

problem is, however, that the Administration needs to be persuaded to spend money for water pollution control which has been earmarked by Congress. So far, the Office of Management and Budget has released less than half of the money for sewage treatment grants which Congress authorised in the 1972 Water Pollution Control Act.

New cyclotron for neutron therapy

John Hall

BECAUSE of Hammersmith Hospital's success in the use of neutron therapy for the treatment of cancer a second British hospital is to be supplied with a compact cyclotron. The Medical Research Council (MRC), the Scottish Home Office and Health Department, and the Cancer Research Campaign will jointly finance a unit costing £819,000 at the Western General Hospital Edinburgh, which should be ready to treat patients by the summer of 1976. Hammersmith Hospital has been a world leader in the use of fast neutrons for cancer treatment and if clinical trials at both centres are as successful in the future as they have been to date, the Department of Health could well be persuaded to make a big investment in this type of treatment.

The first cyclotron in the world to be entirely devoted to medical research was installed at Hammersmith in 1952. After extensive research in the laboratory, clinical trials in the treatment of advanced cancers were started in 1969. Randomised trials conducted alongside conventional programmes of X-ray treatment showed promising results in the treatment of cancers situated in the head and neck, although patients often died from secondary cancers which had spread before the primary source could be destroyed.

Radiotherapy in this area works on the principle that malignant tissue is more sensitive than healthy tissue to destruction by X-rays and γ rays. Where there is a low oxygen concentration in the tissue, caused perhaps by the presence of the tumour, there is, however, a reversal of the effect and the cancer is often able to grow again after partial destruction. The effectiveness of neutron therapy depends on the ability of the neutrons to destroy cancer cells even in the absence of oxygen.

After closely following the trials at Hammersmith, workers in the United States decided a year ago to adapt three of their large cyclotrons used in physical research for cancer treatment and other centres will be established in France, Germany, the Netherlands and Japan.

The Edinburgh cyclotron will produce neutrons with twice the energy available at Hammersmith and will be made more versatile by the inclusion of a steering device which will allow a site to be attacked from several different positions.

The new installation will be an outstation of the MRC's Hammersmith Cyclotron Unit, which is directed by Mr Derek Vonberg. The clinical programme will be directed by Professor W. Duncan of the Department of Radiotherapy (University of Edinburgh) and the clinical trials (which at Hammersmith were led by Dr Mary Catterall) will be supervised by a special committee on neutron therapy of the MRC, on which the Cancer Research Campaign will be represented.

What is wasted?

EVEN when we can actually lay hands on fuel for motor systems and power generation we waste a vast amount of the energy potential contained in the raw materials. In his Inaugural Lecture at the University of Leeds, Professor Alan Williams examined Britain's power station wastage and compared the fuel efficiencies of various methods of transport.

He finds that the average power station supplying 2,000 MW of electricity also produces 4,000 MW in steam and warm water which is generally not put to any use, so that even during the energy crisis Britain can only benefit from 45% of all fuel actually burnt.

The average engine is still less than 20% efficient in converting fuel into useful motive power and a comparison of different transport methods in terms of passenger miles per gallon showed a fully loaded train to be ten times more efficient than a jet aircraft and fifteen times more efficient than Concorde.

Professor Williams, Livesy Professor of Fuel and Combustion Science, considers that the efficiency of liquid fuel engines and power stations is capable of being improved by a further 10%. Of the 25,377,000 tons of liquid fuel used for transport in 1972, something like 74% was used by road vehicles operating at low efficiencies. Although in theory a diesel engine might have a thermal efficiency of 37% and a petrol engine 25% (17% in the case of a Wankel), in fact only 15% to 20% of their fuel is converted into useful energy.

Bringing NASA down to Earth

Colin Norman, Washington

BURIED in the pile of bills, resolutions and impeachment motions facing members of the US Congress who returned to Washington last week is a little-noticed item which could radically alter the National Aeronautics and Space Administration (NASA) and create yet another new focus for federal science policy-making. The bill, which was introduced into the Senate last September, is likely to be the subject of public hearings in February and the topic of considerable debate thereafter.

Called the "Technology Resources Survey and Applications Act" and numbered S2495, the bill would give NASA some \$200 million a year to help apply science and technology to pressing domestic problems, partly by enlisting the help of the depressed aerospace industry. It would also establish a Cabinet-level committee to survey the United States' scientific resources, and to plan how those resources could best be used to improve such items as health care delivery, sewage treatment and other domestic services.

The bill would thus greatly extend NASA's range of activities in fields other than space research, and it would add considerable impetus to the much-discussed move toward spending federal research and development dollars on more socially useful projects. But it is also likely to run into opposition from the Administration, and its prospects are uncertain.

In many respects, the bill is similar to Senator Edward M. Kennedy's National Science Policy and Priorities Act, which was passed by the Senate in 1972 but which died from neglect in the House of Representatives. Kennedy's bill would, however, have placed responsibility for supervising and sponsoring such domestic research and development programmes in the National Science Foundation—at best an unlikely location, but one which would have placed the whole effort under the jurisdiction of Kennedy's NSF Subcommittee. NASA is clearly a more logical home for such an enterprise because it already has an office concerned with technology utilisation, but even so, some bureaucratic turf fighting would be inevitable if the bill were passed in its present form.

For one thing, the National Science Foundation is now supposed to have responsibility for surveying the government's efforts in science and technology and for advising on how federal money should be spent on research and development. It would be unlikely to yield a good part of that responsibility