

Study on Utilization of Wastewater Heat in Hamakurosaki Area of Toyama Public Sewerage

(Research for FY 2016-17)

1. Purpose

In 2016, Japan Sewage Works Agency (JS) carried out a feasibility study of the utilization of wastewater heat at the building of water & wastewater bureau (test facility), Hamakurosaki service area in Toyama City. This feasibility study verified that the effectiveness of wastewater heat, and at the same time, the needs of consideration of its heat storage process or combination process with other heat sources.

This study aims to compare and evaluate multiple utilization systems of wastewater heat and consider the optimized proposal with high feasibility for the test facility.

2. Achievements of the past years

2016: Feasibility study on the wastewater heat applied to Hamakurosaki service area

2017: Consideration of the optimized utilization system of wastewater heat with high feasibility

3. Achievement of this year

(1) Figure 1 describes two sampling points.



Figure 1: Sampling points

Toyama City decided to take measures against aging conduit including pipes of 1,000 mm diameter. Wastewater heat was collected at the time of pipe rehabilitation carried out by spiral wound lining method for inner smoothness.

(2) Three heat supply methods were compared at the test

facility.

- Plan A (conventional): gas absorbent hot-and-chilled-water generator
- Plan B (general): the air-cooling heat pump system
- Plan C (proposal): wastewater heat + air-cooling heat pump

① Running cost comparison: Plan B and Plan C reduced running cost by 49% and 60%, respectively in comparison with Plan A (figure 2.)

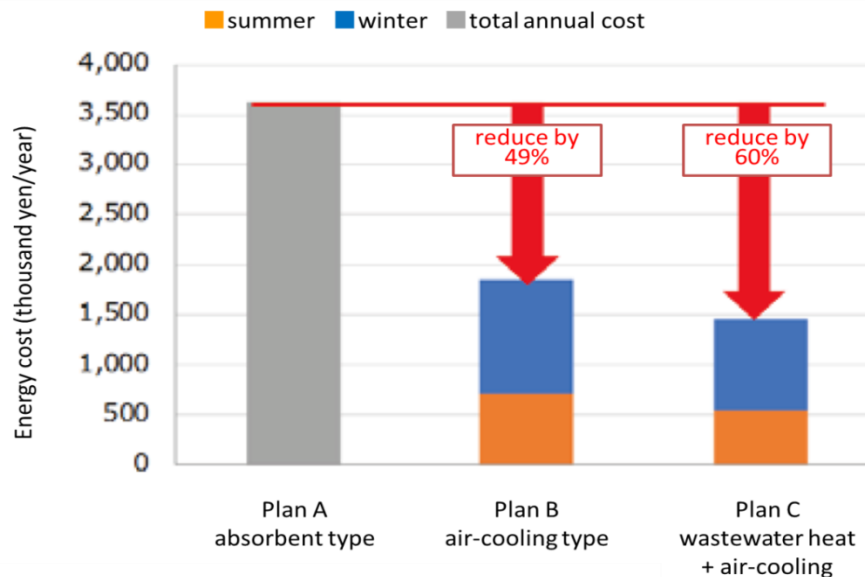


Figure 2: Running costs comparison

② Initial cost comparison: Plan C was found to get to be more expensive than Plan A or B. Even if Plan C got a subsidy for its utilization of wastewater heat, its initial costs were still higher than that of Plan A by 26% (Figure 3.)

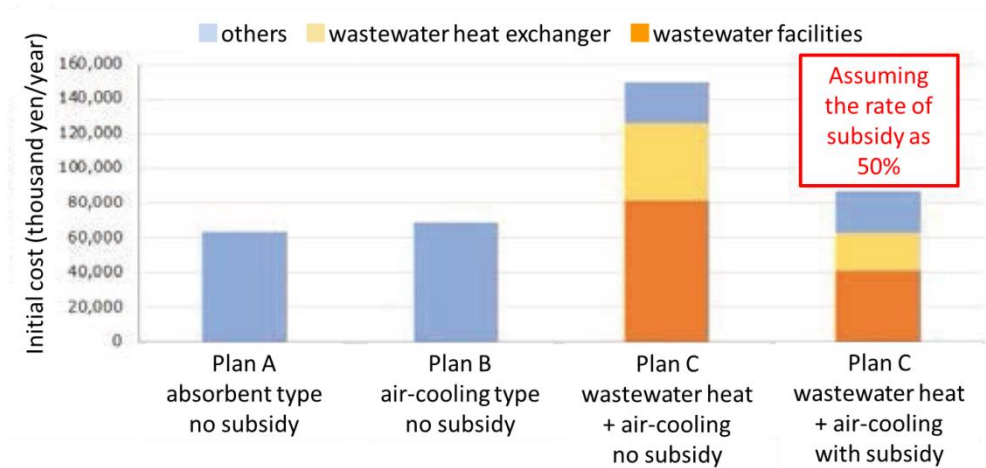


Figure 3: Initial cost comparison

③ Profitability comparison: Plan C needs 31 years to recover its investment if no subsidy was applied. When the subsidy was applied to 50% costs except for air-cooling heat pump, the investment would be recovered in six years considered to be economically feasible. The grant of the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) for the improvement of public infrastructure is assumed to be applied as a subsidy.

4. Conclusion (Future issues)

The issues for a master plan are as follows:

1. The confirmation of business scheme and boundaries of responsibility are required.

2. A heat exchanger, a key technology of wastewater heat utilization, is a new technology with few case examples. Therefore, its application needs a detailed confirmation including the possibility of execution to manufacturers and related companies.
3. Since a wastewater heat pump has a huge different output in summer and winter, some solutions such as a divided heat storage tank are required.

Keywords: Utilization of wastewater heat, Cooling-air heat pump, Pipe rehabilitation, Spiral wound lining
