operated in the 60 to 300 GeV range, it was argued, this would still be sufficient to produce a large amount of important physics, even without the possibility of investigating collision energies between 600 and 800 GeV.

In the end, the panel refrained from making any such formal proposal. But it did state that current information from Brookhaven was insufficient to assess whether the pilot production of the dipoles was likely to begin in mid-1981 as planned. "If it is not, the ISABELLE project will encounter significant delays", the sub-panel reported.

Brookhaven scientists have been heartened by the report's recommendation that the successful completion of ISABELLE — including any necessary R and D funding — should remain a top priority of the Department of Energy, as well as becoming "the responsibility of the entire national community".

At the same time, however, others are warning of the dangers of failure in what has become recognized, both at Brookhaven and to a lesser extent at Fermilab, as a high-risk/high-benefit programme still facing large engineering uncertainties.

"The US high-energy programme is now highly dependent on the successful solution of such engineering problems and I would recommend greater diversification to reduce that dependence", Dr Wolfgang Panofsky, director of the Stanford Linear Accelerator Centre (SLAC), told a meeting held in Washington last week to celebrate 50 years of particle accelerator construction.

SLAC is promoting its own proposal, developed by Dr Burton Richter, to construct a machine which would collide bunches of electrons and positrons, passed in tandem down the linear accelerator and then in separate directions around a ring at the end.

Dr Richter is pushing for early funding of the so-called Stanford Linear Collier (SLC), attempting to finesse experiments on CERN's LEP and claim discovery of the intermediate vector boson. The Woods Hole sub-panel examined the proposal closely, describing it as a "fascinating and challenging new departure in accelerator technology". However, the sub-panel refused to endorse SLC for immediate funding. In particular, questions were raised about whether SLC's predicted luminosity would be sufficient to make it truly competitive with LEP, which will also have a larger energy range.

David Dickson

Dead Sea

Coming to life

Theodore Herzl's dream of a canal from the Mediterranean to the Dead Sea is at last a cost-effective proposal, the Israeli government was informed last week. Use of the 400 m drop between the two seas to generate hydroelectricity could now match the cheapest generation from fossil fuel stations, according to a government-appointed working party chaired by Professor Yuval Neeman of Tel Aviv University.

Assuming an initial investment of $800 million, the canal with a cascade of hydro-electric installations would, said Dr Neeman, pay for itself in 30 years, simply from the 100–150 MW of hydroelectricity produced. In addition, the canal could provide the sites for nuclear power stations which cannot be accommodated along the crowded Mediterranean coast. (That between Ashquelon and Ashdod has been found to be earthquake-prone.) A thermal power station using the water from the canal but fired by local oil shale deposits could also be built at Ein Bokek.

Ecologically, the main benefit of the canal would be to replenish the waters of the Dead Sea. The only natural feeder of the Dead Sea is the lower Jordan, which draws its water from the Sea of Galilee and from its east bank tributary, the Yarmuk. The Sea of Galilee is however the source of water for virtually the whole country, while the Jordanians have almost completed a major irrigation project involving the diversion of the Yarmuk into the East Ghor Canal. When this is complete, the lower Jordan will shrink even further to a mere 200 million m^3 annually, mostly return flow from irrigation.

Evaporation loss from the Dead Sea is 1,200 m^3 a year, so that the sea has shrunk considerably — the S'dom potash works have become stranded and a special channel has been built to pump brine to the evaporation pans. By November 1978, in a Knesset debate on the proposed canal, both government and opposition were agreed that any further shrinkage could bring irreversible ecological damage.

Then came the drought of 1979. By September, the Dead Sea had split in two at the narrowest point (some 3 km across) and, according to Shlomo Drori of the Dead Sea Development Company, there was a dry plain some 12 km long between the northern part of the Sea and the sourthern fragment, then split into a number of pools. Meanwhile, plans were going ahead to use the Dead Sea for generating electricity on the "solar pond" principle, based on the temperature difference developed in brines exposed to sunlight where the density gradient is too great to allow convection mixing. The first solar pond power station was opened at Ein Bokek in December 1979.

The ecological advantages of the proposed canal are admitted by all concerned. Until now, they have been the paramount concern, with hydroelectricity considered rather as a valuable spin-off. As late as the Knesset debate of 1978 on the canal, Energy Minister Yitzak Moda'i stressed that electricity could still be generated more cheaply from fossil fuels. Professor Neeman's estimates, for the first time, reverse this situation. However, with the Israeli economy in a state of crisis — inflation is now running at 130 per cent per annum — it is by no means clear whether the government could raise the necessary $800 million.

Vera Rich

Biogenetic hormones

Insulin trial

Eli Lilley, the US pharmaceutical company, has taken another step along the road to producing human insulin on a commercial scale. Last week, it announced a $40 million programme to build two plants at its factories at Speke in the United Kingdom and Indianapolis in the United States for the commercial production of human insulin from genetically engineered bacteria. Ultimately, human insulin produced in this way should be much cheaper than the insulin currently extracted from pig and beef pancreas.

Full-scale production, however, is still a few years off. First, any problems cropping up with manufacture on a large scale will have to be resolved and extensive clinical trials have to be done. The first trials with insulin from the company's US laboratories began on healthy people earlier this month at Guy's Hospital in London. Initially at least, the trials are being conducted in the United Kingdom to avoid delay in getting permission from the Food and Drug Administration for trials in the United States.

The tests at Guy's Hospital mark the first time that any recombinant DNA hormone has been injected into humans. Preliminary tests to measure the effectiveness of the new insulin in reducing the blood glucose level of healthy people and their immune response to it should be complete in a few weeks. By the autumn, tests should begin on diabetics. It is expected that human insulin will be tolerated without the production of antibodies. Some diabetics do produce antibodies to insulin derived from pigs and cattle. One possible advantage of human insulin is that it will minimize or eliminate the risk to middle-aged diabetics of eye and liver damage.

The techniques Eli Lilly are using are those developed by Genentech (which will get a cut of the profits) whereby synthetic genes for the A and B insulin chains are put into an *Escherichia coli* plasmid. The bacteria expressing the two genes are fermented separately, killed and broken up to extract the A and B chains. The chains are then chemically combined to produce human insulin. So far, no method of getting genetically engineered bacteria to excrete their products has been found, but Eli Lilly claims that its method of extraction has produced pure insulin free from bacterial fragments.

The production of human insulin from recombinant DNA is more complicated

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