

Exhaust Heat Recovery  
**Boiler Economizer Systems**

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## Overview

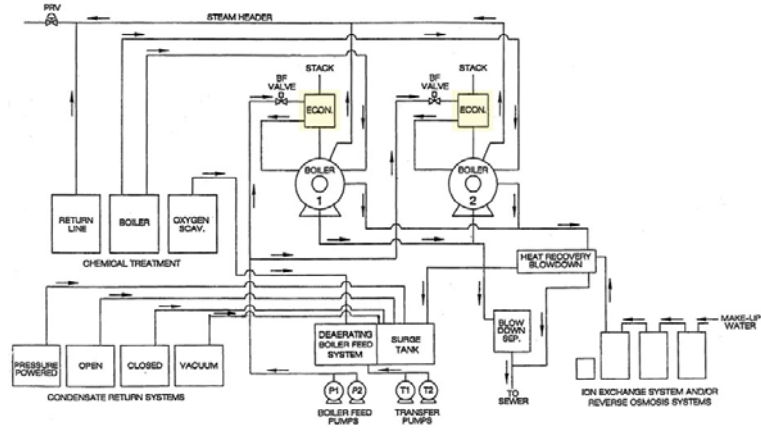
- Most boilers have a combustion efficiency of 78-82%.
- Stack energy loss is typically 18-22%.
- Boiler exhaust temperatures exiting into the atmosphere: 350° - 600° F.
- Economizers recover a portion of the stack loss and return the energy (Btu) to the system in a usable form such as pre-heated water.
- Economizers increase efficiency thus reducing fuel costs.  
Average efficiency increase is 4-7%.
- Typical simple payback of an installed economizer is 6 months to 3 years.  
Average ROI (Return on Investment) for economizer and installation is 18 months.



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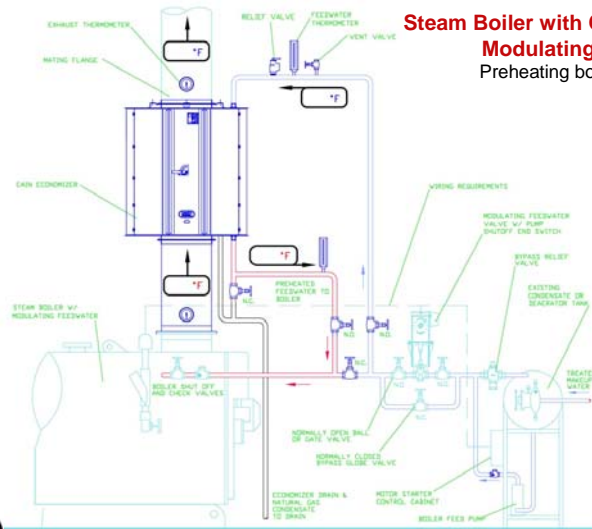
## System Configuration



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## Economizer Applications



**Steam Boiler with Continuous Modulating Feedwater**  
Preheating boiler feedwater

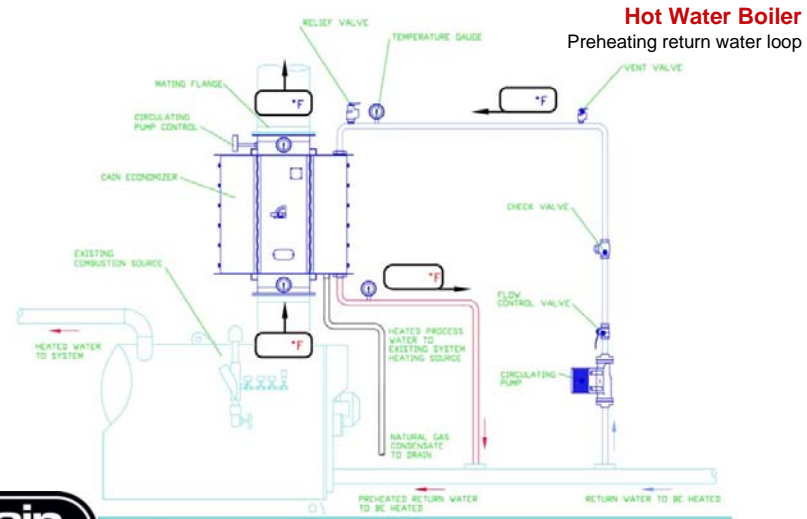


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## Economizer Applications



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## Economizer Product Lines: Cylindrical

### Cain Cylindrical Economizers:

- Compact
- Lightweight
- Hinged stainless steel access doors
- Stainless steel internal exhaust gas bypass



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## Economizer Product Lines: Rectangular

### Cain Rectangular Economizers:

- Individually removable tubes
- Stainless steel interior shell
- Hinged full face access door
- Stainless steel internal exhaust gas bypass



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## Installation Before & After



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## Case Study #1

Location: Sparrow Hospital, Lansing, MI

Boiler: 800 HP Steam Boiler

Exhaust gas temp *before* economizer: 370° F

Exhaust gas temp *after* economizer: 295° F

Btu transferred into boiler feedwater: 2954 MBtu/hr

Capital cost: \$31,662

**Annual savings: \$65,592/year**

**Simple payback: 5.8 months**



Installation cost not included in example



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## Case Study #2

Location: Dow Corning Corp., Midland, MI

Boiler: 2500 HP Steam Boiler

Exhaust gas temp *before* economizer: 450° F

Exhaust gas temp *after* economizer: 332° F

Btu transferred into boiler feedwater: 592 MBtu/hr

Capital cost: \$44,061

**Annual savings: \$217,038/year**

**Simple payback: 2.4 months**



Installation cost not included in example



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# Economizer Proposal

To receive a detailed proposal:

## 1. Gather information:

Minimum criteria for potential boiler economizer application:

- **Hours of Operation**  
i.e. 8 hrs/day  
5 days/week  
50 weeks/year  
(2000 hours)
- **Minimum Stack Temperature**  
i.e. 350° F
- **Fuel Cost**  
i.e. .70/therm

## 2. Complete simple Application Data Form:

Available at [www.cainind.com](http://www.cainind.com):

- Basic information:
- Boiler type and size
  - Fuel type
  - Exhaust gas data
  - Exhaust stack dimensions
  - Inlet water temperature

## 3. Proposal issued, typically within 24 hours:

Cain Proposal includes:

- Quotation
- Performance and projected fuel savings
- Equipment payback
- Economizer submittal and dimensions
- Flow diagram
- Cut sheets, technical information, literature



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## Summary

- Economizers reduce energy costs by recovering Btu lost in boiler exhaust waste heat.
- Typical economizer applications are: preheating boiler feedwater, make-up water, hot water return loop.
- Typical payback of an installed economizer is 6 months to 3 years (equivalent to 75% ROI per year of boiler operation).



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