

'Closed Loop Zero Waste Management System' for Palm Oil Mills

EES state-of-art Closed Loop Zero Waste Management System has been installed in a palm oil mill with a processing capacity of 200 Tons of EFB per day and 40 m3 of POME per hour located in Banting, Malaysia.



Palm oil cultivation in Malaysia covers more than 3 million hectares. The estates and associated mills generate nearly 60 million tons of Palm Oil Mill Effluent (POME) and 40 million tons of Empty Fruit Bunches (EFB) annually, which in some form have to be disposed off.

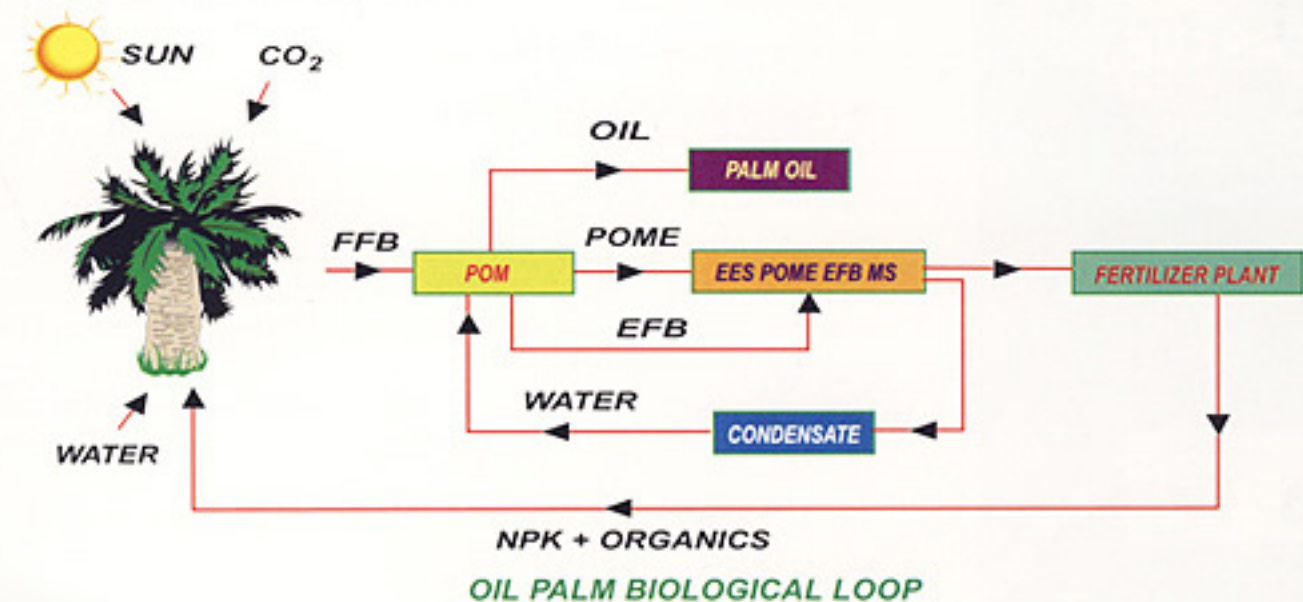
POME is one of the major by-products released from a palm oil mill. A mill with a processing capacity of 40 tons of Fresh Fruit Bunches (FFB) per hour can generate about 200,000 tons of POME annually. Majority of mills utilise land application treatment methods with conventional biological systems consisting of anaerobic and aerobic to treat the POME.

The EFB are the solid by-products, which have to be disposed off separately including mulching as fertilizer or incineration. The drawback of incineration is 'white smoke', which consists mainly of water vapour and is aesthetically unacceptable.

The increasing environmental awareness and the deteriorating receiving (river) quality has compelled the Department of Environment (DOE) to impose a more stringent ruling and has in certain areas imposed zero discharge standards.

Furthermore, POME has been found to contain valuable plant nutrients and is now considered a valuable resource that needs to be recovered and processed to produce commercial organic fertiliser, which is a more desirable alternative from an environmental as well as the treatment and disposal perspectives.

As a result of this, *Enersave Engineering Systems* has developed a *Closed Loop Zero Waste Management System ZWMS* capable of processing EFB to generate energy and of recovering POME for conversion to organic fertiliser. The result is there will be no liquid or solid effluent out of the palm oil mill and with organic fertiliser being the beneficial by product.



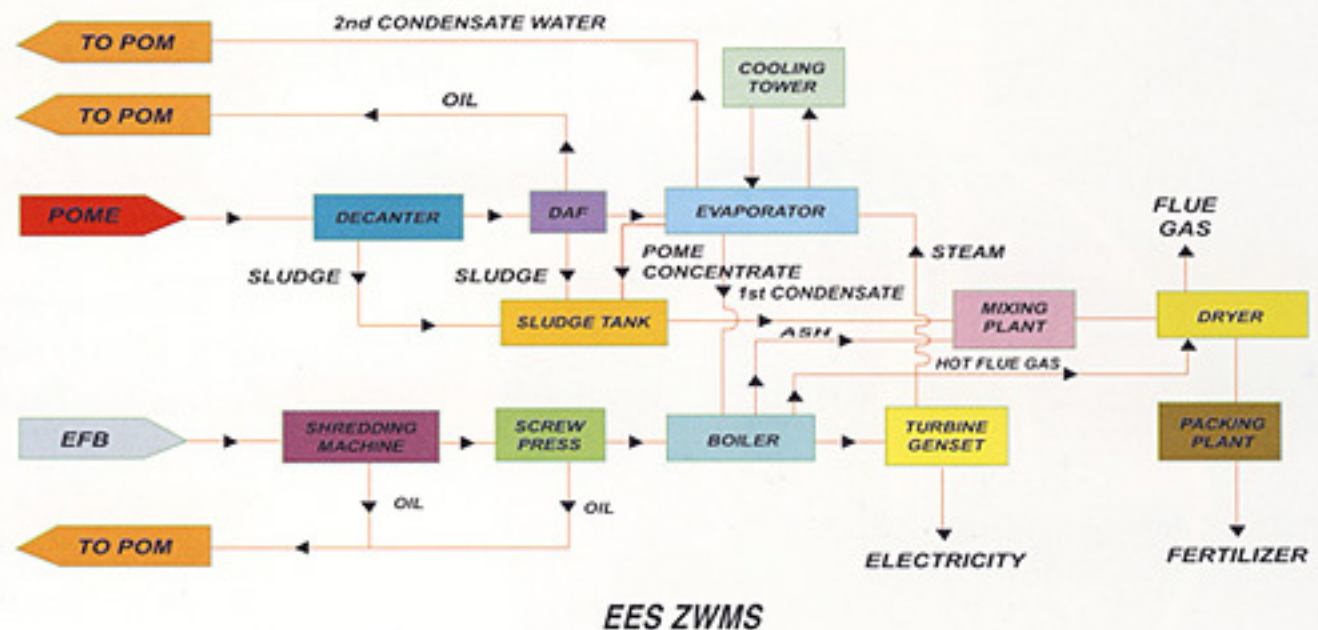
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Technology Overview



The *ZWMS* is achievable with the innovative application of Multiple-Effect Vaporization Technology and the system has three main elements:

1. Multi-Effect Evaporators

POME undergoes a pretreatment process for debris, oil & grease removal and pH adjustment. This weak liquor is then pumped to a three-stage evaporator, ultimately producing high quality condensate and POME concentrate.

2. Energy Generating System

The EFB serves as the power requirement of the plant. After screw press application to reduce moisture content and extract the residual palm oil, EFB is conveyed to boilers by conveyor, a section being hot jacketed to further dry the fuel. The high-pressure saturated steam produced is sufficient to produce 500kW of power using a steam turbine. The design of the boiler incorporates a step-grate system for better combustion of EFB.

3. Drying System

In a mixing plant, the primary ingredients of fertiliser, i.e. evaporator and decanter sludge, and boiler ash are mixed before transfer to the rotary dryer. This organic fertilizer then proceeds to a packing station.

EES ZWMS's Benefits

- ◆ Eliminate Environmental Pollution
- ◆ Eliminate The Emission Of Green House Gases
- ◆ Optimization of Oil Recovery
- ◆ Increase In Yield Of Palm Oil
- ◆ Achieving Water Recycling With Recovery Rate Up to 85%
- ◆ Reclaim / Recycle Nutrient To Produce Commercial Organic Fertilizer Rich In N.P.K

Overall, to the palm mill operator, this process is a much more desirable alternative from an environmental as well as the treatment and disposal perspectives. A safer working environment is created which can only enhance the image of the palm industry.

Combined with the saving in plant operating costs, the potential is to save millions of Ringgit in foreign exchange by reducing the importing of expensive fertilizers.

These benefits and the plants success is a testament to the design and engineering capabilities of *Enersave Engineering Systems*.



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