# Waste Heat Recovery Systems Training Course

Professional Development Training Course Outline

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|---|---|---|---|
| **Category** | General Training | **Duration** | 5 Days |
| **Base Fee** | $1,500 USD | **Delivery Mode** | Online / On-site Hybrid |

## Course Introduction

Waste Heat Recovery Systems (WHRS) are transforming modern industrial energy management by enabling the capture and reuse of thermal energy that would otherwise be lost to the environment. In today's era of decarbonization, energy efficiency optimization, and sustainable industrial engineering, WHRS plays a critical role in reducing fuel consumption, lowering greenhouse gas emissions, and improving overall process efficiency across sectors such as power plants, cement, steel, oil & gas, and manufacturing.

Waste Heat Recovery Systems Training Course is designed to equip participants with advanced knowledge of thermal energy recovery technologies, ORC systems, heat exchangers, economizers, and industrial heat integration strategies. The course blends theory with real-world industrial applications, enabling learners to design, evaluate, and optimize WHR systems for maximum energy savings and ESG compliance.

## Programme Curriculum

**Waste Heat Recovery Systems Training Course**

**Introduction**

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**Course Duration**

5 days

**Course Objectives**

1. Understand fundamentals of waste heat recovery technologies and energy balance systems
2. Analyze industrial processes for energy efficiency optimization
3. Evaluate different WHR systems including economizers, recuperators, regenerators
4. Design basic heat exchanger networks (HEN) for industrial applications
5. Understand Organic Rankine Cycle (ORC) and steam recovery systems
6. Identify heat loss sources in cement, steel, refinery, and power plants
7. Apply carbon footprint reduction strategies using WHR solutions
8. Develop skills in thermal system performance assessment
9. Learn integration of WHR into Industry 4.0 smart energy systems
10. Conduct feasibility studies for industrial energy recovery projects
11. Optimize fuel consumption using process heat integration techniques
12. Understand global standards for energy management (ISO 50001)
13. Build capability in sustainable engineering and net-zero transition strategies

**Target Audience**

1. Energy engineers and process engineers
2. Mechanical and thermal engineers
3. Plant managers and operations supervisors
4. Sustainability and ESG consultants
5. Industrial maintenance engineers
6. Power plant technicians and engineers
7. Oil & gas refinery professionals
8. Engineering students specializing in energy systems

**Course Modules**

**Module 1: Fundamentals of Waste Heat Recovery**

- Basics of thermal energy and heat transfer
- Sources of industrial waste heat
- Heat loss mechanisms in industries
- WHR system classifications
- Energy audit fundamentals
- **Case Study:** Heat loss mapping in a cement manufacturing plant

**Module 2: Heat Exchanger Technologies**

- Types of heat exchangers
- Heat transfer efficiency improvement methods
- Fouling and maintenance issues
- Thermal performance evaluation
- Material selection for high temperature systems
- **Case Study:** Shell & tube exchanger optimization in oil refinery

**Module 3: Economizers and Recuperators**

- Working principles of economizers
- Flue gas heat recovery systems
- Furnace heat recovery techniques
- Recuperator design and applications
- Efficiency improvement calculations
- **Case Study:** Boiler economizer installation in a power plant

**Module 4: Organic Rankine Cycle (ORC) Systems**

- ORC working principle and components
- Low-grade heat utilization
- Working fluids selection
- Power generation from waste heat
- Performance optimization
- **Case Study:** ORC system in geothermal and industrial waste heat plant

**Module 5: Industrial Heat Integration & Pinch Analysis**

- Introduction to pinch technology
- Heat cascade analysis
- Minimum energy targeting
- Process integration strategies
- Software tools for heat integration
- **Case Study:** Heat integration in petrochemical complex

**Module 6: Energy Efficiency & Decarbonization**

- Industrial energy benchmarking
- Carbon emission reduction methods
- Energy recovery ROI analysis
- Net-zero industrial pathways
- Sustainability reporting
- **Case Study:** Steel plant carbon reduction using WHR

**Module 7: WHR System Design & Simulation**

- Thermodynamic modeling
- Simulation tools
- System sizing and selection
- Economic feasibility analysis
- Risk assessment in WHR projects
- **Case Study:** Simulation of WHR system in cement kiln

**Module 8: Smart Energy Systems & Industry 4.0 Integration**

- IoT-based energy monitoring
- Predictive maintenance for WHR systems
- AI-driven energy optimization
- Digital twin technology in energy systems
- Smart grid integration
- **Case Study:** Smart WHR monitoring system in manufacturing plant

### Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

**Register as a group from 3 participants for a Discount**

**Send us an email: info@fineskilltrainingcenter.org or call** *+254769199797*

***Certification***

*Upon successful completion of this training, participants will be issued with a globally- recognized certificate.*

***Tailor-Made Course***

*We also offer tailor-made courses based on your needs.*

**Key Notes**

**a.** The participant must be conversant with English.

**b.** Upon completion of training the participant will be issued with an Authorized Training Certificate

**c.** Course duration is flexible and the contents can be modified to fit any number of days.

**d.** The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

**e.** One-year post-training support Consultation and Coaching provided after the course.

**f.** Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

## Upcoming Scheduled Sessions

| Start Date | End Date | Location | Price |
|---|---|---|---|
| **23 Nov 2026** | 27 Nov 2026 | Online | $1,000 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $1,500 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $3,000 |

| Start Date | End Date | Location | Price |
|---|---|---|---|
| **23 Nov 2026** | 27 Nov 2026 | Physical | $3,000 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $6,000 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $4,500 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $6,000 |
| **23 Nov 2026** | 27 Nov 2026 | Physical | $6,000 |

Ready to enroll or request a customized program? Book online or contact us:

**Register Online Now**

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