

23. Study on New Energy System for School Facilities

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Introduction

Japan has publicized its mid-term target of reducing greenhouse gas emissions by 25% from the 1990 level by 2020, and is required to further promote efforts for realizing a low-carbon society.

Under such circumstances, the Education Facilities Research Center of the National Institute for Educational Policy Research prepared a guidebook for introducing solar photovoltaic power generation to schools, entitled “Encouraging Children to Study and Support Use of the Sun’s Bounty,” together with the Ministry of Education, Culture, Sports, Science and Technology in July 2009.

This booklet is the guidebook following the one mentioned above, compiling information necessary for school founders regarding the use of solar power as well as other types of new energy, including wind generation. The booklet was published under the title of “Encouraging Children to Study and Support Environmentally Friendly Energy” in March 2010 and was delivered to boards of education nationwide.

For preparing the booklet, the Education Facilities Research Center established a commission consisting of external professionals (chaired by Hiromi Komine, Professor in the Faculty of Engineering, Chiba Institute of Technology), and the commission had discussions and conducted on-site surveys for nearly half a year.

1. Usefulness and effects of new energy application

New energy, which can be produced domestically, diversifies energy sources and is environmentally efficient, contributing to the prevention of global warming with less CO² emissions.

The introduction of a new energy system into schools will enhance children’s awareness of new energy. They will be able to learn the fact that sunshine, wind, ground heat, and other types of new energy can be utilized for heating and power generation, and directly feel the benefits therefrom.

2. Points for installation and use of new energy system

The guidebook introduces seven types of new energy that can be installed at school facilities (solar heat, micro wind-power generation, ground heat, biomass energy, snow-and-ice cryogenic energy, micro hydroelectric power generation, and fuel cells).

The outline of each system and matters to be noted upon designing them are explained

clearly, along with methods to utilize new energy in environmental education, and facility conditions required for introducing a system into existing school buildings.

(1) Solar heat radiant air floor heating system

Ambient air taken from the eaves is heated by solar radiation in a glass heat collector built on the roof, and then that air is used for heating. The system can be installed even at existing school buildings by renovating their roofs into pitched double-roofs.

(2) Micro wind-power generation (windmills)

Wind turbines installed on the rooftop of the school building or in the schoolyard rotate with wind, and the kinetic energy of turbine rotation is converted into electric power by means of a power generator. Looking at windmills rotating, children can easily perceive the power of new energy.

(3) Use of biomass energy (pellet stoves)

Biomass energy is attracting attention as carbon neutral energy.

Pellet stoves use the fuel called pellets, which are bar-shaped particles created by compressing woodchips (from timber and branches), tree bark, and leaves. The stoves have two chambers: one for pellet storage and the other for combustion. A small amount of stored pellets is consecutively fed into the combustion chamber, and therefore most pellet stoves use electricity, enabling automatic ignition at the press of a switch. The ease of use of pellet stoves is quite close to that of coal-fired stoves and kerosene heaters. The combustion efficiency is around 85-90%.

3. Introduction to operation and maintenance

Following the explanation of the seven types of systems, there is a table showing procedures from the planning of the introduction of a new energy system to the operation and maintenance thereof. At the planning and designing stage, school founders need to ensure budgets, understand the usefulness and effects of the introduction, and confirm the concrete schedule, as well as conduct a survey on natural conditions and devise methods to utilize the system in environmental education.

Considering that new energy is subject to natural conditions and other features of respective regions, the guidebook also contains information on local features.

4. Case studies on new energy system installations

At present, there are not many schools that have introduced new energy systems other than

solar photovoltaic power generation. However, the guidebook introduces advanced cases of seven schools and three boards of education that have already introduced a new energy system and have been utilizing it in their environmental education.

The whole text of this guidebook is available on the website of the Education Facilities Research Center.

5. Reports on this study

“Encouraging Children to Study and Support Environmentally Friendly Energy – Guidebook on the Use of New Energy at School Facilities”

<http://www.nier.go.jp/shisetsu/pdf/newenergy.pdf>