

Hydrogen, Wind, Biodiesel, and Ethanol...Alternative Energy Sources to Fuel Montana's Future?

EQC Study Report
September 2004

September 2004

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Chapter 1: EQC Evaluation of Alternative Energy Resources

√ Introduction

Why Study Alternative Energy Resources?

Members of the EQC at the beginning of the 2003-04 legislative interim expressed an interest in studying the selected alternative energy sources. The stated rationale was that given Montana's current energy situation, it is important to evaluate alternative energy resources like biodiesel, hydrogen, wind, and ethanol to help diversify Montana's energy options. The full EQC unanimously incorporated this expressed interest into the Council's interim work plan. At the June 2003 EQC meeting, the Council appointed a six-person subcommittee to investigate alternative energy resources. The Council allocated .10 FTE (270 hours) of staff resources to this subcommittee.

EQC's Involvement in Energy Issues

Via its broad statutory authority under the Montana Environmental Policy Act (MEPA) and specific energy policy development statutory authority, the Environmental Quality Council has a longstanding history of involvement in energy policy issues. In the 1970s the EQC was extensively involved in the Colstrip power generation permitting issues. In the 1980s the EQC was very active in the Major Facility Siting Act process. During the 1990s, the Council expended a significant amount of effort in the 1993-94 interim in developing a statewide energy policy statement and in the energy policy development process. The 1995 Legislature enacted the EQC's recommendations. During the 1995-96 interim, the EQC assigned a broad-based working group of stakeholders to make recommendations on transportation energy policy and on alternative transportation fuels. Again, the 1997 Legislature adopted the EQC's recommendations. Since that time, there has been little activity in terms of EQC energy policy development. The EQC monitored and received updates on electric industry restructuring during the 1997-98 and 1999-2000 interims. EQC staff also staffed the Transition Advisory Committee on Electric Industry Restructuring during the 1997-98, 1999-2000, 2001-02 interims. During the 2001 Legislative Session, energy issues took center stage. Policy issues involving high electricity costs, consumer protection, utility financial stability, environmental issues, and Montana's evolving landscape of electric industry restructuring converged. These energy issues created a groundswell of interest among legislators and the public across the state of Montana. In May of 2001, the EQC assigned a seven-person subcommittee to evaluate energy policy issues. This

subcommittee produced two education publications: The Electricity Law Handbook and Understanding Electricity in Montana. Both of these publications were used extensively during the 2003 Legislative Session. The 2003 Legislature created a new interim committee (Energy and Telecommunications Interim Committee) that has broad oversight and policy statutory authority for energy and telecommunication issues. Recognizing this authority, but still wanting to pursue specific alternative energy issues, the EQC appointed an EQC Energy Policy Subcommittee with strict direction to work with the Energy and Telecommunications Interim Committee to ensure that there was no duplication of effort during the 2003-04 Interim.

√ The EQC Alternative Energy Resources Study Process

The EQC Energy Policy Subcommittee developed an interim work plan that stated the following Subcommittee goals:

- Goal #1: Gather information on biodiesel.
- Goal #2: Gather information on hydrogen fuels.
- Goal #3: Gather information on ethanol.
- Goal #4: Gather information on distributed wind energy.
- Goal #5: Monitor federal energy legislation.
- Goal #6: Gather information on fossil fuels as it relates to alternative energy sources and policies.

In addition to these stated goals in the work plan, the EQC requested additional information on the State of Montana's bonding process for energy projects. Figure 1-1 outlines the EQC's 2003-04 interim study process

Figure 1-1. EQC Alternative Energy Sources Study Process



October 2003

- ▶ Subcommittee Work Plan:
 - ▶ EQC Energy Policy Subcommittee Adopts Interim Work Plan
- ▶ Information Analysis:
 - ▶ Full EQC Heard a Panel Discussion on Biodiesel

January 2004

- ▶ Information Analysis:
 - ▶ Hydrogen Panel Discussion
 - ▶ Ethanol Panel Discussion
 - ▶ Distributed Wind Panel Discussion
 - ▶ Update on Energy and Telecommunications Interim Committee (ETIC) Activities
 - ▶ Update on Federal Energy Legislation

March 2004

- ▶ Information Analysis:
 - ▶ Multiple Discussions on the Opportunities for and Barriers to Hydrogen, Wind, Biodiesel, and Ethanol Development
 - ▶ Incentive Funding Options for Alternative Energy Sources
 - ▶ Update on ETIC Activities
 - ▶ Update on Federal Energy Legislation
- ▶ Subcommittee Approval of Draft EQC Alternative Energy Report Table of Contents
- ▶ Subcommittee Approval of Producing State Bonding Brochure for Legislators and Citizens
- ▶ Subcommittee Approval of Updating EQC Energy Publications

May 2004

- ▶ Information Analysis:
 - ▶ Presentation on State Bonding for Energy Projects
 - ▶ Panel Discussion on NAFTA and State Energy Regulation
- ▶ Subcommittee Review of Draft Report
- ▶ Subcommittee Discussion of Preliminary Recommendations and Legislation (if any)

June 2004

- ▶ Send Out Draft Report for 30-Day Public Comment Period

July 2004

- ▶ Compile Public Comments
- ▶ Final EQC Energy Policy Subcommittee Decision on any Recommendations to the EQC
- ▶ Subcommittee Briefs EQC on the Recommendations and the Study Report

September 2004

- ▶ Final Decision by the EQC on the Study Report and Recommendations, Including Content of Proposed Legislation
- ▶ Selection of Bill Sponsors if Needed and Development of Session Strategy

√ What is Not Addressed in this Study?

There are a number of alternative energy sources other than hydrogen, wind, biodiesel, and ethanol that this study did not address. These include: biomass, small-scale hydro-generation, and solar generation. Given the limited staff resources devoted to this project, the Council prioritized the topics it wanted to address.

√ Summary of EQC Draft Recommendations

The EQC at its July 2004 meeting made the following *draft* recommendations:

1. That the EQC request a bill draft to be submitted to the 2005 Legislature to clarify that the alternative renewable energy resource projects are eligible for renewable resource grant and loans. (See LC0210 in Appendix A.)
2. That the EQC request a bill draft to be submitted to the 2005 Legislature that raises the loan eligibility amount for alternative energy systems from \$10,000 to \$40,000 for small businesses, individuals, and nonprofit entities and that clarifies the administrative costs that can be charged for processing loans. (See LC0209 in Appendix A.)
3. That the EQC request a bill draft to be submitted to the 2005 Legislature that clarifies that an applicant that is proposing to build an ethanol production facility may not concurrently submit more than one written plan for the same production facility location. (See LC0208 in Appendix A.)
4. That EQC staff, working with the State Bond Counsel, develop a two-page brochure that explains state debt and bonding.
5. That the EQC and Department of Environmental Quality Council staff update the publications *The Electricity Law Handbook: A Montanan's Guide to Understanding Electricity Law (2002)* and *Understanding Electricity in Montana (2002)* prior to September 2004.
6. That the State of Montana support funding for instate research and development of hydrogen as an energy source.

Chapter 2: Overview of Alternative Energy Incentive Policies

√ Introduction

The EQC Energy Policy Subcommittee requested that an explanation of the types of incentive policies that the State of Montana, the Federal Government, and other selected states currently have in place for the alternative energy sources be provided in this report. The rationale for this request was that the Subcommittee wanted to understand Montana's current incentive policy framework and to evaluate the status of other selected state and federal incentive programs. This chapter will provide an explanation of the overall framework for alternative energy incentive policies, including an inventory of incentive policies and a discussion of potential funding mechanisms. Each subsequent chapter that analyzes a specific alternative energy source will explain the specific incentive policies in place for that particular alternative energy resource.

√ Alternative Energy Incentive Policy Framework

The National Wind Coordinating Committee through the National Conference of State Legislatures (NCSL) commissioned a study in 1999 that reviewed and analyzed state policy options that supported wind energy development.¹ This analysis, although focused on wind energy, provides an extremely logical framework that can be applied generally to most alternative energy incentive policies, both at the state and federal level. Table 2-1 illustrates a noninclusive inventory of alternative energy incentives and policies currently used in the U.S.²

Relying heavily on the NCSL report, Table 2-2 summarizes descriptions and explanations of each incentive policy type.³ These incentives run the gamut from heavy governmental involvement to market-based approaches. The effectiveness of these incentives is not analyzed in this report.

¹ Nancy A. Rader and Ryan H. Wiser, Strategies for Supporting Wind Energy, National Wind Coordinating Committee, NCSL (1999).

² Id.

³Id. The descriptions used in Table 2-2 are taken almost verbatim from the Supporting Wind Energy report.

Table 2-1 General Alternative Energy Incentive Policy Categories

Tax Incentives	<ul style="list-style-type: none"> ▶ Production Tax Credits ▶ Investment Tax Credits ▶ Sales Tax Reductions ▶ Property Tax Reductions ▶ Accelerated Depreciation
Direct Cash Incentives	<ul style="list-style-type: none"> ▶ Production Incentives ▶ Investment Incentives (Grants)
Low-Cost Capital Programs	<ul style="list-style-type: none"> ▶ Government-Subsidized Loans ▶ Project Loan Guarantees ▶ Project Aggregation
Distributed Resource Policies	<ul style="list-style-type: none"> ▶ Standard Contracts for Small Distributed Projects ▶ Net Metering ▶ Line Extension Policies
Customer Choice Opportunities	<ul style="list-style-type: none"> ▶ Utility-Supplied Renewable Energy Pricing Options ▶ Alternative Energy Marketing from Retail Electricity Sellers ▶ Aggregated Consumer Purchases ▶ Fuel Source Disclosure Requirement and Certification
General Environmental Regulations	<ul style="list-style-type: none"> ▶ Externality Valuation in Resource Planning ▶ Externality Valuation in Environmental Dispatch ▶ Emission Taxes ▶ Emission Caps/Marketable Permits
Other Policies	<ul style="list-style-type: none"> ▶ Government Purchases ▶ Site Prospecting, Review, and Permitting ▶ Renewable Portfolio Standard ▶ Auctioned Contracts ▶ Performance-Based Rate-Making

Table 2-2 Alternative Energy Incentive Policy Descriptions and Explanations

POLICY TYPE	Description/Explanation
<i>Tax Incentives</i>	
Production Tax Credits	A production tax credit provides an investor or owner of the qualifying alternative energy property with an annual tax credit based upon the amount of energy produced or generated.
Investment Tax Credits	An investment tax credit allows an investor of an alternative energy project to reduce its tax obligation by some portion of the amount invested in the project.
Sales Tax Reductions	Exemptions or reductions in state or local sales taxes that apply to the transfer or exchange of energy, material, and land assets reduce the overall tax burden for alternative energy projects.
Property Tax Reductions	Exemptions or reductions in state or local property taxes decrease the tax burden for alternative energy projects.
Accelerated Depreciation	Some assets lose value over time. Tax depreciation attempts to approximate the loss of asset value over time by allowing a portion of the investment to be deducted from taxable income in any given year.
<i>Direct Cash Incentives</i>	
Production Incentives	Direct production incentives can take the form of direct cash subsidy or price support payment based on energy production, not capital investment.
Investment Incentives (Grants)	Investment incentives can take the form of direct cash payment to defray capital costs of energy projects.
<i>Low-Cost Capital Programs</i>	
Government-Subsidized Loans	Debt costs can affect as well as determine whether an alternative energy project is built. Government can lower the cost of debt by providing direct low-cost loans.
Project Loan Guarantees	Project loan guarantees provide government-backed assurance or security to a lender that the loan will be repaid. This provides risk insurance for the project costs.
Project Aggregation	Combining multiple alternative energy projects can in some instances decrease project financing. Project aggregation services can be provided by multiple entities, including government, nonprofit organizations, or private companies.
<i>Distributed Resource Policies</i>	

Standard Contracts for Small Distributed Projects	Long-term standard power purchase contracts with predefined interconnection requirements with, in some cases, fixed power purchase rates for sellers of alternative energy that meet certain size, type, and ownership requirements. Standard contracts simplify negotiations, reduce transaction costs, speed the contracting process, improve chances of project financing, and treat all sellers of alternative energy equally.
Net Metering	A policy mechanism that allows electricity customers to install their own grid-connected alternative energy generation system and allows the customer to be billed only for the net electricity consumed over the entire billing period. If the customer produces more electricity than is consumed, the customer receives credit against future electricity consumption.
Line Extension Policies	Historically, utility customers have subsidized line extensions for new customer hook-ups. Usually, customers are granted a free footage allowance within which the costs are borne entirely by the utility and its customers.
<i>Customer Choice Opportunities</i>	
Utility-Supplied Renewable Energy Pricing Options	Some utility customers are willing to pay a premium, if given the choice, to buy renewable energy. Providing customers with a choice creates a voluntary market for renewable energy.
Alternative Energy Marketing from Retail Sellers	In a restructured electricity market, some retail suppliers of electricity have used alternative energy as a marketing tool to differentiate products.
Aggregated Consumer Purchases	Aggregation of small customers to purchase alternative energy creates increased bargaining power and resources to purchase alternative energy at lower prices.
Fuel Source Disclosure Requirement and Certification	Differentiating alternative energy from other sources of energy through disclosure of energy generation sources provides information to customers that allow those customers to make a choice on the type of energy they want to consume. Certifying the fuel source means verifying that the production of alternative energy has occurred. Certification may also refer to an endorsement by a particular entity.
<i>General Environmental Regulations</i>	
Externality Valuation in Resource Planning	Taking into account in selecting energy resources the full social costs of the energy resource during resource planning and acquisition, usually through an integrated resource planning process.
Externality Valuation in Environmental Dispatch	Taking into account the full social costs when deciding which energy resources should be dispatched (utilized).
Emission Taxes	The Clean Air Act gives states the ability to use market mechanisms such as emission charges or taxes as a way to comply with federal environmental standards.

Emission Caps/Marketable Permits	The Clean Air Act provides states with the authority to impose emission caps along with marketable permits. This type of program involves setting a limit for total emissions of a particular pollutant and then allocating emission allowances to individual sources.
Other Policies	
Government Purchases	Direct governmental purchases of alternative energy can help foster alternative energy development. The impact of governmental purchases can be powerful, given that public institutions are some of the largest buyers in the country.
Site Prospecting, Review, and Permitting	This refers to a number of activities that a state can undertake to help prepare and facilitate alternative energy development. These include resource assessments, distribution and transmission studies, advanced environmental analysis, zoning, and site permitting.
Renewable Portfolio Standard	Under this type of policy, a state would require every retail power supplier to support a specific amount (i.e., 10%) of energy produced from alternative energy sources.
Auctioned Contracts	Auctioned contracts are requests for proposals (rfp) that can be used to facilitate the use of alternative energy resources.
Performance-Based Rate-Making	Performance-based rate-making decouples utility profits from costs and, instead, ties profits to performance indices that can include a resource diversity index to stimulate alternative energy resources.

Table 2-3 generally illustrates the types of alternative energy incentive policies that are currently used in Montana. Specific descriptions of those policies can be found in subsequent chapters of this report. Table 2-3 underscores that Montana has been fairly proactive in providing a range of policy incentives for alternative energy sources.

Table 2-3 Alternative Energy Incentive Policies Used in Montana to Promote Alternative Energy Development

POLICY TYPE	Does Montana Use This Policy to Promote Alternative Energy Sources	
	YES	NO
<i>Tax Incentives</i>		
Production Tax Credits	X	
Investment Tax Credits	X	
Sales Tax Reductions		X
Property Tax Reductions	X	
Accelerated Depreciation	X	

Direct Cash Incentives		
Production Incentives	X	
Investment Incentives (Grants)	X	
Low-Cost Capital Programs		
Government-Subsidized Loans	X	
Project Loan Guarantees		X
Project Aggregation	X	
Distributed Resource Policies		
Standard Contracts for Small Distributed Projects	X	
Net Metering	X	
Line Extension Policies		X
Customer Choice Opportunities		
Utility-Supplied Renewable Energy Pricing Options	X	
Alternative Energy Marketing from Retail Sellers	X	
Aggregated Consumer Purchases	X	
Fuel Source Disclosure Requirement and Certification	X	
General Environmental Regulations		
Externality Valuation in Resource Planning	X	
Externality Valuation in Environmental Dispatch		X
Emission Taxes		X
Emission Caps/Marketable Permits	X	
Other Policies		
Government Purchases		X
Site Prospecting, Review, and Permitting		X
Renewable Portfolio Standard		X
Auctioned Contracts		X
Universal System Benefits Program	X	
Performance-Based Rate-Making		X

√ Potential Funding Sources for Alternative Energy Incentives

Most (but not all) incentives require money. There are multiple sources that states and local governments use to help fund alternative energy incentives.⁴ Those sources include:

- ⇒ State or Local General Fund
- ⇒ State or Local Bonds
- ⇒ Earmarked Tax Revenues
- ⇒ Service Wire Charges (i.e. Universal System Benefits Charge)
- ⇒ Voluntary Consumer Payments
- ⇒ Blending Price of Alternative Energy Service

The general fund is the checking account of local or state government--usually funded through personal and corporate income taxes, sales taxes, property taxes, and user fees. In these cash-strapped times, current and future use of general fund money for alternative energy projects is uncertain at best. With decreases in general fund money appropriated to alternative energy incentives, states have relied on earmarked tax revenues (taxes designated for a specific purpose) and service wire charges (analogous to the universal system benefits charge used in Montana) to fund these incentives. Consumers may also volunteer (if given the choice) to pay a premium for alternative energy development. An indirect form of funding incentives for alternative energy development is the use of the technique called price blending. Under this funding option, as with all other energy sources, the cost of the alternative energy is blended into the commodity price of energy paid by the consumer.⁵ State and local governments also use bonds (long-term borrowing mechanism) to raise money to finance alternative energy projects. Chapter 7 examines Montana's bonding process for energy projects.

Like traditional fossil fuel incentives, there are many creative funding options that state and local governments use to fund alternative energy resources. However, just like in the movie Jerry McGuire which coined the phrase "Show Me the Money!!", the process of finding the money can be a difficult political exercise, especially when there are multiple important constituencies competing for scarce resources.

⁴ Id. at footnote #1.

⁵ Id. at footnote #1.

Chapter 3: Hydrogen

√ What is Hydrogen?

Hydrogen is the most plentiful element in the known universe, making up about 75% of matter.⁶ Technically speaking, hydrogen is not an energy source like the sun, oil, wind, or coal, but an energy carrier like gasoline or electricity.⁷ Hydrogen almost never occurs by itself, but occurs in combination with other elements like carbon or oxygen. Once separated from other elements, hydrogen is considered a very clean high-quality form of energy that can readily be converted to electricity.⁸ Hydrogen is also highly flammable, taking only a small amount of energy to ignite it.

√ How is Hydrogen Produced?

Hydrogen can be produced in a variety of ways from a variety of sources. Most methods involve splitting water (H_2O) into the component parts of hydrogen and oxygen. Figure 1 illustrates the what the general hydrogen production life cycle looks like. The most common type of hydrogen production involves natural gas steam reforming in which natural gas is subjected to high temperature steam to produce hydrogen, carbon monoxide, and carbon dioxide. Other methods include:

- ⇒ Electrolysis: uses electrical current to split water into hydrogen and oxygen gas.
- ⇒ Steam Electrolysis: uses heat energy, instead of electricity, to split water.
- ⇒ Photo Electrolysis: uses sunlight absorbed in semiconducting material to split water.
- ⇒ Thermochemical: uses heat and chemicals to split water to produce hydrogen.
- ⇒ Biomass/Coal Gasification and Pyrolysis: uses high temperature to break down biomass or coal into gas from which pure hydrogen is produced.

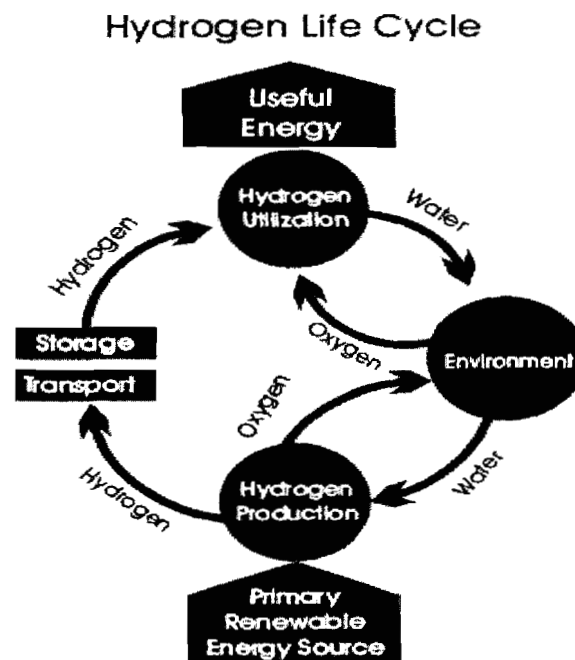
⁶ See Amory B. Lovins, *Twenty Hydrogen Myths*, Rocky Mountain Institute (2003), and U.S. Department of Energy, Energy Efficiency and Renewable Energy Website at: <http://www.eere.energy.gov/hydrogenandfuelcells/>

⁷ Id.

⁸ Id.

- ⇒ Photobiological: certain microorganisms utilize sunlight to split water, producing hydrogen.
- ⇒ Biological systems: uses a variety of microbes to break down biomass feedstocks into hydrogen.
- ⇒ Thermal water splitting: uses high temperature (1000 degrees C) to split water.

Figure 1.

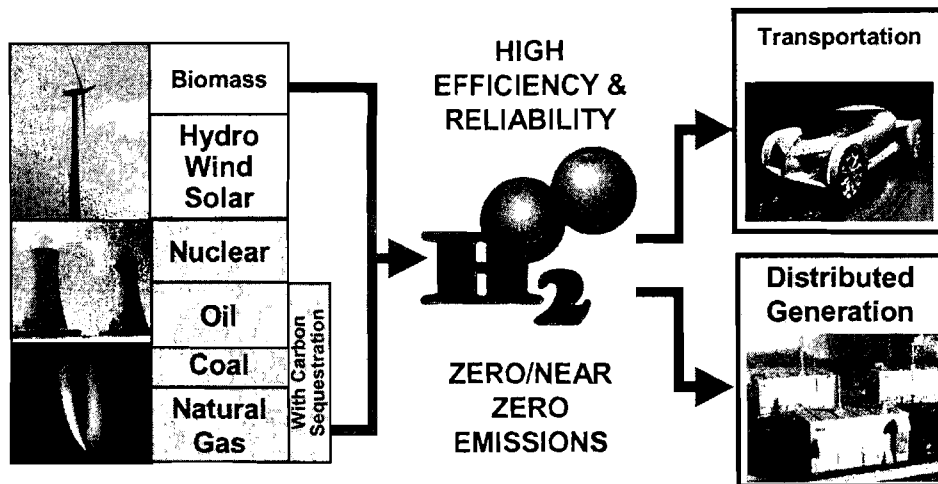


Source: The Need Project, Secondary Energy Infobook, 2002.

The sources for producing hydrogen are endless, including renewable resources such as wind, sunlight, wood, biomass, geothermal, hydro-generation, and other resources including coal, oil, gasoline, ethanol, biodiesel, natural gas, propane, methane, and nuclear energy.

Figure 2 graphically illustrates hydrogen production and possible end uses.

Figure 2. Hydrogen Production and End Use



Source: Bob Evans, PowerPoint Presentation, NREL (January 2004).

Currently in the U.S., the hydrogen industry produces about 9 million tons of hydrogen per year for use in petroleum refining, chemicals production, metals treating, and electrical applications.⁹

√ How is Hydrogen Stored and Distributed?

Hydrogen can be stored as a compressed gas or liquid. In addition, hydrogen can be combined with certain metals producing stable metal hydrides that when heated can release the hydrogen. Hydrogen can also be absorbed by active charcoal through a gas-on-solid process that can store hydrogen at high densities. Hydrogen can be distributed in a variety of ways: via pipeline or by road using cylinders, tube trailers, and high compression storage tanks on trucks and trains.

√ What are the Uses of Hydrogen?

Basically anything that needs energy can use hydrogen. Uses include transportation, electricity production, and distributive energy used in homes, schools, and buildings.

⁹ Department of Energy Website: <http://www.eere.energy.gov/hydrogenandfuelcells/>

√ What are the Advantages and/or Opportunities of Producing and Using Hydrogen In Montana?

Professor Paul Williamson, Dean of the University of Montana College of Technology, testified during a panel discussion on hydrogen before the EQC Energy Policy Subcommittee that "Montana could potentially be a huge contributor and player to the hydrogen economy."¹⁰ It is clear that in order to transition to a hydrogen economy, fossil fuels along with cost-effective renewables will be required to make the necessary jump.¹¹ In the long term, renewables will likely take a leading role in producing hydrogen. With Montana's unmatched resources including wind, solar, coal, natural gas, water, methane, hydro power, forest products, agriculture products, ethanol, biomass, petroleum, minerals, and public lands, Montana is strategically positioned to be a key player in the production of hydrogen.

Hydrogen also has the potential to increase or leverage the value of Montana's resources. Take the following simplistic example, which can also be calculated for renewables, petroleum reforming and byproducts, and pollution control:

40 Million Tons of Coal @ \$6.23/ton = \$250 million

40 Million Tons of Coal = 1.72 million cubic feet of H₂ = \$7.4 billion

Obviously the costs of hydrogen production and storage, as well as the costs of sequestering any carbon produced, need to be netted against the \$7.4 billion dollar figure, but this very simplified example illustrates that hydrogen has the potential to add value to Montana's resources.

It has also been demonstrated that hydrogen production, distribution, storage, use, and research and development creates and attracts quality technology jobs. Case in point: the Canadian experience. In Canada, revenues topped \$97 million last year, \$179 million was invested in research and development, and the hydrogen industry in Canada boasts 1772 jobs. Over 72% of the workers in the Canadian hydrogen industry have a post-secondary education. Projected growth for the next year includes \$165 million in revenues, \$358 million invested in research and development, and 2639 jobs. The drivers for hydrogen production nationally include:

- ⇒ National energy security through the use of domestic resources and distributed energy systems;
- ⇒ Environmental stewardship; and

¹⁰ Presentation before the EQC Energy Policy Subcommittee on March 9, 2004.

¹¹ See footnote #6.

⇒ Economic prosperity.

Demand for hydrogen in the U.S. is expected to increase to 40 million tons per year by 2020. As noted on pages 20-21, other states are making aggressive moves to be a part of the hydrogen economy, while Montana still waits on the sidelines.

√ What are the Disadvantages or Barriers of Producing and Using Hydrogen in Montana?

There are a number of challenges with producing, distributing, and using hydrogen in Montana as well as the rest of the U.S. Commentators often raise technical obstacles to hydrogen development, including storage, safety, and the cost of the hydrogen and its distribution infrastructure.¹² A recent study from the Academy of Sciences concluded that:

The vision of the hydrogen economy is based on two expectations: (1) that hydrogen can be produced from domestic energy sources in a manner that is affordable and environmentally benign, and (2) that applications using hydrogen--fuel cell vehicles, for example--can gain market share in competition with the alternatives. To the extent that these expectations can be met, the United States, and indeed the world, would benefit from reduced vulnerability to energy disruptions and improved environmental quality, especially through lower carbon emissions. However, before this vision can become a reality, many technical, social, and policy challenges must be overcome.¹³

Testimony before the EQC Energy Subcommittee from the National Hydrogen Association noted that breakthroughs are needed for: mature, cost-effective renewable energy production; high-density storage of hydrogen for transportation; high-efficiency electrolysis of water; and the reduction of environmental impacts of converting conventional fuels to hydrogen.

One commentator, however, strongly suggests that most of the obstacles have been resolved to support rapid deployment of distributed hydrogen technology and that the hydrogen transition should not need enormous investments in addition to those that energy industries are making already.¹⁴

Regardless of who you believe, the transition to a hydrogen economy has some formidable hurdles to jump. The EQC heard testimony from a variety of entities

¹² Id. at footnote #6 and see New York Times Article "Report Questions Bush Plan for Hydrogen-Fueled Cars", February 6, 2004.

¹³ National Academy of Sciences, The Hydrogen Economy: Opportunities, Costs, Barriers and R&D Needs (2004).

¹⁴ Footnote #6, Amory Lovins, Twenty Hydrogen Myths at page 7.

including the Department of Energy, the National Hydrogen Association, and Montana hydrogen experts on barriers to hydrogen development. One of the overriding themes of that testimony was the lack of coordination within Montana, among other states, and between states and the federal government. Dean Williamson suggested that in order for the State of Montana to create a viable hydrogen economy Montanans should formulate a cohesive, inclusive, strategic energy plan. Dean Williamson went so far as to develop a draft Montana Vision 2020 for Montana's energy future (see Appendix B).

Howard Haines, a bio-energy engineer with the Department of Environmental Quality, testified that the lack of a coordinating body or task force within the state to coordinate efforts of state government, universities, small businesses, and other key stakeholders has and will lead to an uncoordinated and unfocused effort to develop hydrogen in Montana.

√ What is the Montana Experience to Date with Hydrogen?

Outside of a few fuel cell demonstration projects and some research and development grants awarded to Montana's university system, Montana's experience with hydrogen is limited. A Montana Hydrogen Futures coalition has been established by a group of individuals interested in the possibilities that a hydrogen economy could bring to Montana. The goals of this coalition are to:

1. Establish a hydrogen futures park at the University of Montana.
2. Establish statewide hydrogen production and distribution capabilities.
3. Leverage hydrogen investments that create new hydrogen products, businesses, and jobs.
4. Use the hydrogen-generated resources that enhance Montana's infrastructure growth.

√ What are Montana's Current Policies Regarding Hydrogen?

During the 2003 Legislative Session, the legislature passed a nonbinding resolution (House Joint Resolution 26) supporting the implementation of a Montana hydrogen energy plan to:

- (1) educate Montanans about the benefits of a hydrogen economy and promote a Montana hydrogen futures coalition;
- (2) establish the Montana Hydrogen Futures Project as the key economic development focus of the state;
- (3) institute necessary state policies and legislation to promote Montana Hydrogen Futures Project

development and statewide involvement;

(4) support the establishment of a focal point of the hydrogen economy at the Montana Hydrogen Futures Park at the University of Montana-Missoula;

(5) support and encourage federal commitment and necessary matching funds to construct the Montana Hydrogen Futures Park and provide for development of the Montana energy products network to attract hydrogen-based business and industries to Montana;

(6) establish alliances with energy producers and promote resource identification by Montana communities by identifying all existing and potential federal, state, tribal, and community resources for inclusion in the Montana energy products network;

(7) develop a first-class education and training system that attracts and prepares high-quality hydrogen professionals for all levels of the hydrogen economy and replicate this system throughout the state;

(8) expand the Montana energy products network by creating the statewide micro enterprise system that establishes business opportunities, incentives, and state business development marketing; and

(9) pursue national prominence with other states and agencies in the supply of hydrogen to the national hydrogen distribution system.

This resolution is the most current expression of the Montana Legislature regarding hydrogen development. When the 2003 Legislature was asked in House Bill 377 to authorize the Board of Examiners to issue general obligation bonds not to exceed \$30 million to finance infrastructure improvements for a hydrogen futures park located at the University of Montana-Missoula, College of Technology, the House Appropriations Committee tabled the bill over concerns regarding the State's general obligation debt. Currently there is no state funding for any of the activities outlined in House Joint Resolution 26.

The State of Montana has an number of state incentives in place for renewable resources like hydrogen. These include:

*Alternative Energy Revolving Loan Program: provides loans of up to \$10,000 to individuals and small businesses to install alternative energy systems (including fuel cells), which must be paid back within 5 years.

* Property tax reduction: generating plants using alternative fuels (including fuel cells) producing 1 MW or more of power get a 50% reduction of taxable value for the first 5 years after the construction permit is issued.

* Property tax exemption: generating plants using alternative fuels (including fuel cells that don't require hydrocarbon fuel) producing greater than 1 MW are exempt from property taxes 5 years after the start of operation.

* Property tax exemption for renewable energy systems (including fuel cells) can be

claimed for 10 years after installation of the property. Up to \$20,000 is exempt for a single-family residential dwelling and \$100,000 for a multifamily or nonresidential building.

* Residential alternative energy system tax credit: up to \$500 tax credit for installation of an alternative energy system (including fuel cells).

* Income tax credit for an individual or business (up to \$500 for vehicle weight of 10,000 pounds or \$1,000 for heavier vehicles) for conversion of a vehicle to use alternative fuels including hydrogen.

* Fuel cells and hydrogen electricity generation generally are eligible for economic development bonding via the BOI and industrial development bonding via local government.

√ What are Other State and Federal Policies Regarding Hydrogen?

Other states have stepped up their involvement in creating a hydrogen economy. Table 3-1 highlights these other state hydrogen initiatives.

Table 3-1. State Hydrogen Initiatives

STATE	INITIATIVE
California	California Hydrogen Business Council California Fuel Cell Partnership California's Hydrogen Highways
Florida	Florida Hydrogen Partnership Coal Gasification/Hydrogen Project
Hawaii	State Hydrogen Plan and Power Park Natural Energy Laboratory of Hawaii Gateway Project
Indiana	State Hydrogen Road Mapping Project
Maine	Hydrogen Energy Center
Michigan	Ad Hoc Hydrogen Rules Committee NextEnergy Project
New Mexico	New Mexico Hydrogen Business Council

North Dakota	Coal Gasification/Hydrogen Project and Pipeline
New York	NYSERDA State Hydrogen Road Mapping Project

The federal government has also become very active in supporting the development of a hydrogen economy. In his 2003 State of the Union Address, President Bush announced a \$1.2 billion hydrogen fuel initiative to reverse America's growing dependence on foreign oil by developing the technology for commercially viable hydrogen-powered fuel cells to power cars, trucks, homes and businesses with no pollution or greenhouse gases. The hydrogen fuel initiative will include \$720 million in new funding over the next five years to develop the technologies and infrastructure to produce, store, and distribute hydrogen for use in fuel cell vehicles and electricity generation. Combined with the FreedomCAR (Cooperative Automotive Research) initiative, President Bush is proposing a total of \$1.7 billion over the next five years to develop hydrogen-powered fuel cells, hydrogen infrastructure and advanced automotive technologies.¹⁵

Just recently (April 27, 2004) the U.S. Department of Energy awarded \$350 million for 130 hydrogen research projects conducted at various sites across the country. The research will focus on hydrogen production, hydrogen storage on vehicles, and educating consumers.

¹⁵ White House Press Release dated January 30, 2003.

Chapter 4: Wind Energy

√ What is Wind Generation?

There are two types of wind generation: distributed wind energy generation and utility-scale grid-connected wind energy generation.

Distributed wind energy generation places the generation source (wind turbine) near the load (or user of the energy). Distributed wind energy usually involves small wind power turbines (300 watts to 100 kilowatts) that are installed at individual homes, farms, businesses, schools, etc. These wind turbines have high reliability and low maintenance. Distributed wind turbines need a 9-mph average wind speed. Distributed wind generation is installed on the customer side of the meter or completely off the grid.

Utility-scale wind power is installed on wind farms that can produce anywhere between 10 and 300 megawatts of electricity. The size of the turbines are from 600 to 1,800 kilowatts. Utility-scale wind is connected to the utility side of the grid and requires another source of generation to firm up the electricity that is generated. Utility-scale wind generation requires professional maintenance. Utility-scale wind turbines need a 13-mph average wind speed in order to operate.

√ How does Wind Produce Electricity?

Regardless of whether you have a large- or small-scale wind turbine, the mechanics of generating electricity are the same. Wind is the workhorse energy that drives a turbine that converts mechanical energy to electricity by forcing electrons to separate from atoms and begin flowing over wires. The larger the blade diameter and the greater the average wind speed, the more electricity is produced. Increasing the height of the wind tower increases the potential wind power. Although self-evident, wind generation of electricity is heavily dependent on the wind blowing. Siting of wind turbines is significantly influenced by wind attributes.

√ What are the Advantages of Wind Energy Generation in Montana?

Montana ranks fifth among the top 20 states for wind energy potential (see Table 4-1). Figure 4-1 is a map that illustrates the distribution of potential wind power in Montana. Given Montana's high wind energy potential and the notion that wind as a fuel source is free, Montana is potentially a very attractive place for both distributed wind energy generation and utility-scale wind energy production.

Table 4-1 Top Twenty States For Wind Energy Potential

1	North Dakota	1,210 MW
2	Texas	1,190 MW
3	Kansas	1,070 MW
4	South Dakota	1,030 MW
5	Montana	1,020 MW
6	Nebraska	868 MW
7	Wyoming	747 MW
8	Oklahoma	725 MW
9	Minnesota	657 MW
10	Iowa	551 MW
11	Colorado	481 MW
12	New Mexico	435 MW
13	Idaho	75 MW
14	Michigan	73 MW
15	New York	62 MW
16	Illinois	61 MW
17	California	59 MW
18	Wisconsin	58 MW
19	Maine	56 MW
20	Missouri	52 MW

Source: NCAT, Discover Renewable Energy, Montana Wind Power, September 2002

The advantages of producing wind energy in Montana include:

1. Development of Montana's rural economies including expanding the tax base and diversifying the local rural economy. According to the Windustry website, each 100 MW of wind development in southwest Minnesota has generated about \$1 million per year in property tax revenue and about \$250,000 per year in direct lease payments to landowners.¹⁶

¹⁶ See the Windustry website at: <http://www.windustry.com/basics/02-whywind.htm>

2. Wind energy development creates jobs. For every new megawatt of wind power installed, 15-19 jobs are created and about 60 person-years of employment.¹⁷
3. Wind energy production enhances energy security and self-reliance.
4. Wind energy development is compatible with Montana's agricultural operations.
5. Wind energy production does not produce pollution or result in the production of waste byproducts.

√ What are the Disadvantages of Wind Energy Generation in Montana?

Wind energy is an intermittent resource. When the wind stops blowing, generation of electricity ceases. For small-scale distributed wind that is off the grid, this means that battery storage capacity is essential. For large-scale utility wind developments, there is a need to "firm up" the electricity using traditional fossil fuel, nuclear, or hydro generation to ensure that the flow of electricity is there when it is needed. To the extent that wind blows when loads are absent, the electricity still needs to be moved. There are also some disadvantages from a utility perspective regarding small distributed wind projects in terms of safety, reliability, backup power, and lost revenue (see Appendix C).

√ What are the Barriers to Wind Energy Development in Montana?

During a panel discussion on wind development in Montana before the EQC Energy Policy Subcommittee, the question was asked: "Why isn't there any wind development in Montana? Currently there are multiple barriers that have prevented wide-scale wind development in Montana:

1. Wind energy generation is capital intensive. Over 90% of the cost of wind energy generation is embodied in the first investment. This is true both for small-scale and large-scale wind generation.
2. Transmission within Montana is good, but moving power outside the state is difficult. This means that the market for wind energy is practically limited to the native load.

¹⁷ Id.

3. Although Montana ranks 5th in wind energy potential, it is in the bottom 10 states in terms of power consumption.
4. Montana's substantial distance from ports or manufacturing centers increases the capital costs of wind energy equipment.
5. For utility-scale wind projects, the lack of eligible native load makes it tough to secure a contract to supply electricity.
6. Inconsistent intrastate net metering policies make it difficult to develop distributed wind across the state.

√ What is the Montana Experience to Date with Wind Energy Generation?

Montana's experience with wind to date has been primarily limited to small- to medium-scale distributed wind projects in located in White Sulphur Springs, Norris, Ennis, Stanford, Browning, and Livingston. Currently there is no utility-scale wind development in Montana. NorthWestern Energy is assembling its default supply portfolio, which includes up to 150 megawatts of wind energy. Contracts to supply that wind energy have not been entered into or approved by the Public Service Commission.

√ What are Montana's Current Incentive Policies Regarding Wind Energy Generation?

Montana's laundry list of wind energy incentives includes:

- * Alternative Energy Investment Corporate Tax Credit: Investments of \$5,000 or more in commercial and net metering alternative energy investments are eligible for a tax credit of up to 35% against individual or corporate tax.
- * Property Tax Exemption: New generating facilities built in Montana with a nameplate capacity of less than 1 MW and using alternative renewable energy sources are exempt from property taxes for 5 years after start of operation.
- * Property Tax Reduction: Generating plants using alternative fuels greater than 1 MW (50% taxable value during first 5 years after the construction permit is issued).

- * Residential Alternative Energy Systems Tax Credit: Residential taxpayers that install an energy system using a recognized nonfossil forms of energy are eligible to receive a tax credit not to exceed \$500.
- * Alternative Revolving Loan Program: Provides loans to individuals and small businesses to install alternative energy systems that generate energy for their own use. Loans up to a maximum of \$10,000 must be repaid within 5 years. (Rate for 2003 of 5.5%.)
- * Net Metering: For NorthWestern Energy customers, net metering is allowed for alternative energy systems of 50 kilowatts or less to offset customer requirements for electricity.
- * Universal System Benefits Programs: Supports renewable energy resources including wind energy generation.
- * Wind Easements: Allows property owners to create wind easements for purposes of protecting and maintaining access to wind.
- * Wind projects eligible for economic development bonding via the Board of Investments (17-5-1501).

√ What are Other State and Federal Policies Regarding Wind Energy Generation?

Other Selected State Incentives:

Wind Incentives	States				
	ID	WY	ND	SD	MN
<i>Tax Incentives</i>					
Production Tax Credits	X		X		X
Investment Tax Credits	X		X		X
Sales Tax Reductions		X	X		X
Property Tax Reductions	X		X	X	X
Accelerated Depreciation	X				

Direct Cash Incentives					
Production Incentives	X		X		X
Investment Incentives (Grants)	X				X
Low-Cost Capital Programs					
Government-Subsidized Loans	X				X
Project Loan Guarantees					X
Project Aggregation	X				X
Distributed Resource Policies					
Standard Contracts for Small Distributed Projects	X				X
Net Metering	X		X		X
Line Extension Policies	X				
Customer Choice Opportunities					
Utility-Supplied Renewable Energy Pricing Options	X		X	X	X
Alternative Energy Marketing from Retail Sellers	X				X
Aggregated Consumer Purchases	X				X
Fuel Source Disclosure Requirement and Certification	X		X		X
Other Policies					
Renewable Portfolio Standard					X
Universal System Benefits					X
Wind Easements					X

Federal Incentives:

- * Accelerated Depreciation for Businesses: A business can recover investments in wind property through a 5-year period.
- * Renewable Electricity Production Credit: 1.5 cents per kWh credit adjusted for inflation. Expired 12/31/03.
- * Renewable Energy Production Incentives: 1.5 cents per kWh incentive payment for first 10-year period of operation. Expired 12/31/03.
- * Renewable Energy Systems and Energy Efficiency Grants: \$23 million to agricultural producers or rural small businesses during 2003. Limit \$500,000 per renewable energy project and \$250,000 per efficiency project.
- * Federal Government Green Power Purchase Goal: Federal government agencies are required to purchase 2.5% by 2005.
- * Tribal Energy Program Grant: DOE technical assistance to tribes.

Chapter 5: Biodiesel

√ What is Biodiesel?

For those of us who use diesel in our cars, trucks, heavy equipment, school buses, and farm equipment, biodiesel may be a viable fuel supplement or replacement. So what is biodiesel? Imagine pulling up to your local McDonald's drive-through here in Montana and asking, "May I have a Big Mac and fries and will you fill my diesel fuel tank with used french-fry oil, please." Although not entirely realistic, the Golden Arches scenario may not be as far-fetched as it seems. Biodiesel is an alternative fuel produced from biodegradable, nontoxic, renewable resources such as new and used vegetable oils and animal fats. Biodiesel, combined with petroleum diesel fuels, can be used in any diesel engine with little, if any, modifications.¹⁸

√ How is Biodiesel Made?

The recipe for biodiesel is fairly straightforward. Take vegetable oils or animal fats, or both, screen out any water, then add one part alcohol and a pinch of catalyst (sodium or potassium hydroxide). A chemical reaction takes place in a caldron that produces two products: fatty acid methyl esters and a chemical compound called glycerol that is used in cosmetics and pharmaceuticals. Separate the fatty acids from the glycerol, and voila. . . you have biodiesel.¹⁹

√ What are the Advantages of Producing and Using Biodiesel in Montana?

Biodiesel is renewable. It can be blended into existing petroleum diesel or used as a petroleum diesel substitute. According to the U.S. Department of Energy, biodiesel blends require no engine modifications--you can use them in existing diesel engines.²⁰ Biodiesel is much less combustibile than petroleum diesel, making it safer to handle. It reduces greenhouse gas emissions. It is approved for use as a registered fuel and fuel additive by the Environmental Protection Agency and has been designated as an

¹⁸ See the Department of Energy's Alternative Fuels Data Center website at: www.eere.energy.gov/cleancities/afdc.

¹⁹ For a more thorough and complete recipe for biodiesel see the Department of Energy's website at www.eere.energy.gov/cleancities/afdc/altfuel.biodiesel.html.

²⁰ Id.

alternative fuel by the Department of Energy and the U.S. Department of Transportation.²¹ Biodiesel has been tested in a variety of unmodified diesel vehicles for 40 million road miles, including 120,000 miles in Yellowstone National Park.²²

Biodiesel can be produced from certain varieties of canola, safflower, mustard, camelina, and crambe, all which can be grown here in Montana. Growing the raw materials in Montana and refining and producing biodiesel in Montana maybe a value-added proposition that has the potential to create jobs, revitalize rural Montana's economy, and promote alternative fuel development.²³

√ What are the Disadvantages of Producing and Using Biodiesel in Montana?

Biodiesel is a relatively new technology. It is uncertain whether biodiesel and biodiesel blends affect engine performance, especially fuel economy, torque, and power.²⁴ Montana's cold climate may hinder the storage of biodiesel. The Department of Energy reports that although using biodiesel decreases the emission of many air pollutants, it also increases emissions of nitrogen oxides and more research and development is needed to resolve this problem.²⁵ Greater use of biodiesel may have potential revenue and tax impacts on the state.

The price of biodiesel may also be a concern. Feedstock costs account for a large part of biodiesel production costs. For example, the Department of Energy says that it takes 7.3 pounds of soybean oil at a cost of 20 cents a pound to produce a gallon of biodiesel.²⁶ This translates, for feedstock costs alone, into at least \$1.50 a gallon of soy biodiesel. The Department of Energy also says that fats and greases cost less and produce less expensive biodiesel (\$1 per gallon).²⁷ If the market price of biodiesel is

²¹ See the National Biodiesel Board FAQs Website at www.biodiesel.org/resources/faqs/.

²² For mileage numbers see footnote # 21.

²³ See the November 1, 2002, issue of Business MONTANA from the Governor's Office of Economic Development that touts the potential economic benefits of biodiesel in Montana.

²⁴ See the Western Transportation Institute, College of Engineering, Montana State University's Evaluation of Biodiesel Fuel: Literature Review, July 2, 2003.

²⁵ See the Department of Energy's Alternative Fuels Data Center website at: www.eere.energy.gov/cleancities/afdc/altfuel/whatis_biodiesel.html

²⁶ See the Department of Energy's Alternative Fuels Data Center website at: www.eere.energy.gov/cleancities/afdc/altfuel/bio_market.html.

²⁷ Id.

greater than the market price of petroleum diesel, there may be very little incentive for Montana consumers to purchase biodiesel.

Distribution, storage, and access to biodiesel may also be a potential barrier to using this resource. Lack of uniform standards in neighboring states regarding the definition and use of biodiesel may hamper efforts to market biodiesel in Montana to interstate transport companies.

√ What is the Montana Experience to Date with Biodiesel?

A number of activities have taken or are taking place in Montana regarding the use and production of biodiesel. Below is a brief summary of each activity.

- ⇒ House Bill No. 502, introduced by Rep. Holly Raser of Missoula during the 2003 session, would have mandated that all diesel fuel sold for use in internal combustion engines contain at least 2% biodiesel fuel by volume. The bill was discussed and heavily amended by the House Transportation Committee, but the bill never made it to the floor of the House.
- ⇒ In response to a letter from the House Transportation Committee during the 2003 session, the Montana Department of Transportation (MDT) has initiated a research project in partnership with Montana State University that will focus on the viability of using biodiesel as an alternative fuel in MDT's vehicle fleet. The project entails the identification of biodiesel types, review of engine performance data, review of storage requirements, review of emissions and air quality impacts, assessment of potential for engine damage, review of tax issues, identification of advantages and disadvantages of biodiesel, and documentation of research findings. The project will take place over the 2003-04 legislative interim.
- ⇒ The Montana Department of Environmental Quality completed a demonstration project on the use of biodiesel fuel in Yellowstone National Park in December 2002. Biodiesel was produced from rapeseed oil and potato residues. The project documented results on performance and air quality emissions. Running a conventional diesel engine on 100% biodiesel, the truck operated normally for 121,000 miles and started well in cold weather. The department also noted a reduction in a number of pollutant emissions, including nitrogen oxide.
- ⇒ West Yellowstone boasts the first pump in Montana to offer biodiesel. The town's Econo-Mart is offering a blend of 10% biodiesel and 90% diesel primarily for use in Yellowstone National Park.
- ⇒ Peaks and Prairies Oils Seed Growers Cooperative received a grant from the U.S. Department of Agriculture in October 2002 to study the feasibility of

producing oil seed crops for conversion into biodiesel. The growers' cooperative is in a partnership with Sustainable Systems, LLC, a Missoula-based renewable energy research, development, and commercialization company that will be responsible for converting the oil seed crops into biodiesel. The growers' cooperative has been working with both Montana State University and the University of Montana on this project.

⇒ The University of Montana has logged over 35,000 miles of biodiesel use in the "Bio-Bus". The Bio-Bus is a shuttle bus used on campus.

√ What are Montana's Current Policies Regarding Biodiesel?

In 1995, at the request of the Environmental Quality Council, the Montana Legislature enacted an alternative fuels policy statement and implementing guidelines. The policy states that Montana encourages the use of alternative fuels and fuel blends to the extent that doing so produces environmental and economic benefits for the citizens of Montana.

Within the alternative fuels policy statement, the Legislature recommends several guidelines for the development of a state alternative fuels policy, including the following:

- (1) the use of self-sufficient markets should be encouraged;
- (2) any state alternative fuels program should have measurable benefits that are communicated to the public;
- (3) state and local governments should be encouraged to set an example with their vehicle fleets in the use of alternative fuels and fuel blends. The state also encourages production of alternative fuels and fuel blends (90-4-1011, MCA).

In addition to the alternative fuels policy statement, state law allows an income tax credit for individuals and businesses of up to a 50% income tax credit for equipment and labor costs of converting vehicles to operate on alternative fuels. The tax credit is limited to \$500 for the conversion of vehicles of 10,000 pounds or less gross vehicle weight and to \$1,000 for vehicles over 10,000 GVW. The credit must be applied in the year the conversion is made, and sellers of an alternative fuel may not receive a credit for converting their own vehicles to operate on the alternative fuel that they sell (15-30-164 and 15-31-137, MCA).

State law also allows for incentives for biodiesel blends that will be available for 4 years after a biodiesel plant is constructed and begins operating in Montana. These incentives reduce motor fuel taxes to the consumer by 15% (15-70-204 and 15-70-321, MCA, and Chapter 568, L. 2001).

√ What are Other State and Federal Policies Regarding Biodiesel?

Other State Biodiesel Incentive Policies

Biodiesel Incentives	States				
	ID	WY	ND	SD	MN
Tax Incentives					
Production Tax Credits	X	X		X	
Investment Tax Credits	X				
Sales Tax Reductions				X	
Property Tax Reductions					
Accelerated Depreciation					
Direct Cash Incentives					
Production Incentives			X	X	X
Investment Incentives (Grants)					
Low-Cost Capital Programs					
Government-Subsidized Loans					
Project Loan Guarantees					
Project Aggregation					
Distributed Resource Policies					
Standard Contracts for Small Distributed Projects					
Customer Choice Opportunities					
Utility-Supplied Renewable Energy Pricing Options					
Alternative Energy Marketing from Retail Sellers					
Aggregated Consumer Purchases					

Fuel Source Disclosure Requirement and Certification					X
Other Policies					
Renewable Portfolio Standard					X
Universal System Benefits					

Federal Biodiesel Policies

Federal income tax deductions of between \$2,000 to \$50,000 are available for the incremental cost to purchase or convert qualified clean fuel vehicles.

Under the Energy Policy Act of 1992 (EPAct), the Department of Energy's (DOE) mission is to reduce reliance on petroleum-based fuels. DOE's goal is to replace 30% of the petroleum-based motor fuels by 2010. In addition to the federal tax incentives for qualified clean fuel vehicles, EPAct also authorized a number of incentive activities including:

- ⇒ Clean cities programs
- ⇒ State and alternative provider fleets programs
- ⇒ State energy programs to promote renewable energy technologies

The U.S. Department of Transportation (DOT) also administers programs that provide incentives for biodiesel use. The Congestion Mitigation and Air Quality Improvement Program that DOT administers provides funding to reduce transportation-related emissions. The DOT also administers the Clean Fuels Grant Program that supports acquisition of low-emission vehicles in transit fleets.

The U.S. Environmental Protection Agency (EPA) is charged with regulating air quality under the Clean Air Act Amendments of 1990 (CAA). Under the CAA the EPA has initiated the Clean Fuel Fleet Program, which requires cities with significant air quality problems to acquire fleet vehicles that meet clean fuel emission standards. In addition, the EPA administers the Air Pollution Control Program and the Pollution Prevention Grant Program, both of which provide money to state and local agencies for pollution prevention programs.

Chapter 6: Ethanol

√ What is Ethanol?

Ethanol is a throwback to the prohibition period--it is basically high-octane moonshine. Ethanol is an alcohol known as ethyl alcohol that is produced from grains or biomass. Ethanol is a clear, colorless, flammable oxygenated fuel.²⁸ Ethanol can be blended with gasoline at a 5.7%, 7.7%, or 10% volume. Ethanol can also be used as an alternative fuel to replace gasoline (85% ethanol and 15% gasoline).

√ How is Ethanol Made?

Ethanol is produced by fermentation of sugars. The fermentation process involves some organic matter (grains or biomass) that is modified through a yeast microorganism enzyme process that produces alcohol. The production stages in making ethanol include: feedstock storage and preparation, fermentation, distillation, dehydration, ethanol storage, and by-product treatment.

√ What are the Advantages of Producing and Using Ethanol in Montana?

Ethanol Production:

With the phaseout of MTBE (a gasoline additive) in California and Washington, there is an expanding market for ethanol fuels in the West that Montana, with its proximity, can take advantage of. Montana fuel ethanol markets may also expand in federal fleets and in the Clean City areas of Yellowstone, Teton, and Glacier. Ethanol production provides an additional market for Montana grain growers and biomass producers. Successful ethanol production provides wheat cattle feed and other additional products. Ethanol production can also assist in the disposal of paper mill waste sludge.

The EQC Energy Policy Subcommittee heard testimony from the Nebraska Ethanol Board regarding the state and local benefits of ethanol production. Those benefits include:

1. Stimulation of local grain prices and reduction of grain transportation costs.

²⁸Clean Fuels Development Coalition in cooperation with the Governors' Ethanol Coalition, Ethanol Fact Book (2001).

2. Increased economic value for the cattle and dairy industry because of production of cattle feed.
3. Creation of quality jobs and retention of skilled workers.
4. Ethanol production plants are well suited for rural areas that need economic development.
5. Ethanol production increases the local and state tax base.
6. Ethanol production is a value-added industry and promotes export of finished products.
7. Attracts capital to the state which results in related economic activity.
8. Stimulates allied industries and enhances infrastructure.
9. Use of ethanol produced in state reduces outflow of energy dollars.

Ethanol Use:

The environmental benefits of ethanol use include:

1. Ethanol blends of gasoline do not have the water quality problems associated with BTEX-MTBE blends of gasoline.
2. Ethanol blends quickly disperse in water and evaporate.
3. For every million gallons of 10% ethanol blend burned in the Yellowstone region, the potential emissions of carbon monoxide are reduced by 61 tons.
4. Ethanol is a cleaner-burning fuel than gasoline for all of the major air pollutants.

Ethanol displaces gasoline for other uses. From an energy security standpoint, ethanol decreases our dependence on fossil fuels.

√ What are the Disadvantages of Producing and Using Ethanol in Montana?

Production of Ethanol:

As noted below, Montana's past history in maintaining a viable ethanol production industry has been anything but stellar. Financial institutions are leery of past defaults by Montana ethanol production facilities. The Montana market for ethanol is small and although the ethanol market is increasing in the West, distribution of Montana ethanol has cost hurdles.

Arguments have been made that ethanol does not have a positive energy balance when considering the fuel and energy used to grow, harvest, and process feedstocks.

The literature goes both ways.²⁹ Corn ethanol production for a "typical farming operation" has an energy ratio of 1:24. For every Btu dedicated to corn ethanol production, there is a 24% energy gain. Still other commentators dispute the energy efficiency of ethanol production from a typical farming operation noting the variability in what constitutes a "typical farm".

Use of Ethanol:

Ethanol requires more energy than gasoline to achieve the same power but burns more efficiently. Ethanol is also harder to start burning at lower temperatures and produces higher emissions of unburned aldehydes and alcohols. Testimony before the EQC Energy Policy Subcommittee noted that there are some surmountable technical obstacles for some gas refining and distribution facilities in Montana in terms of ethanol blending and use. Testimony also suggested that ethanol does have water quality problems when ethanol was shipped in bulk quantities by barge over water and ethanol was leaking from tanks. Studies are under way in Canada to investigate the effects of ethanol blends in conjunction with BTEX-MTBE blends that have leaked from underground storage tanks into groundwater.

√ What is the Montana Experience to Date with Ethanol?

Ethanol Production In Montana:

The first ethanol plant in Montana started production in 1980. Currently, there are no ethanol production facilities in operation in Montana. Table 6-1 illustrates the past ethanol producers in Montana.³⁰

Table 6-1. Past Montana Ethanol Producers

FACILITY	PRODUCTION CAPACITY
AE Montana, Manhattan, MT	2.5 million gallons per year
AlcoTech, Ringling, MT	3.5 million gallons per year
Bronec Fuel, Geraldine, MT	1.5 million gallons per year
AgriFuels, Polson, MT	300,000 gallon per year

²⁹ Id. at footnote #28. See also the Journey Forever website page entitled "Is ethanol energy efficient?" at: http://journeytoforever.org/ethanol_energy.html. This website inventories articles that discuss whether ethanol production is energy efficient or not.

³⁰ Howard Haines, Montana Fuel Ethanol Basics, PowerPoint presentation before the EQC Energy Policy Subcommittee, January 2004.

Sage 'n Cedar, Terry, MT	1 million gallons per year
Southwest Alcohol Producers, Dillon, MT	660,000 gallon per year

There are a number of reasons for the demise of ethanol production in Montana, including undercapitalization, poor management decisions, lack of production capacity, variable feedstock sources, and lack of education.

Currently, there are seven proposed ethanol production plants in the works. There are plants proposed for Great Falls, Hardin, Huntley, Miles City, Scobey, Shelby, Kalispell, and Butte. The majority of the media and legislative session focus has been on the proposed plant in Great Falls. Agritech of Great Falls is proposing to construct a 100-million-gallon-per-year facility with a drying capacity for 58 million pounds of wheat gluten and 500,000 tons of distillers grains per year. Agritech has applied for the Montana producer credit and has permits filed and approved by the Department of Environmental Quality for the facility.³¹ Agritech has made recent progress towards final financing.³²

Ethanol Use in Montana:

There are a number of ethanol blends being sold and used in Montana today. The most common blend used in Montana is E-10 (10% blend).³³ E-10 blends are sold in numerous stations across Montana. Over 6,000 vehicles in Montana can use an 85% blend of ethanol, but there are only two stations in Montana that provide this type of blend.³⁴

√ What are Montana's Current Policies Regarding Ethanol?

In 1995, at the request of the Environmental Quality Council, the Montana Legislature enacted an alternative fuels policy statement and implementing guidelines. The policy states that Montana encourages the use of alternative fuels and fuel blends to the extent that doing so produces environmental and economic benefits for the citizens of Montana.

³¹ Id.

³² Id.

³³ See footnote #30.

³⁴ See footnote #30.

Within the alternative fuels policy statement, the Legislature recommends several guidelines for the development of a state alternative fuels policy, including the following:

- (1) the use of self-sufficient markets should be encouraged;
- (2) any state alternative fuels program should have measurable benefits that are communicated to the public;
- (3) state and local governments should be encouraged to set an example with their vehicle fleets in the use of alternative fuels and fuel blends. The state also encourages production of alternative fuels and fuel blends (90-4-1011, MCA).

In addition to the alternative fuels policy statement, state law allows an income tax credit for individuals and businesses of up to a 50% income tax credit for equipment and labor costs of converting vehicles to operate on alternative fuels. The tax credit is limited to \$500 for the conversion of vehicles of 10,000 pounds or less gross vehicle weight and to \$1,000 for vehicles over 10,000 GVW. The credit must be applied in the year the conversion is made, and sellers of an alternative fuel may not receive a credit for converting their own vehicles to operate on the alternative fuel that they sell (15-30-164 and 15-31-137, MCA).

State law also allows for incentives for ethanol blends that will be available for 4 years after an ethanol plant is constructed and begins operating in Montana. These incentives reduce motor fuel taxes to the consumer by 15% (15-70-204 and 15-70-321, MCA, and Chapter 568, L. 2001).

In 1983, Montana instituted an alcohol production incentive program administered by the Department of Transportation (MDT). The program was designed to stimulate alcohol production by using special revenue from the state's highway revenue account. The incentive is a 30-cent-per-gallon credit for each gallon of alcohol produced from 100% Montana feedstocks. The alcohol distributor is only paid for the gallons of alcohol produced. The amount of the tax incentive per gallon is reduced proportionately for non-Montana feedstocks used in the production process. The cap on incentive payments to an individual alcohol distributor is \$3 million in any consecutive 12-month period. The total tax payments for the tax incentive in any consecutive 12-month period may not exceed \$6 million.

A potential alcohol distributor is required to submit an application with a written business plan to the Department at least 24 months before the distributor's anticipated collection of the tax incentives. The applications are taken in the order they were submitted. Information required in the application includes the:

1. source(s) of financing for the acquisition of the plant, land, and equipment used for the production of gasohol;

2. anticipated source of agricultural products used in the production of gasohol;
and
3. anticipated time, quantity, and duration of production of gasohol.

From the date the application is received by the MDT, the potential alcohol distributor is required to adhere to the following timeline to construct or remodel a plant for production:

1. start construction or remodeling of a production facility within 24 months;
2. complete 50% of construction or remodeling within 36 months; and
3. complete 100% of construction or remodeling and be in production of alcohol for use in gasohol for distribution within 48 months.

If the applicant does not adhere to the schedule, the applicant loses its priority for receiving the tax incentive payments. The MDT is required to reserve, in the order that written plans are received, the alcohol tax incentives based on the anticipated time, quantity, and duration of production. A new tax incentive may not be paid if the total tax incentive of \$6 million dollars has been reserved or paid. As Table 6-2 shows (as of July 2004), two applicants have reserved the total tax incentive. The third applicant (Yellowstone Power) is actually a placeholder for Rocky Mountain Ethanol in case the original application expires.

Table 6-2 Tax Incentive Application Status

INFORMATION	ROCKY MT ETHANOL, HARDIN	AGRITECHNOLOGY MT, GREAT FALLS	YELLOWSTONE POWER, HARDIN
Date Plan Received	12/6/2001	5/28/2002	11/19/2002
Projected Payment Date	7/1/2005	11/1/2005	
Revised Production Date	7/1/2005	11/1/2005	7/1/2005
Output: Gallons Per Year	30,000,000	100,000,000	30,000,000
Projected Payment in FY 06	\$3,000,000	\$3,000,000	
Construction Starting Date	4/1/2002	5/28/2004	4/1/2002

% Construction Completed	5%	0%	5%
Statutory Deadlines Start Construction: 50% Completed: 100% Completed:	12/6/2003 12/6/2004 12/6/2005	5/28/2004 5/28/2005 5/28/2006	11/19/2004 11/19/2005 11/19/2006
Air and Water Permits	Have not started	Air quality permit completed and no water quality permit is required	Have not started
Financing Status	Working on it	95% committed	Working on it

The alcohol production tax incentive is statutorily scheduled to sunset in 2010.

√ What are Other State and Federal Policies Regarding Ethanol?

Other State Ethanol Incentive Policies

Ethanol Incentives	States				
	ID	WY	ND	SD	NE
Tax Incentives					
Production Tax Credits	X	X		X	X
Investment Tax Credits	X				X
Sales Tax Reductions				X	
Property Tax Reductions					
Accelerated Depreciation					
Direct Cash Incentives					
Production Incentives			X	X	X
Investment Incentives (Grants)					X
Low-Cost Capital Programs					

Government-Subsidized Loans					
Project Loan Guarantees					
Project Aggregation					
<i>Distributed Resource Policies</i>					
Standard Contracts for Small Distributed Projects					
<i>Customer Choice Opportunities</i>					
Utility-Supplied Renewable Energy Pricing Options					
Alternative Energy Marketing from Retail Sellers					
Aggregated Consumer Purchases					
Fuel Source Disclosure Requirement and Certification					X
<i>Other Policies</i>					
Renewable Portfolio Standard					
Universal System Benefits					

The EQC Energy Policy Subcommittee heard testimony from a representative of the Nebraska Ethanol Board regarding the Nebraska ethanol production incentive process. Nebraska has established a production credit of 20 cents per gallon of ethanol produced, up to an annual limit of 15,625,000 gallons per plant, at new facilities for a period of 96 consecutive months. During the 96-month eligibility period, a new production facility can claim credits on a total of 125 million gallons of ethanol, subject to the annual limit. Credits for ethanol produced at a new facility will be available through June 30, 2012. A new facility must produce a minimum of 100,000 gallons annually to begin receiving production credits and be in production before June 30, 2004. An incentive of 7.5 cents per gallon is available to existing ethanol production facilities that increase capacity. Nebraska also has investment tax incentives that are triggered if certain performance measures such as jobs creation or rural development are met. Over \$220 million in incentives have been paid out in Nebraska for ethanol production. To date, Nebraska has received over \$1.7 billion in new capitol investment for ethanol production.

Nebraska has a unique funding mechanism for its ethanol production tax incentives. Funding of the 20-cent production credit per gallon comes from multiple sources, including general fund, grain check-off money, gas tax, transfers, fertilizer taxes, and interest on investments.

Federal Ethanol Policies

See page 34 for federal biodiesel policies that also apply to ethanol.

Chapter 7: Explanation of State Energy Bonding

The EQC Energy Policy Subcommittee requested that the State Bond Counsel, Mae Nan Ellingson, provide the Subcommittee with an explanation of the state bonding process as it relates to financing energy projects. What follows is a memorandum and an outline that the State Bond Counsel provided to the Subcommittee in response to the Subcommittee's request.

MEMORANDUM

TO: State of Montana
Department of Administration
Legislative Council

FROM: Dorsey & Whitney LLP
Mae Nan Ellingson and Joseph Gonnella

DATE: May 12, 2004

RE: Tax-Exempt Financing of Electric Generating and Transmission Facilities and Power Purchase Contracts

The purpose of this memo is to outline the requirements that would permit the State of Montana through the Board of Examiners or other governmental entities to issue tax-exempt revenue bonds to finance the acquisition or construction of electric generating and transmission facilities or the purchase of electric energy. Of necessity, the following discussion is general and should not be construed as legal advice regarding a specific transaction. We will first discuss generally the requirements imposed by the Internal Revenue Code of 1986, as amended (the "Code") on tax-exempt financings, and then briefly describe their application to financings of electric generating facilities, transmission facilities and the purchase of electric power.

INTRODUCTION

The Montana Legislature in 2001 enacted HB 474 authorizing, among other things, the creation of the Montana Power Authority to purchase electric energy to meet the aggregated load requirements of consumers in Montana. The Power Authority was authorized to purchase, construct and operate electric generation and transmission facilities, either on its own or as part of a joint venture, and to sell electric energy to any distribution services provider in the State. HB 474 further authorized the Board of Examiners to sell revenue bonds of the State in an aggregate principal amount not to exceed \$500 million, the proceeds of which are to be used by the Power Authority to acquire or construct electric energy generation, transmission or distribution facilities, to fund capitalized interest and a debt service reserve fund and to pay costs of issuance. In the 2003 session, similar legislation was introduced and given the current energy situation in Montana and pending initial legislative petitions, it is likely that these issues will arise in the 2005 legislative session.

Assuming that the Legislature has given the State or one of its agencies or political subdivisions authority to issue revenue bonds to finance electric generating and transmission facilities of the State, its agencies or political subdivisions, the question of whether such bonds can be issued and bear interest excludable from gross income for federal income tax purposes arises. And if they can, under what conditions and how those conditions might restrict the security that can be provided to bondholders. (We note that under current Montana law any bonds issued by the State, an agency or political subdivision would in any event bear interest not includable in gross income for State of Montana individual income tax purposes (but would be includable in the computation of income for purposes of the Montana corporate income tax and the Montana corporate license tax).) This memo will also consider whether bonds issued to finance the acquisition of electric energy through the payment of amounts due under a power purchase contract with a wholesale power supplier may be issued on a tax-exempt basis, if such authority is granted by future Legislatures.

Governmental Bonds in General

The Internal Revenue Code of 1986, as amended (the “Code”) treats “private activity bonds” and “governmental bonds” differently. Private activity bonds bear interest excludable from gross income for federal income tax purposes only if they are “qualified bonds” within the meaning of Section 141(e) of the Code (i.e., the facilities or purposes of the bonds that may provide benefit to a nonexempt person are substantially limited) and, additionally, certain other restrictions apply to qualified bonds, such as the need for volume cap, public approval, the limitation on financing issuance costs and arbitrage rebate. Governmental bonds generally are not subject to these additional requirements (although the exception from arbitrage rebate is limited). Clearly, it is advantageous, and, depending on the purpose of the bond issue, it may be necessary, that bonds be governmental bonds rather than private activity bonds in order that they may bear interest excludable from gross income for federal income tax purposes.

Bonds are “*private activity bonds*” under Section 141 of the Code if (i) both the “private business use” test and the “private payment or security test” are met or (ii) the bonds are “private loan bonds.” Generally, the “*private business use*” test is met if more than (i) 10 percent of the proceeds of the bonds or the facilities financed thereby, or (ii) for output facilities, if less, \$15,000,000 per project, are to be used for any private business use. An issue of bonds will meet the private security or payment test if the payment of principal of or interest on the bonds representing more than 10 percent of the proceeds of the issue is (under the terms of the bonds or an underlying arrangement) either, directly or indirectly, (i) to be derived from payments (whether or not to the issuer of the bonds) in respect of property or borrowed money used or to be used for a private business use (the “*private payment test*”) or (ii) secured by any interest in property used or to be used for a private business use or payments in respect of such property (the “*private security test*”). Generally, bonds are “*private loan bonds*” if more than five percent of the proceeds are to be used, directly or indirectly, to make or finance loans to persons or entities other than governmental units.

Bonds issued to finance electric generating or transmission facilities or to purchase electric energy generally must be issued as “governmental bonds,” instead of “private activity bonds,” to bear tax-exempt interest under current law. While a limited exception for qualified bonds issued to finance the local furnishing of electric energy or gas was part of the Code as it was enacted in 1986 (Section 142(f)), that provision was generally terminated by legislation enacted in 1996 for persons not engaged in the local furnishing of electric energy or gas on January 1, 1997. (Section 142(f)(3)) Consequently, it would be critical for the proposed revenue bonds to fail either the private business use test or the private payment or security test and to avoid characterization as private loan bonds, unless the bonds were to be issued as “qualified 501(c)(3) bonds.”

An issuer of governmental bonds must reasonably expect that bonds will not be private activity bonds during the term of the bonds and must not take any deliberate action during the term (such as executing a contract with a nonexempt person) to cause the private activity bond tests to be met. If an adverse deliberate action is proposed during the term, it may be possible for the issuer to take remedial action (such as the redemption of the nonqualifying bonds) to preserve the tax exemption of interest on the bonds.

Qualified 501(c)(3) Bonds

Private activity bonds that are “qualified 501(c)(3) bonds” may be issued on a tax-exempt basis if the facilities financed are owned by a governmental unit or a Section 501(c)(3) tax-exempt organization and the bonds would not be deemed private activity bonds if 501(c)(3) organizations were treated as nonexempt persons with respect to their activities which do not constitute unrelated trades or businesses and the private business use test and the private security or payment test are applied using a limit of 5% of the net proceeds of the issue, instead of 10% of the proceeds. In substance, this requires that substantially all of the users of the facilities be governmental units or 501(c)(3) organizations using the facilities in furtherance of their exempt purposes. An example would be an electric generating facility from which power is sold only to governmental units or colleges, universities, hospitals, nursing homes, etc. which are 501(c)(3) organizations.

PRIVATE ACTIVITY BOND TESTS

Private Business Use Test in General

Generally, as summarized above, the private business use test is met if more than 10 percent of the proceeds of the bonds or the facilities financed thereby are to be used for any private business use. Private business use is any use, direct or indirect, in a trade or business (which is defined to include *any* activity of an entity) carried on by any person or entity (including the federal government) other than a state or local governmental unit (a “nonexempt person”). “In most cases, the private business use test is met only if a [nonexempt] person has special legal entitlements to use the financed property under an arrangement with the issuer. In general, a [nonexempt] person is treated as a private business user of proceeds and the financed

property as a result of ownership; actual or beneficial use of property pursuant to a lease; or a management or incentive payment contract; or certain other arrangements such as a take or pay or other output-type contract.” (Regulations, Section 1.141-3(b)(1)) It is noteworthy that a contract to provide for the operation of public utility property (which includes regulated electric energy facilities), if the only compensation is the reimbursement of actual and direct expenses of and reasonable administrative overhead expenses of the service provider, generally does not give rise to private business use. (Regulations, Section 1.141-3(b)(4)(iii)(C)) Moreover, use of financed facilities by a nonexempt person acting solely as an agent of a governmental unit is not private business use. (Regulations, Section 1.141-3(d)(1))

Business related use of bond-financed facilities by a nonexempt person will not give rise to private business use so long as the facilities are used by that person on the same basis as the general public. Use of financed property by nonexempt persons in their trades or businesses is treated as general public use only if the property is intended to be available and in fact is reasonably available for use on the same basis by natural persons not engaged in a trade or business. (Regulations, Section 1.141-3(c)(1)) Nevertheless, if the facility financed is not reasonably available for use on the same basis by natural persons not engaged in a trade or business (such as transmission lines), and the facilities are used only by a few entities in their trades or businesses, private business use may result. (Regulations, Section 1.141-3(f), Ex. 8(ii)) Certain exceptions are provided for short-term use of bond-financed facilities (e.g., monthly contracts for a public parking ramp), and an additional exception applies to output facilities, as discussed below.

In general, the amount of private business use is determined according to the average percentage of private business use of the facilities during the term of the bonds, based on the averages of the percentages of private business use during one-year periods. The average is based on actual private business use and governmental use; nonuse is not taken into account as governmental use. Specific rules are provided for governmental and business uses of a facility at different times or concurrently.

Private Payment or Security Tests in General

Generally, an issue of bonds will meet the private security or payment test if the payment of debt service on the bonds representing more than 10 percent of the proceeds of the issue is (under the terms of the bonds or an underlying arrangement) either, directly or indirectly, (i) secured by any interest in property used or to be used for a private business use or payments in respect of such property (the private security test) or (ii) to be derived from payments (whether or not made to the issuer of the bonds) in respect of property or borrowed money used or to be used for a private business use (the private payment test).

Both direct and indirect payments made by a nonexempt person that is treated as using the proceeds of the bonds are taken into account as private payments to the extent allocable to the proceeds used by that person, whether or not they bear any relationship to the debt service payable on the bonds. Thus, both the extent of use of the bond-financed property and the

reasonable allocation of payments in respect of other property or to equity may reduce the amount of payments that must be taken into account under the private payment test. For example, if a nonexempt person uses 7% of the proceeds of the issue, payments by that person are taken into account only to the extent that the present value of those payments does not exceed the present value of 7% of the debt service on the bonds. Payments may also be reduced by portions of the payments properly allocable to the payment of ordinary and necessary expenses of operation and maintenance of the facility. To be taken into account, payments generally do not have to be made to the issuer or a related party. Also, generally applicable taxes used to secure or pay debt service on bonds are not treated as payments for purposes of the private security or payment test. However, the pledge by an issuer of its full faith and credit to payment of bonds does not, in itself, except bonds from the private security or payment test.

In determining whether a bond issue meets the private security or payment test, the present value of the payments or the property taken into account is compared to the present value of the debt service to be paid over the term of the bonds. In calculating present value, the yield of the bond issue as computed under Section 148 of the Code and applicable Regulations is used as the discount rate. If the sum of the present value of the payments taken into account under the private payment test and the present value of the property taken into account under the private security test exceeds 10% of the present value of the debt service on the bonds, then the private security or payment test has been met.

Property used for a private business use and payments in respect of that property are treated as private security if any interest in that property or payment secures the payment of debt service on the bonds. The property securing the bonds need not be financed with proceeds of the bonds. Payments made by anyone with respect to property subject to private business use, even by members of the general public, qualify if such payments secure debt service.

The private payment or security test may not represent a significant independent test, since where the private business use test is met, generally all payments made by such business users must be taken into account under the private payment test and will often be sufficient in themselves to exceed the permissible threshold.

Special Rules for Output Facilities

The Code and the Regulations reissued January 18, 2001 provide special rules for determining the applicability of the private activity bond tests to “output facilities,” such as electric generating, transmission and distribution facilities. The following is a brief summary of some of the special rules.

Acquisition of Existing Property from Nonexempt Person. Section 141(d) of the Code provides that if the lesser of 5% of the proceeds or \$5,000,000 of a bond issue is used by a governmental unit to acquire output property (including electric generating and transmission facilities) owned by a nonexempt person, such bonds will be private activity bonds, unless more

than 95% of the output of the facility will be used in the “qualified service area” of the governmental unit acquiring the facility. “Qualified service area” means any area throughout which the unit provided at all times for the ten years previous to the acquisition output of the same time.

Measurement of Available Output. The available output of a generating facility is determined by reference to its nameplate capacity, which is not reduced by reserves, maintenance or other unutilized capacity, unless the issuer reasonably expects that private business users will purchase more than 20% of the actual output of the facility, in which case, the Commissioner of Internal Revenue may measure available output on a different basis, such as the average expected annual output of the facility.

General Rule. The purchase by a nonexempt person of available output of an output facility is taken into account under the private business tests if the purchase has the effect of transferring substantial benefits of owning the facility and substantial burdens of paying debt service on bonds issued to finance the facility, so as to constitute indirect use by such persons of more than 5% of the proceeds of the bonds. The benefits and burdens test is met: (1) if the output contract gives the purchaser rights to capacity of the facility on a basis that is preferential to the rights of the general public and the issuer reasonably expects that it is substantially certain that payments will be made under the contract (disregarding default, insolvency or other similar circumstances) or the contract is pledged as material security for the bonds; (2) if a nonexempt person agrees pursuant to a *take contract* (a contract under which the purchaser agrees to pay for output if the facility is capable of providing the output) or a *take or pay contract* (a contract under which the purchaser agrees to pay for output, whether or not the facility is capable of providing the output) to purchase available output from the facility; or (3) for wholesale *requirements contracts* (the nonexempt purchaser agrees to purchase all or a part of its output requirements from the facility) unless it is not “substantially certain” that the purchaser will pay for the purchased electricity. If an output contract results in private business use, the amount of private business use generally is the amount of output purchased under the contract.

The benefits and burdens test is not the exclusive means by which output facilities may become private activity bonds; direct use of the facility, such as a lease, may satisfy the private activity bond tests as well.

Whether output sold under a contract is allocated to a particular facility, to the entire system of the seller or to a portion of a facility is based on all the facts and circumstances. In general, output is allocated to a facility only to the extent that it is physically possible for the facility to deliver such output.

Certain Exceptions. The Regulations recognize that certain contracts or arrangements do not result in private business use and are not taken into account under the private business use tests. Such contracts or arrangements include: (1) an output contract the term of which (including renewal options) is not longer than one year, the contract is a negotiated, arms-length arrangement at fair market value or is based on generally applicable and uniformly applied rates

and the facility is not financed for a principal purpose of providing output to the purchaser under the contract; (2) small output contracts (the average annual payments thereunder must be less than 1% of average annual debt service); and (3) certain swapping or pooling arrangements entered into to permit the parties to satisfy different peak load demands, accommodate temporary outages or to enhance reliability in accordance with prudent reliability standards.

The Regulations also provide certain exemptions for existing transmission facilities to permit mandated wheeling and mandated open access without resulting in impermissible private business use. Unfortunately, those exemptions apply only to existing transmission facilities financed originally before February 23, 1998, and not to new transmission facilities.

Special Rules for Output Facilities Used to Provide Open Access

Operation of Transmission Facilities by Nongovernmental Persons. The operation of an electric transmission facility by a nongovernmental person may result in private business use of the facility based on all the facts and circumstances. E.g., a nongovernmental operator who is compensated for transmission services, in whole or in part, based on a share of net profits from the operation of the facility will be considered a private business user of such facility.

Independent Transmission Operators. A contract for the operation of an electric transmission facility by an independent entity, such as a regional transmission organization (RTO) or an independent system operator (ISO) (an “independent transmission operator”) does not constitute private business use if: (i) the facility is governmentally owned; (ii) the operation of the facility by the RTO or the ISO is approved by the FERC under one or more provisions of the Federal Power Act or by a state authority under comparable provisions of state law; (iii) no portion of the compensation of the RTO or the ISO is based on a share of net profits from the operation of the facility; and (iv) the independent transmission operator does not bear risk of loss of the facility.

Use by Nongovernmental Persons under Certain Output Contracts.

Transmission Facilities. The use of an electric transmission facility by a nongovernmental person pursuant to an output contract does not constitute private business use of the facility if: (A) the facility is governmentally owned; (B) the facility is operated by an independent transmission operator in a manner approved by FERC or a state authority; and (C) the facility is not financed for a principal purpose of providing that facility for use by that nongovernmental person.

Distribution Facilities. The use of an electric distribution facility by a nongovernmental person pursuant to an output contract does not constitute private business use of the facility if: (A) the facility is owned by a governmental person; (B) the facility is available for use on a nondiscriminatory open access basis by buyers and sellers of electricity in accordance with rates that are generally applicable and uniformly applied, which includes situations in which different rates apply to different classes of users, such as volume purchasers, if the differences in rates are customary and reasonable or specifically negotiated rate arrangement is entered into, but only if

the user is prohibited by federal law from paying the generally applicable rates and the rates established are as comparable as reasonably possible to the generally applicable rules; (C) the facility is not financed for a principal purpose of providing the facility for use by that nongovernmental person (other than a retail end-user).

GENERATING FACILITIES

The construction of new generating facilities may be financed on a tax-exempt basis if the bonds are government bonds or qualified 501(c)(3) bonds. The acquisition of existing generating facilities may be financed with qualified 501(c)(3) bonds or, if acquired from a governmental unit, with governmental bonds. An issuer may be an owner of an undivided interest in an electric generating facility jointly with private parties and finance its pro rata share of costs of the facility with tax-exempt bonds, subjecting its allocable share of ownership and output of the facility to the private activity bond tests.

The private activity bond tests would entail that for governmental bonds the generating facility be owned and operated by a governmental unit (although management of the facility could be contracted to a private party if certain safe-harbor guidelines are observed), and substantially all of the output of the facility be sold to other governmental units (either for their own needs or for their retail customers) or to members of the general public. Thus, a generating facility cannot be constructed and then leased or sold to a private utility and financed on a tax-exempt basis. Similarly, a significant portion of the output of a generating facility financed with tax-exempt bonds cannot be sold to a private utility for resale to other electric customers. Generally, the issuer must have contracts or other arrangements with retail electric customers (such as the power to impose rates on those located within its service area) in order to be treated as selling output to members of the general public for tax purposes.

(On this point, California's recent financing is instructive. The California Department of Water Resources issued \$13.4 billion in revenue bonds to finance the purchase of electric energy (in part to reimburse the State's general fund for approximately \$7 billion it advanced during the last fiscal year and payment of a similar amount for the current fiscal year). The Department historically has not provided electric service. The power purchased by the Department was to be sold to retail end use customers and to municipal utilities and the Department was authorized to contract with, or request the Public Utilities Commission to order, private utilities to transmit and distribute such power and, as agent of the Department, to provide billing, collection and other related services at reasonable compensation and adequately secure payment to the Department. Upon delivery of power, the retail end use customers are deemed by statute to have purchased the power from the Department. The Department is authorized to charge rates sufficient, subject to certain limitations, to pay the bonds, to pay for power that is purchased, to fund necessary reserves and to pay administrative costs, so as to provide necessary security for purchasers of the bonds.)

As mentioned above, qualified 501(c)(3) bonds may be issued to finance the acquisition or construction of generating facilities. Substantially all of the output would have to be sold to

governmental units, Section 501(c)(3) tax-exempt organizations for use in furtherance of their exempt purposes or members of the public.

TRANSMISSION FACILITIES

Under current law, the ability to finance the construction of transmission facilities is limited. The Regulations provide relief for federal- or state-mandated open access requirements only for existing transmission lines for which bonds are outstanding (although the Service has requested comment on this portion of the Regulations). New transmission facilities are subject to the private business use rules. Thus, no special rules apply to permit either open access participation or mandated wheeling to the extent reasonably expected by the issuer on the date of issuance of the bonds. As a result, it is likely that at least a portion of the construction costs of transmission facilities must be financed on a taxable basis. New transmission facilities financed on a tax-exempt basis may not be used by private parties for periods longer than one year without giving rise to private business use unless such use was not reasonably expected at the time the bonds were issued. Such restrictions obviously limit the ability of the issuer to provide security for holders of bonds issued to finance such facilities.

POWER PURCHASE CONTRACTS

While there is no explicit legal authority in Montana for the Power Authority to issue bonds to finance the acquisition of electric energy through the payment of amounts due under a power purchase contract, we will briefly discuss the tax-exempt financing restrictions applicable to such financings.

Generally, there are substantial restrictions imposed under the Code on tax-exempt financings of working capital, as opposed to capital expenditures, such as capital costs of generating or transmission facilities. Complex and technical arbitrage rules govern the expenditure of bond proceeds for working capital (bond proceeds are generally deemed spent last after all other “available amounts”) and the deemed creation of “replacement proceeds” of a bond issue and substantially impair the ability of an issuer to finance working capital expenditures with tax-exempt bonds on a long-term basis..

In general, tax-exempt financing would be available to finance purchases of electric energy for purchases within the next year or to reimburse the issuer for recent purchases, but generally not for a longer term.

In addition, all of the private activity tests described above would be applicable to the sale and distribution of power purchased on a tax-exempt basis. For example, the power could not simply be sold to a utility for resale to retail customers.

CONCLUSION

We have attempted to describe briefly the limitations imposed by the Code on tax-exempt bonds issued to finance electric generating and transmission facilities as well as the purchase of electric energy. As we trust you recognize, these limitations substantially restrict the ability of the State, the Power Authority, and other governmental utilities to finance such facilities or purchases and involve private utilities as direct purchasers or users of such output facilities. We should emphasize that these limitations apply only if the financing is to be done on a tax-exempt basis for federal income tax purposes, and that these limitations are subject to legislative or administrative change as the restructuring of the electric industry develops.

Despite the length of this Memorandum, we recognize that we have discussed only summarily these intricate limitations. Thus, we would be happy to respond to any questions you may have or requests for a more specific analysis in light of a particular proposal. Please do not hesitate to call any of us if you have any questions or concerns about these issues.

The foregoing discussion has been based, of course, on the state of existing law. As we have mentioned, legislation is currently pending in Congress that directly affects these issues. In addition, the existing regulations promulgated by the Department of Treasury are temporary (they expire in three years) and were promulgated on a temporary basis because of the continuing and substantial changes in the electric power industry. Any changes in the law or regulations or issuance of other authority by the Internal Revenue Service could affect the conclusions reached in this Memorandum.

**OVERVIEW OF TYPES OF
DEBT THAT MAY BE ISSUED BY THE
STATE OF MONTANA AND ITS AGENCIES
May 12, 2004**

I. State Debt - State Law Issues.

A. Historical Overview.

1. 1889 Constitution, Article XIII, Section 2. The legislature shall not create any "debt or liability" which with other outstanding indebtedness exceeds \$100,000 without approval by a majority of those voting at a general election.
2. Outgrowth of this provision is the indebtedness described below. In a series of cases, the Board has construed what constitutes "debt or liability." Barbour v. Board of Education, 1932. Bonds were issued to construct residence halls at State University at Missoula and School of Mines in Butte, payable from "net revenues" of operation. Was not authorized by voters and exceeded \$100,000. Court held did not violate constitution. State v. Board of Examiners, 1934. "If bonds are payable from a 'special fund' they do not create debt. Since income or revenue and not taxes was pledged, no debt was created. Result of cases generally was if not payable from ad valorem property tax or a pledge of full faith and credit it was not a "debt or liability."
3. In State ex rel Diedrichs v. State Highway Commission, the Supreme Court questioned the validity of the special fund doctrine where a tax of any kind is pledged to the payment of the debt. In State ex rel Ward v. Anderson (1971), the Court went further and indicated that a pledge of any of the State's constitutional tax sources created a debt or liability under the 1889 Constitution requiring voter approval.
4. Constitutional Requirement, Article VIII. Section 8 1972 Constitution. No State debt shall be created unless authorized by a two-thirds vote of the members of each house of the legislature or a majority of the electors voting thereon.

B. Types of Debt.

1. General Obligation Bonds (Title 17, Chapter 5 Part 8). General obligation bonds (G.O. Bonds) are issued upon legislative authorization by the Board of Examiners for specified projects or programs in specified amounts. General obligation bonds constitute a pledge of the full faith and credit of the State, and the State, in issuing them, covenants to levy taxes through the life of the Bonds in amounts necessary to pay the principal and interest thereon. G. O. Bonds can be issued for any purpose authorized by the legislature. They have typically been used for

the State's long-range building program, some water development projects; the renewable resource program; the energy conservation program; information technology or other projects for which no other specific revenue source is available for adequate payment, or where there may be a source of revenue available, but lower interest rate will be achieved if issued as general obligation. (The State's Revolving Loan Program and Renewable Resource Loan Program are good examples of this approach).

G. O. Bonds may be sold at a competitive sale or a negotiated sale as determined appropriate by the Board.

2. Special or Limited Tax Obligation Bonds. The legislature may create and impose special or limited taxes, fees and charges and authorize the issuance of one or more series of bonds secured by that tax or revenue source for a project, multiple projects or a program. The tax or charge that is pledged may be limited as to both rate and amount. Since bond holder ultimately takes the risk as to adequacy of tax or the charge, the bond authorizing documents will contain provisions limiting the ability to issue additional bonds secured by that tax or revenue and other covenants relative to security. Generally, the State would reserve the right to issue additional parity bonds (those payable on an equal basis to first bonds), subordinate bonds (payable from taxes remaining after payment of first bonds) or on conditional bonds. These limitations generally take the form of an additional bonds test. Under such authorizing legislation, the State would agree to continue to impose and collect the tax or charge until the outstanding bonds were paid.

- a. Coal Severance Tax Bonds. Title 17, Chapter 5, Part 7. Coal Severance Tax Bonds are issued by the Board of Examiners upon authorization by the legislature. Coal Severance Tax Bonds are secured by the coal tax trust receipts deposited annually in the coal severance tax bond fund, and do not constitute a general obligation secured by the State's full faith and credit.

Thus far, coal severance tax bonds have been issued only to finance the State's Water Development Program (which program was consolidated with the Renewable Resource Program in 1993), although the coal severance tax bonds may be issued for any purpose authorized by the legislature. The coal severance tax renewable resource program bonds are also payable from loan repayments made by local governments. There are currently outstanding \$52,911,282 in bonds, which amount represents 11 separate issues. Montana Code Annotated Sections 85-1-601 through 85-1-631, as amended, presently permits the issuance of no more than \$250,000,000 in aggregate principal amount of coal severance tax bonds. The 2003 legislature authorized the issuance of up to \$10,162,991 of coal severance tax bonds, in addition to the outstanding bonds, for the Coal Severance Tax

Renewable Resource Program.

- b. Highway Revenue Bonds. Title 17, Chapter 5, Part 9, M.C.A. Highway Revenue Bonds are issued by the Board of Examiners upon authorization by the legislature, secured and payable from “highway revenues” as defined in Article VIII, section 6 of the Constitution and any other revenues, taxes or receipts received by the highway department. There is currently \$150,000,000 of Highway Revenue Bonds authorized by the legislature.
3. Revenue Bonds. Revenue bonds are payable from and secured by a specific stream of revenues, other than taxes, and may include revenues of a particular program or project. This type of financing constitutes a significant portion of public finance for both the state and local governments. On a local level, sewer and water systems are financed by revenue bonds. These bonds are generally not considered “debt.” Public utilities have generally been financed through the use of revenue bonds and legislation has been introduced during the last two sessions that would allow the State to issue up to \$500 million of revenue bonds to acquire electrical generating facilities. Various state agencies and boards issue “revenue” bonds that are secured by program revenues which are primarily loan repayments from borrowers to whom loans have been made.
- a. University System Facility Revenue Bonds The university system finances college dormitories, student union buildings and other revenue producing facilities through the issuance of facility revenue bonds. These bonds are issued by the Board of Regents pursuant to Title 20, Chapter 25, Part 402, M.C.A. Revenue producing facilities at each unit of the university system may be considered as one, but the income derived at one unit cannot be used to discharge obligations for facilities at another. These bonds are not a debt or liability of the State. Recently, revenue bonds have been issued by the Regents to finance additions to classroom facilities, and research facilities payable from federal grants.
 - b. Mortgage Revenue Bonds. These bonds are issued by the State Board of Housing pursuant to Title 90, Chapter 6, Part 1 to finance acquisition of single family houses. These are obligations do not create a debt or liability of the State, but are an obligation of the State Board of Housing only, payable from program revenues.
 - c. Health Facility Revenue Bonds. These bonds are issued by the Health Facility Authority pursuant to Title 90, Chapter 7, Part 1. Proceeds of bonds are used to make loans to eligible health care facilities, which may be operated by not-for-profit corporations or publicly owned. The legislature has authorized the Authority to

issue up to \$150,000,000 of bonds. The bonds are not a debt or liability of the State.

- d. Student Loan Revenue Bonds. These bonds are issued by the Montana Higher Education Student Assistance Corporation (MHESAC), a non-profit corporation designated by the Board of Regents to operate the State's student loan program pursuant to Title 20, Chapter 26, Part 11, M.C.A. The bonds are not a debt or liability of the State but are payable from the student loan repayments. The Board of Regents is authorized to guarantee the students loans from federal payments receives for that purpose.
- e. Economic Development Revenue Bonds. Economic development revenue bonds or IDB's, as they have come to be known, are issued by the Board of Investments pursuant to Title 17, Chapter 5, Part 15, M.C.A. (the Economic Development Bond Act), to finance commercial, industrial, manufacturing, agricultural, hydroelectrical and other types of economic development projects. The definition of eligible Projects under the Act has been amended recently to include "any land; any building or other improvement; and any other real or personal properties considered necessary in connection with the improvement, whether or not now in existence, that must be suitable for use for commercial, manufacturing, agricultural, or industrial enterprises; recreation or tourist facilities; local, state, and federal governmental facilities; multifamily housing, hospitals, long-term care facilities, community-based facilities for individuals who are persons with developmental disabilities as defined in 53-20-102, or medical facilities; higher education facilities; electric energy generation facilities; family services provider facilities; the production of energy using an alternative renewable energy source as defined in 15-6-225; and any combination of these projects". Cities and counties may also issue the same types of bonds, and in issuing these bonds, the Board of Investment may act as a conduit financier in the same way a city or county would. The Federal Tax Code has significantly limited the ability of the State and local governments to pass on its tax-exemption to most private activity bonds, although bonds can still be exempt for state income tax purposes. Bonds issued under the Economic Development Bond Act are not obligations or debt of the State.

"Moral obligations". Under the Housing Act, the Economic Development Bond Act and the Health Facility Authority Act, the legislature while providing that bonds issued under those Acts do not constitute a debt or liability of the State nor a pledge of the faith and credit of the State, authorized the governor to place in his or her budget the amounts necessary to restore any deficiency, and request the legislature to appropriate moneys from

the State's general fund to restore deficiencies in the respective reserve accounts created for the bond issues. This type of legislation has come to be known as moral make up clause or a moral obligation clause. The Montana Supreme Court, Huber v. Groff, 171 Mont. 442, 558 P.2d 424 (1976), a test case validating the Housing Act bonds upon the moral mark-up provisions and determined that the "moral obligation" of the Legislature to appropriate funds was an unenforceable pledge, purely permissive in nature and non-binding and therefore not a debt subject to the 2/3 legislative approval. The Housing Bonds have not been structured as moral obligation bonds, although authorized to be. Several issues of Health Facility Authority bonds have been issued as moral obligations.

- f. Municipal Finance Consolidation Act Program Bonds. The Board of Investments has authorized the issuance of bonds under three separate bond programs to initially purchase obligations of local governments and now the programs extend to State agencies and the State. Like the other revenue bonds, the credit of the State is not pledged for the payment of the bonds. The source of payment is the repayments the loans made from bond proceeds. While the bonds themselves are not debt of the State, the underlying loans may be "debt" of the State or local borrowing entity. The Board cannot have outstanding at any one time more than \$120,000,000 of its bonds, excluding refundings or bonds to purchase tax and revenue anticipation notes.
4. Double-Barreled Bonds. Some of the bonds discussed above are secured and payable from both revenues and taxes. Nature of pledge can significantly differ between issues. Reasons to combine - revenues may be inadequate, pledging tax secures a better interest rate, disclosure difficulties, etc.
5. Tax and Revenue Anticipation Notes. The notes are authorized to be sold by the Board of Examiners, pursuant to Title 17, Chapter 1, Part 2, M.C.A., upon request of Department of Administration, in anticipation of receipt of taxes and revenues, as necessary to meet the monthly cash flow requirements of the State. These notes are secured by the full faith and credit of the State. The amount of notes cannot exceed the amounts appropriated under the budget for state law purposes and for federal law purposes cannot exceed the maximum cumulative cash flow deficit. Principal and interest on the notes must be paid from taxes and revenues not later than the end of the fiscal year in which notes are issued.
6. Bond Anticipation Notes. Bond anticipation notes or "BANS" may be issued by any of the issuers of the bonds described above prior to and in anticipation of selling bonds. Reasons to issue Bans as opposed to the

bond: uncertainty of markets, interim construction funding, want to defer issuance of bonds.

7. Refunding Bonds. Generally speaking, bonds may be issued to refund outstanding bonds, subject to restrictions in the Code. This is generally done in order to take advantage of lower interest rates or get out from under bond covenants that may be excessively restrictive.

II. Federal Tax Implications for State of Montana Bonds.

- A. In order for bonds issued by the State to be exempt from federal income tax, as well as state income tax, the bonds must comply with provisions of the 1986 Internal Revenue Code (the Code).
 1. Section 103 of the Code excludes from definition of gross income interest on any state or local bond, except:
 - a. any private activity bond which is not a qualified bond within the meaning of Section 141;
 - b. any arbitrage bond within the meaning of Section 148; and
 - c. any bond not in registered form.The restrictions, limitations and regulations enacted to implement this section are numerous, complicated and technical. This outline will discuss the most critical requirements in a fairly summary fashion. We will provide any additional materials or information required.
 2. Procedural Requirements.
 - a. Registration Section 149(a)1. The requirement that tax exempt bonds be issued in registered form has been upheld by the United States Supreme Court in South Carolina v. Baker (1988). Various States have argued the registration requirement was constitutionally invalid under (i) the Tenth Amendment and principles of federalism, and (ii) the doctrine of intergovernmental tax immunity.
 - b. Federal Guarantee Prohibition Section 149(b)1. Bonds cannot be federally guaranteed if interest is to be tax exempt. There are specific exceptions for guarantees of FHA, VA, Fannie Mae, etc.
 - c. Information Reporting Requirement Section 149(e)1. The issuer must file with the Internal Revenue Service an informational return for each issue of tax exempt bonds.
 3. Arbitrage.

- a. Section 103(b)(2) of the Code provides that interest on any bond which is an arbitrage bond within the meaning of Section 148 is not tax exempt under Section 103(a) of the Code; and
- b. Concept of Arbitrage. The disparity between taxable and tax exempt interest rates have enabled issuers of tax exempt bonds to invest proceeds of the exempt bonds in higher yielding taxable obligations and profit from the differential. This transaction and variations of it are reasons for Section 148 and the arbitrage regulations.
 - i. Prior to 1986, the Code and arbitrage regulations have generally attempted to balance between:
 - (a) preventing the issuance of bonds primarily in anticipation of realizing an “arbitrage” spread, while at the same time;
 - (b) not interfering with traditional financing practices of state and local government.

That was done in three major ways:

- (1) if issuer could reasonably expect at the time bonds were issued, that proceeds would not be invested at a materially higher yield than bonds, the arbitrage analysis came to an end;
 - (2) in the event some or all of the bond proceeds are expected to be invested in materially higher yields, “temporary period rules” allow the investment of proceeds for a temporary period (usually 1 year) if it was “reasonably expected” that bond proceeds would be expended within 3 years following the bonds, there would not be arbitrage restrictions on investment of funds; and
 - (3) issuers were permitted to invest up to 15% of their bond proceeds at whatever yield is available, without respect to a temporary period either as part of “reasonably required reserve” or “replacement fund,” or simply representing the “minor portion.”
- ii. Generally speaking, the arbitrage rules are designed to prevent over issuance of bonds and early issuance of bonds.

iii. Analysis of arbitrage generally requires you to focus on:

- (a) amount of bonds to be issued;
- (b) size of reserve (should minimize);
- (c) when will money be spent.

c. Arbitrage Rebate. Unless a bond issue meets a specific arbitrage rebate exception, the issuer must rebate to the Federal Government any arbitrage profit earned on the proceeds of the bonds. Those exceptions are:

- i. Substantially all (not less than 95%) of the proceeds of the Bond (except for amounts to be applied to the payment of costs of issuance) will be used for local governmental activities of the borrower;
- ii. The aggregate face amount of all "tax-exempt bonds" (including warrants, contracts, leases and other indebtedness, but excluding private activity bonds) issued by or on behalf of a borrower and all subordinate entities thereof during [2004] is reasonably expected not to exceed \$5,000,000.
- iii. If notwithstanding the provisions listed above, the arbitrage rebate provisions of Section 148(f) of the Code apply to the Bond, the borrower will covenant and agree to make the determinations, retain records and rebate to the United States the amounts at the times and in the manner required by said Section 148(f).

B. Governmental and Private Activity Bonds.

1. Private Activity Bond.

a. Section 141 divides state and local bonds into two categories: governmental use bonds and private use bonds. A bond is a private activity bond if it meets one of two separate tests.

i. Private Use Test:

- (a) business use test - more than 5% of proceeds of issue are used for any private business use;
- (b) private security or payment test payment of principal or interest or more than 5% of the proceeds of the issue is directly or indirectly secured by an interest in property used for a private

business, or payments in respect of such property,
or derived from payments in respect of property.

- ii. Private Loan Financing Test: if proceeds of the issue are used directly or indirectly to make or finance loans to persons other than governmental units which exceed the lesser of 5% of such proceeds, or \$5,000,000.
- b. Qualified Private Activity Bonds may be issued as tax exempt bonds, assuming compliance with provisions of the Code for the following purposes:
 - i. exempt facility bond,
 - ii. qualified mortgage bond,
 - iii. a qualified veteran's mortgage bond,
 - iv. qualified small issue bond,
 - v. qualified student loan bond,
 - vi. qualified redevelopment bond, or
 - vii. qualified 501(c)(3) bond.
- c. Exempt facility bonds may be issued for the following purposes, if the facility serves the public or is available to the public on a regular basis:
 - i. airports;
 - ii. docks and wharves;
 - iii. mass commuting facilities;
 - iv. facilities for furnishing of water;
 - v. sewage facilities;
 - vi. solid waste disposal facilities;
 - vii. qualified residential rental projects;
 - viii. facilities for the local furnishing of electrical, gas or energy;
 - ix. local district heating or cooling facilities;
 - x. qualified hazardous waste facilities;

- xi. high-speed inner city rail facilities;
- xii. environmental enhancements of hydroelectric generating facilities; and
- xiii. qualified educational facilities.

2. Volume Cap.

- a. All private activity bonds, except qualified 501(c)(3) bonds, whether issued by the state or local governments are subject to state volume cap.
- b. State's cap for 2004 is greater of an amount equal to the lesser of \$225 million or \$75 multiplied by the state's population, with an adjustment each year for cost of living. The department of administration administers the allocation pursuant to Title 17, Chapter 5, Part 13, M.C.A. (the Allocation Act).
- c. The state's volume cap is allocated among issuers in the Allocation Act, with 70% set aside for state issuers and 30% for local government issuers.
- d. The state's share is allocated as follows:

Board of Examiners	4%
Montana Board of Housing	41%
Board of Investments	25%
MHESAC	26%
Health Facility Authority	4%
- e. After the first Monday of September in each year, allocations become available for redistribution to other agencies, if not used;

3. Other limitations on Private activity bonds:

- a. average maturity cannot exceed 120% of average reasonably expected economic life of facilities financed with bonds;
- b. the bond would not be a qualified activity bond if held by a substantial user of the facility;
- c. limitations on use of proceeds, restrictions on acquiring land and

existing property;

- d. public hearing approval; and
- e. limitations on costs of issuance (2% of bond proceeds).

- 4. Restriction on Acquiring Existing Output Property. Section 141(d) of the Code defines a private activity bond to include any bond issued as part of an issue if the lesser of 5% or \$5,000,000 of the proceeds are used by the governmental entity to acquire non-governmental output property.

Nongovernmental output property is defined as any property (or interest therein) which before such acquisition was used by a person other than a governmental unit in connection with an "output" facility.

Nongovernmental output property does not include property which is used in connection with an output facility 95% or more of which is consumed in a qualified service area of the governmental unit acquiring the property or a qualified annexed area of such unit.

Output facilities is a term used to describe electric generating, transmission and distribution facilities.

Chapter 8: EQC Draft Recommendations

The EQC at its July 2004 meeting made the following *draft* recommendations:

1. That the EQC request a bill draft to be submitted to the 2005 Legislature to clarify that the alternative renewable energy resource projects are eligible for renewable resource grant and loans. (See LC0210 in Appendix A.)
2. That the EQC request a bill draft to be submitted to the 2005 Legislature that raises the loan eligibility amount for alternative energy systems from \$10,000 to \$40,000 for small businesses, individuals, and nonprofit entities and that clarifies the administrative costs that can be charged for processing loans. (See LC0209 in Appendix A.)
3. That the EQC request a bill draft to be submitted to the 2005 Legislature that clarifies that an applicant that is proposing to build an ethanol production facility may not concurrently submit more than one written plan for the same production facility location. (See LC0208 in Appendix A.)
4. That EQC staff, working with the State Bond Counsel, develop a two-page brochure that explains state debt and bonding.
5. That the EQC and Department of Environmental Quality Council staff update the publications *The Electricity Law Handbook: A Montanan's Guide to Understanding Electricity Law (2002)* and *Understanding Electricity in Montana (2002)* prior to September 2004.
6. That the State of Montana support funding for instate research and development of hydrogen as an energy source.

Appendix A. Draft Legislation

LC 0210:

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

A Bill for an Act entitled: "An Act clarifying that alternative renewable energy projects are eligible for renewable resource and grant loans; amending section 85-1-602, MCA; and providing an immediate effective date."

Be it enacted by the Legislature of the State of Montana:

Section 1. Section 85-1-602, MCA, is amended to read:

"85-1-602. Objectives. (1) The department shall administer a renewable resource grant and loan program to enhance Montana's renewable resources through projects that measurably conserve, develop, manage, or preserve resources. Either grants or loans may be provided to fund the following:

(a) feasibility, design, research, and resource assessment studies;

(b) preparation of construction, rehabilitation, or production plans; and

(c) construction, rehabilitation, production, education, or other implementation efforts.

(2) Projects that may enhance renewable resources in Montana include but are not limited to:

(a) development of natural resource-based recreation;

(b) development of offstream and tributary storage;

(c) improvement of water use efficiency, including development of new, efficient water systems, rehabilitation of older, less efficient water systems, and acquisition and installation of measuring devices required under 85-2-113; and development of state, tribal, and federal water projects;

(d) water-related projects that improve water quality, including livestock containment facility projects; ~~and~~

(e) advancement of farming practices that reduce agricultural chemical use; and

(f) projects that facilitate the use of alternative renewable energy sources as defined in 15-6-225.

(3) The renewable resource grant and loan program is the key implementation portion of the state water plan and must be administered to encourage grant and loan applications for projects designed to accomplish the objectives of the plan."

{Internal References to 85-1-602: None.}

NEW SECTION. **Section 2.** {standard} **Effective date.** [This act] is effective on passage and approval.

LC0209:

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

A Bill for an Act entitled: "An Act increasing the loan eligibility amount for alternative energy systems for small businesses, individuals, and nonprofit entities; allowing nonprofit entities to be eligible for alternative energy system loans, allowing energy conservation projects to be eligible for alternative energy system loans; clarifying administrative costs for loans; amending sections 75-25-101, and 75-25-102, MCA; and providing an immediate effective date."

Be it enacted by the Legislature of the State of Montana:

Section 1. Section 75-25-101, MCA, is amended to read:

"75-25-101. Alternative energy revolving loan account. (1) There is a special revenue account called the alternative energy revolving loan account to the credit of the department of environmental quality.

(2) The alternative energy revolving loan account consists of money deposited into the account from air quality penalties from 75-2-401 and 75-2-413 and money from any other source. Any interest earned by the account and any interest that is generated from a loan repayment must be deposited into the account and used to sustain the program.

(3) Funds from the alternative energy revolving loan account may be used to provide loans to individuals, ~~and~~ small businesses, and nonprofit organizations for the purpose of building alternative energy systems, as defined in 15-32-102, for residences, ~~and~~ small businesses, and nonprofit organizations to generate energy for their own use and for net metering as defined in 69-8-103, and for capital investments by those entities for energy conservation purposes, as defined in 15-32-102, when done in conjunction with an alternative energy system.

(4) The amount of a loan may not exceed ~~\$10,000~~ \$40,000, and the loan must be repaid within 5 years."

{Internal References to 75-25-101:

75-2-401 x 75-2-413 x}

Section 2. Section 75-25-102, MCA, is amended to read:

"75-25-102. Administration of revolving loan account -- rulemaking authority. (1) The department of environmental quality shall adopt rules establishing:

(a) eligibility criteria, including criteria for defining residences, and small businesses, and nonprofit organizations, criteria for defining capital investments for energy conservation purposes, ownership of the alternative energy facility, financial capacity to repay the loans, estimated return on investment in the alternative energy and energy conservation, and other matters that the department considers necessary to ensure repayment of loans and to encourage maximum use of the fund for alternative energy and net metering uses;

(b) processes and procedures for disbursing loans, including the agencies or organizations that are allowed to process the loan application for the department; and

(c) terms and conditions for the loans, including repayment schedules and interest.

(2) The department shall solicit assistance in the development and operation of the program from individuals familiar with financial services and persons knowledgeable in alternative energy systems.

(3) Administrative costs charged to the account may not exceed 10% of the total loans or \$30,000 per year, whichever is greater. Legal fees and costs associated with collection of debt on principal are not considered administrative fees costs.

(4) The loan repayment period may not exceed 5 years. The loans must be made at a low interest rate. The department may set the interest rate at an amount that will cover its administrative costs, but the rate may not be less than 1% per year. The department may seek recovery of the amount of principal loaned in the event of default."

{Internal References to 75-25-102: None.}

NEW SECTION. **Section 3. {standard} Effective date.** [This act] is effective on passage and approval.

LC 0208:

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

A Bill for an Act entitled: "An Act clarifying that an alcohol distributor may not submit concurrent written plans for the same production facility location; amending section 15-70-522, MCA; and providing an immediate effective date."

Be it enacted by the Legislature of the State of Montana:

Section 1. Section 15-70-522, MCA, is amended to read:

"15-70-522. Tax incentive for production of alcohol -- written plan required -- reservation of incentives -- rules.

(1) (a) If the alcohol was produced in Montana from Montana agricultural products, including Montana wood or wood products, or if the alcohol was produced from non-Montana agricultural products when Montana products are not available, there is a tax incentive payable to alcohol distributors for distilling alcohol that:

(i) is to be blended with gasoline for sale as gasohol in Montana;

(ii) was exported from Montana to be blended with gasoline for sale as gasohol; or

(iii) is to be used in the production of ethyl butyl ether for use in reformulated gasoline.

(b) Payment must be made by the department out of the amount collected under 15-70-204.

(2) Except as provided in subsections (3) and (4), the tax incentive on each gallon of alcohol distilled in accordance with subsection (1) is 30 cents a gallon for each gallon that is 100% produced from Montana products, with the amount of the tax incentive for each gallon reduced proportionately, based upon the amount of agricultural or wood products not produced in Montana that is used in the production of the alcohol. Beginning July 1, 2010, there is no tax incentive.

(3) Regardless of the alcohol tax incentive provided in subsection (2), the total payments made for the incentive under this part may not exceed \$6 million in any consecutive 12-month period.

(4) An alcohol distributor may not receive tax incentive payments under subsection (2) that exceed \$3 million in any consecutive 12-month period.

(5) An alcohol distributor may not receive tax incentive payments under subsection (2) unless the distributor has provided a written business plan to the department of transportation at least 24 months before the distributor's anticipated collection of the tax incentives and has complied with the schedule provided for in subsection (6). The plan must contain the following information:

(a) the source or sources of financing for the acquisition of the plant, land, and equipment used for the production of alcohol for use in gasohol;

(b) the anticipated source of agricultural products used in the production of alcohol for use in gasohol; and

(c) the anticipated time, quantity, and duration of production of alcohol for use in gasohol.

(6) An applicant that has provided the department with a written business plan shall meet the following schedule to be able to receive alcohol tax incentive payments:

(a) start ~~building~~ construction or remodeling within 24 months of the date on which the department received the business plan;

(b) complete 50% of construction or remodeling of a production facility within 36 months of the date on which the business plan was received; and

(c) complete 100% of construction or remodeling of a production facility and be in production of alcohol for use in gasohol for distribution within 48 months of the date on which the business plan was received.

(7) If the applicant does not adhere to the schedule in subsection (6), the applicant loses its priority for receiving incentive payments.

(8) After the department has verified production, the department shall begin payments of the alcohol tax incentives based on actual production according to the terms of subsection (2).

(9) ~~The (a)~~ Except as provided in subsection (9)(b), the department shall reserve, in the order that written plans required under subsection (5) are received by the department, alcohol tax incentives based on the anticipated time, quantity, and duration of production.

(b) An applicant may not submit more than one written plan as required under subsection (5) concurrently for the same production facility location.

(10) A new tax incentive payment may not be made if the total tax incentive established in subsection (3) has been reserved or paid. If an alcohol tax incentive has been reduced or canceled, the amount by which the tax incentive has been reduced or canceled is available for reservation as provided in subsection (9).

(11) The department shall prescribe rules necessary to carry out the provisions of this section."

{ Internal References to 15-70-522: None. }

NEW SECTION. **Section 2. {standard} Effective date.** [This act] is effective on passage and approval.

Appendix B. Montana Vision 2020

Montana Vision 2020

Montana's Portfolio for the Future

“Positioning Montana for the rest of the 21st Century”

Montana Vision 2020 was started by the 2003 Montana Legislature when it resolved “to take all necessary steps to move Montana into a hydrogen-based economy”. That step set the direction, *Montana Vision 2020* starts a plan.

Preface

The 2003 Montana Legislature, in House Joint Resolution No. 26, recognized the need for Montana to move forward with a new vision, setting its sites on the a hydrogen-based economy. Based on national energy security needs, technological advances, federal support of hydrogen initiative, Montana's unique natural and renewable resources, the State's hydrogen production potential and the need for a state-wide economic driver, the Senate and the House of Representatives resolved to support all necessary steps to move Montana into a hydrogen-based economy by:

1. Educating Montanans about the benefits of a hydrogen economy;
2. Establishing the Montana Hydrogen Futures Project as a key economic development focus of the state;
3. Instituting necessary state policies and legislation to promote Montana Hydrogen Futures Project development and statewide involvement;
4. Supporting the establishment of a focal point of the hydrogen economy at the Montana Hydrogen Futures Park at the University of Montana-Missoula
5. Supporting and encouraging federal commitment and necessary matching funds to construct the Montana Hydrogen Futures Park and provide for development of the Montana Energy Products Network to attract hydrogen-based business and industries to Montana;
6. Establishing alliances with energy producers and promote resource identification by Montana communities by identifying all existing and potential federal, state, tribal, and community resources for inclusion in the Montana Energy Products Network;
7. Develop a first-class education and training system that attracts and prepares high-quality hydrogen professionals for all levels of the hydrogen economy and replicate this system throughout the state;
8. Expanding the Montana Energy Products network by creating the statewide Micro Enterprise System that establishes business opportunities, incentives, and state business development marketing;
9. Pursuing national prominence with other states and agencies in the supply of hydrogen to the national hydrogen distribution system.

Introduction

Energy is the all-pervasive common denominator of human and economic development to which we are inextricably linked. Yet Montana has not, to this point, taken advantage of its extensive natural and renewable resource base to build a future. In most cases, planning has been left undone and resource management relegated to others. However, the time is perfect for Montana to take advantage of what may be its last best chance to reverse its fortunes and play a controlling role in its own human and economic development. *Montana Vision 2020* is an initiative that seeks to meet future energy needs and environmental challenges by developing and implementing solutions from informed creativity. It is an outline that illustrates the great magnitude and scope of complete energy management and begins the process of setting a state-wide focus through goals, objectives and outcomes. Quite simply, *Montana Vision 2020* looks at the year 2020 and asks: Where do we want to be in 2020? This visioning step is intended to establish a target from which we can extrapolate what significant actions, timeline, we have to take between now and then to meet MV2020 goals.

Plan Outline Organization

Step A. *Montana Vision 2020* (MV2020) is a strategic initiative to set in motion a plan that will establish Montana as an energy leader by setting target goals for the year 2020. The goals are intended to be comprehensive in scope. Goal areas include: (1) energy management and production; (2) air, water, land, and waste management; (3) transportation and vehicle development; and (4) energy-related economic development.

Step B. Each goal area is followed by a series of objectives and sub-objectives stated as desired 2020 energy-related outcomes. These objectives will enable Montana to accomplish the *Vision 2020* goals.

Step C. Each objective needs a series of sequential steps that fulfill the objectives. These steps may include action plans, policies, directives or laws---- all of which demand extensive work and state-wide dedication.

From Draft to Reality

Montana Vision 2020, like any initial draft, is intended to be a work in progress that begs the attention of many minds, proposes paradigm-shifting changes, and suggests areas where Montana can implement modifications to achieve a united, state-wide focus and direction.

Moving Forward

Montana Vision 2020 has its basis on what is happening right now and where alternative energy and hydrogen are or will be. Some states have already achieved much of what is included in MV2020 therefore much of this plan must be considered as short-term (3-5yrs) if it is hoped that Montana desires to catch up and assume leadership. Key questions are: **Does Montana really want to control its destiny? Are Montanans willing to cooperatively work together to wisely use its resources for a new tomorrow?** Extensive discussion and work will be needed on each facet of this outline to reconcile the massive implications that each goal and objective suggests. Regulatory direction, legislative leadership, governmental cooperation, and agency interaction must walk hand-in-hand with regional and national groups to make MV2020 a reality. Realizing that there will never be a plan that meets everyone's perspective, *Vision 2020* hopes to move to the will of the majority forward. Extensive knowledge, work and education will need to be incorporated into this planning effort.

Legacy

It is the intent that in the end, prosperity will be enhanced, a legacy will be created and benefits will grow for generations to come.

Plan Basis

The outlined *Montana Vision 2020* was drafted from existing energy initiatives in other states, Federal directions, and perceived state-wide needs.

Montana Vision 2020

1. TO HAVE, IN PLACE BY 2020, A COMPREHENSIVE STATEWIDE ENERGY PRODUCTION AND MANAGEMENT SYSTEM.

- 1.1 To have a comprehensive **vertical and horizontal management** system for all energy-related natural and renewable resources.
 - 1.1.1 To have an overarching Montana Energy Coordination **Council**.
 - 1.1.2 To have a **federal** energy project coordination office.
 - 1.1.3 To have an all-encompassing, natural and renewable energy **resource inventory**, assessing Montana's strengths and weaknesses.
 - 1.1.4 To have all **private, Native American, Public, and Federal resources** included in assessment and planning.
 - 1.1.5 To have an **integrated**, comprehensive, responsible and long-range energy and state fiscal plan.
 - 1.1.6 To have a **solid link** among alternative energy developers, businesses, energy leaders, government, and infrastructure providers.
 - 1.1.7 To have a complete inventory of alternative energy and hydrogen **best practices**.
- 1.2 To have the best **energy incentive** system in the United States.
 - 1.2.1 To have a six month **energy permit** process.
 - 1.2.2 To have the most **energy friendly** development incentive in the U.S.
- 1.3 To be a major contributor to the **energy security** of the United States of America.
 - 1.3.1 To **produce** 50% of all electricity through alternative/clean means.
 - 1.3.2 To have a renewable portfolio and produce at least 25% of the state's power needs from **renewable** (wind, solar, geothermal, and biomass) sources.
 - 1.3.3 To **gasify** 400 million tons of coal a year into hydrogen and synthetic fuel.
 - 1.3.4 To have instituted **micro-cogeneration** energy technology state-wide.
 - 1.3.5 To have an energy **facilities** construction bonding program.
 - 1.3.6 To have cellulosic biomass and waste-derived methane and ethanol **conversion** to hydrogen processes.
- 1.4 To have 'below prime' **electricity rates** and **distributive energy** opportunities for all Montanans.
 - 1.4.1 To have **electricity portfolio** options for all Montanans.
 - 1.4.2 To have Montana **blackout-proof**.
 - 1.4.3 To have an **off-peak power** hydrogen production facilities at all electricity facilities.
 - 1.4.4 To have six integrated **clean coal/renewable energy centers** of excellence producing synthetic fuel and hydrogen.
 - 1.4.5 To have two petroleum **coke gasification** to hydrogen production centers.
 - 1.4.6 To have an **electron scrubbing** center in operation.

- 1.5 To be a national **leader** in alternative energy production.
 - 1.5.1 To produce 1000 MW in **solar voltaic** power generation.
 - 1.5.2 To produce 2000 MW in **wind power** generation.
 - 1.5.3 To have regionalized **forest biomass** biooil, products, and energy production.
 - 1.5.4 To have program to promote stranded and other natural gas **reforming** to hydrogen.
 - 1.5.5 To have a **coal bed methane** ecosystem recovery production program.
 - 1.5.6 To have an **ethanol** production incentive program.
- 1.6 To have an aggressive state-wide energy **conservation** program.
 - 1.6.1 To provide illustrative **examples** and **data** on energy saving techniques.
 - 1.6.2 To have building **insulation** standards consistent with energy savings goals.
 - 1.6.3 To have advanced building efficiency **testbed** program in all Montana communities.
 - 1.6.4 To have a model low income energy **assistance/work/education** program.
 - 1.6.5 To have a residential and business **energy efficient** property incentive program.
- 1.7 To have a symbiotic relationship between **environmental policy and judiciary statutes** that is consistent with the energy management system.
- 1.8 To have state-wide coordination of all energy production **infrastructure**.
 - 1.8.1 To have for seamless **grid interface** for all energy production
 - 1.8.2 To have **net/smart metering and reciprocating power** for all energy production sources.
- 1.9 To power all **public buildings** with alternative fuels.
- 1.10 To supply department of **defense** alternative fuel goals and needs.
- 1.11 To provide leadership in the adoption of the **Kyoto** Agreement.
- 1.12 To produce 200 MW of power from **public lands**.
 - 1.12.1 To have forward-thinking **lease/sale/production** public lands incentive programs.
 - 1.12.2 To have increased, easy **access** across public lands for resource development.
 - 1.12.3 To have **multiple-use** of public lands.
- 1.13 To have state-of-the-art **petroleum** refining exploration, and hydrogen **reforming**.
- 1.14 To have in place state of the art rail, truck, pipeline and line energy **distribution system**.
 - 1.14.1 To have present and future **rights** of way corridors for energy distribution
 - 1.14.2 To have a **regional** energy distribution operating plan.
 - 1.14.3 To have **hybrid power** and advance transmission distribution systems.
 - 1.14.4 To have a **third-party** finance system.
 - 1.14.5 To have a **15-year property** rule for distribution systems
- 1.15 To have the largest energy production output from **Native American Lands** in the U.S.

2. TO HAVE, IN PLACE BY 2020, A COMPREHENSIVE, COORDINATED, STATEWIDE AIR, WATER, LAND AND WASTE MANAGEMENT SYSTEM.

- 2.1 To have reduced **greenhouse gases** in Montana by 50%.
- 2.2 To have instituted an all-encompassing **water use** and energy production program.
 - 2.2.1 To have **hydro-electric** management plan
 - 2.2.2 To have a comprehensive stream, river, ground water energy **plan**
 - 2.2.3 To have a **drought** management energy plan.

- 2.3 To have regenerated 50% of **waste** into energy and value added products.
 - 2.3.1 To recycle 50% of all Montana cardboard, aluminum, newspaper, magazines, plastic, paper and scrap metal in the Comprehensive Waste Management Plan.
- 2.4 To lead the nation in water **electrolysis** as part of the water management plan.
- 2.5 To have an orchestrated **land** and value-added **agricultural** development.
 - 2.5.1 To support **family farm** stabilization
 - 2.5.2 To have a **straw and switchgrass** energy production program in place.
 - 2.5.3 To have facilitated rural, small **wind** energy development.
- 2.6 To have coordinated local, regional, national and world **pollution and health** standards.
 - 2.6.1 To have coordinated **standards** with Canada.
- 2.7 To have waste, municipal, household, agricultural, transportation, commuting, commercial, institutional, and industrial **pollution standards** with implementation assistance strategies.
- 2.8 To have required and measured effectiveness **energy star** rated equipment requirements in place.
- 2.9 To have **energy and water savings** measures in government buildings.
- 2.10 To have contract precedent to companies and organizations achieving **energy savings** performance.
- 2.11 To have a complimentary **wildlife-energy** program in place.
- 2.12 To have **waste regeneration** systems in all major cities.
- 2.13 To have zero emission **recreational vehicle and marine** state-wide.
- 2.14 To have a speedy **permitting** process.
- 2.15 To have **codes and standards** that are current, relevant, logical, consistent, and supportive of new alternative energy and hydrogen use.

3. TO HAVE, IN PLACE BY 2020, A 21ST CENTURY VEHICLE AND TRANSPORTATION SYSTEM.

- 3.1 To have 50% of all vehicles and equipment in Montana **powered** by alternative fuels.
 - 3.1.1 To furnish all hydrogen fueled vehicles in Montana with hydrogen at **low or no cost**.
 - 3.1.2 To have all **intercity** bus systems running on hydrogen.
- 3.2 To have 100% of all **state-run vehicles** powered by alternative fuels.
- 3.3 To have an alternative energy advanced **transportation** research, conversion and promotion **center**.
 - 3.3.1 To provide distribution of **synthetic fuels** and hydrogen in Montana for the trucking industry.
- 3.4 To have an operational state-wide alternative energy refueling **distribution** system.
 - 3.4.1 To provide for the design, permitting and development of **hydrogen fueling** stations.
- 3.5 To demonstrate the use of hydrogen-powered **personal rapid transit**.
- 3.6 To have incentives for **conversion** of internal combustion engines to hydrogen.
- 3.7 To have a state-wide **railroad** energy efficiency program.
- 3.8 To have a **farm equipment** alternative energy use program.
- 3.9 To have a **school bus** retrofit and hydrogen power program.

4. TO HAVE, IN PLACE BY 2020, A COMPREHENSIVE STATEWIDE ENERGY ECONOMIC DEVELOPMENT PLAN.

- 4.1 To have the best **workforce** in America for energy workers.
 - 4.1.1 To have a seamless K-18 **energy education** opportunities to all Montanans.
 - 4.1.2 To have an incentive program from Montanans to secure **energy education and employment**.
 - 4.1.3 To have an alternative energy resource and research **knowledge** information center.
 - 4.1.4 To have a state of the art national **hydrogen safety** training center.
- 4.2 To have the most **technologically advanced** energy facilities and equipment.
 - 4.2.1 To have a technology **infrastructure** program.
 - 4.2.2 To have an aggressive business technology R&D program.
 - 4.2.3 To have a energy small business advocacy, assistance and development center
- 4.3 To have financing mechanisms promoting **alternative energy** use and development.
 - 4.3.1 To have a leading tax **incentive** program for energy development.
 - 4.3.2 To have a **capital formation** and **public-private partnership** programs to business and industry.
 - 4.3.3 To have cost sharing programs for energy production.
- 4.4 To provide **hydrogen**, at low/no cost, to all Montanans.
- 4.5 To be a leader in fuel cell and alternative energy **value-added product development** and production.
 - 4.5.1 To have mobilized Montana resources to incentivize **energy company development**.
 - 4.5.2 To involve every community in Montana in the **Energy Products Network**.
 - 4.5.3 To have established markets for gasification **slag**.
- 4.6 To have \$5 BB in the state's **Revolving Energy Investment Pool**.
 - 4.6.1 To have a workable and useable energy development **enterprise support system**.
 - 4.6.2 To have both small and large, established and new energy business interests.
 - 4.6.3 To generate \$.01 per energy unit of measurement for revolving investment pool.
- 4.7 To have an empowered the **Office of Energy Development** to represent Montana in energy business and industry development.
 - 4.7.1 To **market** \$5 BB in Montana green energy products annually.
 - 4.7.2 To have the **Montana Energy Coordination Council** incorporating all energy producers.
- 4.8 To have increased rural and **agricultural energy** development by 200%.
- 4.9 To have a federal **government relations**, research and contracts oversight liaison.
- 4.10 To have established **value-added markets** for energy by-products.
- 4.11 To have a **Fischer-Tropsch** process loan guarantee program.
- 4.12 To have equitable and stable **tax and royalty** policies.
- 4.13 To have a systematic **transfer** of R&D to the marketplace.
- 4.14 To have identification of hydrogen technology **concentration** in Montana

- 4.15 To have **niche markets** for Montana business, industry and academia to support.
- 4.16 To have **tax-free zones** for alternative energy development.
- 4.17 To have strategies that deal with and eliminate **disincentives** to progress.

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Montana Vision 2020
OUTCOMES WORKSHEET

Objective Number: _____

Objective/Outcome: _____

	NEEDED ACTION	RESPONSIBILITY		STATUS
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Appendix C. NorthWestern Energy Small Wind Discussion Paper

EOC Energy Subcommittee Small Wind Discussion Paper

Utility Issues Associated with Distributed Wind Projects

NorthWestern is a transmission/distribution utility and we are relatively indifferent about who generates power, BUT neither NorthWestern nor its customers should be asked to subsidize generation irrespective of its form.

So, What is Distributed Generation, specifically, how do we define distributed wind generation? Distributed wind generation capacity can be as small as 100 watts, and can be large enough to be considered as a central power generation plant. At this time, NorthWestern Energy has over thirty net-metered wind turbines interconnected to its distribution system. Net-metered wind turbines operate in parallel to the utility and are given credit for the energy generated at the appropriate customer rate. Several wind generators operate as small power producers. It is important to note that when we talk about distributed wind generation we are generally describing single wind turbine generators located at some distance from one another, we are not describing wind farms where a number of wind turbines are located at the same place. Smaller generators are typically metered with a single meter capable of rotation in both directions, while larger machines are metered with two meters, one serving the customer's facility, the other registering the energy generated by the wind machine. The Customer-generator is responsible for all of the costs to install the generator. NorthWestern Energy will replace the existing meter with a net meter at no cost to the customer for non demand metered customers, for demand metered customers the cost of the additional service necessary is borne by the customer. NorthWestern Energy allows for net metering of distributed wind projects according to Montana statute. NorthWestern Energy must net meter wind generation up to 50 KW capacity.

Fundamentally, the utility has two areas of concern with small distributed wind generators. The first is customer and employee safety, and the second is lost utility revenue and increased utility cost. Other concerns are by comparison more minor, and include power quality, metering and billing issues.

Utility Issues regarding Distributed Generation

Safety:

There are two ways to interconnect small wind turbines. In every case, the utility requires manual disconnect switches to be installed so the generator can be isolated from the distribution system. Utility personnel may open these switches and lock them open if they feel that an unsafe condition may exist or if the utility needs to perform maintenance on the distribution system.

Inductive generators (larger machines in general) are connected when the wind turbine speed is

high enough, a switch supplies utility power to the generator, which then generates power at the frequency and phase of the utility. If the utility experiences an outage, the machine typically shuts off because of low voltage or high current. In some cases where the wind turbine capacity closely matches nearby loads, the wind turbine may have to be fitted with over and under frequency control in order to assure disconnection in the case of a utility outage. Machines of 50 KW capacity and less are generally thought to be of little impact, but in the case where the utility line is weak, even these may cause safety or power quality problems. Inductive generators generally use reactive power from the utility, sometimes to the point that the generators must be fitted with capacitors. Technically this is not a problem, but it does raise the installed cost of the machine.

Machines of ten KW capacity and smaller are typically interconnected using static power inverters. These inverters take direct current power generated by the wind turbine and convert it to alternating current and match it to the utility. These inverters constantly monitor the condition of the utility power, and if the utility experiences an outage, the inverter disconnects. When the utility power is restored, the inverter senses the utility power, and reconnects. NorthWestern Energy requires the inverter to be listed by Underwriters Laboratories as suitable for this purpose, and also to meet other applicable codes and standards.

Reliability

Per NERC and WECC rules, sufficient reserves must be maintained to cover loss of generation serving load. Because the customer will not be carrying reserves for their distributed generation, reliability may suffer. This does not become a big issue until DG becomes a larger portion of the overall resource mix. If the control area operator must carry these reserves (and knowing how much could be difficult, because they may not be aware of the quantity of load and/or distributed generation), who will cover the cost – all other customers?

When power is scheduled to serve load, a control area can manage the differences between the scheduled power and actual load through system balancing and load following (at a cost). However, when distributed generation becomes a large piece of the resource mix, and this generation comes on-line or goes off-line, it will be difficult, and likely costly, to manage.

Backup Power

When the distributed generation is not on-line, power must be acquired elsewhere to cover the load. How this power is acquired, at what cost, and how to allocate the cost to the cost-causer(s) needs to be addressed. As with the delivery costs, this added cost, if any, should not be borne by the rest of the customers.

How does the utility manage power?

The utility must make the power available fit the load, whatever the load is. We can come close; load forecasting based upon history is used. The challenge really begins when the time to meet the load gets close. Bulk electric power cannot be stored. Power is used as it is manufactured,

and it is shipped from the manufacturer to the customer basically instantaneously. System balancing costs are the hour-ahead purchases and sales necessary to balance the system, while the load following covers the within-the-hour balancing. Next hour scheduling must come close enough that any intra-hour variations are within utility load following contracts. Because distributed generation does not provide for reserve power (the replacement of power when scheduled power turns out not to be there) the control area operator has to provide these reserves. If this is the case, all control area customers foot the bill. Managing this variable power may also be a challenge. We do not know at this time what the cost impact will be. If Distributed Generation is a small part of the resource mix, the impact is small, as distributed generation increases, the impact will increase.

Potential increase in transmission imbalance costs: NorthWestern Energy transmission must constantly balance system loads to generation resource. If the predicted load to resource balance is off of the actual balance, the utility may incur additional costs and penalties. These additional costs and penalties could result because of the unpredictable nature of wind generation, especially if the total capacity of distributed wind generation grows to a significant percentage of the utility's resources. It should be noted that the total distributed generation capacity at this time is less than one half of a Megawatt, or a maximum of 0.01 percent of the utility base load.

Potential increase in transmission load following costs: NorthWestern Energy transmission purchases load following resources in order to balance the supply to the load at all times. Distributed wind generation could increase the amount of load following NorthWestern Energy purchases, raising the associated costs. Again, at this time we do not feel that this is a significant cost, but if the connected generation capacity grows significantly in the future it could affect the load following costs.

Lost Revenue

Any costs not directly attributed to a distributed generation customer the utility loses between rate cases, but then collects it in rates from the non self generating customers after a rate case has been filed and approved. This becomes an equity question at this point -- why should the other customers pay for added Transmission and Distribution costs, while receiving none of the DG benefits. Under a vertically-integrated utility scenario, this shifting of costs might make sense because the DG could possibly reduce the resource costs for everyone since less generation would be required by the utility. With retail access, and a default supply concept, this savings is not likely, and the dollars (savings/costs) will likely not be allocated to the correct customers. For example, It is possible for a net metered customer to generate all of his own electric energy and never pay for the electric service to his home, even though power is flowing through the lines all of the time.

Other cost issues: Smaller and more difficult to quantify are additional metering costs, billing costs, and costs associated with poor power quality. At this time, any of these costs are reported as utility expense, and are paid for by all of the customers except in the case of unusual metering. When a customer requests a net meter, a different meter must be programmed and installed. The

paperwork associated with net metering is additional to that required by regular customers. Handling the credits resulting from net backward meter rotation from month to month takes customer service personnel time and provides a hassle factor. The utility was not designed to run backward, neither in the wires sense, nor in the billing sense. If unusual metering is required, the customer is expected to pay for the metering equipment. This cost can be significant, with electronic meters costing from \$3000.00 to \$10,000 to install. To date, every effort has been made to keep this cost reasonable. Power quality is also of some concern. Larger machines can create flicker when switching on and off in weak distribution lines, and therefore the utility must do some degree of study when a larger wind turbine is to be interconnected, to estimate the impact. Flicker can be a major problem. Our Generation Interconnection Agreement limits flicker to low levels and requires wind to operate for a period of time with a power quality meter. Correcting flicker will add costs.

Voltage variation could possibly cause damage to sensitive equipment in a neighboring customer, for which the utility could be liable, so we have to be careful when doing these interconnections.

A Future Look at Distributed Generation

I have indicated that at this time we do not have a significant quantity of distributed generation on our system relative to our system load. It is difficult to predict how distributed generation will grow in Montana, it depends upon fuel costs, technology development, and particularly for wind generation, on the capital cost of equipment. We do believe that at some time in the not too distant future, distributed generation will provide a significant portion of the generation in Montana. What might the utility perspective be in the future when perhaps 1%, 2%, 10% of the generation is distributed?

The utility invests in infrastructure to serve loads. Distributed generation presents two opposing problems. The first problem is if the utility builds to serve loads without accounting for distributed generation, the utility will overbuild, and the infrastructure will not be used. This may result in higher cost than necessary. The second opposing problem is if the utility will start to rely on the distributed generation the utility may not build sufficient capacity in the system to handle loads if for some reason the distributed generation disappears. System planning in the future will be more complex, with distributed generation kind and diversity playing a more major role in electric system modeling. New rates and contracts will need to be designed to accommodate greater amounts of distributed generation. Contract provisions such as load shedding may be included in customer contracts involving distributed generation. Some contracts may be written to require scheduling of certain generators, and more telemetering of smaller generation may be attractive to be more aware of generation characteristics. Again, NorthWestern is a transmission/distribution utility and we are relatively indifferent about who generates power, BUT neither NorthWestern nor its customers should be asked to subsidize generation irrespective of its form.

NorthWestern Energy has experienced no significant trouble as a result of installation of small distributed wind generation. We do continue to address individual problems as they come up,

usually in the form of billing problems, and we continue to improve internal processes in order to better serve our customers.

