

The Hydrogen Merchants

An international technological race is on to develop the commercial base for hydrogen energy which could eventually see this gas replace hydrocarbons as the fuel which drives the industrial world. Hydrogen is the choice of some experts as the most likely replacement fuel for oil and natural gas, and Canada's unique set of circumstances makes her a potential world leader.

How close is the hydrogen era? In Canada alone, private industry is investing large sums on the production and application of hydrogen. Governments are supportive; so are utility giants like Ontario Hydro and Hydro Quebec. Large research and development programs are operating in the U.S., France, West Germany, Switzerland, Japan and Canada. Hydrogen powered test vehicles are already on the road, and hydrogen aircraft may soon be flying. In ten years, we could see major commercial applications. In 20 years, it is likely that hydrogen energy will be in substantial use.

Professor David Scott, head of the University of Toronto's Mechanical Engineering Department, where a major thrust on Canadian hydrogen research is being initiated, calls the advent of world hydrogen energy "inevitable." He sees the combination of CANDU nuclear reactors with hydrogen as the ideal system to reduce the world's dependence on hydrocarbons.

Professor Scott claims that, "Canada could probably produce hydrogen now at about the same energy equivalent price as current jet aircraft fuel in Europe." Eventually, the conversion of electrical energy to hydrogen energy in a reactor-electrolysis process may exceed 100 per cent in electrical terms — with the deficiency of input energy being supplied in the form of heat; some of this heat could be supplied from the reactor moderator coolant.

Lockheed of California is promoting the formation of an experimental airline to be powered by hydrogen, which the company says should be flying by 1986 if the necessary capital resources — \$1.15 billion are allocated to the project.

The Lockheed proposal involves building four L-1011 aircraft, modified to run on hydrogen, and having them fly freight on a route which would loop through Pittsburgh, Pa.; Birmingham,

England; Frankfurt, West Germany; and Riyadh, Saudi Arabia. If the scheme gets off the ground, a Toronto group, Toronto Air Cargo Terminals, headed by Mrs. Norma Reed, is ready to finance the installation of hydrogen fueling facilities at Toronto International Airport. Willis M. Hawkins, senior vice president of Lockheed for aircraft, calls hydrogen energy a medium "that is very nearly perfect," and he adds that "a hydrogen powered aircraft is potentially the biggest single step in aircraft efficiency that we could take."

The economic and ecological soundness of a gradual world conversion to hydrogen energy to replace the fading hydrocarbon economy and the world's changing primary energy resource base makes the eventual change inevitable. It is not a matter of whether or not we will convert to hydrogen energy; it is a matter of how fast it will happen. That speed, of course, depends on how rapidly the technological developments can be made, and on the proportion of our resources that we wish to expend to effect the transition.

Satellites

Canada is a pioneer in communications satellites.

Telesat Canada, jointly owned by Canadian telecommunications carriers and the federal government, was incorporated in 1969 to establish a commercial system of satellite communications serving all points in the country.

ANIK-A, the world's first domestic synchronous communications satellite system, with three units, was launched in 1972. ANIK-B, a single satellite, was launched in 1978 and ANIK-C, a series of three, will go up in the early 1980s.

Canada's satellites orbit 22,300 miles above the equator and, since their movements are synchronized with the rotation of the earth, they appear to be stationary.

They relay messages—telephonic, telegraphic and digital data—and radio and television programs between their ground stations that serve the vast, thinly populated areas of the North. They have dish antennas nearly 100 feet in diameter. There are also remote earth stations some of which are mobile.

Satellites have become increasingly sophisticated. HERMES, which was the world's most powerful communications satellite, cost \$60 million. It was designed by the Department of Communications Research Centre in 1976 and was intended to have only a two-year life but it lasted

until December 1979. HERMES was the first satellite which could transmit to very small earth stations, some only eighteen inches in diameter. It was used in dozens of experimental programs. In one, medical information, including x-rays and electrocardiograms, was transmitted between London, Ontario, and Moose Factory and Kasechewan in the North. Patients hundreds of miles from hospitals were given complete diagnostic tests.

Canada Aids Kampuchean Recovery

Three Canadian voluntary agencies are at work on recovery and rehabilitation projects to benefit the people of Kampuchea, assisted by \$715,000 in matching contributions from the Canadian government.

The projects involve agriculture, fisheries, education, medical care and cottage industries. They are part of broader programs with a total cost of several millions of dollars that aim at relieving immediate suffering and beginning the long task of reconstructing Kampuchean society. The Canadian contributions, from the funds of the Canadian International Development Agency (CIDA) Non-Governmental Organizations (NGO) Division, will be used for development purposes such as the provision of agricultural supplies and equipment needed as assistance efforts move into the rehabilitation and reconstruction phase.

In addition to these initiatives, many other Canadian volunteers and non-governmental organizations have been working in various ways to help the people affected by Kampuchea's recent problems. The Canadian University Service Overseas (CUSO), for example, has requested a \$300,000 CIDA grant to help finance a \$1.3 million program for the organization and operation of a camp for 15,000 Kampuchean refugees in Thailand.

These private-sector initiatives are in addition to other assistance provided by the Government of Canada through other channels. Canada has provided a \$3 million cash contribution to support the work of the Red Cross and UNICEF in Kampuchea and Thailand, and has supplied \$2 million worth of food aid (rapeseed oil). An additional pledge of \$10 million in Canadian assistance was made November 5, 1979 at the special session of the UN General Assembly called to receive commitments of aid for the Kampuchea people.