COGEN 3
Proven, Clean & Efficient Biomass, Coal, Gas Cogeneration
The EC - ASEAN Business Facilitator

FSDP special issue

# Environmentally friendly conversion of wood wastes into useful energy:
## How ecoWise Holdings Limited will do it.

### The ecoWise Project

ecoWise Holdings Limited is a Singapore listed resources management and environmental solutions company. Bee Joo Industries Pte Ltd., its wholly owned subsidiary, will operate a cogeneration plant within the existing premises of ecoWise.

The 1 MWe cogeneration plant will be using tree prunings and waste wood pallets as fuel to generate power and heat for drying copper slag and wood chips. The excess energy will also provide additional business opportunities.

The company's mission is to help support Singapore's efforts for a cleaner and safer environment.

### LOCATION

The ecoWise plant is located in Sungei Kadut, Singapore.

### ECONOMICS

The total investment costs amount to Euro 2.1 million, excluding civil works and building foundations. The expected pay back period is 3 years after commissioning.

### TECHNOLOGY

The plant consists of:

- a solid fuel feeding system with a "Moving Floor" ;
- a combinational boiler generating 15 tonnes of steam per hour at 22 bar(a);
- a 1 MWe back pressure turbo-generator.

*Cogeneration plant construction site*

### CUSTOMER VIEWPOINT

*Mr. Lee Thiam Seng, Executive Chairman*

"ecoWise provides resources management services and environmental solutions to maximise the use of resources and minimise waste," explains Mr. Lee Thiam Seng, Executive Chairman, ecoWise Holdings Limited.

"The collected waste constitute raw materials from which we produce recycled products that address market needs. ecoWise is a licensed general waste collector. We provide clearance and disposal services for used copper slag and general waste, including wooden crates and pallets. We are an appointed clearing and services contractor for major shipyards and fabrication yards in Singapore."

Mr. Lee continued, "We are excited by the opportunities presented by the biomass-fired cogeneration plant. We will be able to recycle more wood wastes and make a greater contribution to the recycling efforts of Singapore. The wood waste can be converted into energy in the form of heat and electricity."

"ecoWise will also be able to generate more revenue from the increased collection of wood waste. The heat and electricity generated will be used to further leverage our recycling and future activities. These will contribute towards increased earnings and profitability," Mr. Lee concluded.

The plant is expected to be commissioned in December 2004.

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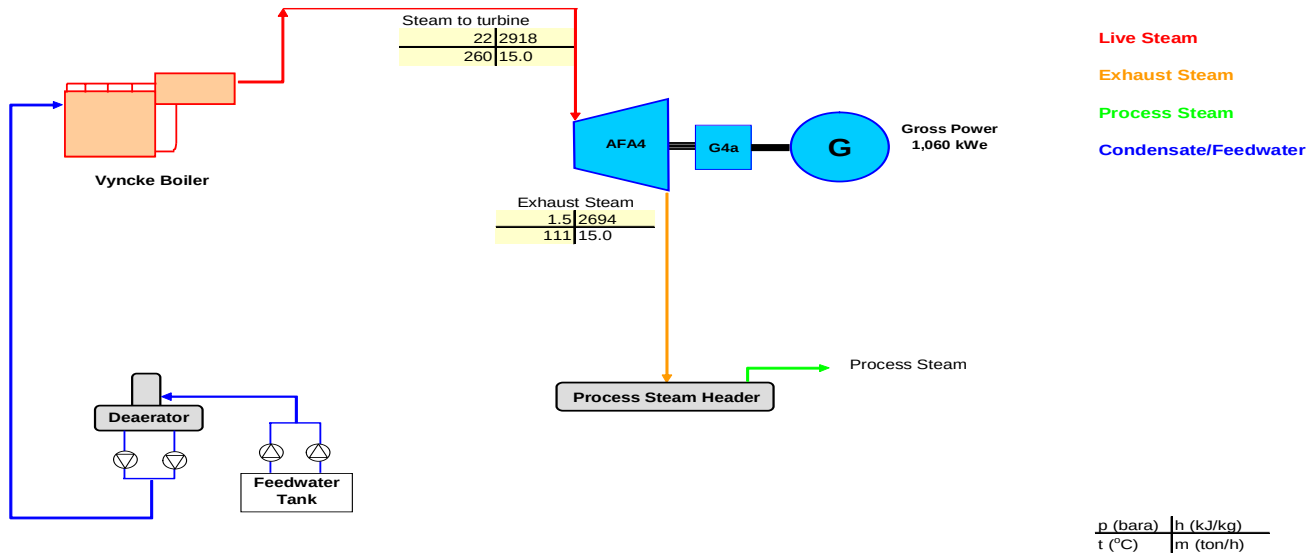
### ecoWise Heat Balance Diagram



## SUPPLIER VIEWPOINT (VYNCKE BOILER)

*Mr. Ken Poh Som*
*Project Manager*

"The ecoWise plant is one of the wood-fired cogeneration plants we have supplied in Singapore, where environmental requirements are the strictest in South East Asia. Vyncke has been providing clean energy technology in Asia for more than two decades, offering the solutions from fuel feeding, combustion, regulation and boiler construction under one roof," says Mr. Ken Poh Som, Project Manager from Vyncke.

"This ecoWise plant is tailor-made to use wood waste coming from pellets, packing materials, boxes, etc. It aims at covering the energy need of ecoWise by generating 1 MWe of electricity and 15 tonnes at 1.5 bar of steam for the process. The steam will be used for the drying of copper slags and wood chips."

"The boiler is equipped with an automatic fuel feeding and an ash handling system. The boiler is operated semi-automatically. Therefore, the regulation of the boiler from fuel consumption to stable steam output requires minimal human intervention."

"At the heart of the plant is our worldwide patented Dynamic Watercooled Stepgrate, which is probably the best available combustion technology for biomass," explains Mr. Ken. This technology enables us to keep emission levels within the strict Singapore standards. The combinational boiler design coupled with the Watercooled Stepgrate enables very reliable generation of electricity and a stable steam capacity and pressure output."

"The experts from COGEN 3, played a priceless role in both their technical and financial advice in showing the viability of cogeneration. The electricity generation of 1 MWe enables the facilities to be self-sustaining," concludes Mr. Ken.

*Vyncke boiler*

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## SUPPLIER VIEWPOINT (KKK TURBINE)

*Mr. Ralf Machhaus*
*Regional Service Manager*

Jebsen & Jessen Technology is not new in the cogeneration business as it has installed more than 600 industrial power plants/turbines in all sectors of industries in the ASEAN region since 1960. The ecoWise cogeneration project, is another successful waste to energy plant being implemented.

The key factor of this project is the selection of a simple, robust, reliable and efficient machine to meet the customer's requirement in heat and power. With this in mind, a Kuhnle Kopp & Kausch (KKK) single stage impulse turbine was selected for its easy operation and low maintenance characteristics. The modular construction makes it easy to optimise the output for this particular application.

Like all axial flow KKK turbines, the proven components make it an ideal machine for dry saturated steam and for frequent starts and stops. The efficiency advantage of these models means that this single-stage turbine can reach the efficiency of multi-stage turbines.

The KKK designed mechanical P-Governor guarantees a steady speed control and the in-built mechanical overspeed trip unit offers the safety requirement, which is needed for island mode operation.

The ecoWise plant is another perfect example of the COGEN 3 effort in promoting renewable energy cogeneration plants. COGEN 3 financial analysis showed a viable return of investment and that cogeneration applications are still possible, even in Singapore, with its limited biomass waste resources.

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*KKK turbine*

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## COGEN 3

The objective of COGEN 3 is to promote the use of cogeneration using biomass, coal or gas as fuel. This is achieved through partnerships between ASEAN industries and European suppliers.

The EC-ASEAN COGEN Programme Phase III is financed by the European Commission. It is co-ordinated in ASEAN by the Asian Institute of Technology (AIT), Bangkok, Thailand and in Europe by Carl Bro International, Sweden. COGEN 3 started its operation in January 2002 and will continue until December 2004. Besides Thailand and Sweden, COGEN 3 has offices in Cambodia, Indonesia, Malaysia, Philippines, Singapore and Vietnam.