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2003 SENATE FINANCE AND TAXATION

SCR 4012

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2003 SENATE STANDING COMMITTEE MINUTES

BILL/RESOLUTION NO. SCR4012

Senate Finance and Taxation Committee

Conference Committee

Hearing Date February 11, 2003

Tape Number	Side A	Side B	Meter #
1	X		1-500

Committee Clerk Signature *Maar Kuyk*

Minutes:

Senator Urlacher opened the hearing on SCR4012. All committee members are present. This resolution establishes an official state wind power development objective of 10,000 megawatts of installed turbine capacity to be achieved by the year 2020. Will hear testimony today, then delay the hearing until 2-18-03.

Senator Mike Every (mtr #66) - Introduced the resolution and explained the intent. Supports SCR4012. Also reviewed a proposed amendment.

Brian Kramer, ND Farm Bureau (mtr #308) - Testified in support of SCR4012.

Mary Christianson, Dakota Resource Council (mtr #448) - Testified in support of SCR4012.

Written testimony will be forwarded for the file.

Senator Urlacher (mtr #500) - Recessed hearing on SCR4012.

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2003 SENATE STANDING COMMITTEE MINUTES

BILL/RESOLUTION NO. SCR4012

Senate Finance and Taxation Committee

Conference Committee

Hearing Date February 18, 2003

Tape Number	Side A	Side B	Meter #
1	X		32-3250

Committee Clerk Signature *Mary Kay L. ...*

Minutes:

Senator Urlacher opened the hearing on SCR4012. All committee members are present. This resolution establishes an official state wind power development objective of 10,000 megawatts of installed turbine capacity to be achieved by the year 2020.

Senator Mike Every (mtr #47) - Reintroduced the resolution. Referenced handouts (exhibit A & B). Intend to have wind energy move forward.

Joe Richardson, President of Harnessing Dakota Wind (mtr #229) - Testified in support of SCR4012. Written testimony is attached along with supplementary testimony (exhibit C).

Senator Syverson (mtr #1087) - Requested more explanation of hydrogen production.

Mr. Richardson (mtr #1123) - Gave additional information on hydrogen production and how that will interface with wind energy. Also explained how coal energy would back up both.

Karl Limvre, Chairperson, Rural Life Committee ND Conference of Churches (mtr #1434) - Testified in support of SCR4012. Written testimony is attached.

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Page 2
Senate Finance and Taxation Committee
Bill/Resolution Number SCR4012
Hearing Date February 18, 2003

Terry Schaunaman, Dakota Resource Council (mtr #1620) - Testified in support of SCR4012.

Written testimony is attached.

Dean Hulse, ND landowner (mtr #2165) - Testified in support of SCR4012. Written testimony is attached.

Senator Wardner (mtr #2560) - What do you envision if this resolution is passed?

Mr. Hulse (mtr #2591) - Would alert the wind energy world that we are in the game.

Senator Wardner (mtr #2638) - Encouraging legislation has already been passed. Is there something other than a statement.


Mr. Hulse (mtr #2677) - Related personal experience and rational on how this resolution relates to wind energy.

Senator Urlacher - Closed the hearing on SCR4012.

Senator Wardner (mtr #) - Proposed an amendment and explained. Moved to amend. 2nd by Senator Nichols. Voice vote 6 yea, 0 nay. Resolution is amended.

Senator Syverson moved a Do Pass as Amended. 2nd by Senator Tollefson. Roll call vote 6 yea, 0 nay, 0 absent. Carrier is Senator Syverson.

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33074.0101
Title.0200

Adopted by the Finance and Taxation
Committee
February 18, 2003

AB
2-18-03

PROPOSED AMENDMENTS TO SENATE CONCURRENT RESOLUTION NO. 4012

Page 2, line 23, replace the first comma with "and" and replace ", and each state board and"
with a period

Page 2, remove line 24

Renumber accordingly

Page No. 1

33074.0101

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Date: 2.18.03
Roll Call Vote #: 2

2003 SENATE STANDING COMMITTEE ROLL CALL VOTES
BILL/RESOLUTION NO. SCA 4012

Senate Finance and Taxation Committee

Check here for Conference Committee

Legislative Council Amendment Number _____

Action Taken Do pass as amended

Motion Made By Sen. Syverson Seconded By Sen. Tollefson

Senators	Yes	No	Senators	Yes	No
Senator Urlacher - Chairman	1		Senator Nichols	1	
Senator Wardner - Vice Chairman	1		Senator Seymour	1	
Senator Syverson	1				
Senator Tollefson	1				

Total (Yes) 6 No 0

Absent _____

Floor Assignment Senator Syverson

If the vote is on an amendment, briefly indicate intent:

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Deanna Halls Operator's Signature 10/23/03 Date

REPORT OF STANDING COMMITTEE (410)
February 19, 2003 8:04 a.m.

Module No: SR-32-3208
Carrier: Syverson
Insert LC: 33074.0101 Title: .0200

REPORT OF STANDING COMMITTEE

SCR 4012: Finance and Taxation Committee (Sen. Uriacher, Chairman) recommends AMENDMENTS AS FOLLOWS and when so amended, recommends DO PASS (6 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). SCR 4012 was placed on the Sixth order on the calendar.

Page 2, line 23, replace the first comma with "and" and replace ", and each state board and" with a period

Page 2, remove line 24

Renumber accordingly

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2003 TESTIMONY
SCR 4012

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Exhibit A.

10,000 Megawatt Installed Turbine Capacity Objective for North Dakota

U.S. Department of Energy Initiative: 5% of U.S. consumption
from wind by end of 2020.

U.S. 2020 consumption: 4,983 billion kWhs

Source: Energy Information Administration, Outlook 2002

5% of U.S. consumption: 249.15 billion kWhs

Converted to Wind Turbine Output Operating at 35% Efficiency =
81,262 Megawatts U.S. DOE Initiative

(note: each megawatt of wind turbine capacity = 3,066,000 kWhs annual output)

State Wind Power Resource Shares					
in billions of kilowatt hours					
	%			%	
	kWhs	Share		kWhs	%
1 North Dakota	1,210	11.56%	11 Colorado	481	4.59%
2 Texas	1,190	11.37%	12 New Mexico	435	4.15%
3 Kansas	1,070	10.22%	13 Idaho	73	0.70%
4 South Dakota	1,030	9.84%	14 Michigan	65	0.62%
5 Montana	1,020	9.74%	15 New York	62	0.59%
6 Nebraska	868	8.29%	16 Illinois	61	0.58%
7 Wyoming	747	7.13%	17 California	59	0.56%
8 Oklahoma	725	6.92%	18 Wisconsin	58	0.55%
9 Minnesota	657	6.28%	19 Maine	56	0.53%
10 Iowa	551	5.26%	20 Missouri	52	0.50%

Source: 1991, Pacific Northwest National Laboratory study.

81,262 x North Dakota's 11.56% Share = 9,394 MWs

Round up for Hydrogen and Other Production: 10,000 MWs

Harassing Dakota Wind
A North and South Dakota Farm Bureau Initiative

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Exhibit B
1 of 2

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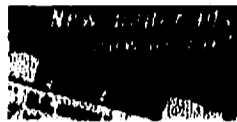
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Posted on Sat, Jan. 18, 2003



VIEWPOINT: Time gets ripe to tap the wind

By Michael Noble

ST. PAUL - A recent legislative proposal in the North Dakota Senate endorsed the Farm Bureau's vision of 10,000 megawatts of wind energy in the state by 2020. If realized, that would inject a whopping \$10 billion of private investment into the nation's windiest state.

This represents the kind of practical idealism that Americans are famous for around the world. It's a patriotic vision of producing energy without pollution while reducing dependence on foreign energy. It's an attainable vision to bring wealth and development to a declining rural economy. It's just the boost North Dakota needs, with its aging population and a decade of weather disasters.

If it seems far-fetched, consider Germany. Much less windy than North Dakota, by 2002 Germany already had \$10 billion in private investment in wind power. In one recent year alone, the equivalent of \$2.5 billion U.S. was invested. At hundreds of locations in the Dakotas, new wind power plants would be the lowest cost new power supply anywhere in the United States - cheaper than new coal plants, new hydropower dams or new natural gas burners.

There are two huge hurdles, though. North Dakota needs far less electric energy than it already produces. The usual assumption is that wind power would be exported to population centers via new power lines, although other strategies merit serious discussion.

But the existing transmission system already is stretched thin. Building or upgrading transmission lines presents major challenges of financing, siting and routing, including public consultation and regulatory approval. Without strong collaboration between state governments, and buy-in from landowners and environmental groups, transmission siting delays will kill transmission deals nearly every time.

The second hurdle is not economic, technical or social. It's a cultural change that's needed. North Dakotans must recognize that building coal plants for rising Minnesota electric demand was a strategy best suited to the 1970s.

North Dakota's political and financial muscle continues to back Vision 21, the outdated plan to expand North Dakota's coal-fired power production. In Minnesota, a 50-year old buttoned-down civic group called the Citizens League recently identified Minnesota's top energy problem not as supply or reliability or even cost, but instead the 75 percent reliance on the burning of coal for electricity.

Minnesota policy-makers, regulatory officials and consumers have little interest in encouraging new sources of toxic mercury contaminating Minnesota lakes and fisheries. In addition, no matter what anyone believes about global warming, financial markets increasingly are concerned about its environmental and financial risks and the economic impact of future regulations.

If North Dakota can act fast to help meet a pressing Minnesota energy need in the next five years, it could get a quick jump on the big wind power goal. Decisions soon vbe made determining how the state will replace power generated by the Prairie Island nuclear station. (Current law in Minnesota requires a five-year phaseout of a plant that produces as much energy as could be generated by about 2000 of the most modern commercial wind turbines.)

North Dakota could make a big dent in its 10,000 MW wind vision if it can identify ways to deliver wind power to metro Minnesota within the next five years. Xcel Energy promises to look at all options for replacing Prairie Island and do objective analyses of competing replacement choices. Other nonwind plans are on the table, and the Minnesota

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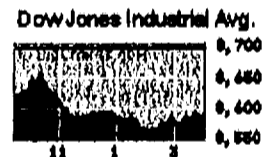
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DJIA 8,586.74 ▼ -111.13
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Market Update: Regional Companies

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BREAKING NEWS

Updated Saturday, Jan 18, 2003

Columbia's crew continues experiments - 07:25 AM PST

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External B3
2 of 2

Legislature may be asked to weigh in this year.



Competition to the Dakotas from Minnesota wind energy producers will be stiff. Wind power producers in Minnesota have the advantage of being closer to market, while North Dakota enjoys an advantage as the lowest cost producer. Whether North Dakota gets a piece of the early action depends on how fast governments can act to pave the way for private investment in generation and new transmission, and whether Minnesotans can be assured that new transmission proposals are not just Trojan horses bearing energy from new coal projects.

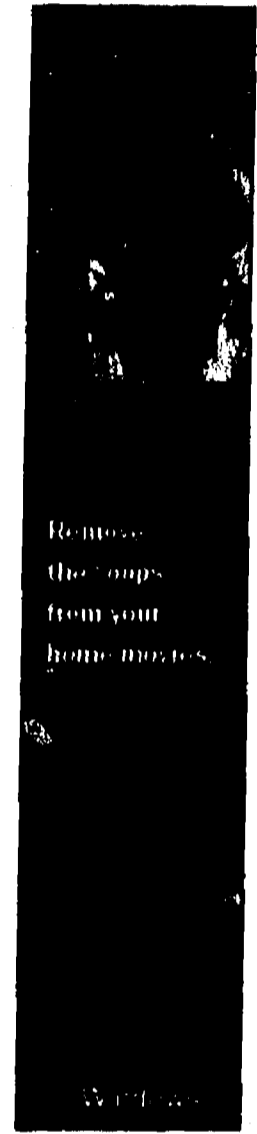
As you can see, the vision of \$10 billion in private investments in wind power is a worthy goal. The North Dakota Farm Bureau should be commended for proposing it, and the North Dakota Senate Democrats should be applauded for taking up the call. The planned closure of Prairie Island is an immediate business opportunity that North Dakota legislators should focus upon.

Noble is executive director of Minnesotans for an Energy-Efficient Economy.

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Testimony in Favor of SCR4012

by Joe Richardson, President, Harnessing Dakota Wind
701-239-4848; wind@ndfb.org

Mr Chairman, members of the committee, I am Joe Richardson the president of Harnessing Dakota Wind, a nonprofit organization dedicated to the aggressive pursuit of wind development in the Dakotas and insuring that farmers, landowners and their neighboring communities are equitable participants and beneficiaries of that development. I have prepared a rather long supplementary document with information supporting the establishment of a 10,000 megawatt installed turbine capacity objective to be achieved by 2020. I hope that you will consider this document and that you find the information useful when contemplating the huge opportunity wind presents for our rural economic development.

Mr. Chairman, members of the committee, we all often feel that biting winter breeze these days. I submit that it is the scratch of money blowing right by us to be picked up in states like Minnesota, the #9 wind resource state with 335.9 megawatts of turbine capacity in the ground and plans for another 250 megawatts to be completed by the end of this year; Iowa, the #10 resource state where 422 megawatts are in the ground and plans are firm for another 210 megawatts to be installed this year; or, Texas, the #2 wind resource state with 1,095 megawatts in the ground and 240 more coming this year. Just to round out the top five resource states, Montana, #5 resource state is likely to have their first 100 megawatt windfarm in the ground this year while Kansas,

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the #3 resource state has already achieved over 110 megawatts. North and South Dakota are sink holes of lost opportunity being the #1 and #4 wind resource states with only 4.8 and 3 megawatts in the ground respectively. In North Dakota we have 60 megawatts anticipated for this year which is on average what the #2 wind resource state built in three weeks of 2001.

The 10,000 megawatt objective says just one thing: we intend to develop our share of the national wind resource. We could make our objective 5,000 megawatts but then would be conceding that we are not able to accomplish resource proportional development of our resource. It would be self-defeating before we even tried. Of course we could say that transmission and marketing are problems too daunting for us to overcome. As you will see in the long document I have provided, the market growth within the region can support our development objective. You will also note that the transmission line technology also exists if we can figure out how to finance it. There are impediments but none are insurmountable.

I submit to you that we should view the entire state of North Dakota as one wind system composed of geographically dispersed privately owned windfarms that would be connected to a central long-haul transmission line and interfaced with hydrogen production piped to Minneapolis, backed by coal gasification and Manitoba Hydro. We could become the leading producer of wind power while also being a major player in hydrogen production. Envision if you will the power of such a system. The flow of

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wind through a central long-haul line is made more stable or "firm" because while the wind power output in one geographical location may not be as strong as we would like, the slack is picked up by higher production a hundred or more miles away. Tying our wind farms together on a central long-haul transmission line allows us to overbuild wind farm capacity and use hydrogen to "shave the peak" output. For instance, if we had one 8,000 megawatt line we could build 10,000 - 12,000 of turbine capacity. When the entire system is at maximum production we divert some of the turbine output to hydrogen production and as the wind system production decreases in output, we bring more turbines out of hydrogen production to firm the power flow on the transmission long-line. We continue to firm the hydrogen production with either coal gasification, domestic hydro or Manitoba hydro. By using hydrogen to help firm our wind under this scenario, we get to play in both the electricity market and the emerging vehicular market. This is a huge opportunity.

But, this is only one imaginative way to get us to the expressed objective. In a way it tears a page out of the Alaskan energy play book where they have a number of independent producers feeding one oil pipeline through Canada and into the lower 48 states. Let's even go further and tear one more page out of their book. In 2002, the President's energy plan was HR4. In that plan, the Alaskan's would have received a \$10 billion federal loan guarantee for a new gas pipeline that would have allowed several of their producers to share a gas line going into the Midwest. Interestingly, their new gas pipeline was also successfully attached as an amendment to the Senate Energy

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bill. Alaskan's are aiming at our market -- the Midwest. Our wind electrons are every bit as fat and frisky as their gas electrons. Let's outflank them. Let's determine that we are going to compete in the new energy markets and compete hard by first making a bold, and perhaps to some, audacious statement that we aim to be a resource-proportional player. Let's take the risk of staking our claim by planting our wind production flag high enough that it has to be noticed. Let's not quickly compromise on this wonderful gift by failing to claim what this gift can provide to the rural communities throughout the state.

Finally, much has been said about our becoming an entrepreneurial state and about saving North Dakota. We are the nation's leader with a huge resource that is becoming increasingly popular as a source of domestically produced power. This is the right time and the right place for us to make a major play that can spin billions into our rural economies for decades to come. We should be aggressively pursuing every angle to realize the maximum benefit from this wind gift. The market is ours if we have the will, savvy and creativity to seize it. What we do not build, others will. Help focus our attention on winning a new rural economic revival by declaring within the state, regionally and nationally that when it comes to wind power and a hydrogen interface, we are #1 in resource and in development.

I beg you to stand with us senators in delivering to our young a clear message that we can and that we will take risks when opportunities this great so clearly call us to

action. To say that we will not allow ourselves to become overwhelmed in doubt or lack of confidence in our ability to steer around or jump over what today may appear to be insurmountable hurdles. To future generations we want the message of this moment to say when named the greatest wind resource in the country, we honestly weighed and faced the real challenges and while not knowing for sure how we would overcome all of them, we stood together in our willingness to overcome them. Let's remember that the greatest entrepreneurs are those who doggedly pursued visions others said could not be realized. Let's truly be an entrepreneurial and visionary state.

Thank you.

Basis for the Objective
Wind Vision 2020 - Our Share of Wind Development

1999 Department of Energy Objective: 5% of U.S. electricity from wind by 2020.

Energy Information Administration (EIA) Forecast: 4,983 B kWh

5% of EIA forecast: 249 B kWh

1 megawatt of turbine capacity = 3,066 million kWh

249 B kWh = 81,213.3 MWs of wind turbine capacity (35%)

North Dakota's share of the wind resource: 11.56% (PNNL)

North Dakota's Share of the Turbine Capacity = 9,388 MWs

Round up for hydrogen production: 10,000 MWs

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EXHIBIT C

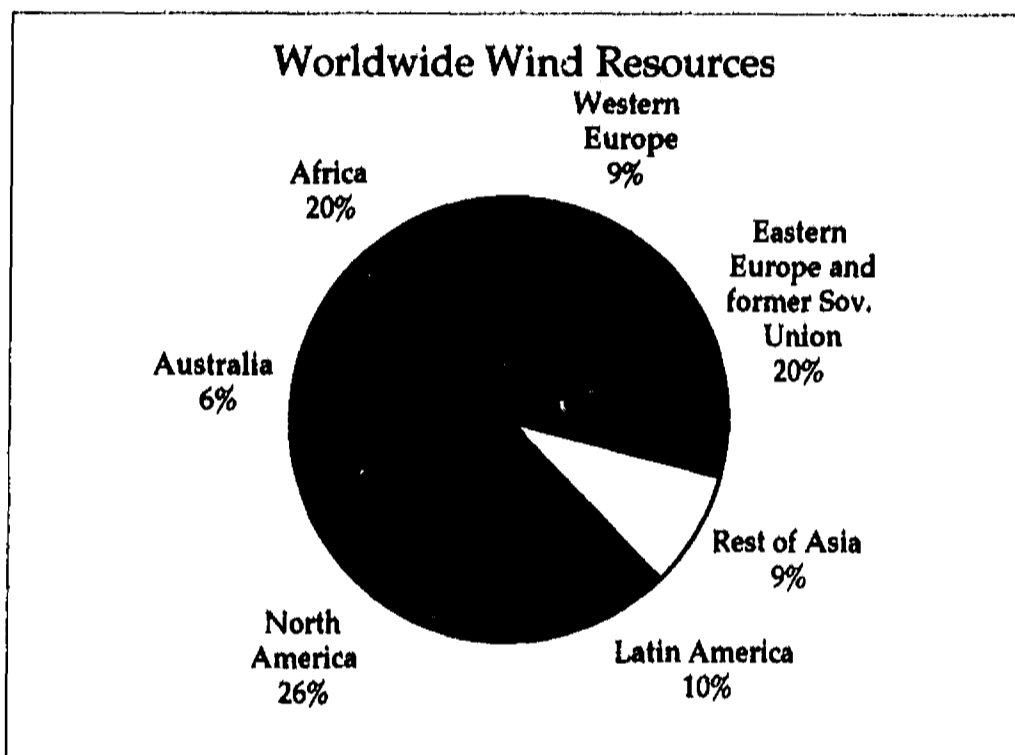
Supplementary Testimony in Support of SCR 4012

By Joe Richardson, Harnessing Dakota Wind
701-239-4848; "wind@ndfb.org"

Harnessing Dakota Wind's Mission Statement

To aggressively pursue resource-proportional wind development in the Dakotas and to ensure that farmers, landowners and their neighboring communities are equitable participants in and beneficiaries of that development.

The Dakotas have been said to be the "Saudi Arabia" of wind. What does that really mean?



North Dakota has 2.28% and South Dakota has 1.94% or together **4.23% of world's wind resource.**

World Wind Resources (billions kWh)

Western Europe	4,800
Eastern Europe and former Sov. Union	10,600
Rest of Asia	4,600
Latin America	5,400
North America	14,000
Australia	3,000
Africa	10,600
Total	53,000
North Dakota	1,210
South Dakota	1,030

Sources:

Wind Resources from Michael Grubb and Niels Meyer, 1994

Note: Does not include Greenland, the Antarctic or offshore areas. Includes land with wind speed above 11.5 MPH or 5.1 m/s at 32.8 ft. or 10m height.

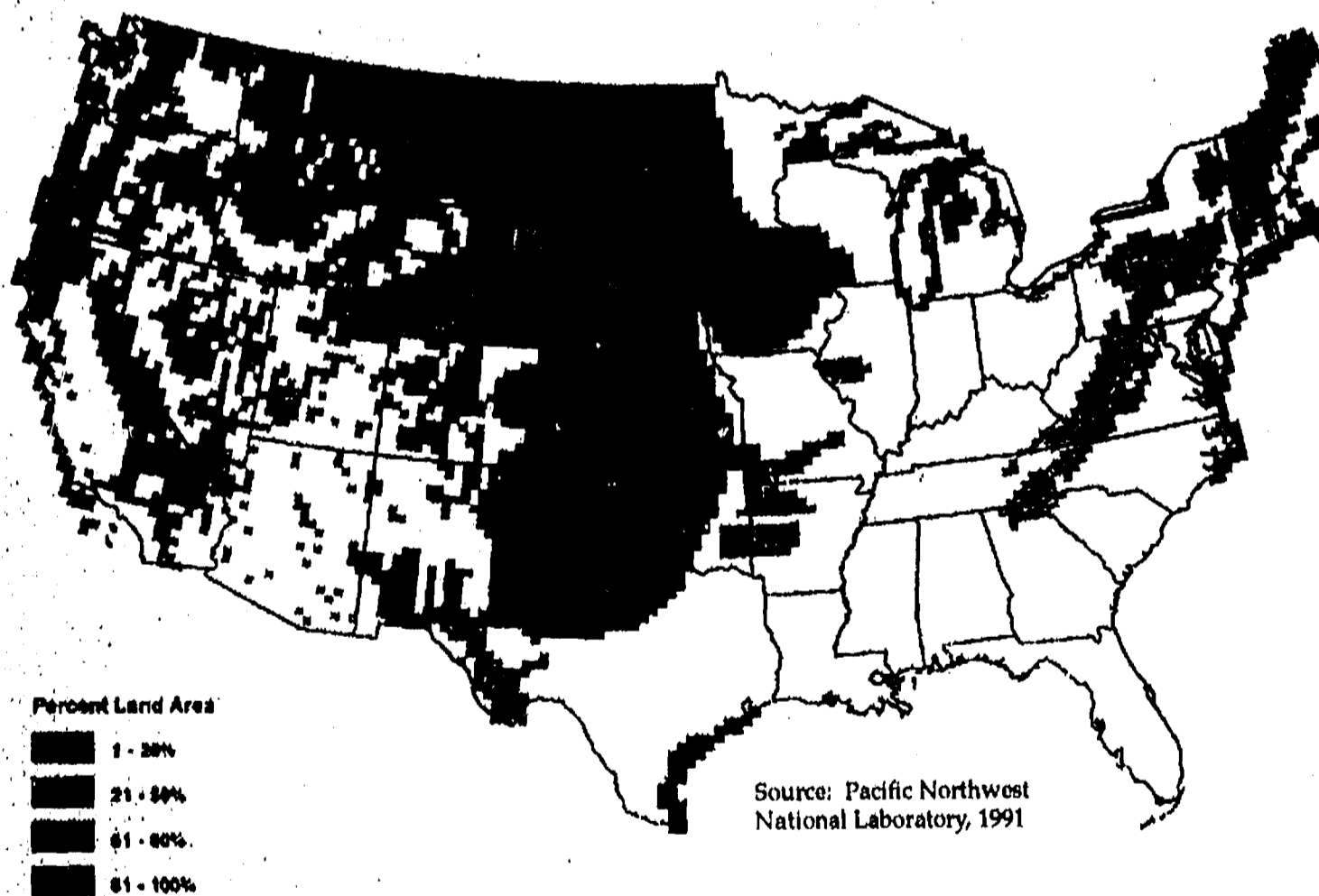
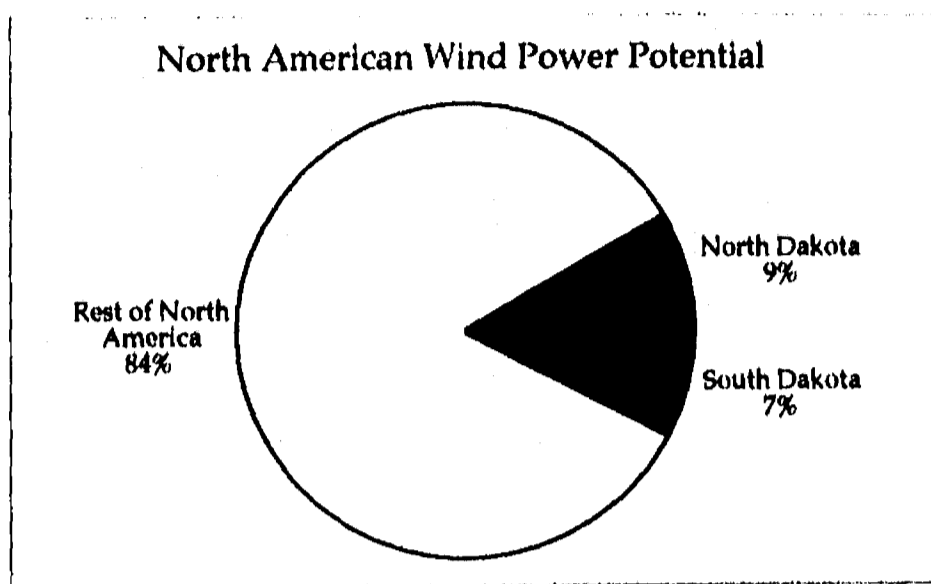
North Dakota and South Dakota wind resources: Pacific Northwest National Laboratory Study, 1991

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The Dakotas have 16% of North America's Wind Resource

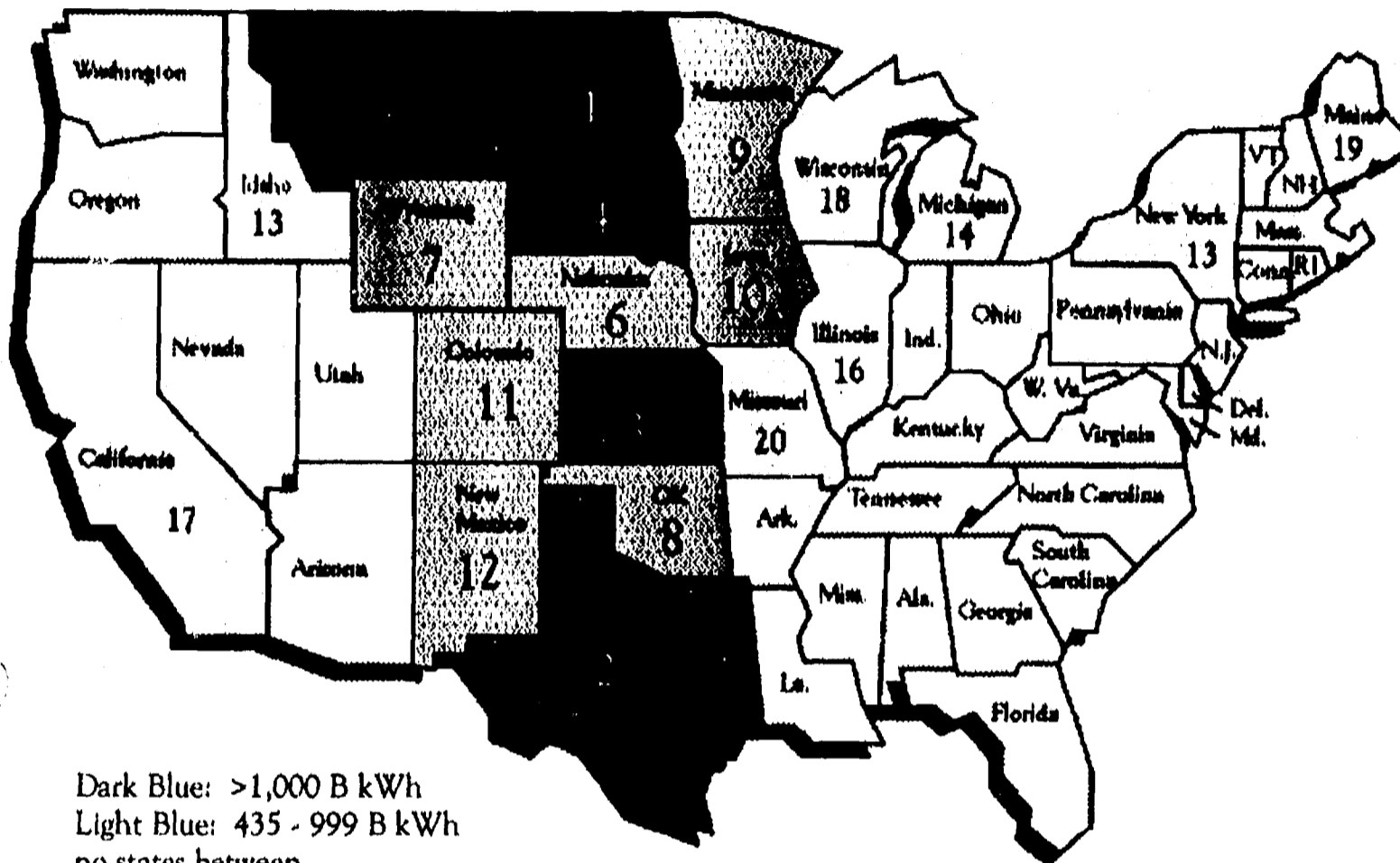


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National Wind Resource - Ranking Top 20 States



Dark Blue: >1,000 B kWh
 Light Blue: 435 - 999 B kWh
 no states between
 Light Yellow: 50 - 73 B kWh
 White: <50 B kWh

Source: Pacific Northwest National Laboratory, 1991

State Wind Power Resource Shares in billions of kilowatt hours

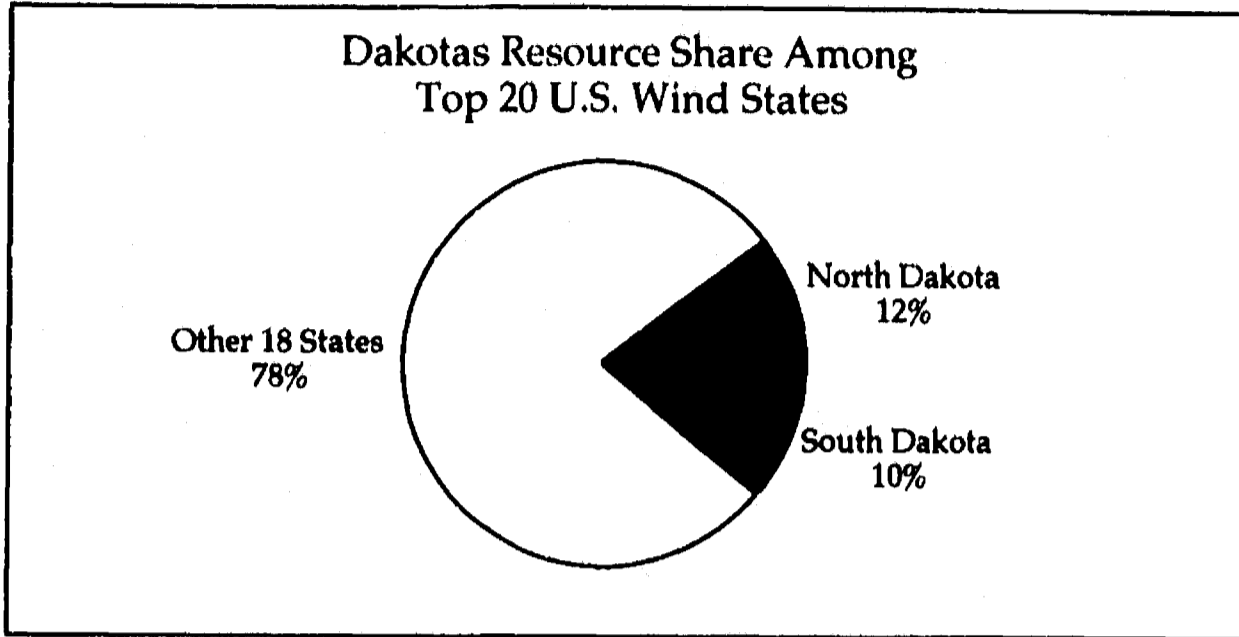
	kWhs	Share %		kWhs	Share %
1 North Dakota	1,210	11.56%	11 Colorado	481	4.59%
2 Texas	1,190	11.37%	12 New Mexico	435	4.15%
3 Kansas	1,070	10.22%	13 Idaho	73	0.70%
4 South Dakota	1,030	9.84%	14 Michigan	65	0.62%
5 Montana	1,020	9.74%	15 New York	62	0.59%
6 Nebraska	868	8.29%	16 Illinois	61	0.58%
7 Wyoming	747	7.13%	17 California	59	0.56%
8 Oklahoma	725	6.92%	18 Wisconsin	58	0.55%
9 Minnesota	657	6.28%	19 Maine	56	0.53%
10 Iowa	551	5.26%	20 Missouri	52	0.50%

% is of Top 20 Resource, below which only marginal development can occur.
 Source: Pacific Northwest National Laboratory, 1991

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Perhaps not the "Saudi Arabia" of wind worldwide, the Dakotas certainly have a world class wind resource and more developable wind than any other two adjacent states in the country.

We Are Failing to Match our Resource with Development

Top Twenty States with Installed Utility Scale Wind Power

installed is in turbine rated megawattage
 AWEA - 1/23/03

	Installed	%		Installed	%
1 California	1822.3	38.93%	11 Wisconsin	53.0	1.26%
2 Texas	1095.5	25.96%	12 New York	48.5	1.15%
3 Iowa	422.7	10.02%	13 Pennsylvania	34.5	0.82%
4 Minnesota	335.9	7.96%	14 Nebraska	14.0	0.33%
5 Washington	228.2	5.41%	15 Hawaii	8.6	0.20%
6 Oregon	218.4	5.17%	16 Vermont	6.0	0.14%
7 Wyoming	140.6	3.33%	17 North Dakota	4.8	0.11%
8 Kansas	113.7	2.69%	18 South Dakota	3.0	0.07%
9 W. Virginia	66.0	1.56%	19 Michigan	2.4	0.06%
10 Colorado	61.2	1.45%	20 Tennessee	2.0	0.05%
			Total	4,681.3	MW
			Keeping Pace North Dakota Should Have	541.0	MW
			Keeping Pace South Dakota Should Have	460.5	MW

Source: American Wind Energy Association, 1/23/03

Our development is less than 1/100th of what we should have if we were developing at a resource-proportional rate.

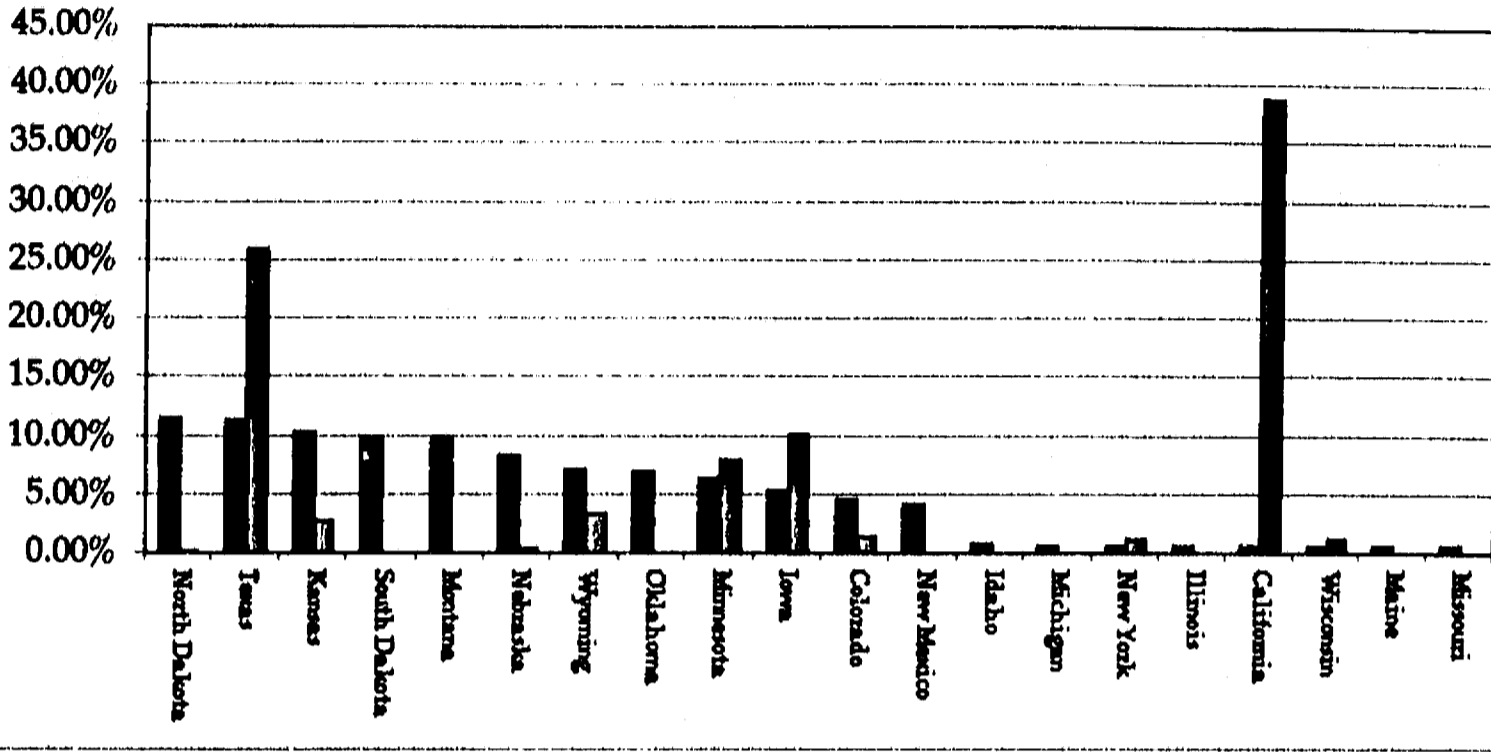
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Deanna Hill
 Operator's Signature

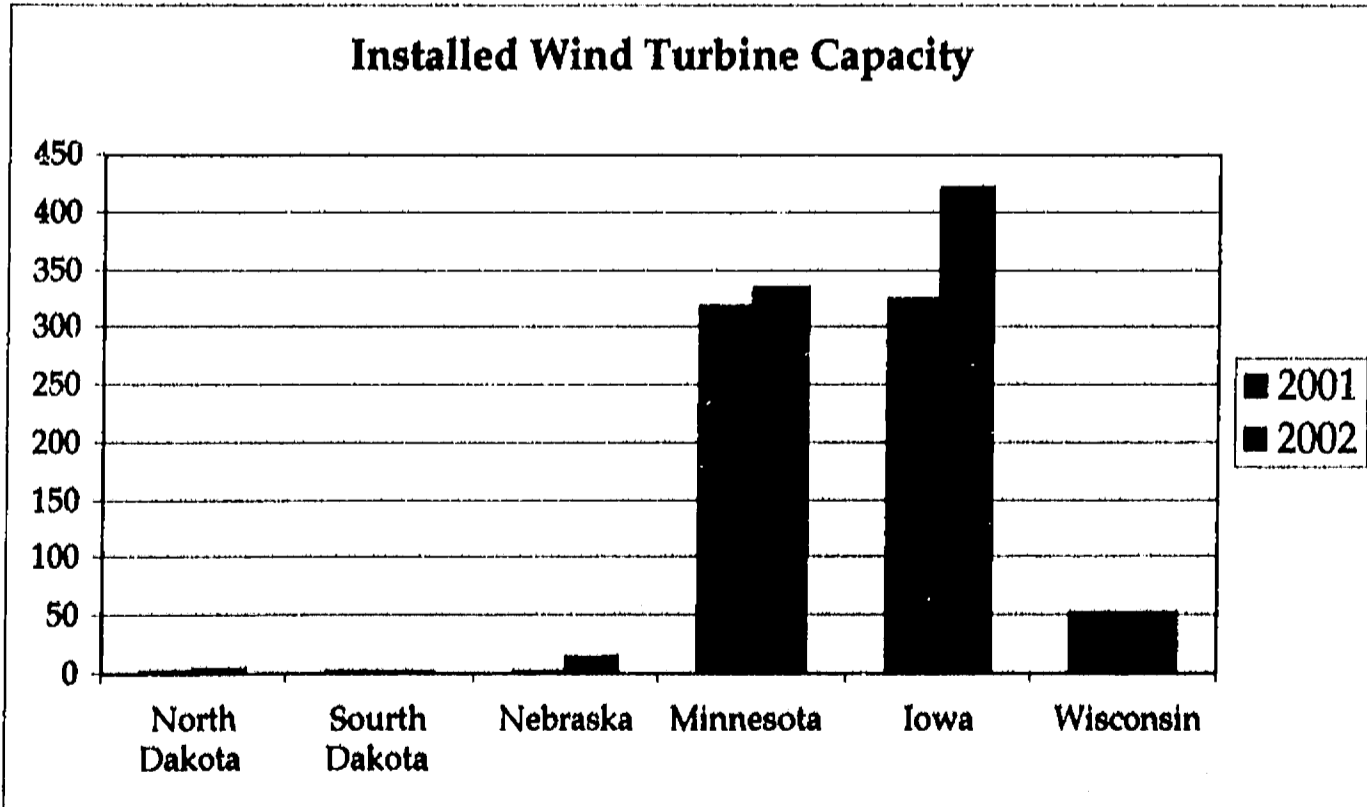
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Relative Resource Shares v. Relative Development Shares As of 1/23/03

Red is state share of the resource, Yellow is state share of current development.



Within our region, Nebraska, Minnesota and Iowa added more installed wind turbine capacity in 2002 than North Dakota has in total.



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Keeping pace with our share of the resource, North Dakota would have 541 megawatts of turbine capacity today. Keeping pace in last year's growth would have had us adding 53.3 of the 461 megawatts added among the top 20 states in 2002.

Measured in terms of state population, electricity consumption or wind resource, we are way behind Iowa and Minnesota, not to mention Texas or California. By any reasonable measure we are falling behind in wind development. Why?

Perhaps it is that we do not quite believe that wind power is a real form of power generation. Unfortunately, there are some among us who are still scurrying to find more wet blankets to cover a quickly growing reality. More than \$5 billion dollars have been invested in U.S. wind farm developments. Over half that amount has come since 1998.

The United States was the leader in wind turbine technology back in 1980; however, now we have only one of the top 10 turbine manufacturing companies. Since 1998, Germany alone has experienced over \$9 billion in wind farm developments. Recently, General Electric invested over \$400 million in acquiring the only major turbine manufacturer left in the U.S. Also, other major names in the energy have begun making hundreds of million dollar investments in wind power, including: BP Amoco, ChevronTexaco and Shell among others.

The turbines are becoming less expensive while the technology that controls their blade pitch and gearing becomes far more sophisticated. In 1980 wind was about 40¢ per kWh. Now we have seen long-term contracts under 2.5¢ kWh. Basin Electric's wind guru, Ron Rebenitsch, publicly stated this fall that wind power is coming down in cost by 6-8% per year and that they expect it to be the lowest cost of any new generation within five years.

Wind farms are subject to economies of scale. The most efficient windfarms are 80 megawatts and above. It is becoming common to see 100 megawatt and above wind farm developments. The Bonneville Power Authority has three 150 megawatt projects in the works in Washington where FPL already has a 180 megawatt project in the ground. Zikha Renewable Energy also has a 100 megawatt project planned for Washington. In Oregon FPL has an 83 megawatt project in the ground and another 100 megawatt project planned. In Montana, Mountain Energy is completing a 100 megawatt project while Montana Wind has another 150 megawatt project being planned. In Iowa, Edison Capital has a 112, FPL has a 97 megawatt and GE Wind and Entergy each have 80 megawatt wind farms in the ground while another 100 megawatt project is planned. In California there are three wind farms each with over 500

megawatts with two 150 megawatt projects coming. In Texas, FPL has a 278 megawatt project completed and three other 150 megawatt or above wind farms have also been installed. FPL is planning a 240 megawatt wind farm for Texas. In Kansas, a 112 megawatt windfarm has been completed.

A 100 megawatt wind farm means a capital investment of about \$100 million dollars.

"Potential Economic Impacts of Commercial Wind Power Development in North Dakota," by Dr. F. Larry Leistritz, a NDSU agricultural economist, Prepared for Griggs/Steele Wind Power Development Group, LLC, published in late 2001. The study was prepared with support from the Department of Energy.

North Dakota is uniquely positioned to realize the benefits of wind farm construction with the turbine blade manufacturer LM Glasfiber in Grand Forks and the tower manufacturer DMI, in West Fargo.

100MW Windfarm Direct (000s)			
	Local Area	Non-Local In-State	State Total
Construction Phase (one time)			
Construction Sector	\$27,920	\$18,619	\$46,539
Manufacturing Sector		\$16,461	\$16,461
Total Phase	\$27,920	\$35,080	\$63,000
Operation/Mtc Phase (annual)			
Household Sector:			
Lease/Royalty Payments	\$285		\$285
Salaries/Wages	\$926		\$926
Retail Sector	\$79	\$52	\$131
Business & Personal Services Sector	\$79	\$52	\$131
Total O&M Sector-Annually	\$1,369	\$104	\$1,473

100MW Windfarm Operations Phase Direct & Secondary (000s)			
Sector	Local Area	Non-Local In-State	State Total
Construction	\$61	\$60	\$121
Retail Trade	\$582	\$547	\$1,129
Finance, insurance & real estate	\$114	\$111	\$225
Services	\$245	\$97	\$342
Communications & Public Utilities	\$74	\$75	\$149
Households	\$1,609	\$419	\$2,028
Other(1)	\$145	\$220	\$365
Total Gross Business Volume	\$2,830	\$1,529	\$4,359
Total Employment (FTE jobs)	26	18	44

(1) Other, includes: agriculture, mining transportation, and government

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In addition the study shows annual property tax receipts of \$555,000 (post 2001 session) and ten FTEs in maintenance jobs that would likely be in the local area at wages above the state average. This is just one 100MW wind farm.

North Dakota has the resource and available land for more than 345,000 megawatts of installed turbine capacity, cranking out 138,000 firm megawatts of power.

SCR4012 calls for a 10,000 megawatt turbine capacity state objective by 2020, with a power output of approximately 3,500 - 4,000 firm megawatts.

Based on the impact shown above and scaled for higher volume, the one time construction impact provided the state and the ongoing operational phase economic impact, derived primarily in rural areas, would be significant and measured in billions of dollars. The extra \$555,000 from just one 100 MW wind farm could provide the revenue to make a rural school viable and save it from consolidation.

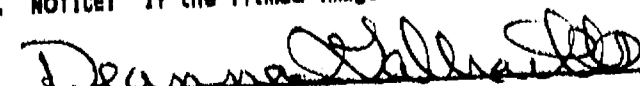
Is it possible to achieve?

Impediments do exist; however, there are no technical reasons preventing our achieving this objective. The impediments are largely policy issues that can be overcome if we have the will to succeed. The policy issues are not trivial and they require work on state, regional and federal levels. But, one sets an objective in order to focus on resolving the barriers inherent to getting from here to where you want to be.

The Vision

First comes the vision, then comes development of the strategies and tactics to realize that vision. If we prevent ourselves from articulating a vision until all of the impediments are resolved, it is doubtful that we will ever realize the vision. I submit that any vision worth stating is one that will be resisted by someone or at best be viewed as audacious at the time it is expressed. "No-brainers" make for weak visions. Visions should drive us to succeed where we might otherwise founder. Visions should be bold enough to excite our creativity in designing solutions to overcome recognized and unforeseen obstacles.

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Major leaps forward come from focused and applied creativity breaking through the existing context of conventional thinking. Change always disturbs someone, those who benefit from the existing order or those who simply fear disruption. Our commitment to change is directly related to our recognition of the need for change.

Placing a statistical face on the need to change, I submit that between 1960 and 2000:

- 9 of 53 counties had population losses exceeding 50%.
- Only 9 counties grew in population.
- The remaining 35 counties averaged 33.85% loss of population.
- Total population living outside the four major metro counties dropped from 68.9% in 1960 to 50.57% in 2000.
- In 2000 North Dakota was 48th among the states in average wages and in 2002 we dropped to 49th, with only Montana lower.

We all know that these statistics are only the tip of the iceberg. Beneath the water dozens of communities are dying, losing basic services that support minimal quality of life. Schools consolidate forcing children to commute longer distances, medical and ambulance services evaporate increasing the danger of living in rural areas, retail stores are boarded up forcing longer trips to obtain supplies. The need for rural revitalization is profound.

Our vision for stemming the erosion of our communities should be equally as profound as the need for change.

We have come to recognize that we have been given the nation's greatest wind resource at precisely the time when wind power is the fastest growing of all forms of electricity generation. This stunning opportunity for rural economic development has been handed to us and now it is up to us to boldly pursue maximizing the value of this gift or, conversely, cower in confusion and frustration over the litany of potential problems that might lead to failure.

Many have asked entrepreneurs to become engaged in developing bold ideas to revitalize the state's economy. Invitations have been hung from dozens of forums throughout the state. Entrepreneurs are about change. Change is disruptive.

The Rationale

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The 10,000 megawatts of installed turbine capacity called for by 2020 will produce between 3,500 and 4,000 megawatts of power.

The 10,000 megawatts comes from taking our 11.56% share of the wind resource against the Department of Energy initiative calling for 5% of U.S. electricity coming from wind by 2020. Using Energy Information Administration forecasts for 2002, 5% of U.S. electricity would require 81,262 megawatts of installed wind turbine capacity. Thus, $81,213 \times 11.56\% = 9,388$ megawatts of turbine capacity. We rounded up to 10,000 because we knew that hydrogen production and policy changes that appear likely to occur over the next 20 years will either increase the amount of electricity required or increase the percentage of U.S. electricity coming from wind. Also, "10k by y20" doesn't sound too bad.

One should note that the European Community has a directive for having 12% of all electricity coming from renewable energy sources by 2010. Since wind is the lowest cost renewable, it is likely that wind will be the desired source. At the end of 2002, Europe had approximately 75% of the world's developed wind power. Germany alone added over 3,000 megawatts of turbine capacity in 2002 according to the European Wind Energy Association.

Timeliness

On a national and regional level, transmission policies are in flux. Many recognize that the patchwork system of lines can not support the forecasted growth in electricity consumption. Unless something very dramatic happens in the next ten years, we are told to expect a lot more power disruption.

Regional plans are being developed that will serve as the foundation in addressing new transmission infrastructure. Once those plans have become firmly ensconced, they will be much more difficult to change. Absent any state objective for wind power development, we are left with goals devised by planners in Chicago or Minneapolis.

Think of it this way, there are right now no major U.S. transmission backbones. While we have recognized how important having a federal interstate superhighway system is to commerce, we have not in the past recognized that the movement of electrons is every bit as important as the moving of goods. It is likely, in the opinion of many, that we will increasingly see the federal government involved in creating interstate transmission capacity. Just as it was with superhighways, it is imperative that

we make noise now about how much transmission we desire.

We need to be as committed to getting our wind power to regional consumption markets as Alaska was and is in getting their power resources to remote markets. Perhaps some of you remember that the administration is supporting a new pipeline that will ship natural gas from Alaska across Canada and into the midwest. Into a market that our wind could serve. This is worth repeating. The Alaskans are gaining support for federal loan guarantees to ship natural gas into the midwest. In fact, they won an amendment to the Senate energy bill to do just that. While the Alaskans pursue the Midwest power market, we should outflank them by creating a transmission spigot from our wind fields to Chicago.

Those states who gain new transmission capacity highways will experience growth, those who don't will be shut out for decades. No road to market no product. No expression of need or desire to produce, no road, no product. The bigger the road, the bigger the load shipped. We want transmission capacity that serves our development objective.

Impediments to Development

The magnitude of an impediment is inversely proportional to the desire to overcome it. Barriers stop those who lack the will to overcome them.

If we in North Dakota wanted 10,000 megawatts of installed turbine capacity in five years, two things would need to be resolved: transmission and market. Given those, the developers would take over building the generation. We don't have a lack of developers interested and capable of investing in generation in North Dakota. If developers could be assured of 20 year contracts for electricity at 2.5 - 3.0¢ kWh and have the road to reach their market they would build.

So strong is our resource, that wind power in parts of North Dakota and South Dakota can be tapped at the lowest cost of any in the region spanning from the Dakotas to Chicago, and beyond. Chicago has become the transmission gateway to the eastern grid. This allows all regional generators to shift generation to the east where electricity is generally more expensive.

Transmission

Transmission is planned on the basis of a generator or small localized group of generators working to string a line to their target market. Transmission rules do not

now allow lines to be overbuilt in anticipation of future generation. Imagine the problems we would have in the our national highway system if we allowed trucking companies to build only enough highway as they needed to ship their loads to market. There is no transmission planning process on a national, regional or even state basis whereby growth in power consumption is forecast, say 40 years out, and future generation capacity is then matched with the load growth forecasts. Reserving transmission capacity for future growth brings into question who would pay to overbuild the lines and for the operations and maintenance of such lines once built.

Building to meet only the existing transmission need condemns us to inefficient use of transmission corridor right-of-ways and the expensive process of upgrading lines frequently. We need a more rational planning process. Some organizations are working on just that level of planning.

1. Define regional consumption forecasts and regional export market needs.
2. Match the consumption forecasts with generation.
3. Build the capacity anticipated to be required within reasonable future parameters.

On the state basis, we should:

1. Define our generation objectives based on statewide benefit values and market trends.
2. Work to shape regional policies that will further our development objectives.
3. Design the transmission within the region that allows us to meet our objective.
4. Aggressively pursue common sales of power for generators.
5. Advocate national energy policies that support our generation objectives.

Instead, in North Dakota we have two or three transmission initiatives that will benefit only a limited number of generators. Plans are being made without consultation by state stakeholder groups or within the context of what will benefit the state most. Wind advocate groups in many parts of the state have no voice and fear that the wind development interests from certain areas of the state will be ignored.

Absent any statewide development objective, we could inadvertently strangle our development potential by building smaller capacity lines than we should have. Furthermore, I would submit that if we want strong development on a statewide basis for wind power, a DC line is probably not the way we would want to go for the following reasons:

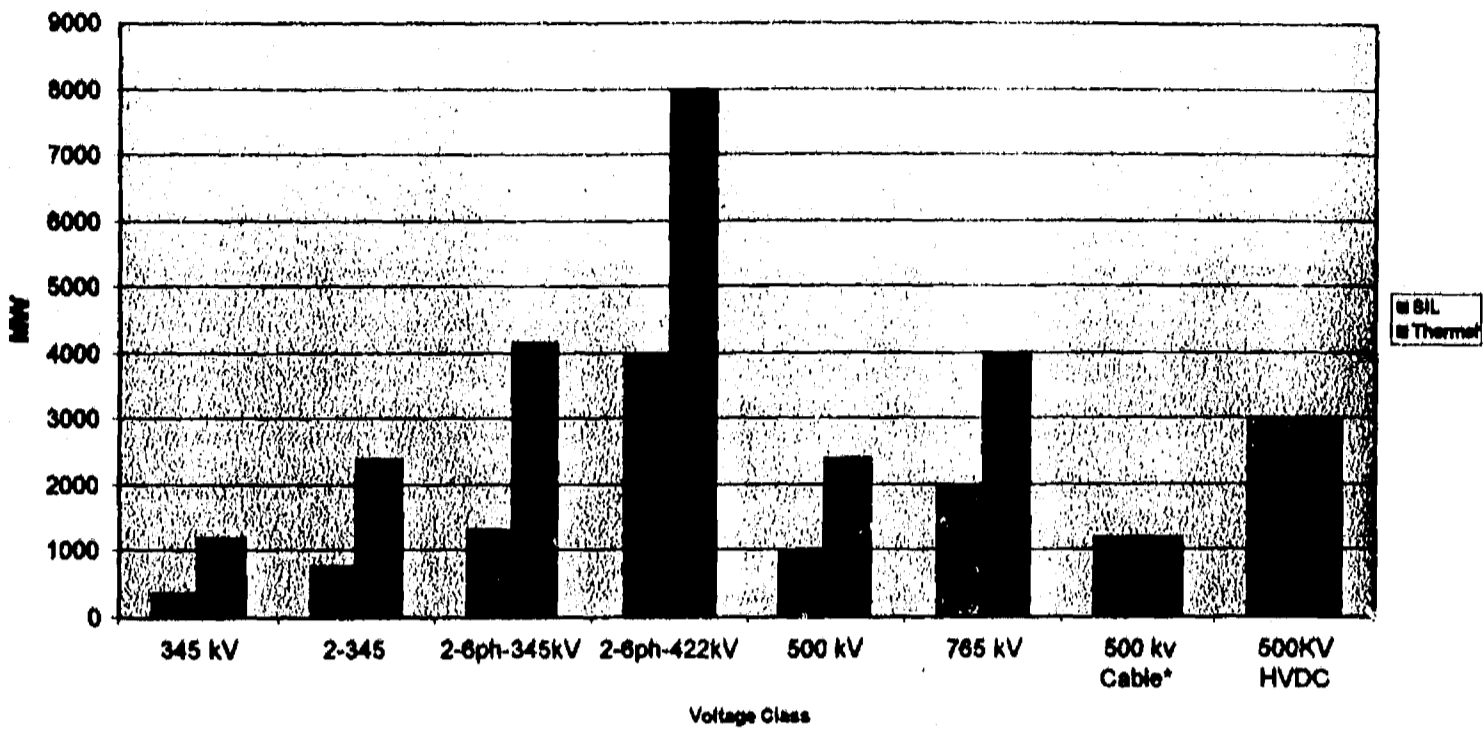
1. The variability of wind power carries unique challenges that are best met with a different approach to transmission than firmer generators of power might utilize.
2. Geographically dispersing wind farms, all attached to one long-haul transmission line will greatly assist in providing a firmer stream of power to the line end. DC line interconnections are prohibitively expensive.
 - A networked approach allows for lower wind in one part of the network while higher wind in another picks up the slack.
 - A large scale system or networked approach on a single line will allow peak shaving whereby we overbuild the number of wind farms and when the peak power production exceeds the line capacity, we divert the excess to hydrogen production. As the overall wind output declines, we would place more of the turbine output back on the transmission line from the hydrogen.
3. Using high capacity modern AC line technology will allow us to curry favor in states we need the line to cross by allowing them to place some of their wind on our line. DC line interconnection costs are too high. Furthermore, their lower capacity would mean that we give that we would reduce our output too much to make room for them.
4. The cost of DC lines is much higher on a megawatt mile basis than high capacity AC that can carry so much more power.
5. Transmission should be planned with a hydrogen interface, possibly with a coal gasification connection and with attention to other backup or firming.

Certainly we need changes in transmission policies in order to ferry a sizeable share of our wind to market; however, this should be no more daunting than the effort Alaska has put in building oil and now gas pipelines across Canada into the Midwest.

Dale Osborn, Lead Transmission Expansion Planning Engineer for MISO states that the cost for shipping wind to Chicago on a 2 circuit, 6 phase line, including capitalization, O&M and a reasonable return on investment would be 8/10ths of a cent when operating at only 60% of capacity. The cost would go down as we are able to utilize greater capacity.

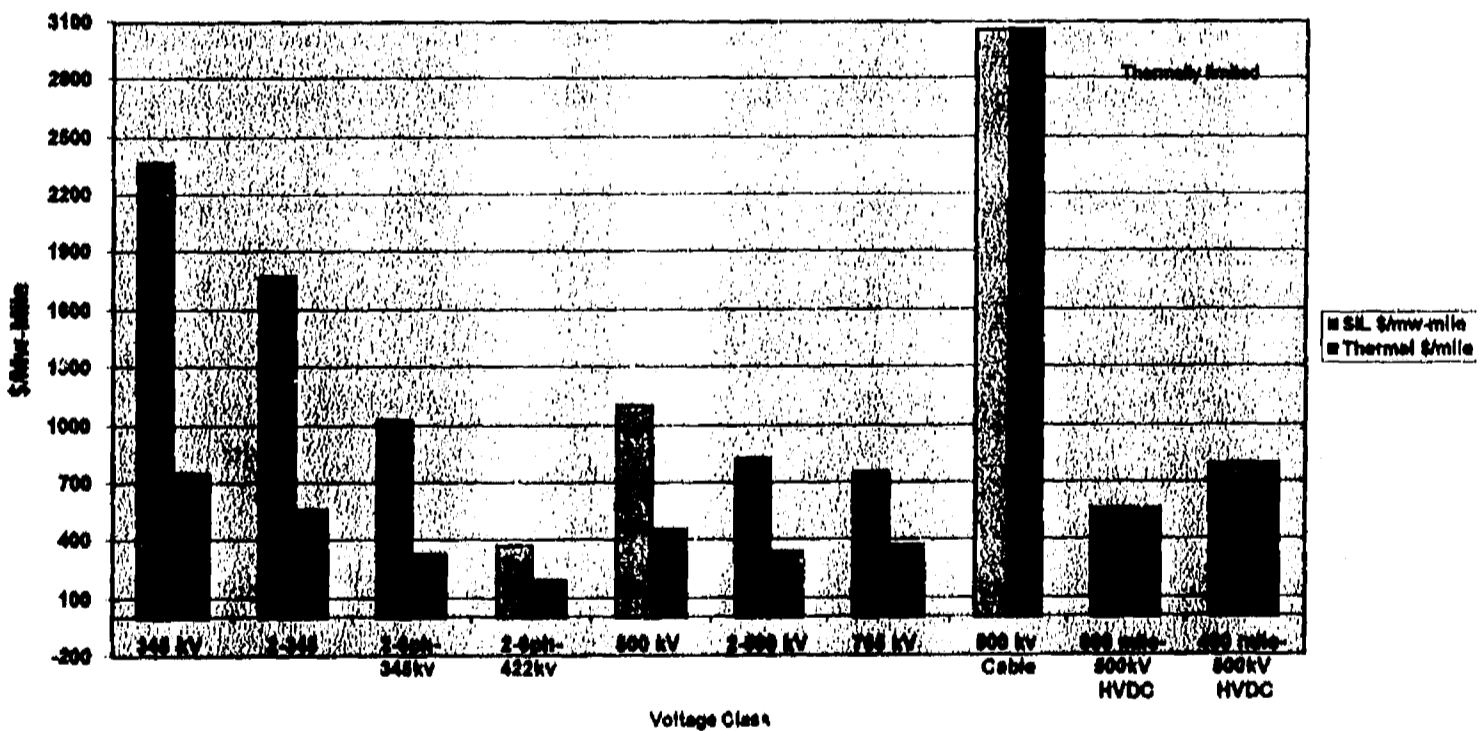
Typical Line Ratings

Provided by: Dale Osborn, Lead Transmission Expansion Engineer, MISO



Transmission Cost

Provided by: Dale Osborn, Lead Transmission Expansion Engineer, MISO



Dakota Wind System: Transmitting 10,000 MWs with Line & Hydrogen Pipeline

Using a Dakota Wind System approach instead of looking at transmission needs on a windfarm by windfarm basis allows us several interesting advantages along with the

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ability to build more wind turbine capacity than otherwise.

Private developers can build a wide area network of individual windfarms throughout the state amounting to a total 10,000 to 12,000 megawatts of turbine capacity attached to a central long-haul 8,000 MW transmission line if we work a hydrogen component into the mix. Geographically dispersing the wind farms will contribute to overall system power flow on the transmission line. Lighter winds in one local area can be augmented with higher wind from another if both are on the same line. When the entire system is near overproducing the capacity of the transmission line we begin diverting turbines to the production of hydrogen. As the overall systems power flow begins to erode, we pull from hydrogen production to feed the transmission line. This is a form of "peak shaving" that will increase the capacity utilization of the transmission line. Together with the self-firming property of having a geographically dispersed network of windfarms, we should be able to greatly exceed the 60% transmission capacity utilization that Dale Osborn used as the base for his 8/10th of a cent transmission cost projection for shipping a kilowatt hour of electricity to Chicago on a "double-six" (2 circuit, 6 phase, 422kv line, 8,000 MW capacity) line.

Under the above plan, we would use in-state hydro, coal gasification and possibly Manitoba Hydro as a backup for hydrogen production. The hydrogen would be piped to Minneapolis/St. Paul for use in vehicular markets.

This plan, in effect, allows us to use wind for both electricity and vehicular markets. It solves the firming problem with wind and it provides a pipeline that can be used to store electricity in the form of hydrogen. It is one large system far more efficient than any single wind farm will ever be.

This is only one rudimentary plan for achieving our wind objective. Surely, there will be others or refinements to this plan as we begin focusing more acutely on strategies for achieving the objective.

Market

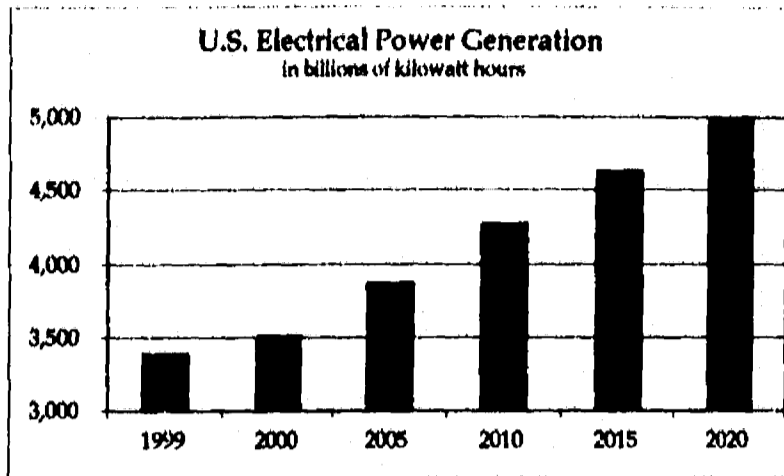
Which comes first, the transmission or the market. Surely we can't have one without the other. Ideally, we would work on both a common transmission line, a pipeline and a common power purchase agreements at the same time. The developers of wind projects would be independent companies willing to feed power to our central line to meet the master power purchase agreements.

As can be seen below, growth in regional and national electricity consumption is

forecast to be strong enough to support considerable more than the 10,000 megawatts called for in this objective. A market exists and the question is who will supply it.

United States electricity consumption to grow 42.2% between 2000 and 2020.

This does not include plant replacement or aggressive hydrogen production.



Source: Energy Information Administration, Outlook 2002.

Annual Growth Factor:	0.50% South Dakota	0.50% North Dakota	0.50% Nebraska	1.60% Minnesota	1.60% Iowa	1.60% Wisconsin	1.80% Illinois	Total Consumption
1999	7,992,354	9,272,624	22,886,127	60,169,575	39,461,216	66,307,813	136,874,068	342,963,777
2000	8,032,316	9,318,987	23,000,558	61,132,288	40,092,595	67,368,738	139,337,801	348,283,283
2001	8,072,477	9,365,582	23,118,560	62,110,405	40,734,077	68,446,638	141,845,882	353,690,621
2002	8,112,840	9,412,410	23,231,138	63,104,171	41,385,822	69,541,784	144,399,108	359,187,273
2003	8,153,404	9,459,472	23,347,294	64,113,838	42,047,995	70,654,453	146,998,291	364,774,747
2004	8,194,171	9,506,769	23,464,030	65,139,659	42,720,763	71,784,924	149,644,261	370,454,578
2005	8,235,142	9,554,303	23,581,351	66,181,894	43,404,296	72,933,483	152,337,857	376,228,325
2006	8,276,318	9,602,075	23,699,257	67,240,804	44,098,764	74,100,418	155,079,939	382,097,575
2007	8,317,699	9,650,085	23,817,754	68,316,657	44,804,344	75,286,025	157,871,378	388,063,942
2008	8,359,288	9,698,336	23,936,842	69,409,724	45,521,214	76,490,601	160,713,063	394,129,067
2009	8,401,084	9,746,827	24,056,527	70,520,279	46,249,553	77,714,451	163,605,898	400,294,619
2010	8,443,089	9,795,561	24,176,809	71,648,604	46,989,546	78,957,882	166,550,804	406,562,296
2011	8,485,305	9,844,539	24,297,693	72,794,981	47,741,379	80,221,208	169,548,718	412,933,824
2012	8,527,731	9,893,762	24,419,182	73,959,701	48,505,241	81,504,748	172,600,595	419,410,960
2013	8,570,370	9,943,231	24,541,278	75,143,056	49,281,325	82,808,824	175,707,406	425,995,489
2014	8,613,222	9,992,947	24,663,984	76,345,345	50,069,826	84,133,765	178,870,139	432,689,228
2015	8,656,288	10,042,912	24,787,304	77,566,871	50,870,943	85,479,905	182,089,802	439,494,024
2016	8,699,569	10,093,126	24,911,240	78,807,941	51,684,878	86,847,584	185,367,418	446,411,757
2017	8,743,067	10,143,592	25,035,797	80,068,868	52,511,836	88,237,145	188,704,032	453,444,336
2018	8,786,783	10,194,310	25,160,976	81,349,970	53,352,026	89,648,939	192,100,704	460,593,707
2019	8,830,717	10,245,281	25,286,781	82,651,569	54,205,658	91,083,322	195,558,517	467,861,845
2020	8,874,870	10,296,508	25,413,214	83,973,994	55,072,949	92,540,655	199,078,570	475,250,761
2021	8,919,245	10,347,990	25,540,280	85,317,578	55,954,116	94,021,306	202,661,985	482,762,500
2022	8,963,841	10,399,730	25,667,982	86,682,659	56,849,382	95,525,647	206,309,900	490,399,141
Growth 2013 - 2020								
Total Turbine MW	37,855	32% growth in consumption						
Retirement	25,000							
Total Needed	62,855							
State Wind Shares	23.23%	27.30%	19.58%	14.82%	12.43%	1.26%	1.38%	
Turbine Cap/MW	14,604	17,156	12,307	9,316	7,813	794	865	

Finally

What would our state do to pursue a company prepared to make a billion dollar

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capital investment in our state? I submit that we would risk a considerable amount of time and money to attract such a company. With our wind, we are looking at a potential several times that size. Conversely, opportunities lost come at a great cost to our future. Can we afford to let this, the largest economic development opportunity likely to face this state in decades, blow by us?

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**Statement of
Karl Limvere, Chairperson
Rural Life Committee
North Dakota Conference of Churches**

Senate Concurrent Resolution No. 4012

**Senate Finance and Taxation Committee
February 18, 2003**

Mr. Chairman and Committee Members: My name is Karl Limvere. I am pastor of the Zion United Church of Christ of Medina and serve as the chairperson of the Rural Life Committee of the North Dakota Conference of Churches.

This past fall, the North Dakota Conference of Churches and its Rural Life Committee adopted a statement encouraging the development of renewable energy resources in North Dakota. I have attached a copy of our adopted statement to this testimony for your review and consideration.

In particular we view the development of the wind energy resources of our state as a positive response to the needs of stewardship of our earth's resources and economic development within our region. Senate Concurrent Resolution No. 4012 is consistent with our statement and objectives. As you will note from our statement we have specifically indicated that wind energy development in this region should move forward proportionately to this region's potential wind energy resources and the need for renewable energy in this nation.

Both the Rural Life Committee and the Conference of Churches would emphasize that as we encourage public and private initiatives to develop wind energy resources for the common good of our society, we also want to ensure that such development is done in an environmentally and socially responsible manner. That also means that such development should serve the broad public interests of our society so that both the producers and the consumers of this energy resource receive benefits from it and have a voice in its development.

This resolution would help establish the public-private partnership that will be necessary to achieve these objectives. Through this resolution, we would hope that the State of North Dakota will be able to take a leadership role in shaping this new industry so that its benefits are widely dispersed and serve to build our communities through positive, sustainable growth.

Thank you.

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North Dakota Conference of Churches
and its Rural Life Committee

Statement on Energy Production & Stewardship

The North Dakota Conference of Churches and its Rural Life Committee recognizes our human responsibilities to serve as the stewards of creation to ensure sustainable development of human and natural resources and to reduce adverse environmental impacts upon the earth and the health and well-being of future generations. In recent years we have outlined those concerns and its challenges to the Christian community and our individual lifestyles in our video documentary, "Stewards of Creation, Stewards of Hope."

Recognizing that energy production has become a necessary component of modern life and in keeping with our understanding of our stewardship responsibilities, we encourage the conservation and wise use of energy resources and the systematic development of and conversion to just, equitable, renewable, and environmentally sustainable sources of new energy.

We further recognize that wind energy is becoming a viable source of new energy production and that the wind resources of North Dakota make it a primary area for potential wind energy production. We therefore encourage public and private initiatives that would develop this resource for the common good of our society in an environmentally and socially responsible manner, keeping in mind the principle of equitable control of economic benefit for both producers and consumers. We further encourage that wind energy development move forward in proportion to this region's potential wind energy resources and the need for renewable energy sources in the nation.

Adopted by Rural Life Committee, NDCC 9/12/02
Adopted by North Dakota Conference of Churches 9/23/02

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Testimony, Senate Committee Resolution 4012
Presented to Finance and Taxation Committee

February 10, 2003

Chairman Herb Urlacher and Members of the Finance and Taxation
Committee.

Dakota Resourced Council (DRC) supports SCR 4012.

SCR 4012 is a resolution establishing an official state wind power
development objective of 10,000 megawatts of installed turbine capacity to be
achieved by the year 2020 and directing all state departments, agencies, and
commissions to adopt this official objective for planning and policy development
purposes.

North Dakota ranks first among the states in commercially usable wind
resources but ranks ~~20th~~_{7th} among the states in the development of wind power.

In 1999 the governor and the legislature of Texas, second ranked wind
resource state, adopted a policy of installing 2,000 megawatts of renewable
energy by 2009. Based on this state policy Texas has enjoyed over \$1 billion in
wind power investments.

Wind energy development in North Dakota in proportion to the wind energy
resource potential would result in billions of dollars of new capital investment
hundreds of millions of dollars in land lease rentals, taxes, ancillary business
development, and critical economic development benefits to rural communities
throughout the state. States that develop their wind power resources first will
benefit most from this unlimited renewable energy source.

By the end of 2003 there will be two major wind energy projects of 40 MW and
20 MW in North Dakota along with other planned projects.

The Department of Energy is doing a field test a new high performance
electrical power line developed by 3M. Western Area Power Association
installed one mile of a high performance line near Fargo, North Dakota on
December 9, 2002. This line has the potential to carry two to three times more
electricity than conventional lines. To date the results of this study is very
promising. The use of high performance lines in North Dakota have great
potential in reducing the current transmission constraints that now exist. Senator
Byron Dorgan has been very involved in this.

Senator Kent Conrad is working to get a \$750,000 study to determine whether
excess capacity in the electrical transmission grid could carry electricity

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generated by wind in North Dakota. Also Senator Conrad has been facilitating meetings with the Western Area Power Administration agency to determine how to integrate wind and hydro electricity (utilize the state's hydro electricity to firm the unrivaled wind energy).

Recently Senator Kent Conrad indicated that a company is prepared to invest \$1 billion on a wind farm in North Dakota if the federal tax credits are extended and the transmission gridlock problem can be solved.

President Bush recently announced on his State of the Union address a \$1.2 billion FreedomCar and Fuel Initiative to develop hydrogen-powered fuel cells at the national level. "With a new national commitment, our scientists and engineers will overcome obstacles to taking these cars from laboratory to showroom, so that the first car driven by a child born today could be powered by hydrogen, and pollution free", said President Bush.

With a strong commitment to wind energy production North Dakota can also position itself to be a regional and national leader in fueling the future hydrogen economy and capitalizing on the most significant industrial transformation since the beginning of the internal combustion engine.

DRC urges the committee vote a "Do Pass" on SCR 4012

Respectfully submitted for Dakota Resource Council by

Terry Schaunaman, staff

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DATE: Tuesday, 18 February 2003

TO: Members of the N.D. Senate Finance and Taxation Committee
Sen. Herb Urlacher, Chairman
Sen. Rich Wardner, Vice Chairman
Sen. John O. Syverson
Sen. Ben Tollefson
Sen. Ronald Nichols
Sen. Tom Seymour

FROM: Dean Hulse
1437 East Gateway Circle
Fargo
701-232-7997

RE: Testimony in support of Senate Concurrent Resolution No. 4012

As an owner of farmland in Bottineau County who is concerned about economic conditions in rural North Dakota, I am testifying today in support of Senate Concurrent Resolution No. 4012. In supporting this resolution, my only concern is that the objective of 10,000 megawatts (MW) of installed wind turbine capacity by the year 2020 is too conservative. This objective has been based on a 1999 U.S. Department of Energy initiative calling for 5 percent of the U.S. electricity demand to come from wind by 2020. However, the American Wind Energy Association recently reported that the European Union has announced a renewable energy GOAL that calls for 22 percent of EU electricity to come from renewable sources by 2010—that is, 22 percent of EU electricity to come from renewable sources within the next SEVEN YEARS.

To my ears, that EU goal represents a challenge to America. To put that challenge in a more recognizable perspective, might I suggest that we begin correlating images of EU wind farms with recollections of the Soviet Union's Sputnik. As the Cold War turned space exploration into a race, globalization is turning the necessity of achieving energy independence into a similar contest.

Wind-rich states such as North Dakota will be the ultimate winners in the race toward energy independence. With that potential in mind, the Griggs-Steele Wind Power Development Group LLC commissioned a study that investigated a 100-MW wind farm in a two-county area, as well as 1,000 MW of production statewide. Joe Richardson, president of Harnessing Dakota Wind, has extrapolated that study's statewide results to reflect 10,000 MW of production, and his calculations indicate that North Dakota landowners could receive nearly \$23 million annually from wind developers. In addition, the local property taxes

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accruing from 10,000 MW of wind energy could total about \$53.4 million annually – an amount also paid by wind developers. Overall, the construction of 10,000 MW of wind turbine capacity could result in a one-time infusion of \$6.06 billion for North Dakota. Because North Dakota has two manufacturers linked to wind energy – DMI Industries in West Fargo and LM Glasfiber in Grand Forks – more wind-development money is likely to remain in the state than in other states lacking these industries.

In short, wind energy is a cash crop for cash-strapped farmers, rural communities, manufacturers and other wind-energy businesses. Please send Senate Concurrent Resolution 4012 out of committee with a "do pass" recommendation so that North Dakotans can set about ensuring that 10,000 MW of installed turbine capacity will indeed be in place by 2020.

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uncertainty of exact locations, this analysis estimates that the affected counties will see an increase of between \$200,000 and \$400,000 per year in tax revenue for each 100 megawatts of development that occurs.

Job Creation

Construction jobs for a wind project are relatively short-term assignments during the construction phase of the development process. Construction time for a wind project is generally a year or less depending on the size of the project. For each of the 100 megawatt projects outlined in the analysis, the equivalent of 65 to 85 full-time jobs may be created during the construction phase. This number varies due to the additional transmission and distribution requirements for the different phases. Local contractors and suppliers are often used for some of the construction activities. The use of local equipment, supplies and services provided to the crew also benefit the local economy during the construction period. This analysis has concluded that during construction on each of the 100 megawatts that are developed, approximately \$1.5 million will be expended on construction materials and supplies and between \$850,000 and \$1 million will be expended on local goods and services.

The number of people employed by a wind power plant during commercial operation depends on the number of turbines and the administrative structure of the project. This analysis finds that 10 full-time operations and maintenance jobs will be created for every 100 megawatts of installed wind power capacity. The operation of a wind project results in the purchase of local goods and services in the form of construction materials, construction equipment, maintenance tools and supplies, maintenance equipment, and manpower essentials such as food, clothing, safety equipment, and other articles. Support services such as accounting, banking, and legal assistance are also required. This report estimates that approximately \$400,000 per year will be expended to the local economy from operations and maintenance for each 100 megawatts of development.

Disbursed Generation

Wind power projects can provide economic opportunities for local residents not only through royalty payments and jobs but also through community investment in locally-owned wind power projects that sell the electricity to a utility. Under the right circumstances, locally owned wind power projects could provide a way for local communities to gain additional economic benefits from wind energy development by retaining the return on investment and energy sales profit that might otherwise leave the area with a private developer. Wind turbines under local ownership could be located either in clusters or disbursed widely across many farms, similar to those now commonly found in parts of northern Europe. This analysis shows that, provided access to the required capital, locally owned disbursed generation can produce 25 to 150 more jobs and \$700 thousand to \$4.3 million in total value added than the Phase II scenario and can have a much larger impact on the local economy in the form of retained revenues from the local ownership of the turbines. The study provides a detailed cash flow analysis and local economic impact projections for this type of development.