

processes, improved and more efficient refining, and the reduction of coke and sulphur production. Considerable basic experience is available on resource characterisation, including exploration and sampling, research on the physical properties of oil sands and crude bitumen, and the classification and dissemination of information.

With the two plants now in operation, and more proposed, Canadian firms are showing an increased ability to supply equipment and engineering requirements, although most of the large and more sophisticated equipment, some of which requires exotic alloys that are unavailable domestically, is still imported. In many cases, only a handful of foreign companies service the global market. Canadian engineering services will likely assume particular importance in servicing overseas requirements. However, the countries to which such expertise might be supplied are limited. Major accumulations of oil sands and extra heavy oils are limited to nine countries of the world: Canada, USA, Venezuela, Trinidad, Columbia, Madagascar, Albania, Romania and the USSR, with over 95% in the first three mentioned. Research and test scale developments are in progress in USA, USSR, Albania and Venezuela.

Much of Canada's production of heavy oils (currently production runs at about 15% of total crude oil, or about 220,000 barrels per day) has been exported to the USA. The major domestic market has traditionally been the asphalt industry. However, research and development are now concentrating on future production and upgrading for domestic use. Tertiary methods of recovery, which it is hoped will eventually allow yields well above the 10% that is obtained by waterflooding, and new upgrading methods, are under intensive investigation (including experimental pilot projects). A considerable amount of government assistance is available for this purpose, through federal-provincial agreements, and through the national oil company, Petro-Canada. A dedicated heavy-oil upgrading plant is likely to soon be constructed in Saskatchewan, and possibly in Alberta.

In addition to the heavy oils, it is hoped that enhanced recovery techniques now under development will allow greater yields to be obtained from the conventional oil fields of Western Canada.

In 1975 the Government of Alberta set up the Alberta Oil Sands Technology and Research Authority, AOSTRA, which over the past five years has represented a centre for research and development funding, technology assessment and information transfer in the areas of oil sands and heavy oils. The main objectives of AOSTRA's program are to work