

Final Technical Report
“20% Wind by 2030: Overcoming the Challenges”

DE09EE0000517

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List of Acronyms

AWEA	American Wind Energy Association
BPA	Bonneville Power Administration
CUP	Colstrip Upgrade Project- Also known as Path 8 Upgrade
DEQ	Montana Department of Environmental Quality
DOC	Montana Department of Commerce
DOE	Department of Energy
EPDD	Energy Promotion & Development Division (MT Dept. of Commerce)
EPREP	Energy Planning and Renewable Energy Program (MT Dept. of Environmental Quality)
M.O.R.E. POWER	RMSC's Maximizing and Optimizing Renewable Energy Initiative
MSU	Montana State University
NCAT	National Center for Appropriate Technologies
NTTG	Northern Tier Transmission Group
RMSC	Rocky Mountain Supercomputing Center
RTEP	WECC's Regional Transmission Expansion Planning Project
TRANSAC	NorthWestern Energy's Transmission Advisory Committee
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
WfS	Department of Energy's Wind for Schools Program
WIEB	Western Interstate Energy Board
WPA	Wind Powering America

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Executive Summary

The funds allocated through the Wind Powering America (WPA) grant were utilized by the State of Montana to support broad outreach activities communicating the benefits and opportunities of increased wind energy and transmission development. The challenges to increased wind development were also clearly communicated with the understanding that a clearer comprehension of the challenges would be beneficial in overcoming the obstacles to further development. The ultimate purpose of these activities was to foster the increased development of Montana's rich wind resources through increased public acceptance and wider dissemination of technical resources.

The activities supported through the grant were undertaken on an individual, community, state, regional, and national level through personal communications, advertisements, and special event hosting/sponsorship. These communications helped foster not only wider community understanding of wind and transmission issues but also provided technical assistance and resources to industry participants on wind resources, transmission congestion, and wind integration.

Leveraging WPA funds allowed members of Montana's state government to travel in-state educating citizens on the benefits of wind development. Travel funds also facilitated out-of-state travel where Montana's wind resources were promoted to a regional and national audience and Montana representatives were able to attend regional transmission and integration meetings. Through the use of WPA funds, EPDD staff were able to attend numerous wind energy events such as the American Wind Energy Association (AWEA) WindPower conferences in 2010 and 2011, the Western Wind and Transmission Leadership Summit (2011), and WPA's Wind Integration and Transmission Barriers and Solutions meeting (2011).

Support was provided to wind and transmission developers to ensure utilization of government and private industry resources to assist with the development (siting, financing, and integration) of wind energy. Assistance was provided to multiple Montana-based wind companies as they sought state and federal financial assistance. In addition, the WPA funds supported the work of

the EPDD as they acted as a clearinghouse, connecting countless companies and organizations involved in wind development in Montana to create synergies and increase opportunities for development.

EPDD focused on transmission planning and development along with wind integration through participation in Western Electricity Coordinating Council's (WECC) Scenario Planning Steering Group meetings, and Bonneville Power Administration's (BPA) rate case process.

WPA funds allowed for the continued expansion of the Montana Wind and Transmission Working Group, a collection of wind and transmission developers, regulatory agencies, utilities, and renewable energy organizations that meet quarterly to discuss how to move the wind industry forward in Montana. The state of Montana leveraged funds to support the technical capacity of wind educators through the purchase of wind assessment software and training of educators on use of the software.

In conclusion, WPA funds supported a wide variety of work across two state of Montana departments: the Department of Environmental Quality (DEQ) and the Department of Commerce (DOC). The purpose of this work was to further the development of Montana's vast wind resources for small, medium and large scale benefits to Montana and the nation. This was accomplished through collaborative work with wind industry representatives, state and local governments, the agricultural community and interested citizens. Through these efforts, state representatives were able to identify development barriers, educate and inform citizens as well as participate in regional and national dialogue that will spur the development of wind resources.

Introduction

The Wind Powering America grant supported the work of two State of Montana Departments: the Department of Commerce (DOC) Energy Promotion and Development Division and the Department of Environmental Quality (DEQ) Energy and Pollution Prevention Bureau, specifically the Energy Planning and Renewable Energy Program (EPREP). The funding was split among the two programs to maximize the impact by capitalizing on the different focus of each agency.

The Energy Promotion and Development Division (EPDD) was created in 2007 to help implement Governor Schweitzer's commitment to “clean and green” energy development in Montana. While Montana has vast amounts of geothermal, bioenergy, and hydroelectric resources, the wind resources are arguably the least utilized relative to the development potential of the resource. The EPDD is the front-line for state support for energy development in Montana and WPA funding allowed an increased focus on promoting wind generation and the supportive energy delivery infrastructure.

The mission of the EPDD is to foster the creation of high quality energy-related jobs while enhancing domestic energy security through direct work with private industry, local & regional economic development organizations, along with state, federal, and tribal governments to facilitate, promote, and develop clean and green energy projects throughout Montana.

The DEQ Energy and Pollution Prevention Bureau is responsible for improving energy efficiency and increasing the use of renewable energy for power generation and transportation fuels; preventing pollution of air and water; reducing the amount of waste going into landfills; increasing recycling markets and planning for energy emergencies. The bureau also provides economic analysis and planning information to policy makers and businesses in addition to providing market development assistance to businesses and local governments.

The Energy Planning and Renewable Energy Program in the DEQ provides information for citizens, schools, businesses, and government on a wide variety of energy topics such as conservation and efficiency, renewable energy, and Montana energy production. In addition the

EPREP produces custom publications, hosts energy related events and connects individuals and businesses interested in energy in Montana to the proper contacts throughout Montana state government.

The EPDD was the primary recipient of grant funding receiving 80% of total funds while EPREP received the remaining 20% of funds from WPA. In broad terms, EPDD applied their share of the grant to support wind outreach work; funding staff time and travel promoting wind energy and creating promotional materials and campaigns to educate the public on the benefits of increased wind development. The EPREP program focused their spending on creating a technical capacity for increased wind development and developing educational infrastructure for a wind industry labor force.

Background

The primary objective of activities carried out under the “20% Wind by 2030: Overcoming the Challenges” grant funding was to encourage the further development of Montana’s wind resources through public outreach and technical assistance to developers. As stated in the introduction, the funds were allocated among two state of Montana Departments with the Department of Commerce focusing on community outreach and the Department of Environmental quality centering on developing technical capacity and the purchase of wind-site-assessment software.

The Department of Commerce (DOC) established multiple educational and communication campaigns to increase awareness of Montana’s rich wind resources and the benefits associated with wind development in the Big Sky state. In addition, WPA funding supported the creation of a statewide “Wind and Transmission Working Group” that has met quarterly and provided a forum for wind and transmission developers to stay abreast on activities throughout the state. Finally, the DOC supported the development of the “Maximizing & Optimizing Renewable Energy (M.O.R.E.) POWER” initiative, a collaboration between the State of Montana, Rocky Mountain Supercomputing Center (RMSC), and Northrop Grumman Information Systems – Atmospheric Sciences & Engineering. (See *Results and Discussion* section for more details.)

The DEQ worked with Montana State University and five state Colleges of Technology to provide access to wind-site-assessment software along with instructor training on the software. DEQ used a portion of the fund allocation for installation and removal of meteorological tower equipment and to support the Montana Wind for Schools (WfS) program.

Results and Discussion

The WPA funds allocated to the state of Montana were used effectively to increase the public's knowledge regarding the advantages of wind development, build the capacity of Montana's wind and transmission industry, and provide resources to wind educators throughout the state.

Wind Integration, Storage & Advanced Forecasting

Wind integration was addressed through a number of different avenues including storage technologies, resource mapping, and extolling the unique benefits of Montana's wind regime. In partnership with private industry, compressed air storage was researched and analyzed. While no project ultimately was completed, valuable information was gathered and numerous questions from developers and private citizens on the feasibility of compressed air storage were responded to. Another storage technology that was explored was pumped hydro. EPDD staff consulted with a private developer that currently has permits for two projects in Montana, assisting in exploring water rights and the requirements for state permits. The final storage technology supported through WPA funds is a zinc-air battery technology. EPDD staff assisted the developer as they sought public and private financing to continue development of their innovative technology. In July of 2011, the Montana based developer announced a deal to provide their technology to a community scale wind developer.

The EPDD widely publicized the results from a February, 2011 study, *The Impacts of Integrating Montana Wind Resource on Transmission System Operators and Utilities in the Pacific Northwest*, illustrating the unique characteristics of Montana's wind resource. The primarily results included:

- Central Montana wind resource positively correlates with many Pacific Northwest utility loads on a monthly and hourly basis.
- Central Montana wind resource is counter-seasonal and complementary on an hourly basis relative to wind and hydro generation on the existing BPA system (Appendix 1).
- Has a significantly higher capacity factor than existing BPA system wind generation.
- Provides a unique product with desirable characteristics for integration into the BPA grid.

EPDD has continued to work closely with the Rocky Mountain Super Computer Center and Northrup Grumman in developing and disseminating this wind farm-siting optimization software tool. EPDD participated in monthly conference calls and arranged meetings between developers and MORE Power representatives.

Fostering Collaborations

EPDD focused on creating collaborations between private industry and public organizations that would create synergies to foster the increased development of wind energy in Montana. This work was primarily achieved through the establishment of the Montana *Wind and Transmission Working Group*, a collaborative group of industry, government, academic, and other stakeholders that meets quarterly to identify obstacles to transmission and wind development and to develop strategies to overcome those obstacles. In addition, the working group meetings provide a forum for quarterly progress updates from developers, presentations by regulatory agencies, and allow regular interactions among individuals and organizations active in wind and transmission development in Montana. The *Wind and Transmission Working Group* consists of 169 members with regular meeting attendance of approximately 60 people in person and 8-10 participating through teleconferencing. A sample meeting summary from October 2010 is provided in Appendix 9.

EPDD staff members maintained a contact list of all wind and transmission developers active in the state and regularly act as clearinghouse connecting government agencies, businesses, and non-governmental organizations to create synergies in Montana wind and transmission development. Examples included connecting landowners interested in developing their wind resource to organizations that assisted in wind monitoring and connecting developers to local environmental organizations to help mitigate any potential environmental impacts. The number of interactions fostered through this “industrial matchmaking” was difficult to track but it was estimated that 2-3 connections were made per month over the course of this grant.

EPDD worked during the term of this grant to foster both interstate and international collaboration. EPDD met regularly with the developer of the 189 MW Rim Rock wind farm to work on financing (DOE loan guarantee) and transmission issues. This work included a trip to Edmonton to meet with Alberta Premier Ed Stelmach and Montana Governor Brian Schweitzer to discuss transmission issues facing the project situated near the Montana/Alberta border. Construction commenced on the 189 MW first phase of the 309 MW Rim wind farm that will connect to the Montana Alberta Tie Line. Approval was recently granted by the California Public Utilities Commission to allow a California utility to invest \$250 million in the Rim Rock wind farm. This unique tax equity investment by a utility company in a wind farm could potentially serve as a template for future investor-owned utility tax equity investments.

Regional and Sub-Regional Transmission Planning

Tom Kaiserski, program manager of EPDD, participated on a number of state and regional bodies active in transmission development in the west and WPA funding helped to fund a portion of his time and travel so he could continue advocating for the increased transmission development necessary to move Montana's wind energy to market.

WPA funding allowed Tom and EPDD staff to be members of NorthWestern Energy's Transmission Advisory committee (TRANSAC), an open and transparent forum whereby electric transmission stakeholders can comment and provide advice to NorthWestern Energy during the early stages of its electric transmission planning. Tom also played an active role in the Western Energy Coordinating Council's (WECC) Regional Transmission Expansion Planning Project (RTEP). EPDD continues to track the activities of the Northern Tier Transmission Group (NTTG), the recognized sub-regional transmission planning group that serves the northern Rockies region.

EPDD contracted with a Montana based energy consulting firm experienced in wind and transmission issues, and traveled to Portland on April 12, 2010 to discuss the potential for two Oregon-based utilities to develop and/or own wind farms in Montana. One of the goals of the trip was to interest either of these utilities in not only purchasing or owning Montana wind

generation but also to encourage these companies to become active in facilitating the 700 MW expansion of the existing Colstrip 500 kV power line known as the Colstrip Upgrade Project (CUP). That trip was followed by a second meeting with one of the utilities on June 14 and the developer of the 100 MW Beaver Creek wind farm to gauge interest in purchasing power from Beaver Creek or investing in the project as a developer. Discussions are continuing on these potentials and the CUP project has continued to develop; the anticipated completion of the project is 2015/2016. Also on April 12, Tom attended a Bonneville Power Administration (BPA) rate case workshop in Portland to discuss modification of the Montana Intertie transmission rate so as to eliminate this rate pancake that adds cost to ship Montana's wind generated electricity to the Pacific Northwest. Tom also attended a follow-up BPA workshop on June 14. Tom is involved in on-going discussions with BPA on this important issue, with the next rate case meeting scheduled for August 18, 2012. Travel expenses for these two wind-focused Portland trips were paid with DOE grant funds. A concerted effort was put forward to combine meetings on these trips thus being very cost effective with our DOE travel funds.

In 2010, the EPDD also worked on the creation of a Shelby, Montana to Mid – C railroad right of way transmission cost model in conjunction with the WIEB and an outside consulting firm (Appendix 5). The purpose of this work was to explore the possibility of utilizing railroad right of way as a transmission corridor thus eliminating land acquisition requirements and potentially avoiding difficult siting issues. The modeling showed that a high-voltage, direct current line could be cost effective located within the BNSF right of way between north central Montana and central Washington.

Land Use Planning & Addressing Challenges to Development

The primary challenge to further wind development in Montana is a lack of transmission capacity to move wind energy from Montana's remote resources to markets that are demanding clean electricity. An additional challenge was due to a dramatic increase in renewable energy generation capacity, both hydroelectric and wind generated in the Northwest combined with stagnant or even decreases in demand over the course of the grant. The saturation of Montana's

most accessible markets combined with a lack of transmission capacity led to sluggish growth in wind development in 2010 and 2011.

That said, WPA funds allowed the state to confront these challenges by working with other state agencies and private industry to help mitigate and overcome these challenges. As previously stated, EPDD worked on promoting the benefits of geographically dispersed wind development, highlighting the complementary nature of Montana's wind resources relative to existing capacity.

A major focus of the EPDD was to provide assistance to the Montana-Alberta Tie Ltd (MATL) transmission line that provides 300 MW of bi-directional transmission capacity between US and Canadian markets. The EPDD advocated for the project since its inception in 2006, working to synchronize state and federal regulatory processes. When the regulatory processes became bogged down in 2008, EPDD coordinated twice weekly phone calls with DEQ and DOE to get the Environmental Impact Statement completed and secured commitment from DOE to dedicate several staff to work with DEQ for nearly a week to complete the document. Permits were issued for the project 8 weeks after this coordinated effort. EPDD also sat on a landowner liaison committee, organizing community meetings as well as sitting down with individual landowners to hear their concerns and discuss potential solutions to their issues. The MATL project received a \$161 million loan from WAPA, and EPDD advocated to WAPA that MATL was a qualifying "shovel ready project" which resulted in MATL becoming the first project funded by WAPA with its ARRA expanded borrowing authority. Construction of the MATL line is scheduled to be completed in mid-2012, and the line will begin moving wind generated power from the 189 MW Rim Rock wind farm that is also slated to be completed in mid-2012.

Developers of MATL and Rim Rock had the following to say about EPDD's support, "Time and again we found the need for counsel, guidance and advice and found such to be invaluable in the Energy Promotion and Development Division," and "The support that we have received from the Energy Promotion and Development Division has greatly facilitated our accomplishments on these two wind farm projects and our progress would not have been as smooth or as timely as it has been without the Division's capable assistance."

EPDD staff worked on eliminating the Montana Intertie transmission rate “pancake” in BPA’s 2012 rate case that adds cost to Montana generators interconnecting to BPA’s transmission system. While the rate was not totally eliminated, the hard work done by EPDD and numerous Montana organizations reduced the rate by more than 50 percent. EPDD continues in discussions with regional parties to work toward a settlement of the cost allocation and precedent related issues.

Community Outreach

In 2010, EPDD began publishing a quarterly newsletter, *Montana Means Energy*, that is electronically distributed to nearly 4000 people in Montana, the Northwest, and around the country. This newsletter provides updates on recent energy developments, profiles wind and transmission developers, and provides insight into innovative renewable energy financing mechanisms.

WPA funds were also used to create a series of standalone ads (Appendix 3 &4) and fund a number of wind advertising campaigns. One such campaign conducted by the DOC was through the Montana State University (MSU) Bozeman athletics program to promote Montana wind energy throughout the 2010/2011 football and basketball seasons through website advertisements, in-game visuals, and a series of radio ads (Appendix 2 & 5). The focal event of this promotion was the sponsorship of the September 18, 2010 home football game promoting Montana wind power. The division has heard from dozens of constituents on the effectiveness of this information campaign. This promotion has gone a long way toward generating positive public acceptance of wind power generation and transmission development.

EPDD prepared a marketing piece for public distribution on the economic benefits of transmission and wind development in December of 2010 (Appendix 11). The heart of this information is a report prepared by the Montana Department of Labor and Industry at the request of EPDD that studied the economic impacts that will result from the construction of the more than 6,000 MW of transmission capacity currently being developed in Montana. That report

estimated the capital investment exceeding \$4.25 billion and total direct and indirect employment created to exceed 11,500 jobs.

WPA funding allowed EPDD staff to travel both in and out of state to present information on Montana's vast wind resources along with sponsoring a major wind and transmission development summit (Appendix 14). The EPDD supported *Western Wind and Transmission Leadership Summit* was attended by more than 150 people involved in wind and transmission development in the West. This summit, keynoted by Governor Brian Schweitzer, was also attended by major industry players from the private sector and the agenda included high ranking Government officials including top transmission point people for the Obama Administration in Lauren Azar from the DOE and Steve Black from the Department of Interior. EPDD staffed a booth with information on wind and transmission development opportunities in Montana along with their economic benefits. In addition, to playing a major role in organizing the conference, EPDD worked with local media to ensure public coverage of the event.

Educational Training & Wind Data Analysis

The scope of DEQ's wind outreach effort evolved over the course of the grant from the development of the Montana Wind Working Group and traditional outreach efforts, to the final focus on working with the state's university system to deliver a workforce trained to enter the wind industry.

The DEQ collaborated with Montana State University (MSU) Wind Application Center (WAC) and five state Colleges of Technology. The focus was working with the universities to provide wind-site-assessment software for classroom training. The project also included training of instructors to use the program and teach college students. The WAC will become the knowledge base for this software and provide technical support and ongoing education to the participating satellite Colleges of Technology. These collaborations support development of educational programs for wind technicians and engineers.

The DEQ also contracted with MSU Wind Application Center (WAC) for the acquisition of wind-site-assessment software for class room training and 130 seat licenses were purchased.

Training was provided for MSU and the Colleges of Technology. The training was held at MSU in Bozeman on November 17th and at MSU-Great Falls' campus on November 18th. Video-recording of the training was permitted as a tool for future training including annual courses and refresher sessions for participating institutions. This software will be incorporated into wind technician courses by educators and used by students in wind educational courses at five Montana State University locations including: MSU-Bozeman, MSU-Billings, MSU-Havre, Montana Tech-Butte and Great Falls College of Technology. In addition, six 20-meter metrological towers along with miscellaneous sensors and data acquisition systems were transferred from the state to the universities to support student teaching programs. The WAC also received three 30-meter metrological towers through NREL. This equipment will be used to teach students to install and maintain meteorological towers and then collect and analyze the data to characterize feasibility of wind farm or stand-alone turbine production capacity. In the future, the state plans to contract with Universities to obtain state land wind resource characterization services.

DEQ utilized WPA funds to support the Wind for Schools (WfS) program in Montana through a contract with the National Center for Appropriate Technologies (NCAT) to visit the ten schools who are participating in Wind for Schools and six other potential schools. NCAT provided DEQ with a report on the information for each school. In addition, DEQ provides technical and program assistance to the Montana WfS coordinator.

DEQ's website hosts wind data from 38 sites distributed across the state with data measured from 10 to 50-meter tower heights. The state maintains eight active wind measurement systems and/or supports data reduction for these systems. This data is available along with NREL's wind maps to help characterize potential wind sites for residential and commercial development. Additionally, the WAC will host wind data collected from university met towers.

Accomplishments

The following accomplishments/milestones were achieved through WPA funding:

Wind Integration, Storage, & Advanced Forecasting

EPDD worked with RMSC throughout the term of the grant to provide support and a venue to publicize the benefits of their M.O.R.E (More Optimized Renewable Energy) POWER initiative. A minimum of 6 meetings with high level executives were arranged to allow RMSC and their project collaborators to explain this important initiative and the benefits of using their proprietary siting algorithm. A M.O.R.E. POWER pilot study of existing Montana wind farms found 58% more usable power could be generated, three times fewer significant ramping events, and an increased ROI for wind power investors using their siting tool relative to existing wind farms. WPA funds allowed state participation on monthly conference calls and ensured RMSC participation in a number of wind energy events in Montana. The Western Interstate Energy Board is currently evaluating a proposal that EPDD has developed to fund a study under the DOE funded Regional Transmission Expansion Project (RTEP) that would utilize M.O.R.E. Power to quantify the benefits of geospatial diversity in wind farms in the WECC region. The current lack of comprehensive and accurate data quantifying geospatial diversity of wind farms is a significant gap in transmission planning and this study could fill that gap, benefitting not only Montana wind development but wind development across the west.

The state of Montana continued to advocate for advanced energy storage development in Montana through support of three distinct technologies: compressed air storage, pumped hydroelectric and advanced battery technologies. Support from EPDD included assistance in navigating state and federal regulatory processes and technical assistance in applying for government backed financing. There are currently two federally permitted pumped hydroelectric projects in Montana which, if constructed, would provide nearly 800 MW of energy storage. A Montana-based company has also announced a deal with a wind developer to provide 1 MW storage capacity at a developing wind farm.

Fostering Collaborations

WPA funds were used to support the development of Montana's Wind and Transmission Working Group which met quarterly over the course of the grant. Membership in this group increased to 169 members and includes wind and transmission developers, landowners, regulatory agencies, environmental organizations, and renewable energy advocates.

Presentations and meeting summaries are hosted on the EPDD website

(<http://www.commerce.mt.gov/energy>) and the contact list developed is used to provide regular communication to those interested in wind and transmission development in Montana.

Regional and Sub-regional Transmission Planning

WPA funding allowed state of Montana representatives to travel to numerous meetings to support the continued development of Montana's electrical transmission infrastructure and to coordinate with regional bodies. Tom Kaiserski currently sits on the State and Provincial Steering Committee (SPSC) and the Scenario Planning Steering Group (SPSG) for the Western RTEP process being implemented in the Western Interconnection by the Western Governors Association and the WECC. This is the leading regional transmission effort in the west and will produce 10 and 20 year interconnection wide transmission plans. WECC recently released its first 10 year plan which can be found in Appendix 8. Tom Kaiserski participated in numerous BPA rate case meetings, advocating for the elimination (or decrease) of the Montana Intertie transmission rate "pancake". While the process is ongoing, the rate was reduced by more than 50% over the course of the grant.

During the term of this grant, EPDD worked with the San Francisco-based Energy Foundation to develop scope of work for preparation of a transmission right sizing white paper. That scope of work led to the preparation of a document by the legal firm of Stoel Rives entitled "The Way Forward – Why Transmission Right Sizing and Federal Bridge Financing Hold the Key to Western Renewable Resource Development" (Appendix 10). This document was completed in 2010.

Land Use Planning & Addressing Challenges to Development

WPA funding was used by EPDD staff in multiple ways to facilitate better land use planning as it pertains to wind and transmission development. EPDD traveled to a number of communities affected by wind and transmission development to hear from landowners and organized meetings to ensure issues and concerns were openly communicated. In addition, EPDD and the Montana Governor's Office of Economic Development provided support of the "MSTI Review Project" (www.mstireviewproject.org) that is providing an independent analysis of impacts and issues surrounding the development of the Mountain States Transmission Intertie (MSTI) transmission line, a 1,500 MW AC line in the latter stages of permitting that is being developed by Northwestern Energy, the capacity of which is targeted to wind energy developers in Montana. The MSTI Review Project is facilitating exhaustive and groundbreaking stakeholder input coupled with state of the art GIS capability to identify a least impact route for MSTI.

Community Outreach

Quarterly newsletters were produced throughout the term of the grant, providing a venue for clear and regular communication on the status of wind and transmission projects in Montana. WPA funding assisted in a number of wind advertising campaigns including, the Montana Wind Game campaign that resulted in 10 months of radio ads promoting wind energy, advertisements at the 2010 and 2011 AWEA WindPower show, and the publication of numerous materials promoting wind energy (Appendix 3, 4).

Educational Training and Wind Data Analysis

The DEQ Renewable Energy program worked with the MSU WAC to obtain licensing rights to wind resource assessment software and provided training to instructors on the use of the software. DEQ also utilized WPA funds to provide technical and program assistance to the Montana WfS program coordinator. DEQ maintains a website where all of the state's historical wind data are available to the public.

<http://deq.mt.gov/energy/renewable/windweb/WindDataSources.mcp>

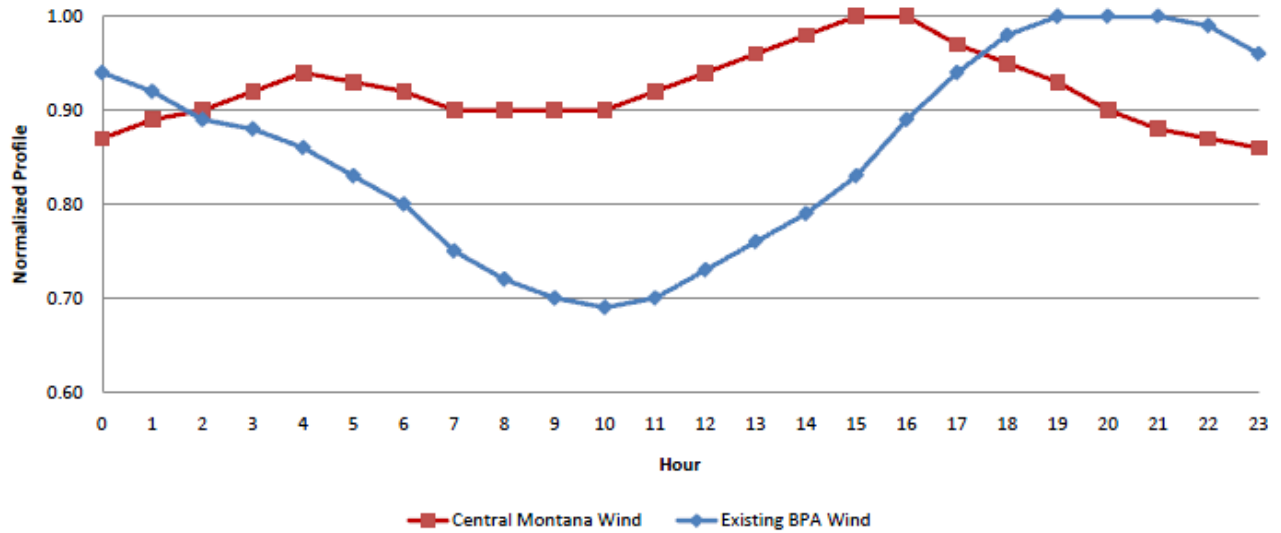
Conclusions

WPA funds were used to foster the development of Montana's wind resources by building broad support as well as through specific campaigns and projects. EPDD's role as an information conduit, providing a regional and national presence for Montana and direct interaction with energy leaders has helped to create an environment conducive to increased wind and transmission development in Montana.

EPDD has a nearly 4,000 member email distribution list which is used to distribute a quarterly newsletter, schedule meetings and to otherwise inform developers, government, affiliated organizations, and citizens on wind and transmission issues development in Montana. EPDD is an active participant in regional/national transmission planning activities and advocates for the responsible development of Montana's rich resources. Whether it is developers, investors, or top government officials, EPDD's communication with all key players has proven to increase process efficiency in both the public and private sector.

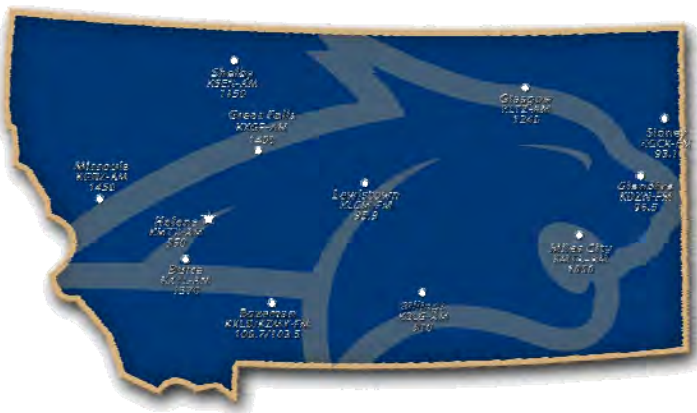
Appendix

Appendix 1: Graph illustrating how Central Montana wind is daytime peaking and complementary to existing BPA wind generation.




Appendix 2: Map indicating the geographic reach of EPDD's wind promotion with MSU.

Montana State Radio Affiliates



Appendix 3: 2011 AWEA advertisement (1 of 3 produced for 2011)



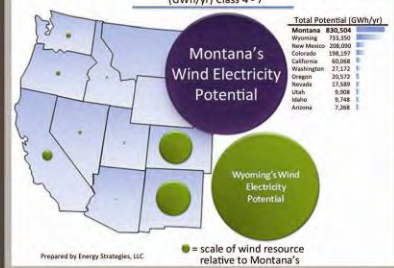
MONTANA







WIND ELECTRICITY POTENTIAL
(GWh/yr) Class 4 - 7



Montana's Wind Electricity Potential

Wyoming's Wind Electricity Potential

Prepared by Energy Strategies, LLC

● = scale of wind resource relative to Montana's

State	Total Potential (GWh/yr)
Montana	830,304
Wyoming	251,200
New Mexico	108,000
Colorado	108,197
California	108,000
Washington	21,172
Oregon	21,172
Nevada	21,172
Utah	9,748
Idaho	9,748
Arizona	9,748

Great communities.
Skilled workforce.
WORLD-CLASS WIND.

Born and raised in the Rocky Mountains, Montana wind has the greatest energy generation potential in the nation. With an unparalleled quality of life, top ranked business climate, and a government with money in the bank throughout the recession, Montana is a gold mine for wind & transmission development and manufacturing.



**Energy Promotion
and Development
Division**
Montana Department of Commerce



BOOTH #605

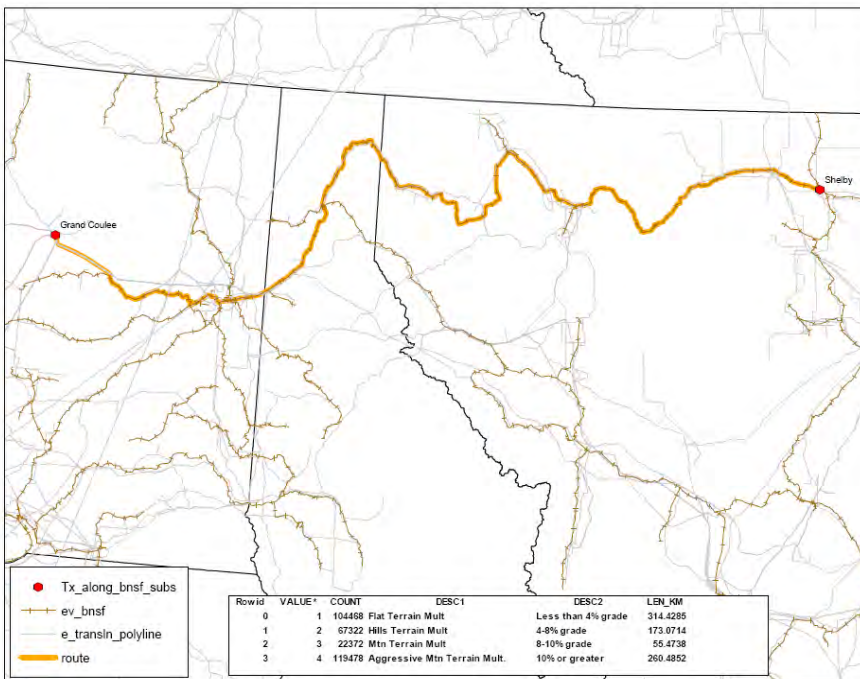
GOVERNOR
BRIAN SCHWEITZER

CONTACT THE GOVERNOR'S OFFICE AT BUSINESS.MT.GOV - 406.444.5634 OR
THE ENERGY PROMOTION AND DEVELOPMENT DIVISION AT COMMERCE.MT.GOV/ENERGY - 406.841.2030

Appendix 4: 2010 AWEA advertisement.



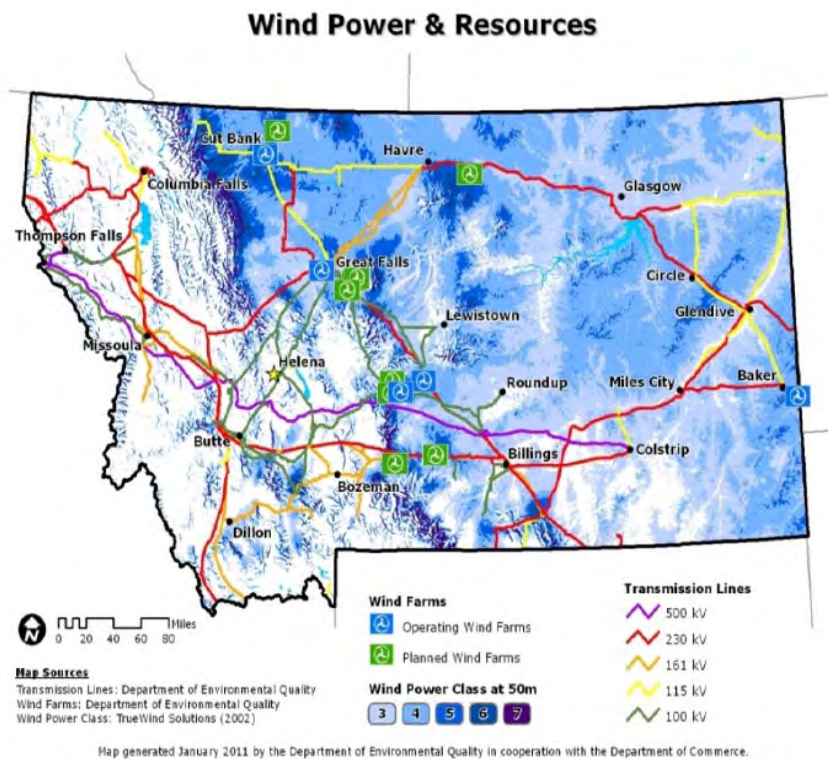
Appendix 5: Map looking at using BNSF right-of-way as a transmission corridor.



Appendix 6: Photograph of posters promoting Montana wind at a MSU football game.

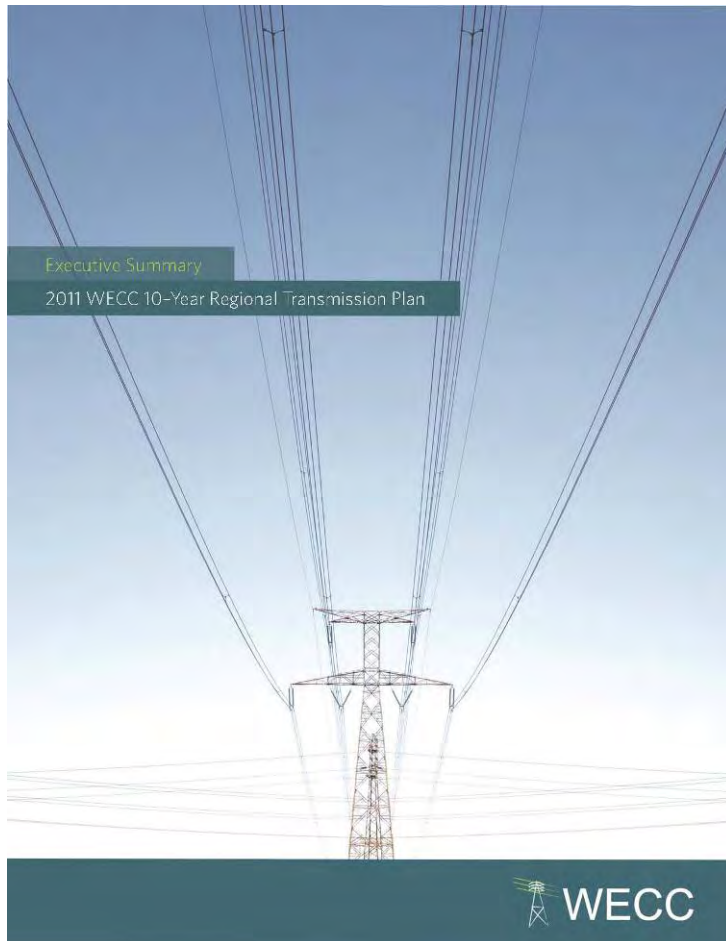


Appendix 7: Map created by EPDD and DEQ highlighting Montana's wind resources.



Appendix 8: Cover of WECC's 10-Year Regional Transmission Plan, which EPDD staff provided input. Full document available:

<http://www.commerce.mt.gov/content/Energy/docs/Presentations/WECC10YearPlan.pdf>



Appendix 9: Sample meeting summary from Transmission Working Group meeting.

Transmission/Wind Group Meeting Summary

A Montana Transmission Wind Working Group meeting was held on October 29, 2010 in Helena. Attended by approximately 50 stakeholders, the meeting covered transmission siting, potential modifications to the Montana Intertie transmission rate pancake, wind education and outreach and a presentation of a new wind farm site optimization tool.

The meeting began with a panel discussion with presenters providing perspectives on transmission siting in Montana given the recent experiences of MATL and MSTI and in light of

the other transmission projects being proposed in Montana. The panelists included Dave Gates representing NorthWestern Energy, Darryl James representing MATL, Chuck Magraw representing NRDC and Tom Ring representing MDEQ.

Panelist comments on siting covered a variety of perspectives including the following:

- Renewable energy development and transmission development needs to be done right in Montana and that if it's not done right it will hurt Montana, development, and consumers.
- Public concern about transmission siting is growing and there is a need for a more robust public vetting process to obtain better stakeholder buy-in and keeping the public constantly informed through a variety of means, including public forums.
- Industry needs certainty and predictability in siting process.
- Siting needs to be about siting and not economics particularly as MFSA relates to the determination of need.
- Timing mismatch in the permitting process—wind development can take 6 months while transmission can take 6 years or more—needs to be better synchronized.
- Industry wants to disconnect MFSA from MEPA and NEPA; there is a need to make certain that the siting act is the ultimate siting authority.

Following the panel session, an open discussion took place with most of the conversation focusing on the determination of need in state law for transmission projects. The takeaway of the transmission segment of the meeting was that siting is important to developing Montana renewable energy and MFSA, while needed, was written nearly forty years ago and many changes have occurred, such as energy de-regulation, that need to be reviewed as we grapple with ways to make siting more predictable and workable.

An update was provided on the issue of the potential of modifying the Bonneville Power Administration Montana Intertie Transmission rate. A number of Montana wind developers have argued for eliminating this rate pancake as a means of making Montana wind more competitive with Columbia Gorge wind and thus facilitating the delivery of high capacity factor Montana wind to the Pacific Northwest. The shape of Montana wind compliments Columbia Gorge wind,

i.e., Montana wind typically peaks in the winter while Columbia Gorge wind typically peaks in the spring/summer, thus helping to balance these two wind regimes.

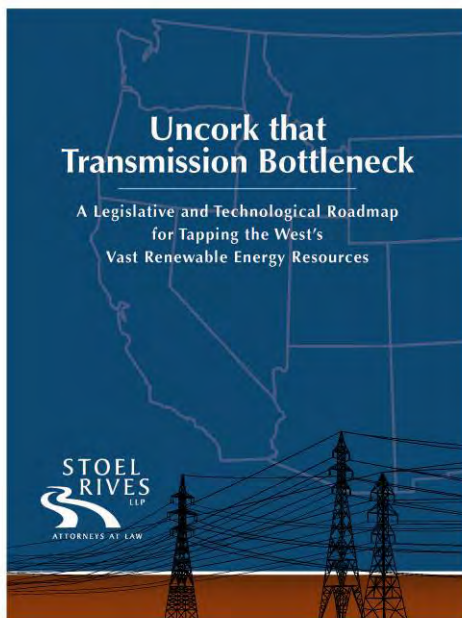
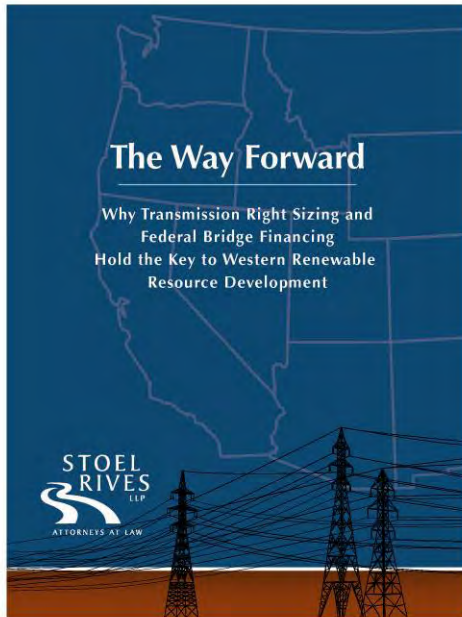
Governor Schweitzer wrote BPA Administrator Stephen Wright a letter last February urging BPA to eliminate this rate pancake. The issue was placed as a “parking lot” issue and discussed in a series of 2012 BPA transmission rate case workshops held this summer. BPA staff worked on preparing a detailed analysis of rate impacts for various scenarios of potential modifications and found no matter what option might be selected to modify the Montana Intertie rate pancake, the effects on the delivered cost of power would be negligible (less than one-half of one percent). The BPA rate case is set to commence on November 17, 2010 and it is within this process that any potential modifications to the Montana Intertie rate can occur.

Another segment of the meeting covered transmission education and outreach, i.e., a discussion of how to bring public support and how to get the word out about the benefits of transmission. The bottom line is that we all need to work harder to educate and spread the word about the positive impacts of transmission. An organized association was suggested to help clarify misunderstanding and provide timely and accurate information to the public. Public forums, discussion with local commissioners, and small scale targeting were also suggested as ways to provide education and outreach.

The meeting concluded with a working lunch and a presentation by Earl Dodd of the Rocky Mountain Super Computer Center (RMSC) on a newly developed wind farm optimization tool called M.O.R.E. Power (Maximizing and Optimizing Renewable Energy Power). This is a joint project of RMSC and Northrop Grumman to roll out the availability of this tool that uses sophisticated weather data sets, originally developed by the US Department of Defense for military purposes.

The use of the M.O.R.E. power tool is designed to optimize wind farm placement so as to maximize diversity benefits in wind farm placement and to realize more usable power output. A recent test demonstration of the tool showed how an optimized model of wind farms mirroring the current output of existing Montana wind farms could result in 58% more usable power.

Appendix 10: Cover images of two transmission reports requested by EPDD. Full reports available online: <http://www.commerce.mt.gov/Energy/publications.mcp>



Appendix 11: Promotional material promoting wind and transmission development in Montana
(2 images).

MONTANA'S RENEWABLE ENERGY PORTFOLIO

Montana's Resource History

Development of the Treasure State's vast natural resources is Montana's history. Rich mineral deposits brought our forefathers here to secure their economic prosperity. The land was torn open and the minerals were quickly extracted in abundance. These resources gave rise to a strong economy and eventually statehood. Montana's mineral wealth remains largely intact, but demand for Montana resources has shifted.

A New Day

Today, Montana's vast, diverse energy portfolio provides Montana with a great opportunity to meet national and international demands for clean, renewable energy and helps to secure the future of our economy and the prosperity of our citizens.

Developing Montana's Broad Energy Portfolio

Montana is blessed with an abundance of energy resources, both conventional and renewable, that can be harnessed to reap economic benefits, increase energy security and address environmental concerns. Renewable resources can meet growing demand for clean, domestic energy while decreasing our reliance on energy supplied by unfriendly and unstable countries that we should not be supporting with our energy dollars. Energy development in Montana means export to external markets, which we do already with about 60% of our current energy production. As always, Montana citizens want it done in a manner that provides for sustainable, affordable energy for Montana's businesses, industries and families for generations to come.

MONTANA RENEWABLE PORTFOLIO SNAPSHOT

- 2nd highest wind energy potential in US
4 wind farms producing 386 MW
- 15 high temperature geothermal sites
several direct use sites
- 16.5 million acres of crop land
1 yr. biodiesel contract with BNSF
- 19 million acres of non-reserved forest
proposed UM biomass boiler system

RENEWING MONTANA'S RURAL ECONOMIES

Montana's wide open spaces have served Montanans in a multitude of ways. Homesteaders traveled the James Hill rail line to stake their claim in Montana's soils and in the nation's growing wheat market. Today with the rise of corporate farms, we have seen a dramatic decrease in the number of Montana family farms as agricultural production on a smaller scale has become less and less sustainable.

Now Montana farmers and ranchers have a new market that they can tap into...clean, green, renewable energy. It just so happens that the bread basket of the world is also one of the world's best energy corridors. Whether growing oilseed or erecting wind farms, rural Montana is finding that agriculture and energy go hand in hand.



Energy Promotion
and Development
Division
Division of Natural Resources

RENEWING MONTANA'S ECONOMY

ECONOMIC BENEFITS OF WIND ENERGY

The US Department of Energy has determined the US could achieve 20% of its electricity needs from wind by year 2030. To attain this percentage, Montana is expected to contribute 5,261 MW of wind generated electricity. As development of this resource continues, Montanans can expect to see an increase in high paying jobs and additional revenues generated from state and local taxes.

ACCESS TO MARKETS

Development of Montana's energy resources hinges on our ability to deliver a product to market. Montana currently exports ~60% of its electrical generation to out of state markets, but that capacity is limited. Expanding our transmission line capacity is essential to further renewable energy development in Montana.

MONTANA HAS THE LOWEST COST FOR WIND GENERATION IN THE WEST

LEVELIZED BUSBAR COST (\$/MWH)	
ARIZONA	\$93.36
CALIFORNIA	\$95.89
COLORADO	\$91.50
IDAHO	\$102.11
MONTANA	\$76.62
NEVADA	\$103.27
NEW MEXICO	\$88.53
OREGON	\$96.26
UTAH	\$98.17
WASHINGTON	\$109.60
WYOMING	\$81.91

SOURCE: ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

Economic Impacts from 1,000 MW of New Wind Development

DIRECT IMPACTS	INDIRECT & INDUCED IMPACTS	TOTALS (construction + 20 years)
PAYMENTS TO LANDOWNERS: \$2.7 million/year	CONSTRUCTION PHASE: \$118.1 million to local economies 1,505 new jobs	TOTAL ECONOMIC BENEFIT: \$1.2 Billion
LOCAL PROPERTY TAX REVENUE: \$14.9 million/year	OPERATIONAL PHASE: \$22.6 million/year to local economies 276 local jobs	NEW LOCAL JOBS DURING CONSTRUCTION: 3,211 jobs
CONSTRUCTION PHASE: \$188.5 million to local economies 1,706 new jobs		NEW LOCAL LONG TERM JOBS: 547 jobs
OPERATIONAL PHASE: \$21.2 million/year to local economies 271 new long term jobs		

SOURCE: MONTANA RENEWABLE ENERGY LABORATORY

Economic Impacts of Operational Montana Wind Projects

Wind Farm	Mega Watts	Property Taxes (2010)	Annual Property Taxes after credit expiration
Horseshoe Bend	9	\$211,888	\$350,000 (exp. 2018)
Diamond Willow	30	\$81,369	\$110,000 (exp. 2017)
Judith Gap	135	\$1,441,874	\$2,300,000 (exp. 2015)
Glacier	210	\$3,708,734	\$6,200,000 (exp. 2018)

SOURCE: MT DEPT. OF REVENUE

Economic Impact Estimates from Montana Transmission Projects

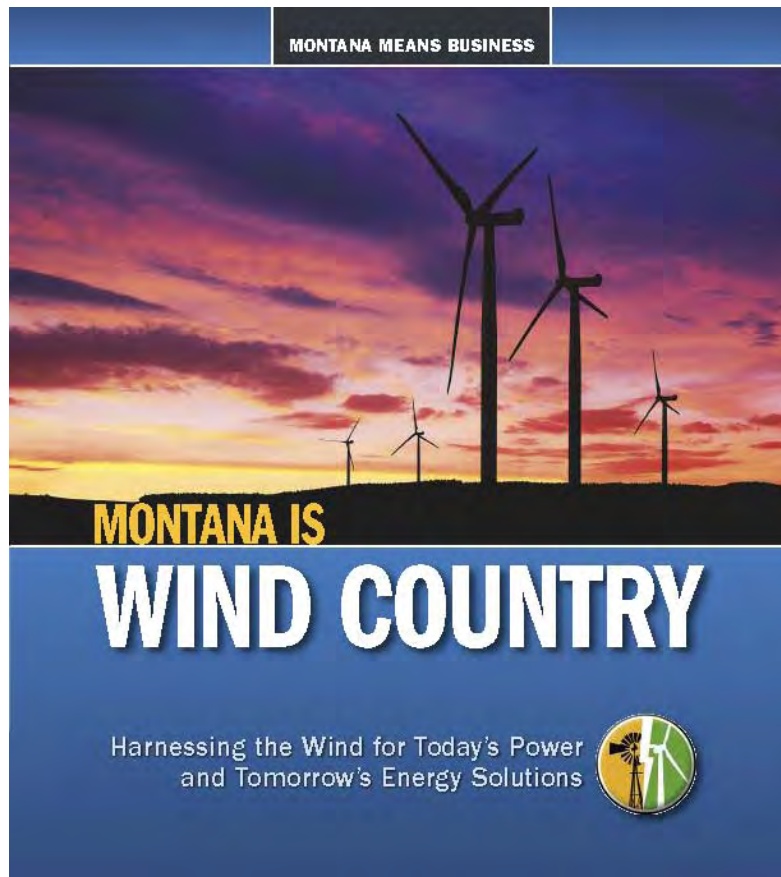
Transmission Project	Capital Expenditure	Direct Jobs	Total Jobs	Direct Impact	Total Impact
MSTI	\$616,431,000	742	1,203	\$68,865,272	\$120,046,544
MATL	\$162,132,000	360	720	\$52,492,984	\$92,173,816
NWE Collectors	\$842,455,000	2,082	3,980	\$272,759,520	\$482,279,520
Grasslands	\$1,474,639,000	1,776	2,878	\$164,735,952	\$287,169,472
Chinook Line	\$939,502,000	1,131	1,833	\$104,947,160	\$182,945,424
Colstrip	\$215,751,000	546	1,034	\$86,951,160	\$140,643,872

SOURCE: MT DEPT. OF LABOR AND INDUSTRY


* Information regarding current printing and distribution may be obtained from the Energy Promotion and Development Division of the MT Department of Commerce

Appendix 12: *Montana is Wind Country* brochure cover. Full brochure available online:

<http://www.commerce.mt.gov/content/Energy/docs/WindBrochure.pdf>



Appendix 13: Presentation given by EPDD staff on renewable energy opportunities for tribal communities.

<h3>Energy Promotion & Development Division</h3> <p>Funding Tribal Energy Projects</p> <p>Dan Lloyd dlloyd@mt.gov March 31, 2011</p>	<h3>Overview</h3> <p>How do energy projects get financed?</p> <ul style="list-style-type: none"> • Typical structure • Public programs <ul style="list-style-type: none"> • Local • State • Federal <p>Who can I contact for more information?</p> <ul style="list-style-type: none"> • Development organizations & state agencies • Web resources 	<h3>Typical Funding Structure</h3> <ul style="list-style-type: none"> • Large projects funded primarily through private capital <ul style="list-style-type: none"> • 20% equity • 80% debt/loan • Public sector programs supplement private funding sources <ul style="list-style-type: none"> • Low-interest loans • Loan guarantees • Seed money: feasibility studies, preliminary engineering
<h3>Local Assistance</h3> 	<h3>Certified Regional Development Corporations</h3> <ul style="list-style-type: none"> • Big Sky Economic Development - Rocky Boy & Ft. Belknap PH: 406-268-9226 • Big Sky Economic Development - Crow PH: 406-962-3914 • Big Sky Economic Development - Ft. Peck PH: 406-683-2990 • Big Sky Economic Development - Northern Cheyenne PH: 406-748-2990 • Big Sky Economic Development - Blackfoot PH: 406-727-5173 • Big Sky Economic Development - Flathead PH: 406-678-9901 	<h3>Certified Regional Development Organizations</h3> <ul style="list-style-type: none"> • Big Sky Economic Development PH: 406-447-1510 • Big Sky Economic Development PH: 406-535-2591 • Big Sky Economic Development PH: 406-782-7333 • Big Sky Economic Development PH: 406-433-2103
<h3>Montana Department of Commerce Programs</h3> <ul style="list-style-type: none"> • Select Programs through Business Resource Division <ul style="list-style-type: none"> • Workforce Training Grants • Big Sky Economic Development Trust Fund • Treasure State Endowment Grants • Montana Board of Investments • Indian Country Economic Development Grants 	<h3>State Programs: Montana Dept of Commerce</h3> <p>Business Resources Division</p> <ul style="list-style-type: none"> • Administers programs aimed at improving Montana's economic and business climate. • Work with the private sector, LDO's and federal and private programs • Enhance the economic base of Montana through business creation, expansion, and retention efforts. 	<h3>State Programs: Montana Dept of Commerce</h3> <p>Workforce Training Grants</p> <ul style="list-style-type: none"> • Use for employee training needs • \$5,000 / job created typical • Approximately \$4 million granted out annually • Eligible jobs must pay lower of state or county average wage
<h3>State Programs: Montana Dept of Commerce</h3> <p>Big Sky Trust Fund</p> <ul style="list-style-type: none"> • Use for planning and development • \$5,000 - \$7,500 / job created • Approximately \$1 million granted out annually with amounts increasing as trust builds principal • Eligible jobs must pay average county wage 	<h3>State Programs: Montana Dept of Commerce</h3> <p>Treasure State Endowment Grants</p> <ul style="list-style-type: none"> • Use for planning and public infrastructure grants • \$15,000 planning grant • \$750,000 max. infrastructure construction grant • Jennifer Olson, Bureau Chief (406) 841-2773 	<h3>State Programs: MT Finance Information Center</h3> <p>http://www.mtfinancetoday.com</p> <p>Provides info on:</p> <ul style="list-style-type: none"> • Business Finance • Public Infrastructure • Housing Programs • Local Development • Tribal Resources

<h3>Federal Programs</h3> <ul style="list-style-type: none"> USDA Rural Development <ul style="list-style-type: none"> Loan Guarantees up to \$25,000,000 Other grant possibilities REAP Workshop May 10th 	<h3>Federal Programs</h3> <ul style="list-style-type: none"> Tribal Energy Development Guide (DOE) <ul style="list-style-type: none"> http://www.doe.gov/energy-efficiency/tribal Excellent walkthrough of development process Gateway to information and financial resources from federal gov't <ul style="list-style-type: none"> Dept of Ag Dept of Interior Dept of Commerce EPA 	<h3>Summary</h3> <ul style="list-style-type: none"> Energy projects are capital intensive Generally require private investors Wide variety of public programs Talk to as many people/organizations as possible Utilize the vast public resources available
<h3>Thanks</h3> <p>Energy Promotion and Development Division</p> <p>Dan Lloyd 841-2033 dlloyd@mt.gov</p>		