Source:JASE-W Japanese Smart Energy Products & Technologies
https://www.jase-w.eccj.or.jp/technologies/index.html

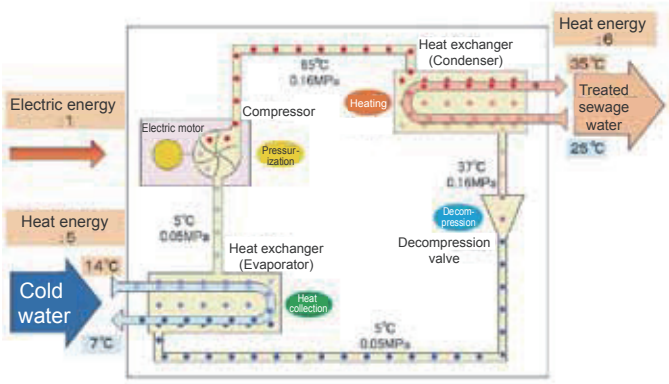
O-24	Keywords	Y4	system or software	Z4	electricity	F33	electricity

Tokyo Electric Power Company Holdings, Incorporated

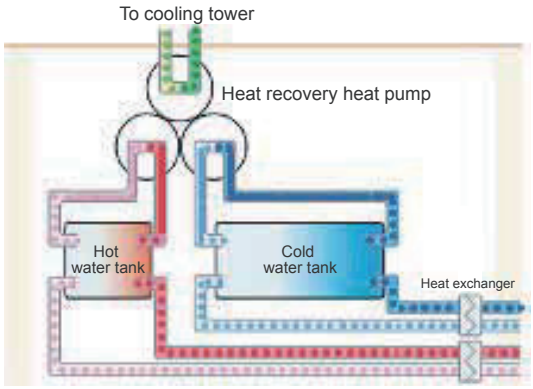
High-efficiency Heat Supply System (Unused Energy Utilization and Heat Recovery Heat Pump)

Features

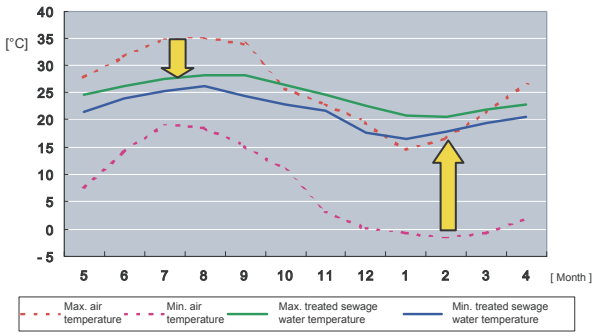
- Temperature difference of river water, sea water, sewage water (treated or untreated), etc. is one of the unused energy sources. Because these waters are comparatively warm in winter and cold in summer, they can increase the operating efficiency of heat pumps.
- When both types of load of cold heat and hot heat coexist, heat recovery heat pumps that can simultaneously produce cold water and hot water may be utilized for realizing high efficiency.
- In both unused energy utilization and heat recovery heat pump, it is more rational to use thermal storage tanks in combination with them and construct the overall system as a thermal storage heat pump system that can offset the time difference between heat supply and demand.
- Introduced here is a case of a heat supply system that uses treated sewage water as a heat source (Makuhari New City High-tech & Business District).



Configuration of a heat pump system for using treated sewage water (when cooling in summer)



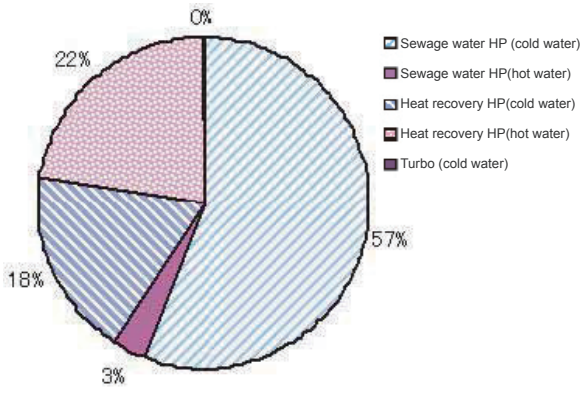
System image for using a heat recovery heat pump



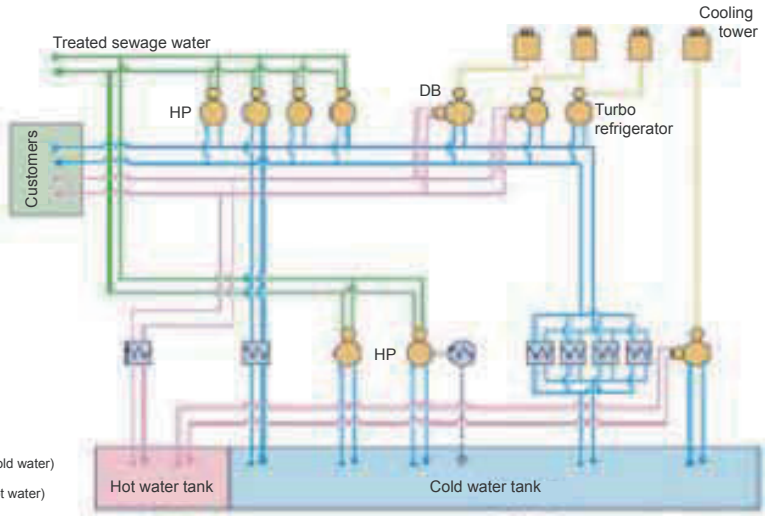
Changes in outdoor air temperature and treated sewage water temperature (May 2006 to April 2007)

Basic Concept or Summary

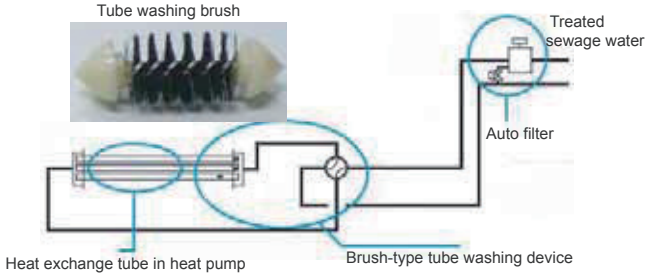
- Features of a system for using treated sewage water
  - The water intake line is equipped with an auto filter for removing floating debris, etc. The heat exchange tube of the heat pump is equipped with a brush-type cleaning device for preventing the heat exchange efficiency from being lowered by the accretion in the tube.
- Operating state of heat source devices
  - Treated sewage water heat pumps and heat recovery heat pumps cover around 60% and 40% of the annual air conditioning load respectively.



Annual heat production ratio by each type of heat source machinery



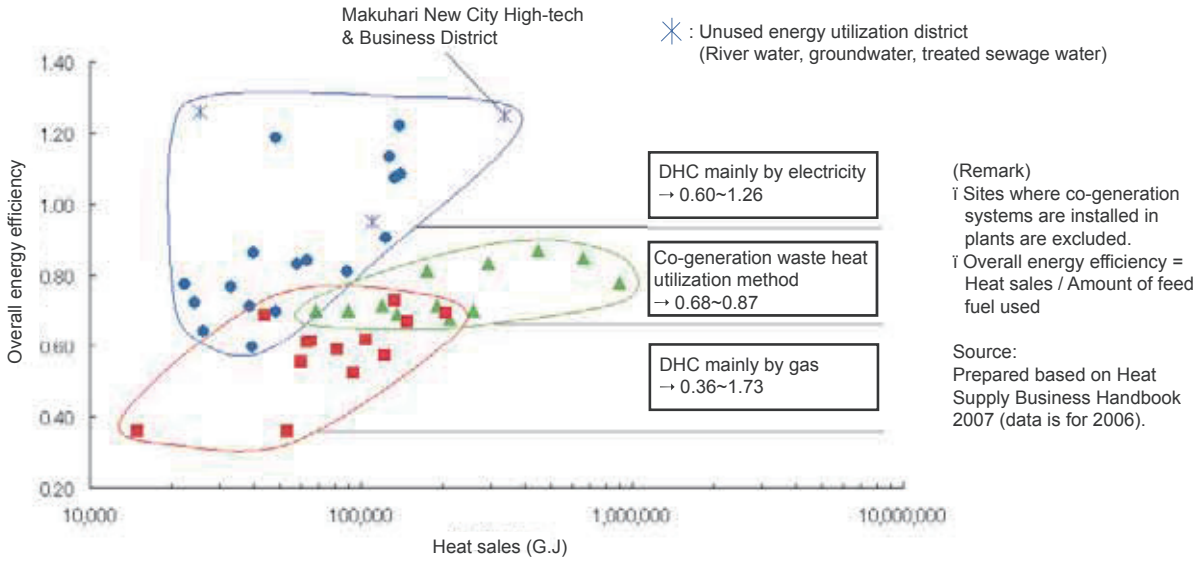
HP --- Heat pump that uses treated sewage water as a heat source
DB --- Heat recovery heat pump



Plant system diagram (in summer) and treated sewage water intake system

Effects or Remarks

◆ Unused energy and heat recovery pumps are effectively utilized for realizing the first-rate efficiency among the heat supply districts within the service area of TEPCO.

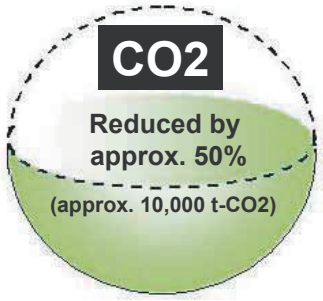


Overall energy efficiency of DHC districts within the service area of TEPCO

◆ Experimental calculation of the effect on reducing the amount of CO2 emissions indicates CO2 was reduced by approximately 10,000 tons.

(Remark)

The national average DHC coefficient of the amount of CO2 emissions per unit heat sales was compared with the performance at the Makuhari New City High-tech & Business District and the effect was calculated using the annual heat sales of the said District.



Result of experimental calculation of the effect on reducing CO2

Heat pump for utilizing sewage water heat

◆ As the operation of a cooling tower is eliminated, water consumption is saved by around annual 120,000 tons.

◆ In Japan, the Tax Scheme for Promoting Investment in the Reform of Energy Supply-Demand Structure (Energy Reform Tax Scheme) is applied.

◆ Awards received:

ï The 32nd Society of Heating, Air Conditioning and Sanitary Engineering Award (May 17, 1994 from The Society of Heating, Air Conditioning and Sanitary Engineering);

ï Global Warming Prevention - Minister of the Environment Award for Promulgation and Introduction of Countermeasures Technology (Dec. 7, 2003 from Yuriko Koike, Minister of the Environment)

Installation in Practice or Schedule

Domestic

◆ The cases of heat supply utilizing the unused temperature-difference energy: (1) Sewage water (treated or untreated) and gray water (domestic wastewater): 6 districts; (2) River water: 4 districts; (3) Sea water: 4 districts; (4) Groundwater: 3 districts.

◆ Heat recovery heat pump (for simultaneous use of hot and cold water): Around 300 units.

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