EXHAUST HEAT RECOVERY

# Heat Recovery

## SYSTEMS


cain industries
heat recovery systems

*"Manufacturing Waste Heat Transfer Products To Save Energy"*

# Cain Industries manufactures waste heat recovery and steam generator systems for the cogeneration (CHP), boiler economizer and industrial heat exchanger markets.

**Combustion Sources:**
- Boilers
- Engines
- Turbines
- Microturbines
- Fuel Cells
- Fume Incinerators
- Thermal Oxidizers
- Catalytic Converters
- Industrial Ovens
- Furnaces

**Fuel Types:**
- Natural Gas
- Propane
- Biogas
- Digester and Landfill Gas
- Diesel to Heavy Fuel Oils

**Heat Sinks:**
- Steam Production
- Thermal Fluids
- Glycol
- Water

It is a fact that a minimum of twenty cents of every fuel dollar is wasted, when instead, much of it can be recovered. Cain Industries recovers the heat and transfers the usable BTUs to water, glycol, special fluids or steam. Listed below are some of the combustion sources that would benefit from a Cain heat recovery system.

| Combustion Sources: | Wasted $$ for every fuel dollar spent: |
|---|---|
| Industrial Hot Water or Steam Boilers | $ .20 |
| Commercial Hot Water or Steam Boilers | $ .30 |
| Dryers | $ .30 |
| Reciprocating Gas Engines | $ .35 |
| Diesel Engines | $ .35 |
| Ovens | $ .40 |
| Furnaces | $ .80 |
| Incinerators | $1.00 |
| Catalytic Converters | $1.00 |

## VERSATILITY

Since 1978, Cain Industries has produced high quality waste heat transfer products. We are dedicated to the reduction of fuel usage and pollution worldwide. Our expertise makes us the natural choice for both the retrofit and OEM client. We set ourselves apart from others by producing products to serve a broad spectrum of markets: the Diesel and Gas Cogeneration market, the Boiler Exhaust market and the Fume Incineration market. As the only manufacturer in all of these markets, Cain Industries has the greatest selection of products and system applications available.

We have become leaders in this industry by replacing old technology with the most recent technological advancements. Using elaborate computer programs, Cain Industries has developed and manufactured twelve product lines with over 3,500 dependable heat transfer products. Our unique designs increase efficiency and performance, while making installation, service and maintenance more cost effective.

We are also dedicated to a primary investment in our associates, their manufacturing technology, quality improvements and innovative cost reductions to meet the customer's budget. It is by these means that we will achieve absolute customer satisfaction. The success of Cain Industries is a direct result of our simple philosophy: to produce the highest quality products and provide unmatched customer service.

## FAST PAYBACK

The words "safely and economically recover waste heat" also mean "no-risk return on investment" which is exactly what Cain Industries heat recovery systems represent. By installing a fuel saving economizer on a combustion source, the BTU recovered pays for all the equipment installed, usually in 12 to 18 months (or an equivalent return on investment of 75 to 100% annually). This means recapturing approximately 50% of the wasted $$ for every fuel dollar spent. The exact payback period for your installation will depend on local fuel costs and the number of hours of usage.

## ADVANTAGES

Depending on fuel type, temperatures, flow size requirements, performance and specification, Cain Industries can propose a specific cost effective exchanger to economize your fuel bills. Listed below are just a few design features which clearly speak for themselves and far exceed the capabilities of other economizer manufacturers:

- **Internal stainless steel exhaust bypass** for stack corrosion control, tempering exit temperatures and/or protection against exhaust backpressure buildup due to fouling.
- **Stainless steel hinged access doors** for ease of routine inspection and/or cleaning.
- **Quick release adjustable tension latches** requiring no tools to open access doors.
- **Five types of available fin tube materials:**
  1. SA249 TP316 /316L Stainless Steel Tube with AL-FUSE™ Aluminum Fin - Metallurgically Bonded
  2. SA249 TP316 /316L Stainless Steel Tube with 304 or 316 Stainless Steel Fin - Nickel Braze/Welded*
  3. SA249 TP316 /316L Stainless Steel Tube with Carbon Steel Fin - Nickel Braze/Welded*
  4. SA789 S31803 Alloy 2205 Duplex Stainless Steel Tube with AL-FUSE™ Aluminum Fin - Metallurgically Bonded
  5. SA178 Gr.A Carbon Steel Tube with Carbon Steel Fin - Nickel Braze/Welded*

  *Nickel Clad Available
- **No weld/removable tubes** with no pressure welds in the gas stream make for easy tube replacement.
- **Round or rectangular design configurations** as standard model selections.
- **Custom computer design** for special multiple order OEM requirements.

## PRESSURE VESSEL & BOILER CERTIFICATIONS

- **ASME** Certificate of Authorization: U Stamp, UM Stamp and S Stamp
- The **National Board** Certificate of Authorization: NB Mark and R Stamp
- Canadian Certification of Registration: CRN

## OPTIONAL COMPONENTS

Depending on the application, Cain Industries offers a variety of ancillary equipment, such as timed automatic sootblowers, factory insulation, circulating pumps, thermometers, remote indicating controllers, modulating damper actuators and stack-to-economizer transitions to meet the needs of each specific installation.

## FREE SAVINGS ANALYSIS STUDY

Upon review of your application, you can expect our proposal within 48 hours. It will include professionally engineered details showing equipment costs, savings analysis, computer-generated economizer performance, cad dimensional drawings, flow schematics, warranty and performance guarantee.

## EASE OF INSTALLATION

The selection of a Cain Industries economizer results in the most economical design to install and maintain. Design advantages such as compactness and lightweight construction allow for installation at the very lowest cost.

## GUARANTEED PERFORMANCE

All economizers are guaranteed to meet or exceed the anticipated performance specification.

# EM Energy Manager

## Design

Stainless Cylindrical
Heat Transfer Coil Design

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Slip Fit Gas Connections

Quick Release Tension Latches

Stainless Steel Internal Bypass

Hinged Stainless Steel Access Door Panels

Circulating Pump Package Including: Inline Circulating Pump, (2) Inlet and Outlet Temperature Gauges, Check Valve, T&P Relief Valve, Flow Control Valve and Differential Pump Control

## Application

**Combustion Sources:** steam boilers, hot water boilers, dryers and ovens

**Combustion Capacity:** 200,000 to 6,400,000 BTU/hr input

**Entering Gas Temperatures:** 300°F to 700°F

**Heat Sink Types:** boiler feedwater, makeup water, hot water return, hot water storage tank, condensate tank, process water and potable water

**Summary:** The EM is a circulating recovery system designed to recover waste heat safely and efficiently. A control valve regulates water flow to the unit that effectively reduces stack temperature to 250°F or lower (adjustable with the differential pump control as the burner cycles). The EM operates with very low static gas pressure drop for safe, automatic operation on atmospheric and power burners. The 10 standard models are lightweight and come complete with a circulating pump package. Standard stack diameters of 6", 8", 10", 12", 14", 16", 20", 24", 28" and 32" fit most small size combustion sources (optional stack transitions available). Equipped with all the standard design features of the larger cylindrical units for specific engineering needs.

# FCR Fin Coil Recovery

## Design

Internal Thermal Expansion Design

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Cylindrical Heat Transfer Coil Design

Mounting Flanges for Bolting to Mating Flanges or Adapters

Stainless Steel Internal Bypass

Quick Release Tension Latches

Hinged Stainless Steel Access Door Panels

Condensate Drain Catch Ring Assembly

## Application

**Combustion Sources:** steam boilers, hot water boilers, hot oil heaters, combustion sources with round stack diameters from 4" to 36" and a maximum liquid flow of 50 gpm

**Combustion Capacity:** up to 450 boiler horsepower

**Entering Gas Temperatures:** 300°F to 800°F

**Heat Sink Types:** boiler feedwater, makeup water, process water, potable water, thermal fluids and run-around systems

**Summary:** The FCR is a custom-designed heat exchanger which can be applied in confined areas and is offered in stainless steel, carbon steel or AL-FUSE™ finned tubing. Design flexibility allows specific engineering requirements to be met such as fin spacing for fouling conditions and low gas pressure drops.

# RTR Rectangular Tube Recovery

## Design

Standard Models Have No Pressure Welds in the Gas Stream

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Internal Thermal Expansion Design

10 Gauge Structural Exterior

Stainless Steel Interior

2" Factory Insulation

Mounting Flanges for Bolting to Mating Flanges or Adapters

Hinged Access Door

Stainless Steel Bypass

Header Manifold for High Liquid Flow

Compression Fittings for Ease of Tube Replacement

Condensate Drain Catch Assembly

## Application

**Combustion Sources:** steam boilers and hot water boilers

**Combustion Capacity:** 10,000 to 250,000 pph steam output boiler

**Entering Gas Temperatures:** 300°F to 1,250°F

**Heat Sink Types:** boiler feedwater, makeup water, hot water return, hot water storage tank, condensate tank, process water and potable water

**Summary:** A variety of RTR heat transfer surfaces are available: 316L stainless steel, carbon steel, duplex stainless steel, and stainless steel tube with aluminum bonded AL-FUSE™. Combustion sources with round exhaust stacks require optional transitions. The internal gas bypass can be used to temper exiting gas to control stack corrosion or to maintain outlet water temperatures. The economizer can be used in conjunction with cold water or condensing applications.

# CXL Single Stage Condensing Exchanger

## Design

For Increasing Boiler Efficiency up to 95%

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Internal Expansion Design

Mounting Flanges for Bolting to Mating Flanges/Adapters

12 Gauge Stainless Steel Exterior

Stainless Steel Interior

2" Factory Insulation

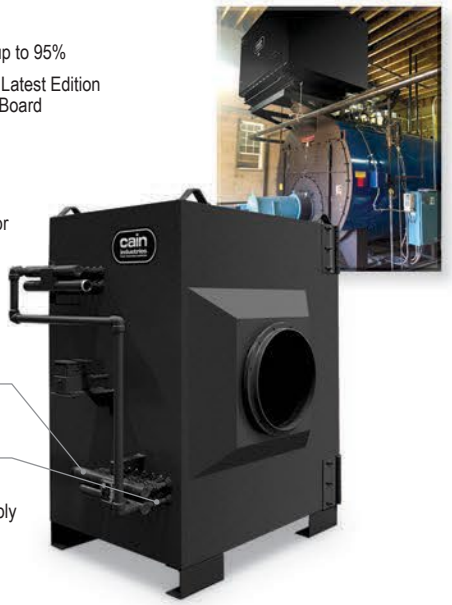
Hinged Access Doors (optional)

Stainless Steel Bypass

Stainless Steel Header Manifold for High Liquid Flow

Compression Fittings for Ease of Tube Replacement

Condensate Drain Catch Assembly



## Application

**Combustion Sources:** natural gas fired steam boilers, hot water boilers and hot oil heaters with inputs up to 150,000,000 BTU/hr

**Combustion Capacity:** up to 150,000 pph steam output boiler

**Entering Gas Temperatures:** 300°F to 800°F

**Heat Sink Types:** makeup water and process water

**Summary:** The CXL is specifically designed to recover sensible and valuable latent heat as combustion exhaust is drastically cooled to 170°F - 120°F causing it to condense. Recovered heat is usually transferred to a cold makeup or process water increasing overall system efficiency while reducing fuel demand. All condensation is safely drained from the exchanger and away from the combustion source.

# HRSA Heat Recovery Silencer Axial

## Design

Stainless or Carbon Steel Exterior

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Internal Thermal Expansion Design

Cylindrical Heat Transfer Coil Design

Sound Attenuation

Optional 1" to 6" Factory Insulation

Optional Circulating Pump

## Application

**Combustion Sources:** gas engines (reciprocating, turbo charged, naturally aspirated and rotary) and diesel engines

**Combustion Capacity:** 15 to 150 kw (20 to 200 scfm)

**Entering Gas Temperatures:** 300°F to 1,300°F

**Heat Sink Types:** engine jacket water, process water, boiler water and ethylene glycol

**Summary:** The HRSA waste heat recovery silencers are compact cylindrical exchangers designed for dual or single exhaust small engines. 65 standard models are available to lower exhaust noise and meet specific design-performance criteria. The unique coil type configuration and optional circulating pump allow for a secondary circulating liquid flow system. 1" NPT interconnecting main liquid flow loop piping provides simple and less costly piping modification changes. The heat transfer surface coupled with a water flow diversion from the main flow recovers the desired BTU/hr performance and controlled outlet exhaust temperatures. An optional internal or external stainless steel exhaust bypass allows tempering or full control of the exit temperature.

# HRSR Heat Recovery Silencer Radial

## Design

Full Exhaust Gas Bypass Assembly

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Sound Attenuation

Stainless Steel Interior Lining

Hinged Access Door

Internal Heating Surface Expansion Design

Standard Models Have No Pressure Welds in the Gas Stream

10 Gauge Hard Shell Seal Welded Exterior

Single Row Design for Complete and Full Access

Ease of Tube Replacement Requiring No Overhead Cranes or Special Rigging

Compression Fitted Tube to Header Attachment (optional)

Available Modbus RTU, Modbus TCP or Ethernet/IP Remote Monitoring Controls and PLC

## Application

**Combustion Sources:** gas engines (reciprocating, turbo charged, naturally aspirated and rotary) and diesel engines

**Combustion Capacity:** 200 kw to 7 MW

**Entering Gas Temperatures:** 300°F to 1,300°F

**Heat Sink Types:** engine jacket water, process water, boiler water and ethylene glycol

**Summary:** The HRS Radial waste heat recovery silencer is a packaged configuration designed to receive total liquid flow. It reduces gas temperatures to desired levels and exhaust noise eliminating the need for a muffler (except in bypass mode). The stainless steel internal gas bypass allows tempering of exit temperatures as required. The radial design allows immediate access to the core for cleaning and routine inspection of a single row core assembly (optional sootblowers are available for dirty combustion conditions).

# DXL Two Stage Condensing Exchanger

## Design

For Increasing Boiler Efficiency up to 90%

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Internal Expansion Design

Mounting Flanges for Bolting to Mating Flanges/Adapters

12 Gauge Stainless Steel Exterior

Stainless Steel Interior

2" Factory Insulation

Hinged Access Doors

Stainless Steel Bypass

Stainless Steel Header Manifold for High Liquid Flow

Compression Fittings for Ease of Tube Replacement

Condensate Drain Catch Assembly

## Application

**Combustion Sources:** natural gas fired steam boilers, hot water boilers and hot oil heaters

**Combustion Capacity:** up to 150,000 pph steam output boiler

**Entering Gas Temperatures:** 300°F to 800°F

**Heat Sink Types:** boiler feedwater, makeup water, hot water return, hot water storage tank, condensate tank and process water

**Summary:** The DXL is specifically designed to recover sensible and valuable latent heat as combustion exhaust is drastically cooled to 170°F - 120°F causing it to condense. What makes the DXL unique is that it recovers heat in two stages. The first stage preheats boiler feedwater while the second stage preheats makeup water. The transferred heat increases overall system efficiency and lowers fuel demand.

# ITR Incinerator Tube Recovery

## Design

10 Gauge Structural Exterior

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

High Temperature Alloy Interior

4" to 14" Factory Insulation

High Temperature Alloy Internal Bypass

No Pressure Welds in the Gas Stream

Internal Thermal Expansion Design

Mounting Flanges for Welding to Existing Stack or Adapters

Hinged Access Door (optional)

Header Manifold for High Liquid Flow

Compression Fittings for Ease of Tube Replacement

## Application

**Combustion Sources:** incinerators, thermal oxidizers and catalytic converters

**Combustion Capacity:** all load conditions

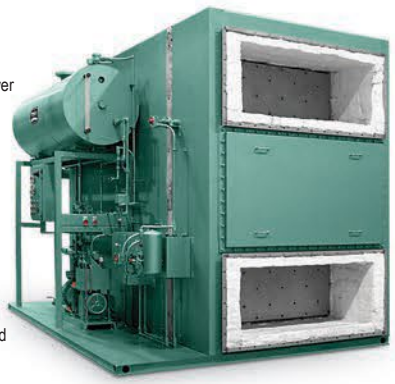
**Entering Gas Temperatures:** 1,250°F to 2,000°F

**Heat Sink Types:** process water, boiler feedwater, hot water return, potable water and hot oil

**Summary:** The ITR is specifically designed for high temperature exhausts. All gas side surfaces in contact with the exhaust are stainless and/or high temperature alloy. Combustion sources with round exhausts require optional stack transitions. Special fin spacing specifications are available dependent on fouling conditions. The internal gas bypass tempers water and exiting gas temperatures (bypass up to 60% dependent on the application).

# ESG Exhaust Steam Generator

## Design



Skid Mounted Packaged Forced Circulation Watertube Design

Size Ranges from 20 to 700 Boiler Horsepower

3 to 400 psig Operating Steam Pressure Range

Produces 99% Dry Steam

5-10 Minute Startup to Full Steam Output

1/3 the Weight and 1/2 the Size of Conventional Waste Heat Boilers

Component Design Requiring No Welding for Ease of Maintenance

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Explosion Proof Heat Transfer Exchanger

Fully Automatic for Supplemental or Primary Steam Output Source

Full Modulating Internal Exhaust Bypass Designed to Easily Accept Dual Engine Exhausts

Lowest "Pinch Point" (operating steam temp. to final leaving exhaust temp.) Offering Greater Efficiency

Available Modbus RTU, Modbus TCP or Ethernet/IP Remote Monitoring Controls

## Application

**Combustion Sources:** turbines, fuel cells, incinerators, thermal oxidizers and catalytic converters

**Combustion Capacity:** 1,000 to 30,000 scfm

**Entering Gas Temperatures:** 500°F to 1,600°F

**Heat Sink Types:** supplemental steam demand and/or primary steam source for steam heating or process steam

**Summary:** The ESG is an unfired, fully automatic, skid mounted packaged steam generator combining a fin tube heat transfer section, steam flash circulating drum assembly and a full exhaust bypass. Where low or high pressure steam output demand is a necessity, the ESG in terms of recovered BTU/hr and its use, is a more valuable alternate selection to liquid or air preheat exchangers. The design allows for important flexibility in heat transfer (explosion proof) output, lightweight design compactness for lower installation costs and will offer the greatest thermal efficiency.

# ESG1 Exhaust Steam Generator 1

## Design

Skid Mounted Packaged Forced Circulation Watertube Design

Size Ranges from 20 to 350 Boiler Horsepower

3 to 400 psig Operating Steam Pressure Range

Produces 99% Dry Steam

5-10 Minute Startup to Full Steam Output

1/3 the Weight and 1/2 the Size of Conventional Waste Heat Boilers

Component Design Requiring No Welding for Ease of Maintenance

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Explosion Proof Heat Transfer Exchanger

Fully Automatic for Supplemental or Primary Steam Output Source

Full Modulating Internal Exhaust Bypass Designed to Easily Accept Dual Engine Exhausts

Low "Pinch Point" (operating steam temp. to final leaving exhaust temp.) Offering Greater Efficiency

Available Modbus RTU, Modbus TCP or Ethernet/IP Remote Monitoring Controls

## Application

**Combustion Sources:** gas engines (reciprocating, turbo charged, naturally aspirated and rotary), diesel engines, turbines, fuel cells, incinerators, thermal oxidizers, catalytic converters, boilers and hot oil heaters

**Combustion Capacity:** 600 kw to 7 MW

**Entering Gas Temperatures:** 500°F to 1,400°F

**Heat Sink Types:** supplemental steam demand and/or primary steam source for steam heating or process steam

**Summary:** The ESG1 is an unfired, fully automatic, skid mounted packaged steam generator combining a fin tube heat transfer section, steam flash circulating drum assembly and a full exhaust bypass. Where low or high pressure steam output demand is a necessity, the ESG1 in terms of recovered BTU/hr and its use, is a more valuable alternate selection to liquid or air preheat exchangers. The design allows for important flexibility in heat transfer (explosion proof) output, lightweight design compactness for lower installation costs and will offer the greatest thermal efficiency.

# UTR U-Tube Recovery

## Design

Hardshell 7 Gauge Structural Exterior

Stainless Steel Interior

1" to 6" Thickness Factory Insulation

Condensate Drain Catch Assembly

Individual Gas Connection Sizes and Designs

Sound Attenuation

Removable Core Assembly

Header Manifold for High Liquid Flow and Low Static Head

## Application

**Combustion Sources:** Gas engines (reciprocating, turbo charged, naturally aspirated and rotary) and diesel engines

**Combustion Capacity:** 30 to 300 kw

**Entering Gas Temperatures:** up to 1,400°F

**Heat Sink Types:** engine jacket water, process water, boiler water, ethylene glycol and thermal transfer fluids

**Summary:** The UTR is applied where both rectangular configuration and heat transfer surface vs. performance is critical. The UTR can be located within the engine to meet space limitations. Flexible exhaust gas connection location and size allow the UTR to adapt easily to an OEM packager's design needs. Fin tube cleaning and inspecting is easy because the core assembly is removed without disturbing the exhaust gas connections. Optional insulation thickness is available.

# UTR1 U-Tube Recovery 1

## Design

Internal Thermal Expansion Design

Stamped in Accordance with the Latest Edition of the ASME Code and National Board

Hardshell 10 Gauge Structural Exterior

2" Factory Insulation

Compression Fitted Tube to Header Attachment (optional)

Removable Core Assembly

Removable Inspection Door

Header Manifold for High Liquid Flow and Low Static Head

## Application

**Combustion Sources:** incinerators, thermal oxidizers, catalytic converters, boilers and hot oil heaters

**Combustion Capacity:** 200 to 50,000 scfm

**Entering Gas Temperatures:** up to 1,450°F

**Heat Sink Types:** process water, boiler feedwater, ethylene glycol and thermal transfer fluids

**Summary:** The UTR1 addresses specific square/rectangular stack heat transfer requirements with confined area restrictions. The UTR1 is offered in stainless, carbon or AL-FUSE™ fin tubing with bare tube through 8 fins per inch spacing. The UTR-1 is versatile with over 100 face areas ranging from 8" x 19" to 72" x 131" and unlimited fin tube rows. Fin tube inspection and cleaning can be done by removing tube rows or core assemblies from the shell without disturbing the exhaust gas connections.

# Savings Comparison Analysis

**Examples of typical combustion source types and the results with a Cain Industries heat recovery system applied.**

| Combustion Source: | | Cain Model Installed: | |
|---|---|---|---|
| **350 BHP Steam Boiler** | | **FCR-1L3B16ALS** | |
| Boiler Feedwater Heat Sink | | Liquid Flow Rate | 24 gpm |
| Waste Exhaust Temp. | 475°F | Final Exhaust Temp. | 324°F |
| Liquid Temp. Inlet | 227°F | Liquid Temp. Outlet | 285.6°F |
| BTU/hr Burner Input | 14,646,000 | Pressure Drop, Water | 4.14 psig |
| Fuel Type | Natural Gas | Pressure Drop, Exhaust | 0.36" WC |
| O2 Content | 7.5% | BTU/hr Recovered | 677,000 |
| Excess Air | 50% | BTU/hr Saved | 866,900 |
| Combustion Efficiency | 78.08% | Total Cost | $21,514 |
| Fuel Cost per Therm | $.50 | **Payback** | **14.9 mo.** |
| Annual Operating Hours | 4,000 | **Annual ROI** | **81%** |
| | | **Annual Savings** | **$17,338** |

**Life Expectancy Savings: $346,760** (20 years)

| Combustion Source: | | Cain Model Installed: | |
|---|---|---|---|
| **600 BHP Steam Boiler** | | **RTR-148F26.5ALS** | |
| Boiler Feedwater Heat Sink | | Liquid Flow Rate | 42 gpm |
| Waste Exhaust Temp. | 486°F | Final Exhaust Temp. | 329°F |
| Liquid Temp. Inlet | 213°F | Liquid Temp. Outlet | 263.4°F |
| BTU/hr Burner Input | 25,200,000 | Pressure Drop, Water | 0.06 psig |
| Fuel Type | Natural Gas | Pressure Drop, Exhaust | 0.36" WC |
| O2 Content | 4.55% | BTU/hr Recovered | 1,022,000 |
| Excess Air | 25% | BTU/hr Saved | 1,275,900 |
| Combustion Efficiency | 80.12% | Total Cost | $27,905 |
| Fuel Cost per Therm | $.55 | **Payback** | **7.3 mo.** |
| Annual Operating Hours | 6,500 | **Annual ROI** | **163%** |
| | | **Annual Savings** | **$45,613** |

**Life Expectancy Savings: $912,260** (20 years)

| Combustion Source: | | Cain Model Installed: | |
|---|---|---|---|
| **Caterpillar G3520H Engine** | | **HRSR-448D25.5SSP** | |
| 50/50 Glycol Water Loop Heat Sink | | Liquid Flow Rate | 520 gpm |
| Waste Exhaust Temp. | 730°F | Final Exhaust Temp. | 309°F |
| Liquid Temp. Inlet | 210°F | Liquid Temp. Outlet | 224.4°F |
| SCFM | 6,474 | Pressure Drop, Water | 1 psig |
| Fuel Type | Natural Gas | Pressure Drop, Exhaust | 1.53" WC |
| O2 Content | n/a | BTU/hr Recovered | 3,287,000 |
| Excess Air | n/a | BTU/hr Saved | 4,108,800 |
| Combustion Efficiency | 80% | Total Cost | $151,691 |
| Fuel Cost per Therm | $.65 | **Payback** | **8.5 mo.** |
| Annual Operating Hours | 8,000 | **Annual ROI** | **141%** |
| | | **Annual Savings** | **$213,656** |

**Life Expectancy Savings: $4,273,120** (20 years)

| Combustion Source: | | Cain Model Installed: | |
|---|---|---|---|
| **Jenbacher J616 Engine** | | **ESG1-824H15.5CSS** | |
| Process Steam Heat Sink | | Operating Steam Pressure | 150 psig |
| Waste Exhaust Temp. | 687°F | Final Exhaust Temp. | 419°F |
| Liquid Temp. Inlet | n/a | Boiler Horsepower | 70 BHP |
| SCFM | 7,236 | Equivalent Evaporation | 2,641 pph |
| Fuel Type | Natural Gas | Pressure Drop, Exhaust | 1.44" WC |
| O2 Content | n/a | BTU/hr Recovered | 2,357,000 |
| Excess Air | n/a | BTU/hr Saved | 2,946,500 |
| Combustion Efficiency | 80% | Total Cost | $179,285 |
| Fuel Cost per Therm | $.65 | **Payback** | **14 mo.** |
| Annual Operating Hours | 8,000 | **Annual ROI** | **85%** |
| | | **Annual Savings** | **$153,220** |

**Life Expectancy Savings: $3,064,400** (20 years)

Savings comparison data is based on a conservative fuel cost per therm and approximate operating hours.
**Contact Cain Industries for your FREE savings analysis proposal.**

EXHAUST

# Heat Recovery Markets

## Cogeneration (CHP)

Engines, Microturbines, Turbines and Fuel Cells

## Boiler Economizer

## Industrial Exchangers

Fume Incinerators, Thermal Oxidizers, Catalytic Converters, Industrial Ovens, Kilns and Furnaces

cain industries
heat recovery systems

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