Coupled with reduced export demand and excess port capacity, increased prices arising from user fees could reduce the Corps of Engineers' estimate of deep-draft needs by two thirds (that is, by deepening only one coal port instead of three).

Finally, considerable uncertainty surrounds the classification of backlogged water projects as needs. CBO's estimates--though they must be considered highly uncertain--suggest major shortcomings in economic efficiency in this area. If, as a condition of construction, users were asked to pay for the benefits they received, perhaps half of the backlogged projects would be dropped (see Table V-2). 11/

FEDERAL STRATEGIES TO IMPROVE WATER RESOURCES INVESTMENT

Under current policy, the federal government pays for about 76 percent of the construction costs of water resources projects. If current policy is maintained, CBO estimates that the federal government will have to spend about $3.7 billion a year--an additional $1.4 billion each year--between now and 1990 to meet estimates of water resources capital needs. Nonfederal participants in water projects would have to expend an additional $400 million a year.

Financial accountability for water projects could instead be spread among all levels of government by increasing the nonfederal share of project costs and implementing user fees in certain instances. Such changes would result in higher prices for water resource services for direct beneficiaries and for nonfederal governments. In turn, water resources officials would be more likely to promote only the most efficient water projects--namely, those that would return benefits in excess of costs. Three alternatives to current policy--a federal loan program, a redirection of the federal role, and institution of block grants--could be effective in furthering this goal.

Federal Loan Program

A federally established loan fund would permit the federal government to serve almost exclusively as a financing partner for new intrastate water projects. This assumes that user fees can correct chronic overestimates of

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11. For more information regarding the problems of backlogged water projects, see General Accounting Office, Water Project Construction Backlog--A Serious Problem With No Easy Solution (February 1983).

needs, and that the federal government has a competitive advantage over state or local governments in financing relatively expensive water projects. States, possibly with local assistance, could select and manage these projects, design and implement user fee systems to recover appropriate project costs, and agree to repay federal loans with the fees collected and with supplementary state payments. Under this option, all benefits produced by water projects could be classified as vendible (such as port improvements, hydropower, irrigation, municipal and industrial water supply, and recreation) or non-vendible (such as flood control, fish and wildlife conservation, and water quality). To repay federal loans, vendible benefits would be marketed by states at cost-of-service prices or higher. In addition, states could agree to repay half of the costs associated with providing non-vendible benefits. Assuming the low estimate of needs, under this option, the federal government could spend an additional $700 million a year through 1990, but out of each year's additional outlays, at least half would be repaid (with interest) over a 50-year period. If especially remunerative projects were undertaken, much more of the federal investment could be repaid.

Under this scheme, the federal government would continue as the principal financial backer and manager of interstate water projects, including the inland waterways and multipurpose reservoirs affecting entire river basins. Federal user fees would be implemented where appropriate, however. Between $300 million and $500 million would be spent each year for these federal purposes, most of which would be repaid by users.

A federal loan program could hold total federal outlays for constructing water resources projects to about $3.1 billion each year, or an increase of about 35 percent above current spending.

User Fees as a Guide to Needs--An Advantage. A federal loan program coupled with user fee increases would encourage a more realistic assessment of needs for several reasons. First, before an intrastate project was started, a joint federal and state feasibility study would be conducted. Potential users of vendible benefits would be presented with an estimate of the costs they would have to bear if the project were constructed. The state would also compare expected benefits with its share of residual costs. If either user groups or the state judged the project to be uneconomic, it would not go forward as planned. Either the project scope would be altered until benefits were perceived to be greater than costs, or the project would be eliminated, allowing the state and the federal government to commit their resources elsewhere.

Second, because states would be financially responsible for repaying a much larger share of any project's cost than they now pay, those projects

perceived by the state to offer the highest net return on the investment would be promoted first. Under this option, states would be responsible for repaying a minimum of half of any project's capital cost, even if all benefits were classified as non-vendible. This would be a significant increase over the current average nonfederal share of 24 percent.

Finally, users would pay at least the full cost of service for vendible benefits. This would result in significant increases in the prices paid for federally subsidized water and related benefits. Users, in turn, would conserve water where possible or make other efficiency adjustments motivated by the real, unsubsidized price of water (see also Chapter VIII).

Disadvantages. Under this scheme, high demand for federal loans could deplete the loan fund rapidly, especially in the early years of the program before state payments fully replenished the balance. If loan demand were high, distribution of available funds among the states could pose problems. Because the project itself would serve as collateral on the loan, defaults could prove burdensome and expensive for both the federal government and the defaulting states. One result could be conflicts over water rights if the federal government repossessed a project to recover its investment.

Redirected Federal Role

A premise for reorienting the federal role is that future water resources needs will be mainly management or rehabilitation, not new construction, and that these activities are most efficiently financed and administered at the local level. Further, this "federalist" approach recognizes that most of the large multipurpose or interstate water projects have already been built, leaving smaller intrastate projects as the basis of needs estimates. Finally, the growing financing and financial management capabilities at the state and local levels would be taken into account, as these governments would be the centers of financial activity for water projects.

Under this approach, the federal government would only participate in water projects that have a clear federal function, and then only to a limited extent: financing projects with implications for national security (some ports and harbors), interstate commerce (inland waterways), or international effects (stream-flow maintenance projects); managing projects that physically affect more than one state, such as multi-state navigation or reservoir systems; or facilitating negotiation between states over projects that involve unavoidable multi-state cost or benefit spillovers. Federal funds used to build new or to operate existing interstate projects would be recouped with federally administered user fees to the degree that the

federal investment produced vendible benefits. All new intrastate projects would be financed, planned, constructed, and operated at the state or local level. Operation and maintenance of existing intrastate projects would be transferred to the states over a ten-year period.

Advantages. Federally administered user fees would match costs to beneficiaries, conditioning investments with users' willingness to pay and reducing the tendency for overinvestment. This federalist approach would also reduce the size of federal water agencies and the cost of federal water programs. Out of about $3.7 billion in federal water resources expenditures in 1982, about $1.5 billion, or 41 percent, would have been a state responsibility if this option were in effect.

Disadvantages. Under this option, states that are not in a strong fiscal position could be put at a relative disadvantage. Energy-exporting states or states with growing industrial and population bases (western and southern states) could probably expand their financial, technical, and management roles in water resources development much more readily than could states with shrinking populations and industrial bases (north central and northeastern states). In addition, shippers on the inland waterways and other users of federally supported interstate projects would pay more for these services than they now pay.

Block Grants and Federal User Fees

Under a block grant scheme, a fixed level of non-reimbursable federal funding would be allocated to the states each year for intrastate water projects on the basis of criteria such as population, land area, and proportional "need" (as defined in Table V-2). Block grant monies could be used for any water development or maintenance purpose, as long as minimum matching requirements were met. 12/ The states would maintain priority lists of intrastate projects and feasibility studies and would make funding decisions based accordingly. A project could only be listed as a state priority if it passed federal and state engineering, environmental, and economic feasibility standards. The federal government would finance interstate water projects such as waterway dredging or lock and dam replacement on a project-by-project basis. Federally administered user fees

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12. A proposal along these lines, introduced in 1981 as S. 621 by Senators Domenici and Moynihan, would have instituted a minimum 25 percent state match for construction and 50 percent for operation and maintenance. If the existing cost-sharing rate for any type of project were higher, it would replace the minimum match.

would recover up to 100 percent of the federal investment in interstate water resources projects.

Promoting Economic Efficiency--An Advantage. Assuming that interstate project construction was conditioned on users' willingness to pay appropriate fees, economically efficient federal investments would follow. For intrastate projects, however, user fees would not be mandatory, and states could subsidize groups of users if they so desired. There would be no guarantee that federal funds allocated to states would be used to build the most efficient projects in terms of number, size, or location. Almost certainly, though, intrastate projects would be built faster than under current policy.

Disadvantages. Matching grants imply a financing role for the states. If matching rates were high, the financing burden on the states would also be high. Some states are building their own water projects now, and this new funding mechanism could substitute for local capital, effectively creating a subsidy. Other states, however, rely on federal financing to build water -r jects. To the degree that projects were cancelled for lack of state matching funds, more prosperous states would get federally subsidized intrastate water projects while less prosperous states would not.

Regional Effects. If the federal government financed interstate projects, and if block grants (for intrastate projects) were distributed on the basis of needs, Ohio and Mississippi River Valley states would receive most of the inland waterway needs funding; Missouri, Texas, Pennsylvania, and Georgia together would receive about 37 percent of the dams needs. Funding for authorized but backlogged projects would be distributed to the South (40 percent), West (36 percent), North Central region (18 percent), and Northeast (6 percent). 13/

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13. Based on historical distribution of water resources funding. For additional details, see Congressional Research Service, Water Resources Expenditures, series of tables depicting regional and state distribution of federal water resources expenditures, developed at the request of the staff of the Senate Committee on Environment and Public Works, 1982.

CHAPTER VI. AIR TRAFFIC CONTROL

Though still adequate to assure safety, the air traffic control system, run by the Federal Aviation Administration, is in need of modernization. The Congress has approved the FAA's National Airspace System Plan, which according to the FAA could cost an estimated $10.7 billion to implement but could save $25 billion by the year 2000 by replacing antiquated equipment with modern microchip technology. CBO analysis points to a conclusion that investment in this plan would prove sound no matter what course growth in aviation takes in coming years. Implementation of the plan, however, would depend critically on consolidation and closure of many facilities, which would entail major personnel reductions and would likely encounter strong opposition. The pace of modernization could be altered to allow gradual and more cost-effective phase-in of new technologies. A slowing of the growth in air traffic, which could result from withdrawing subsidies and raising user fees on general aviation (small aircraft used for corporate business and recreation) to levels that recovered the full federal costs of services to that class of users, could buy time to allow the FAA plan to be implemented in stages that would institute new equipment as it develops.

THE PROBLEMS IN AIR TRAFFIC CONTROL

Flight in the nation's airspace is controlled and monitored by a system of 25 en route navigational centers, 188 terminal area approach stations, and 442 airport terminal control towers--the air traffic control system. In addition, 317 flight service stations provide general aviation pilots with aviation maps, weather reports, and other flight services. To equip, maintain, and staff this system, the Department of Transportation's Federal Aviation Administration (FAA) spent more than $2.5 billion in 1982, of which about 11 percent paid for capital improvements, and nearly 90 percent was devoted to air traffic controllers' salaries and other operating costs (see Table VI-1). Although only about 75 percent of the FAA's operating expenses are financed by fees collected from aircraft operators

TABLE VI-1. FEDERAL CAPITAL AND OPERATING EXPENDITURES FOR AIR TRAFFIC CONTROL UNDER CURRENT POLICY (In billions of dollars)

	1982	1983	1984	1985	1986	1987
Capital Investment a/	0.29	0.31	0.49	0.84	1.08	1.11
Operations	2.29	2.46	2.31	2.18	2.06	1.96
Total	2.58	2.77	2.80	3.02	3.14	3.07

SOURCE: Outlays projected by Congressional Budget Office from budget authority given in Airport and Airway Improvement Act of 1982.

a. Annual budget authority for capital 1983-1987 was $0.73 billion, $1.39 billion, $1.41 billion, $1.38 billion, and $1.16 billion.

and passengers, all capital investment--the primary focus of this chapter--is financed in this way.

Today's air traffic control system has evolved over 40 years, producing a mixture of equipment and technologies of many ages and types. The system has been adequate to assure the safety of air travel, but technological limitations already delay air travelers and incur very high operating and maintenance costs for the FAA. The air traffic control equipment now in use--relying heavily on vacuum tubes--is highly labor intensive and is becoming increasingly costly to buy, maintain, and repair. Further, it is slow to process data received by radar stations and cannot handle the large volume of aircraft use projected to develop in coming years (see also Chapter VII). The far cheaper and more efficient microchip technology that has developed over the last decade makes the current generation of equipment obsolete.

Since technological opportunities now permit greater automation, the air traffic control system could be operating with much greater efficiency than it now does. For example, controllers now determine correct aircraft separation on the basis of radar data, and most data, after being processed by computers, are coded on paper strips torn by hand from computer

printers. This is a costly mechanical system requiring coordination and input by the air traffic controllers. The handover by telephone of aircraft en route from one controller to another is also primitive by today's standards. Automating these functions would sharply reduce requirements for facilities and manpower while simultaneously curbing the reliability problems common in labor-intensive mechanical operations.

Compounding the problems of inefficient and obsolete equipment, anticipated traffic growth--projected by the FAA to increase by 50 percent over the coming decade--promises to place demands on the system that it could not meet safely with present capacity. Although the FAA projections have been criticized as too high, 1/ they appear accurate with regard to the mix of demand from users. Commercial air carriers are expected to account for 22 percent of projected demand growth, while much more--60 percent--is anticipated to arise from general aviation (that is, operators of small private aircraft for business and recreational purposes).

Demand on traffic control towers and en route centers depends largely on the number of aircraft that are active, rather than on the types or uses of aircraft served. Even though air carrier passenger miles could increase by as much as 80 percent by 1994, the number of actual air carrier aircraft is expected to rise by only one-fourth, reflecting the growing use of large aircraft with greater seating capacity. The number of planes in the general aviation fleet, on the other hand, could grow by up to 50 percent, with numbers of business jets--the most active general aviation users of air traffic control--more than doubling. In addition, greater use of avionics (radar transponders that enable pilots to communicate with approach stations, control towers, or en route centers) by existing general aviation planes would exert pressure on the system to expand.

The Costs of Neglect

Without sufficient investment to modernize the air traffic control system, significant costs could arise in the form of diminished safety, higher system running costs, and insufficient capacity. To maintain safe separations between aircraft in flight, traffic controllers using inadequate instruments already require air carrier planes to use roundabout routings that waste fuel and time and consume the useful life of aircraft. Thus, failure to improve the system would result in significant costs for air carriers as well as general aviation. By the late 1980s, air carriers would need to reduce the

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1. See Office of Technology Assessment, Review of the FAA 1982 National Airspace System Plan (August 1982).

number of scheduled flights to accommodate the system's limited capacity. Inefficient routings would add an estimated 90 million hours to passengers' flight times; airlines would waste an estimated one billion gallons of jet fuel. And the FAA's operating costs would be some 50 percent higher than they are today. 2/

CURRENT POLICY IN AIR TRAFFIC CONTROL

Federal coordination and control of air traffic activities minimizes overall administrative costs and ensures uniform rules of navigation and air safety. Although a few local airport authorities install their own navigational instruments, the number of such initiatives has accounted for a very minor share of total air traffic control investment since 1960.

Cumulative capital investment since 1960 in the nation's air traffic control system totals $8.5 billion, all of which has been federally funded. Federal spending over the years displays an erratic pattern, reflecting shifts between periods of high-cost system expansion and periods of low-cost routine repair and replacement (see Figure VI-1). The 1950-1960 decade was one of expansion, as the system grew to accommodate the post-War boom in commercial aviation; the number of airports equipped with control towers rose by more than 50 percent, and five en route centers were added (see below). System capacity stabilized between 1960 and 1967, but a grow-

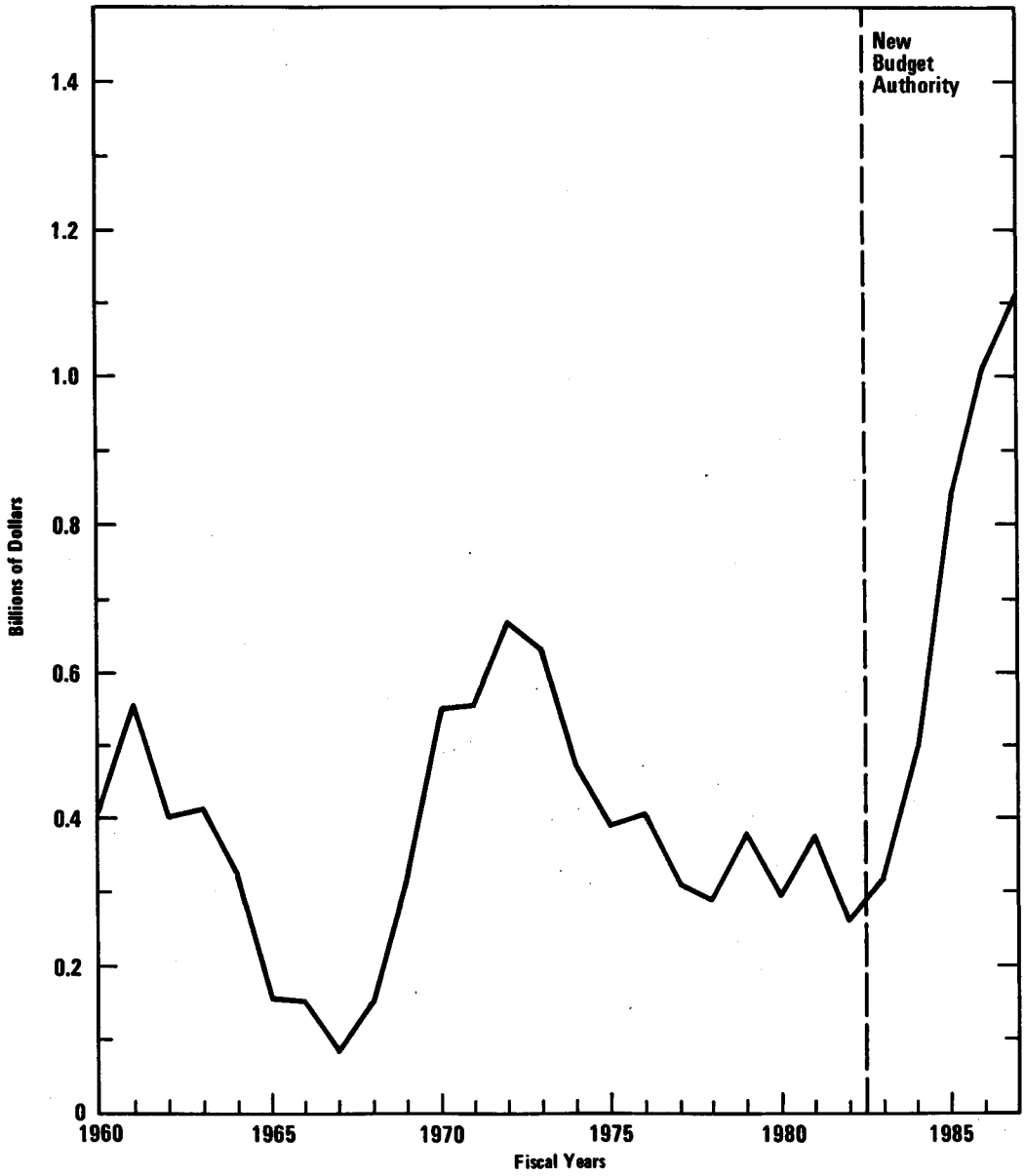
	1960	1973	1982
Number of Airport Towers	256	365	444
Percent change in ten years	+53	+43	+22
Number of En Route Traffic Control Centers	35	27	25
Percent change in ten years	+17	-23	-7

ing number of reroutings, lengthy holding patterns, and forced airline schedule reductions necessitated another round of system expansion and automation from 1967 to 1972. By 1973, an additional 109 airports were equipped with control towers, and automation at en route control cen-

2. From Federal Aviation Administration, Aviation Forecasts (February 1983), and U. S. Department of Transportation, National Airspace System Plan (December 1981, updated April 1983).

Figure VI-1.

Actual and Projected Federal Capital Spending on Air Traffic Control, 1960-1987



SOURCE: Congressional Budget Office from data provided by the Federal Aviation Administration.

NOTE: Outlay figures for 1983-1987 are based on authorizations in the Airport and Airways Improvement Act of 1982.

ters--by means of digital computers and more advanced software, and better displays--increased the hourly number of flights handled by 30 percent, while permitting an actual reduction in the number of centers to 27.

The last ten years have witnessed a return to declining investment in the air traffic control system. In managing the system, the FAA has concentrated capital funds on system maintenance, relying on the addition of more air traffic control personnel to handle growing demands for service. Since the Professional Air Traffic Control union (PATCO) walkout in 1981, the system has been kept operating with a reduced work force by the FAA's administratively limiting air traffic. As of February 1983, there were 23,257 air traffic controllers employed--10.9 percent fewer than the 26,088 authorized, owing to the lingering effects of the strike.

Major Air Traffic Control Investment Needs Under Current Policy

The National Airspace System Plan published by the FAA in December 1981 and approved by the Congress in 1982 under the Airport and Airway Improvement Act charts a future course for the air traffic control system. 3/ With annual authorizations of roughly $1 billion, the FAA plan would automate and consolidate components of the air traffic control system. Through automation, it would increase traffic handling capacity, diminish the risk of mid-air collision and other hazards, and shorten flight times by allowing aircraft to use more direct routes. By consolidating facilities and reducing staff, the plan would lower FAA operating and maintenance costs. By the year 2000, the present 25 en route navigation centers and 188 airport approach facilities would be merged into about 30 facilities, and the 317 flight service stations would be reduced to 61. Staffing would be cut accordingly, from its authorized level of 37,122 in 1983 to 30,200 in 1985, and to 24,200 by the turn of the century.

On the basis of FAA estimates, the major cost of modernization--not only to the federal government but to private-sector users as well--will total $10.7 billion in 1982 dollars by the turn of the century (see Table VI-2). Most of this cost--about 72 percent--represents direct federal investment in computer hardware and software and in other improved equipment. The remainder represents investment expense for the airline industry and general aviation users, who would have to purchase compatible cockpit equipment (transponders and other avionics equipment). Federal funding for the first five years of the program was authorized in 1982 at $1 billion a

3. See U. S. Department of Transportation, National Airspace System Plan (December 1981, updated April 1983).

year under the Airport and Airway Development Act. Although the National Airspace System Plan would capture a number of technological opportunities to improve the efficiency of the existing system, it may--from a technological standpoint--be premature in the rate at which it would expand existing capacity.

EFFICIENCY OF CURRENT POLICY--THE FAA PLAN

As with any long-range investment, the estimated benefits and costs of modernization under the FAA's National Airspace System Plan hinge on a number of policy assumptions and other forecasts. Some of the major assumptions that underlie the FAA plan include continued heavy federal subsidization of general aviation users (see also Chapter VII), an ability to consolidate facilities and thus achieve significant savings in operating costs, and no cost overruns.

On the basis of these assumptions, the FAA has projected that, by the year 2000, the plan would save the federal government $25 billion in operating and maintenance costs--about two-thirds of the total benefits it expects from the plan (see Table VI-3). The remaining one-third of the benefits would accrue to the airlines and general aviation users in the form of lower running costs and shortened delays. (The FAA made no attempt to place a dollar value on most of the expected safety improvements.)

On the basis of these projected costs and benefits (compare Tables VI-2 and -3), the CBO calculates that the annual rate of return to be expected from the plan over the next two decades is 24.3 percent--a healthy return by any standards (see Table VI-4). Indeed, compared with the commonly used (though somewhat arbitrary) standard of 10 percent set by the Office of Management and Budget (OMB) for federal investment, the FAA plan appears to represent very good value. Another useful guide to the economic merit of a capital project is the present value of the expected benefits, minus the costs. Using FAA assumptions, and 10 percent as the discount rate to adjust future costs and benefits to their present-day values, the benefits of the FAA plan are estimated to exceed the costs by $9.1 billion for a benefit-to-cost ratio of 2.3:1.

When should modernization begin? One index of whether a project is well timed is how long the nation must wait before the investment begins to pay off. A long waiting period means that success of the plan hinges on ever more distant forecasts, and such distant forecasts inevitably tend toward speculation. On the basis of the FAA estimates of costs and benefits, the plan would begin to pay for itself (that is, achieve a 10 percent or greater rate of return) within the next five years. This would suggest minimum risk in going ahead with the project now.

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TABLE VI-2. PROSPECTIVE COSTS OF IMPLEMENTING THE NATIONAL AIRSPACE SYSTEM PLAN, 1983-2005

Sources of Costs	Total Cost 1983-2005		Present Value with 10 Percent Discount Rate a/	
	In billions of dollars	As percent of total	In billions of dollars	As percent of total
Federal Investments	7.65	71.7	5.73	82.7
Avionics Costs to Users				
Transponders and other equipment b/	2.42	22.7	0.88	12.7
Microwave Landing System	0.59	5.6	0.32	4.6
Total	10.66	100.0	6.93	100.0

SOURCE: Congressional Budget Office from data provided by Federal Aviation Administration.

a. 10 percent represents the minimum rate of return set by the Office of Management and Budget for federal capital investments.

b. Includes Traffic Alert and Collision Avoidance System (TCAS).

Effects of Possible of Errors in the FAA Assumptions

The foregoing conclusions are, of course, only as valid as the assumptions and forecasts on which they are based, and these cannot be absolutely certain. Thus, it is necessary to look at what could happen to the plan if things do not go as assumed.

TABLE VI-3. PROSPECTIVE BENEFITS FROM THE NATIONAL AIRSPACE SYSTEM PLAN, 1983-2005

Benefits	Total Benefits, 1983-2005		Present Value with 10 Percent Discount Rate a/	
	In billions of dollars	As percent of total	In billions of dollars	As percent of total
Savings in FAA Operating Costs from Increased Productivity	37.09 b/	62.2	10.64	66.5
Savings in Fuel from Transponders and Other Equipment c/				
Air carriers	11.29	18.9	2.62	16.4
General aviation	5.07	8.5	1.13	7.0
Savings from Microwave Landing System				
Improved safety	0.28	0.5	0.08	0.5
Reduced disruptions	2.52	4.2	0.66	4.1
Reduced outages	0.24	0.4	0.07	0.4
Reduced ground and air restrictions	1.99	3.3	0.50	3.1
Shortened approach path length	1.12	1.9	0.30	1.9
Total d/	59.60	100.0	15.99	100.0

SOURCE: Congressional Budget Office from data provided Federal Aviation Administration.

a. 10 percent represents the minimum rate of return set by the Office of Management and Budget for federal capital investments.

b. The FAA estimates that savings in operating costs would total $25 billion by the year 2000. The CBO has projected another five years of savings for analytic purposes. However, the discounting of future costs makes this difference of very little significance.

c. Traffic Alert and Collision Avoidance System (TCAS).

d. Details may not add to totals because of rounding.

TABLE VI-4. ECONOMIC EVALUATION OF THE NATIONAL AIRSPACE SYSTEM PLAN UNDER ALTERNATIVE ASSUMPTIONS

CBO Assumptions	Annual Rate of Return (In percents)	Discounted Benefits Minus Discounted Costs (In billions of dollars) a/	Ratio of Benefits to Costs a/
Operating Cost Savings Delayed Five Years	13.9	3.1	1.5
Operating Cost Savings of Half those Assumed by FAA b/	9.1	-0.4	0.9
Cost Overrun of 25 Percent	17.1	5.0	1.6
FAA Assumptions	24.3	9.1	2.3

SOURCE: Congressional Budget Office and Federal Aviation Administration data.

a. All benefits and costs are discounted to their 1982 values at the rate of 10 percent a year. The analysis period is 1982 to 2005.

b. Includes only federal investment costs and federal benefits in the form of savings in FAA operating costs. Excludes avionics costs to airlines and general aviation users, as well as direct benefits to them.

Subsidization of General Aviation Users. Modernization can yield sizable gains in efficiency independent of traffic growth. But if the FAA's traffic forecasts should prove too high, overall cost savings and incidental benefits would be lower than anticipated. The FAA's projections of future traffic growth assume that the federal government will continue its current

practice of subsidizing general aviation users in their access to air traffic control services. After applying its user fee payments to airport development, general aviation makes very little contribution to its 30 percent share of total traffic control system capital and operating costs. As a measure of the magnitude of this subsidy, recovery of all the costs that general aviation imposes would require the taxes paid by private plane owners to increase from the current 12 cents a gallon of gasoline and jet fuel to about $1.20 per gallon (or an equivalent amount raised through other taxes on general aviation). 4/ This subsidy to general aviation stimulates use of the system, and thus any substantial reduction in this subsidy would diminish the load on the air traffic control system.

Although the FAA plan would remain cost effective even with reduced general aviation traffic (because system modernization and consolidation would yield enough savings in FAA operating costs to justify the investment even if there were no growth in traffic), 5/ a diminished workload could allow the use of even more efficient approaches to system modernization. For example, en route centers now use computers built in the 1960s, and though these are still in good working order, they are not expected to remain adequate for processing the computer programs needed to handle the projected high volumes of hourly traffic in the mid- to late-1980s. The FAA's first step in implementing the plan is replacement of those computers. Use of existing software in new computers, however, runs the risk of freezing future system development, necessitating yet another round of investment in costly computer equipment a few years hence. This could be avoided if general aviation traffic grows more slowly than the FAA now assumes; with reduced subsidies and slower projected growth in air traffic, alternative approaches would be possible. These include delaying computer replacement and beginning immediately to design a complete system of hardware, software, and displays. These steps could take better advantage of advances in computer technology and provide a replacement system within the same time frame, according to the Office of Technology Assessment, and cost savings could amount to some $186 million. 6/

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4. This level of taxation would fully recover all the FAA expenses incurred on behalf of general aviation users, including airport investment.

5. See Statement of Alice M. Rivlin, Director, Congressional Budget Office, Before the Subcommittee on Transportation, Committee on Appropriations, U. S. House of Representatives, April 6, 1983.

6. See Office of Technology Assessment, Review of the National Airspace System Plan (August 1982).

Savings in Operating and Maintenance Costs. The FAA's projected savings of $25 billion over 20 years depend critically on the closure of hundreds of manned facilities and a reduction of 40 percent of the FAA's authorized work force level, or 14,800 personnel. 7/ In the past, such changes have encountered opposition in the Congress and among labor and aviation groups. Even if the same resistance delayed the changes this time by as much as five years, the project overall would still be worthwhile--with a rate of return of 13.9 percent. The project would take longer to pay off, though, and the Congress would be relying on more distant--and thus more speculative--forecasts to achieve an acceptable return on its investment.

If reluctance to make organizational changes obviated half of all projected savings in operating costs, then the FAA plan would no longer be economically worthwhile. In such a case, the discounted federal investment costs would exceed the discounted savings in FAA operating and maintenance costs (see Table VI-4).

Cost Overruns. Although CBO has not made a detailed assessment of the FAA's cost estimates, overruns are common in both public and private investments. Higher costs would diminish the value of the FAA plan, but such overruns would have to be quite large to bring about the plan's economic failure. For example, even with a 25 percent cost overrun and with less traffic than the FAA has forecast, the plan would still yield net benefits of $5 billion. In fact, capital costs would have to double before the costs would exceed the benefits, even with lower traffic forecasts.

FEDERAL STRATEGIES TO IMPROVE AIR TRAFFIC CONTROL INVESTMENT

In August 1982, the Congress adopted the FAA's National Airspace System Plan with little modification. Annual program authorizations were increased from $260.8 million in 1982 to an average of $1.0 billion for the 1983-1987 period--enough to cover all modernization and expansion costs of the first phase of the plan (see Table VI-2). The FAA intends revenues from current user fees to recover these costs fully, although commercial air carriers would continue to subsidize general aviation users (see also Chapter VII). After allowing for their contribution to airport development, general aviation users would continue to cover hardly any of their allocable share. Thus, the Congress may wish to consider, in tandem with the FAA plan, a policy that would institute full-cost-recovery fees from general aviation users. This course might permit a more deliberate program for

7. The reductions would affect not only 10,700 controllers but 4,100 maintenance and administrative workers as well.

system modernization. The merits of both the present FAA plan and a modification involving user fees should be considered from various viewpoints.

Safety and Efficiency. The FAA has recently published a preliminary analysis of the benefits it expects to result from the plan. 8/ Casualties are projected to be reduced, though by an undetermined amount. More direct routing would save one billion gallons of fuel each year. And FAA operating costs, as stated above, would be reduced by $25 billion over the next 20 years.

Service Consolidations and Personnel Cuts. The plan's economic success (benefits in excess of costs) hinges on its actually achieving the savings in FAA operating costs. These savings from automation depend on the FAA's ability to close and consolidate facilities and reduce its work force. To date, evidence of Congressional and other resistance to consolidating control facilities has included opposition to regional office cutbacks. The FAA's 1981 proposal to close five of its 11 regional offices stirred employee protest, state resistance, and Congressional opposition. As a result, the FAA modified its consolidation plan, reducing the number of proposed closings from five to two. In addition, statutory restrictions of flight service station closings could inhibit implementation of the plan. Current law stipulates that only five flight service stations may be closed in 1983, but the plan calls for closing 60 stations in 1984.

The Congress could take either a passive or an active role in smoothing the process. First, it could decide not to interfere with FAA plans to close facilities, or second, it could actually incorporate the FAA's schedule for consolidation and staff reductions as part of the appropriations process. This latter course might include setting lower appropriations that would, in effect, force the FAA to consolidate facilities and reduce staff.

Increased User Fees

If fees, in the form of taxes on fuel, were levied on general aviation users and set to recover the full federal costs of those users' share of air traffic control, the effect would be to reduce general aviation demand for air traffic control to an economically justifiable level, and currently planned outlays for system expansion could be reduced by about 10 percent, to an

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8. See Federal Aviation Administration, Preliminary Analysis of the Benefits and Costs to Implement the National Airspace System Plan (June 1982).

average of $0.7 billion annually (see Table VI-5). Savings would come from delayed computer replacement, more advanced computer technology, more selective application of technologies, and from lower replacement costs made possible by reduced traffic levels. A fuel tax, set at a system-sustaining level, would not result in the most efficient level of demand, however, since it is not sensitive to the actual amount of use that each aircraft makes of the air traffic control system. For example, many recreational aircraft, which usually fly at low altitudes, require very little, if any, air traffic control service. Direct taxing methods, fees geared to the use of air traffic control service by each user, have been impractical in the past, although the FAA plan would introduce a new radar system capable of identifying each aircraft that uses the system, continuously monitoring each plane from take-off to landing. Data from the system could provide a detailed record of the services used and users could be billed accordingly.

TABLE VI-5. PROJECTED FEDERAL CAPITAL EXPENDITURES FOR AIR TRAFFIC CONTROL WITH FAA PLAN ALONE AND SUPPLEMENTED WITH USER FEES (In billions of dollars)

	1983	1984	1985	1986	1987
FAA Plan	0.31	0.49	0.84	1.08	1.11
With Increased User Fees	0.26	0.42	0.77	1.01	1.02

SOURCE: Congressional Budget Office.

Adequacy of Air Traffic Control. Compared to the FAA plan as it now stands, a slower pace of automation with increased user fees could delay productivity improvements somewhat, although by how much cannot be determined precisely. The level of service could be roughly equivalent to that projected under the FAA plan, however, since fewer aircraft would be using the system. Thus, benefits from the plan supplemented with user fees--benefits in the form of fewer accidents, time saved, and fuel saved--could be about the same as benefits produced by the plan under current policies. On the other hand, if general aviation traffic grew more rapidly than is expected with higher fees, the more limited capacity could require administrative quotas to limit traffic (as were imposed during the PATCO strike), at least until additional capacity became available.