

HJR 31 ENERGY STUDY SUMMARY REPORT

**Final Report to the
53rd Legislature
of the State of Montana**

December 1992

**Prepared by the Montana Environmental Quality Council
and the
Montana Department of Natural Resources and Conservation**

House Joint Resolution 31
ENERGY POLICY STUDY
Summary Report

December 1992

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ACKNOWLEDGMENTS

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The EQC would also like to acknowledge the contribution of Ms. Gail Kuntz, former EQC Resource Specialist, for completion of the early phases of the HJR 31 Energy Policy Study.

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SUMMARY OF FINAL EQC RECOMMENDATIONS AND PROPOSED LEGISLATION

A summary of the HJR 31 Montana Energy Policy Study recommendations is listed below. The legislation the Environmental Quality Council has requested to implement recommendations 1 through 3 is presented in Appendix B. Legislation implementing recommendations 4 through 12 will be submitted to the EQC for approval in early January.

ENERGY POLICY GOAL STATEMENT

Recommendation #1

The EQC recommends that the state adopt the following goal statement for Montana energy policy:

The state should promote energy conservation, production, and consumption of a reliable and efficient mix of energy sources that represent the least social, environmental, and economic costs and the most long-term benefits to Montana citizens. In pursuing this goal, the state should:

- A. Recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets; and
- B. Maintain a continuing process to review this energy policy statement and any future changes so that Montana's energy strategy will provide a balance between a sustainable environment and a viable economy.

ENERGY POLICY DEVELOPMENT PROCESS

Recommendation #2

The EQC recommends that the legislature create a continuing process modeled in part on the state water planning process for developing and modifying state energy policy.

ENERGY POLICY ANALYSIS METHODOLOGY

Recommendation #3

The EQC recommends that the legislature adopt an energy policy analysis methodology to inform the legislature and others of the cost/benefit implications of proposed energy legislation.

The following recommendations are subject to final approval by the EQC in early January.

RESIDENTIAL ENERGY POLICY

Recommendation #4

The EQC endorses and recommends that the legislature adopt the following residential energy policy statement developed by a collaborative working group including a broad representation of Montana groups and individuals interested in residential energy efficiency:

The people of Montana have an interest in energy efficiency in residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter. It is, therefore, the policy of the state to encourage energy efficiency in residential buildings through strategies which ensure that:

- The housing consumer has access to the information required to make informed choices about structures and energy efficiency measures;
- Energy efficiency measures are safe, reliable, and readily available for use in Montana;
- Investments in energy efficiency measures would be cost effective;
- The impact of the cost of the energy efficiency measures on the combination of down payments, monthly mortgages payments, and monthly utility bills, will not adversely affect the affordability of housing to prospective homebuyers and renters; and
- The energy efficiency measures will not place an undue or inequitable burden on residential building owners or renters, the residential construction industry, financial institutions, real estate sales persons and appraisers, energy providers, or state and local governments.

RESIDENTIAL ENERGY POLICY IMPLEMENTATION STRATEGIES

Recommendation #5

The EQC recommends that state government in concert with the Montana housing industry, utilities and other interested or affected entities should continue to provide education, training, and technical assessment and demonstration programs regarding residential energy efficiency targeted at consumers and the infrastructure of the housing industry, including builders, building code officials, home inspectors, bankers, realtors, and appraisers.

Recommendation #6

The EQC recommends that the state require a "labeling sticker" describing the energy efficiency components, e.g. heating appliance efficiencies and ceiling, wall, floor, window, and door "R-or U-values", be permanently fixed to the breaker box of all new site built, modular and manufactured homes.

Recommendation #7

The EQC recommends that the state initiate developing and/or selection and testing of a home energy rating system applicable to new and existing residences. Subject to available funding, the system should be developed over the next two years in conjunction with the federal government.

Recommendation #8

The EQC recommends that the state support a petition from the real estate and housing industry to the Federal Home Administration (FHA) to increase the "caps", or upper limits, of FHA home mortgages.

Recommendation #9

The EQC recommends that the legislature appropriate non-general fund dollars, possibly such as federal oil overcharge funds, to establish a loan insurance pool that would allow the Board of Housing Program to increase the affordability of home mortgages to Montanans. The program would raise the mortgage ceiling levels above FHA caps without increasing the down payment requirements above the 3-5% level. Federal income and other qualifying criteria would remain unaffected. A new requirement would be created to obtain mortgages above the FHA caps. The home would have to be built to higher energy efficiency levels than current building practice. Because utilities would benefit from the increased energy efficiency, they should also contribute dollars to the insurance pool.

Recommendation #10

The EQC recommends that Montana utilities offer incentive programs on a voluntary basis to purchase energy efficiency.

Recommendation #11

The EQC recommends that the legislature provide for enforcement of the energy code provisions of the state building code in single family through four-plex residential buildings located in areas outside of the jurisdictions of local governments adopting the state building code. This enforcement should be accomplished via a self-certification by home builders.

Recommendation #12

The EQC recommends that the energy code provisions of the state building code be reviewed this coming summer and raised to the levels agreed to by the residential energy efficiency working group, (see Appendix H) and that the code not be reviewed again until called for under the normal uniform building code review cycle.

INTRODUCTION

NOTE: This version of the report is printed without two lengthy appendices: Appendix F, Montana Energy Law Survey; and Appendix H, Montana Energy Data. The entire report, "HJR 31 Energy Study, Montana Energy Data," is available from the EQC.

Early in 1991, national public attention became focused on energy security and energy efficiency issues as a result of the United States' entry into war in the Middle East. Concerns over uncertain energy supplies prompted increased legislative interest in the development of an official energy policy at both the national and state levels.

The 1991 Montana Legislature responded by approving HJR 31 (see Appendix A), requiring the Environmental Quality Council (EQC) to develop recommendations to the legislature for a comprehensive state energy policy and options for its implementation. HJR 31 instructed the EQC, in cooperation with the Department of Natural Resources and Conservation (DNRC) and the Consumer Counsel, to develop the framework for a proposed state energy policy.¹ The framework was to include specific goals and recommended legislation to guide state programs relating to energy production, consumption, and conservation, and recommend assignments of responsibility to executive branch agencies for the implementation and administration of the proposed policy. HJR 31 also directed the EQC, DNRC, and Consumer Counsel to study: the state's potential for energy conservation; renewable and nonrenewable sources of energy available to the state; and existing energy programs in Montana and other states, the region, and the nation, including the influence of regional and national energy production, consumption, and conservation patterns upon Montana.

This report responds to the mandates of HJR 31. Through a series of consultations with numerous government agencies; energy producers and distributors; organizations and citizens having energy expertise or interest; and, with the able assistance of several task forces or working groups, the EQC has developed recommendations for:

- An energy policy goal statement;
- A continuing process for developing energy policy;
- An energy policy analysis methodology to be used by legislators and others to evaluate the implications of energy-related legislation; and
- A specific policy and implementing strategies for increasing the efficiency of Montana residences.

¹ Because the legislature appropriated no additional moneys to conduct the required study, the EQC, DNRC, and Consumer Counsel's response to HJR 31 was constrained by existing budget and staff.

To provide a context for these recommendations, this report also contains a summary of an inventory of existing state energy-related law and a summary compilation of available data on the production and consumption of energy in Montana by type and end use prepared by the Montana Department of Natural Resources and Conservation.

SECTION I.

ENERGY POLICY GOAL STATEMENT

A. BACKGROUND

The EQC initiated its study of energy policy by creating a Study Design Working Group (Study Group) and charging it with drafting a work plan to guide the effort. The Study Group was chosen to be broadly representative of energy producers, distributors, consumers, state agencies, low-income and environmental groups, and others interested in state energy policy. A list of the members of the Study Group is found in Appendix C.

Because of the financial and time constraints on this study, the Study Group did not recommend developing a comprehensive state energy policy. Instead, it proposed a work plan that addressed the following elements: an energy policy goal statement; the design of an ongoing energy policy development process; an energy policy analysis methodology; and selected energy policy development topics including Montana's energy end uses, energy conservation, and motor vehicles/transportation. For any of the selected topics chosen, the Study Group suggested that three questions be addressed: 1) What is the State of Montana doing now? 2) What could the state do? 3) What should the state do?

The EQC approved the portions of the work plan addressing all but the selected energy topics, which were deferred pending identification of necessary funding and staffing resources.²

After receiving and discussing a proposed goal statement from the Study Group, the EQC adopted the following statement for recommendation to the 1993 legislature:

² Later on in the interim, the EQC selected the topic of residential energy efficiency for policy development. (See Section V.)

B. RECOMMENDATION

Recommendation #1:

The state should promote energy conservation, production, and consumption of a reliable and efficient mix of energy sources that represent the least social, environmental and economic costs and the most long-term benefits to Montana citizens. In pursuing this goal, the state should:

A. Recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets; and

B. Maintain a continuing process to review this energy policy statement and any future changes so that Montana's energy strategy will provide a balance between a stable environment and a viable economy.

SECTION II.

ENERGY POLICY DEVELOPMENT PROCESS

A. BACKGROUND

Historically, many of Montana's energy policies, and particularly coal-related policies, have been developed via combat between interested parties. The forum for this policy development has generally been the legislature, although the courts, and executive branch agencies such as the Board of Natural Resources and Conservation and the Public Service Commission, have made important decisions as well. Policy has been made primarily in an ad hoc rather than comprehensive mode, and few if any policies have been reviewed for effectiveness and contemporary relevance.

The Study Design Working Group recommended to the EQC that some of these aspects of Montana's energy policy making process should be preserved and some changed. Because the legislature is the constitutional mechanism through which the people of Montana set public policy, the Study Group recommended that it should remain the primary energy policy decision forum. The Study Group also recommended that energy policy development should continue to be ad hoc rather than comprehensive in nature because attempts to create the latter tend to degenerate into disputes over symbols and ideologies at the expense of solving actual problems. Even if the symbolic and ideological disputes were resolved and a "comprehensive" policy proposal developed, it probably would not have sufficient public interest or backing to translate it into comprehensive implementing legislation. Energy policies should continue to be made in response to the identification of specific problems or challenges related to the production, distribution, and consumption of energy.

The major change recommended by the Study Group was the creation of a process modeled on the existing, successful state water planning process through which interested members of the public could work together to develop consensus-based policy proposals for disposition by the legislature. Such a mechanism would have three primary advantages over historic circumstances: first, it would reduce the rancor and conflict which has surrounded many policy initiatives; second, it would produce a more informed consideration by the legislature of policy choices; and third, policy initiatives generated by it would likely be supported by the coalition of interests necessary to obtain both legislative action and implementation of that action. A consensus-based mechanism could make a difference by leading to resolution of real problems.

To achieve these objectives the mechanism must:

- Be open and include participation by all interested parties;
- Allow these parties to work together in a structured process so they can understand each other's motivations, concerns, and goals;
- Allow the parties to influence selection of issues of concern as well as identify and evaluate alternative solutions to them;

- Include participation by legislators who could then advocate the group's recommendations to the legislature; and
- Be supported by state agency expertise capable of providing the information and analysis necessary for the group to identify and analyze policy alternatives.

This process would also provide the opportunity to evaluate the effectiveness of Montana's existing energy policies. Historically, if an existing policy has been reviewed, the review has occurred when a legislative proposal was made to change it. However, it is too much to expect time-pressured legislators to conduct a thorough, informed, and objective look at policy effectiveness. The policy making mechanism should and can also be used to review periodically the effectiveness and relevance of existing energy policies.

B. RECOMMENDED ENERGY POLICY DEVELOPMENT PROCESS

Recommendation #2:

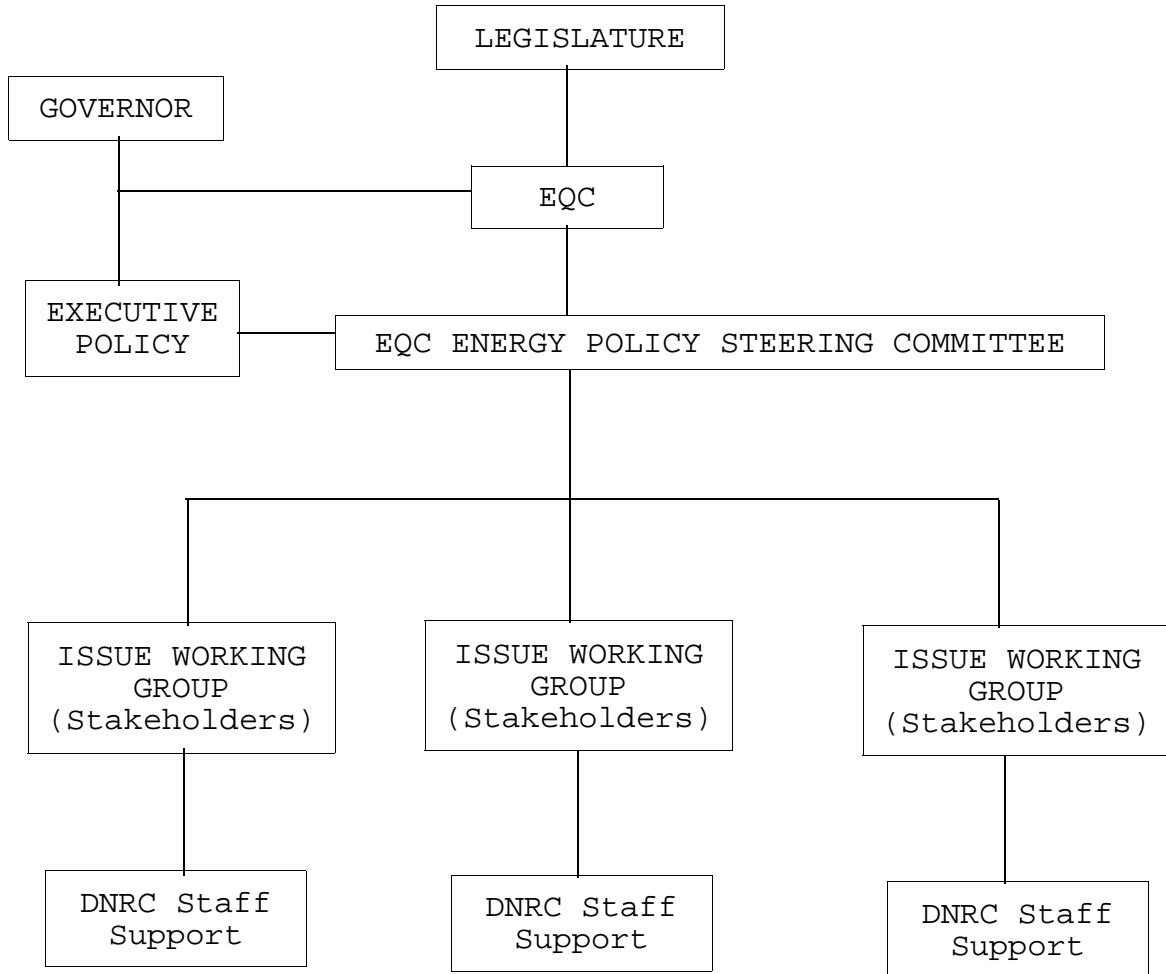
The EQC recommends that the legislature create a continuing process modeled in part on the state water planning process for developing and modifying state energy policy.

Based on the recommendations of its Study Group and public comments, the EQC recommends that the legislature create the continuing energy policy process shown schematically in Figure 1. This process is modeled on the state water planning process which has successfully involved the interested public and executive and legislative branches in consensus-based water planning and policy making. Draft legislation implementing this recommendation is contained in Appendix B.

Overall responsibility for energy policy development would reside with the EQC and the Montana Department of Natural Resources and Conservation (DNRC). The EQC would identify specific components of the state's energy policy needing development, based on the recommendations of the DNRC and the public,. Oversight of the development would reside in an energy policy steering committee, a subcommittee of the EQC with possible representation from other entities. The steering committee would then assign an issue Study Group composed of representatives of the parties with a stake in that specific component the task of developing consensus recommendations for that component of energy policy. At its discretion, the EQC would forward energy policy recommendations to the legislature and appropriate executive branch agencies for adoption.

Technical, administrative and logistical support of the issue Study Groups would be supplied by the Energy Division of the DNRC. Since the Energy Division is the state entity in which energy policy and technical expertise now resides, their support of the issue working groups would result in the lowest costs to the state.

Figure 1
Energy Policy Making Organizational Chart



SECTION III.

ENERGY POLICY ANALYSIS METHODOLOGY

A. BACKGROUND

In addition to creating an ongoing energy policy development process that would involve stakeholders and the public in addressing issues of energy policy as they arise, the Study Design Working Group also recommended that the EQC develop an energy policy analysis methodology that would inform legislators and others regarding the implications of energy-related legislation. The analysis would identify the potential costs and benefits of energy proposals to society in a manner similar to fiscal notes used by the legislature to project the fiscal impacts of proposed legislation.

The EQC accepted the Study Design Working Group's recommendation and appointed a separate working group, the EQC Energy Policy Analysis Methodology Working Group (Methodology Working Group) to develop a methodology. Members of the Methodology Working Group were chosen to be broadly representative of Montana energy producers and consumers and are listed in Appendix D. This working group was assisted by the staff of the DNRC.

B. RECOMMENDED ENERGY POLICY ANALYSIS METHODOLOGY

Recommendation #3:

The EQC recommends that the legislature adopt an energy policy analysis methodology to inform the legislature and others of the cost/benefit implications of proposed energy legislation.

At the recommendation of the Methodology Working Group, the EQC proposes that the 1993 and subsequent legislatures conduct cost/benefit analyses of proposed energy-related legislation using the specific methodology explained in Appendix E. The methodology consists of two parts, an Energy Policy Evaluation Worksheet and an Effects Summary Table. The purpose of the Worksheet is to describe in detail the potential energy, economic, environmental, social, and fiscal effects of a given legislative proposal. The Summary Table would be used to summarize the effects of the proposal in concise, comprehensive terms.

The methodology itself is not intended to dictate any predetermined conclusions or to make energy policy decisions for the legislators. It is designed to serve a role similar to that of a fiscal note and can be prepared by a variety of people, individuals or groups who are also involved in the preparation of fiscal notes. Different individuals and organizations may come to different conclusions using the methodology. The methodology is not intended for administrative rule making.

SECTION IV.

MONTANA ENERGY LAW SURVEY

A. BACKGROUND

The work plan for the energy policy study proposed to the EQC by the Study Design Working Group also included as a selected energy policy topic the evaluation of the effectiveness of Montana's existing energy efficiency statutes and regulations. Based on this suggestion, the Montana Office of the Northwest Power Planning Council agreed to fund a more general survey of all Montana energy statutes and regulations. The survey was conducted by the law firm of Murphy, Robinson, Heckathorn & Phillips, P.C. of Kalispell, Montana. The report, entitled "Montana Energy Law Survey," which attempted to catalogue and summarize all Montana statutes and regulations addressing energy, is available from the EQC in Appendix G of the expanded version of this report. The following summary of existing Montana energy policies is based on the "Montana Energy Law Survey".

B. SUMMARY OF MONTANA ENERGY POLICY

No formal, comprehensive state energy policy has been codified in statute. A number of laws addressing energy topics have been adopted which reflect specific energy policies. A summary of these policies, grouped by related topic and comments on their gaps and inconsistencies follows.

1. Non-Renewable Energy Resources and Conversion and Transmission Facilities

Policy: Montana regulates and seeks through taxation to compensate the people of Montana for the development of non-renewable energy resources including coal, oil and natural gas, and uranium.

Regulation of the state's energy resources includes requirements for land reclamation and the prevention of air and water pollution during resource development. Air and water regulations include both emission and ambient standards. For water with existing quality higher than ambient standards, energy development must not degrade the higher quality unless certain conditions are met.

Energy conversion and transmission facilities larger than certain capacities and fueled by or transmitting non-renewable resources, including coal, oil and natural gas, and uranium, are also subject to regulation. This regulation determines whether and how much of Montana's environment will be allocated to their development. Uranium conversion facility regulation is designed to discourage facility construction and operation in the state until specific conditions are met.

In recent years, severance and other taxes on coal, oil and natural gas have been reduced in an attempt to preserve or stimulate development of these resources.

2. Renewable Energy Resources and Cogeneration

Policy: Montana seeks to encourage and regulate the development of renewable energy resources including hydro, solar, geothermal, and wind power and cogeneration.

One method the state uses to encourage and regulate renewable energy resource development is through state statutes. These statutes remove specific barriers to development, e.g. by providing for solar and wind easements and by requiring purchases of the output of small renewable electricity generating resources by utilities. The state also seeks to stimulate development of renewable resources through tax incentives and research and demonstration grants. As is the case for non-renewable resources, Montana statutes also provide for the regulation of renewable resource energy conversion facilities larger than certain capacities by requiring a determination of whether and how much of the state's environment will be allocated to their development.

3. Conservation

Policy: Montana seeks through regulation, investments, grants and loans, and tax incentives to encourage energy conservation.

State statutes require conservation through building codes and direct the Public Service Commission to allow rate treatment for certain utility investments in residential energy conservation. The state Board of Examiners is authorized to sell bonds to finance energy conservation in state-owned buildings, structures, and facilities. Research and demonstration grants and loans are authorized and tax incentives are offered to individuals and corporations in support of energy conservation.

4. Energy Emergency Powers

Policy: In times of emergency, the state is granted powers to reduce or allocate the usage of energy.

State statutes authorize the governor and/or other state agencies to plan for, gather information, and take action to reduce or allocate the usage of energy during specified emergency conditions.

5. Low-Income Energy Assistance Programs

Policy: The state is authorized to assist low-income people with meeting their energy needs.

State statutes authorize expenditure of federal dollars for the low-income home energy assistance program and low-income weatherization program. No state general funds are expended on these programs.

6. Policy Gaps and Inconsistencies

The two most conspicuous gaps related to state energy policy evident from the survey are addressed by the recommendations from this study: creation of a continuing energy policy development process and a methodology for analyzing the costs and benefits of proposed energy policies and statutes. A third gap identified is the lack of analysis of the costs and benefits of existing statutes and programs which provide incentives to achieve specific policy ends, e.g. tax incentives and grant and loan programs.

In addition to gaps in the state's energy policy, the study also identified a policy inconsistency - the use of severance taxes to maintain trust funds to compensate Montanans for the consumption of non-renewable resources or damages caused by their development - and recent actions to reduce those severance taxes to maintain or spur development of the same resources.

While not necessarily a gap or an inconsistency, two policies should be examined for possible unintended consequences. The first involves the regulation of both renewable and non-renewable energy facilities larger than certain sizes via the Major Facility Siting Act to determine whether and how much of Montana's environment will be allocated to the facility development and operation. The size cutoff for regulation may be uneconomically skewing the size of facilities developed, particularly in the case of non-renewable resources. The second policy involves the practice of diverting at least 5% of federal funds from the low-income home energy assistance program (LIHEAP) to low-income weatherization. LIHEAP is a welfare program that makes payments to low-income Montanans to assist them in paying their energy bills. This diversion, particularly in light of the continuing reduction of federal dollars for LIHEAP, may be short changing low-income people's immediate need for utility bill assistance. The state may wish to end this diversion and thereby concentrate its limited fiscal resources (i.e. federal dollars) on the welfare mission of energy bill assistance to maintain access of low-income people to basic levels of heating. The longer term energy efficiency mission could still be met by assigning low-income weatherization to utilities.

Although an environmental policy as opposed to an energy policy, the water quality non-degradation statute is apparently unclear and controversial. The meaning of the conditions under which reductions in water quality are allowable should be clarified so that they can be understood by regulators and potential energy developers.

SECTION V.

RESIDENTIAL ENERGY EFFICIENCY COLLABORATIVE

A. Background

1. Residential Energy Use

Approximately 14% of the energy consumed in Montana is used in the state's residences for space and water heating, lighting, and appliances. Space heating is the largest category of residential energy use, accounting for as much as 40-50% of total residential use. The amount of energy used for space heating is a function of the energy efficiency of the building structure, the efficiency of the building heating system, and the temperature at which people maintain the building.

State law now requires that buildings be designed to achieve energy efficiency. Sections 50-60-201, 202 and 203, MCA require the Department of Commerce to adopt a building code with the following specific energy related objectives and standards:

(2) permit to the fullest extent feasible the use of modern technical methods, devices, and improvements which tend to reduce the cost of construction consistent with reasonable requirements for the health and safety of the occupants or users of buildings, and, **consistent with the conservation of energy, by design requirements and criteria that will result in the efficient utilization of energy, whether used directly or in a refined form, in buildings;**

(5) encourage **efficiencies of design and insulation which enable buildings to be heated in the winter with the least possible quantities of energy and to be kept cool in the summer without air conditioning equipment or with the least possible use of such equipment;**

(6) encourage **efficiencies and criteria directed toward design of building envelopes with high thermal resistance and low air leakage and toward requiring practices in the design and selection of mechanical, electrical, and illumination systems which promote the efficient use of energy.** (50-60-201, MCA) (Emphasis added).

While the mandate to address energy efficiency is clear, the specific level of energy efficiency which the building code must achieve is left to the discretion of the Department of Commerce. This level has been controversial, at least since 1983 when the Northwest Power Planning Council promulgated and urged the states of Montana, Idaho, Oregon, and Washington to adopt the Northwest Energy Code for electrically heated homes. The Northwest Energy Code incorporates efficiency levels which substantially exceed the levels of Montana's building codes.

2. Residential Energy Efficiency Collaborative

Early in 1992, Pacific Power & Light (PP&L) and the Montana Power Company (MPC) suggested that the EQC form a collaborative group as a part of the HJR 31 energy policy study to attempt to resolve the controversy surrounding residential energy efficiency and energy codes. Montana's investor-owned utilities³ and the Bonneville Power Administration (BPA) agreed to fund the collaborative, including the hiring of a group facilitator. Using utility and BPA funding only, the EQC established the collaborative and charged it with developing consensus recommendations for policies and implementation strategies to achieve increased residential energy efficiency.

The participants in the collaborative, which came to known as the Residential Energy Efficiency Working Group (REEWG), were self-selected. Anyone wishing to participate could do so. Participants (listed in Appendix F), represented a broad range of interests including utilities, home builders, home building suppliers, home lenders, architects and engineers, environmental groups, low-income groups, local governments, and state and federal agencies.

As a result of nine meetings held from July through December 1992, the REEWG agreed unanimously to the following residential energy policy statement and a package of recommended strategies to implement it.

³ The investor-owned utilities supplying funding included Montana Power Company, PacifiCorp, Montana Dakota Utilities, and Great Falls Gas Company.

RESIDENTIAL ENERGY POLICY STATEMENT

Recommendation #4:

The people of Montana have an interest in energy efficiency in residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter. It is, therefore, the policy of the state to encourage energy efficiency in residential buildings through strategies which ensure that:

- The housing consumer has access to the information required to make informed choices about structures and energy efficiency measures;
- Energy efficiency measures are safe, reliable, and readily available for use in Montana;
- Investments in energy efficiency measures would be cost effective;
- The impact of the cost of the energy efficiency measures on the combination of down payments, monthly mortgages payments, and monthly utility bills, will not adversely affect the affordability of housing to prospective homebuyers and renters; and
- The energy efficiency measures will not place an undue or inequitable burden on residential building owners or renters, the residential construction industry, financial institutions, real estate sales persons and appraisers, energy providers, or state and local governments.

IMPLEMENTATION STRATEGIES

Information Strategies

I-1.

Recommendation #5:

The EQC recommends that state government in concert with the Montana housing industry, utilities and other interested or affected entities should continue to provide education, training, and technical assessment and demonstration programs regarding residential energy efficiency targeted at consumers and the infrastructure of the housing industry, including builders, building code officials, home inspectors, bankers, realtors, and appraisers.

I-2.

Recommendation #6:

The EQC recommends that the state require a "labeling sticker" describing the energy efficiency components, e.g. heating appliance efficiencies and ceiling, wall, floor, window, and door "R-or U-values", be permanently fixed to the breaker box of all new site built, modular and manufactured homes.

I-3.

Recommendation #7:

The state should initiate developing and/or selection and testing of a home energy rating system applicable to new and existing residences. Subject to available funding, the system should be developed over the next two years, in conjunction with the federal government.

Financial Strategies

F-1.

Recommendation #8:

The state should support a petition from the real estate and housing industry to the Federal Home Administration (FHA) to increase the "caps", or upper limits, of FHA home mortgages.

F-2.

Recommendation #9:

The Montana Board of Housing should initiate a residential energy efficient mortgage program available to qualifying, first time home buyers which would maintain a low (3-5%) down payment requirement and raise the mortgage ceiling level above FHA caps. The Board of Housing risk exposure for the loan amount above the FHA cap would be assumed in some manner by utilities, state government, or a non-profit entity.

Energy Provider Strategies

EP-1.

Recommendation #10:

Utilities should on a voluntary basis to offer incentive programs to purchase energy efficiency.

Building Code Strategies

BC-1.

Recommendation #11:

The state should provide for enforcement of the energy code in single family through four-plex residential buildings located in areas outside of the jurisdictions of local governments adopting the state building code via a self-certification by home builders. The Building Code Bureau of the Department of Commerce should have no role in enforcing the energy code in areas where the self-certification would apply. The recommendation to extend the energy code to areas of the state where it is not now enforced is contingent on establishment of the housing affordability program described in recommendation F-2.

BC-2.

Recommendation #12:

The energy code should be reviewed this coming summer and raised to the following consensus level, and then the code should be reviewed on the normal code review cycle, i.e. every three years.

	Current Code	Proposed Code Prescriptive Path*	Proposed Code Equivalent Path*
Roof	R-38	R-42	R-38
Walls	R-19	R-21	R-19
Doors	R-2	R-5	R-2
Grade			
Basement	R-10	R-11	R-10
Foundation	R-19	R-19	R-19
Floor	R-19	R-19	R-19
Windows	Double Glazing	U-0.5 (Double Glazing)	U-0.4 (Double Glazing)

*Note: The Working Group's proposed code would be specified in terms of the prescriptive path and equivalent path listed above. This would allow the prescriptive path or any alternative path resulting in an energy performance equal to that of the listed equivalent path to satisfy the code requirement.

B. Recommendations

The Council will discuss the REEWG's recommendations at a meeting in early January and will forward its recommendations concerning residential energy policy and implementing strategies to the legislature.

SECTION VI.

MONTANA ENERGY DATA

Any study of state energy policy requires an appreciation of Montana energy production and consumption. The Montana Department of Natural Resources and Conservation has compiled a comprehensive report on Montana energy production and consumption by fuel type and end use sector entitled "Montana Energy Data Handbook". State energy production and consumption information will be briefly summarized here via excerpts from chapter 1 of the DNRC report; the full DNRC report is available from the EQC as Appendix H to the expanded version of this report.

When considering state energy data and policies, it is important to consider that Montana is an integral part of an inter-state and international energy system. Much of the energy produced within the state in the form of oil, natural gas, coal, and electricity is exported out of state. Although a substantial energy exporter, Montana also imports through pipelines and transmission lines much of the fuels consumed within the state.

A. Energy Production

Montana produces coal, natural gas and crude oil fuels which are used directly or are converted into other forms of energy. The 1991 production of these fuels, plus electricity from hydroelectric dams and from plants that burn wood, was equivalent to 890 trillion British thermal units (Btu) of energy. This is down from a high of 915 trillion Btu in 1988, but still 1.7 percent higher than 1990. For comparison, Montana's 1990 production was a little over one percent of the United States' 81,151 trillion Btu consumption in the same year.

Coal is the source of most of the energy produced in Montana. In 1991, three-quarters of the energy produced in Montana was in the form of coal. Over the last decade, coal production increased from 28 million tons in 1982 to almost 39 million tons in 1988, before sliding back slightly to less than 38 million tons in 1991. That year, around 90 percent of the coal mined was exported, either by rail or by transmission line after conversion to electricity.

Montana also produces significant amounts of crude oil, natural gas, and hydroelectricity. Crude oil has declined since the peak year of 1968, reaching a thirty year low in 1991 of 19.6 million barrels, 40 percent below peak. Natural gas production has been more varied, but over the past decade has stayed around 51 million cubic feet. Hydroelectric production varies from year to year, depending on the amount of precipitation. Since Libby Dam, the last big dam, was completed in 1975, production has varied between 8,500 million kilowatt hours (kwh) and 12,400 million kwh. Production in 1991 was 11,900 million kwh.

B. Energy Consumption

The industrial and transportation sectors have long been the largest consumers of energy in Montana. In 1990, the industrial sector purchased 41 percent of the total energy sold in Montana, the transportation sector 34 percent, residential 14 percent, and commercial 11 percent.

Industrial consumption climbed until the end of the 1970's, then dropped as the Montana economy was restructured. The winding down of the Anaconda Company operations in Montana a decade ago was particularly significant. Transportation energy use peaked in 1979, the year of the Iran crises, then declined, and has remained more or less stable in recent years. Residential use hasn't changed much in the last ten years. By 1990, it still was less than during the 1970's, in spite of modest growth in population and economic activity. The same was generally true of the commercial sector.

In very broad terms, the residential and the commercial sector rely primarily on natural gas and electricity. The industrial sector relies on petroleum and electricity. The transportation sector uses petroleum almost exclusively.

APPENDIX A

52nd Legislature

HJR 0031/02

HJR 0031/02

HOUSE JOINT RESOLUTION NO. 31
INTRODUCED BY RANEY, DOHERTY, GILBERT,
GRADY, DRISCOLL

A JOINT RESOLUTION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA DIRECTING THE ENVIRONMENTAL QUALITY COUNCIL TO STUDY ENERGY RESOURCES AND ENERGY USE IN MONTANA AND TO DEVELOP A PROPOSED STATE ENERGY POLICY IN COOPERATION WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION AND THE CONSUMER COUNSEL; AND DIRECTING THE ENVIRONMENTAL QUALITY COUNCIL TO REPORT ITS FINDINGS TO THE 53RD LEGISLATURE.

WHEREAS, while Montana has an extensive number of laws and programs designed to promote the production, consumption, and conservation of various sources and forms of energy, Montana does not have a comprehensive state energy policy; and

WHEREAS, Montana has substantial renewable and nonrenewable resources that are important for the production of electricity, liquid fuels, heat, and other energy forms for use within and outside of the state; and

WHEREAS, although there is no comprehensive national energy policy, many aspects of energy production, consumption, and conservation in Montana

are determined or strongly influenced by national programs and legislation; regional, national, and international market factors; and national and regional energy production and distribution systems; and

WHEREAS, the nation's independence on imported crude oil and the United States' entry into war in the Middle East have raised substantial public concern about the need for a national energy policy; and

WHEREAS, new electric power generating capacity or new energy conservation, or both, may be needed in the Pacific Northwest region in the near future to meet projected demands for electricity; and

WHEREAS, energy production and consumption have substantial economic value to the state and substantial social and environmental costs; and

WHEREAS, the Legislature and the Executive Branch of state government do not have a comprehensive analysis of the renewable and nonrenewable sources of energy available to the state; the economic, social, and environmental factors influencing production, consumption, and conservation of the various sources and forms of energy in the state; and specific aspects

of energy production, consumption, and conservation that can be significantly influenced by state policies and programs; and

WHEREAS, THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION, ENERGY DIVISION, AND THE CONSUMER COUNSEL HAVE CONSIDERABLE EXPERTISE AND INFORMATION RELATED TO ENERGY PRODUCTION, CONSUMPTION, AND CONSERVATION IN MONTANA, AND

WHEREAS, the state should promote energy conservation and the production and consumption of an appropriate mix of energy sources that are reliable and efficient and that represent the least social, environmental, and economic costs and the most benefits to the state and its citizens over the long term.

NOW THEREFORE, BE IT RESOLVED BY THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA;

That the Environmental Quality Council, IN COOPERATION WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION AND THE CONSUMER COUNSEL, be assigned to:

(1) study the current energy conservation patterns in the state, the forms and amounts of energy conservation available to the state that are not being used, and options for increasing the amount of energy conserved by the state's citizens and all sector's of the state's economy;

(2) study the renewable and nonrenewable sources

of energy available to the state and patterns of energy production and consumption in the state, including but not limited to energy sources and forms such as liquid fuels, natural gas, coal, electricity, biomass, solar, wind, wood, and geothermal;

(3) study existing programs in Montana and programs and legislation in other states, the region, and the nation relating to the production, consumption, and conservation of energy, including the influence of regional and national energy production, consumption, and conservation patterns upon Montana;

(4) develop the framework for a proposed state energy policy that is designed to provide reliable and efficient energy supplies with the least social and environmental cost to the state and its citizens over the long term, including:

(a) specific goals and recommended legislation to guide the development of state programs relating to energy production, consumption, and conservation; and

(b) recommended assignments of responsibility to specific agencies within the Executive Branch of state government for the implementation and administration of the various elements of the proposed policy; and

(5) develop the framework for a proposed state energy policy in consultation and cooperation with state and federal agencies, the Pacific Northwest Electric Power and Conservation Planning Council, the Public Service Commission, Indian tribes, units of

local government, energy producers and distributors, and organizations and citizens with energy-related expertise or interests in the study and development of the proposed state energy policy.

BE IT FURTHER RESOLVED, that the Environmental Quality Council report the findings of the study to the 53rd Legislature, including recommendations for a comprehensive state energy policy and options for implementation of the proposed policy by the Legislature.

-END-

APPENDIX B

BILL DRAFT #!

**** Bill No. ***
Introduced By *****
By Request of *****

A Bill for an Act entitles: An Act adopting a state energy policy goal statement; providing for an ongoing state energy policy development process; and providing for the application of an energy policy analysis study methodology for energy related legislation." Be it enacted by the Legislature of the State of Montana:

NEW SECTION. Section 1. **State energy policy goal statement.**

(1) It is the policy of the state of Montana to promote energy conservation, production, and consumption of a reliable and efficient mix of energy resources that represent the least social, environmental, and economic costs and the most long-term benefits to Montana citizens.

(2) In pursuing this goal, it is the policy of the state of Montana to:

(a) recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets.

(b) maintain a continual process to review this energy policy statement and any future changes to it toward the end that Montana's energy strategy will provide for a balance between a sustainable environment and a viable economy.

NEW SECTION. **Section 2. Definitions.** As used in [sections 3 and 4]. the following definitions apply:

(1) "Council" means the environmental quality council established in 5-16-101.

(2) "Department" means the department of natural resources and conservation established in 2-15-5301.

NEW SECTION. **Section 3. Energy policy development process.**

(1) The department and council, in cooperation with the consumer counsel, shall maintain a continual process to develop the components of a comprehensive state energy policy.

(2) Because of limited state resources and the need to focus intensive effort on specific issues of importance, the development of a comprehensive state energy policy must occur on an incremental basis. As the need arises, the department, in cooperation with the appropriate state agencies and with extensive public involvement, shall identify and recommend to the council specific components of a state energy policy for development under the consensus process described in subsection (3).

(3) (a) Upon selection of a specific energy policy component, the council shall assign a working group composed of representatives of the parties with a stake in that specific component the task of developing consensus recommendations for that component of state energy policy.

(b) The working group must include the broadest possible representation of stakeholders in the issues to be included within the specific component of state energy policy.

(c) The working group shall use a consensus process whenever possible to develop recommendations for a specific energy policy component to be submitted to the council. Recommendations that are not based upon consensus must be so noted by the working group. Upon consideration of the working group's recommendations, the council shall forward its recommendations to the legislature and to the appropriate state agencies for adoption.

(d) the department shall:

(i) provide staff support to the working group, including policy analysis, data-gathering, research, technical analysis, and administrative support;

(ii) provide administrative coordination among the appropriate state agencies in the energy policy development process;

(iii) prepare reports for and make recommendations to the council; and

(iv) consult regularly with the council to coordinate each agency's activities.

(4) In carrying out their responsibilities under this section, the department and the council may contract with experts, consultants, and facilitators and may seek funding from a variety of private and public sources for technical and other assistance necessary to accomplish their responsibilities.

NEW SECTION. Section 4. Application of energy policy analysis methodology for energy related bills. (1) All bills reported out of a committee of the legislature that would affect state energy policy, including consumption, production, and

APPENDIX C

HJR 31

ENERGY POLICY STUDY DESIGN WORKING GROUP

Senator Steve Doherty, Working Group Chairman/Environmental Quality Council (EQC)

Senator David Rye, EQC

John Fitzpatrick, EQC

Art Wittich, Governor's Office/EQC

Van Jamison, Department of Natural Resources and Conservation

Rep. Joe Quilici (Bob Nelson), Legislative Consumer Committee

Bob Anderson (Dan Elliott), Public Service Commission

Shirley Ball, Ethanol/Agriculture

Jay Downen (Jim Eskridge), Rural Electric Cooperatives

Dave Houser, Electric/Natural Gas Utilities

Ben Havdahl, Montana Motor Carriers Association

John Hines, Northwest Power Planning Council

Tom Marvin, Montana Local Government Energy Office

Jim Morton, District XI Human Resource Council

Gerald Mueller, Regulation/Least Cost Planning Group Coordinator

Jim Nybo, Conservation/Environmental Organizations

Dennis Pierce (Bill Kelldorf), Shell Western Exploration and Production, Inc.

Dave Simpson (Darrel Myran), Westmoreland Resources

Sandy Straehl, Montana Department of Transportation

APPENDIX D

EQC ENERGY POLICY ANALYSIS METHODOLOGY **WORKING GROUP MEMBERS**

Doug Abelin, Northern Montana Oil & Gas Association

Jerome Anderson, Attorney for Shell Western E.& P., Inc.

Shirley Ball, Ethanol Producers and Consumers

Richard Brown, MECA and Ravalli County Electric-Coop

Frank Buckley, Montana Consumer Counsel

Janelle Fallan, Montana Petroleum Counsel

H. S. Hanson, Energy Conservation Consultants

Dave Houser, Montana Power Company

Van Jamison, Montana Department of Natural Resources and Conservation, Energy Division

Gail Kuntz, Bonneville Power Administration

Gerald Mueller, Regulation/Least Cost Planning Group Coordinator

Jim Nybo, Conservation/Environmental Organizations

Gene Phillips, Pacific Power and Light

J. Monte Sealey, Musselshell Valley Development Corporation

Dave Simpson, Westmoreland Resources/Montana Consumer Counsel

Mike Volesky, Montana Associated Utilities

Art Wittich, Governor's Office/EQC

APPENDIX E

ENERGY POLICY ANALYSIS METHODOLOGY

INTRODUCTION

A. Background:

House Joint Resolution 31 (1991) directed the Environmental Quality Council to develop a framework for a proposed state energy policy. The EQC Energy Policy Analysis Methodology is an element of the framework that was developed by a working group appointed by the EQC and staffed by the Department of Natural Resources and Conservation. The methodology is designed as a tool for evaluating the costs and benefits of energy-related legislation that will result in state energy policies.

B. Purpose:

The purpose of the EQC Energy Policy Analysis Methodology is to inform legislators and others regarding the implications of energy-related legislation. The methodology is to be used 1) to frame debates or focus discussions on proposed and prospective energy legislation facing the state, and 2) to evaluate legislative proposals through an on-going energy policy development process.

The methodology itself is not intended to dictate any predetermined conclusions or to make energy policy decisions for legislators. It is designed to serve a role similar to that of a fiscal note and can be prepared by a variety of people, including agency and legislative staff, lobbyists, and other individuals or groups who are also involved in the preparation of fiscal notes. Different individuals and organizations may come to different conclusions using the methodology. The methodology is not intended for administrative rule making.

C. Focus:

Decisions on energy and how they are implemented affect numerous aspects of society. The identification of potential costs and benefits of energy proposals should include adequate consideration of all related aspects, including potential economic, social, environmental, and fiscal effects. The Energy Policy Analysis Methodology is designed to identify and describe each of the potential effects of energy-related legislation, and the distribution of those effects, in a consistent format.

Types of legislative proposals that are evaluated using this methodology may include tax measures to encourage production or development of various energy sources and technologies, funding allocations for state energy programs, energy conservation incentives, and other mechanisms to influence how energy is produced and consumed in the state.

D. Framework:

The methodology consists of two parts, an Energy Policy Evaluation Worksheet, and an Effects Summary Table. The purpose of the worksheet is to describe all of the potential effects of a given legislative proposal in detail. The Summary Table is used to summarize the effects of a given proposal in concise, comprehensive terms. Legislators can then review the table as a reference in their decision making process.

1. *Energy Policy Evaluation Worksheet --*

The first part of the Energy Policy Evaluation Worksheet requests a description of the legislative proposal being evaluated. Agency staff, legislative staff, and others filling out the worksheet are asked to identify the problems or issues the legislative proposal is attempting to address, to describe the proposal in detail, and to include an explanation of the intent of the proposed legislation.

The second part of the worksheet consists of the guidelines for the evaluation of the given legislative proposal. This section is used to evaluate effects on energy, the environment, and the economy along with fiscal effects, social effects, and the distribution of the potential effects among different income groups, sectors of the economy, and geographic areas.

2. *Effects Summary Table --*

The Effects Summary Table summarizes the potential effects of proposed energy legislation. The table is divided into the same categories as the Policy Evaluation Worksheet. Within each category is a numbered list of the various effects and a space next to each for brief descriptions. Information from each answer on the worksheet is summarized in the appropriate sections of the Summary Table. The purpose of the table is to allow potential effects to be quickly and thoroughly reviewed by legislators and other interested parties.

ENERGY POLICY EVALUATION WORKSHEET

III. PROPOSAL EVALUATION

INSTRUCTIONS

The following section is to be used by agency staff, legislative staff, and others for developing and evaluating information on the potential effects of proposed and prospective energy legislation. The section is divided into six categories: energy effects, environmental effects, economic effects, fiscal effects, social effects, and distribution of effects. Each category comprises a series of questions designed to provide legislators and others with detailed information on all of the potential effects of the proposed legislation.

General Directions:

Answer the questions in each of the following categories as completely and in as much detail as possible. Be sure to list any assumptions used in reaching the answers. Descriptions of the costs and benefits in each category should include quantitative and/or qualitative measures of the potential effects, with specific attention given to detailed descriptions of the effects and an identification of who benefits and who pays in the particular situation. If certain findings require more space than is available on the worksheet, additional pages may be used. If more than one proposal is being evaluated, separate worksheets should be prepared for each.

Certain questions included in the worksheet may not be relevant for evaluation of all proposals. For example, some questions may be applicable only when the proposed legislation involves the evaluation of a project such as a tax credit encouraging the construction of an energy production facility. Unless otherwise indicated in the question, it is up to those filling out the worksheet to identify which items may or may not be relevant for the given proposal. Those filling out the worksheet for a specific legislative proposal *need only complete the items relevant to that proposal* and should indicate which items are not by writing "Not Applicable" or "N.A." in the space provided.

Several questions require that the short-term and long-term effects of the proposed legislation be identified. The inclusion of this time element in the methodology is necessary in order to help identify the durability of the potential effects of proposed legislation. The short-term should identify immediate effects, and the long-term should identify more enduring effects. The definition of short-term and long-term can vary. Where questions

ENERGY POLICY EVALUATION WORKSHEET

ask for identification of short-term and long-term effects, describe in your answer the assumptions made to define this time element. Example: short-term = 1 to 3 years; long-term = over 3 years.

Suggestions:

Two types of measures may be used in answering the questions on the worksheet. Responses may include qualitative measures, quantitative measures, or both, depending on the nature of the question and on available information.

Quantitative Measures --

Whenever possible, potential effects should be quantified, using appropriate analytic techniques. Quantification of effects provides information that is reproducible and that may be easily compared with results from the analysis of alternative proposals.

A number of effects in each category may be identified in quantitative terms, either with estimated ranges or in specific figures. This may include measures such as number of jobs created or lost; amount of energy produced or saved (in Btu, MW, Kwh, and other units); gallons or acre feet of water used or saved; micrograms per cubic meter of pollutants increased or reduced; and so on. Other measures may be monetary, including dollar costs of a project or program; changes in the price of energy products; changes in income, etc. It is also possible to measure certain externalities, such as environmental effects, in monetary terms. Generally, cost-benefit analysis is used to identify and evaluate the monetary effects of a given proposal. It may be necessary and appropriate, if time and resources allow, for a cost-benefit analysis to be completed for the proposal being evaluated. Pages 64 and 65 briefly describe the techniques behind cost-benefit analysis and present a simple numeric example.

When using quantitative measures, be sure to list and describe any assumptions used in answering the questions.

Qualitative Measures --

Qualitative analysis relies on detailed descriptions of potential effects rather than on monetary or other figures.

ENERGY POLICY EVALUATION WORKSHEET

Not all costs and benefits are easily quantified. In certain cases, time constraints or lack of resources or information may limit the ability to measure certain effects. For example, suppose that proposed legislation is promoting research on coal conversion technologies that are expected to greatly improve efficiency. Precise figures on potential energy savings may not be available at the time the proposal is being reviewed. A description of the potential effects, without identifying specific values, may be all that time and resources allow. If legislators desire more detailed information, a cost-benefit analysis or a technical study may be needed before a decision can be made on the proposal.

Many potential effects cannot be described in quantitative terms. This does not mean, however, that the effects are not important for consideration in the analysis of a legislative proposal. For example, the magnitude of effects on lifestyles and cultures, environmental effects such as impacts on wildlife, and many other potential effects may not be readily quantified, but their existence may have important implications for the acceptability of the proposal.

Use of qualitative analysis enhances available information by identifying or "flagging" environmental or other potential effects of proposed energy legislation. It can therefore be an important part of the decision making process. When describing potential effects in qualitative terms, be sure to identify that qualitative assessments have been made and describe any assumptions used in answering the questions.

ENERGY POLICY EVALUATION WORKSHEET

EVALUATION CATEGORIES

A. ENERGY EFFECTS

- 1. If the proposed legislation addresses a specific project, identify and describe the total dollar costs for the project, including costs of capital, production and operating costs, maintenance costs, etc. Please include the present value of future streams of costs, when possible (see Appendix).**

- 2. Identify and describe the amount of energy (in Btu, MW, Kwh, or other units) expected to be produced or saved as a result of the proposed legislation.**

- 3. Describe the expected time frame in which the potential energy production or savings will be realized. (Include estimated starting date for energy production or savings and estimated duration of future streams of production or savings.)**

ENERGY POLICY EVALUATION WORKSHEET

7. **Identify and describe any benefits the proposed legislation may have from an energy research, development, and demonstration perspective.**

B. ENVIRONMENTAL EFFECTS

1. **Identify and describe the potential effects of the proposed legislation on air quality.**

2. **Identify and describe the potential effects of the proposed legislation on water quality and quantity, both surface and underground.**

ENERGY POLICY EVALUATION WORKSHEET

6. **Identify and describe any other potential environmental effects of the proposed legislation, such as impacts on noise pollution, public health and safety, etc.**

7. **Identify and describe how the proposed legislation may affect the possible alternative uses for natural resources in the short-term and the long-term. Include a description of resources used and identify the potential alternative uses for those resources.**

C. ECONOMIC EFFECTS

1. **Identify and describe how the proposed legislation may affect local, state, and regional jobs in the short-term and long-term. Specify the number of jobs that may be created or lost as a result of the proposal and the sector or industry where each change will occur.**

ENERGY POLICY EVALUATION WORKSHEET

5. **Identify and describe how changes in the price of the energy product may affect the competitiveness of non-residential energy users. Specify which users might be affected.**

6. **Identify and describe how the proposed legislation may affect the affordability of energy to consumers. If possible, specify which income groups might be affected.**

D. FISCAL EFFECTS

1. **Identify and describe the short-term and long-term revenue and expenditure implications of the proposed legislation to state and local government.**

ENERGY POLICY EVALUATION WORKSHEET

- 2. Identify and describe the short-term and long-term implications and the associated costs of the proposed legislation to state and local government services. This may include effects on operating expenses, capital outlay, local assistance/grants, benefits and claims, etc.**

- 3. Identify and describe any potential barriers to the implementation of the proposed legislation, including provisions in existing laws, regulations, or programs.**

- 4. Identify and describe any additional federal, state, and local tax incentives or subsidies that may be needed to implement the proposed legislation. Include, if possible, an indication of how sensitive the proposal might be to changes in future and existing incentives and subsidies.**

ENERGY POLICY EVALUATION WORKSHEET

E. SOCIAL EFFECTS

1. Identify and describe the potential impact of the proposed legislation on human populations, lifestyles and cultures.

F. DISTRIBUTION OF EFFECTS

1. Identify and describe in detail different income groups, sectors of the economy, and geographic areas that would be affected by the proposed legislation.

COST-BENEFIT ANALYSIS

Some costs and benefits, both direct and indirect, can be measured in monetary terms. The monetary measurement of costs and benefits is one way to evaluate and compare proposals. This section briefly explains the techniques used for a simple cost-benefit analysis. Included is a simple numeric example which illustrates the calculation of results. A more detailed cost-benefit analysis may be needed for a some proposals.

Cost-benefit analysis allows for the potential monetary costs and benefits over different time horizons to be identified. This time element is important for several reasons. A proposed project or program may not generate benefits for several years, although its costs may be realized almost immediately. A benefit received 5 years from now has a lower economic value than a benefit received this year. Similarly, an expenditure incurred this year has a higher economic cost than the same expenditure incurred 5 years from now, because resources involved could be used in the meantime for other purposes. A "discount rate" is used to account for costs and benefits of a project over time.

The basic formula for calculation of the present value of a future stream of costs or revenues is the following:

$$\text{The present value of } R_t = R_t (1 + i)^{-t}.$$

$$\text{The present value of } C_t = C_t (1 + i)^{-t}.$$

Where t = year in which the cost or revenue is realized
(starting with 0 for initial outlay).

R_t = the revenue figure for year t .

C_t = the cost figure for year t .

i = the discount rate of interest.

The total net present value (NPV) of a given proposal is found by summing the present values of costs and revenues over each year in the life of the project or program and subtracting the total present worth of the costs from that of the revenues.

$$\begin{aligned} \text{NPV} = & \quad \sum_t R_t (1 + i)^{-t} \\ & - \sum_t C_t (1 + i)^{-t} \end{aligned} \quad \text{for each year } t \text{ in the life of the} \\ & \text{project or program.}$$

The value of the discount rate used in the analysis can vary. Generally, a higher discount rate lowers the present worth of a future stream of costs and benefits. If the rate of discount is 10 percent, for example, the present value of a cost of \$100 which will not be incurred until next year or a benefit of \$100 which will not be received until next year is

$\$100(1 + 0.1)^{-1} = \$100/(1.1) = \$90.91$. Similarly, a cost or revenue of \$100 two years from now would have a present value of $\$100(1.1)^{-2} = \$100/(1.21) = \$82.64$. If a discount rate of 4 percent were used, the present value of \$100 one year from now would be $\$100/(1.04) = \96.15 . Lower discount rates are often used if there are potential social costs or benefits which may be missed by the monetary measurement of the benefit and cost streams. More projects or programs may appear viable given a lower discount rate. The higher discount rate is used primarily to assess a proposal on more stringent terms.

Example of a simple cost-benefit analysis:

(in thousands of dollars)

Year	Costs			Benefits			Present Costs	Worth (10%) Benefits
	(1)	(2)	Total	(1)	(2)	Total		
0	50	0	50	0	0	0	50.00	0
1	75	0	75	0	0	0	68.18	0
2	0	10	10	45	15	60	8.26	49.58
3	0	10	10	40	10	50	7.51	37.56
4	0	10	10	34	6	40	6.83	27.32
5	0	10	10	30	2	32	6.20	19.86
6	0	10	10	25	1	26	5.64	14.68
7	0	10	10	20	0	20	5.13	10.27
Total							157.75	159.27

Net Present Worth = \$1.52 thousand dollars (the difference between the Total Present Worth of Benefits and Costs).

NOTE: These figures were arbitrarily chosen for illustrative purposes.

Results of cost-benefit analysis for the proposed legislation (use additional pages if necessary):

EFFECTS SUMMARY TABLE

DIRECTIONS: Using the information in the Policy Evaluation Worksheet, summarize the potential effects of the proposed legislation as completely as possible in the space provided.

DESCRIPTION OF THE PROPOSAL:

COSTS AND BENEFITS	SUMMARY OF EFFECTS
A. ENERGY EFFECTS	
1. Potential Energy Production Potential Energy Savings	
2. Time Period of Expected Production of Savings	
3. Risks and Uncertainties	
4. Impacts on Energy Reliability	
5. Impacts on Energy Security	
6. Energy Research and Development Benefits	
7. Total Project Dollar Costs	
B. ENVIRONMENTAL EFFECTS	
1. Effects on Air Quality	
2. Effects on Water Quality Effects on Water Quantity	

COSTS AND BENEFITS	SUMMARY OF EFFECTS
B. ENVIRONMENTAL EFFECTS (Continued)	
3. Effects on Existing Water Rights	
4. Effects on Wildlife Populations and Habitats	
5. Effects on Land Use	
6. Other Environmental Effects (Specify):	
7. Effects on Alternative Resources Uses	
C. ECONOMIC EFFECTS	
1. Impacts on Local, State and Regional Jobs Specific Sectors Affected	
2. Effects on Local, State and Regional Income Specific Income Groups Affected	
3. Impacts on Energy Prices	
4. Impacts on Competitiveness of Energy Producers	
5. Impacts on Competitiveness of Non-Residential Users	
6. Effect on Affordability of Energy to Consumers	

COSTS AND BENEFITS	SUMMARY OF EFFECTS
D. FISCAL IMPACTS	
1. Change in Local and State Tax Revenue Change in Local and State Expenditures	
2. Impacts on Government Services	
3. Barriers to Implementation	
4. Additional Federal, State, Local Tax Incentives/Subsidies Needed	
E. SOCIAL EFFECTS	
Effects on Populations, Lifestyles and Cultures	
F. DISTRIBUTION OF EFFECTS	
Who Benefits (Specify)	
Who Pays (Specify):	
ADDITIONAL NOTES OR COMMENTS:	

APPENDIX F

EQC RESIDENTIAL ENERGY EFFICIENCY WORKING GROUP **PARTICIPANTS**

Duane A. Anderson, Montana-Dakota Utilities Co.

Duane Broadbent, Central MT Electric Power Co-op

Don Chance, MT Building Industry Association

Alan Davis, Montana Department of Natural Resources and Conservation (DNRC)

Dan Elliott, Montana Public Service Commission (PSC)

Mike Fasbender, Lumber Yard Supply

John Graham, Pacific Power and Light

H.S. "Sonny" Hanson, Energy Conservation Consultants

John Hines, Northwest Power Planning Council

Sharon Jacobson, Missoula Electric Co-op

Jim Kembel, Montana Department of Commerce, Public Safety Division

Gail Kuntz, Bonneville Power Administration

Steve Loken, Southwall Builders/AERO

Gary Mahugh, Flathead Electric Co-op.

Janeth Martin, Co-Chair Montana Banking Association Real Estate Committee

Tom Marvin, Montana Local Government Energy Office

Mack McConnell, Montana Electric Co-op Association

Lou Moore, DNRC

James Morton, District XI Human Resource Council

Diane Noennig, Western Area Power Administration

Denise Peterson, PSC

C. Eugene Phillips, Pacific Power and Light

John Ralph, Montana Power Company

Shiela Rice, Great Falls Gas Company

Sam Toole, Montana Environmental Information Center