CLEARWATER POWER TECHNOLOGY

PULP & PAPER ENERGY SUPPLY

The pulp and paper industry world-wide is typified by large scale investment in large scale, energy-intensive, continuous process manufacturing assets. All pulp and paper companies are characterised by having the major part of their profitability governed by the cost of raw materials and energy, and by the efficiency of operation of their specific manufacturing assets and processes.

Pulp and paper manufacturing is a highly energy-intensive process. With the current surge in global energy costs, many companies are beginning to suffer serious financial distress. This includes many of the large, blue chip multinational corporations which dominate the global pulp & paper industry.

4 pulp refiners <u>each</u> with 6.5 MW motor

Increasing the efficiency of the manufacturing process, whilst simultaneously reducing raw material and energy costs, is a key element in any business survival, or profitability improvement strategy.

It has become clear that many mills would benefit from a radical shift in their energy supply strategies.

In non-tropical climates (and depending on the prevailing economics of the long term <u>relative</u> cost of oil and gas), there is a major opportunity to offer pulp and paper mill companies fixed price, relatively low-cost energy from modern carbon-based processes (whether directly fired, or via gasification). Attractive primary fuels are coal and petroleum coke (pet-coke). Modern, efficient, desulphurisation processes mean that the traditional penalties of using high-sulphur fuels can be entirely eliminated. Gasification provides the means to replace costly natural gas with fixed price synthetic gas – or "syn-gas".

In tropical regions coal or pet-coke may remain attractive primary fuels. However, in moist tropical, or sub-tropical zones, biomass-based power generation becomes very attractive <u>as long as the appropriate technology</u> is applied.

Typical energy consumption profiles for pulp and paper mills are in the range:

- Electrical energy: from 8 MWe to greater than 60 MWe
- Steam: from 5 Tonnes per hour up to 50 or more Tonnes per hour
- Gas (either as syn-gas, or natural): 5 to 70 MW

Our approach is to offer our clients long-term, stable, economic, energy cost solutions using the most appropriate technology for their precise needs and geo-economic location.

The business model is based on a complete "cradle-to-grave" solution whereby the energy plant is designed, built, constructed, operated and maintained by us as an "island" on the client's site, under a long-term Energy Supply Agreement (ESA), with some form of asset lease-purchase as an option.