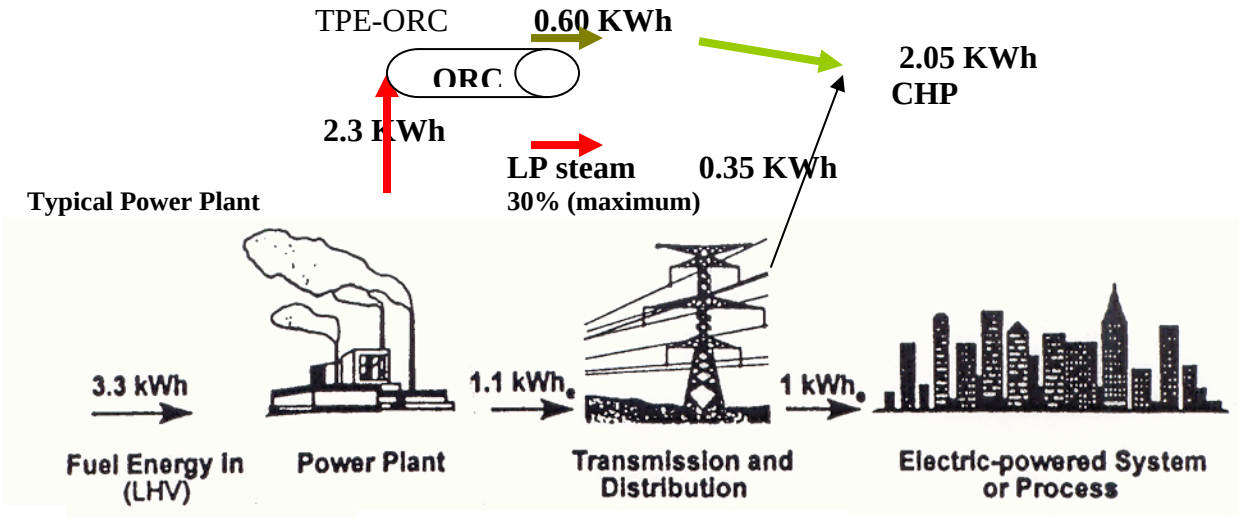
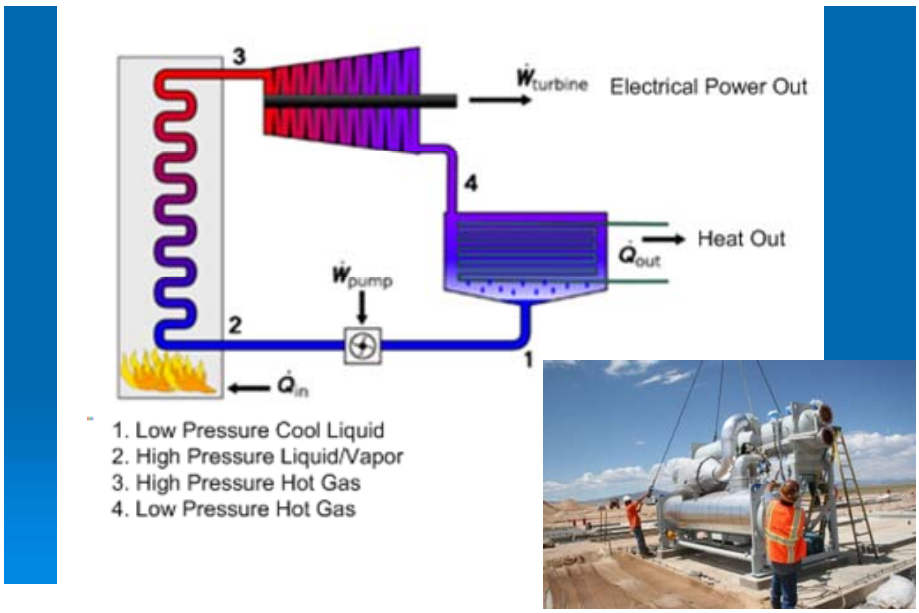
TransPacific Energy Advantage: Case Studies



Typical Power Generated	**1.1 KWh**
Typical Power Wasted	**2.31 KWh**
Typical Power Produced by TPE*	**0.60 KWh**
Total Power Produced with TPE	**1.7 KWh**
Total Heat Available for LP Steam	**0.39 KWh**
Total Utilization Efficiency with TPE	**90.8%**
Fuel savings with TPE:	**39.3%**

***** Depending upon condensation temperature

Base Technology… ***TPE***



TransPacific Energy, Inc.
Innovative Energy Systems for A Cleaner World

- ***Case Study 01***

Measure

ORC-Waste heat recovery from flue gas.

Equipment

Biomass Boiler

Industry / Sector

IPP- Hawaii- US

Cost Benefit Analysis

- Type of Measure: Moderate investment
- Total Power produced: 500 KW
- Cost KWHr produced: $0.28
- Annual Energy Savings: 4,380,000 kWh
- Cost savings: $ 1,664,400
- Payback: 1.76 years

Implementation Highlights

- The installation of the waste heat recovery system requires approval from the supplier of the Boiler. There was a favorable reply from the boiler supplier for installation of our ORCs.

Summary

Installation of waste heat recovery system in biomass steam turbine boiler exhaust gases will result in partial heat recovery by generating power which can be used.

Background

The plant has two biomass boilers with flue gas after steam generation at 340 ˚F and water-cooled condenser. The ORC uses air-cooled condenser to conserve water.

Principle

- Waste heat is available in many forms and grades. It can be recovered by installing waste heat recovery boiler-ORC (WHRB-ORC) conveniently to the exhaust of equipment.
- Almost all WHRB-ORCs are similar to conventional boilers but mostly without first radiant heat transfer tubes. These are generally designed for low gas entry temperatures than conventional boilers.
- Normally the exhaust temperature should be above 750 ˚F for effective generation of steam for a steam turbine system.

- The major benefit apart from the fuel savings are 100% return on investment in the first two years of the operation in this application
- The major factor to be considered during the installation of WHRB-ORC is increase in the back pressure on the biomass boiler DG set and how this is addressed during the operation of the implemented measure
- The major advantages of our ORCs are; environmentally sound and highly efficient in capturing the wasted heat, reducing global warming impact, emission and CO2 footprint as well as the use of air-cooled condenser.

- ***Case Study 02***

Measure

ORC-Waste heat recovery from wet vapor.

Equipment

Process industry by-product

Industry / Sector

Food- England

Cost Benefit Analysis

- Type of Measure: moderate investment
- Total Power produced: 483 KW
- Cost KWHr produced: $0.26
- Annual Energy Savings: 4,231,080.00 kWh
- Cost savings: $ 1,100,080.00
- Payback: 1.8 years

Implementation Highlights

- The installation of the waste heat recovery system requires approval from the supplier of the fryer. There was a favorable reply from the fryers supplier for installation.

Summary

Installation of waste heat recovery system in fryer exhaust gases will result in partial heat recovery by generating power which can be used.

Background

The plant has two fryers with flue gas and wet vapor 293 ˚F. The ORC uses air-cooled condenser to conserve water and availability of cold ambient air.

Principle

- Waste heat is available in many form of wet vapor at low grade heat. It can be recovered by installing waste heat recovery boiler-ORC (WHRB-ORC) conveniently to the exhaust of the fryer equipment.
- Almost all WHRB-ORCs are similar to conventional boilers but mostly without first radiant heat transfer tubes. These are generally designed for low gas entry temperatures than conventional boilers.
- The major benefit apart from the fuel savings are 100% return on investment in the first two years of the operation.
- Another major benefit apart from the fuel savings is the condensation of wet vapor and pump back to the boiler.
- The major factor to be considered during the installation of WHRB-ORC is increase in the back pressure on the Fryer exit and how this is addressed during the operation of the implemented measure
- The major advantages of our ORCs are; environmentally sound and highly efficient in capturing the wasted heat as well as CO2 footprint, emission as well as global warming impact as well as installation cost since air-cooled condensers are used.

- ***Case Study 03***

Measure

ORC-Waste heat recovery from Hot water.

Equipment

By product

Industry / Sector

Process industry- US

Cost Benefit Analysis

- Type of Measure: Moderate investment
- Total Power produced: 885 KW
- Cost KWHr produced: $0.10
- Annual Energy Savings: 7,752,600 kWh
- Cost savings: $ 775,260.00
- Payback: 4.5 years

Implementation Highlights

- The installation of the waste heat recovery system requires approval from the supplier of the pump, new water piping and special insulation as well as flow control. There was a favorable reply from the hot water process suppliers for installation of our ORCs.

Summary

Installation of waste heat recovery system in a closed hot water loop will result in partial heat recovery by generating power which can be used.

Background

The plant has significant hot wasted water at 194 ˚F. The ORC uses air-cooled condenser due to the remote location and unavailability of water.

Principle

- Waste heat is available in wasted hot water and low grade. It can be recovered by installing waste heat recovery boiler-ORC (WHRB-ORC) conveniently to the closed hot water loop.
- Almost all WHRB-ORCs are similar to conventional boilers however in this application liquid refrigerant plate heat exchanger was used.
- The major benefit apart from the fuel savings are 100% return on investment in the first four years of the operation
- The major advantages of ORCs are; environmentally sound and highly efficient in capturing the wasted heat and reducing global warming impact.

- ***Case Study 04***

Measure

ORC-Waste heat recovery from flue gas.

Equipment

Gas turbine

Industry / Sector

IPP- US

Cost Benefit Analysis

- Type of Measure: Moderate investment
- Total Power produced: 1240KW
- Cost KWHr produced: $0.10

- Annual Energy Savings: 10,862,400 kWh
- Cost savings: $ 1,086,240
- Payback: 4.6 years

Implementation Highlights

- The installation of the waste heat recovery system requires approval from the supplier of the Gas Turbine. There was a favorable reply from the Gas Turbine manufacturer for installation of our ORCs providing booster fans are used.

Summary

Installation of waste heat recovery system in gas turbine exhaust gases will result in partial heat recovery by generating power which can be used and enhance the overall system efficiency.

Background

The plant has several gas turbines with flue gas at 600 ˚F. The ORC uses air-cooled condenser to conserve water.

Principle

- Waste heat is available and can be recovered by installing waste heat recovery boiler-ORC (WHRB-ORC) conveniently to the exhaust of equipment.
- Almost all WHRB-ORCs are similar to conventional boilers but mostly with out first radiant heat transfer tubes.
- The major benefit apart from the fuel savings are 100% return on investment in the first four years of the operation
- The major factor to be considered during the installation of WHRB-ORC is increase in the back pressure on the gas turbine set and how this is addressed during the operation of the implemented measure
- The major advantages of our ORCs are; environmentally sound and highly efficient in capturing the wasted heat, reducing global warming impact and emission and installation cost with the use of air-cooled condenser.

- ***Case Study 05***

Measure

ORC-Waste heat recovery from low pressure steam.

Equipment

Alternative to steam condenser used in cogeneration facility.

Industry / Sector

IPP- US

Cost Benefit Analysis

- Type of Measure: Moderate investment
- Total Power produced: 294 KW
- Cost KWHr produced: $0.12
- Annual Energy Savings: 2,575,440 kWh
- Cost savings: $ 309,052
- Payback: 4.2 years

Implementation Highlights

- The installation of the waste heat recovery system requires approval from the suppliers of the steam turbine and boiler. There was a favorable reply both equipment suppliers for installing our ORCs.

Summary

Installation of waste heat recovery system as alternative to steam condenser will result in partial heat recovery by generating power which can be used and eliminate the use of cooling tower.

Background

The plant has several boiler/steam turbines cogeneration units and heat is recovered from low pressure steam at 115 ˚F. The ORC uses water-cooled condenser as water pond was available.

Principle

- Waste heat is available and can be recovered by installing waste heat recovery boiler-ORC (WHRB-ORC) conveniently to the exhaust of steam of the turbine equipment.
- Almost all WHRB-ORCs are similar to conventional boilers but mostly without first radiant heat transfer tubes. In this application steam condensing heat exchanger was used.
- The major benefit apart from the fuel savings are 100% return on investment in the first four years of the operation.
- The major advantages of our ORCs are; environmentally sound and highly efficient in capturing the wasted heat and CO2 footprint and installation cost.

Please contact our offices for further information on the above mentioned case studies.

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