

although a minor component may be contributed by other aquatic plants, grasses or sedges. It is formed very slowly by the decay of this dead vegetation under anaerobic (oxygen deficient) conditions. All Canada's peat bogs have developed since the last glacial epoch, some 10,000 years ago.

Peat bogs differ from other types of wetlands in that they are nourished almost entirely from rainwater. Their surface is a continuous carpet of *Sphagnum* moss which supports a layer of grass and shrubs and, occasionally, trees. In Canada peat bogs may be as large as tens of kilometres across but are generally much smaller.

A peat bog is made up of a number of layers. The top level is living bog vegetation. The second consists of very young peat which is characterized by a loose open structure that clearly shows the form of the dead vegetation from which it is derived. The third layer is of varying

thickness but becomes darker and denser with depth until the black colour and putty-like consistency of mature peat is encountered.

At all its different stages in development, peat contains a very high proportion of water, usually averaging around 95% by weight. This means that, perhaps surprisingly, there is less solid matter in peat than there is in milk. This high water content has always been the main barrier to the extensive exploitation of peat as an energy source.

Because peat occurs on the Earth's surface and extends only to relatively shallow depths, its removal is unlikely to cause environmental problems as severe as those associated with strip-mining. However, great care should be exercised during and after peat excavation to ensure that harvested bogs do not turn into muddy wastelands. Fortunately, peat has been mined for years in other countries and there is a wealth of experience in reclaiming bogs. In fact, with proper management, depleted bogs can be used for agricultural land or for energy plantations (Figure 6-9). It is essential then that peat harvesting only be permitted with the assurance of proper reclamation after excavation.

Harvested peat can be marketed in three different forms. Sod peat is made by a large cutting machine which dredges peat from all depths of the bog, mixes it and forms it into sods. They are therefore all of similar quality and can compete in the marketplace with other industrial fuels. Milled peat is scraped from the surface of the bog in the form of a coarse powder. After drying this material can be either burned in power stations or processed into briquettes. Briquettes are small tightly-packed blocks of milled peat, the quality of which is carefully monitored because the briquetting process can tolerate only small variations in density, moisture and ash content. About one-fifth of the energy in the peat is used to produce the briquettes and this product is used primarily for home heating.

B. INTERNATIONAL AND CANADIAN DEVELOPMENT

World peat resources over 50 cm thick are estimated to total some 145 billion tonnes dry weight, having an energy equivalent to about 63.5 billion tonnes of oil. Much of this total is located in the U.S.S.R. but large quantities are found in other countries as well, with Canada ranking second in terms of resource size (Table 6-5).

Finland has a number of power stations which utilize peat to produce electricity, and steam and hot water for district heating. The Finns expect to derive from 5 to 10% of their total energy requirements from peat in the future.

Development of a Peat Bog for Energy Production

Peatlands have to be developed before they can produce utilizable peat and a great deal of preparation, usually taking several years, is required before production can proceed. First, the bog must be surveyed to determine how much peat there is, what its quality is, how it can best be drained and how access routes to the resource can be set up by rail and road.

The second step is drainage. Since peat is approximately 95% water, it cannot support heavy machinery and removal of as much moisture as possible is essential. A network of drainage ditches is dug to begin the process of dewatering and, as the bog consolidates, these drains are deepened to facilitate further water removal. This stage normally takes five to seven years to complete and reduces the bog's moisture content to approximately 90%. This may seem a trivial improvement but, in fact, it is very significant as it represents removing more than half the water contained in the peat. At 95% water content the ratio is 1 part solid to 19 parts water; at 90% the ratio is 1 part solid to only 9 parts water.

After draining the bog is levelled. This is done to facilitate drying of the peat and to allow mechanical handling to take place with maximum efficiency.

The final step involves establishing a network of light railways over the surface of the bog for the handling and transportation of the peat. All these steps plus the fact that only a few inches of peat are harvested annually mean that a bog may be commercially exploited for several decades.