

these demonstrations are described in the following section on the specific renewable energy sources.

2.1 Oil Sands and Heavy Oils

The oil sands and heavy oils of the Canadian provinces of Alberta and Saskatchewan are among the world's largest known deposits of petroleum hydrocarbons. The oil sands cover a total area of more than 53,000 square kilometres in the north of Alberta, with the four main deposits containing about 150 billion cubic metres of crude bitumen. It has been estimated that with favourable developments of technology the whole area may yield 13-31 billion cubic metres of synthetic crude oil, but development so far has shown that its extraction will be slow, difficult and costly. Too fast a growth rate in oil sands extraction could put considerable pressure on the technical, financial and labour resources of the country. Exploitation of the heavy oils of Western Saskatchewan and Eastern Alberta, where there is as much as 5 billion cubic metres in sandstone deposits 300 - 600 metres below the surface, will depend on developments in enhanced recovery techniques and agreements on pricing policies.

Increasing world and domestic prices for conventional petroleum are making the large scale production and upgrading of these resources more likely, and with declining producibility from conventional wells, Canada will rely on its heavy oils and oil sands to contribute to the goal of self-sufficiency in oil by 1990. The National Energy Program recognizes the need for incentives for the exploration of frontier and off-shore regions and the exploitation of high cost oil, which may not be economic at current domestic prices, and pricing schemes and other incentive mechanisms are presently under discussion with the provinces.

*Syn crude
Sources*

Two oil sands plants are currently in operation in Canada (with capacities of 50,000 and 125,000 barrels of synthetic crude per day), and several more are planned. The two companies use surface mining methods of different types, and the hot water extraction process. High environmental standards will be met, including re-landscaping and treatment of the water before returning it to the Athabasca River.

Because of the vast potential of its own resources, Canada has made a contribution to world technology development in this area and is also gaining valuable practical experience from its operating plants. R&D are continuing in all areas of recovery and upgrading, including in situ mining processes, improved flotation