

Access Energy Technologies
**Heuristic EnvirOcycler – Today's Solution for Waste
Disposal and Renewable Energy Generation**

- The **Heuristic EnvirOcycler** is a patented, environmentally friendly, device that converts biomass and municipal solid waste (MSW) to renewable energy
- The **EnvirOcycler** solves a number of today's environmental problems:
 - ⇒ Reduces the need to increase the number of landfills
 - ⇒ Reduces cost of transporting MSW to landfills that are far from the city
 - ⇒ Can convert waste agricultural or forestry biomass (such as beetle-kill wood) into valuable renewable energy
 - ⇒ Improves the urban environmental quality of cities in developing countries without a good system of MSW collection
 - ⇒ Reduces the need to burn imported fossil fuels
 - ⇒ Reduces global warming through the reduction of methane and CO₂ emissions landfills and uncontrolled decay of MSW
 - ⇒ Creates employment
- The **EnvirOcycler** is versatile and can operate in tropic or temperate climates provided the moisture content of the biomass is between 35% and 60%
- The **EnvirOcycler** was developed in British Columbia, Canada, in the late 1970's and is a **proven** and **developed technology** that has been in continuous operation for over 28 years. Two **EnvirOcycler** units are now being commissioned in Kuala Lumpur, Malaysia to convert over 800 tonnes of agricultural waste from a palm oil operation into 11 MW of power to the grid.
- Emissions from the **EnvirOcycler** are minimal due to the "vigorous, cyclonic, double vortex, thermal oxidation process" employed in the EnvirOcycler's 2nd stage. The EnvirOcycler's 1st stage is a very large, gentle, updraft gasifier.
- **EnvirOcycler** emissions are significantly less those set by the US Environmental Protection Agency for all emissions. This includes:
 - ⇒ < 1 ppm for CO
 - ⇒ < 15 ppm for NO_x
 - ⇒ < 100 mg/m³ for particulate matter
 - ⇒ No traceable toxins (includes dioxins and furans)
 - ⇒ Further reductions to these emissions if:
 - a selective catalytic reactor is added to eliminate NO_x by converting it to N₂ and O₂
 - a "bag house" is added to capture particulate

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- A 100 Million Btu/h (105 GJ/h) **EnvirOcycler** will dispose of:
 - ⇒ 287 Tonnes/day of MSW @ 35% moisture content
 - ⇒ 358 Tonnes/day of MSW @ 45% moisture content
 - ⇒ 476 Tonnes/day of MSW @ 55% moisture content

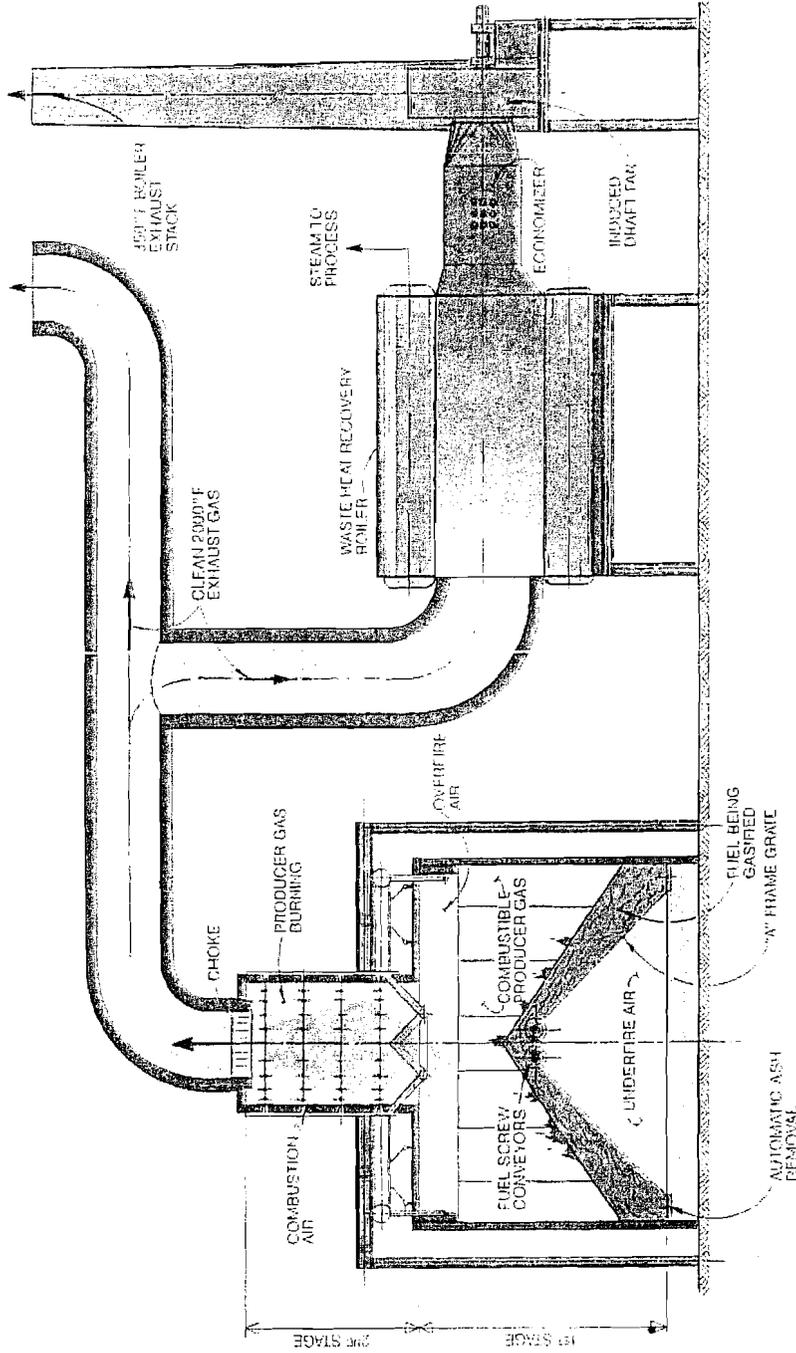
Depending on the municipal waste generated per person per day, one 100 Million BTU/h EnvirOcycler will manage MSW for a population of 35,000 to 50,000 persons. For larger cities, the number of **EnvirOcyclers** can be scaled up.

- Typical operating costs for the **EnvirOcycler** ranges from USD 15 to 25 per tonne of MSW depending on the size and location of the facility
- The 1,850°F (1010°C) products of combustion from each 100 Million Btu/h (105 GJ/h) **EnvirOcyclers** are routed to waste heat boilers, the steam from which is used to drive a condensing steam turbine generator set.
- Net power supplied to the grid by one **EnvirOcycler** unit is ≈ 5.5 MW_e
- An **EnvirOcycler** investment project can generate revenue through:
 - ⇒ “tipping fees” - fees paid from a municipality to a collector of MSW; and
 - ⇒ “feed-in tariffs” - for the sale of renewable electricity to the grid
- The **EnvirOcycler** is eligible for additional revenue streams under the Kyoto Protocol's Clean Development Mechanism, potentially adding 10 to 25% to the project rate of return.

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HEURISTIC ENVIROCYCLER WASTE DISPOSAL WITH ENERGY RECOVERY



OPERATING PRINCIPLE

- First stage: Gentle, updraft gasification generates combustible producer gas at controlled temperatures
- Second stage: Vigorous, cyclonic combustion of first stage producer gas, with minimum excess air, produces high temperature, clean products of combustion

SPECIAL FEATURES

- Feed: Robust, dual screw conveyors or dual hydraulic rams.
- Grate: Large, stainless steel, low heat release rate, A frame grate.
- Ash Removal: Reciprocating, wedge type unloaders on either side of grate bottom (easily removed for servicing).

