

POTENTIAL ENERGY IMPACT OF A FOUR-DAY, FORTY-HOUR WORK
WEEK FOR FEDERAL CIVILIAN EMPLOYEES

A Staff Working Paper

Office of Intergovernmental Relations
Congressional Budget Office

December 1979

This working paper, requested by the House Committee on Interior and Insular Affairs, was prepared by Mark Musell of the Office of Intergovernmental Relations of the Congressional Budget Office. The House Information Service provided support by processing statistical data used in this paper. In keeping with CBO's mandate, it does not contain any recommendations.

SUMMARY

Some 60,000 federal employees are currently participating in experiments with compressed work schedules, including the four-day, forty-hour week. These experiments, authorized for a three-year period, will assist the Congress in determining whether federal agencies should adopt alternative work schedules permanently.

This paper deals with the effect of a four-day, forty-hour week on energy consumption. When four days are worked each week, the work day is normally extended to ten hours. According to CBO estimates, energy consumption under a four-day, forty-hour week might increase or decrease. At one extreme, it could increase by the equivalent of 2.87 million barrels of oil per year; at the other extreme, it could decrease by the equivalent of 3.70 million barrels. The energy impact, regardless of direction, would be negligible when compared to overall U.S. consumption--which would change by less than 0.06 percent.

The specific energy impact of a four-day, forty-hour work week would depend mainly on three factors--the energy used in commuting to and from work, the energy used in nonwork travel, and the energy consumption of utilities for public office buildings. Little information is available on how these might be affected by a four-day, forty-hour work week, although several studies are underway. The estimates in this paper are intended to serve as benchmarks until the completion of more definitive studies.

Federal civilian employees commuting by automobile travel an estimated 13.14 miles per day (average round trip adjusted for carpooling and time off). A federal four-day, forty-hour week would eliminate one round trip per week and save an estimated 1.54 million barrels of oil per year. However, savings from less frequent commuting might or might not be offset by an increase in nonwork travel. Federal employees currently travel an estimated 25.89 miles on both Saturday and Sunday. If leisure travel on the extra day off averaged that same number of miles, commuting savings would be more than offset by an annual increase in fuel consumption of 2.44 million barrels of oil. It may be, however, that no increase in leisure travel would occur under a four-day work week. Some analysts argue that the timing of trips would change but not their distance or frequency.

The impact of a four-day, forty-hour work week on the amount of energy needed for heating, cooling, and lighting federal offices is also indeterminate. It would depend on changes made in business hours and in the schedule for heating and cooling. Estimates range from an increase equivalent to 1.97 million barrels of oil per year (based on five ten-hour business days and a corresponding increase in heating and cooling time) to an annual decrease of 2.16 million barrels (based on four ten-hour business days but no increase in heating and cooling time).

The high estimate given earlier of an increase in total energy consumption by the equivalent of 2.87 million barrels of oil per year is based on the assumption that the extra day off would occur on a Friday or Monday and that leisure travel on that day would approximate the travel that now occurs on a Saturday or Sunday. The estimate also assumes that utility requirements for federal offices would increase if agencies staggered employee hours to maintain a five-day business week and extended the daily peak period for heating and cooling to accommodate the longer work day.

The low estimate of 3.70 million barrels saved per year is based on the assumption that a federal four-day work week would be adopted with energy implications specifically in mind. It assumes that the extra day off would occur in midweek and that there would be no net increase in nonwork travel. It also assumes that federal offices would be closed one additional day each week, and that the period for heating and cooling would not be extended despite the longer 10-hour day.

Energy conservation, of course, is only one of many things to be considered in evaluating the desirability of a permanent four-day work week. Proponents have argued that it would permit employees to spend more time with their families, would increase job performance, and would reduce absenteeism. Opponents have argued that it would have a negative effect on workers' health, on the incidence of on-the-job accidents, on home life, and on job opportunities for the unemployed. Studies of experience in the private sector have been inconclusive on these issues.

BACKGROUND

Last year the Congress authorized federal agencies to experiment for three years with alternatives to the standard five-day, forty-hour work schedule. 1/ These experiments are intended to demonstrate the effects of alternative work schedules on agency efficiency, mass transit facilities, energy consumption, opportunities for employment, and the lives of employees and their families. By March 1982, the Office of Personnel Management (OPM), is required to evaluate the effects and recommend to the Congress legislative or administrative action.

The primary purpose of this paper is to provide estimates of the potential effect on energy consumption of adopting a four-day, forty-hour schedule for most federal civilian employees on a regular basis. So far no studies of this question have been completed, although several are underway. 2/ The estimates in this paper should serve as bases for consideration until more definitive studies become available.

FEDERAL EXPERIMENTS

The first concentrated federal experimentation with alternative work schedules has been in Denver, where 9,500 workers in at least 20 agencies are currently working on compressed work schedules. These experiments, covering about one-third of the local federal civilian workforce, were initiated last year primarily to help reduce air pollution.

-
- 1/ The Federal Employees Flexible and Compressed Work Schedules Act of 1978 (P.L. 95-390) suspends certain overtime and premium pay statutes for a three-year period in order to permit various alternatives for scheduling a forty-hour week.
- 2/ In addition to the forthcoming evaluation from the Office of Personnel Management, the Denver Council of Governments expects to release a report in the fall of 1980 on the effects of agency work schedule experiments in Denver on air quality and energy consumption, and the Department of Energy is studying the energy effects of alternative work schedules in the nonfederal sector.

Nationwide, about 45,000 employees in the Executive Branch are currently involved in experiments with flexible work schedules for individual employees, and 60,000 are with compressed work schedules, including a four-day, forty-hour week. About 5 percent of the federal government's full-time nonpostal civilian workforce is participating, and the number will increase after current negotiations with employee organizations are concluded.

Under a compressed schedule, hours worked per day are extended to compensate for the additional day off. When four days are worked each week, for example, the work day is normally extended to ten hours. Many of the experiments involve scheduling an extra day off every other week. Under this arrangement, employees work eight nine-hour days and one eight-hour day.

The three-year federal experimentation is to assist the Congress in determining whether and in what situations alternative work schedules could be used successfully by federal agencies on a permanent basis. Federal experiments may also offer insight for more widespread adoption of compressed work schedules in the private sector. 3/

POTENTIAL ENERGY IMPACT

The analysis of energy implications in this paper is limited to the effects of a four-day work week on automobile commuting, on nonwork travel, and on energy consumption by federal offices. The analyses of commuting and nonwork travel are based mainly on data from a 1977 unweighted sample of 2,400 government

3/ Several legislative proposals affecting work schedules in the private sector have been introduced in this Congress. H.R. 4430 and S. 1126, for example, would amend the Fair Labor Standards Act of 1938 and the Walsh-Healey Public Contracts Act of 1936 to permit compressed work schedules in private firms having contracts with the federal government.

employees. ^{4/} Although residential energy consumption might change under a compressed work schedule, the impact cannot be quantified and so is not considered.

Commuting to Work. Federal civilian employees commuting by automobile average nationwide an estimated 13.14 miles per day (round trip distance adjusted for carpooling and time off). A federal four-day, forty-hour work week would eliminate one round trip per week and thus offer a potential saving of 1.54 million barrels of oil per year. These estimates do not allow for any impact on public transportation, since federal civilian employees are normally a small portion of the total workforce in a given area (except in Washington, D.C., and a few other localities). Because of a longer work day, some employees might be able to commute during periods of less traffic congestion and thus save up to 7 percent more fuel. However, such additional savings are not considered since estimates of non-rush hour commuting under a four-day schedule cannot be ascertained.

Nonwork Travel. Savings from less frequent commuting might or might not be offset by an increase in nonwork travel. They would be more than offset if leisure travel on the extra day off averaged the 25.89 miles estimated to occur per employee on a Saturday or Sunday. In that case, an estimated 2.44 million barrels of oil would be required annually for the increase in leisure travel. Some analysts, however, believe that a four-day week would not increase leisure travel--arguing that the timing of trips would change but not their total distance or frequency. Moreover, travel on an extra day off would be constrained by the school or work schedules of other family members.

^{4/} The sample was derived from preliminary data contained in the National Personal Transportation Survey (NPTS) which is conducted by the Bureau of the Census for the U.S. Department of Transportation. The CBO analysis is limited to persons aged 16 and over who were employed full-time by federal, state, or local governments. Occupations found predominantly in local government were excluded (that is, teachers, public safety and administration of justice occupations, and sanitation workers). The estimates of distances traveled in commuting to work were adjusted to reflect geographic differences according to the distribution of federal employees among: Standard Metropolitan Statistical Areas (SMSAs) under 3 million population; larger SMSAs; and non-SMSAs.

Utilities for Public Buildings. A four-day, forty-hour work week might either increase or decrease the amount of energy used for heating, cooling, and lighting federal offices. The potential impact would depend on changes in business hours and in the schedule for heating and cooling.

A four-day, forty-hour work week could be implemented in a number of ways. For example, federal agencies could stagger employee schedules in order to remain open five days per week. This approach, used in most federal experiments, creates a fifty-hour business week of five ten-hour days. Under another approach, agencies could close one day out of five, thus creating a forty-hour business week of four ten-hour days.

Under a four-day, forty-hour week, changes in work schedules could cause changes in the hours that federal offices are heated and cooled. On one hand, the existing period for heating and cooling, averaging 11 hours per day, could accommodate a longer ten-hour work day. ^{5/} For purposes of comfort, on the other hand, the period could well be extended with a resulting increase in energy consumption.

Depending on the scheduling of business hours and the time allowed for heating and cooling of offices, the impact of a four-day work week on office utilities could range from a decrease equivalent to 2.16 million barrels of oil per year to an increase of 1.97 million barrels (see Table 1). The potential impact, whether negative or positive, is small compared to total office building utility requirements, which are nearly four times those of automobile commuting by federal employees.

CBO Estimates

In view of the uncertain effects of a federal four-day work week on factors influencing energy consumption, CBO has prepared a range of estimates of the potential impact. At one extreme,

^{5/} The General Services Administration states that during business hours federal offices nationwide are fully heated and cooled an average of 11 hours per day. This estimate includes 8 hours for the basic work day, 0.5 hours for lunch, and 2.5 hours for start-up and shut-down. During periods of nonoccupancy, equipment is assumed to operate at 20 percent of capacity.

TABLE 1. ESTIMATED ANNUAL ENERGY COST OR SAVINGS FROM
CHANGES IN FEDERAL BUSINESS DAYS AND BUILDING
OPERATIONS: IN MILLIONS OF EQUIVALENT BARRELS OF OIL

Building Operations	Business Days Per Week	
	Five Ten- Hour Days	Four Ten- Hour Days
No Change in Heating and Cooling Time	-0-	-2.16
Increase in Heating and Cooling Time	1.97	-0.59

SOURCE: CBO estimates derived from information provided by the General Services Administration on utility requirements for federal offices.

energy consumption could increase by the equivalent of 2.87 million barrels of oil per year; at the other, it could decrease by the equivalent of 3.70 million barrels. ^{6/} The actual outcome would depend largely on how a compressed schedule was implemented, and on changes that might occur in leisure travel. Whether it took the form of an increase or of a decrease, overall U.S. oil consumption (currently averaging about 6.9 billion barrels a year) would change by less than 0.06 percent.

Estimated Energy Increase. A four-day, forty-hour work week for federal civilian employees could increase annual energy consumption by the equivalent of 2.87 million barrels of oil. The fuel savings (1.54 million barrels of oil per year) from less frequent work trips could be offset by an annual increase of as much as 4.41 million barrels for increases in nonwork travel and in utilities for federal offices (see Table 2).

^{6/} Estimated energy impacts assume that an extra day off would occur each week. If an extra day off were granted every other week, as in many existing federal experiments, the costs or savings would be about half as great.

TABLE 2. ESTIMATED ANNUAL ENERGY COSTS OR SAVINGS IF A FOUR-DAY WEEK WAS ADOPTED FOR FEDERAL CIVILIAN EMPLOYEES: IN MILLIONS OF EQUIVALENT BARRELS OF OIL

	Estimated Energy Increase	Estimated Energy Savings
Commuting to Work <u>a/</u>	-1.54	-1.54
Nonwork Travel	2.44	-0-
Utilities for Federal Offices	<u>1.97</u>	<u>-2.16</u>
Net Impact	2.87	-3.70

NOTE: The estimates assume that a compressed work week would apply to 90 percent of all federal civilian employees except those in the U.S. Postal Service.

a/ The estimate assumes that, nationwide, 86 percent of government employees commute to work by automobile.

The estimated maximum energy increase assumes that the extra day off occurs on a Friday or Monday, as is the case in most federal experiments, and that leisure travel on that day would approximate that which occurs on a Saturday or Sunday. The estimate also assumes that utility requirements would increase significantly. By staggering employee hours, federal agencies could maintain a five-day business week, accompanied by a corresponding increase in heating and cooling time for the longer work day.

Estimated Energy Savings. If a federal four-day work week was adopted with energy implications specifically in mind, some conservation could be achieved, possibly reaching the equivalent of 3.70 million barrels of oil per year. About 40 percent of the estimated savings would result from less frequent trips to work, and 60 percent from a decrease in utilities for federal offices. The net effect would represent nearly a 9 percent decrease in energy used for federal employee automobile commuting and utility services to federal offices.

The estimated maximum energy savings assumes that the extra day off would occur in midweek and that there would be no net increase in nonwork travel. This would be most likely if there were major changes in the present supply or price of oil. Some analysts, however, maintain that a four-day work week would not increase leisure travel even under present conditions. Further conservation could be achieved by closing federal offices one day each week and by not extending the period for heating and cooling on the four days when offices are open, despite the longer ten-hour business day. 7/ If, as a variation, buildings were open five ten-hour days, the estimated annual savings would be limited to the 1.54 million barrels from reduced commuting.

CONSIDERATIONS OTHER THAN ENERGY

Energy conservation may be a relatively minor factor to be considered in evaluating the desirability of a federal four-day work week. Proponents of a four-day work week have made the following general arguments for its adoption: 8/

- o For employees, an extra day off would provide more concentrated time for personal and family matters. Younger employees and working parents would benefit most.
- o For employers, a compressed work schedule might be a means to increased job performance and reduced absenteeism.
- o For society as a whole, the shorter work week means less energy consumption and less air pollution, as well as increased job opportunities for the unemployed.

7/ Some energy conservation in utilities for public buildings could be achieved independently of a four-day work week (by changing start-up and shut-down schedules, thermostat settings, and insulation measures).

8/ For a discussion of the pros and cons see: William F. Glueck, "Changing Hours of Work," The Personal Administrator, March 1979, p. 45; and William G. Whittaker, The Walsh-Healey Public Contracts Act of 1936 and the Compressed Workweek, Congressional Research Service, July 2, 1979, pp. 32-39.

Organized labor often opposes the four-day work week, fearing that the hard-won eight-hour day would be lost. Critics cite the following disadvantages of a longer work day:

- o Employee fatigue would increase, adversely affecting productivity and morale and increasing on-the-job accidents. This concern may grow in importance as the proportion of older employees increases with demographic changes.
- o A longer work day (plus time for commuting) would create family and child care problems, especially for working parents with young children.
- o The quality of services to the public could decline because of scheduling problems or difficulty in recruiting qualified employees for overtime work.
- o Moonlighting on the extra day off might be extensive, increasing worker fatigue and reducing job opportunities for the unemployed.

Some critics view restructuring of the work week as a step to a smaller number of total hours worked per week. They argue that once a ten-hour, four-day week is established, pressure will build for a gradual return to an eight-hour day--but for only four days a week. ^{9/}

Experience in the Nonfederal Sector

The five-day work week still prevails as the standard in the nonfederal sector, although work schedule practices vary among industry groups. In 1978 only 2.2 percent of full-time nonfarm employees worked fewer than five days per week, and 15.0 percent worked more than five days, including those receiving overtime pay. In local administration, however, 11.5 percent of the employees had a work week of fewer than

^{9/} Legislation (H.R. 1784) has been introduced that would reduce the standard work week to 35 hours, with the aim of increasing employment opportunities.

five days. Mining and service trade industries, large proportions of employees work more than five days per week--29.5 percent and 28.6 percent respectively. 10/

Studies of shorter work weeks in the nonfederal sector have produced inconsistent results concerning the impact on absenteeism, worker morale, productivity, labor turnover, and worker fatigue. 11/ A study of 16 firms by the Department of Labor, for example, found some firms reporting improved productivity and others no change. One firm reported a slight decrease in productivity. 12/ Another study showed that absenteeism does not appear to be permanently reduced. 13/

10/ U.S. Department of Labor, Bureau of Labor Statistics, News Release, March 17, 1977 (USDL 77-234), Table 2. Updated information for 1978 supplied by BLS.

11/ William F. Glueck, "Changing Hours of Work," pp. 45-67.

12/ Sol Swerdloff, The Revised Workweek, U.S. Department of Labor, 1975, p. 11.

13/ Janice N. Hedges, "How Many Days Make a Workweek?", Monthly Labor Review, April 1975, p. 33.