

Research Trends and Results

Study of Directions to Achieve Lower Energy Consumption by Road Facilities and Sustainable Energy Use

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1. Introduction

In the intermediate collection of proposals by the Road Committee of the Council for Social Infrastructure (June 2012), specific proposals included “Actions to Promote the Widespread Use of Low Carbon Mobility: Towards Green Road Space”, and as one action to achieve a low carbon society that is a present goal, it presented, “Reducing Energy Use by Road Facilities (aggressive use of LED lighting, use of sustainable energy generating facilities)”.

The Ministry of Land, Infrastructure, Transport and Tourism's Basic Technology Plan (December 2012) positions effectively using energy and minimizing energy consumption as challenges that must be considered to undertake technology policies, in particular, technology R&D.

So the NILIM has collected required information and studied activities to fulfill the roles demanded of road managers by organizing future technology development programs in order to promote energy conservation by road facilities and to introduce sustainable energies.

2. Survey of electric power demand

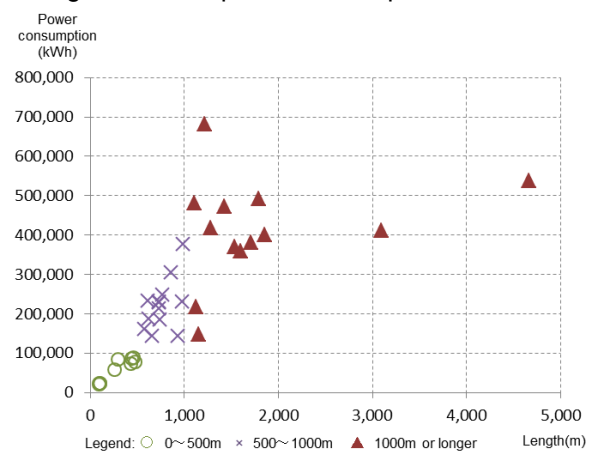
The division surveyed quantities of electric power consumed by road offices throughout Japan in order to clarify characteristics of electric power use (fluctuation by time) and electric power demand of road facilities in Japan.

The results of the survey indicated that road facilities with heavy electric power loads are road lighting, tunnels (lighting and ventilation systems) and snow melting systems (road heating, etc.). The results of an estimation of electric power demand throughout Japan based on the results of the survey show that electric power consumption by government managed roads breaks down as road lighting 35%, tunnels 32%, snow melting systems 15%, drainage equipment, relay points and signboards etc. 10%, and road stations 8%.

About 76.6% of tunnels (locations) in Japan are shorter than 500m, and based on the characteristic installation conditions of tunnel lighting and ventilation equipment, electric power consumption of the tunnels surveyed were organized by tunnel length class (Fig.).

3. Study of directions of technology development

Figure: Electric power consumption of tunnels



Based on characteristics of energy demand by road facilities and directions of Japan's energy policies, we organized challenges and categorized the following five themes (proposals) concerning the desirable directions of the promotion of future developments.

- [1] Research and development to build energy systems adapted to demand characteristics
- [2] Research and development to improve the infrastructure to adapt to the spread of next-generation automobiles
- [3] Research and development to build energy systems for bases to strengthen disaster-prevention functions
- [4] Research and development to build energy systems for entire roads to toughen the national land
- [5] Research and development to build integrated infrastructure

4. Use of the results

Further verification of the electric power consumption values obtained by this research will be carried out and applied to promote research and development of technologies that will further reduce energy consumption by road facilities and sustainable energy technologies.