

1 H BILL NO. 426  
2 INTRODUCED BY Maloy Bradley Hunsicker  
3

4 A BILL FOR AN ACT ENTITLED: "AN ACT REQUIRING PERFORMANCE  
5 OF A LIFE-CYCLE COST ANALYSIS BEFORE ANY STATE AGENCY MAY  
6 LEASE OR CONSTRUCT A FACILITY."  
7

8 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

9 Section 1. Findings and purpose. (1) Operating and  
10 maintenance expenditures associated with energy equipment  
11 and with energy consumed in state-financed and leased  
12 buildings represent a significant cost over the life of a  
13 building. Energy conserved by appropriate building design  
14 not only reduces the demand for energy but also reduces  
15 costs for building operation. The size, design,  
16 orientation, and operability of windows, the ratio of  
17 ventilating air to air heated or cooled, the level of  
18 lighting consonant with space-use requirements, the handling  
19 of occupancy loads, and the ability to zone off areas not  
20 requiring equivalent levels of heating or cooling are but a  
21 few of the considerations necessary to conserving energy.

22 (2) It is very important that energy-efficient designs  
23 provide energy savings over the life of the building  
24 structure. Conversely, energy-inefficient designs cause  
25 excess and wasteful energy use and high costs over that

1 life. With buildings lasting many decades and with energy  
2 costs escalating rapidly, it is essential that the costs of  
3 operation and maintenance for energy-using equipment be  
4 included in all design proposals for state buildings.

5 (3) In order that such energy efficiency considerations  
6 become a function of building design and also a model for  
7 future application in the private sector, it is the policy  
8 of the state that buildings constructed and financed by the  
9 state be designed and constructed in a manner which will  
10 minimize the consumption of energy used in the operation and  
11 maintenance of such buildings.

12 Section 2. "Facility", "energy performance index", and  
13 "life-cycle costs" defined. In [sections 1 through 5] the  
14 following definitions apply:

15 (1) "Facility" means a building or other structure.

16 (2) "Energy performance index or indices (EPI)" means  
17 a number describing the energy requirements at the building  
18 boundary of a facility, per square foot of floor space or  
19 per cubic foot of occupied volume, as appropriate under  
20 defined internal and external ambient conditions over an  
21 entire seasonal cycle.

22 (3) "Life-cycle costs" means the cost of owning,  
23 operating, and maintaining the facility over the life of the  
24 structure. This may be expressed as an annual cost for each  
25 year of the facility's use.

1 Section 3. Life-cycle cost analysis required. Neither  
 2 the department of administration nor any other state agency  
 3 may lease or construct a facility, within limits prescribed  
 4 in this section, without having secured a proper evaluation  
 5 of life-cycle costs, as computed by a qualified architect or  
 6 engineer. Furthermore, construction may proceed only upon  
 7 disclosing, for the facility chosen, the life-cycle costs as  
 8 determined in [section 4] and the capitalization of the  
 9 initial construction costs of the building. The life-cycle  
 10 costs shall be a primary consideration in the selection of a  
 11 building design. Such analysis is required only for  
 12 construction of buildings with an area of 5,000 square feet  
 13 or greater. For leased areas of 20,000 square feet or  
 14 greater within a given building boundary, a life-cycle  
 15 analysis shall be performed, and a lease may be entered only  
 16 where there is a showing that the life-cycle costs are  
 17 minimal compared to available like facilities.

18 Section 4. Rules for conduct of life-cycle cost  
 19 analysis. (1) The department of administration shall adopt  
 20 rules and procedures, including energy conservation  
 21 performance guidelines, for conducting a life-cycle cost  
 22 analysis of alternative architectural and engineering  
 23 designs and for developing energy performance indices to  
 24 evaluate the efficiency of energy utilization for competing  
 25 designs in the construction of state-financed and leased

1 facilities. Such rules and procedures shall take effect 270  
 2 days after July 1, 1977.

3 (2) Such life-cycle costs shall be the sum of:

4 (a) the reasonably expected fuel costs over the life  
 5 of the building, as determined by the department, that are  
 6 required to maintain illumination, power, temperature,  
 7 humidity, ventilation, and all other energy-consuming  
 8 equipment in a facility; and

9 (b) the reasonable costs of probable maintenance,  
 10 including labor and materials, and operation of the  
 11 building.

12 (3) The department shall adopt rules for determining  
 13 life-cycle costs including rules relating to:

14 (a) the orientation and integration of the facility  
 15 with respect to its physical site;

16 (b) the amount and type of glass employed in the  
 17 facility and the directions of exposure;

18 (c) the effect of insulations incorporated into the  
 19 facility design and the effect on solar utilization of the  
 20 properties of external surfaces;

21 (d) the variable occupancy and operating conditions of  
 22 the facility and subportions of the facility; and

23 (e) an energy consumption analysis of the major  
 24 equipment of the facility's heating, ventilating, cooling,  
 25 lighting, and hot water systems and of all other major

1 energy-consuming equipment and systems as appropriate. This  
2 analysis shall include:

- 3 (i) the comparison of alternative systems;
- 4 (ii) a projection of the annual energy consumption of  
5 major energy-consuming equipment and systems for a range of  
6 operation of the facility over the life of the facility; and
- 7 (iii) the evaluation of the energy consumption of  
8 component equipment in each system, considering the  
9 operation of such components at other than full or rated  
10 outputs.

11 (4) Such rules shall be based on the best currently  
12 available methods of analysis, including those of the  
13 national bureau of standards, the department of housing and  
14 urban development, and other federal agencies and  
15 professional societies and materials developed by the  
16 department. Provision shall be made for an annual updating  
17 of rules and standards as required.

18 Section 5. Rules for energy performance indices. The  
19 department shall promulgate rules for energy performance  
20 indices as defined in [section 2] to audit and evaluate  
21 competing design proposals submitted to the state. As  
22 experience develops on the energy performance achieved with  
23 state building, the indices (EPI) will serve as a measure of  
24 building performance with respect to energy consumption.

-End-

STATE OF MONTANA

REQUEST NO. 410-77

FISCAL NOTE

Form BD-15

In compliance with a written request received February 8, 19 77, there is hereby submitted a Fiscal Note for House Bill 426 pursuant to Chapter 53, Laws of Montana, 1965 - Thirty-Ninth Legislative Assembly.

Background information used in developing this Fiscal Note is available from the Office of Budget and Program Planning, to members of the Legislature upon request.

DESCRIPTION OF PROPOSED LEGISLATION:

An act requiring performance on a life cycle cost analysis before any state agency may lease or construct a facility.

ASSUMPTIONS:

1. That the provisions of this bill include life-cycle costing and value engineering for the following building considerations  
1. Mechanical Systems 2. Electrical Systems 3. Exterior Enclosures 4. Structural Systems 5. Materials and Finishes and involving a 20 year analysis of the following cost factors - - 1. Finance 2. Maintenance and Operations 3. Initial Cost 4. Indirect Costs 5. Land 6. Miscellaneous.
2. That an average of 4 alternatives be investigated for each area of consideration.
3. That criteria established by the State of Montana for life-cycle costing and value engineering proposals be based on existing and available computer programs.
4. That the cost of a life-cycle analysis on a potential facility to be leased be borne by the lessor and presented in the proposal submitted to the State.
5. Life-cycle cost analyses would be contracted with architects or engineers as a part of over-all design contract.

FISCAL IMPACT:

The proposed legislation would add \$290,000 to the Long-Range Building Program costs for the 1979 biennium. This would be the cost of contracting with designers to perform the analyses. This legislation would lead to increased construction costs which, hopefully, would be offset by decreased operating costs over the life of the project.

TECHNICAL NOTE:

Requiring an analysis for all construction of buildings over 5,000 sq. ft. could result in much duplication of effort as similar buildings would produce similar results which would be recognizable without the mechanics of a repetitious analysis.

*Richard L. Franz*  
BUDGET DIRECTOR

Office of Budget and Program Planning

Date: Feb 15, 1977

Approved by Committee  
on Natural Resources

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8 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

9 Section 1. Findings and purpose. (1) Operating and  
10 maintenance expenditures associated with energy equipment  
11 and with energy consumed in state-financed and leased  
12 buildings represent a significant cost over the life of a  
13 building. Energy conserved by appropriate building design  
14 not only reduces the demand for energy but also reduces  
15 costs for building operation. The size, design,  
16 orientation, and operability of windows, the ratio of  
17 ventilating air to air heated or cooled, the level of  
18 lighting consonant with space-use requirements, the handling  
19 of occupancy loads, and the ability to zone off areas not  
20 requiring equivalent levels of heating or cooling are but a  
21 few of the considerations necessary to conserving energy.

22 (2) It is very important that energy-efficient designs  
23 provide energy savings over the life of the building  
24 structure. Conversely, energy-inefficient designs cause  
25 excess and wasteful energy use and high costs over that

1 life. With buildings lasting many decades and with energy  
2 costs escalating rapidly, it is essential that the costs of  
3 operation and maintenance for energy-using equipment be  
4 included in all design proposals for state buildings.

5 (3) In order that such energy efficiency considerations  
6 become a function of building design and also a model for  
7 future application in the private sector, it is the policy  
8 of the state that buildings constructed and financed by the  
9 state be designed and constructed in a manner which will  
10 minimize the consumption of energy used in the operation and  
11 maintenance of such buildings.

12 Section 2. "Facility", "energy performance index", and  
13 "life-cycle costs" defined. In [sections 1 through 5] the  
14 following definitions apply:

15 (1) "Facility" means a building or other structure.

16 (2) "Energy performance index or indices (EPI)" means  
17 a number describing the energy requirements at the building  
18 boundary of a facility, per square foot of floor space or  
19 per cubic foot of occupied volume, as appropriate under  
20 defined internal and external ambient conditions over an  
21 entire seasonal cycle.

22 (3) "Life-cycle costs" means the cost of owning,  
23 operating, and maintaining the facility over the life of the  
24 structure. This may be expressed as an annual cost for each  
25 year of the facility's use.

1 Section 3. Life-cycle cost analysis required SHALL BE  
 2 CONSIDERED. Neither the department of administration nor  
 3 any other state agency may lease or construct a facility,  
 4 within limits prescribed in this section, without having  
 5 secured CONSIDERED a proper evaluation of life-cycle costs  
 6 ~~as computed by a qualified architect or engineer~~  
 7 ~~furthermore, construction may proceed only upon disclosing~~  
 8 ~~for the facility chosen, the life-cycle costs as determined~~  
 9 ~~in [section 4] and the capitalization of the initial~~  
 10 ~~construction costs of the building. The ALTERNATE~~  
 11 life-cycle costs shall be a primary consideration in the  
 12 selection APPROVAL of a building design. Such analysis is  
 13 required only for construction of buildings with an area of  
 14 5,000 square feet or greater. ~~For leased areas of 20,000~~  
 15 ~~square feet or greater within a given building boundary, a~~  
 16 ~~life-cycle analysis shall be performed, and a lease may be~~  
 17 ~~entered only where there is a showing that the life-cycle~~  
 18 ~~costs are minimal compared to available like facilities.~~

19 Section 4. Rules PROCEDURES for conduct of life-cycle  
 20 cost analysis. (1) The department of administration shall  
 21 ~~adopt rules and~~ RECOMMEND procedures, including energy  
 22 conservation performance guidelines, for conducting a  
 23 life-cycle cost analysis of alternative architectural and  
 24 engineering designs and for developing energy performance  
 25 indices to evaluate the efficiency of energy utilization for

1 ~~competing designs in the construction of state-financed and~~  
 2 ~~leased facilities. Such rules and procedures shall take~~  
 3 ~~effect 270 days after July 1, 1977.~~

4 ~~(2) Such life-cycle costs shall be the sum of~~  
 5 ~~(a) the reasonably expected fuel costs over the life~~  
 6 ~~of the building, as determined by the department, that are~~  
 7 ~~required to maintain illumination, power, temperature,~~  
 8 ~~humidity, ventilation, and all other energy-consuming~~  
 9 ~~equipment in a facility; and~~

10 ~~(b) the reasonable costs of probable maintenance,~~  
 11 ~~including labor and materials, and operation of the~~  
 12 ~~building;~~

13 ~~(3) The department shall adopt rules for determining~~  
 14 ~~life-cycle costs including rules relating to:~~

15 ~~(a) the orientation and integration of the facility~~  
 16 ~~with respect to its physical site;~~

17 ~~(b) the amount and type of glass employed in the~~  
 18 ~~facility and the directions of exposures;~~

19 ~~(c) the effect of insulation incorporated into the~~  
 20 ~~facility design and the effect on solar utilization of the~~  
 21 ~~properties of external surfaces;~~

22 ~~(d) the variable occupancy and operating conditions of~~  
 23 ~~the facility and subportions of the facility; and~~

24 ~~(e) an energy consumption analysis of the major~~  
 25 ~~equipment of the facility's heating, ventilating, cooling,~~

1 ~~lighting--and--hot--water--systems--and--of--all--other--major~~  
 2 ~~energy-consuming-equipment-and-systems-as-appropriate--This~~  
 3 ~~analysis-should-include:~~

- 4 ~~(i)--the-comparison-of-alternative-systems;~~
- 5 ~~(ii)--a-projection--of--the--annual--energy--consumption--of~~  
 6 ~~major-energy-consuming-equipment-and-systems-for-a-range-of~~  
 7 ~~operation-of-the-facility-over-the-life-of-the-facility;--and~~
- 8 ~~(iii)--the-re-evaluation--of--the--energy--consumption--of~~  
 9 ~~component--equipment--in--each--system--considering--the~~  
 10 ~~operation--of--such--components--at--other--than--full--or--rated~~  
 11 ~~outputs.~~

12 ~~(4)(2)~~ Such rates PROCEDURES shall be based on the  
 13 best currently available methods of analysis, ~~including~~  
 14 ~~those-of-the-national-bureau-of-standards, the-department-of~~  
 15 ~~housing-and-urban-development, and--other--federal--agencies~~  
 16 ~~and--professional--societies--and--materials-developed-by-the~~  
 17 ~~department.~~ Provision shall be made for an annual updating  
 18 of rates PROCEDURES and standards as required.

19 Section 5. rates STANDARDS for energy performance  
 20 indices. The department shall promulgate rates STANDARDS for  
 21 energy performance indices as defined in [section 2] to  
 22 audit and evaluate ~~competing~~ design proposals submitted to  
 23 the state. As experience develops on the energy performance  
 24 achieved with state building, the indices (EPI) will serve  
 25 as a measure of building performance with respect to energy

1 consumption.

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23 provide energy savings over the life of the building  
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1 life. With buildings lasting many decades and with energy  
2 costs escalating rapidly, it is essential that the costs of  
3 operation and maintenance for energy-using equipment be  
4 included in all design proposals for state buildings.

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9 state be designed and constructed in a manner which will  
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19 per cubic foot of occupied volume, as appropriate under  
20 defined internal and external ambient conditions over an  
21 entire seasonal cycle.

22 (3) "Life-cycle costs" means the cost of owning,  
23 operating, and maintaining the facility over the life of the  
24 structure. This may be expressed as an annual cost for each  
25 year of the facility's use.

THIRD READING



1 Section 3. Life-cycle cost analysis required ~~SHALL BE~~  
 2 ~~CONSIDERED~~. Neither the department of administration nor  
 3 any other state agency may lease or construct a facility,  
 4 within limits prescribed in this section, without having  
 5 secured ~~CONSIDERED~~ a proper evaluation of life-cycle costs  
 6 ~~FURTHERMORE, CONSTRUCTION MAY PROCEED ONLY UPON DISCLOSING,~~  
 7 ~~FOR THE FACILITY CHOSEN, THE LIFE CYCLE COSTS AS DETERMINED~~  
 8 ~~IN SECTION 4) AND THE CAPITALIZATION OF THE INITIAL~~  
 9 ~~CONSTRUCTION COSTS OF THE BUILDING, THE~~ as-computed-by-a  
 10 ~~qualified-architect-or-engineer--Furthermore--construction~~  
 11 ~~may--proceed--only--upon--disclosing--for--the--facility--chosen--~~  
 12 ~~the--life--cycle--costs--as--determined--in--[section--4]--and--the~~  
 13 ~~capitalization--of--the--initial--construction--costs--of--the~~  
 14 ~~building. The ALTERNATE life-cycle costs shall be a primary~~  
 15 ~~consideration in the selection APPROVAL SELECTION of a~~  
 16 ~~building design. Such analysis is required only for~~  
 17 ~~construction of buildings with an area of 5,000 square feet~~  
 18 ~~or greater. For--leased--areas--of--20,000--square--feet--or~~  
 19 ~~greater--within--a--given--building--boundary--a--life--cycle~~  
 20 ~~analysis--shall--be--performed--and--a--lease--may--be--entered--only~~  
 21 ~~where--there--is--a--showing--that--the--life--cycle--costs--are~~  
 22 ~~minimal--compared--to--available--like--facilities.~~

23 Section 4. Rules ~~PROCEEDURES~~ RULES for conduct of  
 24 life-cycle cost analysis. (1) The department of  
 25 administration shall adopt-rules-and ~~REQUIREMENTS~~ ADOPT RULES

1 AND procedures, including energy conservation performance  
 2 guidelines, for conducting a life-cycle cost analysis of  
 3 alternative architectural and engineering designs and for  
 4 developing energy performance indices to evaluate the  
 5 efficiency of energy utilization ~~for-competing--designs--in~~  
 6 ~~the--construction FOR COMPETING DESIGNS IN THE CONSTRUCTION~~  
 7 of state-financed-and-leased FINANCED AND LEASED facilities.  
 8 Such RULES AND rules-and procedures shall take effect 270  
 9 days after July 1, 1977.

10 (2)--Such-life-cycle-costs-shall-be-the-sum-of:  
 11 (a)--the--reasonably--expected--fuel--costs--over--the--life  
 12 of-the-building--as--determined--by--the--department--that--are  
 13 required--to--maintain--illumination--power--temperature  
 14 humidity--ventilation--and--all--other--energy-consuming  
 15 equipment--in--a--facility--and  
 16 (b)--the--reasonable--costs--of--probable--maintenance  
 17 including--labor--and--materials--and--operation--of--the  
 18 buildings;  
 19 (3)--The--department--shall--adopt--rules--for--determining  
 20 life-cycle-costs--including--rules--relating--to:  
 21 (a)--the--orientation--and--integration--of--the--facility  
 22 with--respect--to--its--physical--site;  
 23 (b)--the--amount--and--type--of--glass--employed--in--the  
 24 facility--and--the--directions--of--exposure;  
 25 (c)--the--effect--of--insulation--incorporated--into--the

1 facility--design--and--the--effect--on--solar--utilization--of--the  
2 properties--of--external--surfaces;

3 (c)--the--variable--occupancy--and--operating--conditions--of  
4 the--facility--and--subportions--of--the--facility;--and

5 (2) SUCH LIFE-CYCLE COSTS SHALL BE THE SUM OF:

6 (A) THE REASONABLY EXPECTED FUEL COSTS OVER THE LIFE  
7 OF THE BUILDING, AS DETERMINED BY THE DEPARTMENT, THAT ARE  
8 REQUIRED TO MAINTAIN ILLUMINATION, POWER, TEMPERATURE,  
9 HUMIDITY, VENTILATION, AND ALL OTHER ENERGY CONSUMING  
10 EQUIPMENT IN A FACILITY; AND

11 (B) THE REASONABLE COSTS OF PROBABLE MAINTENANCE,  
12 INCLUDING LABOR AND MATERIALS, AND OPERATION OF THE  
13 BUILDING.

14 (3) THE DEPARTMENT SHALL ADOPT RULES FOR DETERMINING  
15 LIFE-CYCLE COSTS INCLUDING RULES RELATING TO:

16 (A) THE ORIENTATION AND INTEGRATION OF THE FACILITY  
17 WITH RESPECT TO ITS PHYSICAL SITE;

18 (B) THE AMOUNT AND TYPE OF GLASS EMPLOYED IN THE  
19 FACILITY AND THE DIRECTIONS OF EXPOSURE;

20 (C) THE EFFECT OF INSULATION INCORPORATED INTO THE  
21 FACILITY DESIGN AND THE EFFECT ON SOLAR UTILIZATION OF THE  
22 PROPERTIES OF EXTERNAL SURFACES; AND

23 (D) THE VARIABLE OCCUPANCY AND OPERATING CONDITIONS OF  
24 THE FACILITY AND SUBPORTIONS OF THE FACILITY.

25 (e)--on--energy--consumption--analysis--of--the--major

1 equipment--of--the--facility's--heating--ventilating--cooling  
2 lighting--and--hot--water--systems--and--of--all--other--major  
3 energy--consuming--equipment--and--systems--as--appropriate;--this  
4 analysis--shall--include:

5 (i)--the--comparison--of--alternative--systems;

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7 major--energy--consuming--equipment--and--systems--for--a--range--of  
8 operation--of--the--facility--over--the--life--of--the--facility;--and

9 (iii)--the--evaluation--of--the--energy--consumption--of  
10 component--equipment--in--each--system--considering--the  
11 operation--of--such--components--at--other--than--full--or--rated  
12 outputs.

13 (4) (2) (4) Such rates PROCEDURES RULES shall be based  
14 on the best currently available methods of analysis,  
15 including those of the national bureau of standards, the  
16 department of housing and urban development, and other  
17 federal agencies and professional societies and materials  
18 developed by the department, INCLUDING THOSE OF THE NATIONAL  
19 BUREAU OF STANDARDS, THE DEPARTMENT OF HOUSING AND URBAN  
20 DEVELOPMENT, AND OTHER FEDERAL AGENCIES AND PROFESSIONAL  
21 SOCIETIES AND MATERIALS DEVELOPED BY THE DEPARTMENT.  
22 Provision shall be made for an annual updating of rates  
23 PROCEDURES RULES and standards as required.

24 Section 5. rates STANDARDS RULES for energy  
25 performance indices. The department shall promulgate rates

1 ~~STANDARD~~ RULES for energy performance indices as defined in  
2 [section 2] to audit and evaluate ~~competing~~ ~~COMPETING~~ design  
3 proposals submitted to the state. As experience develops on  
4 the energy performance achieved with state building, the  
5 indices (EPI) will serve as a measure of building  
6 performance with respect to energy consumption.

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