



**Elliott Energy Systems, Inc.**  
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# Overview

- **Company Background**
- **Product Scope and Development**
- **Elliott Microturbine Installations**
- **Summary**



# Wholly-Owned by Ebara Corporation

**Head Office:** Tokyo, Japan  
**Founded:** November 1912  
**Employees:** 15,966  
**Stock Market:** Tokyo Stock Exchange  
**2004 Net Sales:** \$ 4.23 billion

<b>Major Groups:</b>	<b>Fluid Machinery &amp; Systems</b>	<b>48%</b>
	<i>Pumps &amp; Fans, Microturbines, Gas &amp; Steam Turbines</i>	
	<b>Environmental Engineering</b>	<b>37%</b>
	<i>Waterworks &amp; Sewage Systems, Water Treatment Plants</i>	
	<b>Precision Machinery</b>	<b>14%</b>
	<i>Plating, Cleaning, Gas Scrubber Systems</i>	
	<b>New and Renewable Energy</b>	<b>1%</b>
	<i>Wind Power, Fuel &amp; Solar Cells</i>	



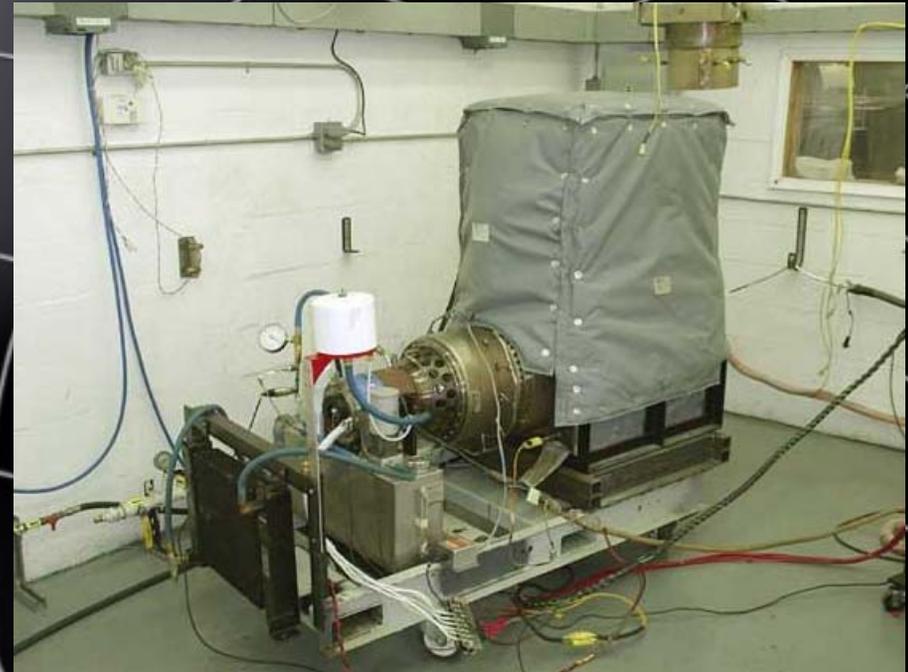
***Elliott is Positioned for Success with strong Corporate support***



# Elliott Energy Systems, Inc.

**Established:** 1996  
**Headquarters:** Stuart, Florida  
**Employees:** 45  
**Production Area:** 32,000 Sq.Ft.  
**Main Product:** Microturbines  
**Capacity:** 300+ Units Per Year





**Tests are performed at  
the component and  
system level.**

- **Total Energy Solutions**
  - **Combined heat and power (CHP)**
  - **Tri-Generation (Absorption Chiller)**
- **DG is an optimal solution for industries that can use localized CHP:**
  - **Process hot water, heating, cooling and dehumidification, district heating**

***CHP Improves fuel utilization, reduces emissions, and Supports Global Sustainability***

# **Elliott Energy Systems**

## ***Product Scope and Development***

# Customer Focused Development

- In an emerging market Customer requirements are always evolving.
- Development at Elliott is focused on Reliability and Market requirements.
  - Reliability Growth and Customer Training.
  - Ease of installation by integration of HRU and GBC.
- Customer Requirements including Integration is often unique.
  - Dual Mode
  - Remote Dispatch
  - Integration with other devices
  - Stand Alone Concepts.

***Emerging Technologies that “PUSH” tend to chase a moving target***

# Product Line

- **Microturbines Designed to Operate:**
  - Simple Cycle & Recuperated Mode
  - Natural Gas, Propane, Low Btu Gas
  
- **Current Models**
  - TA100            100 kW - World Package CHP
  - TA100            100kW – World Package MonoGen
  - TA100 HAP    100 kW – Hazardous Area Package

***Focusing on a single model facilitates concentration on Customer Needs.***

# TA100 Product Features

- **Recuperated Electrical Efficiency**
  - Currently  $29 \pm 1\%$  (LHV @ ISO)
- **Multiple Fuels**
  - Gaseous
    - Natural Gas, Propane Gas, Low Btu (Bio, Digester, Landfill)
- **Exhaust Gas Emission (at ISO and 15% O<sub>2</sub>)**
  - Natural Gas
    - NO<sub>x</sub> 24 ppm Nominal
    - CO 25 ppm Nominal
- **Noise**
  - Standard Enclosure  $< 75$  dBA @ 1m
- **Operation Mode**
  - Grid Tie, Island Mode, Multi-Pack Parallel
  - Remote Monitoring and Control Capable

# TA100 Outdoor System

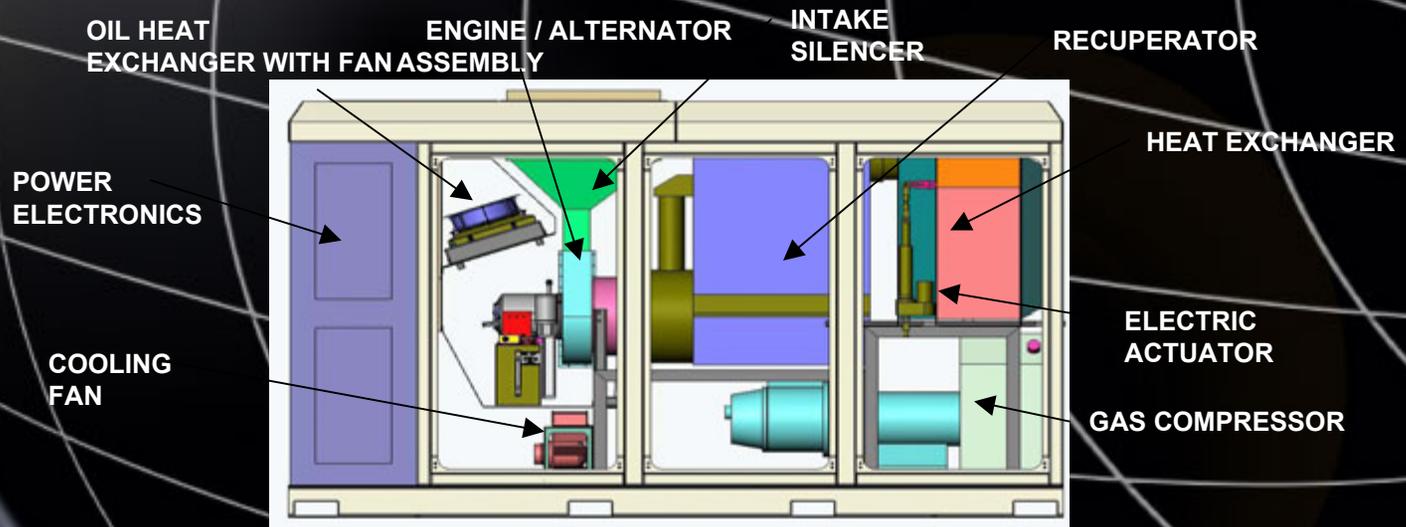
- **Robust, Commercial Design:**
  - Minimal Annual Maintenance
  - Outdoor, Weatherproof Enclosure
- **Clean, Direct Heat:**
  - 587,000 Btu / hr of Net Thermal Power
  - 75% Cycle Efficiency (LHV)
- **Control Protection Allows:**
  - Instantaneous Full Load
  - Dropped Load Operation
  - Unrestricted Restarts



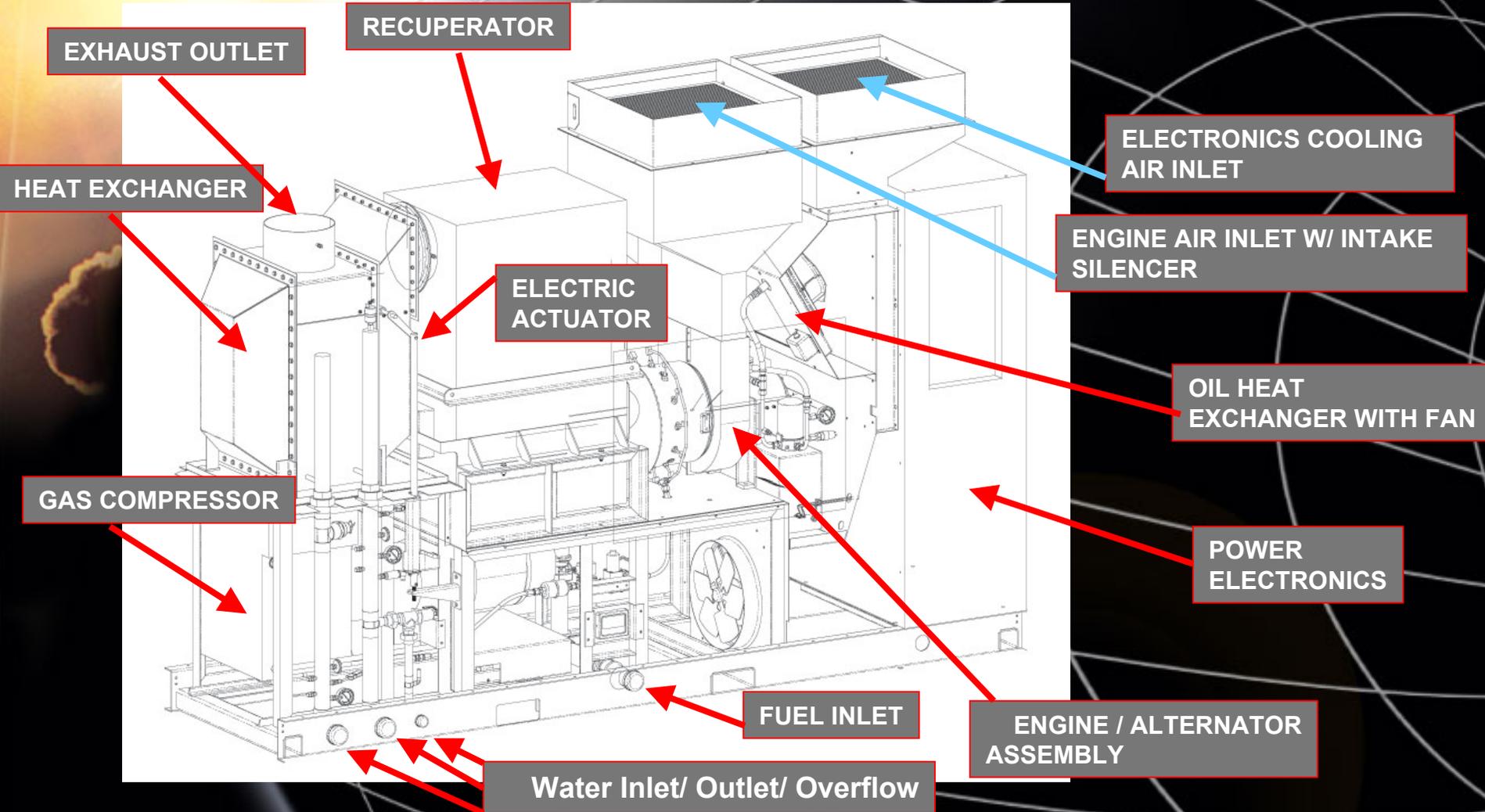
***Elliott TA100 is a Robust Industrial Product***

# TA100 Integrated CHP Package

Height:	78 in	Net Power Output:	100 kWe (ISO)
Width:	33 in	Thermal Output:	172 kW (net)
Length:	120 in	Exhaust Temp.	550 deg-F (ISO) Nom.
Dry Weight:	4000 lbs	Fuel Input Flow:	22.0 scfm



# Integrated CHP Package

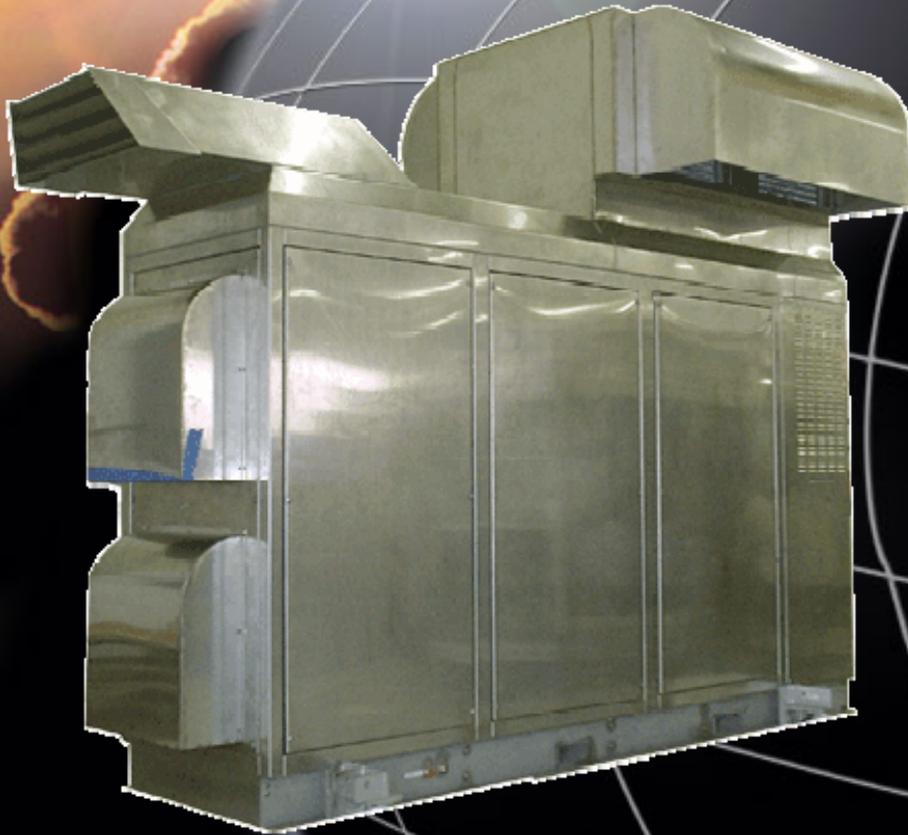


***Elliott Units Are Turnkey Package***

# Offshore Package

## Key Characteristics of the Offshore Package:

- Corrosion resistant enclosure
- Sound attenuation
- Certified hazardous area protection – purged and pressurized
- NEMA 3R weather proofing
- High capacity salt fog air filtration
- Stand alone Parallel Operation
- Modbus communication





**TA100 CHP Microturbine**

**Absorption Chiller**

**Cooling Tower**

***Outdoor Test Facility in Stuart, FL  
Qualified facility, providing cool air for engine test***

- **Modbus Protocol**
  - **RS 232 / 485 Connection Standard**
  - **Remote Monitoring**
    - **Voltage**
    - **Current**
    - **Temperature**
    - **Alarms**
    - **Trending / user defined**
  - **Remote Start/ Stop**

# **Elliott Microturbine *Installations***

# Microturbine Applications

- **Mono-Generation (Power Only)**
  - Simple Cycle
  - Recuperated
- **Combined Heat and Power (CHP)**
  - Hot Water
  - Direct Fired Absorption Chiller
  - Water Fired Absorption Chiller

***Thermal to Electrical output ratio is a fundamental design consideration***

# Typical Installations

- Hotels
- Hospital / Nursing / Rehab Centers
- Sports Facilities
- Colleges / Schools / Education Facilities
- Food Services / Food Processes
- Small to Medium Industries / Factories
- Greenhouses
- Landfills / Bio Gas / Low Btu
- Offshore / Flare Gas

***Ideally Suited to 24/7 Base Load Operation***

# Elliott's Largest Micro CHP Installation



- 15 Elliott Microturbines
- Grid Parallel Operation
- Nat Gas and Propane

- Military Base
- Power Generation
- Heat for Hot Water



# Fitness Center



- Power Generation
- Heat for Swimming Pool
- Heat for Hot Water

## Galvanic Plant



- **Power Generation**
- **Low Pressure Steam for Parts Cleaning / Degreasing**

# Green House



# Parallel Units Installation

Five Units In Remote Operation

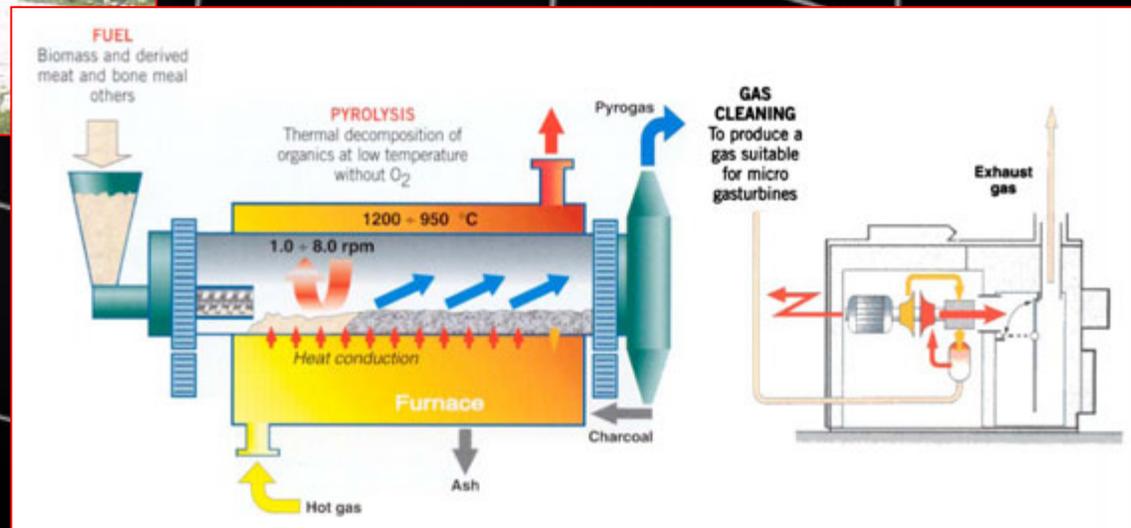


***Power for High-Inductive Load Water ReInjection Pumps***



Of the 6,000 landfills across the United States, there are about 340 energy projects currently in operation.

Pyrolizer Technology eliminates the landfill decomposition step and produces low BTU fuel directly from carbon based waste



**MICROTURBINES MAKE SENSE WITH LOW BTU FUEL APPLICATIONS**

# Summary

- Microturbine technology is maturing and gaining market acceptance
- Early adopters will continue to capture niche applications
- Microturbines with CHP are economically viable and environmentally sound
- Elliott has a product plan that is focused on Reliability and Customer Needs.
- Development at Elliott is Customer Centric

***Elliott Microturbines Offer a  
Customer Friendly Solution***