

2 The Ark for Prince Edward Island

The Ark is a bioshelter designed to contain a controlled ecosystem, powered and heated by the wind and sun. It houses a research laboratory, living unit, family garden and a small commercial greenhouse and fish farm. The structure is experimental, exploring new ideas in self sufficiency in intensive food production.

The south side is an entirely glassed-in greenhouse which traps the energy from the sun behind a special plastic 'solar membrane'. This membrane (No. 2000 greenhouse glazing) allows the sunlight in but cuts heat loss by conduction through the glass. Movable shutters descend at night on the inside to reduce heat losses further.

The north side of the building is never in direct sunlight at this latitude. It therefore has no windows, since they are normally the source of considerable heat loss in buildings and homes. The roof is sloped towards the ground so that the cold winds will blow over the top of the building rather than striking it broadside. It is built on a gentle south-facing slope and it will also be bermed, i.e., soil will be banked up against the building. All of these features reduce the exposure of the building and increase its ability to retain heat.

Solar collectors will trap the sun's

heat energy under glass. Water is circulated through these collectors, warmed, and stored in a 21,000 gallon insulated tank beneath the house. Surplus daytime heat from the greenhouse will be blown by circulating fans into an insulated basement storage area at the back of the building containing 3,000 cu. ft. of rocks. At night the warm rocks are a source of heat for the greenhouse. The fans circulate air through the rocks which is thereby warmed and then blown back into the greenhouse.

Electricity for the Ark will be provided by four 'hydrowind' generating plants. These are windmills specially designed by the New Alchemy Institute. They provide 25 kw. of power in 25 m.p.h. winds and use hydraulics for energy transfer and blade positioning. They will provide electricity for lighting, air circulation, water pumping and some heating. The Ark with its four wind generators is connected to the P.E.I. power grid. It will draw power from the system when there is no wind; in periods of strong winds, surplus power will be fed into the grid system and made available to users elsewhere. Over the entire year the Ark is expected to be a net exporter of electricity.

The solar and wind systems combined in an environmentally-designed structure such as the Ark,

will create the semi-tropical conditions necessary for intensive plant and fish culture around the year. The greenhouse plants will be fertilized by fish wastes and algae from the water in the fish tanks, which will be sprayed on the plant beds regularly. This type of fertilizer is efficient and renewable.

A special fireplace and wood cookstove will provide additional heat for the living quarters. A "Clivus" toilet will compost all human sewage and kitchen wastes. When fully decomposed it will be added to the plant beds as high-quality natural fertilizer. No pollutants will reach the outside environment and no valuable nutrients will be wasted.

The Ark was designed to explore the possibility of restructuring the life-support systems of communities in the hope of making them more compatible with the natural environment. The ideas were formalized by the New Alchemy Institute, headed by biologist John Todd and submitted to the Ministry of State for Urban Affairs under the Canadian Urban Demonstration Program. It was sponsored by Environment Canada. The Government of Prince Edward Island provided the land through a long-term lease to the New Alchemy Institute, access roads and other technical and logistic assistance.

