US space station

Alternatives to space agency plan

Washington

THE US National Aeronautics and Space Administration (NASA) has not yet won its long-running campaign to be allowed to build a space station. Although President Reagan gave the project his approval in January, NASA must still persuade Congress to vote money for it. And in recent hearings on Capitol Hill, Congress's Office of Technology Assessment (OTA) has emerged as a strong critic of NASA's approach.

Officially, OTA declines to say whether it supports a space station or not, but its director, Dr John Gibbons, reminded the Senate Budget Committee last week that the President had approved plans for "a" space station, not "the" space station. While NASA wants to build a major facility costing $8,000 million, a forthcoming OTA study is expected to argue that many of the same objectives could be achieved for a fraction of the cost by adopting a slightly more modest design.

Urging Congress to consider the detailed requirements for a space station before approving NASA's plans, Gibbons sketched out three other possibilities.

- A low cost option could comprise an orbiter capable of supporting up to six people for three weeks. It would be paired with two modestly-powered unmanned free-flying platforms, one in polar orbit and the other in low-inclination orbit. Both could be leased from the private sector and tended periodically by orbiter crews. There would also be a new orbital manoeuvring vehicle that could move between the orbiter and free flyers at other altitudes.
- A "relatively modest" option would be similar in most ways but the lifetime of the orbiter would be supplemented by a permanent orbiting facility with wide-band communications and up to 15 kilowatts of power. Unlike the low-cost option, this would allow long-term experiments using human beings as subjects or requiring human attendance — the kind of experiments of particular interest to the life and materials sciences. Although much cheaper than the more elaborate designs suggested by NASA, this option would give the United States "substantially greater" opportunities than those provided by the Soviet Union's Salyut programme.
- A higher cost option would add a reusable orbital transfer vehicle designed to move back and forth between its service module in low Earth orbit and geostationary orbit. That would enable it to service and modify spacecraft in geostationary orbit and could lay the basis for more efficient travel between the Earth, the Moon and the planets.

Gibbons stressed that OTA was not recommending any of these options, but had developed them to make the point that there is a wide range of possible space station designs and that US space capabilities could be usefully enhanced by spending much less than the $8,000 million envisaged by NASA. OTA has developed a more extensive list of options and their associated costs (see table).

OTA's criticism of NASA's approach is based on a long-standing belief that US civilian space policy has lost its sense of direction and that a sensible decision on whether to build the kind of space station NASA wants cannot be taken until overall space goals have been settled — preferably by a national commission. In the closest OTA has come to direct opposition to NASA's plans, Gibbons told the budget committee that neither NASA nor the government as a whole had tried to develop a national space agenda that could justify the new project.

Peter David

OTA's comparative space station designs

	Date available	Cost ($1,000 million)	Power (kW)	Pressurized volume (cubic feet)	Crew size	Time in orbit	Comments
Shuttle orbiter	Now	None	7	2,000	6	10 days	Can accept Spacelab
Extended duration orbiter	1990	0.4	20	5,000	5	50 days	Limited laboratory space
Spacelab as permanent structure	1990	2	6	5,000	3	Unlimited	Limited crew
NASA plans initial	1992	8	90	6,000	8	Unlimited	Orbital manoeuvring vehicle plus two free flying platforms
NASA plans mature	1996–2000	20	200	10,000	20	Unlimited	Reusable orbital transfer vehicle plus several platforms

Polish environment

Immediate action imperative

POLAND is facing a possible ecological catastrophe, according to Dr Antoni Kuklinski, head of the Committee of Spatial Development of the Polish Academy of Sciences. In the government newspaper *Rzeczpospolita,* he identified three especially "weak links" which had reached "breaking point" — the natural environment, the technical infrastructure (transport, power supplies and water management) and the poor conditions in large urban areas.

The situation could be improved, he said, only if industrial investment were cut to 30 per cent of the national total. At the same time, the housing sector must learn to make better use of the available means. The whole structure of investment must be changed, with greater powers given to local "self-government" bodies. Poland, he said, must invest in its environment lest the shortage of fresh air become worse than the shortage of shoes (a notorious problem).

Dr Kuklinski's warning is not the first to emerge recently in the Polish media. Last August, Warsaw Radio noted that in the upper Silesian industrial belt, 430 per 100,000 inhabitants died prematurely because of environmental conditions and that the death rate was 50 per cent above the national average. Circulatory diseases were 15 per cent more frequent, cancer 30 per cent and pulmonary diseases 50 per cent more frequent. Infant mortality was 13 per cent higher. One doctor recommended that Silesia should be treated as a closed industrial zone in which people should work for not more than 20 years. Those not working should live elsewhere.

This view is reinforced by a report which embodies the findings of a seminar held in Lublin last autumn on the chemical threat to the Polish environment. This notes that, according to a survey carried out in 1982 by the Planning Commission of the Council of Ministers, 27,000 km^2 of Polish territory, encompassing a population of 11 million (more than 30 per cent of the total population), is under severe ecological threat. Special attention is given to the classification of air pollution in terms of its sulphur dioxide toxicity equivalent, since recent international alerts on acid rain have made Polish planners aware of the sulphur dioxide hazard, if not of other pollutants. According to these figures, the hazard from heavy metal dust from the metallurgical and engineering industries is equivalent to 13.8 million tonnes of sulphur dioxide a year, while gases from the chemical industry (other than sulphur dioxide and carbon monoxide) have a sulphur dioxide equivalent of 1.26 million tonnes. The annual emission of sulphur dioxide by Polish industry is 2.45 million tonnes.

The report stresses that the whole pollution problem was worked out anew in the 1982 "Theses" for the reform of the economy, and that action on three "strategic" problems (food supplies, housing and restoration of the ecological balance) will be introduced during the 1986–90 plan.

Vera Rich