uranium to putting the fuel elements into the reactor.

Nevertheless, the search for self-sufficiency does not rule out cooperative projects. Indeed, on returning from the World Energy Conference in Munich last September, Admiral Carlos Castro Madero, the president of the Argentinian commission, openly attacked the "negative aspects" of restrictions of nuclear technology transfer, adopted first by the "London Club" of nuclear suppliers and then (at the end of 1979) by a wider circle of industrialized Western states.

Soviet interest has grown in the past year. Last April, during a visit to Buenos Aires, the Soviet foreign trade vice-minister Aleksandr Manzhelo suggested a major nuclear cooperation between the two countries, stating at the same time that he thought that Soviet-Argentinian trade could well double in the next few years. At the end of July, Yuri Fokin, Secretary of the Soviet Foreign Ministry, visited the Atucha-I plant. **Vera Rich**

Large electron project

Swedish cloud

Sweden is having second thoughts about participating in LEP, the 500-cm 500-GeV electron-positron colliding machine which, at a cost of 900 million Swiss francs, is planned to be the next major project of the European centre for high energy physics research, CERN. At a meeting of the Swedish Natural Sciences Research Council last month, 90 per cent of those present expressed doubts about the arrangements for funding the project.

Delegates from CERN's member states are expected formally to approve the building of LEP at the next meeting of CERN council in June. The plan is to finance the project out of CERN's annual budget by reducing expenditure on other programmes such as the intersecting storage rings and the synchrocyclotron. How quickly LEP can be built will depend on how much of the budget — SwFr610 million this year — can be diverted to it each year. What seems to be worrying Sweden is that the CERN council, which requires a two-thirds majority vote to approve budgets, could demand that Sweden pay more if the cost of LEP rises above initial estimates.

One faction of the Swedish research council says that LEP is simply too expensive to be built now. Another would agree to the project with some concessions — either that Sweden be made exempt from budget increases approved by CERN council, or that the CERN budget be divided into LEP and other programmes, giving Sweden the option of leaving LEP while remaining a full member of CERN's other activities. Under the present arrangement, a decision not to participate in LEP would effectively be a decision to

opt out of CERN altogether. An incidental factor which seems to have added weight to the arguments of LEP's Swedish opponents is the feeling that Swiss industry has reaped unfair benefit from contracts arising out of CERN's work.

Sweden's objections, which have come rather late in the negotiations (most of CERN's members have informally agreed to the LEP proposal), could delay official approval for the project. Although Sweden is not alone in wanting some guarantee that costs will not get out of hand, making it exempt from cost increases approved by CERN council is unlikely to be popular with other members: neither is splitting LEP from the rest of CERN's budget. Many see incorporating LEP into the annual budget as a way of controlling the rate at which money is spent on it.

At present Sweden contributes slightly less than 4.3 per cent of CERN's annual budget. If it decided to leave LEP, the other member states would have to decide how to redistribute the costs amongst themselves or whether to extend the time taken to build the machine. The chairman of the Natural Sciences Research Council, Mr Mats Lemner, expects that the council will shortly discuss the contribution with the Minister of Education. Depending on the outcome of this discussion, parliament may have to make the final decision. If it does, the Swedes would be able to meet CERN's June deadline for a decision on the contribution. **Judy Redfearn**

Artificial hormones

European register?

Brussels

The European Commission is making heavy weather of its plan to ban the use of certain artificial hormones in animal farming. A meeting of agricultural ministers planned for last week was cancelled after the death of Mr F.O. Gundelach, the Danish agricultural commissioner. But the signs were that the meeting would have failed to reach an agreement.

The Commission decided last September that something should be done about hormones after the discovery that diethylstilboestrol was still being used for veal production in Italy. The hormone is banned in the United States and also in many European countries, but is so effective at increasing weight-gain in calves that, where its use is banned, black markets such as that in Belgium spring up.

The agricultural ministers were to have discussed two proposals elaborating on an original proposal made last December. The first calls for a register to keep track of all hormones used as medicinal products, whether for human or animal use, from manufacture and storage to distribution and final use. Veterinarians would be required to control all administration of hormones to animals. The proposed rules say that banned hormones can be used only for "therapeutic treatment" of

pathological cases diagnosed by veterinarians, and not for chronic use in preventive treatments. The second proposal is that there should be a comprehensive sampling system for testing animals and carcasses.

The proposals as drafted involve the "positive listing" of those hormones considered safe for use in meat production. This is opposed by Belgium and the United Kingdom. There is no dispute over banning compounds such as diethylstilboestrol, but it is held that a positive list would inhibit the development of new materials.

A system of "negative listing" would overcome some of these problems, but this would have to be continually revised as alternative hormones came on the market. Given the political need for action, the Commission favours the more cautious positive listing system. Whichever route is followed, the cost to European farmers of making the necessary adjustments will be substantial. **Jasper Becker**

Soviet chemical industry

Effective economy

The Soviet chemical industry is rapidly acquiring prestige status in the Soviet media and ranks, according to a *Pravda* article last week, together with nuclear energy, space research and electronics, as one of the hallmarks of twentieth century progress. The proximate source of this accolade is not hard to identify: almost every article cites, at some point, Mr Brezhnev's dictum that "there can be no effective economy today without a modern large-scale chemical industry".

When Mr Brezhnev made this pronouncement at last October's plenum of the Central Committee of the CPSU, however, he was not so much commending the industry as calling for a programme of "resolute measures" for overcoming major shortfalls in chemical production, ranging from chemical fertilizers and plant protection agents to synthetic fibres, dyes and household detergents. The 33 per cent production increase specified in the guidelines for the new Five Year Plan for the chemical and petrochemical industries (recently placed under separate ministries) is, say the planners, essential if the shortfall is to be eliminated.

The chemical industry does not shoulder full responsibility for the gap. At the end of December, a *Pravda* editorial shifted at least part of the blame to other sectors. Fertilizer plants, said *Pravda*, were held up by insufficient supplies of natural gas and "inaccurate" planning by the light metallurgy sector. Plants with processes requiring high temperatures and pressures often cannot obtain corrosion-proof equipment. In some cases new factories have been built, without the necessary equipment being forthcoming, while, on other occasions, expensive installations have been purchased before it has been

finally decided just what the plant is to manufacture. The state supply board "Gossnab", *Pravda* concludes, must supervise the whole supply process more closely to eliminate such discrepancies.

Far more serious, however, are suggestions raised last week by a group of scientists from Byelorussia that the implementation of radical new technologies is being blocked by inter-departmental wrangles. In a major *Pravda* article they describe two such cases, in sectors which all planners consider to be of the highest priority — energy and agriculture. The first project, highly thought of by the Institute of High Temperatures of the Soviet Academy of Sciences, would have combined an electrolysis unit with a nuclear power plant so that hydrogen for fuel or industry could be produced during "off-peak" times. This combination of chemistry, electro-chemistry and nuclear power engineering ran into the stumbling block of what the group describe as the "excessively rigid specialization of the branches of industry".

The second project, for the production of protein biomass for animal feed using hydrogen-consuming bacteria, was worked out jointly by teams from the Byelorussian and Moldavian academies as long ago as 1976. To be cost effective, however, the byproducts of the synthesis — oxygen, nitrogen and possibly ammonia — would also have been exploited. All these are prime requisites of the mineral fertilizer industry, which itself produces waste gas with a usable hydrogen content. Yet although plans have been drawn up for a pilot biomass plant to be run in conjunction with the "Azot" fertilizer plant in Grodno, neither the Ministry of Chemical Fertilizer Production nor *Glavmikrobioprom* — the body in charge of microbiological production — can see its way to go ahead. **Vera Rich**

European research

Counting costs

Brussels

The knotty problem of putting a value on the European Community's research and development programmes is the subject of new proposals which the European Commission has just put forward. The objective of this soul-searching is to define criteria and methods for both evaluating and exploiting research. The idea stems not from a fit of self-doubt but from the Council of "Research" Ministers in December 1979. There are no hard and fast ideas in the document, but areas of investigation are instead defined. Four pilot projects have been approved, which will give independent experts free rein to put certain programmes under scrutiny. The commission proposes then to use the experience of the experts to formulate a

policy for exploiting and evaluating research results. This is to be ready by the end of the year but, before then, the first outlines of the policy will be presented at the International Congress for Research Evaluation in October.

One pilot project has already been completed by six independent experts, who looked into the Community's energy conservation and solar energy activities. Four other expert groups are to investigate programmes of research and development in fusion, radioactive waste management, the "Reference Bureau Programme" concerned with physical standards and critical data, and geothermal energy, the use of hydrogen as a fuel and work on the systems analysis of energy use.

The tightening of the European Community's budgetary belt is one motive for the new initiative, but another is the fear that the results of research are being ineffectively disseminated. The experts will be concentrating on the diffusion of information and in particular how to make the results available to the layman, requiring that more outlets should be found and language barriers overcome. Indeed, one member of the European Parliament has asked in a written question why the Commission does not publish the results of research in English as well as in the author's mother tongue. But the commission says that unless the results of research are first digested, readership is always restricted to specialist circles.

The stickiest part of the process on which the Community has embarked is the evaluation of research whose impact is likely to be long term or even unforeseen. Simplifying the results may help. Thus the report on solar energy and conservation says that the success of the programme cannot be measured in "tonnes of oil saved" and that the use made of research carried out may require further action and will take time. Even so, the chairman of the evaluation team, Ugo Forinelli, is confident that European research in this area is already competitive with that in the United States even though the European budget is much smaller than the American. Forinelli's team has made a number of recommendations about the management of the Community's programme, including the need for more explicit statements of objectives when putting contracts out to tender and some suggestions of areas where research might be concentrated or even discontinued.

The commission seems modestly aware of the inherent limitations of plans to evaluate research. The underlying objective is to strengthen the link between research and development and industrial innovation, and the commission acknowledges that its own research cannot be an important source of commercial inventions. But restrictions on Community expenditure outside the agricultural field are likely increasingly to stimulate the justifying of research. **Jasper Becker**

Swedish research

Lucky science

Stockholm

Research is one of the very few areas to be given more money in the budget bill for the fiscal year 1981–82, presented this week in Stockholm. Against the background of a budget deficit amounting to about \$15,000 million, cutbacks in social services and mounting economic gloom, research received an extra \$28 million.

Considering that this money is to be divided between the projects of eight ministries, individual increases will not be very great, and in real terms may well be eaten up by inflation, which was 14 per cent in 1980. One staff member at the Natural Sciences Research Council estimated that the net results of the council's \$2 million increase will be an unchanged level of activity. But this is better than a cutback, the fate of nearly all other sectors.

The government sees research strengthening Sweden's industrial competitiveness in the long term. The Minister of Industry, Nils Aasling, wants to develop sophisticated chemical and mechanical products, and is to make specific allocations for this purpose in the spring. One sign of this policy is the changing proportions of the space budget being allocated between international and national programmes. In the 1980–81 fiscal year, the Swedish Space Corporation's budget of about \$44 million was equally divided between international and national activities, but in future the accent will be on national programmes. The corporation's budget has been increased overall to about \$58 million — a real increase in spite of inflation — about half of this will be used to build the country's first space satellite, Viking, which is to be launched from the European rocket Ariane in May 1984. It is hoped to produce the Viking at half the cost of comparable satellites from other European countries, and the project is planned to give Sweden a profitable national space industry. Another project being planned is an experimental telecommunications satellite.

The lion's share of the increase in research expenditure — about \$16 million — is to be disbursed by the Education Minister, Jan-Erik Wickstroem, who wants to increase research capacity across the board. He is proposing an increase of about 12 per cent for mathematics and natural science faculties, an average of about 9 per cent for the four research councils as well as 90 new PhD places to be spread over all subjects, \$2 million for particularly expensive equipment, \$2 million to subsidize lecturers who want to take time off for research and \$1 million for research libraries. Fifteen new chairs will be set up, among them molecular genetics (Karolinska Institute), medicine (Uppsala) and astrophysics (Gothenburg).

Wendy Barnaby