additional costs of science projects such as the space telescope, and the new projects described above, the total requested budget for NASA comes to \$6,700 million. This would be a 20 per cent increase over the budget for the fiscal year 1981 which began last October, and if it is allowed to stand, would be the largest annual increase in the agency's budget since the early 1960s.

The National Science Foundation has also put in for a hefty 23.5 per cent increase, from \$1,096 million in the current year to \$1,353.5 million next year. Most of this reflects the Carter Administration's keenness to support both research and training in engineering fields. The new engineering directorate will receive a 20 per cent increase in its research budgets.

At the National Institutes of Health (NIH), the proposed increase for biomedical research is less spectacular. On the basis that whatever the president asks for is traditionally increased by Congress, Mr Carter is suggesting that the NIH budget for basic research be raised by 9.4 per cent. Allowing for inflation, this would result in a drop of 1.1 per cent between 1981 and 1982.

At the Department of Energy, increased support for research into synthetic fuels and nuclear power — particularly fusion energy — has resulted in a requested increase of 9.4 per cent in real terms for basic research, second only to that of NASA.

Many of these figures will remain only as indications of the "good intentions" with which the Carter Administration is leaving office. Perhaps of more lasting significance are the figures prepared by Dr Press to demonstrate the main trends of federal support for science during Mr Carter's four years in the White House.

These reveal, for example, that overall the biggest winner as far as support for basic research is concerned has been the Department of Defense. If the proposed 1982 budget figures are taken into account, the Pentagon's basic research efforts will have grown by almost a quarter — 22.6 per cent — between 1978 and 1982.

Next come NIH. Congressional enthusiasm has raised the NIH research budget by 13.3 per cent over the four years, compared with a growth of 12.8 per cent at the Department of Energy.

The National Science Foundation, even if it is granted this year's large increase, will still only have seen its basic research grow by 9.2 per cent. And at NASA, reflecting the pressures which the space shuttle has imposed on the space science programmes, the basic research budget actually fell, in real terms, by 0.6 per cent over the same four years.

Overall, the growth in basic research, including the 1982 proposals, would come to 10.8 per cent for the period of the Carter Administration. In current dollars, the budget would grow by 58.2 per cent, from \$3,704 million to \$5,801 million.

Ironically, the research and development budget shows an identical increase of 58.2 per cent from \$26,388 million to \$41,734 million.

"Anyone who says that we do not engage in long-term planning is proved wrong by these figures", quipped Dr Press — expected soon to be elected president of the National Academy of Sciences — although he added that the agreement was actually fortuitous and that "the figures just happened to fall our this way". In practice, he will not be required to explain why it should be otherwise.

David Dickson

Argentinian power

Soviets help

Argentina has bought five tonnes of heavy water from the Soviet Union under International Atomic Energy Agency safeguards, the Argentinian Comisión Nacional de Energía Atómica announced last week. It is intended for "topping up" the Atucha-1 nuclear station, which needs on the average an annual heavy-water replacement of 1.5 tonnes.

The sale is part of the growth of Soviet-Argentinian trade since January 1980, when Argentina refused to back President Carter's embargo of grain sales to the Soviet Union. The Soviet Union is now Argentina's main market for agricultural products. In July of last year, Argentina's Secretary of Commerce, Alejandro Estrado, signed an agreement to supply the Soviet Union with 20 million tonnes of feed grain and soya beans during the next five years. There are also persistent rumours that a major agreement to export meat to the Soviet Union is now being negotiated.

In return, the Soviet side has shown considerable interest in Argentina's nuclear programme. Argentina has been conspicuous among third world countries since the early 1950s for its nuclear programme aimed at ultimate autonomy in both research and technology. The commission has announced that the target will be for practical purposes attained by the end of 1981, when the Córdoba uranium processing plant will begin producing an estimated annual production of 150 tonnes. Rafael Coppa, the director of the plant, said last year that Argentina will then have full control of the primary uranium cycle, from prospecting for

Promises for President Reagan to deny

Specific proposals included in the budget are as follows.

- Major difficulties with the development of a vehicle to launch the two Galileo spacecraft on their journey to Jupiter from the space shuttle have caused NASA to propose delaying the Galileo project for one year and switching to a new launch vehicle, a converted Centaur rocket.

- The Carter Administration proposes that the National Institutes of Health should aim to stabilize support for both competitive research grants and research traineeships. Last year, the Administration promised to provide enough money to keep the number of new and renewing competitive research grants constant at about 5,000. Given general fiscal constraints, however, this meant cutting back severely on the number of traineeships, a move which brought strong protests from various sectors of NIH, and was subsequently overturned by Congress.

- Defense Department support for research on US campuses seems destined to

continue to grow faster than support from any other federal agency. According to the budget request for the fiscal year 1982, military funding for research and development at US universities and colleges will be 21 per cent greater than in 1981, totalling \$639 million.

The proposed figure, most of which will be spent on unclassified basic research projects, is part of a 16 per cent increase in all military-sponsored basic research expenditure.

- One major new start proposed by the National Science Foundation (NSF) is the detailed design and initial construction of a 25-metre millimetre-wavelength radio-telescope which is planned for installation at Mauna Kea in Hawaii.

Plans for the new telescope have generated widespread support in the radioastronomy community. NSF has asked Congress for funds as part of a 29 per cent increase in the NSF budget for astronomical sciences, rising from \$58.5 million to \$75.6 million.

- The Carter Administration is proposing to cut support for research and development in the Environmental Protection Agency (EPA) from \$364 million to \$345 million. At the same time, the outgoing Administration wants to earmark an extra \$28 million to improve its review of the environmental impact of proposed major energy projects in the west of the country — particularly in connection with the synthetic fuels programme — and to launch a government-wide research programme on the effects of acid rain.

- The Carter Administration wants to give a major boost to research into magnetic fusion. The 1982 budget proposals include an increase of 28 per cent in fusion research, to a total of \$520 million in budget obligations. \$32.8 million of this would be spent on a new centre for magnetic fusion energy, as proposed by the Administration following a thorough review of the magnetic fusion programme last year. Research on magnetic confinement systems would increase from \$119 million to \$151 million.

David Dickson

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-1 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