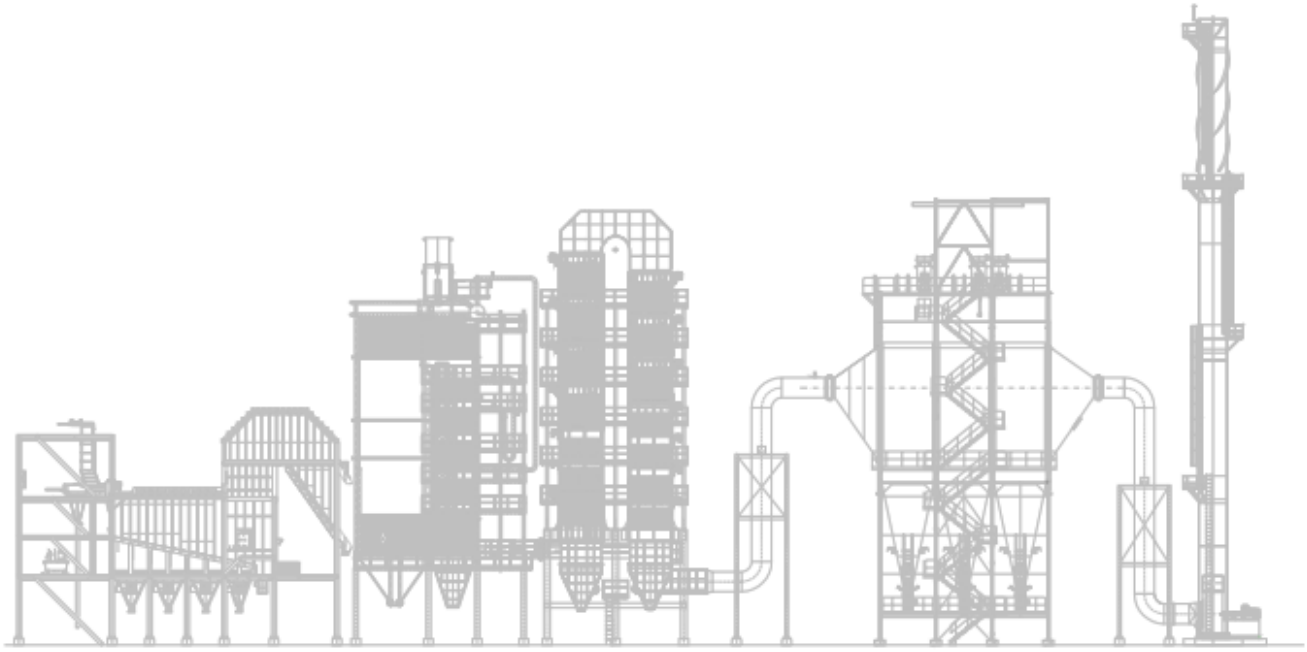
ENGINEERING

Brief project description of the waste-to-energy project

LAWI EtaPlant® - 9.4 MW RDF Power Plant Saraburi

Commissioning Date: June 2017

Location: Saraburi |Thailand



Renewable Power Plant Technology

Project Overview

Type:
9.4 MW RDF Power Plant with *LAWI EtaPlant®*

Location:
Saraburi, Thailand

Commercial Operation Date:
June 2017

Design Fuel:
RDF from industrial waste, landfill waste and municipal solid waste (MSW)

Scope of LAWI:
Overall power plant design and consultancy

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EPC supply of *LAWI EtaPlant®* boiler island incl. feed water system, de-ashing and ash storage system

Due to the ever-increasing amounts of waste produced, waste management has become a major challenge for the governments in Asia and Thailand in particular. Expert's opinions on waste management in Thailand are not very promising - they are warning that the amount of waste will turn the country into the *"garbage bin of the world"*. Municipal solid waste (MSW) composition in Thailand is mostly of high moisture of more than 60 % because of a high ratio of organic fractions, such as food waste. The common practice of waste disposal in Thailand's provinces have long been unsorted landfills (legal and illegal).

The government of Thailand has taken up this matter by setting up clear targets and support mechanisms to reduce the environmental impact of spilled-over landfills with thermal treatment and subsequential electricity generation being an essential pillar of that reduction.

When commissioned in 2017, the 9.4 MW Saraburi RDF power plant introduced herewith is one of the first 15 waste-to-energy (WtE) power plants in Thailand that are successfully operating in support of these targets according to the *Department of Alternative Energy Development and Efficiency*.

Technical Project Data:

Firing Design Capacity:
45 MW_{th}

Steam Boiler Design:
50 tph | 53 bar(a) | 450 °C

Generator Capacity:
9.4 MW_{el}

Design Fuel Consumption:
7.9 tph

Net Heat Rate:
14,257 kJ/kWh_{el}

Gross Electrical Efficiency:
28.3%

The Saraburi project, located about 100 km north of the country's capital Bangkok, feeds the electricity generated into the *EGAT* public grid by thermally converting RDF, made from waste obtained from existing landfills, fresh MSW and partly industrial wastes into renewable energy.

The total capital investment for this project is about USD 31,600,000 and LAWI has been the supplier of the overall power plant design engineering and the EPC supply of the boiler island. All works have been completed within schedule under LAWI project management.

RDF made from different sources (MSW, landfill, industrial waste) with high inhomogeneity was intended to be used in this project and such fuel required a highly flexible and adaptive thermal utilization system; consequently, the *LAWI EtaPlant®* has been the choice of the customer. The heart of the *LAWI EtaPlant®* is the adiabatic *LAWI EtaComb®* incineration system that is combined with an especially designed waste heat boiler and a dry sorption bag-filter flue gas cleaning combination.

The *LAWI EtaComb®* is an advanced adiabatic combustion technology, which has already been successfully installed in more than 45 projects across the world. In the Saraburi project, the *LAWI EtaComb®* showed its strength and robustness when during commissioning and commercial operation it appeared that the RDF fuel "as available" showed far worse properties regarding energy content, moisture as well as aluminium content than the contractual design fuel. Due to the adiabatic combustion chamber design and a sophisticated air and recirculation gas system that are independently controlled in each firing zone, the *LAWI EtaComb®* could be adjusted to the "as available" conditions and guaranteed performance figures achieved despite the challenging fuel properties.

Since its commercial operation date, the Saraburi power plant mainly operates with RDF of lower quality than the contractual design fuel. The power plant has a generator capacity of 9.4 MW_{el}, a firing capacity of 45 MW_{th} and a steam boiler design of 50 tph. Depending on the heating value, the annual throughput of the Saraburi power plant is up to 70,000 tons of RDF, resulting in an annual electricity generation of over 68,000 MWh/year. This power output fully satisfies the design parameters and financial model for the project and therefore also the investor's expectations.

LAWI continuously accompanies and consults the operation team and owner to assure that the Saraburi power plant is operated at the most of its capabilities.

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