DEPARTMENT of the INTERIOR

FISH AND WILDLIFE SERVICE

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FISH AND WILDLIFE SERVICE'S WEST VIRGINIA SOLAR ENERGY SYSTEM ONE OF THE LARGEST OF ITS TYPE IN THE WORLD

One of the world's largest space heating and cooling solar energy systems is harnessing the sun's power amid the hills of West Virginia to fuel the new home of the U.S. Fish and Wildlife Service's National Fish Health Research Laboratory at Leetown.

This new solar unit is part of a larger, highly-sophisticated energy system based on the overall rise and fall of heat within the building. This system extracts and recirculates "waste" heat in a process popularly called "heat scavenging."

When the solar system is in full operation, it will provide as much as 60 percent of the lab's space heating and cooling needs, backed up by a conventional oil-fueled boiler and the lab's 55 degree spring water source that stays at a constant temperature all year.

By combining solar energy and heat scavenging into an integrated energy system at its center for the study of fish health and fish culture, the Interior Department and the Federal Government hope this project will serve as a model to demonstrate the practicality of solar power and energy reclamation.

Perched atop the new, three-story, 44,000-square-foot laboratory is a network of looped piping and concave mirrors that form the bulk of the unit. Called a "line-focusing" system because it uses reflected sunlight to heat circulating water, rather than large solar panels, this system is unique because of its size - with 10,000 square feet of reflective surface, it is one of the largest concentrating collector systems known to be in operation.

The system will crank out roughly 2 billion BTUs of heat annually, or enough energy to heat and cool about 100 West Virginia homes averaging 1,200 square feet apiece.

The solar collectors, arranged in parallel rows, focus and concentrate ribbons of intense sunlight on overhead loops of black-coated chrome pipe containing water. The collectors are controlled by a photocell that rotates them into position to reflect the light. They are oriented on an east-west axis to take full advantage of the sun's rays.

Solar collection is designed to augment the laboratory's overall system for heating, cooling, and ventilation. The idea is for the system to demonstrate the energy efficiency and cost savings of such design.

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On overcast days when sunlight is not available, the system will draw on the energy stored as hot water in high, medium, and low temperature storage tanks, as well as the backup boiler. During off hours, the solar system will shut down automatically.

The collectors heat water up to 250 degrees for both heating and cooling and the building's hot water needs. In winter months, the hot water will power a space heat exchanger, while in summer the hot water will energize an absorption chiller that produces cold water for air conditioning.

A precooling system using Leetown's waste spring water from its "wet labs" will further reduce the need for mechanically-refrigerated water for air conditioning. A 100-ton heat pump will also use the spring water as a source of heat in the winter by dropping the temperature approximately 10 degrees and transferring the heat to space heating.

Heat scavenging at Leetown includes the capture and recirculation of so-called "waste" heat from the lab's lights, stoves, and ovens. Even the exhaust heat from refrigerators and other heavy equipment that ordinarily would be lost to the environment is used.

The Fish and Wildlife Service spent $1.1 million for the entire solar collection system, $300,000 of that for the mirrored collectors alone. The cost of the entire building and equipment was $4.7 million. Despite the cost, Dr. Blake F. Grant, director of the lab, feels the Federal Government will save on heating and cooling costs in the long-run, especially in light of increasing fuel oil prices. "It's a big initial investment, but we'll be getting the use of it over the next 20 to 30 years, at least," Grant says. Based on year-round use of the system, it is projected to pay for itself in 25 to 30 years.

In December 1978, for instance, the lab used 4,000 gallons of fuel oil during the severe weather that buffeted much of the mid-Atlantic region. At that time, the solar system was undergoing tests and only in operation for a few days. Grant says it will enable the lab to cut its fuel oil bill by as much as 50 percent in the future.

In dedication ceremonies for the laboratory in April, Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks in the Interior Department, praised the new system as a model for energy conservation in Federal facilities. "We think this plant will set the highest standards for energy efficiency. And I might add that the concept and design for this building had taken shape before the energy crunch began to make headlines."

Plans for the building were begun in 1972. The Washington, D.C., consulting engineering firm of Gerschon Meckler Associates designed the solar, mechanical, and electrical systems for the building. The Fish and Wildlife Service's Denver (Colo.) Engineering Center was the architect.

The National Fish Health Research Laboratory, founded in 1931 as the Eastern Fish Disease Laboratory, has achieved worldwide recognition as the major center for the study of fish diseases. Eighteen staff members and specialists in parasitology, virology, bacteriology, immunology, physiology, epidemiology, and histopathology conduct research into the infectious diseases of mid-range and coldwater fishes.

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