

Study on utilization of unused energy in suburban city development

Whole term

1998.10 ~ 1999.3

(Purpose)

The reduction of fossil fuel use is recommended to prevent global warming. This should be considered to discuss the energy supply system in urban development.

This research was conducted to determine the direction for the utilization of unused energy in regional urban development by regarding sewage facilities as thermal energy recovery points, examining technical and systematic problems, and planning countermeasure for those problems. In "Morioka South Newtown", a model case study was carried out to summarize technical and systematic problems, to estimate the amount of available unused energy, and to compare economic efficiency between unused energy and existing ones such as electricity and gas.

(Result)

1. Survey items

- (1) Arrangement of introduction styles of projects on unused energy
- (2) Investigation on project situations based on examples
- (3) Examination of introduction of thermal utilization project in Morioka South Newtown
- (4) Summary

Examination of thermal energy source

Feasibility of introduction of unused heat recovery

Effect of utilization of unused heat

Points to be taken into account for introduction of thermal utilization project

2. Arrangement of introduction styles of projects on unused energy

The major examples of unused energy were listed, and applicable cases of unused energy recovery were categorized into regional and facility ones. Moreover, area conditioning by electricity and gas were investigated as the usage forms of unused thermal energy in area heat supply projects, and their problems were represented.

3. Investigation of project situations based on actual examples

The field investigation was conducted about the example of sewage heat usage in west part of Morioka station area. The summary of the project, condition of maintenance and management, local circumstances and its effects on expense were investigated. The important points for thermal usage were also summarized.

4. Examination of introduction of thermal utilization project in Morioka South Newtown

Introduction of unused thermal energy in "Morioka South Newtown" was examined regarding regional characteristics, local circumstances, natural conditions (atmospheric, geographical and geological conditions), and social conditions (land use condition, building use condition, road condition, existing situation of drainage, utility facilities, public facilities). Moreover, thermal energy source was selected, and its scope in application and effectiveness were evaluated. Sewage treatment plants (treated water), sewerage culvert facilities (raw sewage), and electric substations were found possible to be utilized as thermal source facilities in the study area. Since exhaust heat of the substations was assumed to be supplementary, its usage could be mainly applied for area conditioning, snow melting, and warming of bus stops.

5. Summary

While current forms of regional air conditioning are based on electricity and gas, unused heat is possible to be utilized by using heat pump for low-temperature heat source.

Estimation methods of demand and supply capacity of heat were proposed to discuss the possibility of introduction of unused heat.

Economic efficiency and possibility of operation were summarized to evaluate the introduction of unused heat.

Considering economic efficiency of projects, project system and subsidy program were summarized.

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Keywords

suburban city development, unused energy, sewer heat usage, distinct heat supply project