

An aerial photograph of a large-scale aquaculture facility. The image shows several large, circular tanks arranged in a grid-like pattern. Each tank is divided into radial sections by a central metal structure. The water in the tanks appears greenish, likely due to algae or other aquatic plants. A central walkway or bridge runs through the facility, connecting the tanks. The surrounding area is green, suggesting a rural or agricultural setting.

North America
Aquaculture and
Fishery Heating
Demand
Research

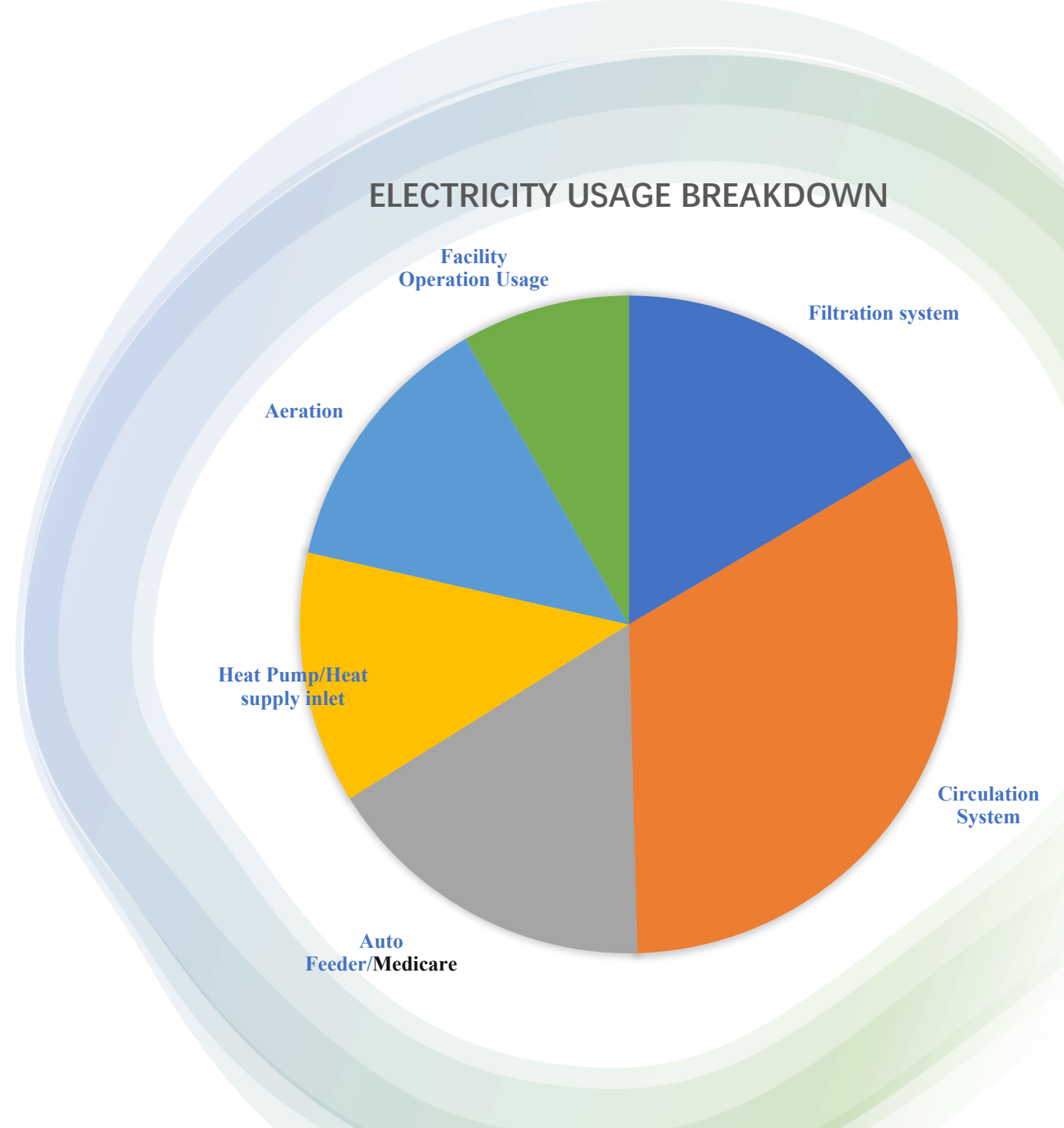


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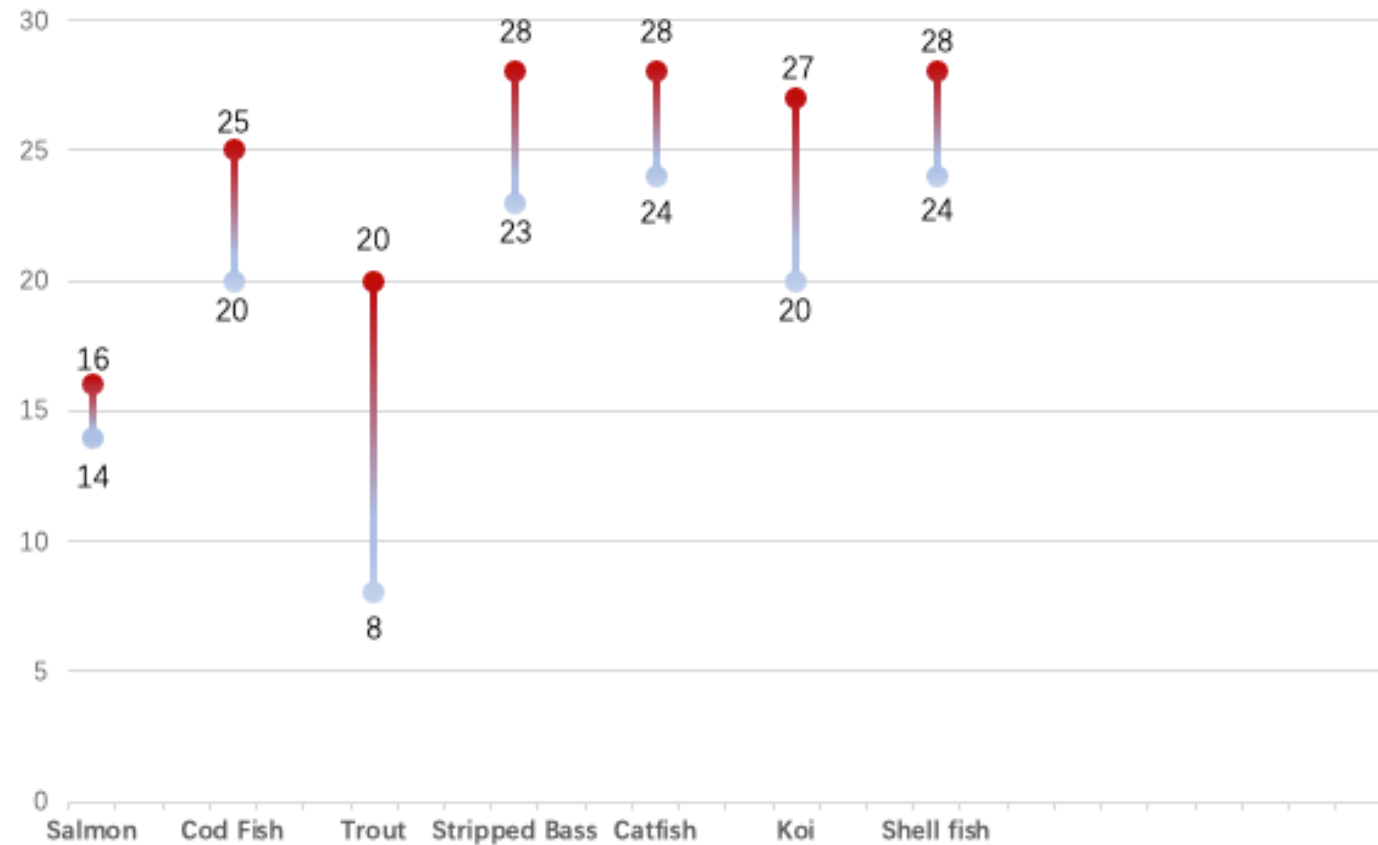
In-land Fishery Farms

- Aquaculture requires energy to power monitoring equipment, circulation pumps, feeding systems, and navigation lighting, as well as refrigerate the harvested product. These power needs are estimated to range between 4 and 715 megawatt-hours per year, depending on the size, location, and purpose of the operation (e.g., shellfish farm, fish farm). (Powering the Blue Economy: Exploring Opportunities for Marine Renewable Energy in Maritime Markets, 38.)



Fish Growth Temperature

Fish Growth Temperature (°C)

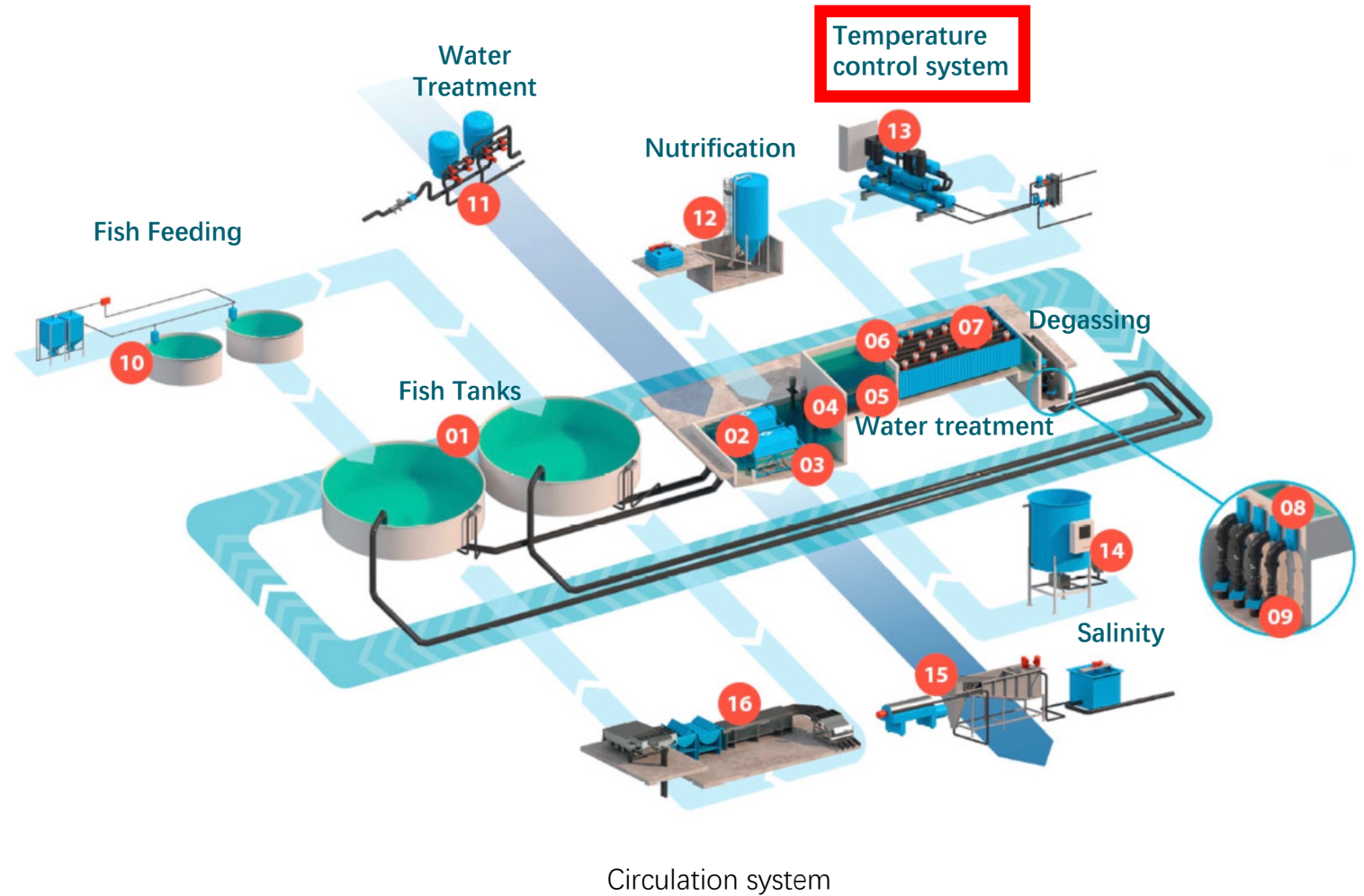


Fishery Farm Temperature Control System Overview

- Fishery Circulation System
- Heat Supply Scenario: Floor Heat/Aquaponics ecosystem
- Different Types of Temperature Control System in Aquaculture
- SAIHEAT BOX Infrastructure product heat supply interface



Fishery Farm Circulation System with Heat interface



Fishery Container types



Fishery Tank 1



Deep Fish Tank



Fishery Tank2



Raceway Fish Tank

Heat supply Scenario: Greenhouse fishery

Normally Greenhouse will use Fan Coil/ Floor heating air-medium as constant temperature heating

This type of constant temperature method is suitable for projects where the water temperature is required to be below 20°C.

This type of constant temperature control of the greenhouse directly controls the temperature of the greenhouse environment to indirectly ensure the water temperature.

The efficiency is relevantly low and the restart process after shutdown is time costly. Precise temperature control of water temperature is difficult



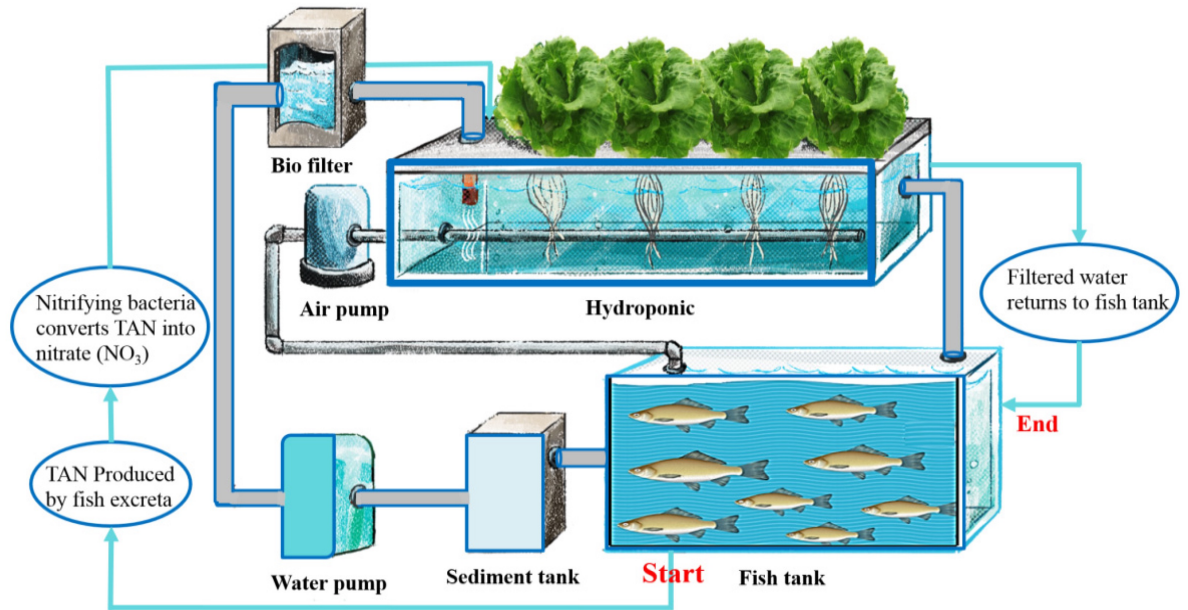
Sealed Greenhouse for Fishery

Heat supply Scenario: Aquaponics

Water temperature is one of the most critical parameters that an aquaponics grower must maintain consistently.

Water temperature affects not only the health of the fish, plants, and bacteria in an aquaponics system. It is also essential for the breakdown and uptake of nutrients and wastes.

The heating pursued by Aquaponic often requires finding a balance between fish ponds and crop ponds.



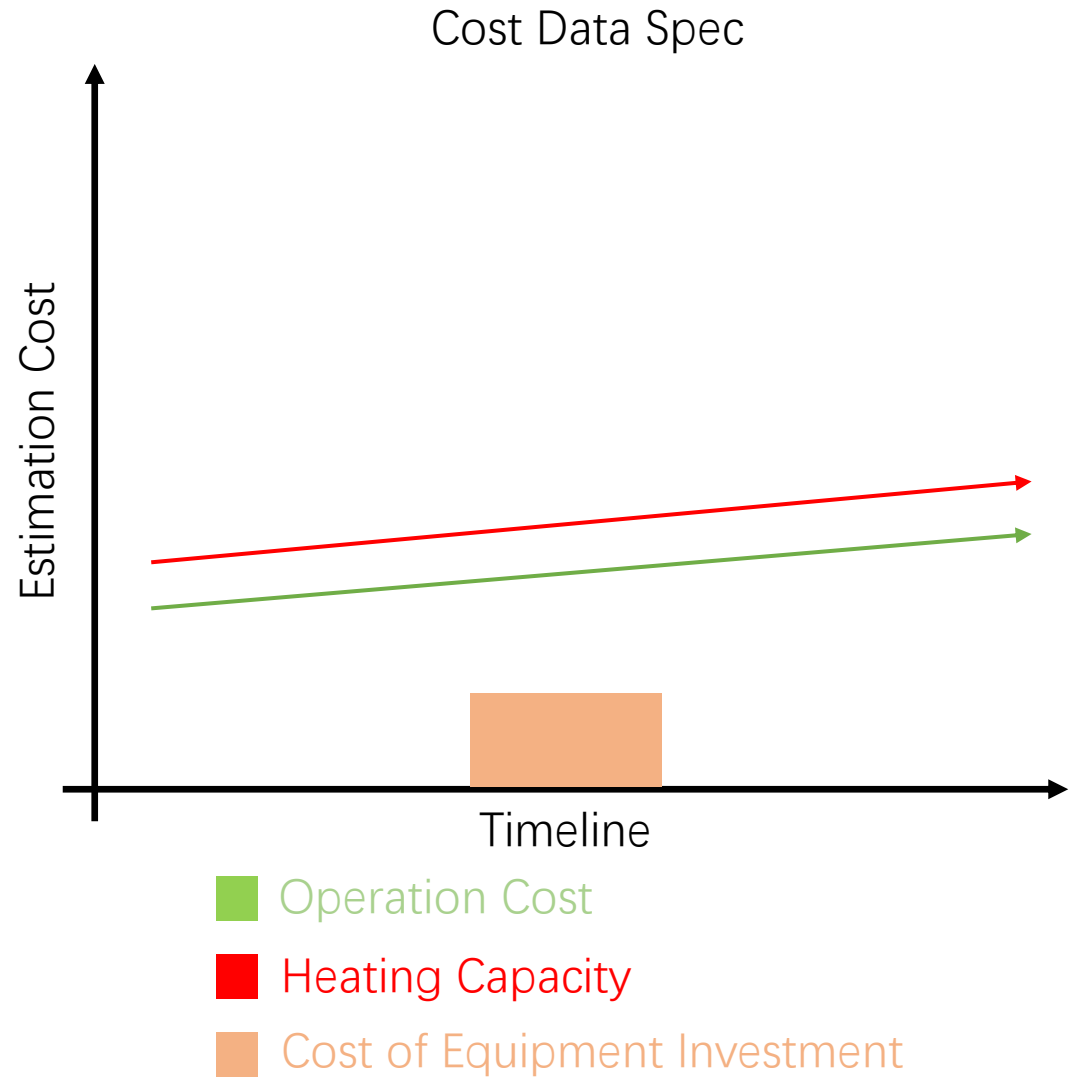
System diagram of aquaponics.

Immersion Heating Tube



The water is heated by directly immersing the heating tube into the fish pond, with automatic temperature control and strong temperature range stability.

Suitable for smaller fish ponds



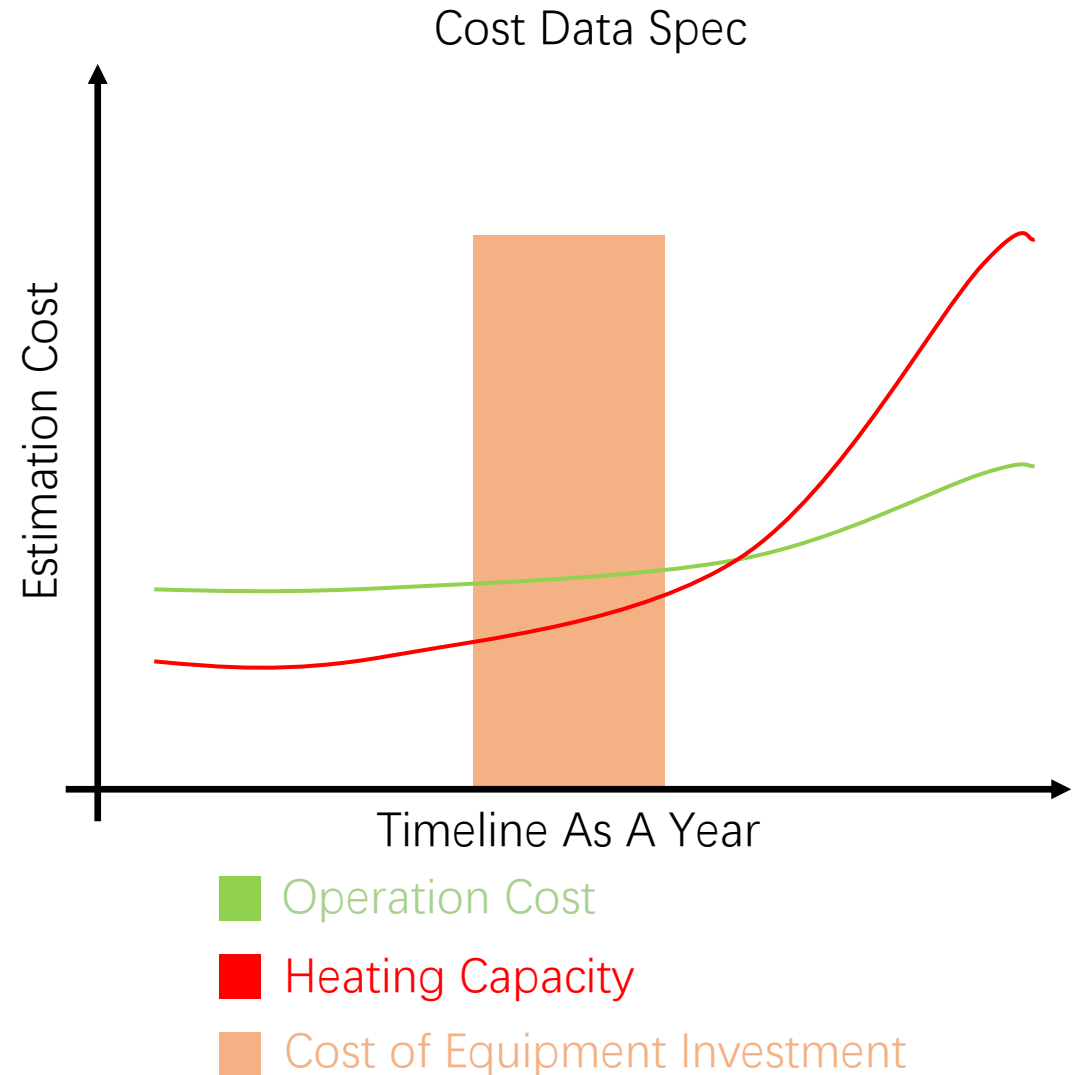
Air Pump Heater/Boiler



Air-to-air heat pumps provide hot or cold air directly to rooms, but do not usually provide hot water. *Air-to-water* heat pumps use radiators or underfloor heating/floor heating to heat a whole house and are often also used to provide domestic hot water.

Traditional air heat pump could gain up to 4 KWH thermal energy from 1 kWh electric energy.

Applicable to various types of fishery heating scenarios.(Indoor & Outdoor)



SAIHEAT Hashing Heat Recovery Infrastructure Product

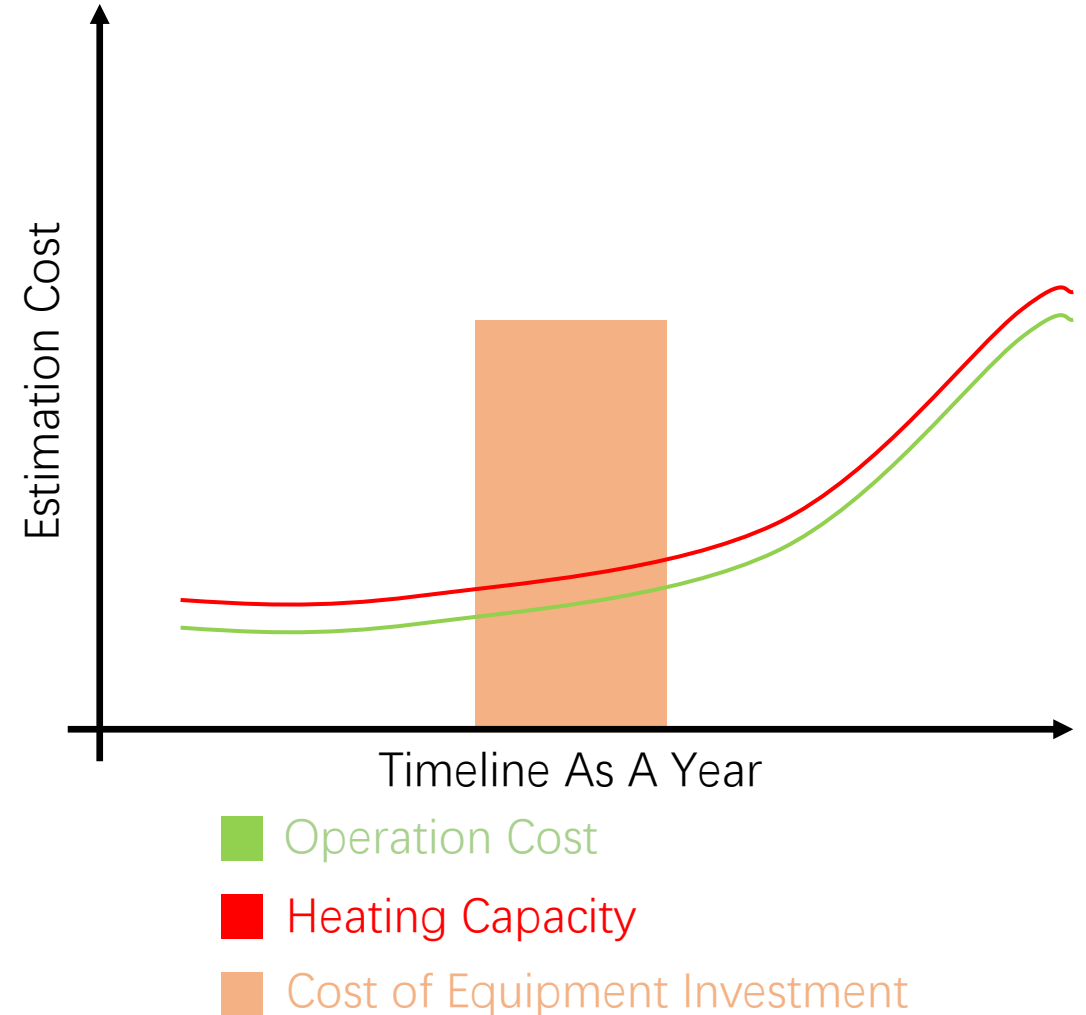


SAIHEAT BOX Product line provide clean computing infrastructure service, focusing on liquid cooling and chip waste heat utilization technology for Bitcoin mining and AI computing.

Equipped with automatic temperature control system can stabilize the outlet coolant temperature within the range of $\pm 1\text{ }^{\circ}\text{C} / 2\text{ }^{\circ}\text{F}$

The Box heat supply port could replace the traditional heat pump and heat dissipation port in the circulation system

Cost Data Spec



Citation & Reference

- **Page 6**, Full Aquaculture circulation system, Source: From Billund Aquaculture Website: [Billund Aquaculture RAS](#)
- **Page 7**, Fish Tank 1, Picture, Source: A screenshot from the video by AuqaBounty: [AquaBounty Farm Tour](#)
- **Page 7**, Deep Fish Tank, Picture, Source: A screenshot from the video by AuqaBounty: [AquaBounty Farm Tour](#)
- **Page 7**, Fish Tank 2, Picture, Source: Picture form Innova Sea Website: [Innovasea Land-Based Aquaculture](#)
- **Page 7**, Raceway Fish Tank, Source: Picture from Texas Gov website: [Texas State Fish Hatcheries](#)
- **Page 9**, Heat supply Scenario: Aquaponics, Source: System Diagram of Aquaponics: [MDPI: Recent Advances of Smart Systems and Internet of Things \(IoT\) for Aquaponics Automation: A Comprehensive Overview](#)
- **Page 10**, Immersion Heating Tube, Source: [Delta hydronics Immersion fishery heater](#)
- **Page 11**, Air Pump Heater/Boiler, Heat Pump Picture Source: [PHNIX Special Heat Pump Applied in The Largest Inland Marine Fish Farm in China](#)
- **Page 12**, SAIHEAT Hashing Heat Recovery Infrastructure Product, Temp control system picture Source: [Billund Aquaculture RAS](#)

Article References:

- US Department of Energy, Office of Energy and Renewable Energy, *Powering the Blue Economy: Exploring Opportunities for Marine Renewable Energy in Maritime Markets*, April 2019.



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