Feature Article

Vynke's Renewable Energy Steam Power Plants

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The progress of renewable energy (RE) power plants had been relatively slow in Malaysia compared to its neighbours. But silently some RE plants have been taking shape behind the scene and perhaps it is useful to highlight them here for the general knowledge of the industry.

In this regard, it would be interesting to note that Vyncke Energietechnik has been selected by Frost & Sullivan as winner of their Southeast Asia 2008 Excellence in Technology Award. The technology they excelled was the steam generator Vyncke contributed for Chubu's two 10 MW renewable power plants they recently set up in Sandakan which are supplying power to the state electricity grid.

In Sandakan, Vyncke has built two biomass-fired steam generators using its patented combustion and heat recovery technology for two power plants each with a net generation capacity of about 10 MW.

The plants are reported to export 82 000 MWhr to Sabah Electricity Sdn Bhd (SESB) grid under the SREP programme. This is expected to be sufficient to meet the power needs of up to 12 000 household and will account for about 5% of SESB's total generating capacity. The entire fuel for this will be empty fruit bunches.

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Vyncke, in Malaysia, appears to be playing a global role as they are now expected to manage projects even in Argentina with parts procurement and project management carried out by Vyncke of Malaysia, China and Europe. The main pressure parts were fabricated by various fabricators in Asia with some high-tech parts and the combustion grate being fabricated Europe.

SPECIAL FEATURE - DYNAMIC WATER COOLED STEP GRATE

On technological side, Vyncke has something to their credit - its worldwide patented Dynamic Water-cooled Step Grate (or DWS as it is popularly known) claimed to be one of the best available combustion technologies that handle all types of fuel - course to fine and wet to dry.

This step grate can reduce the formation of clinkers from fuel with low ash melting points that gives it higher availability exceeding 8000 hr. The life expectancy of the grates are increased due to the minimal exposure of the grates to extreme heat fatigue or undue thermal expansion.

The combustion air is blown into the furnace in a controlled way and is entirely dedicated for combustion purposes only. It is not for cooling the step grates. The step grate cooling is done by water circulation in a closed circuit. In order to achieve optimal combustion and efficient emission, control

is exercised on the exact air that is being admitted to the furnace.

This method deviates from conventional systems where the cast iron grates are cooled by the combustion air which results in regulation conflicts throughout the varying capacity regimes. This is found to reduce the grate cooling efficiency culminating in poor combustion.

The DWS is also versatile in its ability to be extremely fuel flexible. As a result of the individually controlled air intake and pusher speeds, the DWS is able to handle a wide range of fuel with varying calorific values and moisture content while at the same time ensuring complete combustion with excellent emission.

Some of the data related to the power plant in Sandakan are given below:

Fuel Data

Type of fuel : Empty fruit bunches

Dynamic Water Cooled Step Grate Data

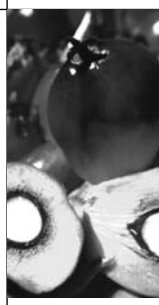
Type of firing grate	:	Dynamic Water-cooled Step Grate - 2 lanes.
Grate cooling medium	:	Water
Firing capacity	:	55 MW t hr^{-1}

Boiler Type

Boiler type	:	Horizontal type (tail-end boiler)
Number of empty passes	:	2
Number of evaporator bundles	:	2
Number of super heater bundles	:	2
Number of economizer bundles	:	3
Type of circulation	:	Natural
Type of circulation in economizer	:	Assisted circulation

Boiler Performance

Capacity of the boiler at feed water temperature of 105°C	:	55 300 kg hr^{-1}
Operating pressure at super heater outlet	:	42 bar (a)
Design pressure	:	59 bar (a)
Super-heated steam temperature	:	420°C
Boiler efficiency - design	:	83%



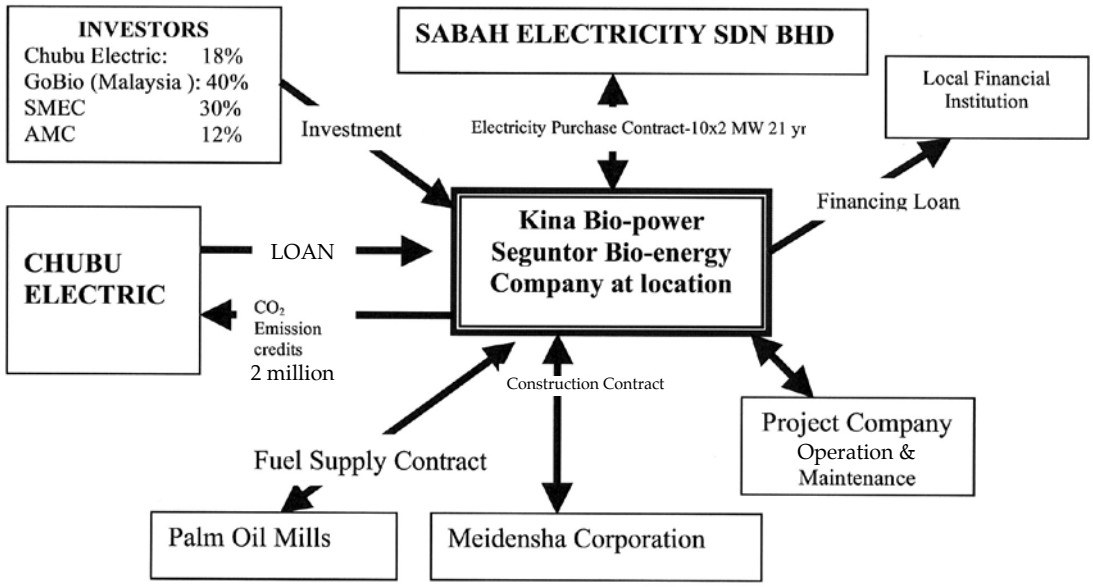
Emissions Guaranteed

Dust particles (M150)	:	< 400 mg N m^{-3}
Dust particles (ESP)	:	< 100 mg N m^{-3}
Carbon monoxide	:	< 250 mg N m^{-3}
NO_x	:	< 450 mg N m^{-3}
Smoke capacity	:	Ringleman 0-1
Boiler power consumption (parasitical load)	:	520 - 620 kW_e

The First Chubu Electric Power Project in Malaysia

Company	:	Seguntor Bio-energy Sdn Bhd (location two).
Capital Investor	:	Location: Sandakan, Sabah. • Chubu Electric Power Com, Inc. • Go Bio Sdn Bhd (local construction company investing in company). • SMEC Energy Sdn Bhd (Malaysia) (power production and Engineering firm). • Agritech Marketing Co. Ltd (AMC) (Japan) - development and investor of biomass power production company.
Power Generation Facilities	:	10 MW per location.
Fuel	:	Empty fruit bunches (170 000 t yr^{-1}).
Construction Location	:	Sandakan.
Buyer of Electrical Power	:	Sabah Electricity Sdn Bhd (nationally owned electrical power operator).
Scheduled Start of Construction	:	August 2006 (location one), October 2006 (location two).
Scheduled Start of Operation	:	March 2008 (location one), May 2008 (location two).

Project Scheme



The soot removal in this boiler is not done by steam blowing but instead it is done mechanically called 'rapping system' by which every single row of convection tubes are cleaned using very little energy. This ensures that the tubes are not subjected to erosion as is the case when steam blasting soot blowers are used. In this system, every row of tubes are cleaned with maximum efficiency. The rapping system, also requires very little maintenance compared to conventional soot blowing system.