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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

LOGISTICS AND COMMUNICATIONS DIVISION

B-178205

APR 18 1975

LM097053

The Honorable Charles A. Vanik
House of Representatives

Dear Mr. Vanik:

On February 12, 1975, you asked us to compare the energy used in five Federal Office Buildings during January, April, July, and October of 1972 with the energy used during the same months of 1974.

Energy consumption and cost information is presented in enclosures for the five buildings, which include the Anthony J. Celebrezze Federal Building in Cleveland, Ohio (formerly the New Federal Office Building). All the buildings are similar in size, age, and use. We obtained the information from utility bills or General Services Administration (GSA) records but did not verify the information. The enclosures also contain the views of GSA building personnel as to the reasons for changes in energy use, and a description and photograph of the building.

Energy use in the five buildings--principally electricity and steam--was substantially lower in 1974 (although cost was in some cases higher) than in the same months of 1972. Following is a summary of the data we obtained:

Location of Building	Percentage over (under) 1972			
	Electricity		Steam/Gas	
	Quantity	Cost	Quantity	Cost
Cleveland, Ohio	(16)	32	(40)	(15)
Boston, Mass.	(24)	38	(22)	78
Kansas City, Mo.	(25)	(10)	(36)	(12)
Los Angeles, Calif.	(40)	62	(79)	(70)
Washington, D.C.	(37)	42	(3)	6

LCD-75-341

We do not plan to distribute this report further unless you agree or publicly announce its contents.

Sincerely yours,

R. B. Rothwell

for F. J. Shafer
Director

Enclosures

ENCLOSURE I

ANTHONY J. CELEBREZZE FEDERAL BUILDING
CLEVELAND, OHIO

ENERGY CONSUMPTION AND COSTS

The energy used in the Anthony J. Celebrezze Federal Building is principally in the form of electricity and steam. The energy consumed and the costs are as follows.

Electricity used (note a)

Month	1972	1974	Over (under) 1972 Amount	%
	(Thousands of KW hours)			
Jan.	1,933	1,720	(213)	(11)
April	1,857	1,559	(298)	(16)
July	2,759	2,241	(518)	(19)
Oct.	1,769	1,489	(280)	(16)
Total - 4 months	8,318	7,009	(1,309)	(16)

Cost of electricity used (note a)

Month	1972	1974	Over (under) 1972 Amount	%
Jan.	$ 28,195	$ 30,295	$ 2,100	7
April	28,142	35,223	7,081	25
July	37,991	55,214	17,223	48
Oct.	27,577	40,336	12,759	46
Total - 4 months	$121,905	$161,068	$39,163	32

[a]Electricity figures for 1972 were taken from GSA utility records and for 1974, from the utility bills.

Information provided by GSA building personnel on electric consumption

Electricity is used for lighting and air conditioning the building and for powering equipment. Steps taken to reduce electricity requirements are:

--raising thermostat settings during the summer months;
--removing about 26 percent of the building's fluorescent tubes; and,
--shutting down unnecessary equipment.

Steam used (note a)

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of pounds)			
Jan.	11,138	7,271	(3,867)	(35)
April	4,547	2,494	(2,053)	(45)
July	1,195	873	(322)	(27)
Oct.	2,968	1,192	(1,776)	(60)
Total - 4 months	19,848	11,830	(8,018)	(40)

Cost of steam used (note a)

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$22,893	$19,249	$(3,644)	(16)
April	10,147	8,519	(1,628)	(16)
July	2,656	3,358	702	26
Oct.	6,674	4,746	(1,928)	(29)
Total - 4 months	$42,370	$35,872	$(6,498)	(15)

[a]Steam figures for 1972 were taken from GSA utility records and for 1974, from the utility bills.

Information provided by GSA building personnel on steam consumption

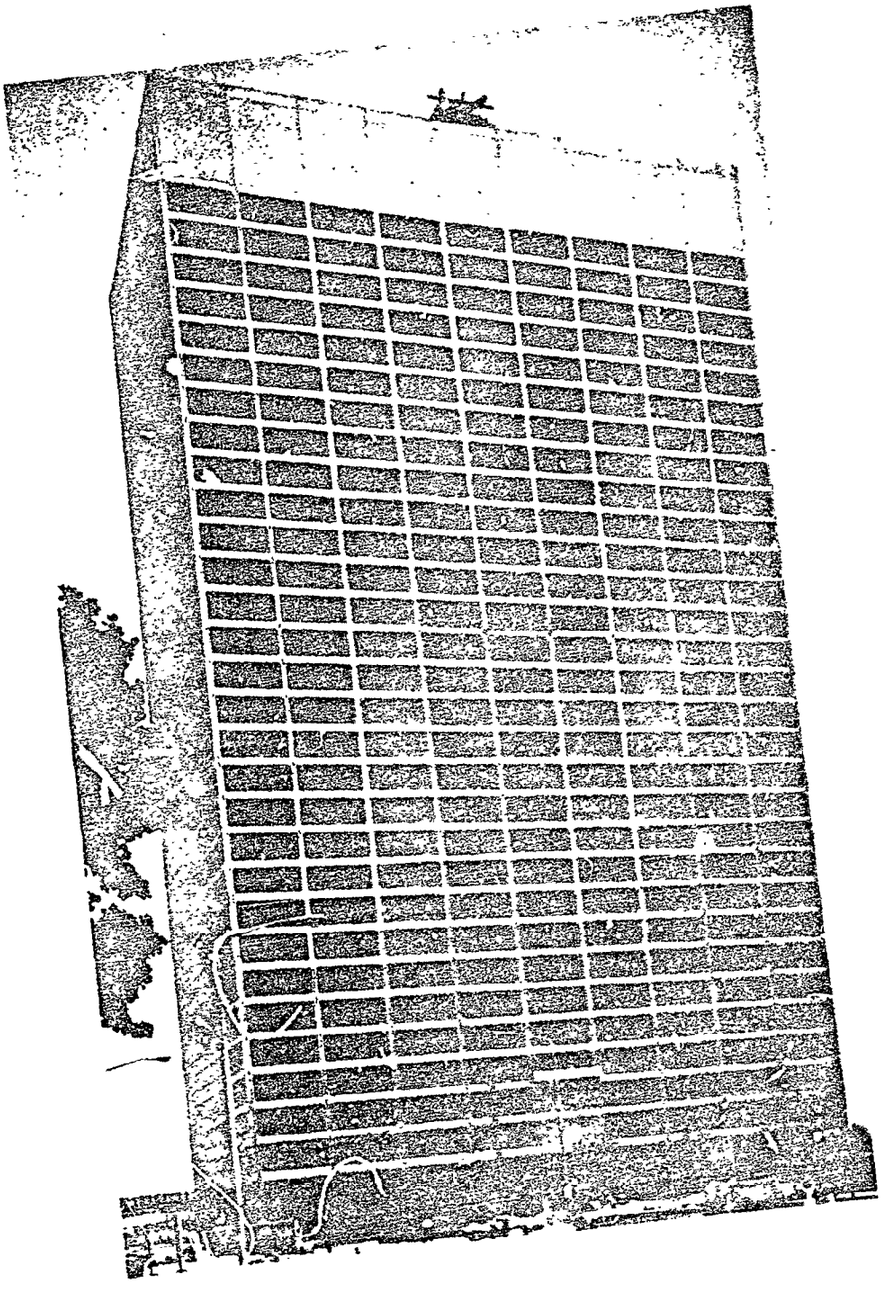
Steam usage, for heating the building, has been reduced by such steps as:

--lowering thermostat settings during the winter;
--repairing steam traps;
--manually controlling the heating system as the weather dictates; and,
--using electric heaters instead of the entire system for off-hours work.

BUILDING DESCRIPTION

The Anthony J. Celebrezze Federal Building, fully occupied in 1967, has a gross area of 1,490,000 square feet in 32 stories (plus mezzanine and penthouse) above grade and two basement levels. Glass makes up about 56 percent of the building's exterior walls. There are 28 elevators and two escalators. About three-fifths of the gross area is assignable office space and the remainder is primarily public use and mechanical areas. (See picture on next page.)

ENCLOSURE I



Anthony J. Celebrezze Federal Building
Cleveland, Ohio

GSA photograph

JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS

ENERGY CONSUMPTION AND COSTS

The energy used in the John F. Kennedy Federal Building is mainly electricity and steam. The consumption and costs are given below. Limited quantities of diesel fuel power certain generators in the building. We did not obtain usage and cost information for this fuel in view of the indicated small quantities used.

Electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of KW hours)			
Jan.	1,310	934	(376)	(29)
April	1,346	956	(390)	(29)
July	1,544	1,262	(282)	(22)
Oct.	1,288	1,040	(248)	(19)
Total - 4 months	5,488	4,192	(1,296)	(24)

Cost of electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$ 25,508	$ 25,779	$ 271	1
April	27,270	37,308	10,038	39
July	29,360	48,063	18,703	64
Oct.	25,672	37,867	12,195	48
Total - 4 months	$107,810	$149,017	$41,207	38

Information provided by GSA building personnel on electric consumption

Electricity is used for lighting and power for equipment. Electric consumption was reduced by measures such as:

--changing the working hours of the cleaning force from 3:30 PM to midnight to 11:00 AM to 7:30 PM so that lights could be turned off earlier;

--removing 11,000 of 50,326 fluorescent tubes; and,
--shutting down five elevators except for use during morning and evening peak periods.

Steam used

Month	1972	1974	Over (under) 1972 Amount	%
	(Thousands of pounds)			
Jan.	12,493	10,421	(2,072)	(17)
April	8,875	5,859	(3,016)	(34)
July	14,404	10,663	(3,741)	(26)
Oct.	5,525	5,330	(195)	(4)
Total - 4 months	41,297	32,273	(9,024)	(22)

Cost of steam used

Month	1972	1974	Over (under) 1972 Amount	%
Jan.	$28,587	$ 40,893	$12,306	43
April	20,715	29,683	8,968	43
July	23,859	47,780	23,921	100
Oct.	11,664	32,356	20,692	175
Total - 4 months	$84,825	$150,712	$65,887	78

Information provided by GSA building personnel on steam consumption

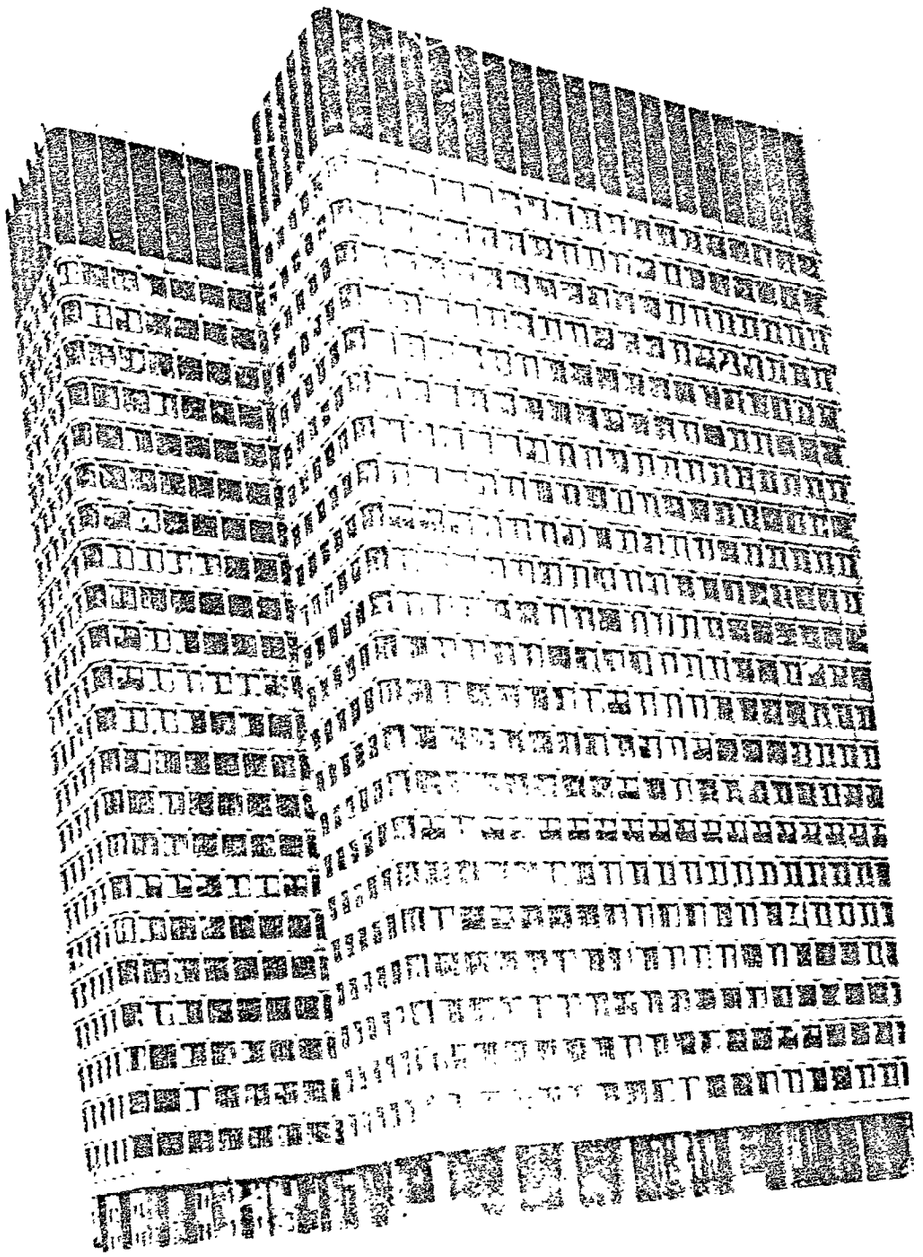
Steam is used for heating and cooling. Steam consumption was reduced by measures such as lowering temperature controls from a range of 72 to 76 degrees F to 65 to 68 degrees F during the heating season, and raising temperature controls from a range of 70 to 74 degrees F to 76 to 78 degrees F during the cooling season. The Building Manager gave no specific reasons for the fluctuations of the percentage decreases in steam consumption. He said implementation of energy conservation measures began in 1972.

BUILDING DESCRIPTION

The John F. Kennedy Federal Building, fully occupied in 1966, has a gross area of approximately 1 million square feet. The building consists of twin rectangular towers 26 stories high, a four-story low

building (not visible in picture on next page), a continuous ground floor and a continuous basement level. About 70 percent of the exterior walls are glass. There are 14 elevators in the twin towers, and five elevators and four escalators in the low building. About three-fifths of the gross area is used for offices and the remainder is for public use and mechanical equipment.

ENCLOSURE II



GSA photograph

ENCLOSURE III

FEDERAL BUILDING
601 EAST 12TH STREET
KANSAS CITY, MISSOURI

ENERGY CONSUMPTION AND COSTS

The energy used in the Federal Building, 601 East 12th Street, Kansas City, Missouri, is mainly in the form of electricity and steam. The consumption and costs are as follows.

Electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of KW hours)			
Jan.	1,890	1,368	(522)	(28)
April	1,901	1,364	(537)	(28)
July	1,940	1,883	(57)	(3)
Oct.	2,074	1,262	(812)	(39)
Total - 4 months	7,805	5,877	(1,928)	(25)

Cost of electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$ 33,262	$ 26,875	$(6,387)	(19)
April	33,018	27,929	(5,089)	(15)
July	34,260	34,623	363	1
Oct.	36,034	33,303	(2,731)	(8)
Total - 4 months	$136,574	$122,730	$(13,844)	(10)

ENCLOSURE III

Information provided by GSA building personnel on electric consumption

Electricity is used primarily for lighting and for operating fans and pumps. About 2,900 lights were removed to conserve electricity.

Steam used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of pounds)			
Jan.	11,750	6,695	(5,055)	(43)
April	10,330	4,830	(5,500)	(53)
July	15,070	12,620	(2,450)	(16)
Oct.	11,292	6,913	(4,379)	(39)
Total - 4 months	48,442	31,058	(17,384)	(36)

Cost of steam used

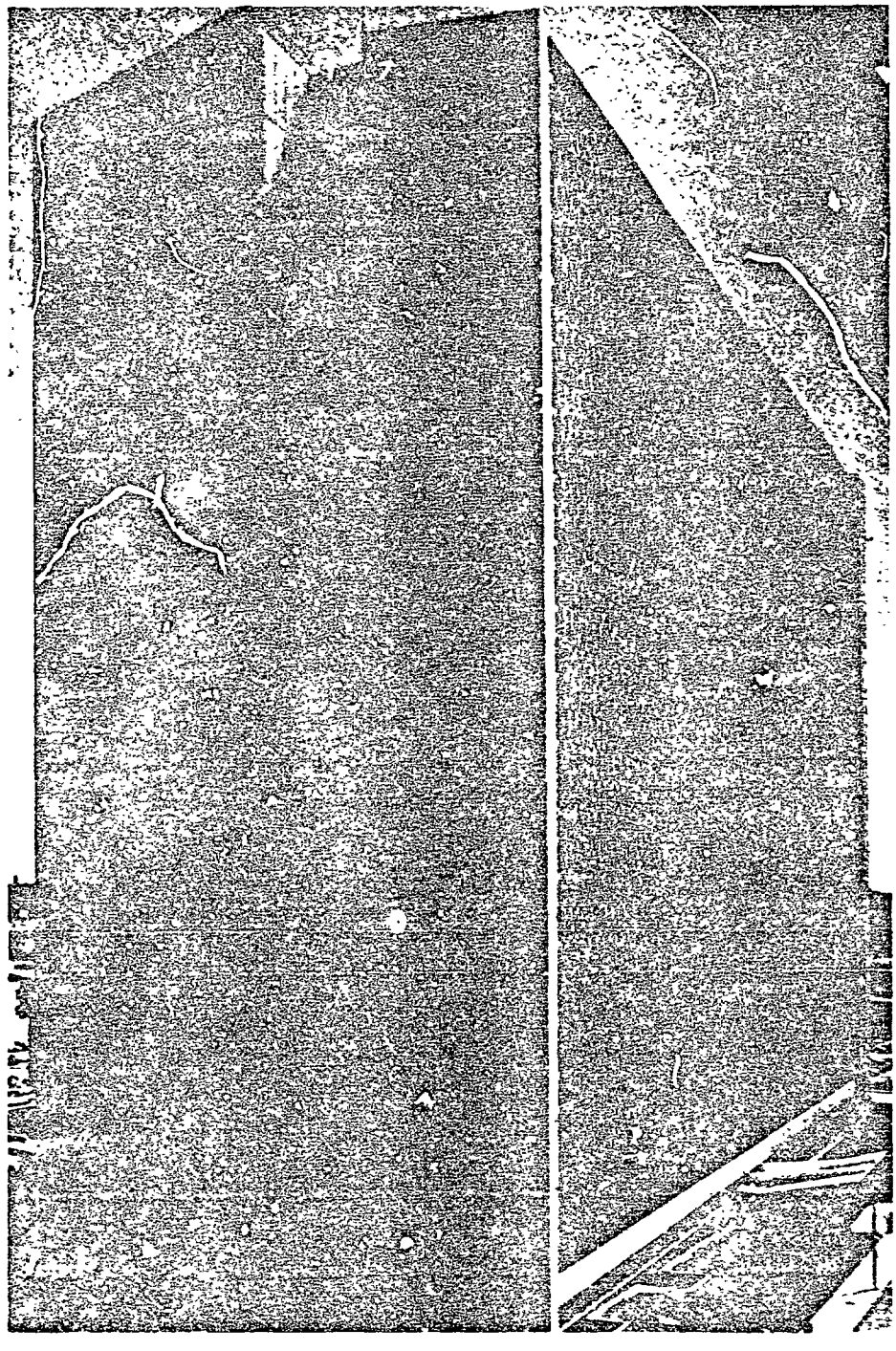
Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$13,595	$ 8,696	$(4,899)	(36)
April	11,509	7,114	(4,395)	(38)
July	16,029	18,840	2,811	18
Oct.	12,173	12,297	124	1
Total - 4 months	$53,306	$46,947	$(6,359)	(12)

Information provided by GSA building personnel on steam consumption

Steam is used for the building's forced-air heating system, and for the chillers which air-condition the building. To reduce steam use temperature controls were set at 65 to 68 degrees F during working hours and at not more than 55 degrees F during nonworking hours, and during the cooling season, temperatures were not maintained lower than 78-80 degrees F.

BUILDING DESCRIPTION

Completed in 1965, the Federal Building has a gross area of about 1,210,100 square feet on 21 floors two of which are basements. A three-story, 160 x 138-foot extension is attached to the north side of the building (not visible in picture on next page). About 19 percent of the exterior walls are glass. There are 19 elevators and six escalators. About half the gross floor space is used for offices and the other half for purposes such as public use and mechanical equipment.



Federal Building
601 East 12th Street
Kansas City, Missouri

GSA photograph

FEDERAL BUILDING
300 NORTH LOS ANGELES STREET
LOS ANGELES, CALIFORNIA

ENERGY CONSUMPTION AND COSTS

Electricity and natural gas are used in the Federal Building, 300 North Los Angeles Street, Los Angeles, California. The consumption and costs are as follows.

Electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of KW hours)			
Jan.	1,995	979	(1,016)	(51)
April	2,048	1,018	(1,030)	(50)
July	2,240	1,576	(664)	(30)
Oct.	2,202	1,511	(691)	(31)
Total - 4 months	8,485	5,084	(3,401)	(40)

Cost of electricity used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$15,170	$19,584	$ 4,414	29
April	15,661	25,527	9,866	63
July	17,553	31,437	13,884	79
Oct.	17,256	29,659	12,373	72
Total - 4 months	$65,670	$106,207	$40,537	62

Information provided by GSA building personnel on electric consumption

Electricity is used primarily to operate air conditioning chillers and for lighting. Measures to reduce electric consumption included:

--removing about 6,500 of the building's 16,206 lights to reduce lighting levels;
--raising thermostat settings from 72 degrees to 78 degrees F during the air conditioning season;

--using ventilation fans alone, when possible, rather than air conditioning to cool the building;
--changing custodial hours from nighttime (5:00 PM - 1:30 AM) to daytime (11:30 AM - 8:00 PM) to eliminate the need for all but minimum lighting; and,
--completely shutting down the air conditioning plant between the hours of 8 PM and 4 AM on workdays and all day on weekends.

Fluctuations in percentage decreases in electric use were caused by varying air conditioning requirements. Air conditioning requirements are minimal in January and April compared to July and October. To properly cool the building during the cooling season, the air conditioning system is sometimes started early in the morning.

Natural gas used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of cubic feet)			
Jan.	4,205	659	(3,546)	(84)
April	2,654	502	(2,152)	(81)
July	1,677	520	(1,157)	(69)
Oct.	2,212	533	(1,679)	(76)
Total - 4 months	10,748	2,214	(8,534)	(79)

Cost of natural gas used

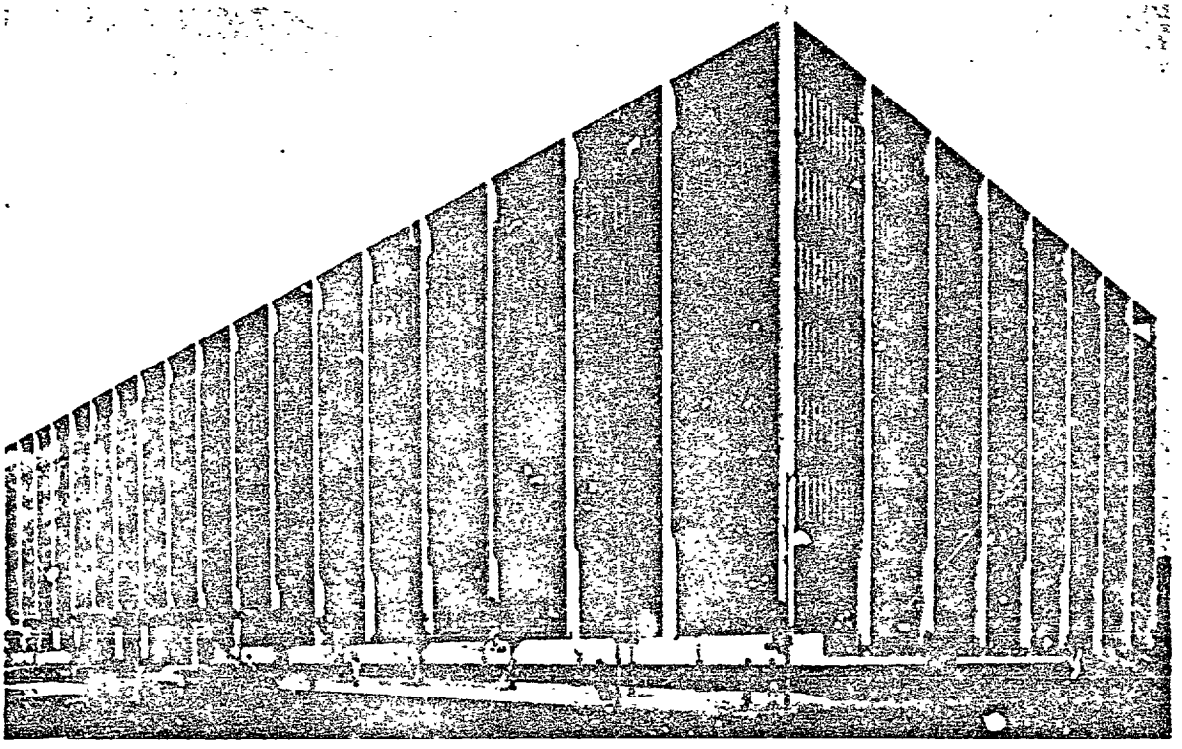
Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$2,407	$ 523	$(1,884)	(78)
April	1,518	437	(1,081)	(71)
July	959	341	(618)	(64)
Oct.	1,270	517	(753)	(59)
Total - 4 months	$6,154	$1,818	$(4,336)	(70)

Information provided by GSA building personnel on natural gas consumption

Natural gas is used to run boilers for heating, air conditioning and hot water. Natural gas consumption was reduced by lowering thermostat settings from 72 degrees to 65 degrees F during the heating season, and by lowering the hot water temperature from 130 degrees to 90 degrees F. Heating plants were completely shut down between the hours of 8 PM and 4 AM on workdays and all day on weekends. The percentage fluctuations in natural gas consumption were attributable to use of boilers during the air conditioning season to reheat chilled air.

BUILDING DESCRIPTION

The Federal Building, opened in 1965, has about 1,175,000 square feet of gross floor area with eight floors, a basement and subbasement. About 35 percent of the building's exterior is glass. There are 18 elevators and three escalators. About three-fifths of the gross floor space is used for offices and the remainder is primarily for public use and equipment. (See picture on next page.)



Federal Building
300 North Los Angeles Street
Los Angeles, California

GSA photograph

FEDERAL BUILDING 10A
800 INDEPENDENCE AVENUE, S.W.
WASHINGTON, D.C.

ENERGY CONSUMPTION AND COSTS

The energy used in Federal Building 10A is mainly in the form of electricity and steam. The consumption and costs are tabulated below. Besides steam and electricity, some natural gas is used in the cafeteria and one laboratory in the building. Because of the small amount of natural gas used and the time it would take to retrieve figures for 1972, we are omitting natural gas consumption data.

Electricity used (note a)

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of KW hours)			
Jan.	1,728	1,210	(518)	(30)
April	1,859	1,181	(678)	(36)
July	2,906	1,593	(1,313)	(45)
Oct.	1,916	1,334	(582)	(30)
Total - 4 months	8,409	5,318	(3,091)	(37)

Cost of electricity used (note a)

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$17,851	$21,780	$ 3,929	22
April	18,953	27,890	8,937	47
July	31,015	42,182	11,167	36
Oct.	21,517	35,135	13,618	63
Total - 4 months	$89,336	$126,987	$37,651	42

[a] The General Services Administration receives one electric bill for buildings 10A and 10B. We prorated the electricity used by the buildings based on the net square feet of the two buildings. According to the Building Manager this is an acceptable method for prorating the bill.

Information provided by GSA building personnel on electric consumption

Electricity is used to operate air conditioning chillers, and to provide light and power. Electric consumption decreased in 1974 due to steps such as:

--reducing lighting in all areas (28,000 fluorescent tubes were removed);
--maintaining temperatures in summer months between 76 and 80 degrees F compared with 70 to 72 degrees F in 1972;
--cutting back ventilating fans in the basement garage during off-duty hours; and,
--shutting off down escalators.

Steam used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
	(Thousands of pounds)			
Jan.	9,055	12,668	3,613	40
April	4,571	5,658	1,087	24
July	4,544	2,647	(1,897)	(42)
Oct.	6,438	2,877	(3,561)	(55)
Total - 4 months	24,608	23,850	(758)	(3)

Cost of steam used

Month	1972	1974	Over (under) 1972 Amount	Over (under) 1972 %
Jan.	$22,547	$31,543	$8,996	40
April	11,382	14,088	2,706	24
July	11,315	7,941	(3,374)	(30)
Oct.	16,031	11,508	(4,523)	(28)
Total - 4 months	$61,275	$65,080	$3,805	6

Information provided by GSA building personnel on steam consumption

Steam is used for the building's forced-air heating system, and for hot water. Steam use in January and April increased due to deteriorated equipment such as pipes, valves and traps. The Building Manager said that repairs are now continually being made to the equipment but he could not attribute the reductions in steam use in July and October 1974 to any specific repairs. Efforts to conserve steam during 1974 included:

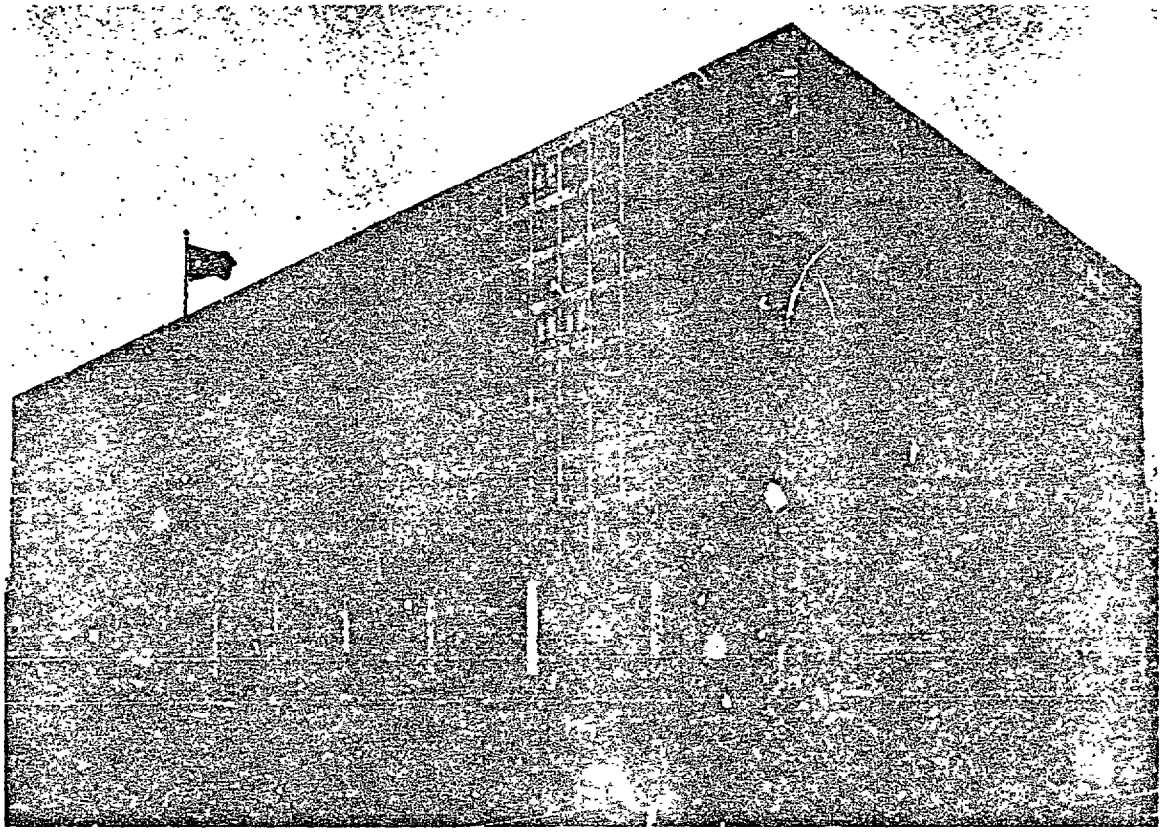
--reducing hot water temperatures for the health clinic and cafeteria from 135 to 115 degrees F, and for areas such as rest rooms from 125 to 105 degrees F;

--eliminating the need to reheat chilled air to bring it up to the desired temperature level by maintaining chilled water at 53 degrees F instead of 42-43 degrees F, and,
--maintaining the temperature in heating months at 65 to 70 degrees compared to 74 to 76 degrees in 1972.

BUILDING DESCRIPTION

Federal Building 10A, completed in 1964, has 1,175,150 gross square feet of floor area in ten floors above grade, two penthouse levels, one rooftop heliport, and two basement garage levels. About 50 percent of the exterior walls are glass. There are 20 elevators and six escalators. About two-thirds of the gross floor area is assignable office space and the remainder is primarily for public use and equipment. (See picture on next page.)

ENCLOSURE V



Federal Building 10A
800 Independence Avenue, S.W.
Washington, D.C.

GSA photograph