



# Energy Promotion and Development Division

Montana Department of Commerce



## MT ENERGY INDUSTRY: CURRENT TRENDS

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SWIB SECTOR STRATEGIES  
JANUARY 11, 2012

# EPDD Mission



## Energy Promotion and Development Division

Montana Department of Commerce

- Foster creation of high quality jobs
- Increase tax base
- Increase Montana energy production

# EPDD Activities



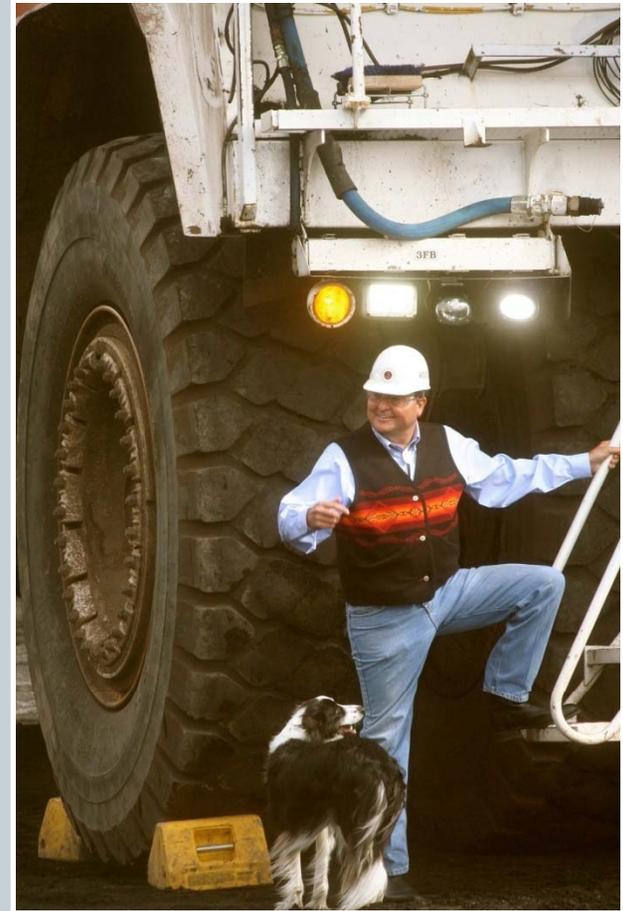
- Due diligence/research on potential partnerships, businesses, and technologies
- Identify and secure funding assistance for energy development projects
- Bring national energy companies to Montana to explore our resources
- Facilitate discussions between potential partnerships
- Monitor energy projects and assist as needed



# The Schweitzer Energy Policy



- Long term, sustainable, reliable, and affordable energy
- Economic growth
- National energy independence
- Clean energy technology
- Clean and healthful environment
- Maintain the Montana quality of life



# A Diverse, Balanced Energy Portfolio

## Traditional Energy Resources

- Coal
- Oil
- Natural Gas



## Renewable Energy Resources

- Wind
- Geothermal
- Hydroelectric
- Bioenergy

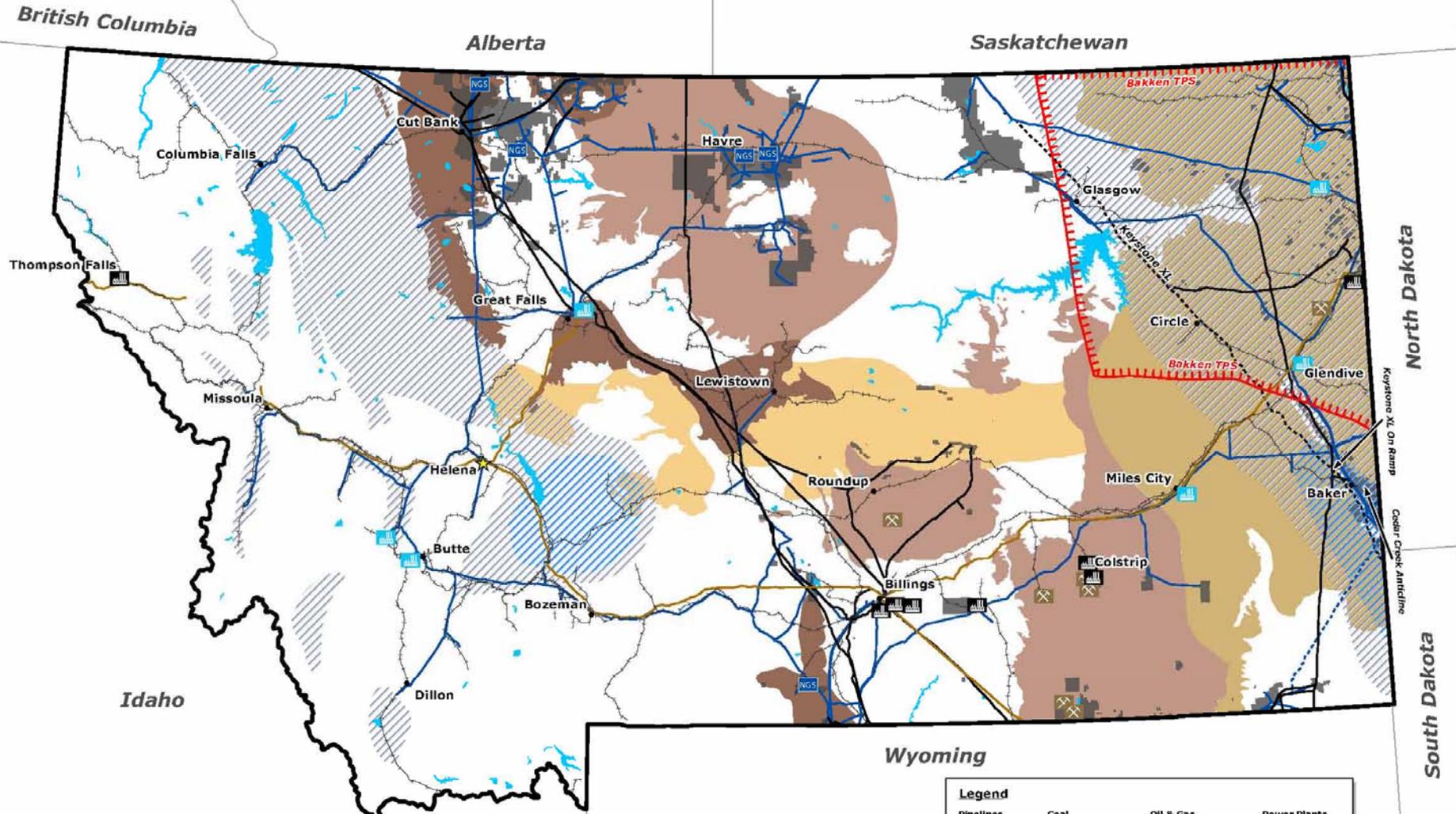


# Montana Energy Highlights



- #1 in U.S. coal deposits
- #1 in wind potential class 3 and above
- More than 15 locations for potential geothermal energy
- Oil production doubled in the last decade
- 16.5 million acres of crop land
- 19 million acres of non-reserved forest
- First completely merchant transmission line in the west

# Traditional Energy Resources



**Map Sources**  
 Pipelines: Department of Environmental Quality  
 Coal Mines: Department of Environmental Quality  
 Coal Shale Deposits: Montana State University (1974)  
 Bakken TPS (Bakken-Lodgepole Total Petroleum System): United States Geological Survey (2008)  
 Oil & Gas Fields: Board of Oil & Gas Conservation  
 Shale Gas Plays & Basins: US Energy Information Administration  
 Coal Power Plants: Department of Environmental Quality  
 Natural Gas Storage Units: Board of Oil & Gas Conservation

Legend			
<b>Pipelines</b>	<b>Coal</b>	<b>Oil &amp; Gas</b>	<b>Power Plants</b>
<i>In Service</i>	Coal Mines	Bakken TPS	Coal
Natural Gas	Coal Shale Deposits	Oil & Gas Fields	Natural Gas
Crude Oil	Bituminous	Shale Gas Plays	
Refined Oil	Sub-bituminous	Shale Gas Basins	
<i>In Progress</i>	Lignite	NGS Natural Gas Storage Units	
Natural Gas	Oil-shale		
Crude Oil	Railroads		

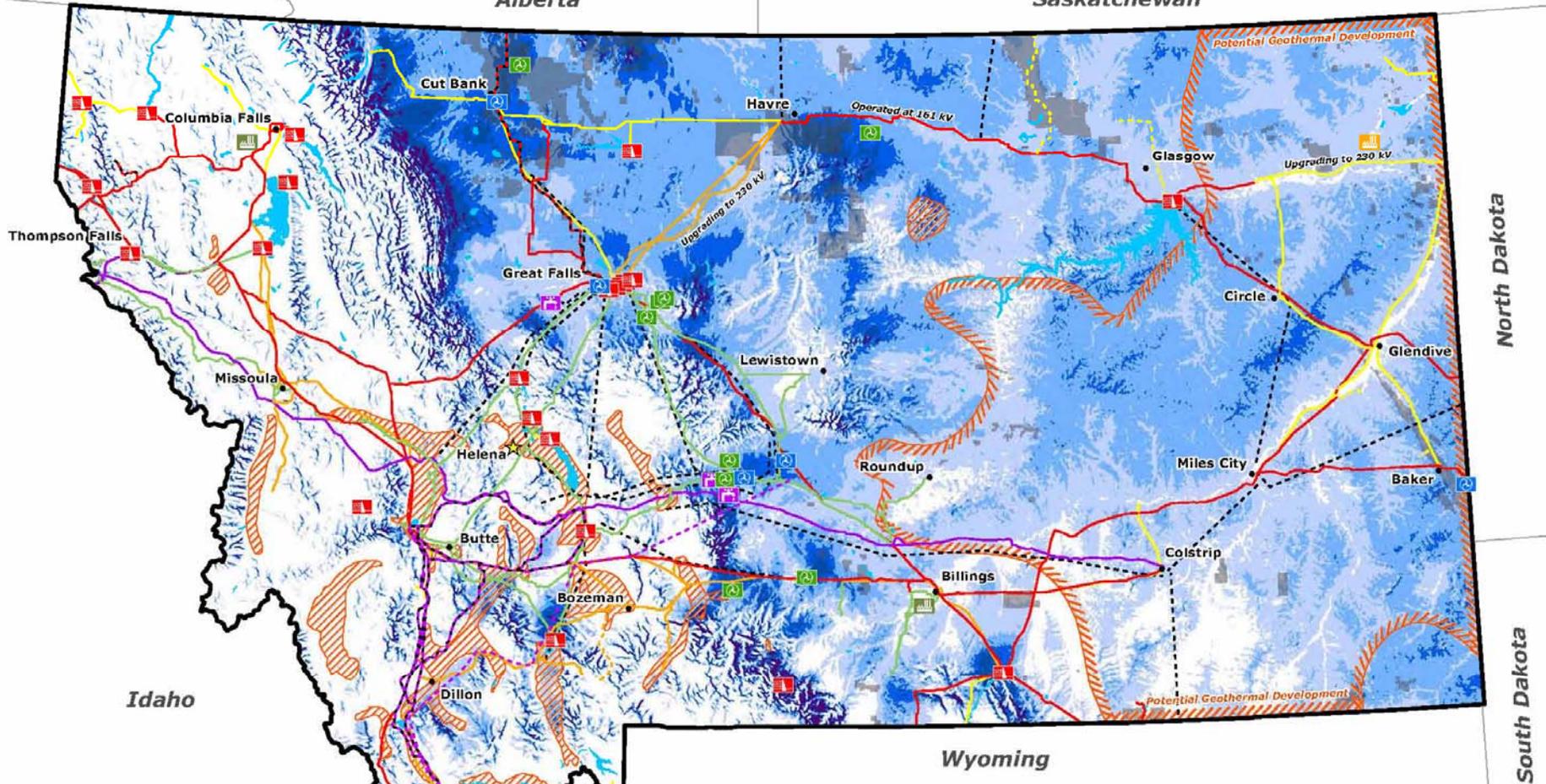
0 5 10 20 30 40 Miles

# Renewable Energy Resources

British Columbia

Alberta

Saskatchewan



**Legend**

<b>Transmission Lines</b>			<b>Wind</b>	<b>Carbon Sequestration</b>	<b>Water</b>
In Service	In Progress	Being Planned	Operating Wind Farms	CO2 Sink	Hydroelectric Dams
500 kV	500 kV	500 kV (DC)	Planned Wind Farms	Energy Recovery Projects	Planned Pumped Hydroelectric
230 kV	230 kV	161 kV	Wind Power Class	Waste Heat	
161 kV	115 kV	115 kV	3 4 5 6 7	Methane Collection	
115 kV	100 kV	Conceptual	Watts/square meter @ 50m elevation	Geothermal	
100 kV				Potential Development	

0 5 10 20 30 40 Miles

**Map Sources**  
 Transmission Lines: Department of Environmental Quality  
 Wind Farms: Department of Environmental Quality  
 Wind Power Class: TrueWind Solutions (2002)  
 Potential Geothermal Development: Idaho National Engineering & Environmental Laboratory (2003)  
 CO2 Sinks: NatCarb (2008 Atlas - Oil & Gas Reservoirs)  
 Gas Storage Units: Board of Oil & Gas Conservation  
 Hydroelectric Dams: Department of Fish, Wildlife and Parks  
 Pumped Hydroelectric: Department of Environmental Quality  
 Energy Recovery: Department of Environmental Quality

# Energy Industry Across Montana



- **Coal**

- New mines
- Export development

- **Oil**

- Bakken boom
- Keystone XL

- **Transmission**

- MATL
- Colstrip Upgrades
- MSTI

- **Wind**

- Rim Rock
- PTC Expiration?

- **Bioenergy**

- Potential biofuels projects

# MT is Coal Country



## Montana's Coal Reserves

**120 Billion Tons**

**28% Nation's Coal**

**8% World's Coal**

# Coal Mining in Montana



## Existing Mines

- Decker Coal Co. at Decker, MT
- Spring Creek Coal Co. at Decker, MT
- Western Energy Co. at Colstrip, MT
- Signal Peak Energy at Roundup, MT
- Westmoreland Resources at Hardin, MT

## Otter Creek

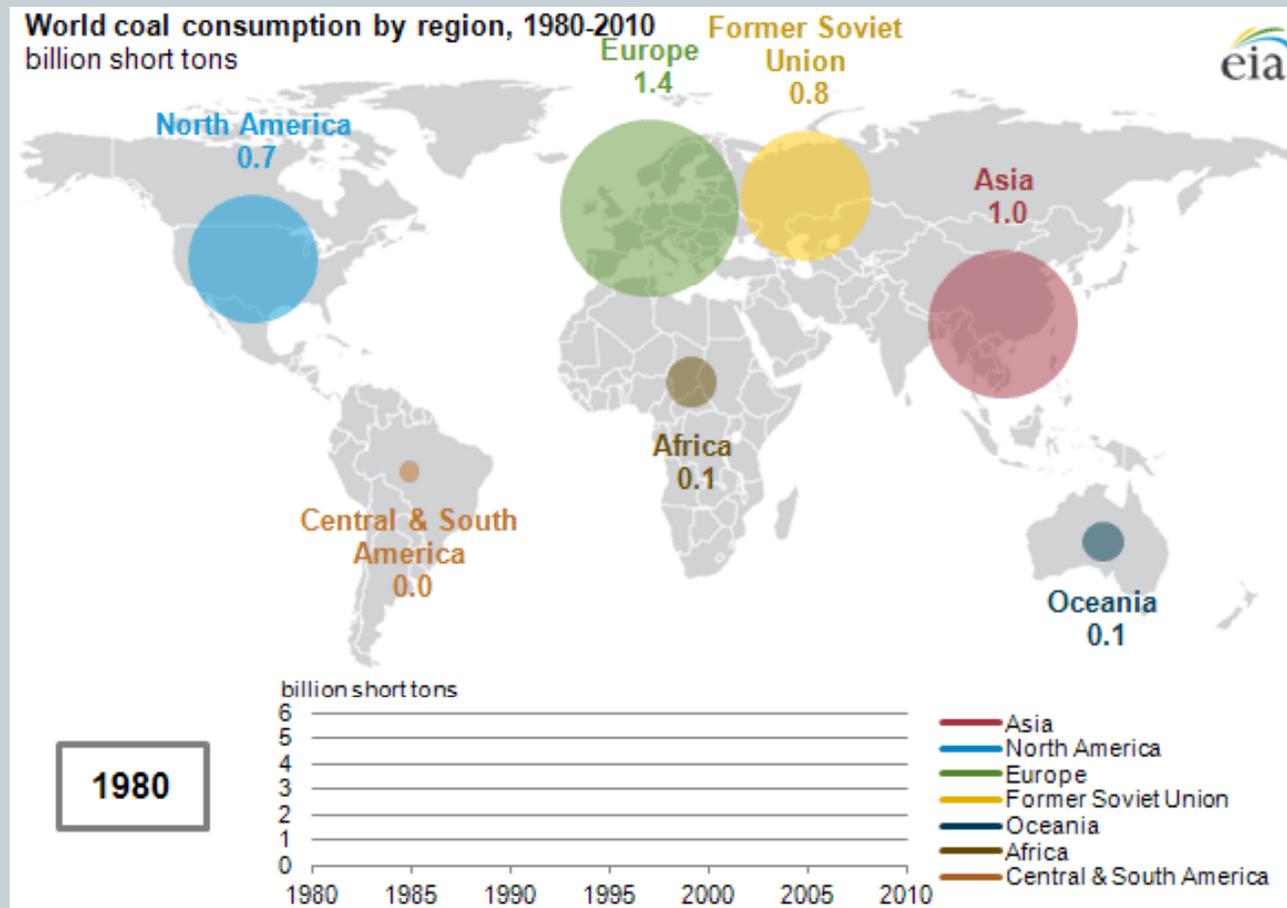
- 1.3 billion tons of coal
- Tongue River Railroad
- Pacific ports
- Far east markets
  - Pacific Rim
  - India

# Issues Impacting MT Coal Development



- **Asian Demand**
  - Port development
- **New Mines & Expanded Production**
  - Otter Creek, Carpenter Creek, Bridger-Fromberg, Pace American
  - New Ownership at Decker
- **Advanced Coal Projects**
  - Big Sky CSP- Kevin Dome
- **Legal Challenges**
  - Otter Creek Lease
  - Tongue River Railroad STB Permit

# Increasing Asian Demand for Coal

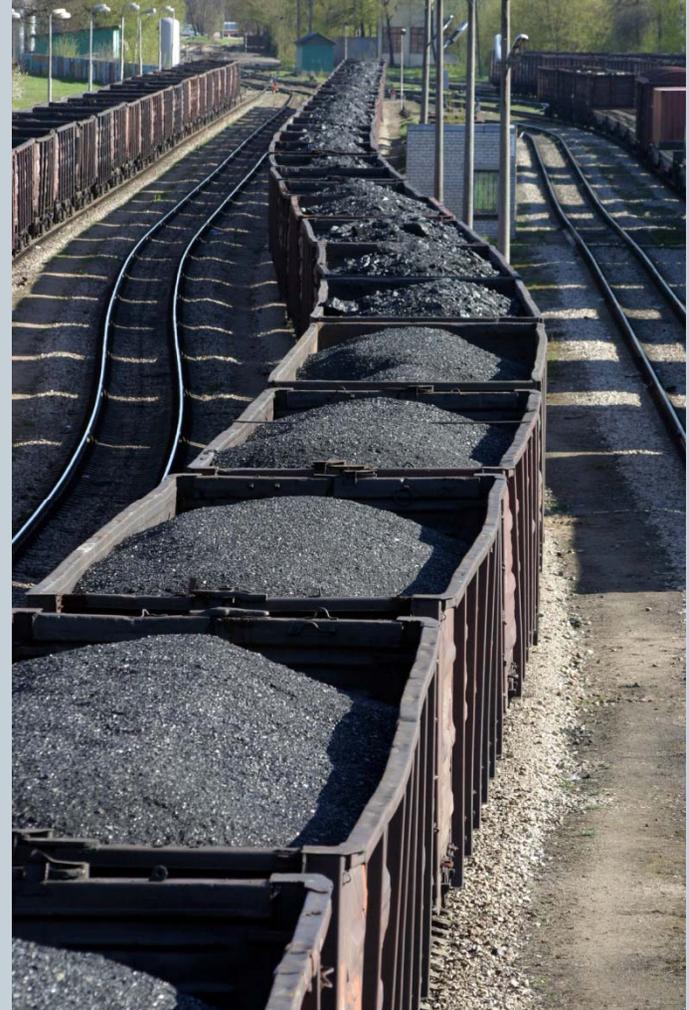


Source: U.S. Energy Information Administration, International Energy Statistics

# Infrastructure Needed for Coal Exports



- Current coal export, through BC ports, at capacity
- Development of at least 2 new ports in Washington
  - Port of Longview- up to 60 mm tons/yr
  - Cherry Point Port- up to 48 mm tons/yr
- Tongue River Railroad
- Increased rail traffic



# Legal Issues Impacting Coal Development

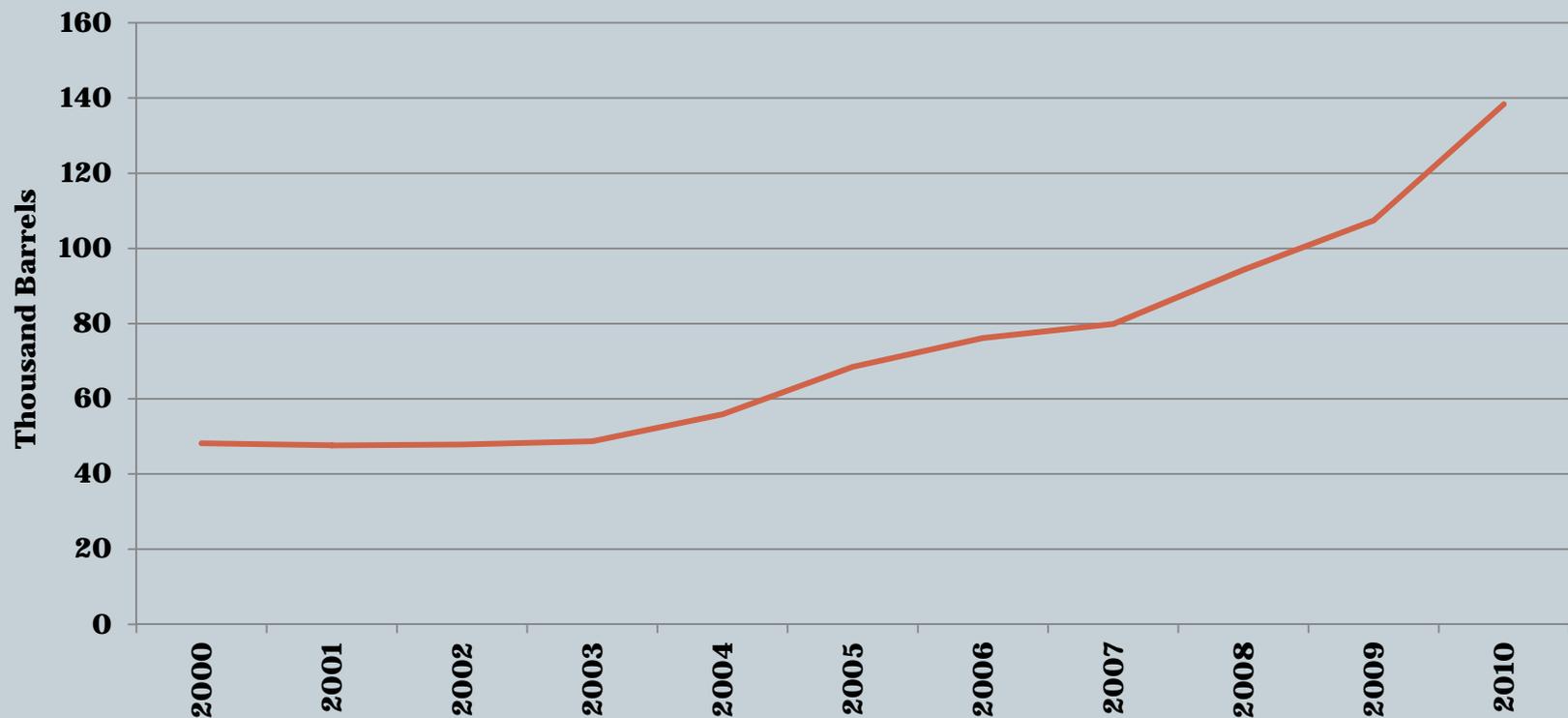


- Suit arguing the Land Board failed to recognize constitutional guarantees of a clean environment when it made its decision to lease the state owned Otter Creek coal tracts.
  - State and Arch Coal v. Four Environmental Organizations
  - Court ruling forthcoming
- Lawsuit challenging the Surface Transportation Board (STB) did not look at the environmental risks of approving the Tongue River Railroad
  - Ruling in December 2011 requires STB to look at impacts of developing Otter Creek
  - Potential 2 year delay in construction

# Quenching the Nation's Thirst for Petroleum



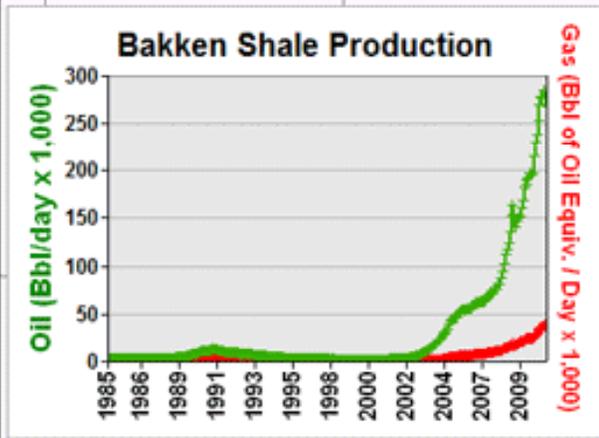
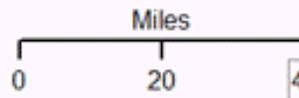
## Bakken Oil Production (MT & ND)



# Bakken Shale Production 1985-2010 Williston Basin, ND & MT

**2010**

- Bakken Shale Producing Wells**  
Bbl Oil per Day (Mean per Quarter)
- 0 - 100
  - 101 - 500
  - > 500
- Gas-Oil Ratio (Mean per Quarter)
- 0 - 1,000 (Oil Bbl >>> Gas BOE)
  - 1,001 - 6,000 (Oil Bbl > Gas BOE)
  - > 6,000 (Gas BOE > Oil Bbl)
- Bakken Depositional Limit**



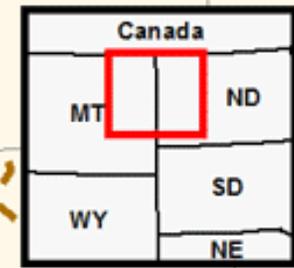
1996: Middle Bakken Vertical well Tests Elm Coulee Field

2000: Elm Coulee Middle Bakken Horizontal wells Discovery

1987: Upper Bakken Shale Horizontal Wells Billings Nose

1976: Upper Bakken Shale, Vertical wells Billings Nose

2006: Parshall Field discovered

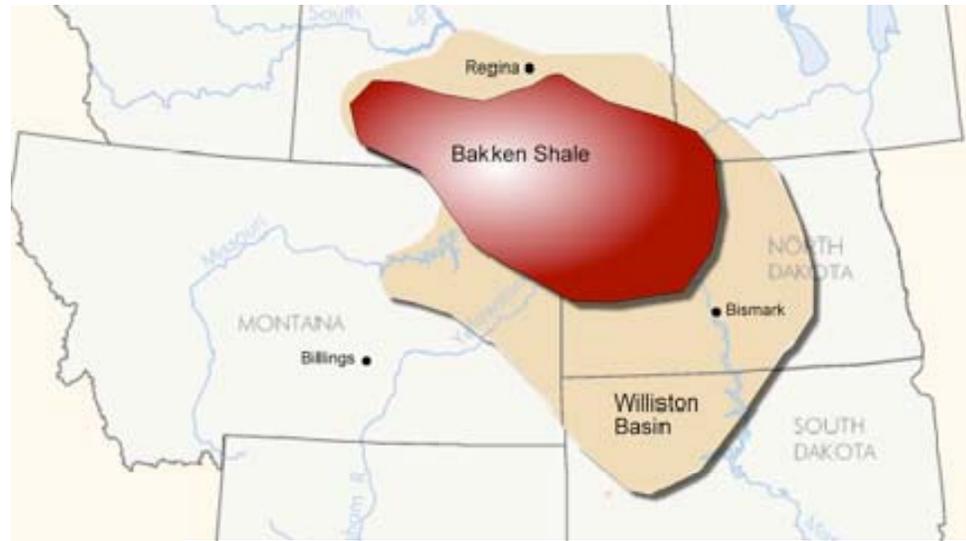




## Montana Production for Domestic Supply

### The Bakken Formation

- 4.3 billion recoverable barrels (increasing)
- Sweet, light crude
- 100% drilling success rate due to horizontal drilling and hydraulic fracturing
- MT wells over 3,000 barrels/day
- ND wells over 5,000 barrels/day



### Montana Production Tax Advantage

Primary Recovery Production First 12 Months.....	0.5%
Primary Recovery Production After 12 Months	
pre-1999 wells.....	12.5%
post-1999 wells.....	9.0%
Horizontally completed well production	
First 18 months of qualifying production.....	0.5%
After 18 months	
pre-1999 wells.....	12.5%
post-1999 wells.....	9.0%

**Avg. Taxes Paid per Barrel of Oil FY05 - FY08:**  
**Montana = \$4.89    North Dakota = \$5.27**

# MT Oil and Gas



- 2010 value of MT oil production~ \$1.8 billion
  - 9 active drilling rigs, more on the way
- Industry agrees MT's business climate and tax structure not detrimental to increased drilling:
  - Brigham Energy: "They (Montana) have a good operating environment." (Billings Gazette May, 2011)
- 6<sup>th</sup> best overall tax climate for business (Tax Foundation 2011)
- Teton County
  - 68% of State Trust land leased

# Oil & Gas Employment Impacts



- **4,600 Employees in Exploration, Production, or Refining (2009)**
  - Average wage of approximately \$60,000
- **Richland County: 2.8% unemployment (Oct. 2011)**
  - 14.6% and 14.4% in Big Horn and Sanders
- **More than 50 Billings businesses involved in Bakken activity**

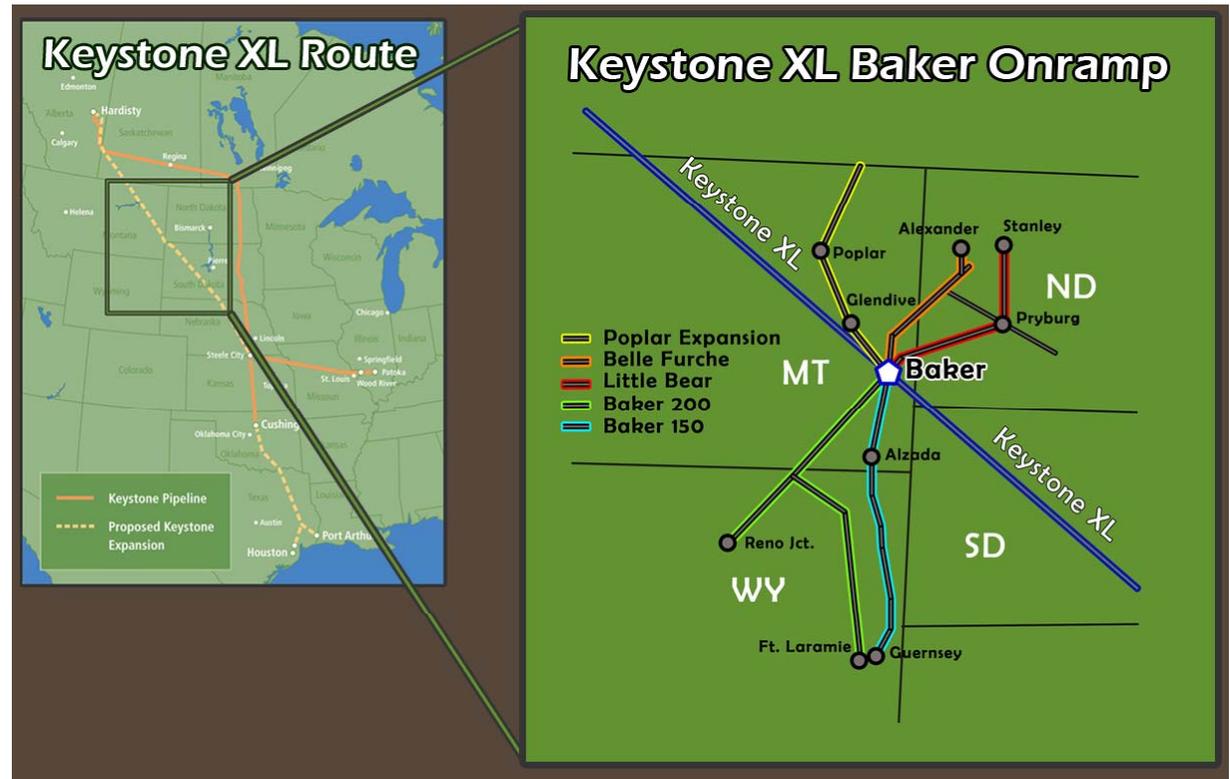


## Value added through Keystone XL

The proposed Keystone XL pipeline proposed by TransCanada will connect Canadian and Bakken oil source to refineries in Port Arthur, TX.

The Baker Onramp will originally allow 65,000 bpd of Bakken crude oil capacity within the pipeline, adding great value to Montana's oil production.

## The Keystone XL Pipeline and Baker Onramp



# 2011 Oil and Gas Impact Funds



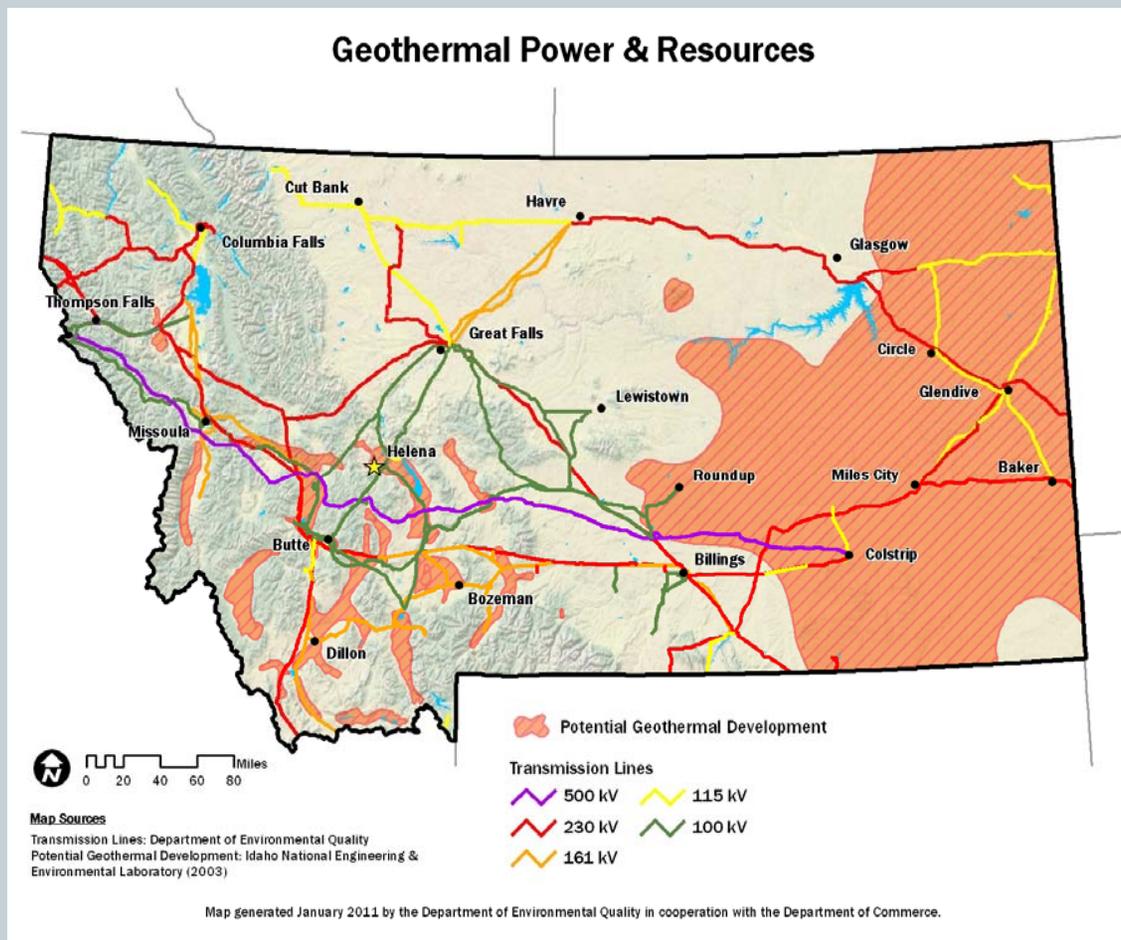
- **Richland: \$47 mm**
- **Fallon County: \$21.7 mm**
- **Sheridan: \$5.2 mm**
- **Roosevelt: \$4.5 mm**
- **Wibaux: \$3.5 mm**
- **Powder River: \$2.5 mm**
- **Glacier \$2.0 mm**

# Opportunities between the Oil, Gas and Geothermal Industries

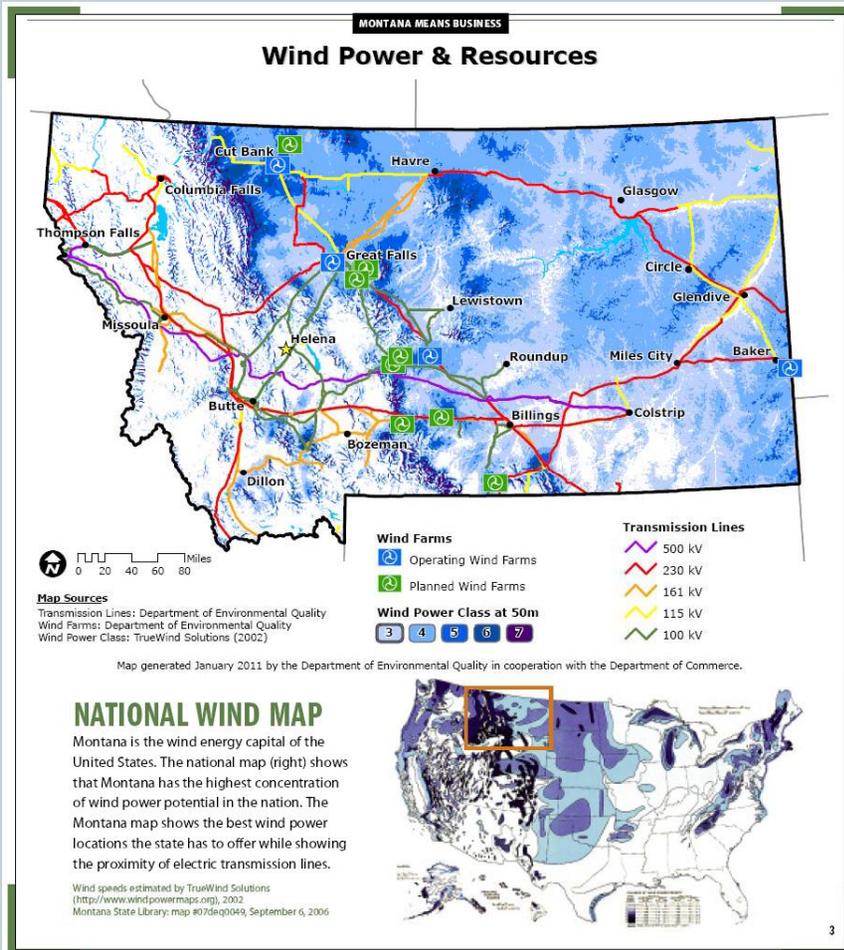
Montana has massive geothermal energy underneath its surface.

The Bureau of Mines and Geology has conducted a report on Montana's geothermal resources largely using data from oil and gas drilling.

Opportunities exist for these energy industries to combine their efforts to further development in Montana.



# Montana: Where the Wind Blows



- Montana is #1 where it counts (Class 3 and above)
- Unique wind patterns
- 386 MW online
- \$812.5 million capital investment in existing WF's
- Rim Rock - \$700 million additional investment

## Energy Investments and Direct Job Impacts to Montana

Wind Project	MW	Capital Investment	Direct Jobs
Horseshoe Bend WF	9	\$15 million	21
Diamond Willow WF	30	\$45 million	83
Judith Gap WF	135	\$202.5 million	162
Galcier I & II WFs	210	\$550 million	371
<b>Totals:</b>	<b>384</b>	<b>\$812.5 million</b>	<b>637</b>

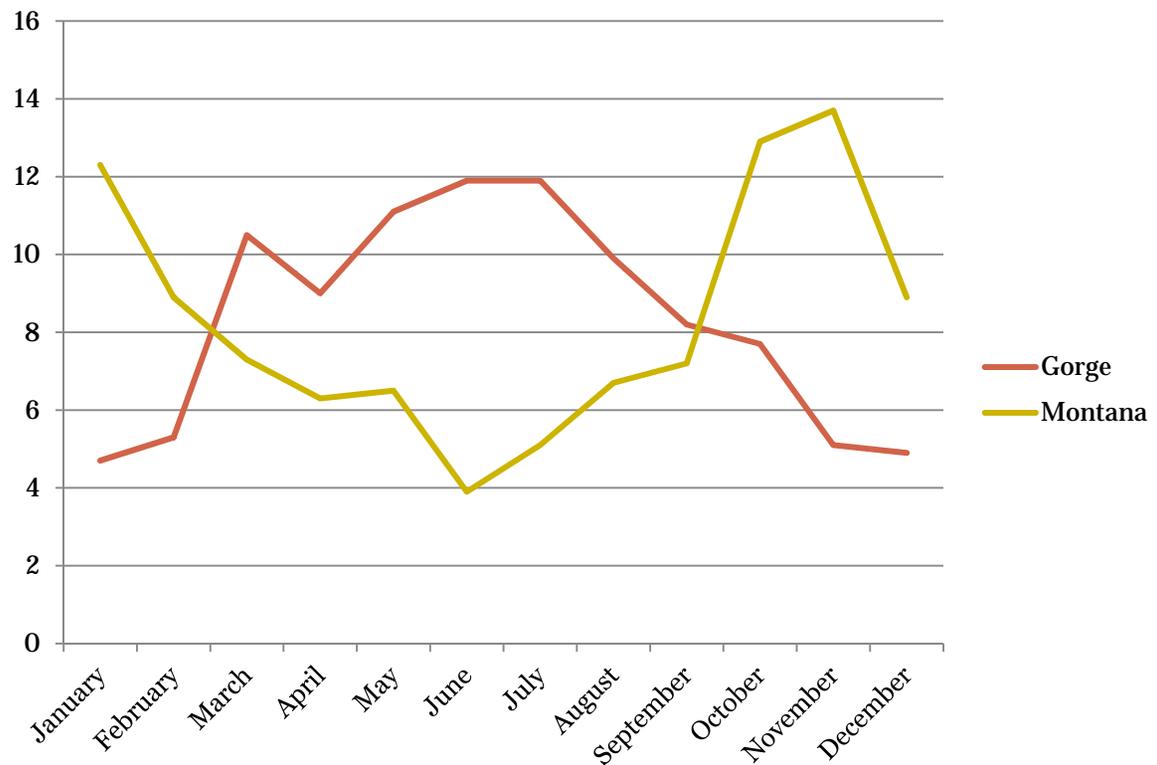


## When the Wind Blows

Montana wind blows when it counts:

- During the day when energy demand is at its peak
- During the winter when energy is needed to heat homes and buildings throughout the region

### Montana Wind vs. Washington Columbia Gorge Wind





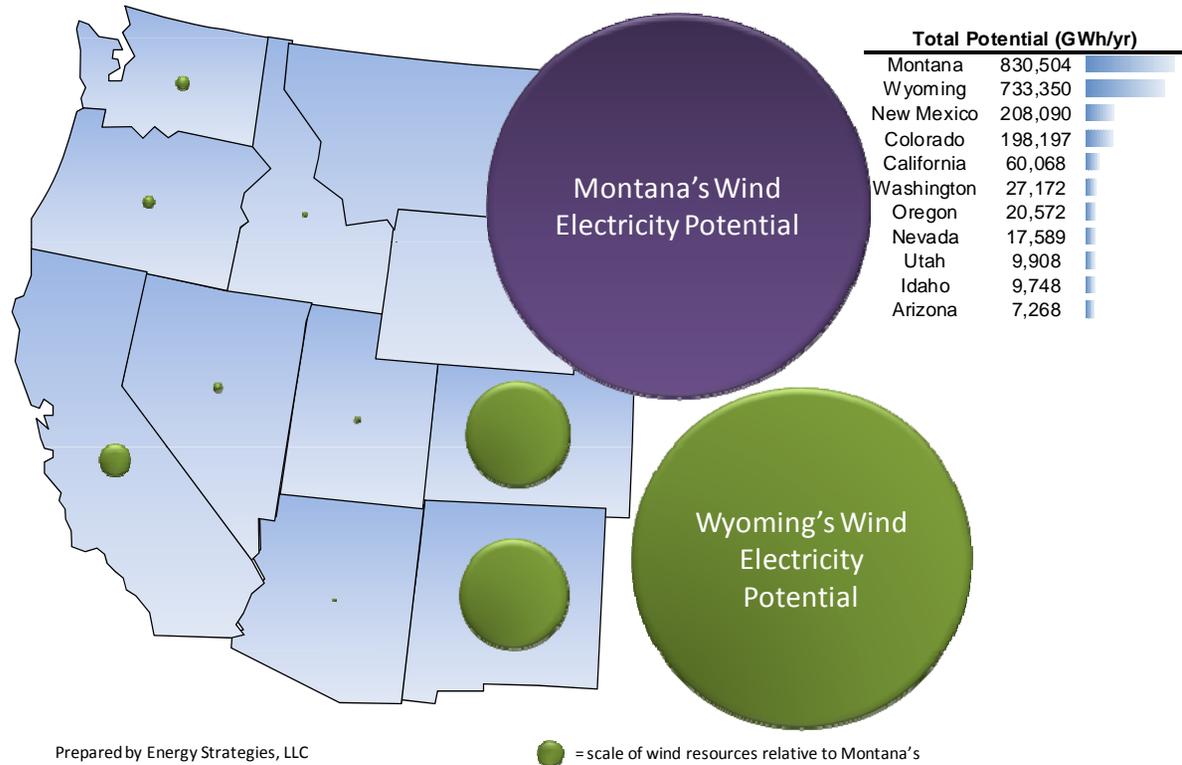
## Energy Supply

Adversely, renewable energy supply is not located near the region's large demand near the pacific coast and southwest.

Montana's renewable resource supply must be able to reach these markets through an intelligent transmission system.

## Western States Wind Energy Potential

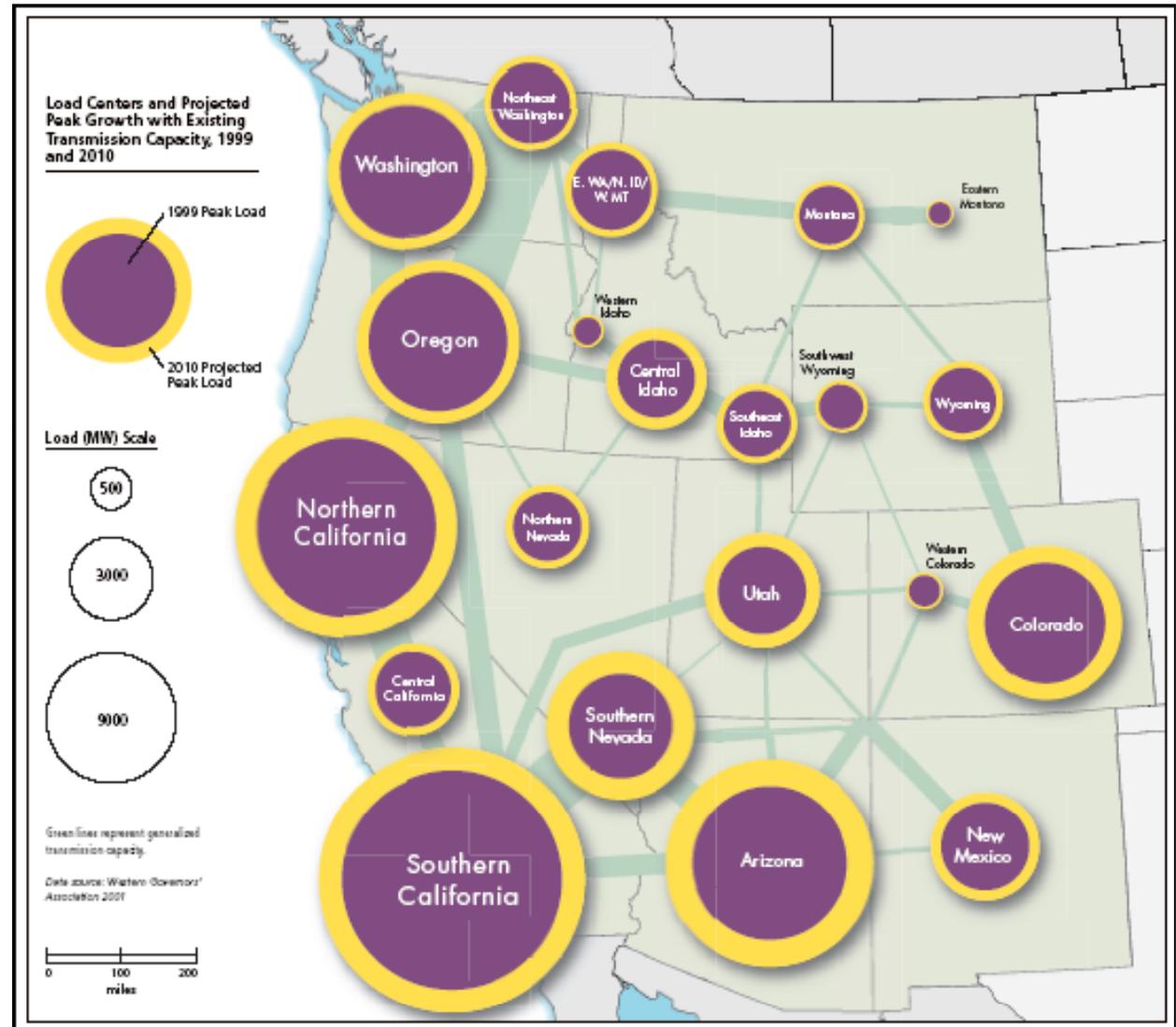
Wind Electricity Potential  
(GWh/yr) Class 4-7



# Montana's Export Markets

Regional market demand in the west is increasing. Renewable Energy Standards have also placed an increased demand on renewable energy.

Montana currently exports ~60% of its electrical generation; increased export is hindered by limited transmission capacity.



# Firming Montana's World-Class Wind

Pairing Montana's natural resources with firming and storage technologies

## Pumped Hydro

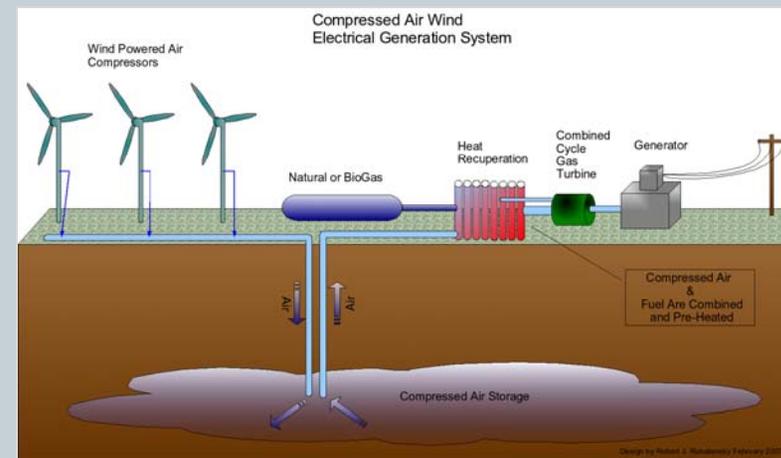
- Grasslands Gordon Butte Project
  - 4050 ac.ft., 350 MW

## Battery

- Zinc Air
  - Zinc Redox batteries
  - 1MW /10MWh battery system
  - Juhl Wind Inc.

## Compressed Air

- Gaelectric has considered a \$105 million, 140-megawatt plant

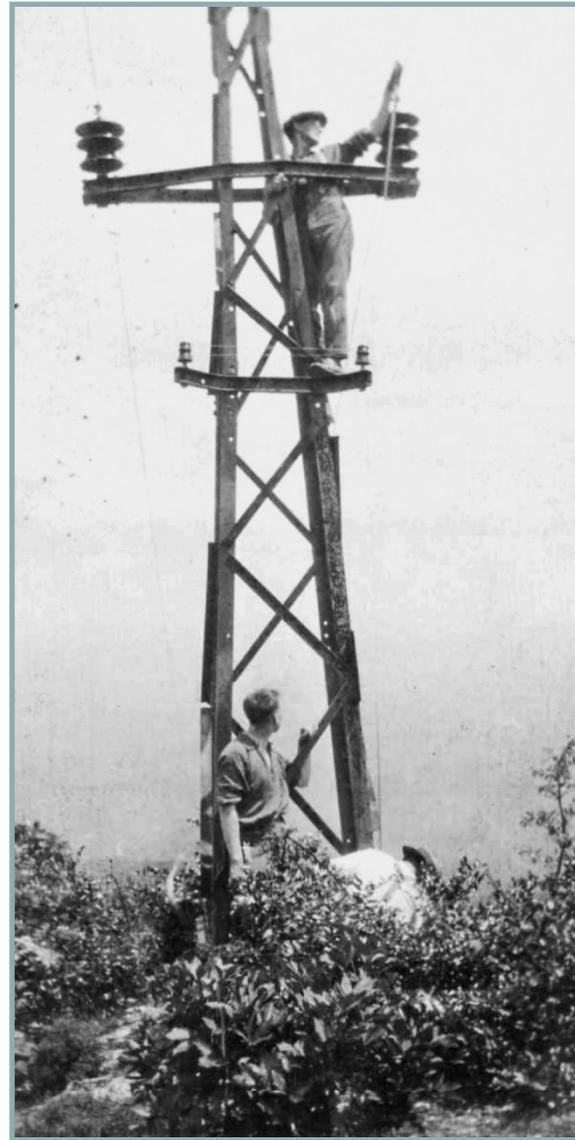




## Transmission is Key

National energy security and stability requires a transmission system that is able to move energy supply to energy demand.

Creation of a transcontinental grid will enhance energy development from all sectors throughout the nation.





# Montana Transmission for America

High-capacity, high-voltage interstate lines:

Montana Alberta Tie Line

Mountain States  
Transmission Intertie

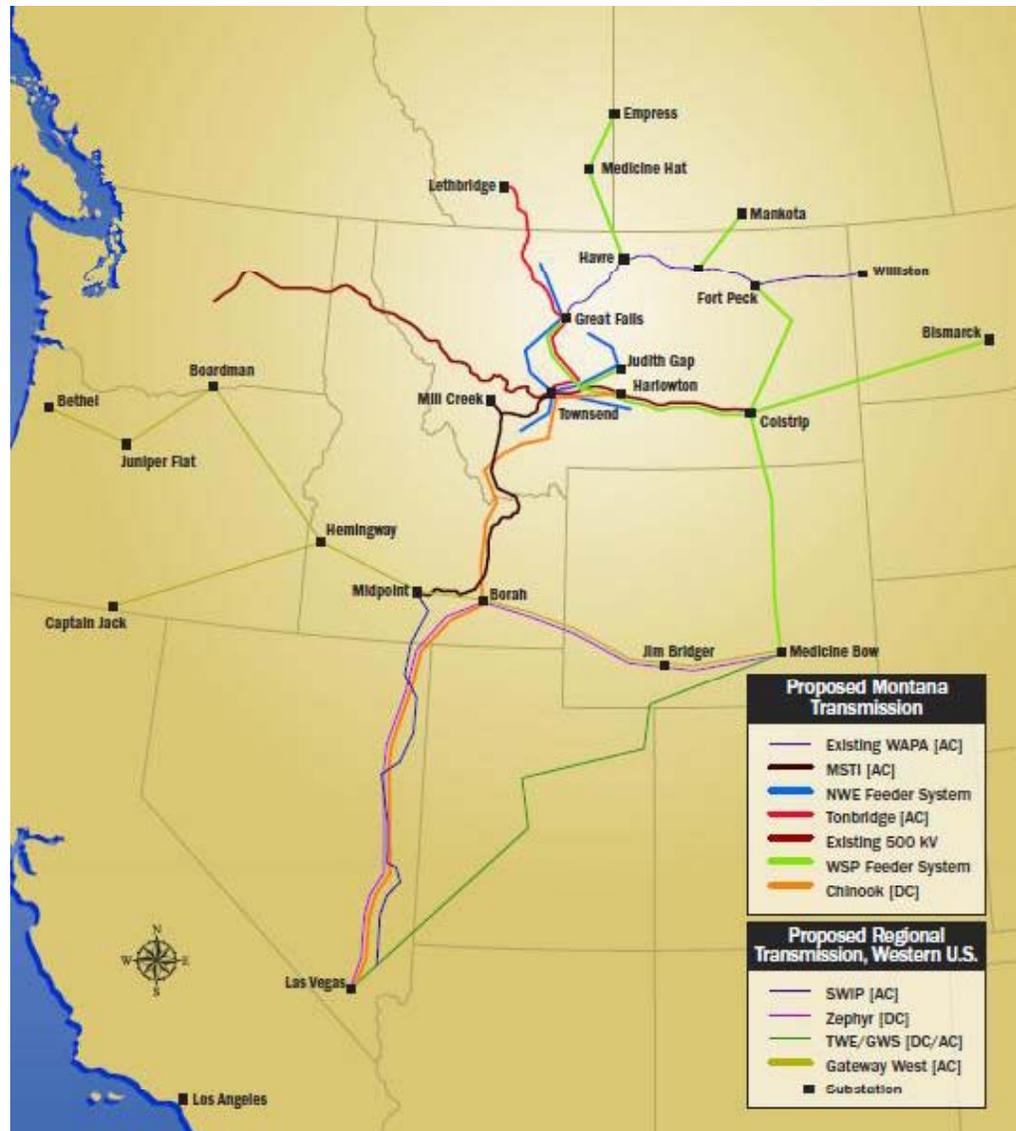
Chinook

Wind Spirit

Wind Collector  
Systems:

NorthWestern Energy

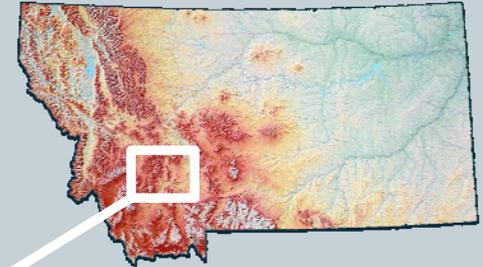
Wind Spirit



# MT Transmission Projects

## Mountain States Intertie

- NorthWestern's 500-kV line is proposed to supply power to out-of-state markets and would run from near Townsend to just north of Jerome, Idaho.
- Montana Supreme Court reversal of District Court ruling
- DEQ, had not violated its legal duty to consult with Jefferson County



# BioEnergy: Slow Growth in Montana

Montana's biofuels and biomass industries have maintained relatively small growth. The primary reason being economic feasibility.

The costs associated with bioenergy projects require either a very low cost bio material, or an integrated business plan which turns a profit from all or most of the byproducts.

Innovative business plans are finding success and a place for their products in the market.



# Economic Benefits Glacier and Rim Rock



## Forecast Project Payments to Local Montana Entities

<i>US\$ millions</i>	<b>Glacier 1</b>	<b>Glacier 2</b>	<b>Rim Rock</b>	<b>Total</b>
Term	25 Years	25 Years	25 Years	
Property Taxes	57.0	49.6	166.8	<b>273.4</b>
County Impact Fee	1.6	1.5	6.7	<b>9.9</b>
Landowners Royalty	30.5	27.8	85.9	<b>144.2</b>
<b>Total</b>	<b>89.1</b>	<b>78.9</b>	<b>259.4</b>	<b>\$427.4</b>
<b>Total per Year (Average)</b>	<b>3.6</b>	<b>3.2</b>	<b>10.4</b>	<b>\$17.1</b>

Source: NaturEner

# Economic Benefits: Glacier and Rim Rock



Job Type	Glacier	Rim Rock (est.)	Total
Engineering	19	28	47
Direct Construction	206	303	509
Indirect Construction	80	117	197
Material Suppliers	<u>181</u>	<u>266</u>	<u>447</u>
<b>Total</b> <small>Source:NaturEner</small>	<b>486</b>	<b>714</b>	<b>1,200</b>

# Economic Benefits



- ✦ **TransCanada Keystone XL Pipeline and Baker on-ramp**
  - \$1.1 billion in capital investment in Montana
  - \$60 million in annual property taxes
  - 790 Construction jobs
  - 15 permanent jobs
  - 65,000 bbl/day on-ramp will provide more market access for Montana producers
- ✦ **Arch Coal Otter Creek Mining Operation**
  - 500+ construction jobs
  - 200 permanent jobs per mine (2 mines proposed)
  - \$5 billion potential in state and local taxes over the life of the mine

# Economic Benefits



- ✦ **Turnbull Hydroelectric Project - 13 MW**
  - \$10 million capital investment
  - 30 construction jobs
  - 1.5 permanent jobs
- ✦ **NorthWestern Energy Mill Creek Regulating Plant– 150 MW**
  - \$206 million capital investment
  - 75 construction jobs
  - 11 permanent jobs
- ✦ **Basin Electric Natural Gas Peaking Plant– 91 MW**
  - \$100 million capital investment
  - 50 construction jobs
  - 7 permanent jobs
- ✦ **Basin Electric Waste Heat Recovery Plant– 5.5 MW**
  - \$10 million in capital investment
  - 10 construction jobs
  - 1 permanent jobs

# State and Local Tax Impact



## Montana Wind Energy Tax Payments

	MW	Property Taxes 2010	~ Property Taxes After Tax Abatement Expiration
Glacier Wind Farm	210	\$3,708,734	\$6,200,000 (expires 2018)
Judith Gap	135	\$1,441,874	\$2,300,000 (expires 2015)
Diamond Willow	30	\$81,369	\$110,000 (expires 2017)
Horseshoe Bend	9	\$211,888	\$350,000 (expires 2017)
<b>Totals</b>	<b>384</b>	<b>\$5,443,865</b>	<b>\$8,960,000</b>

# Energy Development is Good Economics



Transmission projects also bring millions of dollars of economic impact to local and state economies.

Economic Impacts Estimates for Montana Transmission Projects

Project	2007 Real Dollars of Montana Capital Expenditure	Direct Jobs	Direct Jobs per Year	Total Jobs	Total Jobs per Year	Direct Impact (2010 Dollars)	Total Impact (2010 Dollars)
MSTI	\$616,431,000	742	186	1203	301	\$68,865,272	\$120,046,544
MATL	\$162,132,000	360	180	720	360	\$52,492,984	\$92,173,816
NWE Collectors	\$842,455,000	2082	416	3980	796	\$272,759,520	\$482,279,520
Grasslands	\$1,474,639,000	1776	592	2878	959	\$164,735,952	\$287,169,472
TransCanada Chinook Line	\$939,502,000	1131	283	1833	458	\$104,947,160	\$182,945,424
NorthWestern Upgrades (Colstrip)	\$215,751,000	546	273	1034	517	\$86,951,160	\$140,643,872
<b>Total:</b>	<b>\$4,250,910,000</b>	<b>6,637</b>	<b>1930</b>	<b>11648</b>	<b>3391</b>	<b>\$750,752,048</b>	<b>\$1,305,258,648</b>

# Montana Energy Policy Highlights



- RPS = 15% by 2015
- Tax Abatements for:
  - RE manufacturing
  - Energy R&D
  - Transmission lines
- Oil production tax holiday
  - 18-month horizontal well
  - 12-month vertical well
- Clean and Green Tax Incentives
  - 50% tax reduction on Coal plants capturing CO<sub>2</sub> and CO<sub>2</sub> pipelines
  - 50% tax reduction on wind farms
  - 87% tax reduction on RE transmission
  - Renewable energy manufacturing
  - Energy R&D

# MT's Business Development Environment



- 6<sup>th</sup> best overall tax climate for business (Tax Foundation, 2011)
- MT's combined state and local tax burden of 8.7% ranks well below the national average of 9.8% (Tax Foundation, 2009)
- 4<sup>th</sup> most educated workforce (Business Facilities, 2009)
- 5<sup>th</sup> best cost of labor (Business Facilities, 2011)
- Workers comp costs reduced by 20% in 2011
- Oil and Gas taxes regionally competitive

# Regional Policies Affecting Development



## California – RPS of 33% by 2020

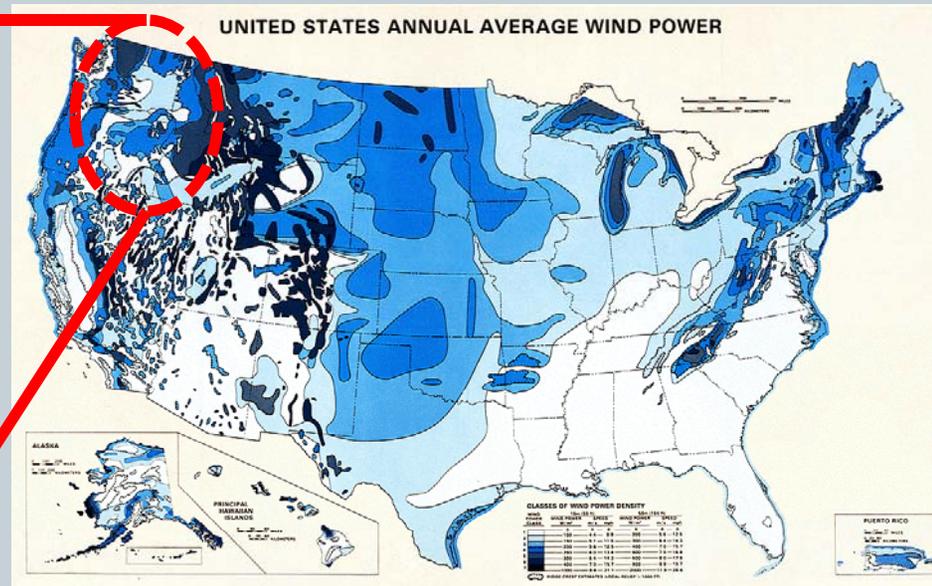
- Import Restrictions on Renewable Energy
  - CPUC ruled to restrict tradable renewable energy credits
- SB 2X passes California Legislature in 2011
- Differences in CPUC rulings and language in SB 2X
  - CPUC makes no distinction in unbundled RECs and firm and shaped (SB 2X does)
  - CPUC sets no minimums of maximums on firm and shaped products
  - RPS rulemaking process is the venue for reconciling differences



# Regional Policies Affecting Development

## Washington – RPS of 15% by 2020

- Import Restrictions
  - I-937
    - Restricts eligible renewable sources to within the BPA boundary



# Regional Policies Affecting Development



## Washington – to greatly reduce electric generation from the burning of coal by 2020 Senate Bill 5769



- deal negotiated among plant owner TransAlta, state officials and environmental groups
- shut down one of the plant's two boilers by 2020 and **phase out coal-burning by 2025**
- agreement allows TransAlta to enter into long-term contracts for coal power, which is currently prohibited
- requires gradual reductions in greenhouse gas emissions before 2025
- TransAlta is encouraging legislators to support the bill stating, "We believe it will provide certainty for TransAlta, our employees and our community,"

# Other Regional Issues



- **RTEP/WREZ – Regional Transmission Expansion Project**
- **BPA – Environmental Re-dispatch and Network Open Season**
- **WAPA – Transmission Infrastructure Program**
- **Montana Intertie**
- **Eminent Domain**
  - **Montana legislation – HB 198**
  - **Wyoming moratorium on Eminent Domain for wind collector lines**
- **Renewable Energy and different approaches to transmission siting**

# National Policy



## Energy Tax Policy Currently Hot Topic in DC

- Many challenging current policies to encourage renewables
  - Charges of erroneous tax claims, lax review by IRS, high profile bankruptcies
  - Budget negotiations require cuts to a variety of programs
- Suggestions
  - Confront challenges of existing programs but also look at successes
  - Continue to message on benefits of clean energy development
  - Innovation needs government support; historically documented

# Conclusion



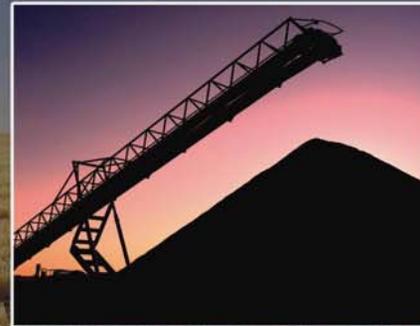
- **Montana has vast Energy Resources**
  - Renewable and Traditional
- **Transmission capacity is essential to continued generation development**
  - Development of our energy resources hinders upon our ability to deliver a product to larger markets
  - A stable energy grid requires an integrated transmission system
- **Energy Development is Good Economics**
  - Billions of dollars in capital investment, millions of dollars in state and local revenues, and thousands of jobs are being generated due to new energy development in Montana.
  - Innovation within this industry will come from supporting our universities and R&D programs.

*Oil- Bioenergy - Coal*

# MONTANA MEANS ENERGY

*Geothermal - Gas - Wind*

120 BILLION TONS OF COAL  
#1 IN WIND CLASS 3 AND ABOVE  
35.5 MILLION ACRES OF BIOENERGY POTENTIAL  
HOME TO THE BAKKEN OIL AND GAS FORMATION  
VAST GEOTHERMAL AND SOLAR POTENTIAL



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



**Energy Promotion  
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Montana Department of Commerce

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