For whatever reasons, be they economic, agronomic or environmental, palm oil mill residues have been raised from the status of waste to that of by products with multiple potential uses. A technical/economic analysis of the agroindustrial setting is needed to determine the most appropriate techniques for treating and making optimum use of them in each particular case.

Making the most out of residues

- CIRAD possesses expertise in the fields of combustion, carbonization and gasification of biomass and has a team of biofuel specialists.
- It operates in oil palm plantations through separate missions carried out by its experts, but also through members of its staff seconded to numerous operators in the supply chain.
- CIRAD is in a particularly good position for carrying out the technical/economic feasibility studies needed to make the most appropriate choices for optimum use of oil palm processing residues. Environmental conservation, rising energy costs and the emergence of greenhouse gas emission rights are unavoidable today. Hence CIRAD is proposing new technologies to industrialists for improving the management of palm oil mill residues, be it for economic or environmental aspects.
Recycle or eliminate waste and by-products

In palm oil mills, FFB processing generates waste and by-products primarily consisting of empty bunches (23% of FFB tonnage at a 65% moisture content), fibres (13% at 40% moisture), shells and debris (7.5% at 20% moisture), liquid effluents (around 60%) and sludges in which suspended solids contained in the effluents are concentrated.

Palm oil mills have always practised co-generation by burning a share of their solid waste, mostly fibres and sometimes shells. Using turboalternators to produce the electricity and steam needed to operate the mill and ancillary services made them energy-independent.

Spreading empty bunches in the field became a necessary replacement for their incineration, with the advantage of producing no smoke pollution and maintaining the organic matter content of the soil.

Treatment of liquid effluents by lagooning was the first technique for reducing pollution. Nowadays, spreading effluents that have been partially treated by lagooning means that use can be made of some of the mineral nutrients they contain.

Some available technologies

- Composting of empty bunches and sludges sprayed with effluents is a concept without methane release. It is carried out in windrows with mechanical turning, or in heaps with forced ventilation.

- Co-generation consists in using all the solid waste for the simultaneous production of heat and electricity. New technologies use multi-stage steam turbines. Energy yields are much higher than when using the equipment usually available in palm oil mills.

- The methanization of oil mill effluents produces gas that can be used in engines or gas turbines to generate electricity, along with fertilizers (methanization sludges).

Technical choices based on an economic analysis

Modern processing industries provide a wide range of opportunities for utilizing oil mill by-products. The "zero discharge" concept is now realistic. The choice of techniques needs to take site characteristics into account, primarily:

- The costs of production factors (energy, fertilizers, etc.).
- The site: plantation topography, soil type, proximity to the national grid (for possibly selling any surplus energy produced).
- The type of activities: the electricity and steam requirements of a palm oil mill-kernel recovery station-refinery complex are often much greater than those of a palm oil mill alone.