



**Turning Waste Heat Into Energy: Steps for Project  
Assessment for ORC Organic Rankine Cycle Utilization  
for waste heat from 31 C to 100 C**

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<https://infinityturbine.com/waste-heat-to-energy-project-assessment-by-infinity-turbine.html>

Turning Waste Heat Into Energy: Steps for Project  
Assessment



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## Project Assessment Basics

To determine what size turbine generator to install for waste heat utilization, follow these steps:

### Step 1: Gather Essential Data from the Customer

#### 1. Heat Source Information:

- Temperature of the Waste Heat: What is the temperature range of the waste heat available?
- Thermal Energy Flow Rate: How much heat energy is available? (e.g., in BTU/hr, kW, or MW)
- Duration of Availability: Is the waste heat available continuously or intermittently? If intermittent, what is the schedule?

#### 2. Heat Medium Details:

- Heat Transfer Medium: Is the waste heat in the form of a gas, liquid, or steam? Specify if it is hot water, exhaust gases, etc.
- Pressure of the Medium: What is the pressure of the waste heat medium (if applicable)?

#### 3. Space and Location Constraints:

- Physical Space Available: How much space is available for the turbine generator and associated equipment?
- Access and Installation Feasibility: Are there any constraints related to installation or maintenance access?

#### 4. Power Requirement and Usage:

- Desired Output Power: What power output (e.g., in kW or MW) is expected or desired from the waste heat system?
- Usage of Generated Power: Is the generated power meant for internal consumption, grid connection, or another specific use?

#### 5. Existing Systems Integration:

- Current Energy Systems: What other energy generation or utilization systems are currently installed?
- Connection Requirements: Is there a need to integrate with existing electrical, thermal, or control systems?

#### 6. Environmental Conditions:

- Ambient Temperature and Climate: Is the location indoors or outdoors? Are there temperature extremes?
- Cooling Options: What cooling methods are available for the turbine and generator (e.g., water cooling, air cooling)?

#### 7. Economic Considerations:

- Budget and ROI Requirements: What is the budget for the turbine system, and what is the acceptable payback period?
- Energy Costs: What is the cost of electricity or other forms of energy in the region (to compare cost savings)?

### Step 2: Evaluate Technical Feasibility

#### 1. Calculate Available Thermal Energy:

- Determine the total available energy using the formula  $Q = m \cdot C_p \cdot \Delta T$  where  $m$  is the mass flow rate,  $C_p$  is the specific heat, and  $\Delta T$  is the temperature difference.

#### 2. Determine Potential Turbine Efficiency:

- Based on the temperature and pressure of the heat source, estimate the efficiency of the turbine using typical values for the type of turbine (e.g., Organic Rankine Cycle (ORC), steam turbine).

## Turning Waste Heat Into Energy: Steps for Project Assessment

In today's world of increasing energy costs and climate concerns, utilizing waste heat to generate energy can be an excellent opportunity for industrial facilities and data centers. By tapping into the energy that would otherwise be wasted, companies can improve efficiency, reduce energy costs, and lower carbon emissions. However, determining how to convert waste heat into useful energy involves careful project assessment and planning. This article outlines the essential steps and the information needed to determine the feasibility and best options for a waste heat-to-energy project.

### Step 1: Gather Essential Data on Waste Heat Source

The starting point of any waste heat-to-energy project is understanding the nature of the available waste heat. Specific information that needs to be collected includes:

- **Temperature of Waste Heat:** The temperature of the waste heat source is crucial to determining which conversion technology is appropriate. Low-temperature waste heat might be suitable for Organic Rankine Cycle (ORC) systems, while higher temperatures may be used for steam turbines.
- **Thermal Energy Flow Rate:** Measure the amount of thermal energy available, typically expressed in units like BTU/hr or kW. This provides an understanding of the potential energy output.
- **Medium Type:** Identify the medium of heat transfer, such as hot water, steam, or exhaust gases. The physical characteristics of the medium (liquid, gas, etc.) impact the type of turbine or energy recovery system that can be used.
- **Availability and Continuity:** Is the waste heat available continuously, or is it intermittent? Understanding the timing and availability helps determine if energy storage is necessary and ensures that the system design meets the customer's energy needs.

### Step 2: Define Power Requirements

The next step is determining how much power needs to be generated and how it will be used. This information is essential to size the turbine and energy conversion system appropriately.

- **Desired Output Power:** Specify the expected power output in kW or MW. This will help in choosing a turbine generator that meets the energy requirements of the facility.
- **Usage of Generated Power:** Consider how the power will be used. Will it be for internal operations, for supplementing grid energy, or for a specific backup system? This will determine the output characteristics, such as the type of generator and synchronization requirements with existing systems.

### Step 3: Evaluate Space and Location Constraints

Proper assessment of the site is vital for designing a system that integrates seamlessly.

- **Space Availability:** Assess the physical space where the waste heat recovery system can be installed. Considerations include the area required for the turbine, heat exchangers, and other auxiliary components.
- **Access for Installation and Maintenance:** Determine if there are any access constraints that could affect the installation process or routine maintenance. Large turbines, for example, may require significant clearance or crane access.

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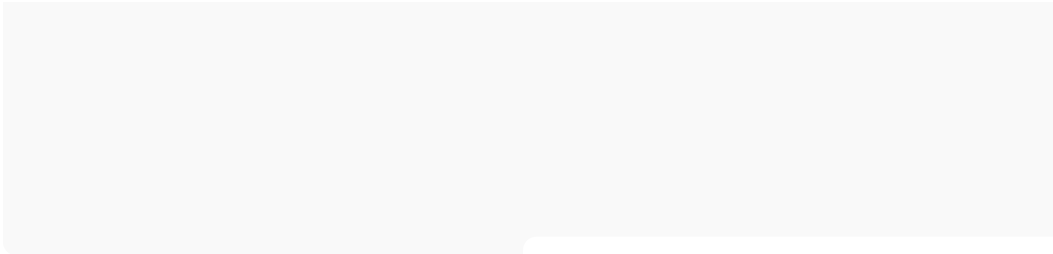
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### Step 4: Analyze Integration with Existing Systems

A waste heat recovery system should be integrated with existing infrastructure efficiently.

- **Existing Energy Systems:** Evaluate the current energy systems and determine how the waste heat recovery system will fit in. Integration requirements, such as whether the system needs to connect to an existing grid or be parallel with other systems, must be addressed.



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