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STATE AGENCY ENERGY
CONSERVATION PLAN

Developed by the
OFFICE OF ENERGY RESOURCES
for
STATE GOVERNMENT

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APPROVED:

James B. Longley
Governor
January 27, 1976

ENERGY SECTORS OF CONCERN:

A comprehensive energy management plan should concentrate on the following energy Sectors:

1. Building and Grounds
2. Transportation
3. Preventive Maintenance
4. Promotion
5. Planning

BUILDINGS AND GROUNDS:

The objective of State government should be to obtain the maximum results in every sector. We will establish a 15% reduction over the Fiscal Year 72-73 in energy conservation for all buildings as a guide. This is not an inflexible standard but has been proven to be a realistic objective. With a concerted program many agencies could realize a higher percentage in reduction. There are few who can not obtain the minimum results. If for any reason that a particular agency can not meet minimum standards, it should respond with documented written justification supporting the particular case.

The Bureau of Public Improvements (BPI) and the Office of Energy Resources (OER) will be responsible for establishing energy conservation guidelines for all State Government buildings and grounds.

Our first recommendations would be in the area of HVAC. (Heating, ventilating and air-conditioning systems.)

1. HEATING AND COOLING STANDARDS:

All state agencies shall implement the following to reduce energy costs of heating and air-conditioning in State Buildings:

A. Cooling

1. Set Air-Conditioning Thermostats at 80°F.
2. Adjust controls on air-conditioners so they are operational one hour after building occupancy and one hour before.
3. Eliminate cooling system in entrances, hallways, storage rooms, and other spaces not used for working areas. Eliminate cooling in meeting rooms, auditoriums, etc., except during periods of use, Air-conditioning systems cannot be shut off completely, the thermostat should be set at the highest control setting.
4. In air-conditioned buildings, leave storm windows and doors on buildings during the summer months to prevent heat infiltration.

B. Heating

1. Set heating to achieve a 68°F ambient temperature

BUILDINGS AND GROUNDS

during the winter heating season.

2. Lower heating thermostats to 55°F during weekends and holidays.
3. Close off rooms not in use, and turn off heat in unused spaces.
4. Reduce heating in lobbies, hallways, and other public areas.
5. Utilize natural light whenever possible. Open curtains during the day to let in sun and close them at night to reduce the heat loss through radiation.

C. General

1. Arrange occupancy in buildings to group light load uses in one wing or in one floor rather than throughout the buildings.
2. Night work or evening meetings shall be confined to one building area.
3. When applicable, turn off pilot lights on gas furnaces at the end of the heating season.
4. Install automatic door closers, where needed.
5. Set all water heaters in State Buildings at 120°F where the water is used primarily for hand washing. In areas of food preparation and dish washing existing State Laws will apply.

II. LIGHTING

When evaluating energy consumption in buildings the thermal operation tends to be the predominant consideration. The lighting operation very often becomes secondary. The fact is that a great deal of savings can be effectuated through simple considerations in lighting requirements and use. Actually, by cutting down on lighting, one saves a very significant amount of energy. One Kilowatt hour (Kwh) of electricity under present generating efficiencies would be the approximate equivalent of 0.07 gal. of residual fuel. This figure alone may appear negligible but for every Megawatt hour (10^6 watt hours) of power, the utility providing that power must use 70.0 gal. of residual fuel. It is estimated that the State will use in the range of 40-60,000 Megawatt hours of electricity thus, taking the lower figure, approximately 2,800,000 gallons of residual oil or equivalent is required to produce the power necessary to light state buildings. Other electrical devices contribute to the aggregate but not to the extent of lighting.

With present price tags on energy the state can hardly afford to take lighting sectors so lightly. A 20% reduction in lighting requirements over FY 72-73 is the target goal.

A. ILLUMINATION LEVELS:

State agencies shall implement the following guidelines for conservation in lighting costs for State Buildings.

NOTE: 1. Ideally, the foot candle values shall be based on calculations using standard formulae and meter readings of a standard light meter.

2. Maintained, average intensity at task level for various areas shall be as follows:

<u>AREA</u>	<u>MAXIMUM</u> <u>(measured 30 inches above the floor)</u>
1. Office	
(a) General	50
(b) Private	50
(c) Clerical, data processing	50 + Spot Illumination
(d) Public Counters	30-50
2. Special working corridors, lobbies and waiting rooms	10-20
3. Conference	20-40
4. Corridors and passages	10
5. Toilets, dressing rooms	20
6. Janitors, inactive storage, showers	10
7. Mechanical and electrical equipment and active storage rooms, as required	15-25
8. Yard, parking, walk, and protective lighting, as required	1-3
9. Recreation rooms	40-50
10. Shops, crafts room, as required	40-75
11. Classrooms and laboratories	50
12. Drafting and plan check rooms, as required	50-75
13. <u>Library</u>	
(a) Reading	50
(b) Clerical	50
(c) Stack Area	50
14. <u>Garage</u>	
(a) Service Repair	40 + Spot Illumination
(b) Service Rough Work	40
(c) Washrooms	20
(d) Active Traffic Area	15
(e) Traffic Lanes	1-3

15. Kitchen and food preparation area	50
16. Elevators	10
17. Dining Areas	20-40

Certain visual tasks will require a greater degree of illumination than is provided by these standards. In such instances, proper illumination shall be achieved by a combination of at least 20 footcandles of general lighting and supplementary lighting as necessary.

B. ADDITIONAL SUGGESTIONS FOR REDUCING LIGHTING EXPENSES ARE:

1. Reducing outside lighting in parking areas, but maintaining sufficient light for safety and security.
2. Utilizing higher reflective interior room finishes. The average illumination in a room can be increased by as much as 30 footcandles.
3. Apparently not so obvious is turning lights off when not in use.
4. Cleaning Lamps and light fixtures enhance lighting levels. Absolute minimum period is one year; more frequently in specialized areas.
5. Purchasing those lamps that are the most efficient.
6. Reducing inside lighting levels by the prescribed standards under part A this paragraph, extracting bulbs from overlit areas.

III. PREVENTIVE MAINTENANCE PROGRAM FOR STATE MECHANICAL SYSTEMS

The State of Maine shall institute a schedule of overall preventive maintenance for all equipment. This should include the established and enforced periodic inspections of the following:

- A. Inspect, adjust, and balance heating, ventilating, and air-conditioning systems.
1. Ensure all dampers are operational and set properly.
 2. Ensure coil temperatures controls are set properly. Ensure all control valves operate properly. Calibrate, adjust, repair, or replace automatic temperature control systems to permit the most efficient operation.
 3. Inspect all filters, and clean and replace them as required. Inspect filters on a more frequent basis, or change them when indicator light shows a dirty condition.
 4. Lubricate bearings, tighten fanbelts, and clean dirty fan blades.

- B. Clean all cooling and heating coils and radiators when dirty, and clean all air and water condensing heat exchangers. Ensure condensing fans are operating properly.
- C. Ensure all duct and piping insulation is in good condition and replace or repair as necessary.
- D. Inspect, clean, adjust, and set all burner and boiler controls to provide maximum operational efficiencies. Ensure burner combustion efficiency is at the maximum level.
- E. Repair and replace worn or obsolete pumps.
- F. Add necessary additives to fuel oil to prevent undue boiler fouling. Add necessary fuel oil additives to permit better burner combustion.

G. GROUND MAINTENANCE

State buildings and grounds should be landscaped with indigenous plants, trees, and rocks. This would decrease the large amount of energy necessary to create massive landscaping projects and to maintain energy intensive landscapes. (per ex.. large expanses of mowed lawn)

Similarly, any other type of construction in which the State is involved should include energy conservation, to the maximum degree possible, in the planning process.

H. STATE BUILDINGS

The Bureau of Public Improvements should implement the following actions:

1. Inspect attic spaces in buildings with insulated ceilings to ensure the insulation has not deteriorated and is in place.
2. If the insulation is not the equivalent of four (preferably six inches) fiberglass, or equivalent, which produces a "U" factor (heat cold transmissibility) of approximately 0.05, add insulation to achieve this value. (Requires capital investment).
3. If the attic space is not vented and does not have thermostatically controlled exhaust fans, add ventilation devices. (Requires capital investment).

4. For buildings that have insulated roofs, make use of the ceiling space for return air, ensure that the roof insulation is in good condition. Repair or replace as necessary.
5. Install storm windows on all state buildings. This is an on going project of BPI. (Requires additional capital investment).

IV. STATE AGENCY RECYCLING OF PRODUCTS

A. Mandatory Waste Paper Recycling

Most state agencies have implemented a waste paper recycling program. To ensure full cooperation, all State agencies will be required to recycle waste paper to the maximum extent possible. The definition of waste paper will include "all volumes of paper resulting from purging of files, replacing of old forms, etc., and individual pieces of paper thrown out by employees at their desks which can be separated at that point from other garbage." The method of separation has been tested and found that it requires no significant extra time on the part of the employee. 1.

All Agency and Departmental Heads should re-evaluate their recycling programs and make certain that the maximum amount of paper is being recycled.

It is estimated that the volume of paper presently being recycled could be at least doubled with an intensive recycling effort requiring total State Agency participation. The employee education and supervisory participation are the factors most likely to determine recycling success. All department heads should advise employees of the recycling program, informing them of the methods used for recycling and what types of paper are to be recycled. To avoid confusion over what types of scrap paper can be recycled, a bulletin board could be made showing scraps of recyclable paper and scraps of non-recyclable paper.

B. Two-Basket System

The two-basket recycling method has proven the most effective way to recycle in State Offices. Paper is sorted from other wastes at the desk of the employee and placed in a separate receptacle. The accumulated waste paper is then placed in recycling containers provided by the collector. Two people working in the same area can designate one waste can for recyclable paper and one for other garbage.

1. Proposed State of Oregon Energy Management Program, Sept. 26, 1974. PP21-22.

Custodial cooperation is essential for waste paper recycling. Janitors working in state-owned buildings are required to participate in the waste paper recycling program. However, agencies that lease buildings should stipulate in their lease or in the janitorial contract, that custodial duties shall include the emptying of the waste paper containers into the proper recycling receptacles.

C. Revenue From Recycling

Current state policy deposits all revenues received from the sale of recycled waste paper into the General Fund.

D. Distant State Offices

State Offices located in outlying regions of "the Capitol Complex" should attempt to establish and participate in the waste paper recycling program, to the maximum extent possible.

E. Other Recyclable Products

In addition to waste paper, the DEP solid waste division should seek potential markets for the following recyclable materials:

1. #10 Freezer Tin Cans
2. Scrap Tires
3. Scrap Aluminum
4. Scrap Batteries
5. Scrap Iron
6. Scrap Steel and Galvanized Steel
7. Scrap Brass
8. Scrap Copper
9. Scrap License Plates
10. Scrap X-Ray and Micro-Film
11. Motor Oil

Some of the materials are currently being recycled. The Bureau of Purchases reported on the following:

Scrap Tires are sold periodically by this Bureau.
Scrap Metal is sold periodically by the Motor Transport Service and by institutions.
Scrap License Plates and other aluminum scrap is sold by the Motor Vehicle Division.
Scrap X-Ray film is sold at prices as high as 30¢/lb. when enough accumulates to bother with. One sale yielded \$3,500.00.
Motor Oil used motor oil is being sold by Motor Transport Service at 5¢/Gal. on contract.

Recycling the Augusta Mental Health Institute has sponsored a self-funded paper recycling collection program which presses waste paper into 700 lb. bales for sale to paper mills.

General Services Administration requires certain percentage of recycled paper in most of their paper products. Most recycled paper costs more than virgin largely because de-inking costs are high as are other steps necessary to condition the used paper to blend with virgin pulp. We have seen samples of 100% Recycled Bond Paper, which were very satisfactory except that brightness is a little lower than for virgin paper.

De-inking plants have a serious waste disposal problem so that it is not easy to find a good plant location.

F. Recycling Industries

A campaign should be instituted to encourage recycling industries to locate in Maine. The State Development Office (SDO) and the Department of Environmental Protection should promote the development of non-polluting industries which re-use, reclaim, or recycle state resources.

G. Procuring Recycled Products for State Use

All State agencies should attempt, whenever possible, to purchase recycled products or products containing a percentage of secondary materials.

State bids on paper products shall give top priority to paper containing a percentage of recycled fibers, except in those cases where virgin paper is required (e.g. permanent records). Paper items containing the highest volume of recycled fibers should be considered if:

1. The paper item continues to meet the specifications established for that type of paper, considering the function it must perform.
2. The recycled product is available and cost competitive.

H. TRANSPORTATION

Each Agency will be requested to make a 20% reduction over FY 72-73 in its use of energy for transportation purposes. Agencies will be responsible for determining their own priorities on making cutbacks. Specific strategies are provided for maximizing fuel economy and providing alternatives to single passenger automobile travel.

Twenty percent appears to be a reasonable level of conservation. This figure is consistent with results achieved by other state governments. During the third quarter of fiscal year 1974, Federal Agencies realized a thirty percent savings in energy used for transportation purposes.

Agencies should encourage the conservation of energy in both to-and-from work, and on-the-job travel. The State, by involving itself in how employees travel to-an-from work, is setting an example for all-employers to take an active interest in their employees commuting habits. If the agency has problems meeting this goal then he will provide written documented evidence justifying his reasons for not doing so.

A. Commuting To-and-From Work

A primary goal of the conservation program is to persuade individuals to alter their methods of travel to-and-from work. The goal is to encourage the use of energy efficient forms of transportation, such as car-pooling, bicycling, walking, and to discourage the very inefficient travel of single individuals in private automobiles. DOT will reactivate and update the carpool inventory and matching system for state government employees.

B. Preventive Maintenance Programs

A State Vehicle (Motor Pool) Program should be formed to provide a good Preventive Maintenance Program for State Vehicles. This program should stress energy conservation. Additional factors to be considered by the Motor Pool include, but are not limited to:

1. Vehicle Maintenance

- (a) Check all electrical ignition circuits and connections for voltage drop and resistance. Clean, tighten, and replace as necessary.
- (b) Check the cooling system. Flush and replace the anti-freeze if it is contaminated. Remove bugs and foreign matter from front of radiator and air-conditioner.
- (c) Check the muffler for clogging or restrictions.
- (d) Set the timing, to the manufacturers specifications.
- (e) Check tire pressure, balance and alignment.
- (f) Check the cylinder compression.
- (g) Check the car for unnecessary weight.

Note: If an agency has maintenance done in the private sector it would be the responsibility of the driver to insure that the functions under this paragraph are implemented.

2. Procurement Specifications

A paragraph containing the following information will be added to the Standard Specifications for all State Agency passenger cars:

"Energy Conservation. All vehicles acquired for use by State Agencies shall be limited to the minimum body size, weight engine size, operational equipment, if any, and maximum fuel efficiency and aerodynamic design necessary to fulfill the operational need for which that vehicle was acquired. Agencies shall consult the Environmental Protection Agency's guide to get mileage for new vehicles before purchasing an automobile."

The paragraph dealing with tire specifications in the Detailed Requirements for all State Agency passenger cars shall be amended to read "radial tires" in the place of "bias ply tires."

3. "Travel-by-Phone Campaign"

State employees shall endeavor, whenever possible, to substitute the use of the telephone for traveling on official business. They should avail themselves of such services as conference calls and long distance dialing.

4. Driving Suggestions

A list of suggestions for achieving maximum fuel economy in employee driving practices, will be placed in all State vehicles. The list shall include the following:

- (a) Plan your trip before you leave.
- (b) Do not idle the engine.
- (c) Accelerate smoothly to save engines, tires, and gasoline.
- (d) Maximum speed 55 m.p.h. (do not violate speed laws).
- (e) Drive at a steady pace. Avoid congested traffic if possible; minimize braking.
- (f) Use your brake when you stop on a hill.... not your accelerator.

Notes: Item 3 is not applicable to Departments that are involved with investigative work or perform inspections where personal contract is necessary.

Item 4 may not be entirely applicable to police vehicles that are subject to patrolling techniques.

AGENCY PLANNING

Energy conservation should be a primary consideration in all construction work done on new existing State Buildings. The Bureau of Public Improvements which reviews all state construction, should require that energy conservation be included to the maximum degree possible in all proposed State bids and plans.

The Bureau of Public Improvements shall require that all energy efficiency standards, which are economically feasible (over the life of the building) and consistent with the functions of the agency which will occupy the building, be adopted.

BPI should investigate the possibility of renovating currently existing buildings before approving plans for the construction of new buildings.

A. LIFE-CYCLE AND ENERGY EFFICIENCY

Essential to any state conservation program is the application of lifecycle costing and consideration of energy efficiency ratings for materials and equipment purchased for state use. State contracts and bids will be awarded on the basis of long-term costing rather than on lowest original cost. For bids on large energy-consuming equipment (e.g. copy machines, air-conditioners, and major appliances), a standard paragraph should be attached to the bid requiring the applicant to submit pertinent BTU information and energy efficiency ratings. Several large manufacturers of office equipment (Olivetti, A.B. Dick, IBM, Xerox and Honeywell, Inc.) have indicated that this information is available and would be supplied to any interested customer.² The Federal Government has already established a Voluntary Labeling Program rating energy efficiency for room air-conditioners, and is instituting the same program for home appliances.

The Bureau of Purchases should investigate the efficiencies of all energy consuming devices to insure that the most favorable are procured for state agencies including fluorescent lights, high pressure sodium and metal halide lamps, and "wattsaver" bulbs using krypton. All these lighting forms use less energy than regular incandescent light.

1. AGENCY BUILDINGS

The base period for measuring energy conservation shall be FY 72-73. Consumption figures should be reported for all agency space in State owned buildings and, whenever possible, for all agency space in leased buildings. Agencies shall petition landlords to supply itemized base period and current consumption figures for leased building space.

². Proposed State of Oregon State Energy Management Program, Sept. 26, 1974. P.P.26.

2. STANDARD ENERGY PARAGRAPH TO ATTACH TO STATE BIDS

A paragraph requiring the contractor to supply all pertinent energy consumption information, including BTU and energy efficiency ratings, should be included in all State Bids for office equipment, major appliances, and room air-conditioners and the like. In addition, the contractor should supply, upon request, additional information regarding life cycle costs of the equipment, i.e. return on investment.

3. LEASE AGREEMENT SPECIFICATIONS FOR STATE OFFICE BUILDINGS

The state should adopt and provide certain specifications for leasing of state office space not in existing state buildings. The lease should contain the following provisions:

- (a) An itemized billing shall be supplied by the lessor to the lessee each month, containing a breakdown of rental cost, janitorial services, heating, and electrical costs (showing gallons, cubic feet, or KWH's consumed).
- (b) All leases accessible to recycling services which include janitorial service shall contain a clause specifying that custodians will participate in the recycling of waste paper by emptying containers into the proper recycling receptacles.
- (c) The leasehold shall be required to meet all existing conservation standards for state agencies.

4. ENERGY CONSERVATION INVESTMENT PROGRAM

Further energy savings could be realized through the implementation of the following suggestions which would involve some additional cost. The Bureau of Public Improvements, (BPI) should investigate the economic feasibility and effectiveness of adopting the following:

- 1. Installing exterior shade devices, awnings, wings, balconies, or trees to shade windows from direct sunlight. (summer only)
- 2. Install photoelectric cells to turn outdoor lights on and off.
- 3. Consider the use of infra-red heaters in high bay areas and warehouses.

The heat provides comfort, and prevents condensation on stored materials because the light heats objects in the radiation path rather than the air in the space.

4. Consideration will be given to the possible implementation of automated systems to reduce energy consumption. Existing Systems can control many of the thermal and lighting operations in standing structures as well as evaluate the alternatives for future buildings in the design phase. Due to increased costs of energy the Return on Investment is projected between 2-3 years for most systems.

V. PROMOTION

All of the above aspects of the Energy Management plan must be prefaced by a promotional campaign for the implementation of the program. First, state employees must be made aware of the following:

- A. The General Energy Problems our country faces in the year ahead.
- B. The wasteful ways state employees consume energy in their day-to-day tasks.

RECOMMENDED ACTION:

- A. Short memorandum from the Governor's Office to all state employees explaining the hows and whys of the energy management plan.
- B. Mandatory showing of the U. S. Department of Commerce film, "Energy, The Critical Choices Ahead" to all state agency heads.
- C. Showing of the same film, on an optional basis during the lunch hour, for viewing of all state employees (a suitable large conference room would be needed for this purpose).
- D. Showing of other energy films (as in "c" above) if available.
- E. Continual reminders to employees in the form of executive memos and announcements at staff meetings.
- F. Construction of Energy Consumption billboard in the cafeteria showing energy savings over a period of time due to energy conservation.
- G. Energy Suggestion Boxes should be situated at convenient locations throughout the state house complex and cash awards (of an amount to be determined later given to the employees whose suggestions are adopted and when implemented save energy and money.

(Note: In Fiscal 1974, employees of the Federal Government submitted some 13,000 energy savings suggestions; about 1250 were adopted with the result being several million dollars saved by the Federal Government.)

- H. Provide greater publicity for the current car-pooling program being conducted by the Office of Energy Resources and Bureau of Public Improvements.

IMPLEMENTATION OF PLAN

- (a) Each individual agency head will be responsible for implementation of the plan for his or her specific agency for the following reasons:
- (1) Direct involvement and dedication from the supervisory level is essential for successful adherence to conservation measures.
 - (2) Each agency can best monitor itself since a successful conservation technique for one agency may not be successful for another.
 - (3) Agencies know their own energy priorities more than any outside group.
 - (4) Individual employees are more likely to respond to the leadership of their agency administrator, rather than to some other state agency.