

ThermoGen™

for

Clean Power Generation from Waste Heat

4/5/2019

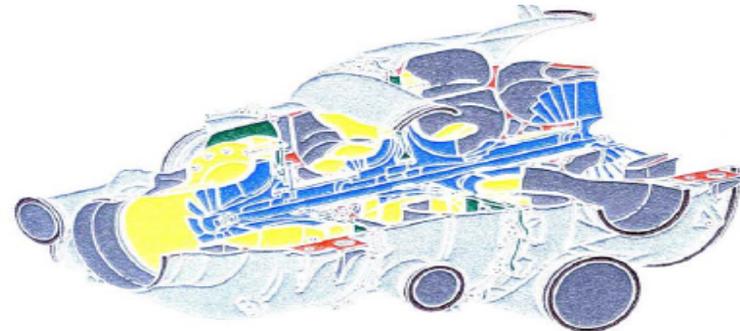
R&D Dynamics Corporation
49 West Dudley Town Road
Bloomfield, CT 06002



Proprietary

Technology Leadership

- Foil Bearing Technology used on 90% aircraft worldwide
- 40,000 airplanes are flying with this technology
- Technology originally developed by “Principals” of R&D Dynamics
- World leader in Foil Gas Bearing technology
- Same technology used in all our products including ThermoGen™



Dr. Giri Agrawal
March, 1994

You brought your reputation as “Father of the Hamilton Standard Air Bearing” to the 777 Program. Your assistance was instrumental in developing the Boeing 777 CACTCS Condensing Cycle and the four-wheeled, air bearing Air Cycle Machine. Your early condensing cycle proof-of-concept testing and assistance in enhancing the air bearing’s reliability was key in Boeing’s selection of Hamilton Standard’s system approach and the successful completion of the development program.

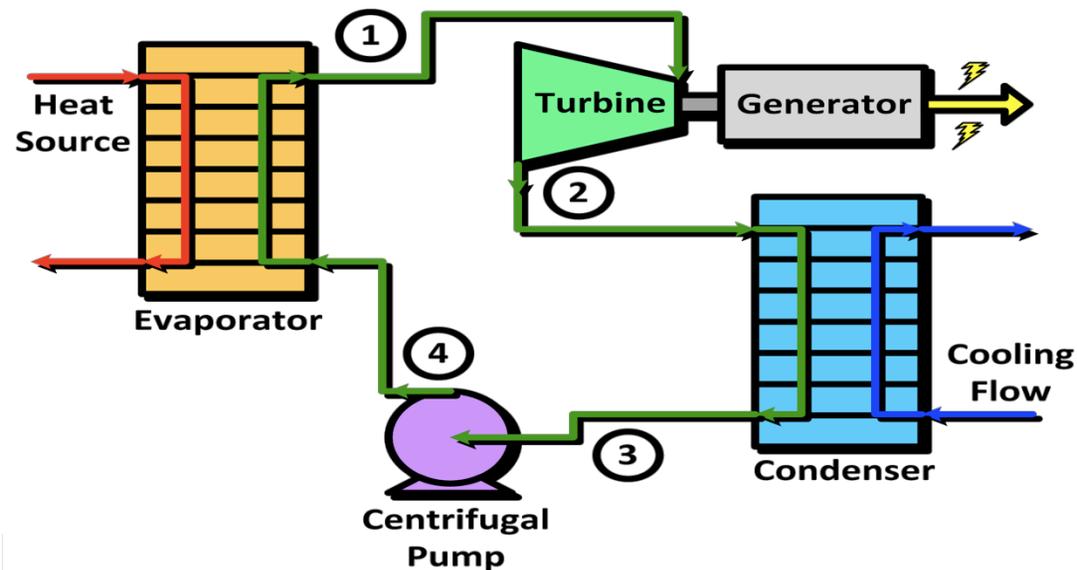
*from the Hamilton Standard
777 CACTCS Team*

Customers

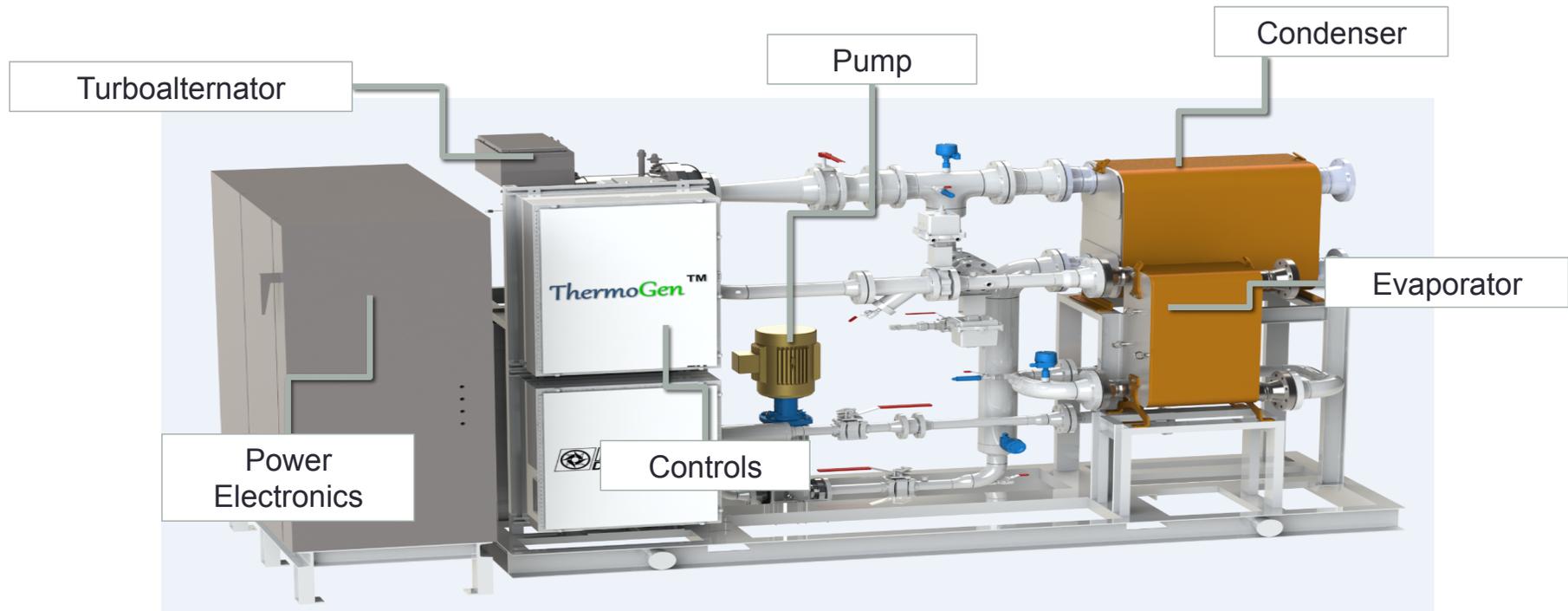
Major World Airlines	General Dynamics
BMW	Volkswagen
United Technologies	CT Light & Power
Rolls-Royce	General Motors
GE Aircraft Engines	Ballard Power Systems
U.S. Department of Energy	FuelCell Energy
U.S. Army	Pacific Consolidated Industries
U.S. Navy	Gas Research Institute
U.S. Air Force	Delphi
NASA	Magnetek
Intelligent Energy	Michelin
Bosch	Wartsila

ThermoGen™ ORC System

- ❖ ThermoGen™ converts waste heat to emission free electricity using ORC (Organic Rankine Cycle)
- ❖ An ORC is opposite of Refrigeration Cycle
- ❖ Refrigeration Cycle takes in electricity and removes heat by working refrigerant
- ❖ ThermoGen™ ORC system takes in heat (170 F to 800 F) and produces electricity by working refrigerant

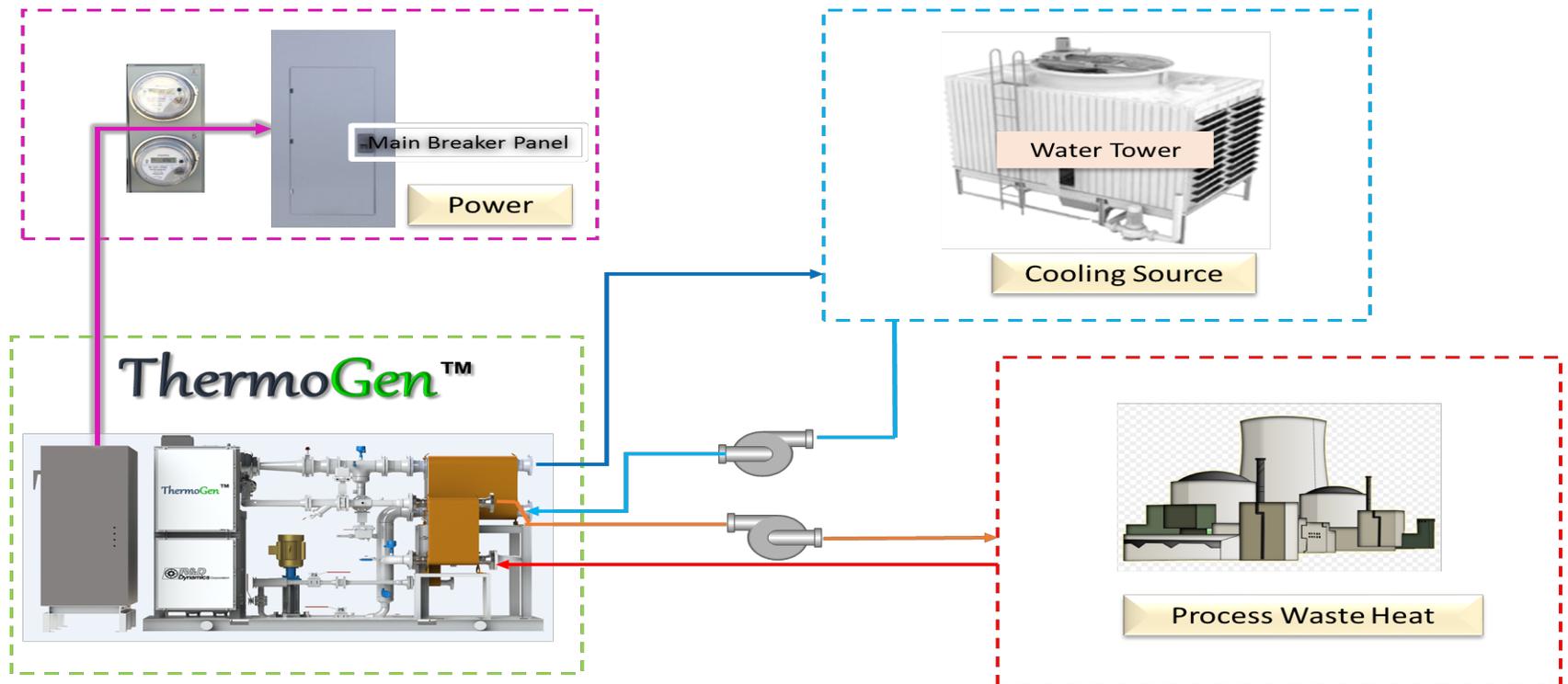


ThermoGen™ 200 kW

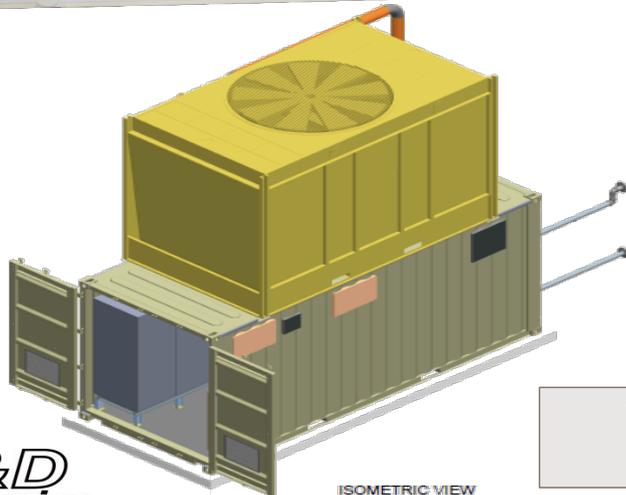
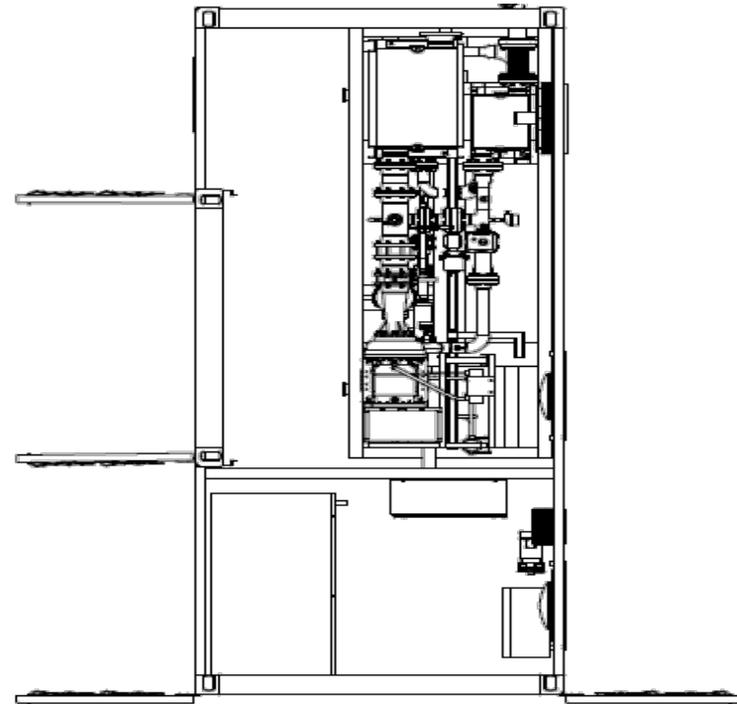
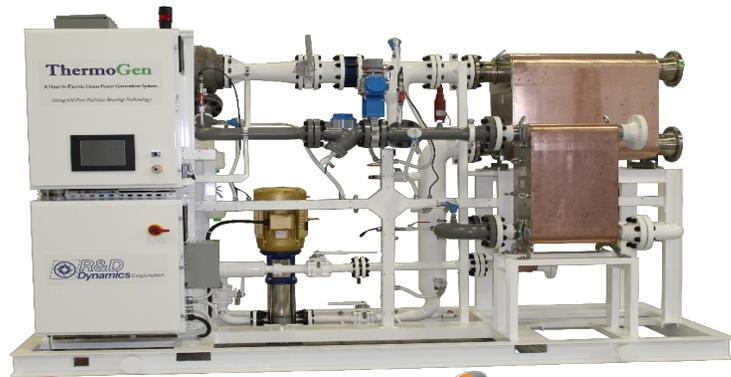


200 kW Compact Production Skid (12.5' Long × 4.5' Wide × 8' Tall)

Installation Schematic



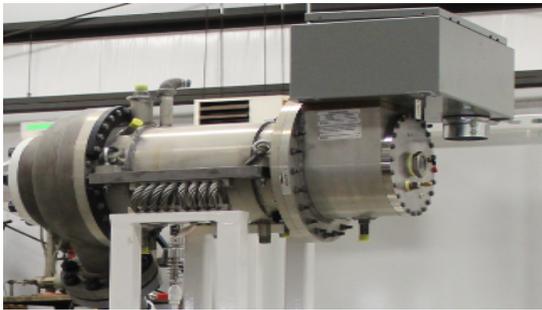
ThermoGen™ 200 kW



ThermoGen™ is pre-packaged in a standard 20 feet shipping container for outdoor installation

Technology Differentiator

High Technology Turboalternator & System Benefits



- >25 years of Design Life
- < 4 years of Payback
- Zero Emissions
- Oil Free Operation
- High Efficiency
- Versatile Application
- Automated & Remote Operation
- Low Operational Costs
- Low Maintenance
- Significant Long Term Financial Benefit
- Environmentally Friendly

Class I Emission Free Renewable Energy Technology

- ThermoGen™ generates emission free electricity without incremental fuel use
- Public Act No. 18-50 recognizes ThermoGen™ as a Class I renewable energy source
- ThermoGen™ will generate ZREC
- The potential annual emissions reduction of ThermoGen™ at 100% capacity factor:
 - NO_x emissions = 342 pounds
 - SO₂ emissions = 110 pounds
 - CO₂ emissions = 396 tons

Conclusion

- R&D Dynamics ThermoGen™ is an innovative oil-free Organic Rankine Cycle system
- ThermoGen™ will produce emission free electricity from the waste heat and provide energy savings
- ThermoGen™ will generate Renewable Energy Credits and reduce emissions
- ThermoGen™ will have high reliability >25 years and pays back in less than 4 years
- Units are available for installation and R&D Dynamics can own and operate on PPA or units can be purchased directly

**Thank you for
joining NEDR #13.**

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Northeast Digestion Roundtable 2019

Quarterly webinars to share technical operations experiences & advance best practices regarding anaerobic digestion in this region.

CONTACT INFO:

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Next NEDR:

Friday, July 12, 2019

Noon Eastern. Eat lunch...

More at:

<https://>

www.nebiosolids.org/ne-digestion-roundtable