

THIS FUSS ABOUT ATOMS

(From a talk recorded for the NZBS by PROFESSOR F. J. LLEWELLYN, of Auckland University College)

FROM 1939 to 1945 atomic scientists and engineers in the Old and the New World directed all their energies towards the production of an atomic bomb. They eventually succeeded and the war with Japan ended even though the Japanese Armies, which were retreating, had not suffered the complete military defeat which had just overtaken their German Allies. In other words atomic weapons destroyed war in 1945, at least temporarily; can they now help to build a better world from the wreckage of the old one? The answer is an unqualified "Yes" provided only that we will learn, and never forget, the lessons of those two terrible days in the spring of 1945.

The most obvious, and probably the least important, method of utilising atomic energy is to direct the great heat produced in an atomic fission into useful channels. For example, with this heat we could raise steam for driving turbines and other steam engines; we could heat water for domestic and industrial purposes and this hot water supply could be piped all over our cities for our greater convenience.

Enormous Cost

One of the main obstacles in the widespread industrial use of atomic power is the enormous cost entailed in separating the U-235 atoms in natural uranium. However, this natural uranium—a mixture of U-235 atoms and U-238 atoms—has an ace up its sleeve. When it is bombarded with neutrons some of the U-235 atoms split up, releasing energy and more neutrons; the U-238 atoms can capture these neutrons and become new atoms. When these new atoms have settled down they are themselves capable of undergoing fission in the same way as the atoms of U-235. In this back-handed manner uranium compliments the scientist on his achievements by supplying him with an easy method of controlling that rate of fission of U-235 as well as providing him with a new kind of atom. The factory set up in Washington for the production of these new atoms—they are called plutonium—represents the ultimate realisation of the alchemist's dream—the transmutation of one element into another. Plutonium can be made on a large scale

and much more cheaply than U-235 can be isolated from natural uranium. Our supply of atomic fuel is therefore reasonably adequate. Atomic fuel is a good name because it gives one the right idea of the application of plutonium and U-235 to the needs of industry. It is a fuel and as such provides heat. This heat has to be converted into work by some kind of engine in the same way as coal or oil is burned to produce heat which is converted into electricity by means of a steam turbine and a dynamo.

But atomic fuel must be used on a moderately large scale in order to sustain the fission reaction, and because the heat energy it develops has to be converted into power through an orthodox heat engine—there is little likelihood of its use in small power units such as those used for propelling motor cars and trucks. The principal use for atomic fuel will be in supplying heat for large power units; electric power stations, large ocean-going vessels, and possibly large air liners and freight carriers come within this category. It is unlikely, too, that

atomic fuel will operate through any but the orthodox heat engines, at least in the immediate future, so that although the atomic fuel will occupy a comparatively small space, the engines will be as large as ever and no more efficient than they are at present.

The advent of atomic fuel will not then revolutionise power generation in the foreseeable future, nor will it greatly reduce power costs; but it will increase the availability of power especially in countries where there is little coal or water power. The great industrial cities of the world need no longer belch forth smoke and soot to pollute the atmosphere and corrode the buildings. Atomic fuel, in this sense at least, is clean.

Why So Much Fuss?

Why, then, we may ask, is so much fuss made about this new source of power? We are abundantly endowed with alternatives. At our present rate of consumption the proved coal reserves will last a few thousand years and from coal we can make petroleum when the natural supply is exhausted. Many ridiculous predictions have been made concerning the peaceful application of atomic fuel, and these have served only to confuse and confound us. Even if we make the assumption that one ton of atomic fuel will have the same cost as one ton of coal and that this quantity will supply energy equivalent to burning just over three million tons of coal; then the cost of power in the home or factory will be reduced by only about

(continued on next page)

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NATIONAL FILM UNIT

WEEKLY Review No. 365 from the National Film Unit to be released on September 3, features "Pig Hunting," a short subject filmed in the Taranaki district, where wild pigs are a menace to the farmer. "Chatham Cup Final," from Wellington's Basin Reserve, shows some exciting Soccer in a hard fought game, and "Chateau Reopens" brings Chateau Tongariro once again into the limelight as one of New Zealand's most favoured holiday resorts.