

Phitsanulok Energy Park – introducing MBT with AD and RDF production in Thailand

P. Bansith¹, K. Krell²

¹Green Tree Foundation, Chiang Mai, 50000, Thailand

²Greenovate Ltd., Nicosia, 2571, Cyprus

Keywords: solid waste, bio-waste, separation, pre-treatment, sorting, recycling

Presenting author email: katharina.krell@greenovate.eu

Abstract

Since the moment the current Thai Government has declared waste management to be a national priority 2 years ago, many public and private players are trying to develop new initiatives to introduce modern waste management in the country. The project presented in this abstract is one of the most advanced among these initiatives and can be considered a pioneering project for modern Thai waste management. If successful, it will pave the way for many other developers.

Thai waste is relatively wet with an average of 55-80% of humidity, depending on density of urbanisation and season. The default collection system in urban areas is door-to-door collection of unsorted Municipal Solid Waste (MSW) and subsequent disposal at landfills. The challenge consists in diversion of MSW from landfill, sanitisation of remaining landfills, material recovery and energetic use of MSW, and safe disposal of hazardous wastes. Low current disposal fees and a political-legal framework for modern waste management in its infancy result in high economic risk for first movers that adds to the technical risk of introducing non-indigenous technologies to Thai waste.

Since 2014, intense exchanges are taking place between Thai Ministries and public administrations at all levels and their European counterparts in search of insight into waste policy frameworks, incentive schemes, collection systems, and treatment solutions. One of these knowledge exchange missions has resulted in the partnership between a Thai and a European waste project developer (who author this abstract). Together they won the confidence of the city and region of Phitsanulok and are currently developing a modern Mechanical-Biological Waste Treatment (MBT) plant with Anaerobic Digestion (AD) and production of Refuse-Derived-Fuel (RDF).

The plant shall treat the waste collected in the city of Phitsanulok and the surrounding region, an estimated 300 tons of MSW per day, collected every day. The waste will arrive at the future plant in compactor trucks from a network of transfer stations owned and operated by the region. Incoming mixed solid municipal waste is first manually sorted for bulky waste and items not intended to end up in the plant. A screen separates the waste in two stream, larger and smaller than 100 mm. From the upper fraction recyclables are manually removed while metals are removed with a magnet and an Eddie Current. The under fraction moves through a hydraulic press by which it is separated into a very pure organic fraction and a non-organic rest fraction. Dried by the pressing out of the wet organic material, the non-organic fraction is combined with the negative fraction of the >100 mm fraction after the sorting line and is prepared as RFD (refuse-derived fuel) through removal of inert materials. The organic fraction after the press goes into an anaerobic digester where the biogas is collected. The gas is to be transformed into electricity in a combined heat and power (CHP) unit, and the green electricity shall be injected into the local grid. After it has released most of its gas, the digestate is stabilised and prepared into high-quality compost. The project has been dubbed “Phitsanulok Energy Park” due to the fact that the waste management plant produces two energy carriers: biogas and RDF.

The plant will be located in an industrial area in immediate proximity to a sub-station, important for the injection of electricity into the grid where a plot of land has been secured. This location has also the advantage of coming with less stringent environmental impact restrictions than a site located outside a designated industrial zone. The environmental impact of the planned project is currently being studied by the Faculty of Engineering of Naresuan University at Phitsanulok. Since the technology to be used is unknown to the Thai Ministry of Environment, it remains unclear for the moment which EIA documentation shall be required.

The project is prepared as a proposal for investment and discussions are currently ongoing with a number of potential private investors. The demonstration of the economic viability of the plant is challenging due to the many unknowns: which electricity price will the bio-electricity fetch in a bidding system that is only being introduced and hasn't done a single round of bidding yet? What's the legal framework for feeding electricity into the grid: is the sale of all electricity produced guaranteed or not? What price are cement plants willing to pay for RDF of a quality that the market doesn't know yet? How will the RDF price evolve if many new plants come online? Yet many Thai investors are keen to move into the waste sector to diversify their assets in the wake of a drop of demand in construction and other sectors, and local production of components coupled with a weak EURO can improve the economic performance of plant.