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Bio-Fuel

HPI is pleased to offer a commercial scale OGT52500 Bio Fuel industrial gas turbine package, capable of running on Bio-Oil. This organic fuel is produced from the pyrolysis of local organic waste products, such as wood waste or agrarian waste.

Political pressures driven by international concerns for the environment are forcing governments to seek new advanced technologies to reduce global CO₂ emissions caused by the combustion of fossil fuels. The use of biomass as a fuel for power generation results in no net CO₂ contribution since the CO₂ released during combustion is recovered during the re-growth of the biomass.

Industries and communities in the agricultural or forestry sectors often produce significant amounts of biomass waste which is often burned in an uncontrolled manner without any heat recovery. Application of this waste biomass for the production of electricity can convert this waste liability into an asset by providing both power and steam on site.

The cost of electrical power for remote or small communities is often high due to the low volume and long distances associated with the transmission of electricity or shipment of fuel. Often, these communities have an agricultural based economy thus providing a significant source of biomass. By using either waste biomass or rotational crops, these communities can produce fuel independently and produce power to supplement or expand their local power requirements.

FUEL PRODUCTION TECHNOLOGY

The complex structures of the biomass feed stocks are broken into useful fuel or chemical "building blocks" by intense thermal action achieved by very rapid heating and a short (fraction of a second) processing time. This process results in the division of the large molecules and their reformation. Rapid cooling then preserves the initial decomposition products and yields a liquid fuel product. The process is flexible in that the fuel properties can be tailored through variation of the processing parameters.

The pyrolysis process is applicable to many types of feed stocks:

- WOOD AND WOOD RESIDUES
- SUGAR CANE RESIDUALS (E.G. BAGASSE AND CANE TRASH)
- STRAW AND GRASSES
- RICE HUSKS
- PALM, PEANUT AND COCONUT SHELLS
- CRUDE OIL

- HEAVY OILS
- ASPHALT AND BITUMEN
- HEAVY DISTILLATES FROM PETROLEUM REFINING
- TIRE CRUMB
- WASTE PAPER AND SLUDGES
- STRAW AND GRASSES
- WASTE PAPER

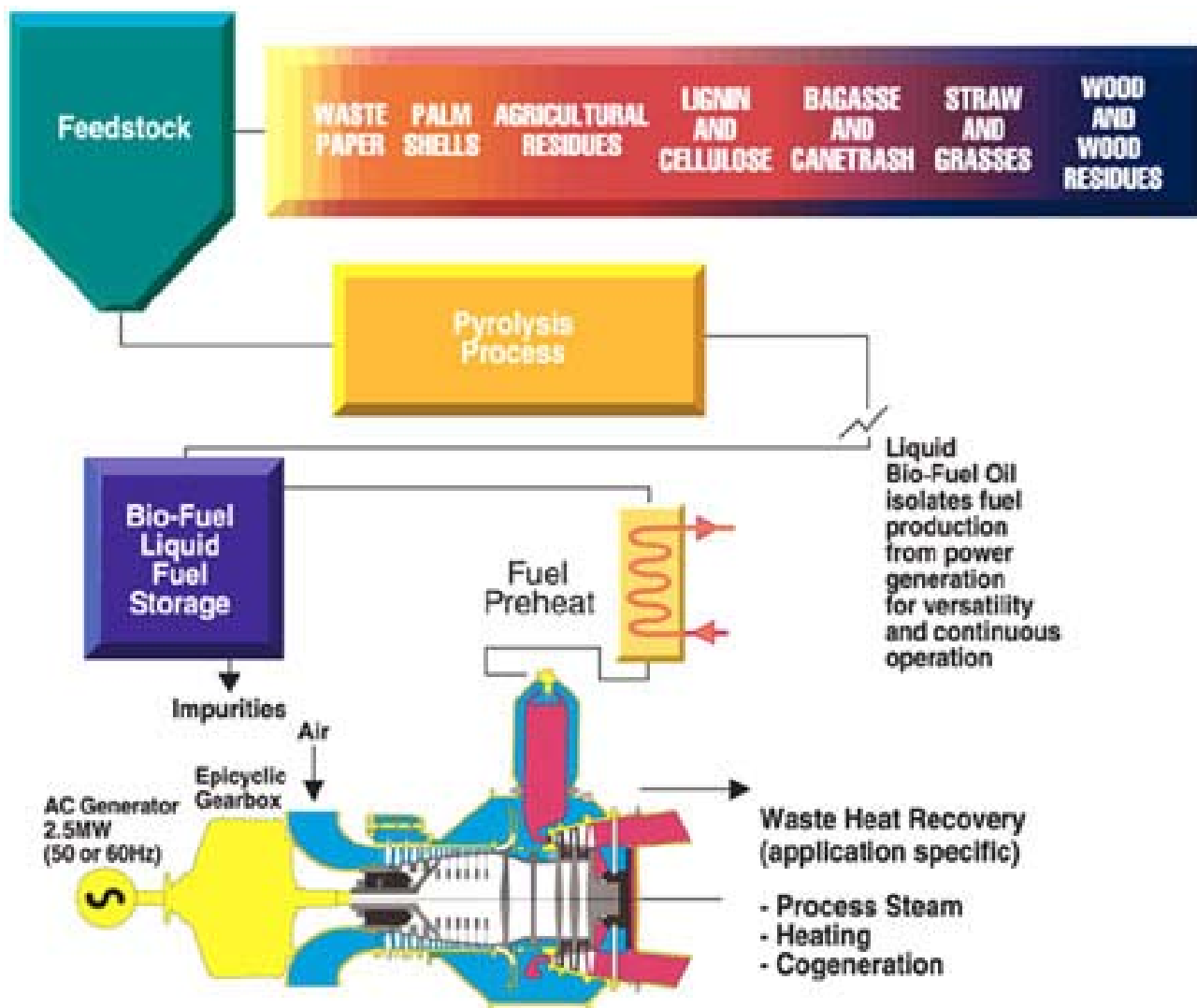
GAS TURBINE TECHNOLOGY

Tailoring process parameters in the fuel production and implementation of engine and auxiliary system design modifications allow for the utilization of this fuel for gas turbine applications.

- **Fuel Nozzle and Combustion Liner**
 - Design modification to accommodate biofuel's high viscosity and low heating value
- **Hot Section Component Upgrades**
 - Development of protective coatings to allow hot section components to survive the aggressive biofuel combustion environment
- **Fuel Post-Processing**
 - Development of techniques to optimize biofuel for use as a gas turbine fuel
- **Fuel System**
 - Dual fuel system designed to start on diesel fuel and transition to biofuel
 - System components and materials optimization to handle high viscosity
 - Pre-heat system to improve fuel flow and atomization characteristics

PRODUCT

In conjunction with Magellan's Industrial group, the biofuel is being developed for application to power their OGT2500 2.85 MW industrial package. The following is a schematic diagram of the application process of this fuel to gas turbine engines:



IMMEDIATE POTENTIAL INSTALLATION DEMAND

- Private and Public Power Generation: Canada - 5 MW; UK - 17.5-47.5 MW; Italy - 5 MW
- Sugar Cane Mills: Brazil - 10 MW; Indonesia - 7.5 MW; Cuba - 7.5-1890 MW
- Other Inquires: Latin America, Australia, Philippines, Thailand, Malaysia, Cambodia, Laos, Myanmar, India, China