

average person's desire to travel during daylight hours. There are personal phobias and biases to overcome in any major shift from the automobile.

CONCLUSION

In summary, we can say that considerable excess capacity is available, but it may be difficult to use unless we can focus sufficient managerial and logistic talent in the transportation area to develop plans to use that capacity. Also, in recent months, evidence that we can handle these problems has increased, as U.S. citizens responded to a realistic awareness of diminishing fuel supplies, to the prodding of rapidly rising fuel prices, and to their desires to reduce U.S. dependence on foreign energy.

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Energy and the Airline Industry

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The most critical problem facing the airline industry today concerns fuel—its availability, price, and supply. This report (a) presents background information on jet fuel availability and prices, (b) discusses fuel efficiency and conservation, and (c) describes the impact of the 1973-1974 fuel shortage and possible future actions resulting from shortages.

FUEL AVAILABILITY

Adequate fuel supplies are necessary to ensure the reliability and availability of air transportation. The following are a few basic facts about jet fuel.

1. Scheduled air carriers use kerosene-based jet fuel (kerojet). It is a middle-distillate product, and only about 10 percent of the crude oil barrel can be used to produce jet fuel. Currently, however, only about 4.5 percent is processed and sold as kerosene-based jet fuel.
2. In addition to its use by scheduled airlines, kerojet is used by the military, general aviation (including business aircraft and commuters), and electric utilities that rely on kerojet as an alternative fuel.
3. Kerojet, as a middle distillate, can be diverted into other comparable products, such as heating oil. In winter months, however, such diversion has an adverse potential for kerojet supplies.
4. Kerojet is sold directly by refiners to air carriers in the United States. Middlemen are seldom involved in its distribution.

U.S. airlines supported the removal of price and

allocation controls from kerosene-based jet fuel, which occurred in February 1979. But, since March 1979 and the upheaval in Iran, suppliers that have contracts with carriers have allocated jet fuel supplies. Most of these allocations, which refer to different base volumes, are tied to corresponding 1978 monthly increases and do not reflect current levels of carrier operations or the continuing surge in air transportation.

The difference between the allocated volumes and the volumes needed to maintain adequate service has been made up with purchases in the spot market, contracts with new suppliers, and, to some very limited extent over the past year or so, cancelled flights.

FUEL PRICE

The recent sharp increases in the price of jet fuel began in the early months of 1979. By December 1979, the average price of jet fuel was \$0.75/gal, compared to \$0.40/gal in 1978 and \$0.12/gal prior to the OPEC embargo in 1973.

Currently, the average price is more than \$0.80/gal. The December 1980 price may well reach \$1.10/gal based on trends over the past year. Every increase of \$0.01/gal adds more than \$110 million annually to the operating costs of U.S. airlines.

The airline industry's total 1980 fuel bill is estimated at \$10.6 billion, with \$4.1 billion added in 1980 due to price increases alone. At this level, fuel accounts for more than 30 percent of total operating expenses. By comparison, fuel accounted for 25 percent of operating expenses in 1979, based on a total fuel bill of \$6.5 billion, and about 12

percent of operating expenses prior to the 1973 oil embargo.

FUEL EFFICIENCY AND CONSERVATION

In the past five years, the airlines have become increasingly more efficient in conserving their use of petroleum resources with the purchase of more fuel-efficient aircraft and with operational improvements. Passenger load factors have increased from 52 percent to 63 percent. Also, the average number of seats per aircraft and stage lengths have increased. Other improvements have included (a) reducing cruise speed, (b) expanding use of flight simulators, (c) increasing the use of computerized flight planning, (d) developing sophisticated monitoring systems to identify aircraft that may be using excess fuel, and (e) shutting down one or more engines for taxiing maneuvers before takeoff and after landing.

Since 1973, the number of airline passengers has increased by about 100 million, or 49 percent, while airline fuel consumption has increased by only 5 percent. For 1980, total airline fuel consumption is expected to remain at the 1979 level of 11.2 billion gal. During the period 1973-1979, passenger miles per gallon, the best efficiency measure for jet fuel use, increased by 43 percent—from 17.5 passenger-miles/gal in 1973 to an estimated 25 passenger-miles/gal in 1979.

1973-1974 SHORTAGE—IMPACT AND ACTIONS

The OPEC oil embargo during the latter part of 1973 had a serious impact on the airlines and the travel industry. Relative to airline traffic, there was a certain amount of diversion from the automobile to the airplane as a result of the gasoline shortage. Domestic airline passenger traffic increased 7 percent in the first quarter of 1974, largely as a result of this diversion from automobile use. Domestic intercity travel by all modes of transportation was down about 4 percent in early 1974. For all of 1974, domestic air travel was up about 3 percent, compared to a decline of about 2 percent for all transportation modes.

As a result of the jet fuel shortage, the airlines dropped nearly 2000 flights/day in early 1974. These flight

reductions averaged 1100/day for all of 1974. During that year, the airlines averaged about 13 000 flights/day, compared to 14 000 flights/day in 1973. With this reduction in capacity, the airlines had to furlough about 15 000 employees in 1974.

With the decrease in flights in 1974 and the increase in traffic, passenger load factors increased. The load factor in 1974 amounted to 55 percent, compared to 52 percent in 1973.

POSSIBLE FUTURE ACTION

The airlines in the future are likely to pursue increasing efficiency as part of their role in the nation's conservation efforts. The purchase of more fuel-efficient aircraft will also help in energy conservation efforts and provide operational improvements.

Airline industry capital requirements for new equipment during the 1980s are estimated at \$87 billion, including passenger- and freight-carrying aircraft. During the past decade, capital investment by the airlines amounted to \$17 billion and in the 1960s, \$10 billion.

The industry will need an average annual corporate return on investment of 13-15 percent to meet the \$87 billion in capital requirements from 1980 to 1990. In 1979, the industry's return on investment was less than 8 percent.

The airlines and other public transportation modes must receive adequate supplies of fuel during tight supply situations because they constitute the basic network of the nation's transportation system. In addition, public passenger transport accounts for only about 10 percent of total transportation-related petroleum consumption.

In the event of future major disruptions in energy supply, such as another embargo, it is hoped that ways could be found to ensure adequate jet fuel supplies to avoid curtailment of airline services. Nevertheless, we must be prepared for reductions in airline services should they prove necessary. Only through the combined cooperation and efforts of all concerned, including carriers, travelers, and shippers of all modes, can the transportation industry meet the national energy challenges of the future.

Energy Needs of the Commuter Airline Industry

Commuter Airline Association of America

The combination of airline deregulation, the uncertain availability and price of automotive fuels, and the surging public demand for air travel have spurred the growth of the commuter airline industry beyond its wildest dreams of just a few years ago. As a result, commuter airlines are gearing up to implement better service, with greater frequency to more communities than ever before.

It might appear that the Airline Deregulation Act of 1978 brought about a near revolution in U.S. air service. It has not. The role of commuter airlines in providing short-haul, hub-spoke air transportation as a replacement for departing certificated jet air-carrier service has long been established. In the 12 years prior to the Airline Deregulation Act, commuter air carriers successfully replaced service at 140 of the 172 cities that were suspended from the certificated air-carrier schedules. Since deregulation, that commuter replacement figure has increased by another 60 cities.

What the deregulation act did provide was a mechanism to allow this change in air service on a rational basis. The Airline Deregulation Act contained important provisions that (a) guaranteed the provision of minimum levels of air service for the next 10 years; (b) established a replacement mechanism that assures an orderly transition in air-carrier service; (c) allowed commuter air carriers to operate

aircraft with a capacity of up to 60 seats, important because the commuter replacement service can be provided in aircraft properly matched to the size of the replacement market demand; and (d) provided key economic incentives to commuter airlines, such as equipment loan guarantees, joint fares, and subsidy where needed—provisions long available to other segments of the air-carrier industry.

Under deregulation, commuter airlines will assume an even more significant proportion of local and feeder air service than ever before. The economics of short-haul transportation make it increasingly difficult for air carriers that use large jet-transport aircraft to profitably serve such markets. On the other hand, commuter airlines with frequent schedules use aircraft matched to the market density and can continue to provide convenient replacement air service in those markets abandoned by trunk- and local-service carriers.

FUEL COSTS

The most significant new element in this changing service pattern has been the incredible rise in the cost of fuel. No one could have foreseen, even several years ago, that the enplane (i.e., to board) price of jet fuel would increase so dramatically. That increase measured some 80 percent