

'Farming-under-glass' project to expand

DANVILLE — The Montour waste-heat greenhouse project, already the largest complex of its kind in the country, is going to be expanded this year.

The Pennsylvania Industrial Development Authority approved a low-interest loan Wednesday last week for AgrowNautics Inc., clearing the way for construction of its 1-acre greenhouse to begin. The company, headquartered in Salisbury, Conn., plans to raise leaf lettuce and possibly other vegetables under controlled environment conditions in its greenhouse, to be located near Pennsylvania Power & Light Co.'s Montour Steam Electric Station north of Danville.

Another grower - Green Empire Inc. of Paterson, N.J. - plans to develop 93 acres of forest between the Montour power plant and the Montour Preserve, where gourmet mushrooms will be grown on oak logs. The company also plans to build a 1-acre greenhouse next year that will be used to grow mushrooms during the winter months, and as a warehouse.

Green Empire is expected to seek PIDA financing for its facilities in the near future.

The new growers will be joining two other greenhouse operators in the Montour "industrial park." Bryfogle's Inc., of Muncy, and Pepperidge Farm Inc., of Norwalk, Conn., each currently operate 6-acre greenhouses at the site.

Bryfogle's raises a variety of flowers, and Pepperidge Farm grows tomatoes for the fresh-produce market. The combined growing area of the greenhouses is roughly the size of eight football fields.

Use Waste heat

A major feature that has drawn these growers to the Montour site is an inexpensive and abundant space-heating source - power-plant discharge heat. Warm water from the condenser-cooling system of PP&L's coal-fired Montour plant is piped to each of the

greenhouses, where the water is distributed through pipes beneath the greenhouse floor.

Another incentive PP&L now offers growers to encourage them to build new greenhouses or to expand existing greenhouses within the utility's service area is a special off-peak rate for those who use supplemental lighting in their crops' growing process. This new rate is being offered to growers throughout the company's 29-county service area.

The Montour greenhouse project has served as a model for similar projects throughout the country, and it has attracted the attention of greenhouse operators, scientists and others worldwide, said Arch G. Knisely, Economic Development & Community Service Manager, Lancaster Division.

Origins of Project

For many years, PP&L has been interested in finding practical ways to use the large amount of heat discharged through the cooling systems of steam electric stations. Here's how the heat is generated:

In steam electric-generating plants, fuel is burned to produce heat. The heat is used to convert water into steam. The steam rushes from the boiler to spin the blades of a turbine, which, in turn, spins a generator. An electromagnet in the generator, turning inside a large coil of wire, produces electricity.

Once the steam has passed through the turbine, it must be changed back into water so it can be recirculated and reheated. In converting or condensing the spent steam back to water, a great deal of heat is released and removed through the condenser-cooling system.

One of the limitations in using this discharge heat is its relatively low temperature. The water is about 100 degrees Fahrenheit when it leaves the plant's condenser-cooling system, which is not hot enough for most industrial processes.



A variety of flowers, including mums, Easter lilies, geraniums and gloxinias, are raised in Bryfogle's Inc. two 3-acre greenhouses located near Pennsylvania Power & Light Co.'s Montour Steam Electric Station north of Danville.

However, this inexpensive, abundant, reliable and under-utilized heating source is ideal for heating greenhouses. Many greenhouse operators, particularly in Pennsylvania, have been forced out of the market by competition from southern and western states, and by foreign countries with warmer climates, which do not have high heating costs.

PP&L also is exploring the use of power-plant waste heat to provide an ideal environment for raising fish. Warm water from the utility's Brunner Island Steam Electric Station south of Harrisburg is used as the heating source for the company's fish farm. That complex also includes a small waste-heat greenhouse.

Growth potential

The growth potential of the project is great, considering that the greenhouses now use about 1 percent of the available waste heat from the Montour plant. As the project continues to expand, its impact on the local economy will be significant, said Knisely. Greenhouses typically employ three to five people per acre of growing area. PP&L is now evaluating nearby land to allow for continued expansion of the Montour complex.

PP&L is hoping that its new electric-service rate for greenhouses will be a "shot in the arm" that the industry needs to return to Central Eastern Pennsylvania, said Knisely.

In December 1983, the Pennsylvania Public Utility Commission approved a rate proposed by PP&L to better meet the needs of artificially lighted greenhouse operations. This new rate helps PP&L to make more efficient use of its power plants by increasing electric use in off-peak periods when demand is relatively low.

Greenhouse technology is becoming increasingly sophisticated, and it enables greenhouse operators to grow a variety of crops year-round. Some crops need intensive lighting during specific phases of their development, others need supplemental lighting during the fall, winter and spring, when periods of sunlight are limited.

New rate

Under the new rate schedule, greenhouses and other environmentally controlled growing facilities that use a minimum of 300 kilowatts for supplemental lighting qualify for PP&L's lower off-peak rates for 16 hours per day on weekdays for their lighting loads.

PP&L's current on-peak period - when demand for electricity is



Controlled-environment agriculture is used in Pepperidge Farm Inc.'s 6-acre greenhouse. With this method, the plants are not grown in either soil or water. Each plant is anchored in its own pot, the open bottom of which looks like the spokes of a wheel. The potted plants are nestled into large rectangular bags that are filled with peat and vermiculite. The plants are fed a carefully formulated nutrient mixture that flows to each plant's roots through plastic tubing that passes through each bag.

greater and its costs for supplying electricity are higher - extends from 7 a.m. to 9 p.m. weekdays. The off-peak period is from 9 p.m. to 7 a.m. weekdays, and 24 hours per day on weekends and holidays.

With the new rate, greenhouse operators are able to purchase electricity to meet their lighting requirements at the lower off-peak rates from 4 p.m. to 8 a.m. weekdays, and all day on weekends and holidays. However, PP&L is permitted to interrupt the lighting load during the company's on-peak period, with a one-hour prior notice to the growers, if the electricity is needed elsewhere in PP&L's system.

Lettuce needs light

AgrowNautics Inc. plans to take advantage of this greenhouse rate

in its 1-acre greenhouse. The company's method of growing lettuce - its primary crop - is dependent on artificial lighting. For about a third of the lettuce's 42-day growing period, the plants are placed in a well-insulated "growing chamber," where high-pressure sodium vapor lights are used 20 hours a day.

AgrowNautics currently operates greenhouses in Salisbury, Conn. and Hopewell Junction, N.Y. where lettuce and other crops are grown hydroponically (without soil). The company is planning a similar operation near the Montour power plant.

Gourmet mushrooms

Green Empire is planning to market Shitake mushrooms in-

(Turn to Page D26)



Heidi Bieber, a worker at Pepperidge Farm Inc.'s 6-acre greenhouse in Montour County, inspects tomato plants. During the company's peak season, 50,000 pounds of tomatoes are shipped from the greenhouse each week to gourmet markets in the Northeast.