

# Energy and Eco-Efficiency in Agro-Industry (E3Agro)

## Eco-Efficiency Component



Client: BMZ (Federal Ministry for Economic Cooperation and Development)  
 Country: Thailand  
 Lead executing agency: Department of alternative energy development and efficiency (DEDE)  
 Term: 2004- 2007

### Background

In Thailand, the income of 60% of the population depends on the productivity and competitiveness of the agro-industry. Additionally, the agro-industry is the largest energy consumer in the Thai manufacturing sector and has at the same time the largest renewable energy potential. Biomass residues could generate 3.000 MW (mega-watts) of electrical power, about 15% of Thailand's present peak load, if a favorable energy policy is put in place. Overall, it is estimated that Thai agro-industry could generate additional income of USD 1 billion annually through waste-to-energy and energy-efficiency improvements. The E3Agro Project aims to tap this potential in selected sectors of Thai agro-industry.

### Objective

The aim of the E3Agro Project is to strengthen the competitiveness of Thai agro-industry through the implementation of cost-effective production process technologies and professional management techniques. At the same time, the project promotes the efficient use of energy and the improvement of biomass utilization for energy production.

### Approach

The project will integrate the overall management of quality, environment, energy and information into a combined system of international best practice manufacturing. To ensure that the project is a sustainable success, two factors are of the greatest importance. First, a suitable energy policy framework and the promotion of financial incentive schemes have to be developed. Second, the private sector has to develop a strong self-interest and commitment to improve its eco- and energy-efficiency in a sustainable manner.

In the beginning, the project will concentrate its activities on the palm oil sector. There are 34 palm oil mills in Thailand, mainly located in the south, with an organic wastewater load equivalent to 5 million people. Each palm oil mill has the potential to generate about 10 MW of electricity from its solid and liquid biomass waste, which in turn could be sold to the public grid. Biogas generation from anaerobic wastewater treatment alone could generate more than 1 MW of electricity, equivalent to an additional annual income of 400.000 Euro.

Both palm oil plantations and mills have a high potential for further optimization in terms of agricultural and production process efficiency. Because palm oil plantations and mills are concentrated in southern Thailand, this industry commands dominant importance in terms of work provision and income generation for local people. However, in addition to their main product – crude palm oil – mills generate many by-products and liquid wastes which have a significant impact on the environment if they are not dealt with properly.



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### Impacts – Results achieved so far

After only one year, more than half of all Thai palm oil mills, representing more than 60% of the production capacity, are participating in E3Agro project activities. In order to promote technology transfer in biomass energy, a study tour to Germany had been organized. Participants from 7 Thai palm oil mills joined the tour, at their own expense, to learn about German technology in the area of biomass, biogas, gas engine and turbine technologies. The study tour was followed up by a visit to Thailand of German technology providers who presented their eco-efficiency technologies to a wider audience.

To highlight the potential for increased eco-efficiency in the palm oil sector, an eco-efficiency benchmarking exercise is being undertaken. So far, 17 out of 34 palm oil mills have signed up to join the benchmarking exercise. At the same time, Asian Palm Oil Company was chosen as a pilot case to carry out a study on optimizing its utilization of biomass residues and energy efficiency at its mill. Presently, a detailed energy audit and a pre-feasibility study for a biomass power plant are being carried out. Through additional energy audits at three other mills, opportunities for energy productivity improvements will be identified.

To ensure that energy savings and the introduction of biomass power plants are profitable for the palm oil mills, GTZ is working with the Thai government on the simplification of the supply regulations for Very Small Power Producers (VSPP).

The project has defined seven quantitative impact indicators, which will be monitored over the 4 years period. By June 2008, at least 100 GWh (giga-watt hours) of electricity per year should be sold by the palm oil mills to the public grid, thereby adding additional income of 5 million Euro annually from waste products.

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