 6,793 | 1 | | 2,346 | 110 |
| Aceh Tamiang | 30,128 | 15,876 | 160,030 | 16,003 | | 1 | 4,693 | 160 |
| TOTALS | 172,946 | 84,788 | 993,334 | 155,604 | 5 | 7 | 44,582 | 1,620 |

In order to create a more accurate and specific outcome, Field Assistant Eko Apriano will conduct additional field surveys in Subullusalam, Singkil, and Aceh Selatan kabupaten (24-31 July) and potentially in Aceh Timur and Aceh Barat in August. This will lead to the identification of specific locations and potential funders for at least two other kabupaten besides the two that include the winning bid and the Serasi project (see Annex 9).

Regarding potential biofuel production plants, the author has concluded that the most immediately likely sites will be in the proximity of Langsa on the east coast of Aceh and Singkil on the west coast of Aceh. These two areas are also demarcated on the provincial map contained on Page 30 in Annex 1. These two areas share several common features:

- Both are in the proximity of large volumes of existing smallholder and large estate palm oil plantations.
- Both have developing deep-water ports that can facilitate barges and tanker vessels of 1,000 to up to 5,000 metric tons for importing catalysts such as methanol and exporting finished products.
- They are strategically located on their respective coasts to capture the production from other small-scale mills further within Aceh.
- Both are close to North Sumatra and thus would have access to supplemental feedstocks from outside Aceh.

During the first portion of this consultancy, the author initiated a dialogue with the general manager of an existing commercial resin plant in Langsa that is interested in exploring potential retrofitting of biodiesel processing capacity into their existing physical plant and infrastructure. The site and logistics are relatively promising, and potential technology providers and business partners have been identified. During the remaining time of this consultancy, the author will review this opportunity further, as it may prove to be a very effective means of stimulating further investments in the small-scale processing plants in Aceh overall.

# 6. POTENTIAL EMPLOYMENT IMPACTS

## A. ANALYSIS OF EXISTING PLANTS IN ACEH

The best means to gauge the potential employment impacts of the small-scale palm oil mills for Aceh is to analyze existing production facilities. At present there are only two operating small-scale mills in the province—one private plant located in Aceh Tamiang kabupaten and another facility owned by the local government in Trumon, Aceh Selatan. The former has been operating on a consistent basis for about three years, while the other mill only operates on an irregular basis.

Of these two, the private plant, C.V. Selaxa Windu, is the sole small-scale palm oil mill currently operating in Aceh that produces high Free Fatty Acid (FFA) crude palm oil (CPO) or HFCPO. This product is currently sold to soap manufacturers and exporters in Medan. Some of the current buyers are also in the process of selling HFCPO as a non-food grade biofuel feedstock to customers in China, Australia, and the United States. Located on 4 hectares of leased land, the plant was built in 2006-2007 by the owner after visiting several of the small-scale mills in nearby Langkat Kecamatan in North Sumatra. He hired a local engineer familiar with the design and construction of these plants to build and install him a facility with a capacity of 24-30 tons of raw material per day.

The plant is currently processing an average of 24 tons of loose fruit (brondol) to yield about 50 tons of HFCPO per week. The raw materials are bought from a supply network of 15 collectors from Aceh Tamiang and Aceh Timur Kabupaten, of which 8 are involved full-time with the plant. The plant uses eight direct steam sterilizer stainless steel kettles that require a significant volume of firewood and is also not running optimally in terms of fuel efficiency and production controls. For example, the lighting and water pumping for the plant uses up to 150 liters of diesel per day to power a stationary electrical generator.

The plant has the following direct and indirect labor utilization:

| | |
|---|---|
| Manager and Plant Workers: | 36 full-time |
| Contract Palm Kernel Sorters: | 15 full-time |
| Suppliers (each unit is oneCollector/ pengumpul and 4 Workers) | 60 full-time |
| Lifters (Bongkar-Muat) | 5 day laborers |
| Total Labor Force | 116 |

The owners of this plant are interested in expanding the plant's production capacity from the current 24 to 80 tons per day, leading to total production of a minimum of 150 metric tons of HFCPO per week. They are interested in introducing a simple boiler to provide power for a consolidated sterilizer. This would create increased efficiencies and cost savings by using biomass fuel which is cheaper and ecologically more sustainable instead of several simple stainless steel kettles powered by firewood. They also are interested in installing a new and expanded palm oil mill waste (POME) pond system. The system will recover all of

the nutrients as well as recirculate the solid and liquid waste components to nearby fruit gardens and deliver the waste products as needed.

The greater efficiency will lead to proportionately less labor requirements and allow the plant to use both loose fruit and overripe fresh fruit bunches (FFBs). This will enable the plant to become more competitive in raw material sourcing and thereby also have the effect of creating higher prices and income for smallholder growers and local traders. The owner estimates that this investment will create an additional minimum of 75 additional workers. Therefore, this plant would create a total of about 190 full-time jobs overall.

# B. PROJECTED EMPLOYMENT OPPORTUNITIES FOR ACEH PROVINCE

Based on the analysis contained in the previous section, the creation of small-scale palm oil mills in Aceh could lead to some significant economic and employment gains for the province. As indicated in the following page, the 12 potential mill sites could create around 1,620 additional workplaces. These figures are based on averages of 110 workplaces created for a 25 ton per day processing plant and 160 workplaces created for a 50 ton per day processing plant. The basic assumption is that the larger plants would be continuous rather than batch processing designs and less labor intensive, thus accounting for the disproportionate workplace creation results. The summary projections of employment impacts are contained in the chart below:

| Kabupaten | Estimated Potential Mills by Mill Size | | Estimated Workplaces Created |
|---|---|---|---|
| | 25 T/day | 50 T/day | |
| **Aceh Jaya** | | 1 | 110 |
| **Aceh Barat** | 1 | | 110 |
| **Nagan Raya** | 1 | 1 | 270 |
| **Aceh Selatan** | 1 | | 110 |
| **Singkil (Incl. Subulussalam)** | | 2 | 320 |
| **Bireun** | 1 | | 110 |
| **Aceh Utara** | | 2 | 320 |
| **Aceh Timur** | 1 | | 110 |
| **Aceh Tamiang** | | 1 | 160 |
| **TOTALS** | 5 | 7 | 1,620 |

During the technical assistance phase to the winning bidder of the pilot processing plant in September 2009, the author will conduct a more detailed assessment of labor aspects of the facility. This will enable a recalibration of the overall potential employment impacts imputed from this sector in Aceh. This effort will attempt to create accurate data on cost per workplace created and the additional income derived from each facility and this sector as a whole if the anticipated number of potential locations can be established.

# 7. MARKET DEMAND AND SALES CHANNELS FOR PALM OIL WASTE BY-PRODUCTS

The output of the small-scale palm oil mills is currently sold by most existing mills to local intermediaries and to processors and exporters in port areas such as Medan, Dumai, and Palembang. With the exception of a now failed Chinese and Indonesian joint venture in Medan, virtually all of these parties are of domestic origin. The primary local demand for the High Fatty Acid CPO (HFCPO, locally known as "asem tinggi") and the sludge oil (called "minyak kotor" in local business channels) is as a feedstock for soap and detergent manufacturing in the indigenous oleochemical industry. Typically the producers simply store and convey the products in recycled 200 liter oil drums, which are stacked in warehouses or loaded into trucks and containers. If they are dealing in greater volumes, they may use larger metal storage tanks ("tanki timbun") or improvise by creating stationary tanks out of tanker trucks.

The facilities and technologies of both the producers and many of their immediate customers are very rudimentary, which creates some marketing and logistical challenges. Depending on the level of Free Fatty Acid (FFA), moisture levels, and impurities, the producers may need to install additional equipment and means to keep or revert the materials back to a fluid state. As a rule of thumb, the higher the FFA percentage, the greater the viscosity of the material and hence its facility to be transferred to new containers. Although the tropical heat often mitigates problems, local plants may need to consider installing heating coils in the tanks or steam heating jackets in order for the plant to run optimally. Most of the local mills do not have the sophisticated laboratory testing procedures or filtering and purification equipment needed to create consistent products and blends. Accordingly, most of the small-scale local mills are best positioned to sell to consolidators rather than directly to manufacturers and exporters.

A typical local manufacturer in Medan will have adequate storage systems and processing equipment to enable them to keep their own operations going and consolidate product for resale. They will likely have relationships with several suppliers who generally expect full cash payment upon delivery of product, if not some degree of prefinancing to guarantee availability. These companies can typically accommodate a large range of variability in the raw material feedstock, as they have the means to blend, clean, or otherwise match specifications. The author is in the process of compiling a list of buyers in several locations in Sumatra, including consolidators, manufacturers, and exporters, which will be included in an updated version of this report.

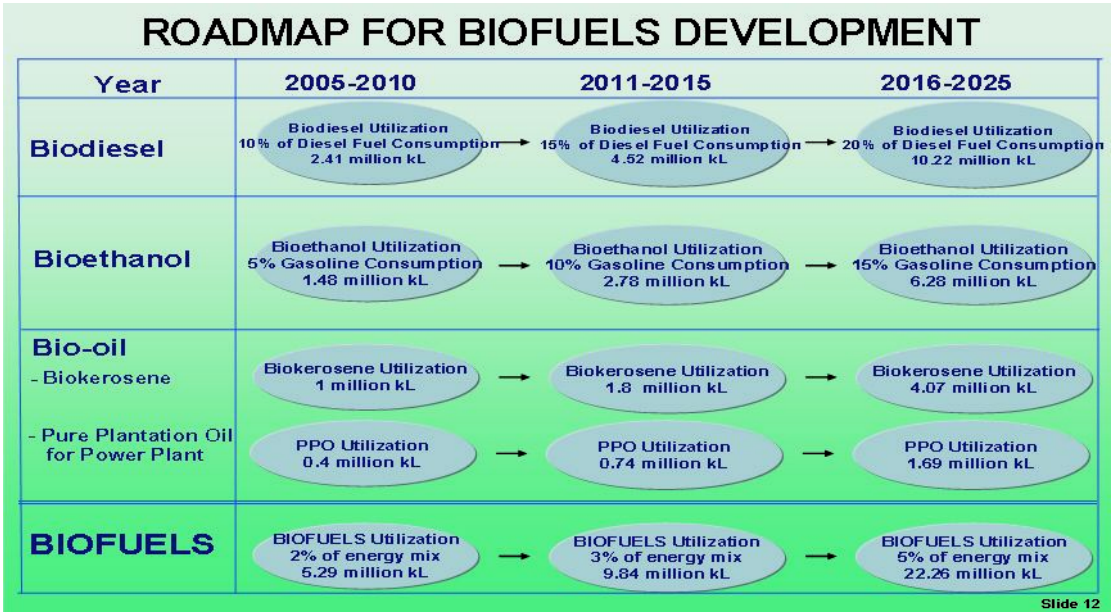
As the absorptive capacity of local manufacturers is limited due to the poor quality of the materials, local traders and manufacturers are increasingly working to develop export channels. Over the last decade, as this palm oil waste stream has found commercial outlets, the most active foreign buyers are of Asian origin, ie. primarily Indians, Pakistanis, Koreans, and Chinese. These buyers work through local agents or consolidators, and also make frequent supervisory visits to the main port areas. Malaysian buyers are rarely involved, as Malaysia is Indonesia's largest competitor when it comes to palm oil. Prices are very similar

as the palm industries in both countries are tied to the international palm oil commodity exchange Bursa Malaysia Derivatives (BMD) based in Kuala Lumpur.

Until recently, most of the foreign buyers have also been engaged in the soap, detergent, and surfactant manufacturing industries in their countries. Since these products sell at a discount to Crude Palm Oil and Palm Kernel Oil, and are technically not acceptable as food grade products, the market is limited to companies seeking low quality, lower priced ingredients. There are reported instances in India and China of manufacturers refining and blending the HFCPO and sludge oil with food grade oils. This, of course, could pose major health and nutrition risks for consumers, as well as liabilities for the manufacturers in the event of enforcement by their health and safety authorities. To our knowledge, these particular markets are currently considered less reliable and often lack transparency and long-term contracting options.

The potential of these products as biofuel feedstocks is on the threshold of major expansion. This burgeoning growth is driven now by three primary forces—a) the creation of domestic and international targets and mandates for biofuel content in the energy sector; b) the urgent need of biodiesel producers to secure alternative, lower-cost feedstocks than the high grade and refined CPO and olein which were required by the first-generation biodiesel plant technologies; and, c) the discovery of new biofuel direct applications such as as a replacement for heavy oils or bunker fuels in power plants, cruise vessels, and household stoves. A fourth driver is looming on the horizon—the growing demand by consumers and customers in the West primarily to insist on non-destructive, environmentally-sound production systems and to avoid using food products for fuel applications.

The illustration below highlights the Indonesian government's current efforts to proactively promote biofuels as a key component of its national energy security policy. The Roadmap for Biofuels Development was drafted in 2007 by the National Biofuels Team, which is comprised by a multi-agency task force comprised of representatives of the Ministries of Finance, Mining and Energy, Agriculture, Trade and Industry, and Transportation, as well as representatives of leading academic institutions such as UI, IPB, and ITB. The team was led by Dr. Evita Legowo, then Special Assistant to the Minister of Mining and Energy, and now elevated to the strategic position of Director General of Oil and Gas (Dirjen Migas).



These ambitious targets are intended to boost and build strong momentum for domestic biodiesel, bioethanol, and bio-oil producers in Indonesia. The Indonesian biodiesel and bioethanol industries have largely risen to the challenge, with estimated production capacities for both segments estimated to match the targets for 2010. However, the Roadmap targets have not been created as clearly defined mandates, nor adequately supported by well-established subsidies and incentives by the legislative branch of the government. Consequently, many biodiesel plants in Indonesia are idled now or mainly producing for international demand due to the lack of these support mechanisms. In a meeting with Director General Dr. Legowo and her deputy in June 2009, the author was informed that the biofuel subsidies (proposed as Rp 1,000 per liter average for 2009 and Rp 2,000 per liter average for 2010) were making progress in the national legislature.

Until recently, the low grade palm oil by-products were not easy to accommodate within the Indonesian and international biofuel industries. The first generation biodiesel plant designs required fairly low FFA percentages in order to function effectively, such as are found in the refined olein (less than 0.5% FFA) and CPO (less than 5% FFA). The process of esterification—adding a catalyst methanol to olein or CPO in a reaction tank in order to produce palm methyl ester (biodiesel) and glycerine—resulted in low yields and excessive costs when the lower grade, higher oil content feedstocks were used. Over the last year, new technologies and processes from Europe and Australia including pretreatment and transesterifcation have been incorporated into newer biodiesel production plants. It is anticipated that by mid-late 2010, a critical mass of the new designs will be out on the market in force, thus giving strong market impetus to palm oil waste by-products. Two major new biodiesel plants in progress now in Riau and North Sumatra will lead the charge, potentially followed or even preceded by a facility in Aceh.

The advent of greater access and production capacities of HFCPO, sludge oil, and other palm waste by-products will also help the biodiesel industry rise up out of its current malaise. Despite many millions of dollars invested by large palm oil companies such as Wilmar, Permata Hijau, and Musim Mas, their investments have not borne fruit yet as the price of CPO has consistently been above that of diesel. The author believes that the convergence of the lower cost feedstock availability, technological improvements, and enactment of biofuel subsidies will create significant momentum. The facts that the low grade feedstocks do not require or induce expansion of the palm oil industry and that they are not of food grade quality are both strong factors which can help to sustain and grow this new industry sector on the ground in Aceh and elsewhere in Indonesia.

The author has been tracking this nascent market segment for over the last year. Based on his own experience and current market trends, the anticipated demand for palm oil waste by-products should begin to accelerate in 2010. This will likely be led by increasing direct application of HFCPO as part of a blend with conventional diesel in Indonesian and international electrical power plants. This will be followed in the rural industrial arena in Indonesia, ie. in agricultural drying operations such as tobacco and cacao, in selected regions of the country, as well as with increasing interest in household plant oil stoves such as those promoted by the multinational company Bosch Siemens. Accordingly, below is a summary of projected potential demand for palm waste by-products in the next few years:

**Estimated Demand for Palm Oil Waste By-Products**

| | |
|---|---|
| **Power Plants:** | |
| -USA/Europe (2010) | 10,000 MT/Mo |
| -Indonesia (2010) | 5,000 MT/Mo |
| **Biodiesel Plants** | |
| -Indonesia (2011) | 25,000 MT/Mo |
| **Industrial Fuel Oils (2010)** | |
| -Tobacco (Indonesia) | 30,000 MT/Yr |
| -Mining (Indonesia) | 1,000 MT/Mo |
| -Household Energy | 1,500 MT/Mo |
| **Sales Volume (2010-2011)** | **18,700-45,000 MT/Mo** |
| **Sales Value (2010)** | **US $7.5-$18MM/Mo** |

The author has been in contact with senior officials of the national electrical authority PLN in their provincial branch office in Banda Aceh. PLN provided him with the province wide data on current installed capacity and fuel usage by each of the 38 power generating stations which are now running on high speed diesel (HSD) or marine fuel oil (MFO). This data is contained in Annex 8 on page 60 in the back of the report. The total power generated in 2008 was 268,394,858 kilowatt hours (KWh), which required 72,300 kiloliter of HSD and 27,883 kiloliter of MFO, or a total fossil fuel consumption of 100,183 kiloliter. In order to achieve the 10% biodiesel utilization target set in the National Biofuels Roadmap, PLN would need to procure about 10,018 kiloliters of biodiesel. For comparative purposes, this is equivalent to about 22.5% of the projected production of 44,582 kiloliters by the 12 proposed small-scale palm oil processing plants in Aceh.

The current reality is that Aceh is only generating about one third of its electricity through these generators. The rest of the power is imported from North Sumatra. The author suggests that PLN begin by running pilot biodiesel trials in two of their generators in Abdya and Tapak Tuan, which are not tied into the North Sumatran power grid and likely to continue in production for several years to come. This is shown in the map in Annex 1, page 32. As envisioned within ***Aceh Green***, in the long term Aceh should become a net energy producer through the sustainable exploitation of its ample geothermal and hydro power resources. However, the author believes that Aceh can move forward on the path towards energy self-reliance through sustainable biofuel production in a way that provides enhanced employment opportunities. This is an option that is achievable and worth pursuing in the short term.

# 8. PROVISIONAL CONCLUSIONS AND RECOMMENDATIONS

The author presents the following **conclusions** for consideration:

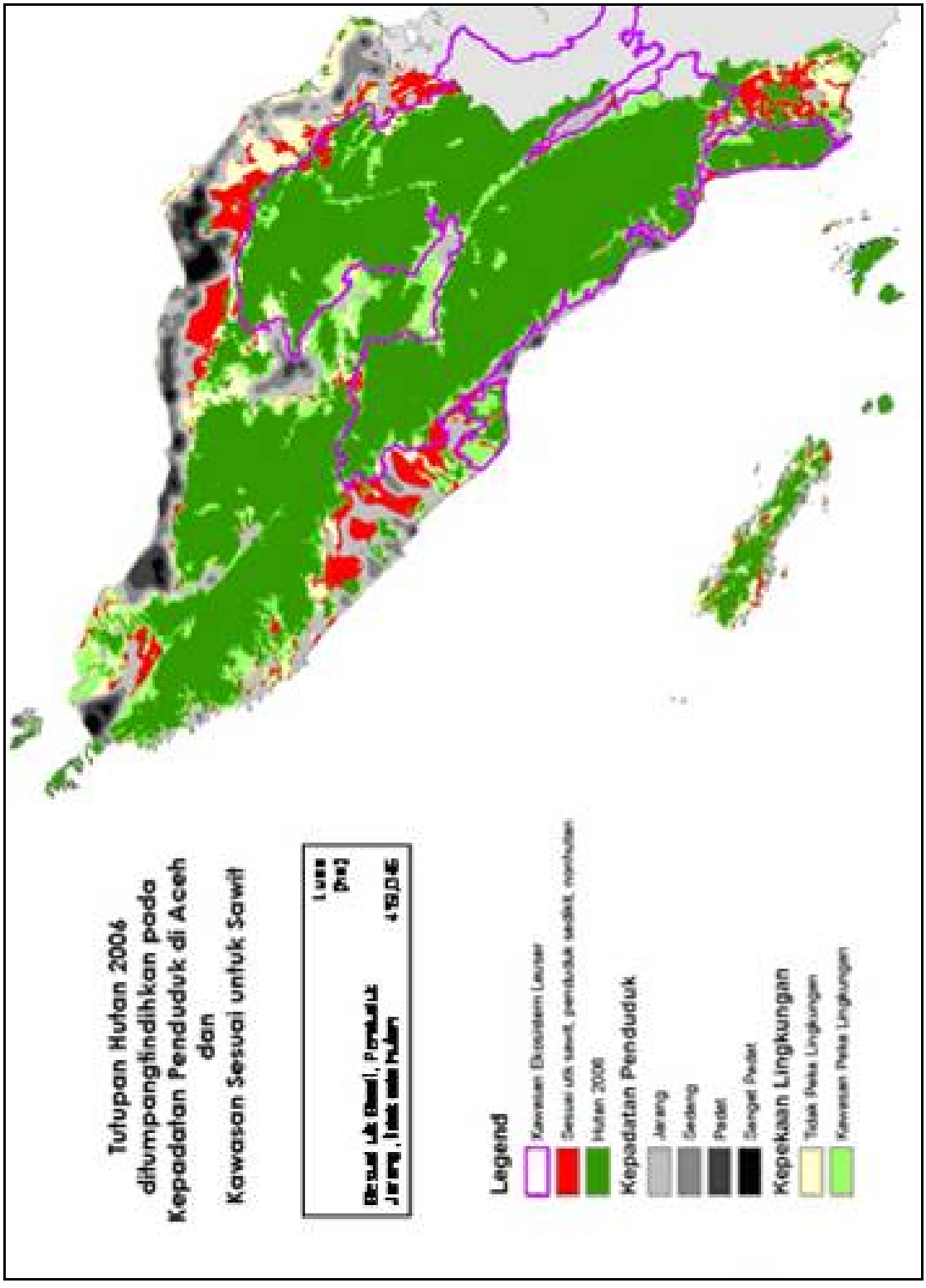
- The original premises and program concepts on biofuel production and sustainable palm oil development within ***Aceh Green*** summarized in Section 2 of this report remain valid and are worthy of renewed support.
- Immediate opportunities for demonstrating the value and effectiveness of biofuels as means for energy self-reliance in Aceh are available at the household, rural industry, and power generation levels.
- Further dialogue and public awareness is needed in Aceh regarding the theme of biofuels and its linkages to sustainable palm oil.
- With additional appropriate financial, technical, and marketing support such as that being provided by ESP in this assignment, small-scale palm oil waste by-product processing plants can be stimulated to achieve significant employment generation objectives in Aceh.
- Detailed multi-stakeholder data collection and analysis is needed at the kabupaten level to pinpoint the specific sites of further local small-scale processing plants.

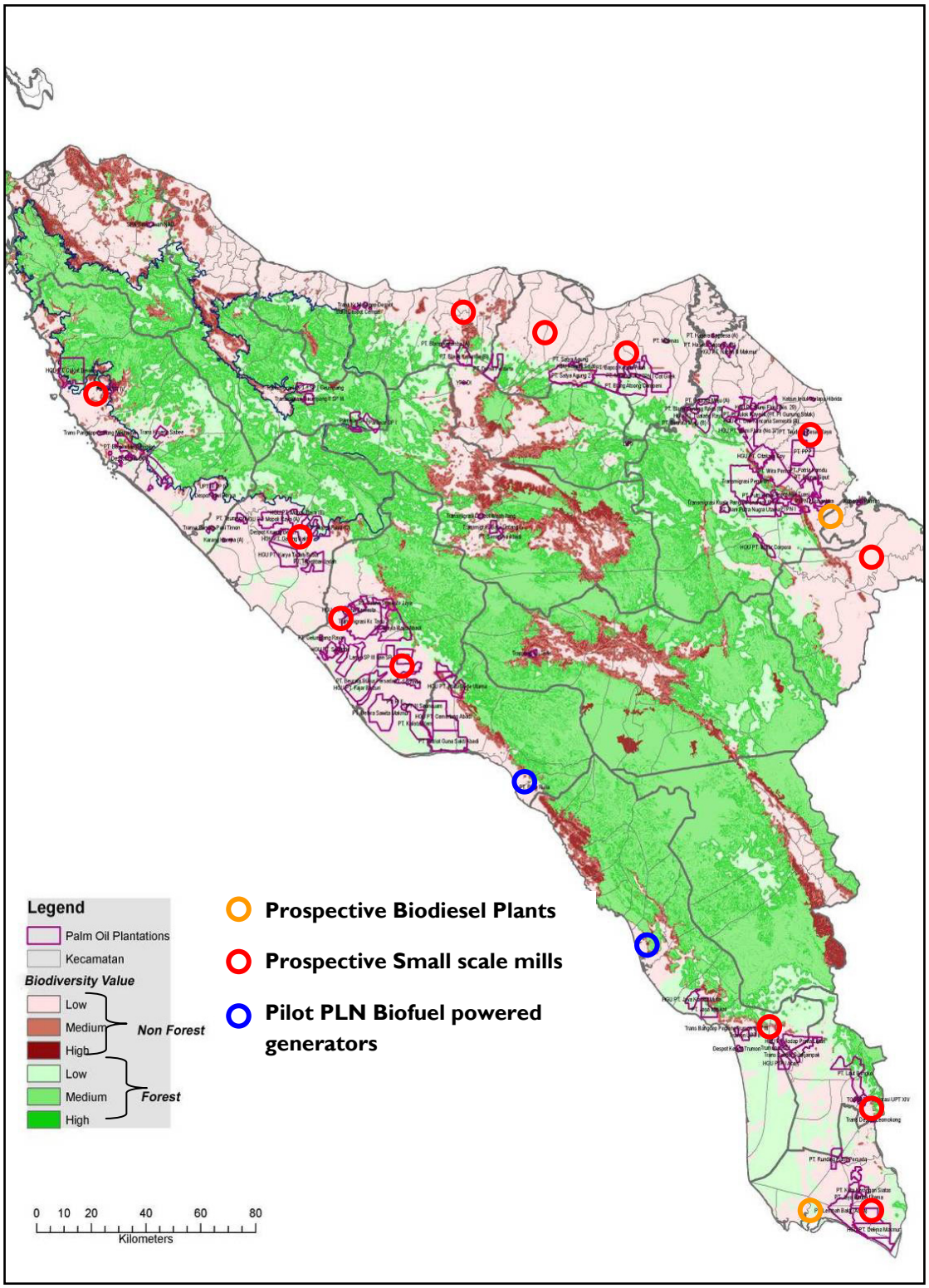
The author makes the following **recommendations** for follow-on actions:

- Convene a high level workshop on biofuel development strategies for Aceh, coordinated by the ***Aceh Green*** secretariat, with a few key invited speakers such as Governor Irwandi and Director General of Oil and Gas Dr. Evita Legowo.
- Seek short-term development financing and investment to supplement the one pilot plant that will be financed by ESP with two others in strategic locations.
- Support the Pilot Smallholder Sustainable Palm Oil and Cacao Initiative in Paya Bakong, Aceh Utara, Indonesia through Serasi and/or other means.
- Create a long-term incentive program within the Government of Aceh and local banks for stimulating further small-scale palm oil mill development in Aceh, especially local level micro and mini-mills which can handle overripe, low-grade, and loose fruit.
- Activate the Indonesian National Biofuels Road Map by conducting pilot biofuel trials at 2-3 PLN generators for a year, to be followed by a B10 (10%) biofuel content target for all of Aceh by the end of 2010 or as soon as Aceh has its own biofuels production capacity.
- Determine to what extent, if any, the current major fossil fuel producers, ie., Exxon Mobil, Arun Gas, and Pertamina, could support the transition to renewable energy and biofuels in Aceh.
- Launch an internal dialogue within USAID Indonesia regarding sustainable palm oil, High Conservation Value (HCV) assessments, Reduction of Emissions through Deforestation and Degradation (REDD), and biofuels.

# 9. ANNEXES

## ANNEX 1: ACEH PALM OIL PRODUCTION AND PROPOSED INFRASTRUCTURE MAPS




Legend
Palm Oil Plantations
Kecamatan
Biodiversity Value
Low
Medium
High
Non Forest
Low
Medium
High
Forest
Prospective Biodiesel Plants
Prospective Small scale mills
Pilot PLN Biofuel powered generators
0 10 20 40 60 80
Kilometers

# ANNEX 2: DESCRIPTION OF 1 TON/HOUR PALM OIL MICROMILL

**MICRO PALM OIL MILL**
**Kapasitas: 1 ton Buah Brondol/jam**

## I. PENDAHULUAN

Buah sawit adalah sumber bahan baku CPO (Crude Palm Oil) dan PKO (Palm Kernel Oil). CPO dihasilkan dari daging buah sawit, sedangkan PKO dihasilkan dari inti buahnya. Baik CPO maupun PKO merupakan bahan baku utama bagi banyak ragam industri seperti : industri makanan (minyak goreng, margarine, shortening, salad dressing, butter, dan sebagainya), industri kimia (fatty acid, fatty alcohol, ester beserta derivatnya), industri kosmetik (sabun dan sejenisnya) bahkan hingga bahan baku utama industri BIODIESEL, yang saat ini sedang sangat popular

Pengolahan buah sawit menjadi CPO sebetulnya memiliki teknologi proses yang sangat sederhana, yaitu : rebus, peras, dan pisah. Meskipun demikian, selama ini pengolahan CPO hanya dikuasai oleh para pemodal besar. Setelah memobilisasi dana ratusan milyar rupiah untuk mega proyek puluhan ribu hektar perkebunan kelapa sawit, selanjutnya mengintegrasikan pengolahan CPO kedalamnya. Akibatnya terkesan bahwa Teknologi pengolahan CPO sangat padat modal, dan susah untuk membayangkan bahwa pabrik pengolahan kelapa sawit bisa dibuat sekecil dan sesederhana penggilingan padi.

Efisiensi modal bisa dilakukan pada beberapa pos, yaitu: infrastruktur dan mesin-mesin pelengkap seperti pesawat-pesawat angkat-angkut. Bangunan pabrik kira-kira seluas 20 m x 20 m, diatas lahan seluas kira-kira 40 m x 40 m, tidak berdinding, dengan konstruksi kayu dan beratap seng. Selama kapasitas pengolahan masih 2 ton buah brondol sawit/jam, pekerjaan-pekerjaan memindahkan bahan produksi dari suatu mesin ke mesin lainnya bisa dilakukan dengan tenaga manusia. Sehingga praktis tidak diperlukan conveyor, bucket elevator dan sebagainya.

Penyederhanaan bahkan bisa dilakukan terhadap peralatan utama seperti bejana rebusan beserta pembangkit steamnya. Dalam pabrik besar, bejana rebusan dengan pembangkit steam (boiler) ditempatkan terpisah, dan terhubung melalui sistim pemipaan yang rumit. Disana, selain berfungsi debagai pembangkit panas, boiler juga difungsikan untuk menggerakkan turbin pembangkit listrik. Boiler berikut turbin seperti ini bisa berharga milyaran rupiah.

Untuk perhitungan setiap ton buah sawit yang diproses, faktor sumber energi listrik adalah selisih biaya produksi. Pabrik besar betul-betul berswasembada listrik dengan memanfaatkan serat hasil presan buah, sehingga faktor biaya untuk ini dapat diminimalkan. Untuk pabrik kecil, serat dan (mungkin) cangkang hanya dimanfaatkan sebagai pembangkit panas. Untuk menggerakkan motor-motor gearbox dan pompa (+ kompresor), dipenuhi dengan genset diesel.

Untuk perhitungan faktor tenaga kerja langsung, mungkin pabrik besar lebih efisien. Akan tetapi, pabrik kecil tidak memerlukan hirarki organisasi yang panjang, sehingga tidak perlu tenaga kerja tak langsung. Pekerjaan-pekerjaan seperti administrasi, inventory, planning, bahkan hingga marketing bisa dirangkap oleh satu orang saja.

# II. DASAR PERANCANGAN

Pabrik dirancang untuk memenuhi kapasitas `1 ton/jam buah sawit brondolan (yang sudah lepas dari tandan). Buah sawit brondolan, biasanya akan menghasilkan CPO dengan kadar FFA antara 8 – 15 %. CPO dengan kadar ini tidak bisa diterima oleh industri minyak goreng. Oleh karena itu, pabrik kelapa sawit besar biasanya mensortir buah brondolan dan memberi harga yang cukup rendah dibanding buah sawit segar bertandan.

Meskipun ada kekurangan seperti yang disebutkan dimuka, buah sawit brondolan memiliki rendemen (rasio hasil CPO dengan umpan buah sawit) yang lebih besar dibanding tandan buah segar (TBS). Brondolan memiliki rendemen 30%, sedangkan TBS hanya memiliki rendemen 20-25%. Meskipun CPO dengan FFA tinggi ditolak pabrik minyak goreng, industri oleochemical (fatty acid, fatty alcohol, sabun) mau menampung CPO ini, berapapun kadar FFAnya

Dari umpan 2 ton/jam buah sawit brondolan, akan didapatkan CPO sebanyak 600 ton/jam, klatak (inti buah sawit dan terlindung batok/cangkang) sebanyak 300 kg/jam, dan selebihnya adalah sabut, yang selanjutnya digunakan sebagai bahan bakar perebusan. Secara sederhana, prosesnya adalah sebagai berikut : buah sawit direbus dalam boiling chamber hingga layu, selanjutnya dikupas dalam digester dan diperas dengan screw press, yang kemudian pulp hasil perasan buah yang telah dilayukan dimurnikan pada continuous separation tank untuk mendapatkan CPO murni.

### Boiling Chamber (Rebusan)

Dengan temperature operasi 130$^{o}$C dan tekanan 3 bar g, buah sawit akan matang dalam waktu sekitar 45 menit. Dengan asumsi waktu yang dipergunakan untuk bongkar-muat boiling chamber adalah 45 menit, maka untuk memasak 1 batch buah sawit dibutuhkan waktu total 1.5 jam.

Agar feeding kedalam digester dan screw press terjaga kontinyu, rebusan harus mampu memasak 3 ton tiap batch (=1.5 jam x 2 ton/jam). Dengan asumsi bulk density buah sawit brondolan adalah 0.75 ton/m$^3$ maka, dibutuhkan boiling chamber sebesar 4 m$^3$ . Dengan faktor koreksi 50 %, boiling chamber dirancang sebesar 8 m$^3$.

Boiler dirancang bekerja kontinyu agar tekanan steam terjaga tetap 4 bar g. Kettle dirancang sebagai kettle pipa api, dimana api dan flue gas berada dalam tube (pipa), sedangkan air berada dalam shell. Steam yang dibangkitkan kettle, selain untuk memasak buah sawit, juga dipergunakan untuk memanaskan CPO dalam purifier dan mempertahankan temperature tangki penyimpanan hasil CPO tetap 90 $^{o}$C.

Bahan bakar Kettle direncanakan akan memanfaatkan sabut hasil screw press yang diumpankan dengan menggunakan blower. Gas buang hasil pembakaran sabut, diisap dengan ex-house fan yang dilengkapi cyclone untuk menangkap abu sisa pembakaran.

### Digester dan Screw Press

Setelah dikeluarkan dari boiling chamber, buah sawit yang sudah layu ini diumpankan kedalam digester. Digester dirancang sebesar 1 m$^3$, berbentuk silinder dilengkapi agitator propeller, dengan kecepatan putaran 100 rpm, berfungsi untuk melumatkan daging buah.

Keluar dari digester, daging sawit yang sudah lumat ini langsung masuk ke screw press untuk diperas. Screw press meliputi dua batang screw (ulir) yang berputar saling berlawanan. Bubur sawit akan terdorong dan ditekan, sehingga menyebabkan sawit terperas. Pulp hasil perasan

keluar lewat perforated strainer, dan selanjutnya ditampung dalam bak, sebelum dipompakan ke bak purifier/CST.

Sabut akan keluar bersama klatak pada ujung screw press, yang kemudian dipisahkan antara klatak dan sabut secara manual. Klatak dikumpulkan untuk dijual, sedangkan sabut diumpankan kedalam tungku kettle sebagai bahan bakar.

**Purifier (Continuous Separation Tank/CST)**

Purifier adalah tangki yang dilengkapi dengan steam coil. Purifier dirancang cukup untuk menampung hasil proses selama 12 jam kerja (20 ton). Setelah dilakukan settling selama lebih kurang 5 jam, CPO murni dipompakan kedalam tangki penyimpanan.

# III. ANALISA EKONOMI

**1. Biaya Proyek**

| | | |
|---|---|---|
| a. Design fee | Rp | 100.000.000,- |
| b. Pembelian mesin, bahan dan peralatan | Rp | 405.100.000,- |
| **T O T A L** | **Rp** | **505.100.000,-** |

**2. Perhitungan Keuntungan**

**Biaya produksi perhari :**

| | | |
|---|---|---|
| - Buah sawit (10 jam x 2 ton/jam x Rp 1.850.000/ton) | Rp | 37.000.000,- |
| - Solar (100 liter x Rp 5000) | Rp | 500.000,- |
| - Kayu ( 0.5 colt diesel ) | Rp | 400.000,- |
| - Karyawan (10 org x Rp 40.000/org) | Rp | 400.000,- |
| **SUBTOTAL** | **Rp** | **38.300.000,-** |

**Biaya operasional :**

| | | |
|---|---|---|
| - Delivery Cost (Rp200/Kg CPO) | Rp | 1.200.000,- |
| **SUBTOTAL** | **Rp** | **1.200.000**,- |
| **GRANDTOTAL** | **Rp** | **39.500.000,-** |

**Penjualan Hasil Produksi :**

| | | |
|---|---|---|
| - CPO FFA (Rp 6.500,-/kg) x 0.3 x 20.000 kg | Rp | 39.000.000,- |
| - Nut/Klatak (Rp 1200,-/kg) x 0.15 x 20.000 kg | Rp | 3.600.000,- |
| **T O T A L** | **Rp** | **42.600.000,-** |
| **Net Profit = Rp 42.600.000 – Rp 39.500.000,-** | **= Rp** | **3.100.000,-** |

Jika dianggap bahwa dalam 1 bulan produksi terdapat 25 hari kerja, maka keuntungan perbulan mencapai **Rp 77.500.000,-**

**Catatan : Harga buah, harga jual minyak CPO hasil produksi sangat tergantung dari harga minyak CPO standard pasaran (CPO spot market), yang fluktuatif.**

# IV. PENGEMBANGAN PROYEK

Proyek ini adalah sasaran awal, dimana CPO FFA adalah celah sempit yang ditinggalkan pemodal besar. **Pasar utama CPO FFA adalah industri oleochemical seperti : soap, fatty acids, fatty alcohol, yang selama ini kesulitan mencari bahan baku murah**. Untuk industri ini, CPO tidak disyaratkan harus memiliki kandungan FFA rendah, tapi lebih kepada impurities dan sifat fisik (warna, bau, titer) saja. Sehingga, pasar CPO FFA masih sangat terbuka.

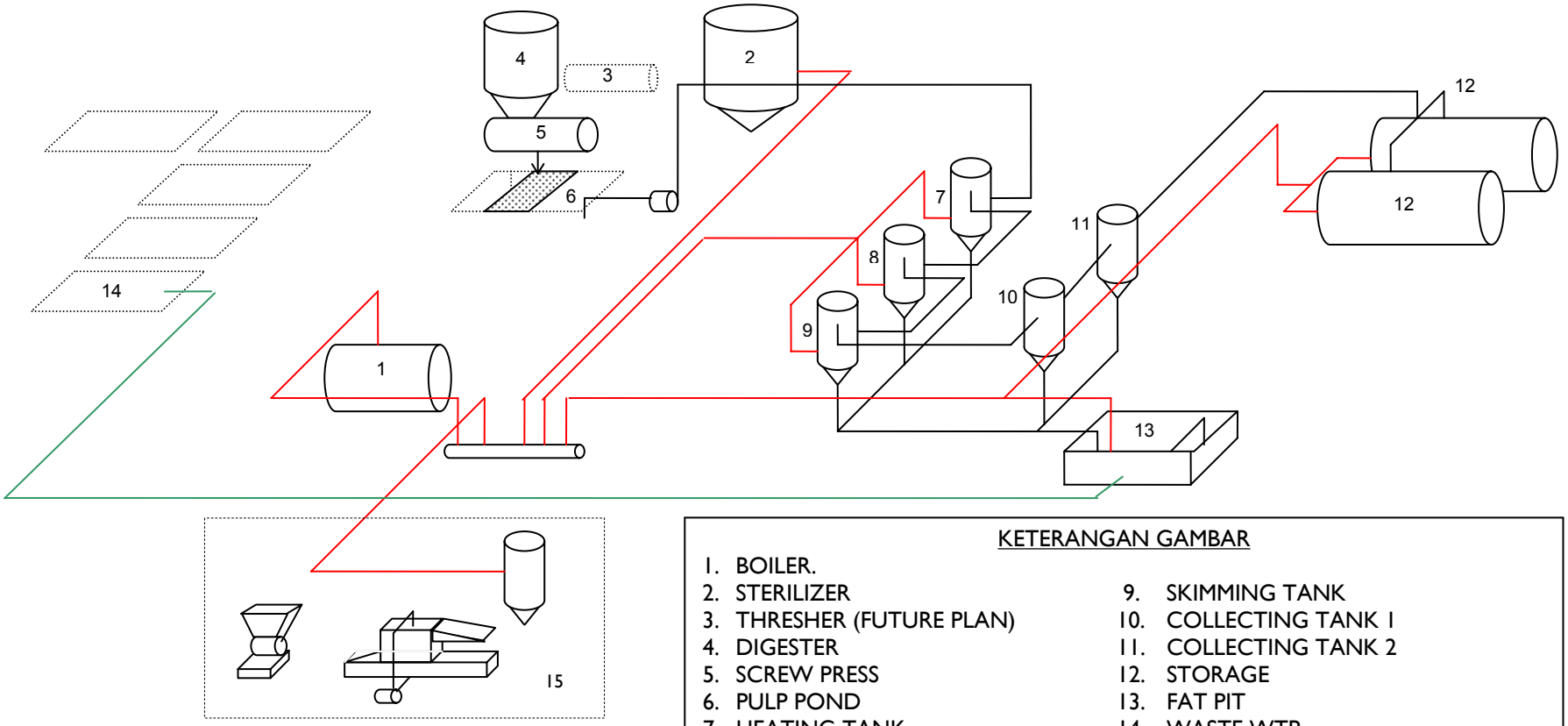
Proyek ini dihitung berdasarkan suplai bahan baku yang sangat minimum yang bisa diperoleh perhari. Padahal, berdasarkan survey pada beberapa pengumpul sawit brondolan di salah satu kabupaten di Sumatera Utara, sehari bisa terkumpul sedikitnya 300 ton sawit brondolan hasil kebun rakyat. Oleh karena itu, kapasitas perhari masih sangat mungkin untuk ditingkatkan dengan menambah jam operasi pabrik.

Dengan mengambil sekitar sepuluh persen keuntungan perbulan, pengembangan bisa dilakukan terhadap peralatan maupun infrastruktur secara bertahap. Pabrik bisa dikembangkan untuk mengolah sawit tandan buah segar menjadi CPO standard dengan menambah 1 unit mesin thresher (mesin bantingan). Mesin bantingan adalah mesin untuk memisahkan janjang (tangkai buah) dengan buah sawit.

Pengembangan selanjutnya bisa juga dilakukan untuk pengadaan mesin pengolah nut/klatak. Mesin ini melepaskan cangkang dari inti (kernel). Nilai jual klatak yang hanya Rp 900/kg akan naik menjadi Rp 2500/kg sebagai inti/kernel. Dan Kernel selanjutnya bisa juga direbus dan diperas menjadi PKO yang bisa mencapai harga Rp 13000/kg. Ini bisa dilakukan dengan menambah rebusan dan screw press baru agar tidak mengganggu aktivitas produksi CPO.

# V. KESIMPULAN

Proyek ini sangat layak untuk direalisir karena sangat menarik dilihat dari keuntungan yang diperoleh. Dengan modal tetap sebesar Rp 505.100.000,- dan modal kerja awal (2 hari kerja produksi) Rp 38.300.000,-, return on investment akan diperoleh dalam 7 bulan. Angka ini menunjukkan bahwa proyek ini adalah bisnis manufaktur yang sangat luar biasa. Bisnis ini juga bisa sangat ekspansif karena beragam turunan produk sawit bisa diolah dengan teknologi murah.




KETERANGAN GAMBAR

1. BOILER.
2. STERILIZER
3. THRESHER (FUTURE PLAN)
4. DIGESTER
5. SCREW PRESS
6. PULP POND
7. HEATING TANK
8. SETTLING TANK
9. SKIMMING TANK
10. COLLECTING TANK 1
11. COLLECTING TANK 2
12. STORAGE
13. FAT PIT
14. WASTE WTP
15. DEPERICARPER (FUTURE PLAN)

MINI PALM OIL MILL KAPASITAS 1 TON / JAM

# ANNEX 3: DESCRIPTION OF 5 TON/HOUR PALM OIL MICROMILL

**MICRO PALM OIL MILL**
**Kapasitas: 5 ton Brondol dan/atau Tandan Buah Segar (TBS)/jam**

## 1. PENDAHULUAN

Pengolahan buah sawit menjadi CPO sebetulnya memiliki teknologi proses yang sangat sederhana, yaitu : rebus, peras, dan pisah. Meskipun demikian, selama ini pengolahan CPO hanya dikuasai oleh para pemodal besar. Setelah memobilisasi dana ratusan milyar rupiah untuk mega proyek puluhan ribu hektar perkebunan kelapa sawit, selanjutnya mengintegrasikan pengolahan CPO kedalamnya. Akibatnya terkesan bahwa Teknologi pengolahan CPO sangat padat modal, dan susah untuk membayangkan bahwa pabrik pengolahan kelapa sawit bisa dibuat sekecil dan sesederhana penggilingan padi.

Proposal dimaksud untuk mempopulerkan prinsip prinsip teknologi tepat guna kepada pemodal kecil – menengah, atau koperasi-koperasi petani sawit yang memiliki total lahan kurang dari 1000 ha. Proyek juga dimaksud untuk menyederhanakan mata rantai perdagangan buah dari petani kecil – pengumpul – agen – PKS. Panjangnya rantai inilah yang selama ini melemahkan nilai tawar petani kecil.

Prinsip Teknologi Tepat Guna adalah efisiensi modal dan bervisi berkembang sambil berjalan. Efisiensi modal bisa dilakukan pada beberapa pos, yaitu: infrastruktur dan beberapa mesin pelengkap seperti pesawat-pesawat angkat-angkut lori. Bangunan pabrik kira-kira seluas 40 m x 40 m, diatas lahan seluas kira-kira ½ ha, tidak berdinding, dengan konstruksi kayu dan beratap seng. Tata letak pabrik dibuat sedemikian sehingga bisa meminimasi pekerjaan-pekerjaan memindahkan bahan produksi dari suatu mesin ke mesin lainnya.

Penyederhanaan bahkan bisa dilakukan terhadap peralatan utama seperti bejana rebusan beserta pembangkit steamnya. Dalam pabrik besar, bejana rebusan dengan pembangkit steam (boiler) ditempatkan terpisah, dan terhubung melalui sistim pemipaan yang rumit. Disana, selain berfungsi debagai pembangkit panas, boiler juga difungsikan untuk menggerakkan turbin pembangkit listrik. Boiler berikut turbin seperti ini bisa berharga milyaran rupiah.

Untuk perhitungan setiap ton buah sawit yang diproses, faktor sumber energi listrik adalah selisih biaya produksi. Pabrik besar betul-betul berswasembada listrik dengan memanfaatkan serat hasil presan buah, sehingga faktor biaya untuk ini dapat diminimalkan. Untuk pabrik kecil, serat dan (mungkin) cangkang hanya dimanfaatkan sebagai pembangkit panas. Untuk menggerakkan motor-motor gearbox dan pompa (+ kompresor), dipenuhi dengan genset diesel.

Untuk perhitungan faktor tenaga kerja langsung, mungkin pabrik besar lebih efisien. Akan tetapi, pabrik kecil tidak memerlukan hirarki organisasi yang panjang, sehingga tidak perlu tenaga kerja tak langsung. Pekerjaan-pekerjaan seperti administrasi, inventory, planning, bahkan hingga marketing bisa dirangkap oleh satu orang saja.

# II. DASAR PERANCANGAN

Pabrik dirancang untuk memenuhi kapasitas 5 ton/jam Fresh Fruit Bunch (Tandan Buah segar – TBS). Dari umpan 5 ton/jam didapatkan CPO sebanyak 1 ton/jam, klatak (inti buah sawit dan terlindung batok/cangkang) sebanyak 500 kg/jam, dan selebihnya adalah tandan kosong, dan sabut. Sabut selanjutnya digunakan sebagai bahan bakar perebusan.

Secara sederhana, prosesnya adalah sebagai berikut : buah sawit direbus hingga layu, selanjutnya dipisahkan dari tandan. Biji sawit kemudian dikupas dalam digester dan diperas dengan screw press. Dari hasil perasan buah (pulp) inilah, CPO murni didapatkan setelah melalui proses pemurnian.

**Sterilizer (Rebusan)**
Dengan temperature operasi 130°C dan tekanan 3 bar g, buah sawit akan matang dalam waktu sekitar 45 menit. Dengan asumsi waktu yang dipergunakan untuk bongkar-muat boiling chamber adalah 45 menit, maka untuk memasak 1 batch buah sawit dibutuhkan waktu total 1.5 jam.

Agar feeding kedalam digester dan screw press terjaga kontinyu, rebusan harus mampu memasak 7.5 ton tiap batch (=1.5 jam x 5 ton/jam). Dengan asumsi bulk density buah sawit brondolan adalah 0.5 ton/$m^3$ maka, dibutuhkan boiling chamber sebesar 15 $m^3$.

Boiler dirancang bekerja kontinyu agar tekanan steam terjaga tetap 4 bar g. Kettle dirancang sebagai kettle pipa api, dimana api dan flue gas berada dalam tube (pipa), sedangkan air berada dalam shell. Steam yang dibangkitkan kettle, selain untuk memasak buah sawit, juga dipergunakan untuk memanaskan CPO dalam purifier dan mempertahankan temperature tangki penyimpanan hasil CPO tetap 90 °C.

Bahan bakar Kettle direncanakan akan memanfaatkan sabut hasil screw press yang diumpankan dengan menggunakan blower. Gas buang hasil pembakaran sabut, diisap dengan ex-house fan yang dilengkapi cyclone untuk menangkap abu sisa pembakaran.

**Thresher (Bantingan)**
Thresher dipakai untuk melepaskan biji sawit dari tandan setelah dikeluarkan dari Sterilizer. Thresher berupa silinder horizontal berlubang, dengan poros pemutar, berpenggerak motor. Setelah dipisah dari tandan, biji sawit selanjutnya diumpankan ke Digester

**Digester dan Screw Press**
Digester dirancang sebesar 1 $m^3$, berbentuk silinder dilengkapi agitator propeller, dengan kecepatan putaran 100 rpm, berfungsi untuk melumatkan daging buah. Keluar dari digester, daging sawit yang sudah lumat ini langsung masuk ke screw press untuk diperas. Screw press meliputi dua batang screw (ulir) yang berputar saling berlawanan. Bubur sawit akan terdorong dan ditekan, sehingga menyebabkan sawit terperas. Pulp hasil perasan keluar lewat perforated strainer, dan selanjutnya ditampung dalam bak, sebelum dipompakan ke bak purifier/CST.

Sabut akan keluar bersama klatak pada ujung screw press, yang kemudian dipisahkan antara klatak dan sabut secara manual. Klatak dikumpulkan untuk dijual, sedangkan sabut diumpankan kedalam tungku kettle sebagai bahan bakar.

**Purifier (Continuous Separation Tank/CST)**
Purifier adalah 5 buah tangki yang dipasang secara seri, dan masing masing dilengkapi dengan steam coil. Purifier dirancang cukup untuk menampung hasil proses selama 5 jam kerja (25 ton). Setelah dilakukan settling selama lebih kurang 5 jam, CPO murni dipompakan kedalam tangki penyimpanan.

Pulp yang tertinggal adalah berupa butiran/serat sabut kecil, kotoran, dan air selanjutnya disebut blended. Blended ini selanjutnya dialirkan ke bak penampung limbah.

**Bak Penampung Limbah (Waste Water Treatment Plant / WWTP)**
Blended tidak boleh dibuang langsung karena selain mengganggu lingkungan, blended masih bisa diambil manfaatnya. Untuk itu, penampung limbah dibuat bersekat sekat sebanyak 4 bak.

Sekatan pertama dibuat untuk menormalkan temperature buangan, sesuai dengan temperature lingkungan. Selain itu, dari bak ini diharapkan masih dapat diambil minyaknya. Keluaran dari bak pertama diatur sedemikian sehingga hanya blended dan air yang masuk ke bak kedua.

Di bak kedua juga diharapkan masih bisa mengambil kandungan minyaknya. Keluaran dari bak kedua juga diatur sedemikian hingga hanya air dan blended yang masuk ke bak ketiga. Sedemikian seterusnya, hingga keluaran dari bak ke empat hanya air yang keluar ke parit pembuangan.

Blended diharapkan tetap tertinggal di keempat bak ini, dan setelah penuh, bak dikuras dengan mengangkat semua blended. Blended selanjutnya dikeringkan dengan dijemur. Blended kering kaya akan unsur hara dan sangat bagus untuk dimanfaatkan sebagai pupuk organic untuk kebun sawit itu sendiri. Selain itu, blended kering juga bisa dimanfaatkan sebagai bahan bakar rebusan.

# III. ANALISA EKONOMI

**a. Biaya Proyek**

| | | |
|---|---|---|
| a. | *Tanah dan Bangunan* | Rp 100.000.000,- |
| b. | *Pondasi dan kontruksi platform* | Rp 400.000.000,- |
| c. | Pembelian mesin, bahan dan peralatan | Rp 4.066.439.640,- |
| d. | ( Perkiraan Pembelian Boiler + Turbin) | Rp 3.000.000.000,- |
| | **T O T A L** | **Rp 7.566.439.640,-** |

**b. Perhitungan Keuntungan Perbulan (25 hari kerja)**

| | |
|---|---|
| **Biaya produksi :** | |
| - Buah sawit (20jam x 5ton/jam x Rp 1.400.000/ton)x 25 | Rp 3.500.000.000,- |
| - Solar (500 liter x Rp 6500) x 25 | Rp 81.250.000,- |
| - Kayu ( 0.5 colt diesel ) x 25 | Rp 10.000.000,- |
| - Karyawan (20 org x Rp 40.000/org) x 25 | Rp 20.000.000,- |
| **SUBTOTAL** | **Rp 3.611.250.000,-** |
| **Biaya operasional :** | |
| - Delivery Cost (Rp200/Kg CPO) | Rp 50.000.000,- |
| **SUBTOTAL** | **Rp 50.000.000,-** |
| **GRANDTOTAL** | **Rp 3.661.250.000,-** |

**Penjualan Hasil Produksi :**

| | | |
|---|---|---|
| - CPO FFA (Rp 8,.000,-/kg) x 0.2 x 100.000 kg x 25 | Rp | 4.000.000.000,- |
| - Nut/Klatak (Rp 1200,-/kg) x 0.10 x 100.000 kg x 25 | Rp | 300.000.000,- |
| **T O T A L** | **Rp** | **4.300.000.000,-** |

**Net Profit = Rp 4,300.000.000 – Rp 3.611.250.000,- = Rp 638.750.000,-**

Catatan :

i. Semua angka pada biaya proyek adalah perhitungan untuk harga di wilayah Sumatera Utara. Untuk daerah lain tentu memiliki faktor harga yang berbeda.
ii. Harga buah, harga jual minyak CPO hasil produksi sangat tergantung dari harga minyak CPO standard pasaran (CPO spot market), yang fluktuatif.

# IV. PENGEMBANGAN PROYEK

Proyek ini dihitung berdasarkan suplai bahan baku dari kebun sawit dengan dengan produktifitas 100 ton TBS perhari. Proyek diusulkan berdasarkan prinsip berkembang sambil beroperasi. Prinsip ini diusulkan untuk meminimasi modal awal. Oleh karena itu, peralatan yang diusulkan adalah peralatan terpenting.

Dengan mengambil sekitar sepuluh persen keuntungan perbulan, pengembangan bisa dilakukan terhadap peralatan maupun infrastruktur secara bertahap. Pabrik selanjutnya bisa dikembangkan untuk bisa mengolah klatak menjadi inti.. Unit ini melepaskan cangkang dari inti (kernel). Nilai jual klatak yang hanya Rp 1200/kg akan naik menjadi Rp 3500/kg sebagai inti/kernel.

Turunan sawit seperti minyak goreng dan sabun sebetulnya juga bisa diproses dengan teknologi tepat guna. Teknologi ini tidak perlu mobilisasi dana besar, asal dengan asistensi teknis yang mengedepankan prinsip efisiensi biaya.

# ANNEX 4: DESCRIPTION OF 5-20 TON/HOUR PALM OIL MINIMILL


## The Way Ahead

## For the Palm Oil Industry

Author : Zebra Special Products
BV Date : 2009
Contact : palmpro@zebra-nl.com

# INTRODUCTION

The PalmPro mill is an innovative concept of Palm Oil Mill, which is addressing some of the issues related to the strong growth of the Palmoil demand.

- The global demand for palmoil is increasing with a speed of 6-7% per year over the last 5 years.
- 90% of the palmoil is produced in Malaysia and Indonesia

Many people (local Individuals or International Companies) try to take their share of the growing demand and nature is under pressure. The PalmPro concept addresses the next financial, technical and ethical issues:

- The mill is a modular concept, targeting the small and medium enterprises and cooperatives.
- Latest technology gives an ultra low energy demand and thus a high-energy efficiency
- With the optional EFB processing line, the mill not only processes
- the common CPO and nuts out of the fruit, but also a 25% of the "waste" which is converted into useful "energy pellets".
- The optional Methane gas conversion from the liquid waste, (POME) provides the mill with energy and decreases the environmental pollution load
- The PalmPro concept also comprises the conversion of wasteland into plantation, as an alternative to the logging of precious (rain) forests
- Modules: 10 or 20 tons/hr; EFB processing line; methane gas conversion from POME;
  Nut pressing line.

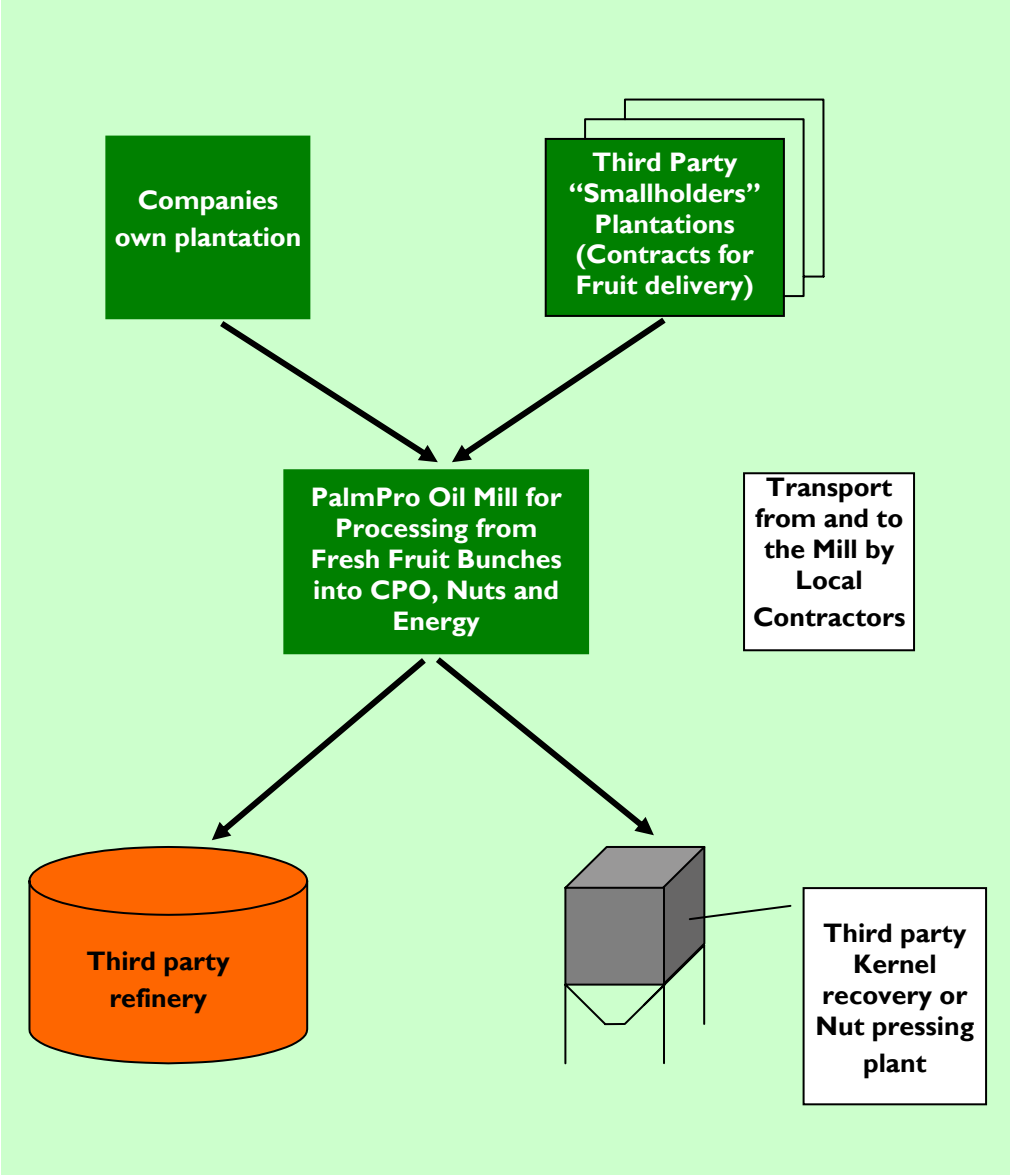



**Figure 4: Flowchart of the production process and raw materials requirement for a PalmPro Mill**

Reclaiming degraded land (non-peat soil)

The same plot 2 years after water management. On the slope after the plantation you see a PalmPro Mill.

The PalmPro Mill, a neat, small concept for medium sized companies

The machinery inside the mill, at the background the pressing platform with 20 tons/hr capacity

The mill office and the tanks for water and Crude Palm Oil (CPO) storage.

And last but not least: the guesthouse for engineers, supervisors and mill staff.

**Profit& Loss Prognosis PalmPro Mill**
prices per 31 March 2009 (fluctuate with commodity market)

| **Description (amounts per year)** | **Cap.** | **Rend.** | **hrs/year** | **unitprice** | |
|---|---|---|---|---|---|
| Sales: | | | | | |
| Crude Palm Oil | | | | | |
| (capxOERxHrsxUNIT/rate | 18.000 | 0,23 | 5.000 | 7.100 | 146.970.000.000 |
| Kernel (capxNERxHrsxUnit/rate) | 18.000 | 0,04 | 5.000 | 2.800 | 10.080.000.000 |
| EFB (capx%xHrsxUnit/rate) | 18.000 | 0,25 | 5.000 | 20 | 450.000.000 |
| Total annual Sales | | | | | **157.500.000.000** |
| | | | | | |
| Purchase fruit: | | | | | |
| TBS purchase @ DISBUN | | | | 1.350 | 121.500.000.000 |
| | | | | | |
| Operational Costs: | | | | | |
| Maintenance costs | | | | | 1.000.000.000 |
| | | | | | |
| Labour and office costs | | | | | 2.329.236.000 |
| Fuelcost (power*rend*hrs*Unit/rate | | | | | |
| methane util. | 50 | 0,33 | 500 | 4.766 | 39.319.500 |
| | | | | | |
| Total Operational Costs | | | | | **124.868.555.500** |
| Financing Costs: | | | | | |
| Depreciation: 10% over equipment | | | | | 3.000.000.000 |
| Financing costs 8% | | | | | 2.400.000.000 |
| Total financial costs | | | | | **5.400.000.000** |
| | | | | | |
| **Gross Annual Result** | | | | | **27.231.444.500** |
| Company tax 30% | | | | | **8.169.433.350** |
| | | | | | |
| **Net result** | | | | | **19.062.011.150** |
| **ROI** | **1,6 year** | | | | |
| Result as % from Turnover: | | | | | 12,10 |

# ANNEX 5: ACEH UTARA FIELD SURVEY SUMMARY

## Survey Potensi Pembangunan Pabrik Kelapa Sawit (PKS) Skala Kecil di Kabupaten Aceh Utara
## Dilaporkan oleh: Eko Apriano, Field Assistant

Aceh utara adalah salah satu kabupaten di provinsi Nangroe Aceh Darussalam yang memiliki topografis tanah sangat berpotensi untuk perkebunan sawit. Walaupun sedikit bergelombang, infrastruktur yang sangat mendukung terutama jalan yang menghubungkan antar kecamatan dan daerah dengan letak geografis dekat pantai sangat berpotensi untuk pengembangan produk hasil perkebunan maupun turunannya.

Daerah yang berbukit dan sangat subur yang berada di ketinggian kurang lebih sampai 500 meter di atas permukaan laut, kabupaten ini telah memiliki perkebunan yang tersebar hampir di seluruh kecamatan yang ada di kabupaten ini. Perkebunan ini adalah terutama perkebunan sawit yang dimiliki oleh masyarakat baik secara berkelompok ataupun tidak telah mendapatkan bimbingan dan pelatihan dari Dinas Perkebunan dan Pertanian setempat dalam pemilihan benih sampai perawatan (*Sumber didapat dari Dinas Perkebunan Daerah Kabupaten Aceh Utara).*

Dengan luas keseluruhan hampir 40,000 Ha, yang terdata maupun tidak oleh Dinas Perkebunan dan meliputi beberapa KUD (Koperasi Unit Desa), masyarakat secara perorangan dengan luas tanah 2 Ha sampai 200 Ha. Dengan alas tanah yang sudah disertifikasi ataupun belum disertifikasi oleh Kantor Pertanahan (Agraria) setempat.

Dari jumlah luas tersebut diatas maka dukungan Pabrik pengolaha Kelapa Sawit sangat dibutuhkan mengingat produk buah sawit sangat rentan terhadap penumpukan yang lama maupun distribusi yang sangat jauh. Apalagi Pabrik yang ada di kabupaten ini hanya satu yaitu Pabrik Kelapa Sawit PTPN I Cot Girek.

Beberapa kecamatan yang sangat berpotensi menurut data dari dinas perkebunan dan hasil survey orang per orang di kecamatan tersebut sampai ke KUD adalah sbb:

| No | Kecamatan | Potensi Lahan(Ha) | Usia Tanam | Bibit (Benih) | Pengelola |
|---|---|---|---|---|---|
| 1 | Santalira Bayu | 13,000 | Produktif | Tenera | Perorangan |
| 2 | Simpang Keramat | 1,200 | Produktif | Beragam | Perorangan |
| 3 | Langkaha | 5,000 | Produktif | Baik | KUD & Perorangan |
| 4 | Kuta Makmur | 5,000 | Produktif | Beragam | Perorangan |
| 5 | Nisam | 7,000 | Produktif | Beragam | Perorangan |
| 6 | Paya Bakung | 600 | TBM | Baik | KUD |
| 7 | Matang Kuli | | | | |
| 8 | Merah Mulia | | | | |
| 9 | Tanah luas | | | | |

Dengan melakukan survey ke tiga kecamatan yang berpotensi dengan perkiraan jarak yang saling berjauhan kami langsung melakukan survey ke orang-orang yang terlibat dalam bisnis ini yang menjadi mata rantai perdagangan mulai dari petani sebagi pemilik lahan perkebunan, agen bangku (pengumpul kecil), agen gudang (Toke) dan beberapa KUD.

Kecamatan yang dipilih adalah sebagai berikut:

### 1. Santalira Bayu

Di kecamatan ini buah dari perkebunan rakyat di beli oleh agen bangku, toke gudang, dengan praktek perdagangan toke memberikan modal terlebih dahulu kepada petani, sedangkan toke gudang memiliki lebih banyak modal yang langsung bisa menjual ke pabrik PKS terdekat yitu PTPN I Cot Girek atau yang berada diluar Aceh utara dengan menggunakan surat perdagangan (SP) yang dimiliki oleh antara lain:

1. Primkopad
2. Narata (KUD)
3. Tengku Cik di Tunong
4. Purchasing PTPN I Cot Girek

Kondisi perkebunan umumnya tidak terawat sehingga buah yang dihasilkan kurang optimal. Dengan 6 Pengumpul (toke gudang) dan beberapa toke bangku total buah perhari yang bisa dikumpulkan berkisar 120 ton / hari. Buah brondolan hanya 5 – 10% dari total buah. Kondisi Buah baik (Buah Tenera). Efektivitas lahan hanya berkisar 60% dari total lahan yang sudah produktif yang ada di kecamatan ini. *(Sumber didapat dari Toke Gudang setempat, Keucik dari hasil wawancara dan pengamatan langsung).*

## 2. Kuta Makmur

Di kecamatan ini praktek perdagangan yang dilakukan petani sama dengan kecamatan Santalira Bayu.

Total buah yang dapat dikumpulkan adalah 40 ton/hari. Buah Brodolan hanya 5-10% dari total buah. Kondisi buah kebanyakan tidak baik (DURA). Efektivitas lahan hanya berkisar kurang dari 60%.

## 3. Kecamatan Langkahan

Di kecamatan ini terdapat 3 KUD yang menagani langsung penjualan buah yaitu:

1. KUD Barona di desa Rumoh Rayo, dengan luas 400 Ha, Produktif
2. KUD Sejahtera di desa Serkei, dengan luas 2000Ha, Produktif
3. KUD Brata Jaya di desa Bola Mas, dengan luas 1200Ha, Produktif

Total Buah hanya berkisar antara 60-80 ton / hari. Buah brondolan 5- 10 %.
Karena kecamatan ini berdekatan dengan daerah Cot Girek kami juga melakukan pengambilan data buah brondolan dari agen yang tersebar di daerah ini mencapai 35 ton brondolan / hari.

**Kesimpulan :**

1. Dua dari tiga kecamatan ini sangat berpotensi untuk didirikan pabrik pengolahan berkapasitas 50 ton buah per hari. Prediksi Minyak yang dihasilkan adalah kira-kira 260 ton/ bulan
2. Apabila efektivitas lahan produksi dapat ditingkatkan mencapai 90% maka kebutuhan untuk menaikkan kapasitas produksi atau pembangunan pabrik dikecamatan lain sagatlah memungkinkan. Diperkirakan dengan kapasitas terpasan produksi minyak akan meningkat menjadi lebih kurang 350 ton/ bulan.
3. Harga buah dari masyarakat berkisar antara Rp 900 – Rp 1000. Ongkos Transportasi berkisar Rp 60 – Rp 120. Maka keuntungan masyarakat akan bertambah 60 -120 rupiah dengan adanya pabrik pengolahan ini.
4. Bisnis ini sangat layak tanpa harus memutuskan mata rantai perdagangan. Karena dua dari empat distributor yang mimiliki SP adalah ex -combatants, yaitu Narata dan Tengku Cik ditunong.

# ANNEX 6: ACEH JAYA FIELD SURVEY SUMMARY

**Survey Potensi Pengembangan Pabrik Kelapa Sawit (PKS) Skala Kecil di Kabupaten Aceh Jaya**
**Dilaporkan oleh: Eko Apriano, Field Assistant**

## 1. Latar Belakang dan Tujuan

Dalam rangka rencana pengembangan PKS skala kecil untuk sektor perkebunan rakyat dan produksi bahan bakar nabati di Propinsi Aceh, maka daripada itu perlu dilakukan beberapa survey lapangan untuk mendapatkan gambaran yang cukup jelas tentang potensi dibeberapa tempat (kabupaten) yang tentunya merupakan daerah yang telah dikembangkan kelapa sawit, khususnya perkebunan rakyat, yang memiliki potensi dengan banyaknya brondolan dan buah restan yang tidak layak untuk diproses sebagai bahan baku makanan karena memiliki kadar keasaman yang tinggi.

Banyaknya buah brondolan dan restan ini menjadi suatu peluang untuk dapat dikembangkan PKS Skala kecil yang berbahan baku buah brondolan dan buah restan yang nantinya diproses dan menghasilkan apa yang disebut minyak kelapa sawit mentah asam tinggi (High Fatty Acid Crude Palm Oil).

Di Propinsi Aceh ada beberapa daerah yang selama ini menjadi kawasan pengembangan sawit, antara lain; Kabupaten Bireuen, Aceh Utara, Aceh Timur, Aceh Tamiang, Aceh Jaya, Aceh Barat, Nagan Raya, Aceh Barat Daya, Aceh Selatan, Aceh Singkil, and Kodya Langsa dan Subullusalam.

Atas dasar tujuan dan maksud di atas, maka kami pada tanggal 6-7 Juni 2009 telah melakukan survey lapangan di Aceh Jaya, tepatnya dilokasi ; Patek dan Teunom.

## 2. Pandangan Umum

Di Kabupaten ini, selain kebun sawit rakyat swadaya, ada beberapa perkebunan yang telah cukup lama eksis diantaranya PT Boswa, PT Tiga Mitra Perdana dan PT Astra Agro.

Dari hasil wawancara dengan masyarakat dan pengumpul buah sawit di kabupaten ini, luas kebun swadaya masyarakat lebih dari 1.000 ha yang keberadaannya terpencar di 3 lokasi (Teunom, Panga, Patek), sedangkan PT. Boswa lebih dari 10.000 ha, PT. Tiga Mitra Perdana seluas 6.000 ha, dan PT. Astra Agro 4,200 ha. Satu hal yang menarik adalah dengan luas yang tersebut di atas, kabupaten ini belum memiliki pabrik kelapa sawit sampai saat ini. Sampai saat ini hasil panen tandan buah segar (TBS) dibawa ke PKS yang ada di Aceh Barat ataupun Nagan Raya, dengan rentang waktu perjalanan TBS dari sekitar 12 jam lebih menggunakan truck ke lokasi PKS yang dituju yakni PKS milik PT. Mopoly Raya ataupun PT. Karya Tanah Subur (Salah satu anak perusahaan milik PT. Astra Agro).

Namun demikian bukannya tanpa alasan belum tersedianya PKS di Kabupaten ini. Tiga perusahaan perkebunan yang ada di kabupaten ini, khusunya PT. Boswa dan PT. Astra Agro belum memiliki tanaman menghasilkan (TM) yang memadai untuk didirikan PKS, dan

khususnya PT. Tiga Mitra Perdana lahan yang telah ditanami sejak tahun 1992 bisa dikatakan sebagai kebun terlantar.

Dalam hal ini kami lebih menyoroti perkebunan kelapa sawit milik PT. Tiga Mitra Perdana. Sedikit merujuk kebelakang tentang sejarah lahan perkebunan PT. Tiga Mitra Perdana, perkebunan ini sebenarnya mitra atau yang lebih tepat sebagai perusahan pembina transmigrasi. Lahan yang dikembangakan oleh perusahaan ini merupakan lahan peruntukkan bagi transmigrasi dari Jawa dan transmigrasi lokal. Lokasi areal perkebunan yang telah dikembangkan di Patek, Panga dan Teunom.

Dari pengamatan di lapangan dapat dilihat perkebunan berada dalam kondisi yang sangat memprihatinkan, karena dapat dikatakan tidak terawat dengan baik. Hasil wawancara dilapangan menjelaskan bahwa kondisi ini terjadi akibat dari konflik yang terjadi di Aceh dan juga khususnya di Kabupaten Aceh Jaya.

Akibat konflik ini, hampir semua transmigrasi yang berasal dari Jawa eksodus dengan meninggalkan lahan dan pemukimannya dan tidak kembali setelah konflik selesai. Hal ini yang menjadi permasalahan utama terlantarnya perkebunan sawit yang telah dibangun oleh PT. Tiga Mitra Perdana sebagai mitra pembina petani dengan program PIR (Perkebunan Inti Rakyat).

Lahan yang ada saat ini, kebanyakkan dioperasikan oleh beberapa orang yang merupakan masyarakat lokal yang menjalin kerjasama operasional dengan perusahaan untuk memanen buah sawit yang ada. Dari hasil panen tandan buah segar (TBS) kebun ini, pihak yang sepakat menerima kerjasama operasional membayar fee dengan pihak perusahaan setelah TBS dibawa ke PKS untuk diolah. Besarnya fee ini beragam jumlahnya, ada yang Rp. 250,- per kg dan Rp. 150,-per kg.




Dari wawancara dengan beberapa pengumpul yang ada rata-rata TBS yang diangkut sekitar 100 ton per hari di daerah Patek, 70 ton per hari di daerah Teunom, dan lebih dari 20 ton per hari dari kebun swadaya masyarakat. Dan kebanyakkan buah yang dibawa berkualitas rendah, khusunya lagi untuk buah yang berasal dari kebun PT. Tiga Mitra Perdana, akibat dari minimnya perawatan.

Kendala transportasi dan sarana jalan yang kurang mendukung mengakibatkan TBS yang dihasilkan kadang terlalu matang baru dipanen, sehingga potensi brondolan cukup banyak. Saat ini harga TBS dan brondolan yang dibeli oleh pengumpul berkisar antara Rp.850,- s/d Rp. 1.000,- per kg.

## Kesimpulan dan Saran

Dengan kondisi sebagaimana tersebut di atas, tentunya daerah ini berpotensi untuk dikembangkan/ didirikan PKS Skala kecil yang dapat memproduksi minyak sawit mentah bukan untuk makanan (CPO non food grade) yang memiliki kadar keasaman tinggi, dengan asumsi kita adanya potensi brondolan sebanyak 30 ton per hari, TBS yang terdiri atas buah restan sebanyak 20 ton per hari. Maka besar peluang untuk dimanfaatkan sebagai bahan baku untuk CPO Asam Tinggi yang dapat dipakai sebagai bahan bakar nabati.

Lokasi yang cukup strategis yang dapat kita tawarkan untuk pembangunan PKS Skala kecil adalah Patek, karena ada lebih 500 ha lahan kebun sawit swadaya dan lahan 2.500 ha lahan transmigrasi yang telah dikembangkan oleh PT. Tiga Mitra Perdana. Sedangkan lokasi lainnya yakni Panga dan Teunom juga dapat mensupply kebutuhan bahan baku karena hanya berjarak 2 jam perjalanan ke Patek.

Dengan dibangunnya PKS Skala Kecil, nantinya diharapkan akan mengurangi biaya transportasi akibat jauhnya lokasi PKS yang menjadi tujuan. Nantinya diharapkan selisih biaya transportasi ini dapat ditambahkan buat petani/ pensupply yang ada, sehingga petani akan mendapatkan penghasilan yang lebih dari sebelumnya.

Pembangunan PKS Skala Kecil ini juga akan membuka peluang kerja bagi masyarakat lokal untuk dapat bekerja di pabrik yang akan didirikan. Hal yang tidak kalah penting lainnya adalah akan terjadi transfer ilmu dan teknologi kepada masyarakat setempat.

# ANNEX 7: NAGAN RAYA FIELD SURVEY SUMMARY

**Survey Potensi Pembangunan Pabrik Kelapa Sawit (PKS) Skala Kecil di Kabupaten Nagan Raya**
**Dilaporkan oleh: Eko Apriano, Field Assistant**

## 1. Latar Belakang dan Tujuan

Dalam rangka rencana pengembangan PKS skala kecil untuk sektor perkebunan rakyat dan produksi bahan bakar nabati di Propinsi Aceh, maka daripada itu perlu dilakukan beberapa survey lapangan untuk mendapatkan gambaran yang cukup jelas tentang potensi dibeberapa tempat (kabupaten) yang tentunya merupakan daerah yang telah dikembangkan kelapa sawit, khususnya perkebunan rakyat, yang memiliki potensi dengan banyaknya brondolan dan buah restan yang tidak layak untuk diproses sebagai bahan baku makanan karena memiliki kadar keasaman yang tinggi.

Banyaknya buah brondolan dan restan ini menjadi suatu peluang untuk dapat dikembangkan PKS Skala kecil yang berbahan baku buah brondolan dan buah restan yang nantinya diproses dan menghasilkan apa yang disebut minyak kelapa sawit mentah asam tinggi (High Fatty Acid Crude Palm Oil).

Di Propinsi Aceh ada beberapa daerah yang selama ini menjadi kawasan pengembangan sawit, antara lain; Kabupaten Bireuen, Aceh Utara, Aceh Timur, Aceh Tamiang, Aceh Jaya, Aceh Barat, Nagan Raya, Aceh Barat Daya, Aceh Selatan, Aceh Singkil, and Kodya Langsa dan Subullusalam.

Atas dasar tujuan dan maksud di atas, maka kami pada tanggal 10-13 Juni 2009 telah melakukan survey lapangan di Nagan Raya .

## Pandangan Umum

Kabupaten Nagan Raya merupakan daeah yang baru dimekarkan dari kabupaten induknya, yakni Aceh Barat. Di daerah ini cukup banyak perkebunan kelapa sawit, baik yang dikembangkan oleh perusahaan besar maupun kebun swadaya masyarakat. Bahkan salah satu perusahaan besar yang ada yakni PT. Socfindo telah eksis di daerah ini sejak pemerintahan Hindia Belanda tahun 1920-an.

Selain PT. Socfindo yang telah eksis di kabupaten ini, ada beberapa perusahan perkebunan yang sudah cukup lama mengembangkan komoditi kelapa sawit, antara lain ; PT. Perkebunan Nusantara I, PT. Fajar Bajuri, PT. Gelora Sawita, PT. Kalista Alam. Belum lagi kebun swadaya masyarakat yang cukup luas di daerah ini, menurut Kepala Cab. Dinas Kehutanan perkebunan dan transmigrasi luas kebun swadaya masyarakat sekarang sudah mencapai 8.500 ha.

Dalam survey yang kami lakukan ini, kami dibantu oleh salah seorang pensiunan kepala cabang kehutanan Calang. Beberapa tokoh yang juga dikunjungi dan berhasil diwawancarai adalah Kepala Cabang Dinas Kehutanan dan Perkebunan Kecamatan Darul Makmur, beberapa pengumpul buah dan petani sawit swadaya.

Dari wawancara dengan beberapa pengumpul yang kami temui saja, setiap harinya ada sekitar 200 ton TBS yang keluar dari daerah ini, dan angka tentu angka minimal karena masih banyak petani kelapa sawit yang tidak tercover untuk diwawancarai.

Bahkan didaerah ini ada beberapa petani yang luas lahan pribadinya lebih dari 500 ha per orang. Mereka ini menjual TBS nya secara langsung ke PKS tanpa perantara/ pengumpul. Mereka memiliki sarana pengangkutan sendiri, dan juga memiliki surat perdagangan (SP) yang dapat memasok langsung TBS ke beberapa PKS yang ada seperti PKS PT. Fajar Bajuri, PT. Mopoly Raya, PT. Karya Tanah Subur, PT. Lestari Tunggal Pratama.

Dengan banyaknya produksi TBS di daerah ini tentunya membuka peluang banyaknya brondolan yang dapat dimanfaatkan untuk bahan baku PKS Skala kecil, rata-rata brondolan dari kawasan ini disekitaran 20%.

Salah seorang petani yang memiliki kebun yang cukup luas mengatakan, dalam prediksinya pada tahun 2010, akan ada peningkatan hampir dua kali lipat produksi yang berasal dari kebun

rakyat. Hal ini tentu bukan hal yang mustahil, karena saat ini banyak tanaman yang belum menghasilkan (TBM) di daerah ini, yang nantinya akan memberikan kontribusi penambahan produksi setahun atau dua tahun yang akan datang.

Informasi yang diterima dari Kepala Cabang Dishutbuntrans, di kabupaten ini mulai tahun 2009 hingga 2014 akan dikembangkan sawit seluas 5.000 ha yang didukung oleh Bank Dunia, yang pelaksanaannya dilaksanakan secara bertahap 1.000 ha per tahun.

Saat ini harga rata-rata ditingkat pengumpul berkisar Rp. 1.150,- per kg, untuk buah brondolan juga dihargai dengan harga yang sama, namun demikian kadang ada potongan 2,5% dari total jumlah yang disuplly.

Hasil diskusi dan bincang-bincang dengan beberapa petani dan pengumpul buah yang ditemui menyambut baik dan mendukung jika rencana pembangunan PKS Skala Kecil dilaksanakan, dan secara langsung mereka siap mensupply kebutuhan buah brondolan sebagai bahan baku pabrik ini.

Salah seorang pemilik kebun swadaya yang memiliki kebun yang luas pernah berencana mendirikan PKS Skala Kecil ini, namun demikian ada beberapa hal ynag menjadi kekhawatiran khususnya dalam hal pemasaran, hal ini disebabkan mereka tidak memiliki akses pasar yang jelas dan ketakutan akan persaingan dengan PKS besar yang ada. Seandainya akses pasar yang permasalahan akses pasar ini telah terpecahkan, mereka siap mengembangkan dan mendirikan PKS Skala Kecil ini ditempat mereka.

Di daerah ini juga sedang dikembangkan pilot project sawit yang berwawasan lingkungan berdasarkan prinsip dan kriteria RSPO seluas 85 ha yang merupakan lahan masyarakat setempat. Pilot project ini dibawah binaan Yayasan Ecosistem Leuser (YEL-Paneco), dan saat ini tengah dilakukan proses pembibitan. Rekan-rekan dari YEL ini juga sangat

menyambut baik gagasan pembangunan PKS Skala Kecil di daerah Nagan Raya. Dan secara eksplisit mereka sangat tertarik dan berkeinginan memiliki dan mengelola PKS ini secara langsung jika ada bantuan pendanaan dan bimbingan teknis dari pihak-pihak yang berkompeten. YEL saat ini juga membina satu koperasi yakni Koperasi Maknue Indah Lestari yang keanggotaannya sebanyak 60 orang, dan saat ini kegiatannya hanya dibidang simpan pinjam, namun tidak menutup kemungkinan untuk pengembangan usaha dibidang lainnya, seperti produksi asam tinggi.

## Kesimpulan dan Saran

Potensi yang dimiliki di wilayah ini cukup besar, karena dengan cukupnya luas kebun masyarakat yang ada dan terus berkembang, ketersedian bakan baku berupa brondolan tentunya akan semakin besar.

Adanya komitmen dan dukungan dari pemilik kebun sawit yang memiliki luas kebun cukup besar untuk mensupply kebutuhan bahan baku yang diinginkan.

Dari pertemuan dengan berbagai pihak, kami berpikir bahwa pola kerjasama yang paling ideal adalah dengan mensinergikan kerjasama antara Koperasi Makmue Indah Lestari (binaan YEL-paneco) sebagai pengelola PKS Skala Kecil dengan beberapa pengumpul dan petani sawit yang memiliki kebun luas sebagai pensupply buah brondolan maupun buah restan sebagai bahan baku PKS. Dengan demikian akan terjadi kerjasama mutualisme yang baik, untuk mendorong terwujudnya pemberdayaan masyarakat dan koperasi. Dengan dilibatkannya koperasi, maka sektor pemberdayaan koperasi dan masyarakat akan lebih terarah dan lebih bermanfaat sehinga dapat lebih dirasakan oleh masyarakat sekitar.

Untuk lokasi PKS Skala Kecil ini, kami sarankan untuk dibangun di Kecamatan Darul Makmur, sebagai kawasan yang sangat banyak dikembangkan kelapa sawit.

# ANNEX 8: PLN DIESEL GENERATOR CAPACITY AND FUEL UTILIZATION IN ACEH

**PT. PLN ( PERSERO ) WIL NAD**
**RENCANA KEBUTUHAN HSD TAHUN 2009 BERDASARKAN REALIASI 2008**

| LOKASI | NO. UNIT DAN JLH MESIN | DAYA | | PRODUKSI | HSD | MFO |
|---|---|---|---|---|---|---|
| | | TERPASANG KW | MAMPU KW | kWh | Ltr | Ltr |
| **CABANG BANDA ACEH** | | | | | | |
| KIT Ktr Cab. Banda Aceh | 12 | 1,044 | 800 | - | - | |
| Aneuk Laot Sabang | 10 | 7,051 | 5,300 | 17,434,183 | 4,829,508 | |
| Lhong | 4 | 1,140 | 940 | 1,706,370 | 537,980 | |
| PLTD SEURAPUNG | 2 | 765 | 700 | 135,427 | 57,522 | |
| Deudap | 3 | 240 | 215 | 69,705 | 28,996 | |
| **JLH CAB. BANDA ACEH** | 33 | 10240 | 7955 | 19,346,010 | 5,454,006 | - |
| **CABANG SIGLI** | | | | | | |
| PLTD Pulo Pisang | 6 | 13,494 | 7,900 | 3,189,473 | 864,664 | 7,991,400 |
| Tangse | 3 | 580 | 240 | - | - | |
| Geumpang | 2 | 200 | 70 | - | - | |
| **JUMLAH CAB.SIGLI** | 11 | 14,274 | 8,210 | 3,189,473 | 864,664 | 7,991,400 |
| **CABANG LHOKSEUMAWE** | | | | | | |
| Cot Trueng | 4 | 15,138 | 13,885 | 12,458,860 | 3,324,965 | |
| Dedalu | | | - | - | - | |
| Ayangan | 6 | 9,888 | 6,980 | 7,111,458 | 1,981,576 | |
| Janarata | 6 | 994 | 728 | 67,992 | 20,665 | |
| Jagung Jeget | 3 | 600 | 385 | 58,343 | 18,839 | |
| Bintang | 2 | | - | - | - | |
| Isaq | 2 | | - | - | - | |
| Owaq | 3 | 157 | - | - | - | |
| KIT Cab. Lhokseumawe | 6 | 392 | 332 | - | - | |
| **JLH CAB. LHOKSEUMAWE** | 39 | 27,169 | 22,310 | 19,693,225 | 5,346,045 | - |
| **CABANG LANGSA** | | | | | | |
| Kuning | 10 | 9,105 | 7,690 | 26,828,190 | 7,495,676 | |
| Seupakat | | 1,770 | | - | - | |
| Blangkejeren | 9 | 4,950 | 4,390 | 12,026,819 | 3,553,857 | |
| Pulo Pusong | 3 | 280 | 235 | 335,929 | 121,024 | |
| Terangon | 1 | 117 | 100 | 15,050 | 5,768 | |
| Lokop | 3 | 240 | 215 | 243,620 | 88,740 | |
| Pinding | 3 | 380 | 265 | 236,912 | 81,993 | |
| **JUMLAH CAB. LANGSA** | 32 | 16842 | 12895 | 39,682,087 | 11,347,058 | - |
| **CABANG MEULABOH** | | | | | | |
| KIT Ktr Cab Meulaboh | 2 | 162 | 40 | - | 60 | |
| Seuneubok | 8 | 22,776 | 13,622 | 47,870,020 | 10,282,593 | 19,891,200 |
| Calang | 4 | 1,790 | 1,120 | 3,566,036 | 989,906 | |
| Sungai Mas | 2 | 60 | 51 | 3,597 | 1,265 | |
| Lamno | 4 | 2,730 | 2,190 | 5,383,849 | 1,592,528 | |
| Sinabang | 6 | 934 | 600 | 526,712 | 177,368 | |
| Lasikin | 8 | 3,479 | 3,166 | 13,934,002 | 4,031,825 | |
| Kampung Aie | 3 | 680 | 525 | 903,928 | 311,269 | |
| SIbIgo | 3 | 197 | 170 | 330,235 | 115,742 | |
| Jeuram | 3 | 2,120 | 2,000 | 3,170,299 | 887,765 | |
| Teunom | 4 | 1,860 | 1,540 | 2,368,221 | 674,779 | |
| Alue Billie | 2 | 2,834 | 2,700 | 3,135,665 | 868,107 | |
| Beutong | 2 | 80 | 70 | 48,580 | 16,853 | |
| **JLH CAB. MEULABOH** | 51 | 39,702 | 27,794 | 81,241,144 | 19,950,060 | 19,891,200 |
| **MESIN SEWA** | | 6,800 | 4,800 | 35,001,600 | 9,458,870 | |
| **TOTAL** | | | | 116,242,744 | 29,408,930 | 19,891,200 |
| **CABANG SB.SALAM** | | | | | | |
| Rimo | 9 | 6,060 | 4,015 | 7,464,757 | 2,154,734 | |
| Singkil | 3 | 1,900 | 1,400 | 1,113,103 | 353,090 | |
| Tapak Tuan | 7 | 7,074 | 5,850 | 21,126,070 | 5,801,847 | |
| Kota Fajar | 3 | 2,420 | 800 | 1,813,192 | 539,570 | |
| Bakongan | 5 | 1,174 | 620 | 199,522 | 59,440 | |
| Trumon | 3 | 532 | - | - | - | |
| Suak | 12 | 13,710 | 8,200 | 43,924,984 | 12,486,486 | |
| Kuala Baru | 3 | 569 | 470 | 283,955 | 95,048 | |
| Haloban | 3 | 120 | 100 | 296,318 | 101,230 | |
| Pulo Balai | 5 | 789 | 672 | 1,216,167 | 369,326 | |
| **JLH CAB. SUBULUSSALAM** | 49 | 34,348 | 22,127 | 70,241,319 | 19,879,690 | - |
| | | | | | | |
| **JUMLAH WILAYAH NAD** | 215 | 142,575 | 101,291 | 268,394,858 | 72,300,393 | 27,882,600 |

# ANNEX 9: ACEH UTARA SMALLHOLDER PILOT PROJECT SUMMARY FOR USAID SERASI PROGRAM

This pilot project will demonstrate means to improve the performance of Governor Irwandi's $40 million Smallholder Expansion Program for the creation of 35,000 hectares of smallholder palm oil estates throughout Aceh. Starting in 2007, this program is being financed in stages, with 500 to 1,000 hectare local projects in former conflict areas such as Aceh Jaya/Aceh Barat/Nagan Raya, Aceh Utara/Bireuen, Langsa/Tamiang and Aceh Selatan/Singkil.

As stated in the ***Aceh Green*** summary document, "Plantations will be consolidated by local farmer organizations and cooperatives. In turn, they will have contractual processing and marketing relationships with large estates attached to crude palm oil (CPO) mills or independent CPO mills. Participating families will receive land titles, land preparation assistance, optimal seedstock, tools, transition financing and management support until their plantations reach maturity. Smallholders must have an effective voice in local pricing boards, along with industry representatives and state government officials."

The proposed pilot project involves one of the largest and most ambitious of the existing local smallholder schemes within the Governor's Smallholder Expansion Program. It is based in Aceh Utara, one of the most severely-affected kabupaten during the conflict era. The project area primarily consists of degraded lands and covers both smallholder oil palm plantation development and processing under a cooperative made up of around 3,000 ex-combatants, widows, orphans and other community members. This integrated project would be a good candidate as the first smallholder cooperative certified by the Roundtable on Sustainable Palm Oil (RSPO). A reputable international conservation organisation will conduct a High Conservation Value (HCV) assessment and a participatory spatial planning process. It will be also assessed by ESP for environmental impacts.

**A. <u>Grantee and Partner Name and Contact Information:</u>**

| | | |
|---|---|---|
| **Grantee Name** | : | Aceh Society Development (ASD) |
| **Contact Person** | : | Tengku Isa Rahmadi |
| **Partner Address** | : | Jl. Iskandar Muda No. 60, Bireuen, Aceh, Indonesia |
| **Telephone** | : | +62-812-69600370 |
| **E-Mail** | : | tisa_rahmadi@yahoo.com |
| **Partner Name** | : | Koperasi Perkebunan Batee Meuasah |
| **Contact Person** | : | Tengku Abubakar Suleiman |
| **Partner Address** | : | Desa Purupuk, Kecamatan Paya Bakong, Aceh Utara |
| **Telephone** | : | +62-645-7015439 **Hand Phone:** +62-85260990626 |
| **Fax** | : | +62-645-31354 Attn: Tengku Abee |

**B. <u>Project Information:</u>**

| | | |
|---|---|---|
| **Project Title** | : | Support Conflict-impacted Communities through Cooperative Development and Processing of Sustainable Palm Oil and Cacao (Pemberdayaan Masyarakat Korban Konflik melaui Koperasi dengan Pengembangan dan Pengolahaan Sawit dan Kakao Berkelanjutan) |
| **Budget** | : | IDR 6.1 billion **approximately:** US$ 596,946 |
| **Project Period** | : | **October** 2009 to September 2011 |

## C. Program Description:

**1. Organization Background:** In 2007, Koperasi Perkebunan Batee Meuasah, a smallholder cooperative comprised of about 3,000 former combatants and conflict victims, was assigned a 6,000 hectare previously unplanted area in Paya Bakong kecamatan by the Forestry and Plantation Crop Department (Dinas Kehutanan dan Perkebunan) for smallholder palm oil plantation development. The cooperative is headed by local former Gerakan Aceh Merdeka (GAM) leader Teuku Abubakar Sulaiman and has to date planted a total of 980 hectares with financial support from the Proyek Pengembangan Masyarakat Miskin Korban Konflik (PMMK-Poor Conflict Victim Community Development Project).

A field survey indicated that this area primarily consists of level or slightly hilly topography and mostly swidden vegetation with fairly fertile soils. The area is bounded by natural forests within the Gunung Leuser Ecosystem to the south, a river and large palm plantation to the west, and smallholder and large plantations to the north and east. A number of the members are intercropping their newly-established plantations with food crops such as soybeans, peanuts, chilies, and turmeric. The cooperative has also built over 45 kilometers of access roads and an office-warehouse center with their own equipment.

The overall project will be coordinated by a respected Acehnese NGO, Aceh Society Development (ASD), based in Bireuen. This organization has worked effectively in Aceh with various Indonesian and international funding agencies, including BRR, IOM, and World Bank, providing technical and institutional support in management, financial, and technical assistance to cooperatives, women's, and farmer organizations. ASD will oversee and coordinate the various providers of inputs and technical assistance indicated, including private sector, Government agencies, and other NGOs.

**2. Rationale:** The project will strengthen the cooperative and the local community's capacity to improve the local economy and support the peace process. It will serve as demonstration pilot project to demonstrate means to improve the effectiveness of Governor Irwandi's provincial smallholder palm oil and cacao development program and the Aceh Green Vision at the local level.

**3. Objective:** The project's primary objective is to enable the cooperative to effectively plan and implement a long-term program to establish productive and sustainable smallholder plantations, increase local employment opportunities, and create value-added enterprises.

**4. Planned Activities:**

1) To furnish 105,000 certified high yielding palm oil seedlings to cooperative members on 650 hectares of land to be cleared for smallholder palm oil plantations in cooperation with a leading local Acehnese palm oil company, P.T. Risyadson Sejahtera Agrobusiness (RSA)/P.T. Satya Agung. The seedlings will replace uncertified seedlings ("bibit palsu") that were destroyed by order of Governor Irwandi in January 2009. In addition to providing the seedlings, which can result in yield increases of 5-10 tons and increased incomes of Rp 6.5-13 million per hectare at current prices, RSA will provide technical support to the cooperative in advanced seedling production technology and plantation management practices.

2) To strengthen the managerial, technical, and financial capacities of Koperasi Perkebunan Batee Muasah in cooperation with Aceh Social Development (ASD) of Bireun, an Acehnese NGO specializing in smallholder cooperative development. This will include on-site technical assistance and participatory training for managers and members.

3) To assist the cooperative in producing a long-term strategic master plan for its 6,000 hectare concession in line with the Principles and Criteria (P&C) of the Roundtable on

Sustainable Palm Oil (RSPO). The cooperative will receive technical support in this area from the international conservation organization Fauna and Flora International (FFI) and smallholder palm oil plantation development consultant Rudi Lumuru of Sawit Watch. The master plan will include land use mapping, a high conservation value (HCV) assessment, an overall management plan, income and expense projections, and a long-term financing strategy.

4) To support the cooperative in setting up a micro-scale palm oil mill capable of processing 25-50 tons of raw material per day into a non-food grade oil for biofuel feedstock and soap production for local and external markets. The mill will be designed and set up in cooperation with an experienced engineering consulting group that has built several such local value-added production plants in North Sumatra. The cooperative will sign a management and maintenance contract with this group to assure successful and sustainable operation of the facility.

5) The cooperative will receive technical support in improving the quality and quantity of its' members smallholder cacao production, with support from the Sulawesi Cocoa Research & Development Institute (SCORE), including finalizing the setup of a processing plant at its existing warehouse complex.

**5. Monitoring and Evaluation:** The project will create a transparent and accountable monitoring and evaluation system, involving various local stakeholders and independent third party evaluators. The project will engage the traditional Acehnese community organizational structures, ie. the kemukiman village clusters and the local leaders such as keucik (village head) and kejereun blang (agricultural steward) to provide oversight and guidance to the project. The cooperative will set up a management team comprised of members and non-members to conduct regular progress review meetings. The project will provide quarterly and annual progress and financial reports to USAID.

**6. Budget**

The project seeks $130,000 in counterpart funding from the Dutch government agency DGIS (Directorate General for International Cooperation) initiative on developing Palm Oil Smallholder pilot RSPO certification projects in Indonesia. They have an estimated 100,000 Euro maximum available per pilot project, and are very interested in including this effort in Aceh in their Indonesian project portfolio. Additional loan financing of $815,000 will be sought from a government or commercial bank under the nationwide Smallholder Estate Crops Revitalization Scheme (Revitalisasi Kebun)

The broader project budget is estimated as follows:

| Project Components: | USAID | Aceh Gov | DGIS-CREM & Others | Coop | Total |
|---|---|---|---|---|---|
| 1) Seedling/Nursery Establishment and Land Preparation | $141,346 | $ 291,538 | $ 10,000 | $30,000 | $ 472,884 |
| 2) Cooperative Capacity Building | $ 60,000 | $ - | $ 75,000 | $12,000 | $144,000 |
| 3) Palm Oil Plantation Planning and Certification | $125,000 | $ - | $ 815,000 | $12,000 | $952,000 |
| 4) Small-scale Mill Establishment | $195,600 | $ - | $ 75,000 | $36,000 | $306,600 |
| 5) Small-scale Cacao Improvement | $ 75,000 | | | $50,000 | $125,000 |
| **TOTALS** | $596,946 | $ 291,538 | $ 975,000 | $140,000 | $2,002,984 |

A more detailed description of Component 3 of this project is contained in concept summary that follows.

## Photographs of Paya Bakong Field Site, Aceh Utara Kabupaten (Kopbun Batee Meuasah):

# FFI PROJECT CONCEPT

**Project Working Title**

Pilot Smallholder Sustainable Palm Oil Initiative in Paya Bakong, Aceh Utara, Indonesia

**Country/Region**

Indonesia/Asia Pacific

| Author(s) | Date of original concept | Date text was last modified |
|---|---|---|
| Thomas Fricke | 2 July 2009 | 5 July 2009 |

**Project Objective (one sentence)**
(State what the proposed project intends to achieve in as quantifiable and time-bound manner as possible)

Over the course of two years, the project will assist a pilot sustainable palm oil smallholder initiative in Aceh in the planning, design, and implementation of High Conservation Value (HVC) assessments, human-wildlife conflict mitigation, spatial planning efforts, best agricultural practice promotion, and Roundtable on Sustainable Palm Oil (RSPO) certification.

**Project background info (max 400 words)**
(incl. major relevant issues, conservation significance of site, threats, underlying causes of threat and what is needed to address them)

In 2007, Koperasi Perkebunan Batee Meuasah, a smallholder cooperative comprised of 3,000 former combatants and conflict victims, was assigned 6,000 previously unplanted hectares in Paya Bakong Subdistrict, Aceh Utara District by the Forestry and Plantation Department (Dinas Kehutanan dan Perkebunan) for smallholder palm oil development. The cooperative is headed by former Gerakan Aceh Merdeka (GAM) leader Teuku Abubakar Sulaiman and has planted 980 hectares funded by Proyek Pengembangan Masyarakat Miskin Korban Konflik (Poor Conflict Victim Community Development Project). The cooperative has also built over 45 kilometers of access roads and an office-warehouse center with their own heavy equipment. Some of the newly-planted palm plantations are intercropped with food crops such as soybeans and chilies.

Field surveys indicate that this area primarily contains level or slightly hilly topography and mostly swidden vegetation with fairly fertile soils. The area is bounded by natural forests within Gunung Leuser Ecosystem to the south, a river and large palm plantation to the west, and smallholder and large plantations to the north and east. The site was designated Areal Pengunaan Lain (Miscellaneous Use Area) by Dishutbun, although data indicates that potential HCV areas may exist.

The project is part of a larger $1,000,000+ initiative submitted to USAID's Serasi Project, other government funders, and lending institutions. The primary objective is to enable the cooperative to effectively plan and implement a long-term program to establish productive and sustainable smallholder plantations, increase local

employment, conserve natural resources, and create value-added enterprises. This will improve the local economy and support the peace process. It will also serve as a pilot project to demonstrate means to improve the effectiveness of Governor Irwandi's provincial smallholder palm oil development program at the local level. The primary components and intended implementing partners include:

1) A leading Acehnese company, P.T. Risyadson Sejahtera Agrobusiness (RSA) will supply 105,000 certified high-yielding palm oil seedlings for planting 650 hectares, co-funded by USAID-Serasi and Dishutbun, which will also finance the land preparation.

2) Aceh Social Development (ASD) of Bireun, a local organizational development NGO, will provide on-site technical assistance and participatory training to strengthen the cooperative's managerial, technical, and financial capacities.

3) FFI will assist the cooperative in producing a long-term strategic master plan and certification for its 6,000 hectare concession in alignment with the RSPO Principles and Criteria.

4) An experienced Medan-based consulting group will help the cooperative establish a micro-scale processing plant for non-food grade oil for biofuel feedstock and soap production for local and external markets.

5) The cooperative will receive technical support in improving the quality and quantity of its' members smallholder cacao production, with support from the Sulawesi Cocoa Research & Development Institute (SCORE), including finalizing the setup of a processing plant at its existing warehouse complex.

**Proposed Project Description**
(List project components or activities that are needed to achieve the objective. List outputs where appropriate and identify likely impacts.)

FFI will coordinate technical assistance, training and field assessments to assist the cooperative in producing a long-term strategic master plan for its 6,000 hectare concession in line with the Principles and Criteria (P&C) of the Roundtable on Sustainable Palm Oil (RSPO). The ultimate outcome will be to establish a pilot sustainable smallholder palm oil initiative that will be RSPO-certified. The key elements in the production of the master plan and certification will include:

1) Participatory land use mapping and spatial planning,
2) A high conservation value (HCV) assessment and management plan,
3) To the extent needed, development of Human Elephant Conflict (HEC) surveys and mitigation strategies,
4) Training and technical support in RSPO's Principles and Criteria and certification system
5) An overall management plan based on best production and processing practices,
6) Business viability and a long-term financing strategy.

The cooperative will receive technical support in these areas from a project manager supported by staff and consultants of FFI Aceh and FFF-Indonesia. The project manager will ideally be a native or long-standing resident of Aceh province, with appropriate technical background in sustainable palm oil and effective project

management skills. At the national level, this will include FFI's sustainable palm oil program team, Senior Advisor Thomas Fricke, RSPO/Agribusiness Specialist Cahyo Nugroho, Smallholder Advisor Rudi Lumuru, and Imam Sayogyo, a leading smallholder palm oil plantation development consultant. At the local level, key FFI-Aceh staff members such as Conservation Response Unit (CRU) Manager Wahdi Azmi and AFEP Project Manager Matt Linkie will provide oversight and technical support as available in the areas of spatial planning, human-wildlife conflict mitigation, and participatory planning.

The project will run for a period of two years, with intensive engagement expected during the first and last six months of the project. During this period the primary expected outputs and impacts will include:

1. Preliminary Assessments and Consultations
   - Multi-stakeholder consultations to establish project benchmarks, objectives and workplan and create assessment team
   - Assess agroecological conditions and operational issues within overall concession, particularly reviewing existing 980 hectare parcel and pending 650 hectare parcel to be planted
   - Initial participatory planning workshop with cooperative leaders, members, and community leaders

2. High Conservation Value (HCV) Assessment
   - Create interdisciplinary HCV assessment team consisting of biological and social scientists
   - Review existing soils, agro-ecological, and species distribution data
   - Conduct field transects with soil and hydrological analysis, vegetative cover assessments, and faunal surveys
   - Record and analyze data pertaining to presence or absence of HCVs 1-6
   - Compile analytical report, graphs, photos, maps, and conclusions and submit to independent verification team

3. Participatory Mapping and Spatial Planning
   - Secure all available satellite imagery, physical maps, and digital data
   - Train and deploy selected cooperative leaders and members to gather and groundtruth GIS data in the field
   - Update digital maps with findings and data gleaned in the field
   - Conduct stakeholder consultations and workshops to create spatial plans

4. Smallholder RSPO Training, Extension, and Certification
   - Conduct three-day RSPO training in cooperation with Dishutbun, Aceh Green Sustainable Palm Oil Working Group, and RSPO Indonesia Office
   - Provide in-situ farmer field school (FFS) training on intermittent basis
   - Document and disseminate smallholder certification compliance, corrective actions undertaken, and incentives for launching RSPO certification
   - Create monitoring team to review and provide feedback to cooperative management and membership vis-à-vis RSPO P & C.

5. Create Master Management, Business, and Financing Plan
   - Utilize internal and external resource persons to support the cooperative in drafting a long-term plantation management and business development plan
   - Assist the cooperative in hiring a competent and committed manager/management consultant to provide guidance for at least 24 month

- In cooperation with FFI HWC expert, develop Human/Wildlife Conflict Mitigation strategy
- Conduct environmental impact assessment (AMDAL) on infrastructure requirements, waste management, and occupational issues
- Identify and selectively pursue additional financing sources, such as Bank Pembangunan Daerah (BPD) Aceh and Rabobank International
- Socialize above named activities and documents with key local stakeholders to facilitate consensus.

The project hopes to receive $130,000 in counterpart funding from the Dutch company CREM bv or another Dutch agency as part of an Indonesia-wide initiative of the Dutch government agency DGIS (Directorate General for International Cooperation). They have an estimated 100,000 Euro maximum available per pilot project, and are very interested in including this effort in Aceh in their Indonesian project portfolio. Thomas Fricke, Frank Momberg, and Ruddy Lumuru have met in Jakarta and had follow-on discussions with Petra Meekers and Marjon van Opijnen of CREM, who are working on developing Palm Oil Smallholder pilot RSPO certification projects for Indonesia. Additional loan financing of $815,000 will be sought from a government or commercial bank under the nationwide Smallholder Estate Crops Revitalization Scheme (Revitalisasi Kebun)

**Explain why FFI involvement is suited for this project**
(in terms of FFI mission and objectives (business plan), any strategic significance, regional mission/goals, regional niches etc. Indicate how this project links to other projects/programmes)

This project fits well with the overall objectives and operational priorities of FFI in Indonesia and Aceh. Sustainable palm oil was designated as a key means of supporting Aceh's post-Tsunami, post-conflict economic recovery within the Aceh Green Vision publicly promoted by Aceh Governor Irwandi Yusuf. This pilot project will therefore be closely integrated with the AFEP-financed Coordinator for the Sustainable Palm Oil Working Group and FFI's Indonesian Palm Oil Program.

If successful, the project can demonstrate effective, participatory means and tools to support biodiversity conservation and sustainable livelihoods utilizing the RSPO Principles and Criteria in Aceh. FFI as a leading international conservation organizational member of the RSPO stands to potentially increase its organizational credibility and influence in the organization. FFI also could increase its capacity to leverage significant government and private resources, such as the $60 million smallholder palm oil development projects funded by the Government of Aceh.

**Logistics**

Preliminary implementation schedule (incl. start and finish dates, deadlines etc)

1. Conduct initial field review, planning workshop, and needs assessment September 2009
2. Create project implementation and monitoring committee September/ October 2009
3. RSPO Smallholder Development and Certification Training October 2009
4. High Conservation Value (HCV) assessment November 2009-December 2009
5. Create initial (December 2009) and long-term (June 2010) Human/Wildlife (particular Elephant) Conflict Mitigation plan

6. Participatory Mapping and Spatial Planning December 2009-February 2010
7. Business and Financial Planning January-March 2010 Plan due End of March 2010
8. RSPO Certification Technical Support April 2010-June 2011
9. Conduct quarterly management and technical team meetings and ongoing technical support and training for the cooperative's management and rank and file.

**Preliminary Summary of Budget (use broad budget headings):**

The broader project budget is estimated as follows:

| Project Components: | USAID | Aceh Gov | DGIS-CREM & Others | Coop | Total |
|---|---|---|---|---|---|
| 1) Seedling/Nursery Establishment and Land Preparation | $141,346 | $ 291,538 | $ 10,000 | $30,000 | $462,884 |
| 2) Cooperative Capacity Building | $ 60,000 | $ - | $ 75,000 | $12,000 | $ 72,000 |
| 3) Palm Oil Plantation Planning and Certification | $125,000 | $ - | $ 815,000 | $12,000 | $217,000 |
| 4) Small-scale Mill Establishment | $195,600 | $ - | $ 75,000 | $36,000 | $231,600 |
| 5) Small-scale Cacao Improvement | $ 75,000 | | | $50,000 | |
| **TOTALS** | $596,946 | $ 291,538 | $ 975,000 | $140,000 | $983,484 |

The estimated budget for FFI's Component 3: Palm Oil Plantation Planning and Certification per line item and sub-component is as follows:

| | |
|---|---|
| 1. Personnel and Consultants | |
| - Project Manager | $ 32,000 |
| - Other FFI Staff | $ 39,000 |
| - Consultants | $ 45,000 |
| 2. Administrative Costs | |
| - Domestic Travel | $ 15,000 |
| - Communications | $ 10,000 |
| - Materials | $ 7,200 |
| - Cooperative Administrative Costs | $ 5,000 |
| 3. HCV Assessment | $ 30,000 |
| 4. Spatial Planning and Mapping | $ 20,000 |
| 5. Smallholder RSPO Training and Certification | |
| - Consultations | $ 10,000 |
| - Short Course Training | $ 8,000 |
| - Certification Inspection | $ 15,000 |
| Subtotal Project Costs | $ 211,200 |
| Overhead @ 15% | $ 31,680 |
| Total Project Costs | $ 267,880 |

| List main or likely funding source(s) and scheme(s) if known. Indicate any potential for co-financing and by whom. |
|---|
| USAID Serasi Project, Requested $125,000<br>Directorate General for International Cooperation (DGIS) Netherlands Government, to be Requested $130,000 (100,000 Euros maximum)<br>Cooperative Batee Meuasah, $12,000 Counterpart Funds<br><br>Total Funding $267,000 |
| **Please summarise any project development work done so far** |
| There has been significant project development conducted during May-June 2009 by FFI Senior Advisor Thomas Fricke, primarily in the context of his Aceh Biofuels Assessment consultancy with USAID Environmental Support Program (ESP)'s Banda Aceh office. This activity included identifying and contacting key resource individuals and organizations, particularly ESP Aceh Manager John Pontius, USAID Serasi Aceh Field Project Director Chris Felley, Isa Rahmadi of Aceh Society Development, and Petra Meekers of CREM bv. |
| **External/local Project Partners** |
| - Koperasi Batee Meuasah, Paya Bakong, Aceh Utara, Aceh<br>- Aceh Society Development (ASD), Bireuen, Aceh<br>- Dinas Kehutanan dan Perkebunan (Dishutbun), Aceh Utara and Banda Aceh, Aceh, Indonesia<br>- Sawit Watch, Bogor, West Java, Indonesia<br>- CREM bv, Amsterdam, Netherlands |
| **Key Contacts (Please give full contact details)** |
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# ANNEX 10: SUSTAINABLE TRADE CONSULTING (STC)

## Latest Developments in Sustainable Palm Oil and the Roundtable on Sustainable Palm Oil (RSPO)

**Date:**

July 26, 2009

**Presented to:**

Chris Bennett
ESP-USAID Project
Jakarta, Indonesia

**Presented by:**

Thomas Fricke
Sustainable Trade Consulting
Marlboro, VT, USA/Sanur, Bali, Indonesia

## Table of Contents



ANNEXES (contained in CD-Rom to be distributed):

1. RSPO Update Seventh Generation (Power Point)
2. RSPO Principles and Criteria Document (PDF)
3. RSPO RT5 Session V - Certification
4. RSPO RT5 (1) Sime Darby-Wild Asia (3 documents)
5. Seventh Generation Presentation 3 October 2008
6. Greenpeace Reports English (Folder)
7. Oil Palm Forest Conversion Moratorium Criteria
8. Resolution on RSPO GA on Deforestation
9. WWF High Conservation Value Forest Landscape
10. Fitzherbert: How Oil Palm Expansion Affects Biodiversity
11. WWF Forest Conversion News (FCN) No. 19

## A. Introduction

In the six years since its founding in 2002, the Roundtable on Sustainable Palm Oil (RSPO) has grown from a small discussion group of palm industry members and environmental NGOs into a major international force. Concurrently, tropical palm oil has emerged as the world's largest vegetable oil crop for a variety of food and non-food applications. As of this writing, the RSPO's membership has expanded to over 300 organizations from the palm oil production and trading industry, manufacturers and retailers, banks and financial institutions, research and development networks, and social and environmental NGOs. The participating companies now constitute well over 40% of global palm oil production. The RSPO's inclusive and at times unwieldy multi-stake-holder consultative process has produced extensive international performance standards and a sophisticated certification system for sustainable production, processing, and marketing of palm oil.

The RSPO is viewed in many different ways—a genuine effort that has achieved significant breakthroughs on the international scene, a dynamic forum for exchanging views, or a costly and cumbersome process-oriented entity. Its proponents, many of whom are active RSPO participants, see the organization's promise in promoting best practices and halting past and present destructive patterns in the rapidly growing international palm oil industry. Its critics, including some within the organization, see the RSPO as too prone to compromise and turning a blind eye to the sins of omission and commission of the major industry players and non-members. As with its sister commodity initiatives such as the Forest and Marine Stewardship Councils, the hopeful signs on the horizon posed by the RSPO are often overshadowed by the overwhelming nature of issues such as global warming, tropical forest and peatland destruction, and species extinction.

This review, accompanied by a CD with extensive documentation, provides a brief summary of the current status of the RSPO, with particular emphasis on the supply chain certification process. This report was prepared by Sustainable Trade Consultants (STC), a Vermont and Indonesia-based consulting firm that has extensive experience in supply chain development, sustainability certification, and environmentally and socially-responsible enterprises in developing countries.

## B. History and Summary of the Roundtable on Sustainable Palm Oil (RSPO)

The Roundtable on Sustainable Palm Oil (RSPO) originated in 2002 through an informal set of meetings involving the European companies Unilerver, Aarhus, Migros, and Sainsbury, the major Malaysian palm oil producer Golden Hope and the Malaysian Palm Oil Association (MPOA), and the international environmental organization World Wide Fund for Nature (WWF). The group created the groundwork for the formation of the RSPO and organized "Roundtable 1" (RT1), the first annual gathering in Kuala Lumpur, Malaysia in 2003. Over 200 participants from 16 countries attended this gathering and signed a Letter of Intent (LOI) which officially launched the RSPO. The LOI proclaimed the vision and mission of the organization as follows:

**Vision:**
*RSPO assures that the production of palm oil contributes to a better world*

**Mission:**
*RSPO promotes sustainable palm oil production, supply and utilization through the development, implementation, and verification of credible global standards, supported by the interaction and communication between key stakeholders throughout the supply chain.*

The basic principles and modus operandi of the fledgling organization were described as follows:

- Multi-stakeholder in nature and membership
- Voluntary and proactive
- Transparency in communications and information-sharing
- Inclusiveness among various stakeholders
- Action-oriented based on tangible results
- Fully committed to the production and utilization of sustainable palm oil

The RSPO has followed in the footsteps of several other global commodity initiatives, such as the following:

- Forest Stewardship Council
- Marine Stewardship Council
- Common Code for the Coffee Community (4C)
- Roundtable on Responsible Soy
- Sustainable Tree Crops Initiative (Cocoa)
- Roundtable on Sustainable Biofuels

These organizations were all created in response to major environmental and social issues related to the production, processing, and marketing of the commodity involved. Most of them brought together major industry players with conservation and development NGOs in response to major concerns such as rainforest destruction, overfishing, land rights, and poverty alleviation. The Forest Stewardship Council (FSC), long based in Vermont, was one of the first, and resulted in the internationally-recognized Smartwood certification system for sustainably produced timber and wood products.

The governance of the RSPO is vested in an Executive Board (EB) that includes 17 members representing the various sectors involved in the organization—palm oil producers and manufacturers, social and environmental NGOs, financial institutions, and trade associations. Since the onset, the President of the Executive Board has been Jan-Kees Vis, the Vice President for Sustainability of Unilever, which is also the world's largest industrial consumer of palm oil products. The second report of this series will highlight Unilever's commitments to sustainable palm oil in greater detail.

In April 2004, the RSPO formally set up a Secretariat in Kuala Lumpur, Malaysia, the capital city of the largest palm oil producer nation at the time. This small office includes an Executive Director, an Activities Coordinator, a Membership Director, and other support staff and consultants as needed. In December 2006, the RSPO set up an Indonesia Liaison Office in Jakarta, the capital city of the neighboring country which has now overtaken Malaysia as the world's largest palm oil producer. These offices organized and conducted the next three annual Roundtables in Singapore and Kuala Lumpur. The most recent of these events, RT5 held in Kuala Lumpur in November 2007, attracted over 800 participants from over 35 countries. By June 2008, the RSPO contained a total number of 229 ordinary members and 87 affiliate members.

From 2003-2005, the main focus of the RSPO was the creation by consensus of a set of Principles and Criteria (P & C) that could serve as the basis of a credible, comprehensive sustainability certification system. The first draft was completed by October 2005, containing 8 broad principles which incorporated 39 specific criteria (see attachment). Once the draft was confirmed at the RT4 in Singapore, the RSPO organized several National Interpretation (NI) initiatives to review and generate specific indicators and guidances to augment the global P & C with adjustments for local conditions. These initiatives were

managed by National Interpretation Working Groups (NIWGs) comprised of leading companies and NGOs in those countries. NIs have now been completed for Malaysia, Indonesia, and Papua New Guinea, and are underway for several other countries in Latin America and Africa.

For example, in Indonesia, the RSPO National Liaison office enlisted four major production companies (Wilmar International, Sinar Mas, Musim Mas, and London Sumatra) to serve as hosts for the field testing of the P & C and the development of indicators, guidances, and trial audits. Working in parallel with open communications and exchanges available to all RSPO members, they conducted RSPO compliance gap analyses, helped develop a road map for the audit process, and field tested RSPO verification and certification protocols. The Liaison Office also worked with key NGOs such as Sawit Watch to develop gap analyses, indicators, and guidances for smallholders.

## C. RSPO Sustainability Verification and Certification

The RSPO auditing and certification system is intended to be a widely recognized and accredited third-party certification program for producers, processors, food and non-food ingredient producers, manufacturers and retailers around the world. From 2005-2007, the RSPO hired the UK-based consulting organization ProForest and several individual consultants to create the basis for its Certification and Accreditation System. By the RT5 in Kuala Lumpur in November 2007, the protocols for certification and accreditation of third party inspection organizations were generated by committees that met directly in person and indirectly though teleconferencing and e-mail.

At the end of the RT5, the RSPO's Executive Committee and the General Membership approved the proposed Certification and Accreditation system. Between that time and the present, six companies in Malaysia, Indonesia, and Brazil have been accredited by the RSPO to perform certification audits. By May 2008, the first of a number of inspections of RSPO member companies was underway by these accredited inspection bodies in Malaysia and Indonesia. The pace of audits and companies entering the certification process is steadily increasing now, as shown in the attached Power Point document RSPO Update Seventh Generation. The first transactions and shipments of certified sustainable product were on the water in early September 2008, using the Greenpalm Book and Claim system that will be described below. At the moment, only origin-based plantation and processing operations have been included in the RSPO's certification program.
The RSPO has attempted to create standards and certification for sustainable production, processing, and marketing of palm oil that will be relatively simple, accessible and implemented worldwide on a consistent basis. These standards are meant to be generic globally and contain provisions for specific conditions for separate countries. The standards and certification are intended to be adaptable to new information, as well as efficient and cost-effective to measure and implement. The entire auditing and inspection process will abide by the RSPO's approach of transparency and multi-stakeholder inputs.

RSPO certification aims to ensure that the products are produced in compliance with widely-respected guidelines with social and environmental safeguards that protect the environment, wildlife, workers and local communities. The basic elements of the standards are the Principles and Criteria (P & C) previously mentioned above and contained in the annex and the Resource CD-Rom. As shown, there are 8 general principles within the P & C, which have an aspirational orientation:

Principle 1: Commitment to transparency (2 Criteria, 8 Indicators)
Principle 2: Compliance with applicable laws and regulations (3 Criteria, 9 Indicators)

Principle 3: Commitment to long-term economic and financial viability (1 Criterium, 2 Indicators)
Principle 4: Use of appropriate best practices by growers and millers (8 Criteria, 31 Indicators)
Principle 5: Environmental responsibility and conservation of natural resources and biodiversity (6 Criteria, 17 Indicators)
Principle 6: Responsible consideration of employees and of individuals and communities affected by growers and mills (11 Criteria, 27 Indicators)
Principle 7: Responsible development of new plantings (7 Criteria, 16 Indicators)
Principle 8: Commitment to continuous improvement in key areas of activity (1 Criterium, 5 Indicators)

As noted above, a total of 39 criteria have been developed in accordance with the operational and organizational realities within the supply chains. Audits will be performed against these criteria, using indicators that were developed by the National Interpretations (NIs). The overall framework is geared to the concept of continuous improvement rather than immediate full compliance. This may be both a perceived strength and weakness of the RSPO, with proponents lauding the process as flexible and realistic, while detractors criticizing the process as overly compromising and incremental.

The RSPO certification of products through the supply chains follows three approved approaches:

1. Total Segregation
This supply chain auditing system allows for complete traceability and tracking for all raw materials through the finished product stage through production, processing, storage, transport, and manufacturing processes. It is currently primarily in place for specialized high value markets such as certified organic products.

2. Mass Balance
This system tracks the volumes of allowable certifiable end products (primarily Crude Palm Oil or Palm Kernel Oil) by correlating these outputs with the raw material inputs produced by plantations and mills in the supply chains being audited. Specific protocols and guidelines for audits under this system have been developed for the RSPO through contracts with Utz Certification Systems and individual consultants.

3. Book and Claim
This system creates a mechanism for issuing certificates equivalent to the calculated volumes of product produced by the plantations and mills that have been audited and certified in the indicated supply chain. This essentially assigns sales quotas for the certified companies, and is not necessarily directly tied to the actual product being shipped. The RSPO has signed a contract with the UK-based data logistics and trading firm Greenpalm, Ltd. to manage this on-line system for both sellers and buyers. For each transaction, Greenpalm provides a financial contribution to RSPO.

These three approaches highlight the complexity and difficulty of creating reliable and cost-effective traceability systems for sustainable palm oil. Only the first track, Total Segregation, provides absolute assurance of traceability and transparency. The other two systems involve aggregation, bulking, and blending at all levels of most conventional palm oil supply chains, making traceability quite difficult. For example, in many parts of the world, the production of a number of local mills and/or refineries, which is often itself the combined production of potentially hundreds or thousands of large and small plantations, is frequently combined in

locally-available storage tanks. This is compounded by the ocean vessels which themselves tend to combine product in the most space and cost-advantageous way. The supply chain is further complicated by commercial bulking stations owned by local and international traders and producers in the countries of origin or destination.

The three approaches above are still in an initial stage as the first generation of RSPO audits is unfolding. The Total Segregation model is considered prohibitively expensive except for special markets with pricing premiums such as organic palm oil and mostly assumed to be impractical in conventional applications except for unusual cases such as in New Britain in Papua New Guinea. In this somewhat isolated region, most operations are in the process of RSPO certification and companies tend to maintain segregated bulking and storage systems.

The mass balance approach appears to offer a more scientific and data-based approach, although it offers opportunities for circumvention or abuse as with many other large-scale certification schemes. The book and claim method is the system most in favor with producers and purchasers now as it appears to potentially offer the most convenient, pragmatic, and cost-effective means to meet market demand for sustainable palm oil products. However, it is also considered suspect by RSPO critics since it may often entail minimal actual product traceability in the supply chain.

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