

2009 HOUSE NATURAL RESOURCES

HB 1426

## 2009 HOUSE STANDING COMMITTEE MINUTES

Bill/Resolution No. 1426

House Natural Resources Committee

Check here for Conference Committee

Hearing Date: 2-12-09

Recorder Job Number: 9319

Committee Clerk Signature

*Nancy L. Gerhardt*

Minutes:

Chairman Porter – Open the hearing on HB 1426.

Rep. Phil Mueller – See **Attachments # 1 & 2.**

Rep. Hanson – Do the neighboring states have boundary regulations?

Rep. Mueller – Yes they do. Minnesota is probably the industry standard. I think some of what they have done is a little onerous from the developers. Have they all done that? I can't answer that, I don't know, I suspect they are like we are in many cases. We're in a new age, new business, and a new industry with wind development. So I would guess the answer would be some have and some have not.

Rep. Keiser – What is the rationale for 500KW? And what happens under 500 KW?

Rep. Mueller – I think there are another set of rules set into place at the PSC and there are others that will be able to answer that. The intent of the language is, we aren't talking about the wind turbine that's going to sit out there next to someone's farm and power that farm. That's not a wind turbine that we're all that concerned about in terms of the commercial development of wind.

Rep. Keiser – What about 2 farmers where one happens to have his house close to the property line and the other farmer doesn't like it and wants to put the turbine next to his house.

Rep. Mueller – We best hope neither has guns. We don't know. I think there are standardized rules in the PSC. I think that is addressed.

Rep. Jon Nelson – I'm here to offer support for HB 1426. I signed on to this bill because I think we need some standardized standards as we go forward in wind development. Questions

Curtis Jabs – Basin Electric Power Cooperative – See **Attachment # 3**. I support the bill with the amendments, but would oppose it if the amendment didn't pass.

Rep. Keiser – Why should the PSC should rule rather than establish law.

Mr. Jabs – This is solely in the jurisdiction in the sitting. When we did this project because it was over 100 MW with the signing process we worked with the PSC where the turbans should be. I think they are the appropriate agency that should develop these.

Chairman Porter – Do you think this is an end run around the authority of the townships and county planning and zoning boards already have?

Mr. Jabs – Absolutely not. Rep. Mueller struck that language, current statute says that townships & counties can have more stringent rules than state rules. That is already in code.

Roger Johnson – ND Agriculture Dept. - See **Attachment # 4**. Wind development has grown very dramatically ND in recent years. My office gets involved because these things are located on farm land, and farmers tend to call the Ag Commissioners office and say "What's the deal?" We don't have any jurisdiction, so we end up talking a lot of the time to farmers and we think this industry is an industry we want to grow in ND for a lot of very good reasons. It is important for the legislature to think carefully about the rules that should apply. One concept I would like you to consider is lines where it talks about the 5 and 2 rotor diameter where it talks about prevailing winds. That concept is important. Because I sit on the industrial commission and we regulate a lot of oil and gas. There are setbacks required for when folks come to drill for oil or gas. There are also provisions if the oil or gas is drained from other land there is

compensation awarded. Even if you locate a tower right next to a border, not the border of the whole development here, but different landowners, there should be a methodology that allows the adjacent owner to share in some of the revenues. Questions

Rep. Hofstad – I'm confused about the borders. Setbacks from the border within a project or setback from landowners within that project?

Mr. Johnson – This bill deals with the borders around the whole development, not the individual towers. The point I want to make is the stink about ways of keeping this concept in mind is the 5 x 2, both within the development and along those borders.

Brad Crabtree – Alliance for Renewable Energy - See **Attachment # 5**. Questions

Vice Chairman Damschen – Do you have a wind farm there now?

Mr. Crabtree – There is now a wind farm with is 5 miles south of my front door. I'd say 199 MW project with ½ the turbans in SD and ½ in ND. Excel Energy has announced a project that will be build in 2011, and another developer is working with us to conform to our zoning which has a 5 rotor setback for some of the same reasons the others have testified to. If you approach this responsibly it will not preclude wind development and it is easy to work with wind developers to solve these problems. There is no need for a straight jacket here. We have to avoid the prospect of people being denied their rights. ND Century Code is a result of a bill passed 2 sessions ago, exclusively recognized the private property rights of wind.

Vice Chairman Damschen – I am curious as to whether the unrest in the community resulted from the siting of the existing wind farm?

Mr. Crabtree – No, the siting that caused the conflice was purposed, they had tested for the foundations, they had identified the sites and the sites were within 150' to 300' upwind of several landowners in our township. They were working with another developer, signed leases and had the developer constructed that wind farm with those turban sites an entire area that

belonged to my neighbors, which was ideally suited for wind development would have become undevelopable. The reason for our zoning was that situation could have been worked out, but the developer was basically taking those wind rights without consultation or compensation. If they had constructed the wind farm. They chose not to construct. The PSC in Minnesota denied them the power purchase agreement.

Rep. Keiser – Do you support in the bill the 5 & 2 rotor and the falling damage distance standards?

Mr. Crabtree – Personally I do, but speaking not as a board member of the alliance, as an individual landowner and township officer I think that's entirely workable. Minnesota has far more wind development than we do. It has worked very well. In fact wind developers that had that experience in MN voluntarily applied that approach in Iowa before Iowa set any standards. That said, all along I'm working with my colleges in industry and farm organizations through the alliance. I have been open all along to the idea that the PSC be tasked to develop the rules, but then let those rules be determined through a public proceeding. It may not come out exactly the way I like, but I think that's fair. I think there are a lot of concerns that are legitimate that deserve an airing.

Chairman Porter – Further testimony in support?

Kayla Pulvermacher – ND Farmers Union – We recognize ND's vast wind resources and urges development of the states enormous potential for electricity generation from the wind. Our organization believes we need to have state laws concerning zoning, regulations describing borders setbacks and so forth. We also believe allowing a county zoning to preempt the state is an important piece of the bill. It is important for all parties to work together with an open dialoged and to allow for future development. Once again we urge a Do Pass on this legislation. Questions

Harlan Fuglesten – ND Association of REC's – We are an active member of the ND Alliance for Renewable Energy. We are very interested in promoting wind development and we think the best way to promote wind development is to have reasonable rules and regulations that eliminate problems in the development of the industry. We are very supportive of the concept of having the PSC draft the rules and regulations for reasonable setbacks and to have the public hearing and regulatory process on that and we ask for your support of the bill as amended. Questions?

Chairman Porter – Further testimony in support? Opposition

Rep. Mike Brandenburg – See **Attachment # 6**. I'm here in opposition to bill 1426 that deals with setbacks for wind towers. First of all I want to point out the study – attachment #6.

I was very much involved with the wind farm going up in Lamoure Co. and I can speak to ????? Power & Light and to the issues how they met with the landowners. The landowners were notified that their land was going to be used for a possible wind farm. They brought those landowners in and said this is what we are looking at. They brought Basin to the meeting, they brought Central Power to the meeting, they brought themselves to the meeting, and they all sat up and talked about what their plans are together with a purchase power agreement. The landowners were there and they were given all that information upfront. They were looking at placing the wind farm in the area, and landowners had some concerns about border issues. Here's the thing that's not being thought about in the bill that's been presented. It's the terrain and the line-up. When you put a wind farm up, and you start looking at a 5 rotor setback, you're talking about a ¼ mile. In order to put a wind tower up your only able to put up 1 wind tower in that quarter. With these types of setbacks. Normally they place anywhere from 3 towers to 4 in a ¼ depending on the terrain of the land. They space those out along there. In Lamoure Co. they work through those issues very well. In the project in Vickie Co.

there were a number of people working up and down the hills signing up landowners. About 5 to 6 different people signing up options. They were ranging anywhere from 3 years to 5 years to 10 years and we heard of even higher, but we know of nobody that signed over 10 years. The landowners that came to the meeting we recommended to them don't go over 5 years. We don't know which ship is going to leave the shore first. Some people did sign up for 10 year options. Since then we've made it so they only sign up for 5 year options in the state. The people who did sign the 10 year options ran in the problem that you had 2 companies bidding on the project in Dickie Co. In that project their working with Ottor tail and went through a purchase power agreement both were bidding on. Some people signed with Prairie Winds Power, which then were paper chasers, and they partnered an agreement with ?????

To put this project up. The project was awarded with Florida Power & Light. The trouble was, ½ the people that signed up with Enexco, ½ the people signed with Florida Power & Light. Then came the issue of where to place the towers. They went out and started looking at the land. They put some posts in the ground and just looking at the land, not determining where they were going to be, and they were following the ridge along the area and they ended up putting some of these stakes in the ground too close to the border line. Then the other landowners were signing with Enexco or Prairie Winds Power. You had terrain butting up against each other and the project didn't get any further than that. Then came the zoning issues. The decision was made that in Spring Valley township it looks like we are not going to be able to build. The landowners that were signed up with Enexco and they couldn't get out for another 5 to 10 years. They couldn't get out of their options. That is why right now Florida Power & Light is looking at going back down into Dickie Co. because these options these people signed are expiring and when they expire they can then get into putting that wind farm up in 2010. Execo is out of the picture now. There are hard feelings down there. The people

who are in Grandvalley township and German township and also other townships have voted not to zone because they want to have a wind farm. One wind farm was put in to the south and those townships voted not to zone. It works. If the people want it zoned and they don't want a wind farm in their area – zone. We have big projects coming up in the state. A 5 rotor setback, you can't build, because not only the towers, and you got to find a ¼ of land where you have a hilltop in the center of the ¼ so you can put the tower there. That's why they follow the terrain of the land. They will work with the landowners. I can say that in our area. We're very happy with what they did. They wrecked the roads, but when they get done they fixed the roads. The roads will be better than they were before. There is always 1 or 2 that will not be happy. Some people love the turbans and some people hate them. Questions

Rep. Keiser – If we address what is in the bill it does include an exemption. Is that not acceptable? As a solution in an individual cases?

Rep. Brandenburg – There are rules right now that they follow. Industry knows best where to put these towers. They want to take care of these landowners. They want to pay them fairly and they also have situations where they sit down and work out their problems. I don't think the bills necessary. I think those people want to be good neighbor.

Brian Rau – See **Attachments # 7 & 8**. Didn't sign in – ND Agricultural Aviation Association

Rep. Hanson – What % of the farmers use air applicators in ND?

Mr. Rau – I can't offer you a percentage. This last year we covered 5 million acres in ND.

Annette Bendish – PSC – See **Attachment # 9**.

Rep. Hofstad – How do you maintain any kind of consistency when you have various zoning regulations with a lot of different townships?

Ms. Bendish – Consistency from project to project?

Rep. Hofstad – Yes.

Ms. Bendish – I don't know if when we site a project we do maintain constancy from project to project because we look at each project individually and the need of that project and what the township zoning requirements would be.

Rep. Hofstad – You talk about discursion your maintaining discursion you are working with a lot of different zoning regulations in a number of different townships with your discretion.

Ms. Bendish – I think the bill as written wouldn't allow us to work with those townships. The commission is looking for discretion to look at each project and work with those townships accordingly.

Rep. Keiser – How many projects does the commission sited to date?

Ms. Bendish – I don't know that off the top of my head. I do know Jerry Linn one of our engineers our analysts are here and he can probably give you that number if you want him to come up and answer that question.

Rep. Keiser – I would like to know how many and how many of those projects that have been sited would not meet the standards in this bill.

Jerry Linn – Didn't sign in – PSC – That is something we would have to look up. Most of them probably do not meet the 5 rotor standards.

Rep. Keiser – As I read the bill, and maybe I'm misinterpreting it, those are the standards that are set up there and it says you have an option for an exemption. The one limitation is it cannot fall on the adjacent property owners land. Given there are exemptions in the bill, given that is the only limitation I see here, how many of your projects would have towers falling in the adjacent property owners land?

Mr. Linn – I don't know if we have any within the fall down distance. We generally tried to observe the 400' level, or roughly the equivalence height. We tried to observe that, whether we have I don't know.

Tim Simons – Crown Bute Power – See **Attachment #10**. We have about 475 MW either developed or underdeveloped in 5 different states. What you see is how a transmission lines the red line going through the center of the map. You have to look at the transmission capability. If you can't get the juice out you don't have a ??? After that you look at the topographical features of the area. Elevation is everything. You want to be on the highest spot you can without sheer slopes on it. We do a footprint. From our computer program we go out and say you are going to put 20, 26, 100, 200 MW on it, we put the footprints on it.

In ND the primary wind direction is West – North West – the turbans have to be at least 3 rotor diameters when they are standing shoulder to shoulder and 7 rotor diameters apart front to back. In areas, after we have established a windrow of the area you say 50% of the time the wind comes from the west/north west and 20% of the time from the south/south east in the summer time and then you divide the other two up out of the north east & south west. Each of those is a primary important feature. The production of electricity is a primary aspect of it.

Your will lose production if your turbans shadow each other. The farther you spread them out the longer the collector system. That means there are lines under all those turbans collecting them to go to the substations. That is \$ 100,000 a mile. So you want to spread them and pack them together all at the same time. It all has to do with the money. After that footprint is established we go to the landowners, from that footprint and lease the land under that footprint.

At some point you have to have the land lease so you can put up a meteorological Towner and know what that part will product. You are going to say on a 20 MW park is around 80 million dollars. We've heard a lot of things here about 5 – 2's, not 3 – 7. That is the science of it.

When you go to the zoning committee and you tell them, they tell you to try to reduce the impact on the agricultural land. If you reduce the impact on the agricultural land it means you go to the edges. Primarily the footprint itself is the size of your living room. You do have to

establish service roads so you can get to those turbans. A 16' wide service road stretching a mile will reduce the agricultural land by about 2 acres. The zoning guys from the individual counties say please put it to the edges of the property. If we put it to the edge of the property and we have a ?????? between landowners, we will stagger it back and forth across the fence line. I don't think any developer has a problem staying away from people's houses. Questions  
Chairman Porter - Do you have copies of your testimony?

Mr. Simons – No, I made it up as I went along.

Chairman Porter – Really, that was wonderful.

Rep. Keiser – This is your wind farm here.

Mr. Simons – One of them. We have a number, in ND we try to stay under 100 MW because the existing transmission doesn't allow a lot of places to put it. We don't have to report to PSC. Our wind farms are in the area of 20, 40, and 60. We have one that is 200 in Adams Co., but it is not that we are trying to avoid the PSC. In order to get a large amount of wind out of ND we know we are going to have to build new transmission lines, and that is going to take a decade. We would like to stay in business in the meantime so we look at the present transmission system and see what we can squeeze in there. That is why the size of our park is that way. Even down in Texas, our parks are 10, 20, and 60, in that category.

Rep. Keiser – So this bill does not apply to you.

Mr. Simons – If we have setbacks it does. These are 20 MWs.

Rep. Keiser – So you do meet the standards. In your wind farms would meet the standards of this bill?

Mr. Simons – I don't know.

Chairman Porter - Further testimony in opposition? Seeing none we will close the hearing on HB 1426.

Additional testimony was handed in **Attachments # 11 & # 12.**

## 2009 HOUSE STANDING COMMITTEE MINUTES

Bill/Resolution No. 1426

House Natural Resources Committee

Check here for Conference Committee

Hearing Date: 2-12-09

Recorder Job Number: 9377

Committee Clerk Signature

*Nancy L. Gerhardt*

Minutes:

Chairman Porter – Open the hearing on HB 1426. Discussion

Rep. Keiser – Move to accept the amendments 0303 plus on line 18 starting with “the commission may not designate” striking that line plus all of line 19 and all of line 20.

Chairman Porter – So we have a motion to move 0303 and what basically what would be left would be the first part of Rep. Mueller’s amendment. Everything else was stricken from the bill.

Rep. Hofstad – 2<sup>nd</sup>.

Rep. Myxter – Isn’t that a different amendment? Don’t we have to vote on Rep. Mueller’s amendment?

Chairman Porter – No – he was moving Rep. Mueller’s amendment in addition to the other language.

Rep. Keiser – The people who spoke in support of the bill came up after the hearing and said if you’re going to have them – the PSC – develop criteria for placement, then you can let them do their job you don’t need to put that minimum level in there.

Rep. Hofstad – The PSC already has that authority right? The only thing we are really changing is the 500 KW?

Chairman Porter – The PSC has the authority on anything greater than 99 MW. Under 99 MW it is the responsibility of the county zoning or township zoning laws. What this does, because it is 500 KW it is almost down to the point of 1 single windmill on a farm. The current standard is 1.5 MW is 1 tower. If you put 1 tower on your farm you would have to fall within whatever they come up with from the PSC standpoint.

Rep. DeKrey – So the PSC is going to do all the 2 – 5 and 4 – 7 and all that.

Chairman Porter – The way it reads is before 2010 the commission shall adopt rules for wind energy facilities that exceed 500 KW. That is correct. Do we have any other discussion on the amendment? All those in favor – unanimous voice vote – opposed none -- motion carries.

Rep. Myxter – All that's left is the 4 lines – 7, 8, 9 & 10?

Chairman Porter – Yes. Discussion? Motions?

Rep. Keiser – Move a Do Pass as Amended.

Chairman Porter – Rep. Keiser moved a Do Pass As Amended is there a 2<sup>nd</sup>? I have a 2<sup>nd</sup> from Rep. Drovdal. Discussion

Vice Chairman Damschen –The PSC testified against it. It might address some problems, but I think it creates more problems than it solves. I'm going to oppose.

Chairman Porter – The clerk will call the roll on HB 1426 for a Do Pass As Amended.

Yes 8 No 5 Absent 0 Carrier Rep. Kelsh

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Title.

Prepared by the Legislative Council staff for  
Representative Mueller  
February 11, 2009

PROPOSED AMENDMENTS TO HOUSE BILL NO. 1426

Page 1, line 2, remove "; and to provide for application"

Page 1, line 6, replace "As used in this section and in lieu of the definitions in section" with "Before April 1, 2010, the commission shall adopt rules for a wind energy facility that exceeds five hundred kilowatts relating to minimum wind tower setback requirements to provide consistency in the development of wind energy and standardized exemptions from setback requirements as appropriate"

Page 1, remove lines 7 through 17

Page 1, line 18, remove "of wind rights within the original setback"

Page 1, line 20, remove "Notwithstanding any other provision of law or any ordinance or"

Page 1, remove lines 21 through 23

Page 2, remove lines 1 through 3

Renumber accordingly

February 12, 2009

VR  
2/13/09

PROPOSED AMENDMENTS TO HOUSE BILL NO. 1426

Page 1, line 2, remove "; and to provide for application"

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Page 1, remove lines 7 through 23

Page 2, remove lines 1 through 3

Renumber accordingly

Date: 2-12-09  
Roll Call Vote #: \_\_\_\_\_

2009 HOUSE STANDING COMMITTEE ROLL CALL VOTES  
BILL/RESOLUTION NO. 1726

House Natural Resources Committee

Check here for Conference Committee

Legislative Council Amendment Number \_\_\_\_\_

Action Taken  Do Pass  Do Not Pass  As Amended

Motion Made By Keiser Seconded By Drovdal

Representatives	Yes	No	Representatives	Yes	No
Chairman Porter		✓	Rep Hanson	✓	
Vice Chairman Damschen		✓	Rep Hunskor	✓	
Rep Clark		✓	Rep Kelsh	✓	
Rep DeKrey	✓		Rep Myxter	✓	
Rep Drovdal	✓		Rep Pinkerton	✓	
Rep Hofstad		✓			
Rep Keiser	✓				
Rep Nottestad		✓			

Total (Yes) 8 No 5

Absent 0

Floor Assignment Kelsh

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

**REPORT OF STANDING COMMITTEE**

**HB 1426: Natural Resources Committee (Rep. Porter, Chairman)** recommends **AMENDMENTS AS FOLLOWS** and when so amended, recommends **DO PASS** (8 YEAS, 5 NAYS, 0 ABSENT AND NOT VOTING). HB 1426 was placed on the Sixth order on the calendar.

Page 1, line 2, remove "; and to provide for application"

Page 1, line 6, replace "As used in this section and in lieu of the definitions in section" with "Before April 1, 2010, the commission shall adopt rules for a wind energy facility that exceeds five hundred kilowatts relating to minimum wind tower setback requirements to provide consistency in the development of wind energy and standardized exemptions from setback requirements as appropriate."

Page 1, remove lines 7 through 23

Page 2, remove lines 1 through 3

Renumber accordingly

2009 TESTIMONY

HB 1426

# HB 1426

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Testimony for HB 1426  
Chairman Porter  
Natural Resources Committee  
Pioneer Room  
Thursday, February 12, 2009 9:00 A.M.

Chairman Porter and members of the House Natural Resource Committee, I  
Phil Mueller from District 24.

You have before you HB 1426. It is about wind turbine setbacks. The setbacks referenced in the bill are setbacks from property lines that define a wind farm's boundary. The language in the bill was found to be problematic for the wind developers and I have had an amendment drawn up to address those issues. I would like to present the amendment with the Committee and the Chairman's permission.

The amendment basically requires that the Public Service Commission adopt rules relating to wind tower setbacks. It is hoped that those rules will specifically address setbacks for two wind farms that have a common boundary. There will be other presenters who will address that need and why it is important. The PSC is also asked to provide exempt language that will address the circumstance where a setback is not necessary due to topography or other issues.

HB 1426 was prompted by a situation that arose in Barnes County where two wind farms were in the process of establishment. The wind farms have a common boundary. No rules exist in North Dakota about how far to stay away from the boundary with another wind farm. The local county zoning board was in a quandary about the setbacks. They, like many other counties, have not had to deal with this problem. The problem had never existed before.

The problem is there now and I think that our state will see the problem more as the wind industry expands. There were serious disagreements in that area about where turbines would be placed relative to the wind farm's property line.

Wind development has come a long way in North Dakota. That is good for the state and for our country. We will have other wind farms with common boundaries. We encourage the wind energy industry, but in a responsible way, with attention to wind farm landowner rights.

I ask for your favorable consideration of HB 1426. Thank you.

**Testimony on HB 1426  
Natural Resources Committee  
February 12, 2009**

Mr. Chairman and members of the committee, my name is Curtis Jabs and I represent Basin Electric Power Cooperative.

I will speak in favor of the amendment, but would oppose the bill if the amendment does not pass. Basin Electric is developing a 115 MW wind farm in the Minot area. Basin Electric has not encountered any problems with setbacks with this development, but realizes that conflict can occur with wind competing development. Basin Electric believes that the Public Service Commission (PSC) should adopt the rules and regulation to prescribe setbacks as appropriate for wind energy facilities.

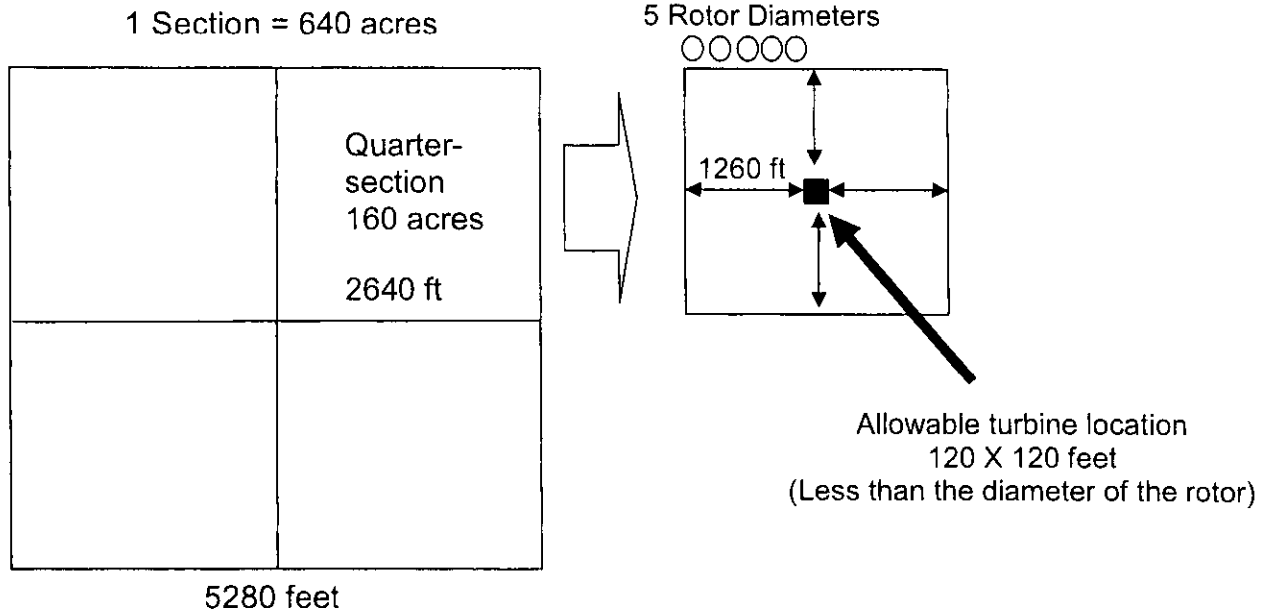
Let me speak on our wind development briefly. Our general policy is to try to setback the wind turbines at least 400 feet from section and property lines where reasonably possible. In case the turbine fell, it would not fall on someone else's property. However, just that requirement sterilizes about half the acres (82.3 acres) in a quarter section (160 acres) from wind development if there are adjoining land owners, so discretion is needed (See attachment). As we understand this bill as originally written requiring 5 rotors diameters as a prescribed setback, only 4 of the 77 sites in our Minot wind development would qualify to be sited. Requiring 5 rotor diameters setback would limit a quarter-section to a small area appropriately 120 feet x 120 feet in the middle of a quarter-section where the wind turbines could be located. I know that the sponsors are not trying to hamper wind development, but rather come up with a policy to address conflicts where competing wind interests on adjoining property both have good resources. The questions are: Who should benefit and what are the requirements for setbacks? It also needs to be recognized that each property in and of itself does not produce the wind.

Wind is a public resource and caution must be taken privatizing this resource or inventing property rights.

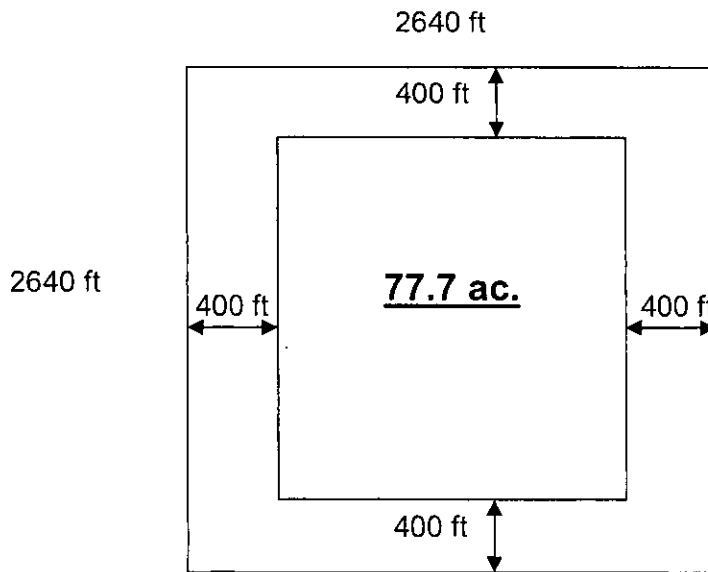
To summarize, the bill as originally written is too prescriptive and would eliminate many potential sites from development. Adopting regulatory setbacks must be done carefully as to not restrict wind development. The setback regulations need to have flexibility in their approach.

The Public Service Commission will provide a public forum for interested parties to offer comments and share their views. Basin Electric believes that this will be the best way to develop the rules and regulation regarding setbacks. I recommend a "do pass" on the amendment and a "do pass" on the amended bill.

# Impacts of Setback Regulations



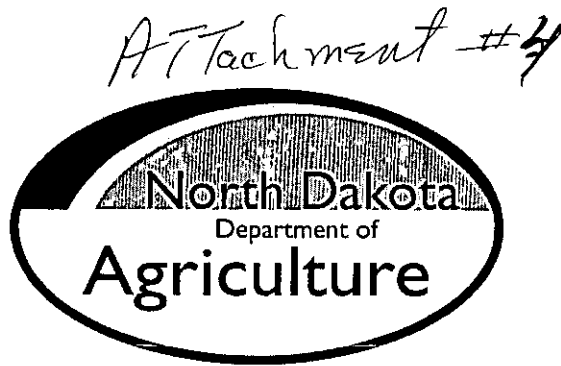
Example: A Quarter Section



Note:  
A 400 foot setback will sterilize  
82.3 acres excluding wind  
development in those areas.  
(over 50%)

**160 ac total.**

Roger Johnson  
Agriculture Commissioner  
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**Testimony of Roger Johnson  
Agriculture Commissioner  
House Bill 1426  
House Natural Resources Committee  
Pioneer Room  
February 12, 2009**

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Chairman Porter and members of the House Natural Committee, I am Agriculture Commissioner Roger Johnson. I am here today in support of HB 1426, which prescribes uniform wind tower setbacks. I believe that the state should have siting regulations in place for wind development that protect the rights of landowners and provide a predictable, fair playing field for wind developers. I understand that an amendment may be offered to this bill that requires the PSC to develop rules and regulations regarding wind tower setbacks. I support that amendment.

Wind development in North Dakota has grown dramatically in recent years. North Dakota is now home to more than 700 MW of installed wind capacity and the potential for more than 4,000 MW of additional projects (Source: Public Service Commission—list attached). I've also attached a chart detailing the status of wind development around the country.

Along with increased wind development, our office has received numerous inquiries from landowners who are interested in developing the wind resource on their land. We've also

received phone calls and letters from landowners and others who have concerns about how wind development is taking place. Many of them are looking for information and advice on the elements of proposed wind leases and some of them have also asked me to contact wind developers and regulators on their behalf to address concerns with siting issues.

Attached is a letter I sent to Public Service Commission members last year regarding siting issues with wind projects in Barnes County. I believe that state-level siting regulations are necessary to help alleviate these types of situations and to help ensure the future growth of the wind industry in North Dakota.

As I stated in my letter to the Public Service Commission, setback and siting requirements are not new to wind development. Minnesota's permitting process includes setback requirements and most of the developers working in North Dakota have also developed projects under the Minnesota guidelines.

Other industries in the state – such as oil and gas – that utilize or draw on shared resources under the ownership of several landowners are regulated. NDCC Section 38-08 requires that all oil and gas resource owners within an established unit receive formula-based compensation when oil and gas development affects their resource. A similar rationale should be used for wind development. In many cases, only the landowners with turbines on their property are compensated by the developer and the landowners without turbines are left with a diminished or perhaps unusable wind resource for future development.

The North Dakota Alliance for Renewable Energy (NDARE) recently released a report – “Next Generation Energy Policy” – which included recommendations on wind development in North Dakota. NDARE consists of more than 60 members ranging from non-profit organizations, banks, utilities and individuals who all have an interest in furthering the promotion and development of renewable energy and energy efficiency. The North Dakota Department of Agriculture is a member of NDARE.

NDARE undertook a strategic planning process in 2008 and developed several policy goals and recommendations. Wind development was discussed at length during the strategic planning process and after weighing different alternatives, NDARE members embraced the idea of the development of a voluntary code of conduct. This committee held a hearing on HB 1509, which calls for that code of conduct. I support HB 1509; however, I believe that HB 1426 addresses further concerns regarding wind tower siting and that siting regulations should be developed at the state-level in North Dakota.

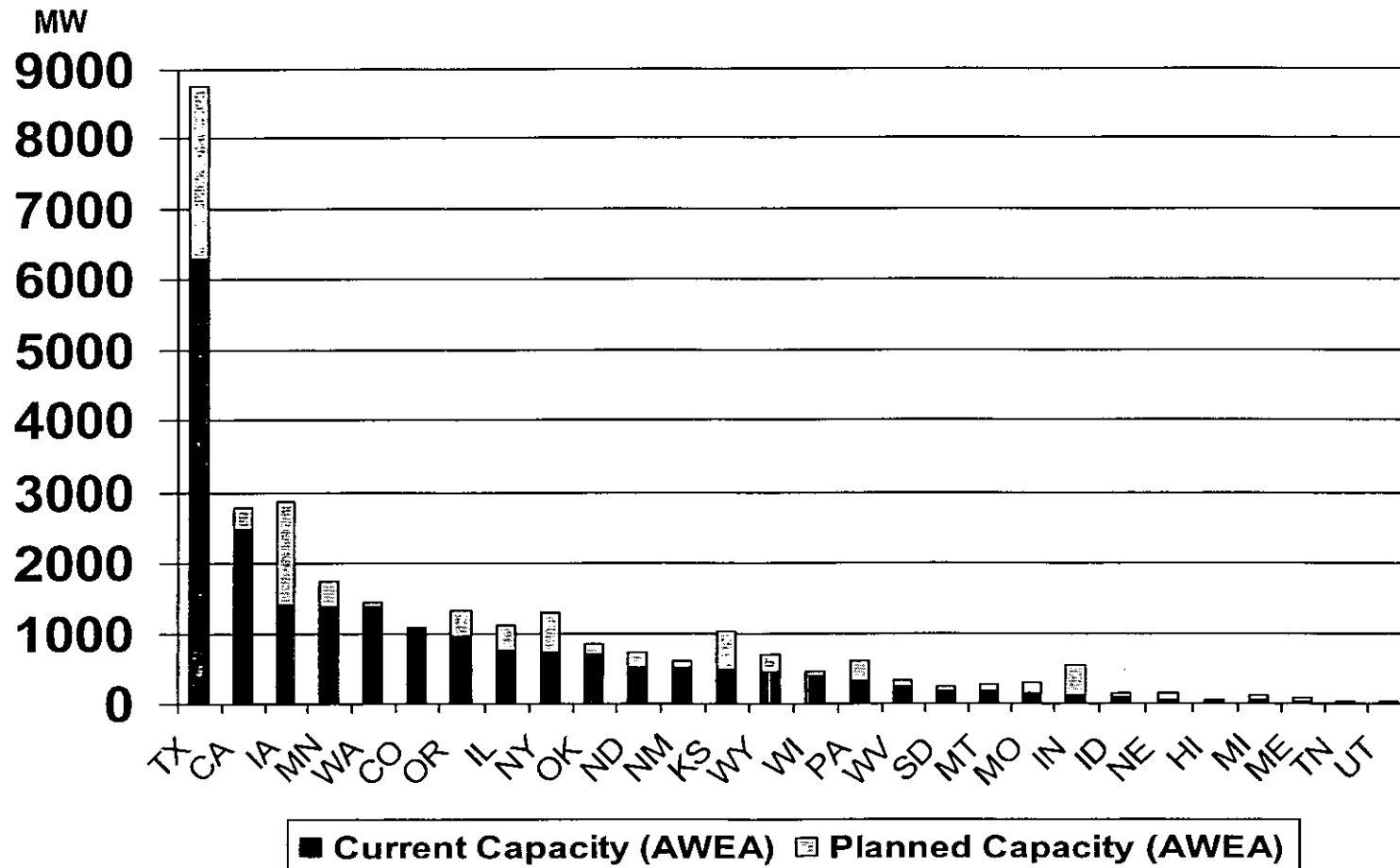
Chairman Porter and committee members, I urge a do pass on HB 1426. I would be happy to answer any questions you may have.

## North Dakota Active Wind Projects

Updated 2/11/2009

<u>Project Name</u>	<u>Owner</u>	<u>Location</u>	<u>Turbines</u>	<u>Capacity (MW)</u>	<u>Manufacturer</u>	<u>Notes</u>
Minot Wind Project	BEPC - PrairieWinds	S. of Minot	2	2.6	Nordex N60	In Service
Edgeley/Kulm Wind Project	FPLE / BEPC	Edgeley	27	40	GE 1.5 MW	In Service
Edgeley/Kulm Wind Project	FPLE / Otter Tail	Edgeley	14	21	GE 1.5 MW	In Service
Valley City Wind Project	Minnkota Power Cooperative	Valley City	1	0.9	NEG Micon NM52/900	In Service
Petersperg Wind Project	Minnkota Power Cooperative	Petersberg	1	0.9	NEG Micon NM52/901	In Service
	Sacred Heart Monastery	Richardton	2	0.13	Silver Eagle	In Service
Fort Totten Wind Project	Spirit Lake Sioux Nation	Fort Totten	1	0.1	Micon 108	In Service
Belcourt Wind Project	Turtle Mountain Chippewa Tribe	Belcourt	1	0.1	Micon 108	In Service
	North Valley Carreer and Technology C	Grafton	1	0.065		In Service
	3 Affiliated Tribes	New Town	1	0.065		In Service
Velva Wind Project	EHN / Xcel Energy	Velva	18	12	Vestas V80	In Service
	Turtle Mountain Community College	Belcourt	1	0.66	Vestas V47	In Service
	FPL Burleigh County Wind LLC	Wilton	33	49.5	GE 1.5 MW	In Service
Oliver County Wind	FPL - Oliver County Wind LLC	Center	22	50.6	2.3 MW Turbines	In Service
Oliver County Wind II	FPL - Oliver County Wind LLC	Center	32	48	GE 1.5 MW	In Service
Langdon Project	FPL- Langdon Wind, LLC	Cavalier County	79	118.5	GE 1.5 MW	In Service
Langdon Project	Otter Tail Corporation	Cavalier County	27	40.5	GE 1.5 MW	In Service
Langdon Expansion	FPL- Langdon Wind, LLC	Cavalier County	26	40	GE 1.5 MW	In Service
	Tatanka Wind Power, LLC	Dickey/McIntosh County	60	90	Acciona AW 1500	In Service
Ashtabula Wind Project	FPL - Ashtabula Wind, LLC	Barnes County	133	200	GE 1.5s	In Service
	Just Wind, LLC	Logan County	160	368	Siemens 93/2.3 MW	Hearing held October 21, 2008
Luverne Wind Farm	M-Power LLC	Griggs/Steele Counties	105	157	GE 1.5 MW	Phase I permit issued 10/30/08
	CROWN BUTTE WIND POWER LLC	Adams/Bowman Counties	133	200	GE 1.5 MW	Letter of Intent Filed February 2008
Prairie Winds Project	BEPC - PrairieWinds ND 1, Inc.	Ward County	77	115.5		Letter of Intent Filed February 2008
Rugby Wind Farm	Iberdrola, Inc. f/k/a PPM Energy	Rugby	71	149.1	Suzlon 2.1 MW S88	Under Construction
Dickey County Wind Farm	FPL Energy, LLC	15 miles NW of Ellendale	100	150		Letter of Intent Filed June 2008
Oliver County Expansion	FPL Energy, LLC	6 miles NW of Center	667	1,000		Letter of Intent Filed June 2008
Border Winds	Sequoia Energy U.S. Inc.	Rolette and Towner Ctys	66	150		Letter of Intent Filed September 25, 2008
Heartland Wind Farm	Heartland Wind Farm, LLC	Ward, Burke, Mountrail Ctys		2,000		Letter of Intent filed July 2008
Allete, Inc. (MN Power)	Bison 1 Wind Project	Oliver County		125		Letter of Intent Filed October, 2008
Merricourt Project	enXco	McIntosh/Dickey ctys		150 MW		Letter of Intent Filed Dec 2008
	Just Wind, LLC	Emmons County		900 MW		Letter of Intent Filed Dec 2008
<b>Total</b>			<b>642</b>	<b>5,130.22</b>		

# Current and Planned Wind Capacity by State



Source: American Wind Energy Association, December 2008.

Roger Johnson  
Agriculture Commissioner  
www.agdepartment.com



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600 E Boulevard Ave., Dept. 602  
Bismarck, ND 58505-0020

March 12, 2008

Susan Wefald, President  
Tony Clark, Commissioner  
Kevin Cramer, Commissioner  
North Dakota Public Service Commission  
600 E Blvd Ave  
Bismarck, ND 58505

Dear President Wefald, Commissioner Clark and Commissioner Cramer:

I am writing regarding proposed wind projects in Barnes County and concerns that have been raised by landowners regarding the potential location of wind turbines in relation to adjacent property lines. As you know this issue has been raised about earlier projects and is likely to be a continuing issue in future projects. The potential turbine locations may detract from the adjacent landowners' ability to utilize the wind resource on their property.

As you are well aware, Florida Power & Light is working to develop a 200 MW project east of Lake Ashtabula, near Valley City. M-Power, LLC is developing a 150 MW project near Luverne.

Landowners and others have raised concerns with me regarding the FPL project and proposed locations of wind turbines. The primary concern is the lack of reasonable setbacks from property lines or compensation for adjacent landowners whose wind resource is diminished. This issue is not currently regulated by the State of North Dakota, except in those cases where wind farms are proposed to exceed 100 MW, in which case it appears the PSC could exercise jurisdiction.

Other industries in the state – such as oil and gas – that utilize or draw on shared resources under the ownership of several landowners are regulated. NDCC Section 38-08 requires that all oil and gas resource owners within an established unit receive formula-based compensation when oil and gas development affects their resource. I think a similar rationale should be used for wind development. In many cases with wind development, only the landowners with turbines on their property are compensated by the developer and the landowners without turbines are left with a diminished or perhaps unusable wind resource for future development.

Setback requirements are not new to wind development. Minnesota's permitting process includes setback requirements – 5 rotor diameter for prevailing winds and 3 rotor diameter for non-prevailing winds. Most of the developers working in North Dakota have also developed projects under the Minnesota guidelines.

President Wefald  
Commissioner Clark  
Commissioner Cramer  
March 12, 2008  
Page Two

It is my understanding that the Public Service Commission has the ability, under current siting authority, to provide conditions for setbacks to address direct and indirect economic impacts. I would urge the PSC to carefully review any wind company conditional use permit requests and to include setback requirements or adjacent affected landowner compensation provisions in such permits.

I would urge the Commission to carefully and quickly consider these siting issues. As you know, the federal production tax credit for wind projects is set to expire at the end of 2008. Wind projects must have their turbines erected by the end of 2008 in order to qualify for the expiring credit. If this issue is not resolved in a timely manner, the Barnes County wind projects may both be in jeopardy if litigation is sought to resolve the issues rather than state guidance or intervention.

North Dakota enjoys wonderful potential and opportunity in wind resource development. I am committed to ensuring that this development occurs in a fair and equitable manner for all concerned parties. I look forward to working with you in the future to maximize the wind benefits in the state.

Sincerely,

Roger Johnson  
Agriculture Commissioner

RJ/pl

Cc: Brett Brudvik, Ohnstad Twichell, P.C.  
Scott Scovill, FPL Energy

**Testimony in Favor of HB 1426: A Code of Conduct for Wind Energy Leases**  
**House Natural Resources Committee**  
**February 12, 2009**

**Brad Crabtree, Vice President**  
**North Dakota Alliance for Renewable Energy**  
**Spring Valley Township Officer, Dickey County**  
**(701) 647-2041, crabtree@drtel.net**

Chairman Porter and Committee members, thank you for the opportunity to testify in favor of HB 1426. I ranch and serve as a township officer in Dickey County and as Vice President of the North Dakota Alliance for Renewable Energy (NDARE), a diverse coalition representing business and industry, farm and commodity organizations, government agencies, institutions of higher education and research, and conservation and environmental groups, all dedicated to advancing renewable energy development, energy efficiency and sound energy policy in North Dakota.

NDARE endorses this legislation, which seeks to protect the private property rights of landowners to their wind resource and the commercial rights of wind energy developers. After several years of dialogue in response to conflicts over proposed wind projects, first in Dickey County and later in Barnes County, and mounting evidence of turbine siting practices adversely affecting the wind resource of adjacent landowners along the boundaries of proposed wind farms, NDARE members reached consensus on a recommendation that the Public Service Commission (PSC) establish sensible rules of the road for this new and rapidly growing industry. Moreover, we concluded that it is necessary to require the PSC to develop such rules, but that the specifics of those rules are best determined by a traditional rulemaking process in which all affected parties have input. NDARE's board of directors believes that HB 1426, with the amendments proposed by Representative Mueller, accomplishes this in letter and spirit.

As a township officer and landowner who has experienced firsthand the conflict, mistrust and ruined relationships caused by the failure of the state to provide regulatory protection for the private property rights to wind resources that are recognized in the North Dakota Century Code—in contrast to well-developed and long-standing state protections for rights to oil and gas resources—this legislation is long overdue and urgently needed to avert further conflicts over wind development and reduce the risk of protracted litigation and landowner backlash that could irreparably harm the industry.

I respectfully urge a do-pass recommendation on this bill. Thank you.

Attachment # 6

**Agribusiness and Applied Economics Report No. 627**

**May 2008**

**Socioeconomic Impacts of the Langdon Wind Energy Center**

**F. Larry Leistritz  
Randal C. Coon**

**Department of Agribusiness and Applied Economics  
Agricultural Experiment Station  
North Dakota State University  
Fargo, ND 58105-5636**

### **Acknowledgments**

This report is a result of the input and assistance of a number of people and organizations. Our appreciation and thanks are extended to the Langdon area leaders who helped us understand the project history and its local effects.

Thanks are extended to Edie Watts for document preparation and to our colleagues who reviewed the manuscript.

The authors assume responsibility for any errors of omission, logic, or otherwise. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors.

Copies of this publication are available electronically at the following website: <http://ageconsearch.umn.edu/>. Please address your inquiries regarding this publication to the Department of Agribusiness and Applied Economics, North Dakota State University, P.O. Box 5636, Fargo, ND 58105-5636, phone 701-231-7441, fax 701-231-7400, or email [ndsu.agribusiness@ndsu.edu](mailto:ndsu.agribusiness@ndsu.edu).

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## Abstract

The Langdon Wind Energy Center is the largest wind energy facility to be developed in North Dakota to date and consists of 106 turbines with a generating capacity of 1.5 MW each, mounted on towers 262 feet tall. The project is owned by FPL Energy and Ottertail Power Company; FPL Energy was the project developer. Construction of the facility began in July, 2007 and was completed in January, 2008. The peak construction work force was 269 workers. A force of 10 permanent employees will operate and maintain the energy center. Construction of the Langdon Wind Energy Center is estimated to have resulted in payments of more than \$56 million to entities within North Dakota. During operation, the facility will make payments of about \$1.4 million annually to North Dakota entities, including \$413,000 in payments to landowners with easement agreements. The \$56 million in statewide direct expenditures during the construction period were estimated to result in an additional \$169 million in secondary impacts for a total, one-time construction impact of \$225 million. The \$1.4 million in annual direct impacts associated with project operation lead to an additional \$3 million in secondary impacts for a total annual impact of \$4.4 million. During operation, the county is expected to receive \$191,000 annually in direct property tax payments and \$194,000 in total increased property tax revenues while having negligible increases in costs. The same pattern is repeated for the Langdon school district, where an estimated \$265,000 in property tax revenues will be received annually from the project during the operations period. This case study shows that commercial scale wind farms can benefit nearby communities by creating stable, well-paid jobs, through lease payments to land owners, and by adding to the local tax base.

**Key Words:** wind energy, renewable energy, economic impact, fiscal impact

## Executive Summary

The Langdon Wind Energy Center is the largest wind energy facility to be developed in North Dakota to date. The Langdon Wind Energy Center consists of 106 turbines with a generating capacity of 1.5 MW each, mounted on towers 262 feet tall. The project is owned by FPL Energy and Ottertail Power Company; FPL Energy was the project developer. The wind generated electricity is purchased by Ottertail Power and Minnkota Power Cooperative, Inc. Construction of the facility was begun in July, 2007 and was completed in January, 2008. The peak construction work force was 269 workers. A force of 10 permanent employees will operate and maintain the energy center.

Construction of the Langdon Wind Energy Center is estimated to have resulted in payments of \$9.3 million to entities in the Langdon area (i.e., Cavalier County and adjacent counties) and an additional \$47 million to entities elsewhere in North Dakota. The major items purchased elsewhere in North Dakota were wind towers and blades, which represented a total of \$42 million. DMI Manufacturing in West Fargo produced the towers while LM Glasfiber in Grand Forks manufactured the blades. During operation, the facility will make payments of about \$1.4 million annually to North Dakota entities, including \$413,000 in payments to landowners with easement agreements (year 1).

The \$56.4 million in statewide direct impacts during the construction period were estimated to result in an additional \$169 million in secondary impacts for a total, one-time construction impact of \$225.7 million. The \$1.4 million in annual direct impacts associated with project operation lead to an additional \$3 million in secondary impacts for a total annual impact of \$4.4 million. This includes \$2.1 million of additional *household* sector gross receipts (gross business volume), which indicates that personal incomes of area residents would be increased by about \$2.1 million each year during project operation.

Project construction is estimated to create 1,656 secondary jobs statewide, in addition to the 269 peak construction jobs. Given the relatively brief duration of the construction phase, some of this secondary employment may have been reflected in longer hours and associated overtime pay for present employees, as opposed to new job creation. During the operation of the project, an estimated 21 secondary jobs are created, in addition to the 10 workers employed by the project. Based on information from local leaders, all 10 project employees were estimated to live in Cavalier County as were 8 secondary jobs.

The housing and public service needs associated with the project were also estimated. During project construction, there was a need for temporary housing. During project operation, housing impacts are negligible, as the work force is small and most jobs are filled by local residents. During both construction and operation periods, the effects on area schools were negligible – during construction because few nonlocal workers brought families to the area and during operation because of the small work force that was mostly filled by local residents. During project construction, public service requirements were quite small, as most workers did not bring families to the region. During project operation, public service effects are negligible.

The effects of the project on revenues and costs of state and local governments were estimated. During construction, the state was expected to receive substantial revenue from sales and use and personal income taxes. State revenues exceed added state costs by more than \$2 million. During operation, most of the added state revenue comes from these sources, while added state costs are virtually nonexistent because of the minimal population influx. Cavalier County experienced little effect on either its revenues or costs during the construction phase. During operation, the county is expected to receive \$191,000 in direct property tax payments and \$194,000 in total increased property tax revenues while having negligible increases in costs. The same pattern is repeated for the Langdon school district, where an estimated \$265,000 in property tax revenues will be received annually from the project during the operations period, and the district's net fiscal balance is expected to be \$271,000. The City of Langdon receives no revenue directly from the project, but is projected to have a small but positive net fiscal balance for both the construction and operations phase.

To summarize, wind energy has been viewed with interest for a number of years not only as a promising source of renewable energy but also as an opportunity for rural economic development. Commercial scale wind farms could benefit nearby communities by creating stable, well-paid jobs, through lease payments to land owners, and by adding to the local tax base. This case study of the Langdon Wind Energy Center quantifies these local economic benefits and shows them to be substantial. Further, construction of a wind farm results in a very substantial, albeit one-time, contribution to the state economy, primarily through purchases of towers and blades manufactured in North Dakota.

# **Socioeconomic Impacts of the Langdon Wind Energy Center**

**F. Larry Lelstritz and Randal C. Coon<sup>1</sup>**

## **Introduction**

Concerns about the long-term environmental effects of consuming fossil fuels, together with the rising costs of oil and natural gas, have led to rising interest in renewable energy sources. Wind power in particular has been experiencing rapid growth. In 2007, the U.S. led the world in new wind capacity installed (5,244 megawatts [MW], compared to 3,552 MW in Spain and 3,449 in third ranked China) (Global Wind Energy Council 2008). The U. S. also led the world in new capacity installed in 2006 (Wiser and Bolinger 2007). Total U. S. installed capacity at the end of 2007 was 16,818 MW, second only to Germany (Wiser and Bolinger 2007, Hamilton 2008). Wind is generally considered the lowest cost renewable energy source for the Midwest region, and both a federal production tax credit (PTC) and state renewable portfolio standards (RPS) have favored expansion in recent years.

Although North Dakota has been estimated to have the greatest wind generation potential of any state (Pacific Northwest National Laboratory 1991), development was relatively slow until recently. In June of 2007, 172 MW of wind generating capacity was in place with 5 projects involving 125 turbines. However, by the end of 2007, 3 projects with 198 turbines and 297 MW of capacity had been added. The largest of these new projects is the Langdon Wind Energy Center with 106 turbines and 159 MW of generating capacity. Development of a facility like the Langdon Wind Energy Center promises substantial benefits for the landowners where the turbines are sited, as well as new jobs and additional tax revenues for local governments. The purpose of this report is to examine the socioeconomic effects of developing the Langdon Wind Energy Center.

The remainder of this report is organized into three sections. The first briefly describes the site area and the communities likely to be affected by the project. The next describes the Langdon Wind Energy Center while the third presents impact estimates for the project.

## **Site Area Characteristics**

The Langdon Wind Energy Center is located southeast of Langdon and extends south about 10 miles, just to the east of ND Highway 1 (see Figure 1).

---

<sup>1</sup>Professor and Research Specialist, respectively, Department of Agribusiness and Applied Economics, North Dakota State University, Fargo.

## Population

Population trends for the counties and communities in proximity to the Langdon Wind Energy Center are summarized in Table 1. All of these counties and communities have lost population since 1980. The changes in population in this area are largely a result of underlying changes in the area economy, discussed in subsequent sections.

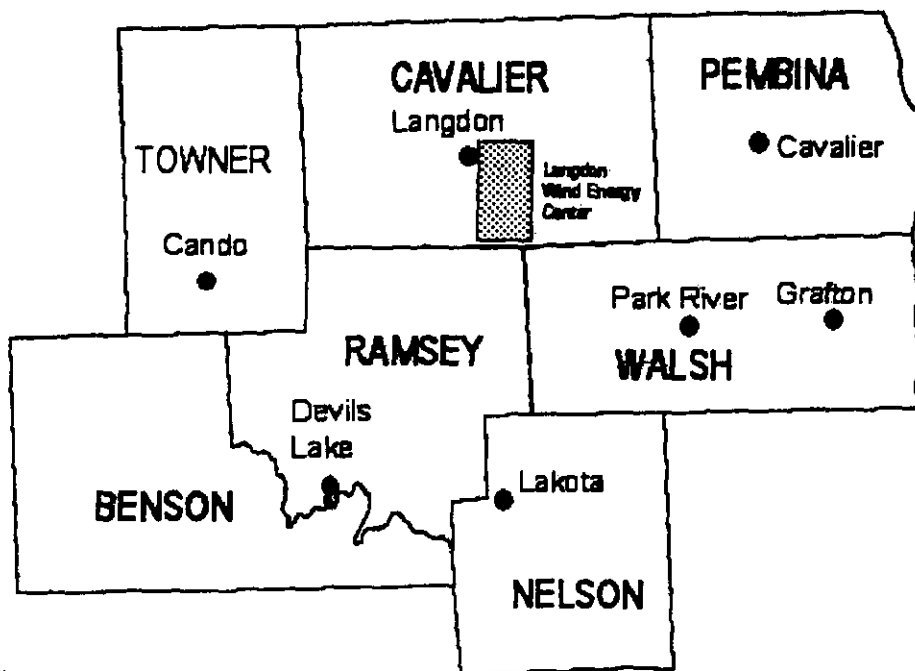


Figure 1. Langdon Wind Energy Center Study Area

Table 1. Population of Selected North Dakota Counties and Communities, 1980-2000, and Estimated 2006

County/City	Population				Percent Change	
	1980	1990	2000	2006*	1990-2006	1980-2006
Cavalier Co.	7,636	6,064	4,831	4,009	-33.9	-47.5
Langdon	2,335	2,241	1,535	1,409	-37.1	-39.7
Nelson Co.	5,233	4,410	3,715	3,289	-25.4	-37.1
Lakota	963	898	781	726	-19.2	-24.6
Pembina Co.	10,399	9,238	8,585	7,906	-14.4	-24.0
Cavalier	1,505	1,508	1,537	1,420	-5.8	-5.6
Ramsey Co.	13,048	12,681	12,066	11,267	-11.2	-13.6
Devils Lake	7,442	7,782	7,222	6,718	-13.7	-9.7
Towner Co.	4,052	3,627	2,876	2,417	-33.4	-40.4
Cando	1,496	1,564	1,342	1,113	-28.8	-25.6
Walsh Co.	15,371	13,840	12,389	11,362	-17.9	-26.1
Grafton	5,293	4,840	4,516	4,163	-14.0	-21.3
Park River	1,844	1,725	1,535	1,407	-18.4	-23.7

\*2006 estimates were for July 1, 2006.

Source: U.S. Bureau of the Census (2006).

### Economic Base

One measure of an area's economy is its sales for final demand (a.k.a. its economic base), which are generally defined as those sales of goods and services to markets outside the area (Coon and Leistritz 1998). Sales for final demand for the six study area counties for 1980 - 2006 are summarized in Table 2. The values in Table 2 are expressed in 2006 dollars, meaning that the effects of economy-wide inflation over the 26-year period, 1980-2006, have been removed. The changes reflected in Table 2 can thus be termed *real* changes (i.e., after removing effects of inflation). The values in Table 2 indicate that the study area counties enjoyed some real growth in their sales for final demand over the period 1980-2006, but that these gains were not shared equally among counties or among economic sectors.

Table 2. Sales for Final Demand by Economic Sector, for Selected North Dakota Counties, 1980-2006  
(constant 2006 dollars)

Year/County	Sector						TOTAL
	Ag	Energy	Mfg	Tourism	Exp Serv	Fed Govt	
-----million dollars-----							
1980: Cavalier	163.5	--	2.8	3.2	--	48.8	218.3
Nelson	80.7	--	6.2	2.4	--	31.9	121.2
Pembina	234.3	--	66.2	3.5	--	67.7	371.7
Ramsey	107.9	--	8.6	17.0	--	112.0	245.5
Towner	95.1	--	1.3	4.1	--	29.8	130.3
Walsh	289.0	--	12.1	3.5	--	93.2	397.8
Total	970.5	--	97.2	33.7	--	383.4	1,484.8
Percent of Total	65.4	--	6.5	2.3	--	25.8	100.0
1990: Cavalier	113.3	--	0.7	5.4	--	73.9	193.3
Nelson	90.0	--	1.1	2.9	--	37.9	131.9
Pembina	194.1	--	56.3	4.0	--	95.3	349.7
Ramsey	85.3	--	3.3	20.4	--	133.4	242.4
Towner	64.3	--	5.0	4.7	--	41.6	115.6
Walsh	174.9	--	12.7	3.4	--	133.0	324.0
Total	721.9	--	78.4	40.8	--	515.1	1,356.9
Percent of Total	53.2	--	5.8	3.0	--	38.0	100.0
1995: Cavalier	105.3	--	6.8	11.3	--	76.8	200.2
Nelson	57.2	--	1.4	5.5	--	35.6	99.7
Pembina	201.8	--	89.2	8.0	--	104.2	403.2
Ramsey	76.2	--	6.3	40.4	--	147.5	270.4
Towner	71.8	--	7.6	9.7	--	41.4	130.5
Walsh	219.9	--	14.2	6.7	--	133.4	374.2
Total	732.2	--	125.5	81.6	--	538.9	1,478.2
Percent of Total	49.5	--	8.5	5.5	--	36.5	100.0
2000: Cavalier	109.8	--	1.9	36.6	2.2	79.6	230.1
Nelson	43.4	--	1.2	17.7	--	31.7	94.0
Pembina	266.7	--	116.9	25.5	--	104.0	513.1
Ramsey	48.0	--	14.0	131.9	5.1	160.9	359.9
Towner	52.7	--	10.7	31.7	--	32.1	127.2
Walsh	227.9	--	35.7	18.0	4.8	117.7	404.1
Total	748.5	--	180.4	261.4	12.1	526.0	1,728.4
Percent of Total	43.3	--	10.5	15.1	0.7	30.4	100.0
2006: Cavalier	142.3	--	26.1	42.0	2.0	86.8	299.2
Nelson	52.1	--	5.0	20.4	--	43.3	120.8
Pembina	220.5	--	75.1	29.3	--	111.1	436.0
Ramsey	78.7	--	14.1	149.1	4.5	209.4	455.8
Towner	80.5	--	5.1	36.3	--	50.3	172.2
Walsh	178.6	--	75.6	25.1	4.4	160.8	444.5
Total	752.7	--	201.0	302.2	10.9	661.7	1,928.5
Percent of Total	39.0	--	10.4	15.7	0.6	34.3	100.0

Table 2. Sales for Final Demand by Economic Sector, for Selected North Dakota Counties, 1980-2006 (constant 2006 dollars) continued

Year/County	Sector						TOTAL
	Ag	Energy	Mfg	Tourism	Exp Serv	Fed Govt	
Percent Change							
1980-2006	-22.4	--	106.8	796.7	--	72.6	29.9
1990-2006	4.3	--	156.4	640.7	--	28.5	42.1
2000-2006	0.6	--	11.4	15.6	-9.9	25.8	11.6

Source: Coon and Leistriz (2008).

During the 1980s, total sales for final demand in the study counties dropped substantially (26%), and all but one of the study counties (Nelson) shared in this decline. Since that time, total sales for final demand have grown (42%), and all but one of the study counties (Nelson) have shared in this growth.

The period since 1980 has also seen a substantial change in the composition of the economic base of the study area. In 1980, the *agricultural sector* (i.e., sales of crops and livestock and federal commodity program payments) accounted for 65 percent of total sales for final demand, *federal payments* (i.e., payrolls, transfer payments, etc.) for 26 percent, *manufacturing* for 6.5 percent, and *tourism* (i.e., expenditures by out of state visitors) for 2 percent. In 2006, the *agricultural sector* accounted for 39 percent, *federal payments* for 34 percent, *tourism* for 16 percent, and *manufacturing* for 10 percent.

### Employment

Employment provides another measure of an area's economy and the role of various economic sectors. Employment by economic sector for 2000 and 2006 for the six counties is summarized in Table 3. The area's leading sectors in employment in 2006 were services (22%), agriculture (21%), retail trade (18%), and government (14.5%). Total employment in the study area declined (5%) from 2000 to 2006. Most of the area's leading employment sectors shared in this decline.

### Per Capita Income

Per capita income in Towner and Cavalier Counties in 2005 exceeded that of North Dakota as a whole, although still less than the national average (Table 4). The other four study area counties registered values less than the state average. The study area counties differed considerably in their personal income change from 1995 to 2005. Towner and Cavalier Counties registered gains considerably above the state average (49% and 47%, respectively) as did Nelson County (39%). The other three counties registered gains less than the state average, and in Pembina County real per capita income declined (3%).

Table 3. Employment by Economic Sector for Selected North Dakota Counties, 2000 and 2006

Year/County	Sector									TOTAL
	Ag	Const <sup>1</sup>	Trans, Comm, & Pub Util	Mfg	Energy Extract & Conv	Retail Trade	FIRE <sup>2</sup>	Services	Govt	
2000:										
Cavalier	1,059	106	136	142	--	371	101	594	282	2,791
Nelson	619	47	45	157	--	194	76	381	229	1,748
Pembina	1,112	182	372	1,539	--	988	129	729	741	5,792
Ramsey	759	307	233	561	--	1,506	321	2,204	1,259	7,150
Towner	656	27	45	164	--	127	77	230	155	1,481
Walsh	1,165	202	358	762	--	1,390	166	1,537	1,124	6,704
TOTAL	5,370	871	1,189	3,325	--	4,576	870	5,675	3,790	25,666
Percent of Total	20.9	3.4	4.6	13.0	--	17.8	3.4	22.1	14.8	100.0
2006:										
Cavalier	1,009	60	199	127	--	387	89	473	247	2,591
Nelson	589	34	32	152	--	233	81	316	185	1,622
Pembina	1,058	161	323	987	--	984	130	727	822	5,192
Ramsey	723	241	292	493	--	1,602	305	2,071	1,196	6,923
Towner	625	24	47	269	--	125	93	225	140	1,548
Walsh	1,109	186	356	1,031	--	1,019	177	1,641	935	6,454
TOTAL	5,113	706	1,249	3,059	--	4,350	875	5,453	3,525	24,330
Percent of Total	21.0	2.9	5.1	12.6	--	17.9	3.6	22.4	14.5	100.0
Percent Change 2000-2006	-4.8	-18.9	5.0	-8.0	--	-4.9	0.6	-3.9	-7.0	-5.2

<sup>1</sup>Includes non-energy mining

<sup>2</sup>Finance, Insurance, and Real Estate

Source: Coon and Leistritz (2008).

Table 4. Per Capita Personal Income for Selected Counties, North Dakota, and the United States, 1995 and 2005.

County	Per Capita Income*		Change 1995-2005	2005 PCI Comparison to	
	1995	2005		North Dakota	U.S.
	dollars		percent		
Cavalier	21,574	31,667	46.8	101.0	91.9
Nelson	18,908	26,232	38.7	83.7	76.1
Pembina	28,955	28,019	-3.2	89.4	81.3
Ramsey	23,563	28,996	23.1	92.5	84.1
Towner	21,576	32,197	49.2	102.7	93.4
Walsh	24,447	28,687	17.3	91.5	83.2
North Dakota	24,186	31,357	29.6	100.0	
United States	29,585	34,471	16.5		100.0

\*Constant 2005 dollars

Source: Bureau of Economic Analysis Internet Website. 1995 and 2005. Per Capita Personal Income Interactive Tables. U.S. Department of Commerce, Washington, D.C.

## Retail Trade

Retail sales for seven study area communities are summarized in Table 5. Devils Lake and Grafton serve as trade centers for multi-county trade areas and are classified as complete shopping centers (Bangsund et al. 1991). Cavalier and Langdon are classified as partial shopping centers, Cando and Park River are full convenience centers, and Lakota is a minimum convenience center. Inflation adjusted taxable sales in each of these communities declined from 2000 to 2006.

Pull factors measure a trade center's sales relative to the purchasing power of trade area residents. A value of 1.0 indicates that actual sales are equal to potential sales (estimated based on trade area population and per capita income). The pull factors for Devils Lake and Grafton are somewhat lower than the state average for complete shopping centers (0.84), while the pull factor for Cavalier is equal to the state average for partial shopping centers (0.64) and that for Langdon is somewhat less. The pull factor for Cando is substantially greater than the state average for full convenience centers (0.56), and Park River's is substantially lower. Lakota's pull factor is lower than the state average for minimum convenience centers (0.43). In general, these communities, like many of the state's smaller communities, appear to be struggling to maintain their retail and service sectors in competition with larger trade centers.

**Table 5. Taxable Retail Sales and Pull Factors for Selected Communities, North Dakota, 1990-2006**

Town	Taxable Sales*			Change 2000-2006	2005 Pull Factors
	1990	2000	2006		
	-----\$000-----			-----%-----	
Cando	9,802	8,514	8,480	0.4	0.87
Cavalier	25,769	34,483	25,788	-25.2	0.64
Devils Lake	114,059	137,381	115,483	-15.9	0.75
Grafton	64,040	58,330	43,856	-24.8	0.66
Lakota	5,342	2,636	2,195	-16.7	0.23
Langdon	26,897	25,118	19,779	-21.3	0.49
Park River	11,249	12,022	9,310	-22.6	0.32

\*Constant 2006 dollars

Sources: Office of the State Tax Commissioner (1990, 2000, and 2006), Coon and Leistritz (2008).

### School Enrollments

Enrollments in study area school districts for the period 1995-96 to 2006-07 are summarized in Table 6. All districts experienced declining enrollments during this period. From 2000-2001 to 2006-2007, the decreases in enrollments ranged from -4 % in St. Thomas (Pembina Co.) to -49.5 % in Bisbee-Egland (Towner Co.).

The decrease in enrollments is similar to those being experienced in other nonmetro areas of the state. It is a product of the changing age structure of the population, which in turn has resulted from the high levels of net out-migration experienced over the past several decades.

Overall, the study area can be characterized as one that has been struggling economically. Area leaders have long sought economic development and diversification opportunities.

Table 6. School Enrollment (K-12) in Cavalier County School Districts, and Surrounding School Districts, 1995-2007

District	1995-1996	2000-2001	2006-2007	Change
				2000-01 to 2006-07
		students		percent
Langdon	685	663	517	-22.0
Munich	<u>243</u>	<u>155</u>	<u>106</u>	-31.6
Cavalier Co. Total	928	818	623	-23.8
Dakota Prairie	566	399	273	-31.6
Lakota	<u>312</u>	<u>295</u>	<u>217</u>	-26.4
Nelson Co. Total	878	694	490	-29.4
Cavalier	715	633	431	-31.9
Drayton	274	248	144	-41.9
North Border (Pembina)	721	578	477	-17.5
St. Thomas	<u>142</u>	<u>124</u>	<u>119</u>	-4.0
Pembina Co. Total	1,852	1,583	1,171	-26.0
Devils Lake	2,192	2,217	1,075	-51.5
Edmore	168	113	79	-30.1
Starkweather	<u>140</u>	<u>121</u>	<u>87</u>	-28.1
Ramsey Co. Total	2,500	2,451	1,241	-49.4
Bisbee-Egland	155	111	56	-49.5
North Central (Rock Lake)	121	78	62	-20.5
Southern (Cando)	<u>363</u>	<u>308</u>	<u>204</u>	-33.8
Towner Co. Total	639	497	322	-35.2
Adams	115	113	67	-40.7
Fordville-Lankin	160	160	94	-41.3
Grafton	1,263	1,039	914	-12.0
Edinburg	179	144	122	-15.3
Minto	259	260	236	-9.2
Park River	<u>522</u>	<u>454</u>	<u>415</u>	-8.6
Walsh Co. Total	2,498	2,170	1,848	-14.8

Sources: North Dakota Department of Public Instruction Internet Website. North Dakota Educational Directory 2006-2007 and 2000-2001. Bismarck: North Dakota Department of Public Instruction;

North Dakota Department of Public Instruction Internet Website. 1994-2007 Finance Facts Data - Fall School Enrollment by District for K-12. Bismarck: North Dakota Department of Public Instruction.

## **Langdon Wind Energy Center – Project Background**

The Langdon Wind Energy Center consists of 106 turbines with a generating capacity of 1.5 MW each, mounted on towers 262 feet tall. The project is owned by FPL Energy and Ottertail Power Company; FPL Energy was the project developer. The wind generated electricity is purchased by Ottertail Power and Minnkota Power Cooperative, Inc. FPL Energy, with headquarters in Juno Beach, Florida, has been a leader in wind power development, both in the Dakotas and nationally. FPL Energy subsidiaries own five wind energy centers in North Dakota and one in South Dakota. These projects represent an investment of more than \$500 million and pay a total of \$1.4 million in state and local taxes each year. The projects employ a total of 32 staff and pay about \$1 million in landowner lease payments annually. FPL Energy is also the largest generator of wind energy in the nation with 55 facilities in 16 states and a generating capacity of 5,275 MW at the end of 2007.

Construction of the Langdon Wind Energy Center began in July, 2007 and was completed on January 12, 2008. The peak construction work force was 269 workers. A force of 10 permanent employees will operate and maintain the energy center. These workers were hired during 2007 and sent out of state for training. All but two of these employees were hired from the local area.

Langdon area leaders had been interested in the prospect of wind development since the 1990s. They had observed the development of the state's first commercial wind farm in the Edgeley-Kulm area, which was developed and constructed by FPL Energy. In 2004, they decided to put up a metrological (met) tower to gather wind data. They were assisted in this effort by a ND Dept. of Commerce matching grant of \$10,000. FPL Energy entered the scene in the fall of 2006, when they held an informational meeting in the area. FPL returned in March of 2007 to hold landowner meetings. They offered option agreements to landowners in exchange for the right to develop a wind farm. A few weeks later they returned seeking wind farm easements. The project came together fast. The availability of two years of data from the met tower likely expedited the design of the wind farm.

Before on-site activity began, FPL held a Job Fair to hire local workers. FPL also leased housing for their personnel. As the construction labor force grew, the market for temporary housing and accommodations became tight. The workers used all available local housing. The motels were full, and all rental housing was taken. The trailer court also was full, and RVs were parked in the city park. Some workers stayed in Cavalier, Lakota, and even Devils Lake, but this was seen as a last resort, as workers were working long hours. The City and the Chamber helped workers find temporary housing.

Local leaders have indicated that local businesses did well during construction. The local repair shop did a good business, as did the hardware store. Warm clothing became a best seller as the weather cooled. A local restaurant/lounge did a good business. The construction jobs associated with the wind farm were seen as desirable, with good wage rates and the potential for lots of overtime.

During construction, a lot of material had to be delivered to the site. For instance, each turbine needed 3 blades, so the 106 turbines represented 159 semi loads of blades. However, Langdon missed much of the traffic, as most material was delivered via U.S. Highway 2 and ND Highway 1 (i.e., from the south). Local residents also noticed a major increase in traffic during shift changes. However, traffic returned to normal when construction ended.

Now that the project is in operation, the easement payments will be a boost for landowners' incomes. Another significant economic contribution will be local property taxes, which are estimated to total \$456,000 annually for all entities, with \$191,000 to the county alone. The school district will also benefit substantially (estimate is \$265,000).

### Estimated Langdon Wind Energy Center Impacts

Construction of the Langdon Wind Energy Center is estimated to have resulted in payments of \$9.3 million to entities in the Langdon area (i.e., Cavalier County and adjacent counties) and an additional \$47 million to entities elsewhere in North Dakota (Table 7). The major items purchased elsewhere in North Dakota were wind towers and blades, which represented a total of \$42 million. DMI Manufacturing in West Fargo produced the towers while LM Glasfiber in Grand Forks manufactured the blades. During operation, the facility will make payments of about \$1.4 million annually to North Dakota entities, including payroll and employee benefits and landowner payments.

Table 7. Estimated Direct Expenditures by the Langdon Wind LLC Project in the Langdon Area, Elsewhere in North Dakota, and Total, for Construction and Operational Phases, 2007-2008

Input-Output Sector	Construction Phase			Operational Phase
	Langdon	Elsewhere in ND	Total	
	\$000			
Comm & Pub Utilities	85	--	85	40
Ag Proc & Misc Mfg	--	42,000	42,000	--
Retail	2,055	635	2,690	15
FIRE	320	250	570	100
Bus & Pers Service	4,985	3,775	8,760	50
Prof & Soc Service	100	75	175	--
Households	<u>1,853</u>	<u>250</u>	<u>2,103</u>	<u>1,208</u>
TOTAL	9,398	46,985	56,383	1,413

## Impact Assessment Model

The model used in this analysis, referred to as the Microcomputer Economic Demographic Assessment Model (MEDAM), consists of four modules; an economic (input-output) module, a demographic module, a service requirements module, and a fiscal impact module. A more complete description of the model is contained in the Appendix.

## Economic Impacts

Input-output coefficients incorporated within the MEDAM model were used to estimate the secondary and total economic impacts of facility construction and operation. The \$56.4 million in statewide direct impacts during the construction period resulted in an additional \$169 million in secondary impacts for a total, one-time construction impact of \$225.7 million (Table 8). The \$1.4 million in annual direct impacts associated with project operation lead to an additional \$3 million in secondary impacts for a total annual impact of \$4.4 million. This includes \$2.1 million of additional *household* sector gross receipts (gross business volume), which indicates that personal incomes of area residents would be increased by about \$2.1 million each year during project operation. Other sectors receiving substantial impacts during construction included *manufacturing* (\$73.6 million), *households* (\$44.6 million), and *retail trade* (\$35.2 million).

Project construction is estimated to create 1,656 secondary jobs statewide, in addition to the 269 peak construction jobs (Table 9). Given the relatively brief duration of the construction phase, some of this secondary employment may have been reflected in longer hours and associated overtime pay for present employees, as opposed to new job creation. During the operation of the project, an estimated 21 secondary jobs are created, in addition to the 10 workers employed by the project.

The estimated residential location of construction phase and operation phase workers is shown in Table 10. During construction, 223 secondary jobs were estimated to be associated with local area construction spending. Of these, 133 were expected to be located within the four counties while the remaining 90 were estimated to be located in larger trade centers that serve the area (e.g., Grand Forks). As noted previously, some of the secondary jobs may represent more hours for existing employees, rather than new employees. During the operation phase (represented by 2008), 21 secondary jobs were estimated to be created in addition to the 10 project employees. Based on information from local leaders, all 10 project employees were estimated to live in Cavalier County as were 8 secondary jobs. Four secondary jobs were estimated to be created in the other three counties, while 9 were estimated to be located in larger trade centers.

Table 8. Estimated Direct, Secondary, and Total Economic Impact from the Langdon Wind LLC Project, Langdon Area and Project Total

Sector	Wind Farm Construction (Total)						Wind Farm Operational (Annual)		
	Langdon Area			Project Total			Direct	Secondary	Total
	Direct	Secondary	Total	Direct	Secondary	Total			
	\$000								
Construction	--	548	548	--	3,418	3,418	--	122	122
Transportation	--	103	103	--	698	698	--	14	14
Communications and public utilities	85	917	1,002	85	4,653	4,738	40	151	191
Manufacturing	--	316	316	42,000	31,550	73,550	--	60	60
Retail trade	2,055	4,517	6,572	2,690	32,479	35,169	15	1,011	1,026
Finance, insurance, and real estate	320	1,040	1,360	570	7,126	7,696	100	228	328
Business and personal services	4,985	438	5,423	8,760	2,839	11,599	50	85	135
Professional and social services	100	527	627	175	3,011	3,186	--	132	132
Households	1,853	5,978	7,831	2,103	42,462	44,565	1,208	861	2,069
Government	--	719	719	--	4,439	4,439	--	150	150
Other <sup>1</sup>	--	773	773	--	36,667	36,667	--	138	138
<b>Total</b>	<b>9,398</b>	<b>15,876</b>	<b>25,274</b>	<b>56,383</b>	<b>169,342</b>	<b>225,725</b>	<b>1,413</b>	<b>2,952</b>	<b>4,365</b>
Secondary employment (FTE jobs)		223			1,656			21	

<sup>1</sup>Includes agriculture, mining, and energy conversion.

**Table 9. Employment Associated with the Langdon Wind LLC Project, for Construction and Operational Phases, 2007 and 2008**

Year	Construction <sup>1</sup>	Operation	Secondary	Total
2007	269	0	1,656	1,925
2008	0	10	21	31

<sup>1</sup>Reflects peak employment.

**Table 10. Workers<sup>1</sup> by Type and Residence, Langdon Wind LLC Project, 2007 and 2008**

Year/County	Worker Type			Total
	Construction	Operation	Secondary	
<b>Regional Impact:</b>				
2007	269	0	223	492
2008	0	10	21	31
<b>Cavalier County:</b>				
2007	188	0	89	277
2008	0	10	8	18
<b>Nelson County:</b>				
2007	27	0	11	38
2008	0	0	1	1
<b>Pembina County:</b>				
2007	40	0	11	51
2008	0	0	1	1
<b>Ramsey County:</b>				
2007	13	0	22	35
2008	0	0	2	2

<sup>1</sup>The figures in this table refer to all workers of a given type, without regard to their origin (local vs. nonlocal).

### Demographic Effects

To estimate the effects of a project like the Langdon Wind Energy Center on an area's population, it is necessary to estimate the percentage of the project-related workers who will relocate to the area (or conversely, to estimate the percentage of the new jobs that can be filled by the area's unemployed or by local residents who enter the labor force). It has been estimated that 55 percent of the construction jobs, 80 percent of the operations jobs, and 85 percent of the secondary jobs will be filled by local workers (see Table 11).

**Table 11. Demographic Parameters Used in Impact Assessment for the Langdon Wind LLC Project**

Percentage of each worker type who will be nonlocal:

Construction	45%
Operation	20%
Secondary	15%

Percentage of nonlocal construction workers who will bring families to the area:

Families locating	5%
-------------------	----

Residential Location by worker type:

<u>County</u>	<u>Construction Workers (%)</u>	<u>Operation Workers (%)</u>	<u>Secondary Workers (%)</u>
Cavalier	70	100	40
Nelson	10	0	5
Pembina	15	0	5
Ramsey	5	0	10
<u>Town</u>			
Langdon	70	100	40
Lakota	10	0	5
Cavalier	15	0	5
Devils Lake	5	0	10

A second important parameter is the percentage of relocating construction workers who will bring families to the area. Based on the short duration of the construction phase and information from local leaders, it was estimated that only 5 percent of construction workers brought families.

A third factor that is important in determining the community-level impacts of a project is where the relocating workers choose to live. The residential location assumptions that were developed for the Langdon project area are summarized in Table 11. All operations workers were assumed to live in Cavalier County, in or near Langdon. Construction workers were estimated to stay primarily in or near Langdon with some spillover to adjacent counties as shown in Table 11. Of the secondary jobs, 60 percent were expected to be in the four county area, with 40 percent expected to be in larger trade centers outside the local area.

The population implications of project construction and operation are presented in Table 12. In 2007 (during project construction), 196 persons were estimated to temporarily locate in the four-county region. The corresponding figure for 2008 is 4. The construction phase population growth included 122 new residents in Cavalier County. In 2008 (i.e., operations phase), the region would have 4 new residents.

Table 12. In-Migrating Population by Worker Type and County/City of Residence, Langdon Wind LLC Project, 2007 and 2008

County/City/Year	Worker Type			Total		Total
	Construction	Operation	Secondary	Male	Female	
<b>Regional Impact:</b>						
2007	136	0	60	159	37	196
2008	0	2	2	2	2	4
<b>Cavalier County:</b>						
2007	96	0	26	103	19	122
2008	0	2	0	1	1	2
<b>Langdon City:</b>						
2007	96	0	26	103	19	122
2008	0	2	0	1	1	2
<b>Nelson County:</b>						
2007	12	0	1	13	0	13
2008	0	0	0	0	0	0
<b>Lakota City:</b>						
2011	12	0	1	13	0	13
2016	0	0	0	0	0	0
<b>Pembina County:</b>						
2007	18	0	1	19	0	19
2008	0	0	0	0	0	0
<b>Cavalier City:</b>						
2007	18	0	1	19	0	19
2008	0	0	0	0	0	0
<b>Ramsey County:</b>						
2007	6	0	2	7	1	8
2008	0	0	0	0	0	0
<b>Devils Lake City:</b>						
2007	6	0	2	7	1	8
2008	0	0	0	0	0	0

## Housing Impacts

One of the most obvious implications of the population influx associated with the construction and operation of a major project is the need for housing or work-week accommodations for the workers and, in some cases, their families. The MEDAM model estimates the housing units that will be required to accommodate the in-migrating (relocating) population, based on coefficients that specify the housing type preferences of workers of each job type. The coefficients used in this analysis are shown in Table 13. These coefficients indicate, for instance, that only 5 percent of the nonlocal construction workers will desire single-family houses, while 30 percent will prefer apartments, about 35 percent will prefer mobile home (including RVs and travel trailers) accommodations, and 30 percent will be housed in motels, rented rooms, and similar work-week accommodations. Similar interpretations apply to the coefficients for the other worker types.

Table 13. Housing Requirements by Worker Type Associated with the Langdon Wind LLC Project

Worker Type	Housing Type			
	Single-Family Houses	Multi-Family Apartments	Mobile Homes <sup>1</sup>	Other <sup>2</sup>
	----- percent -----			
Construction	5	30	35	30
Operations	60	20	20	0
Secondary	35	35	20	10

<sup>1</sup>For construction workers, this category will include RVs and travel trailers.

<sup>2</sup>For construction workers, this category will include motels and rented rooms. For secondary workers, this category will include younger workers who live with their parents.

The housing requirements projected to be associated with Langdon Wind Energy Center construction and operation are summarized in Table 14. The regional impact of the project included a need for about 154 housing units or work-week accommodations at the peak of construction activity, while project operation will require about 4 additional housing units (or result in occupancy of some units now vacant). Construction phase impacts were greatest in Langdon, where 98 housing units or work-week accommodations were needed. However, since most construction workers were not accompanied by families, many housing units (e.g., apartments, motel rooms) may have accommodated more than one worker. During project operation, housing impacts are negligible, as the work force is small and most jobs are filled by local residents.

**Table 14. Housing Requirements Associated with the Langdon Wind LLC Project, 2007 and 2008**

County/City/Year	Housing Type				Total Units
	Single-family Houses	Multi-family Apartments	Mobile Homes	Other	
<b>Regional Impact:</b>					
2007	18	48	49	39	154
2008	2	1	1	0	4
<b>Cavalier County:</b>					
2007	9	30	33	26	98
2008	1	0	0	0	1
<b>Langdon City:</b>					
2007	9	30	33	26	98
2008	1	0	0	0	1
<b>Nelson County:</b>					
2007	2	5	4	4	15
2008	0	0	0	0	0
<b>Lakota City:</b>					
2007	2	5	4	4	15
2008	0	0	0	0	0
<b>Pembina County:</b>					
2007	2	6	6	5	19
2008	0	0	0	0	0
<b>Cavalier City:</b>					
2007	2	6	6	5	19
2008	0	0	0	0	0
<b>Ramsey County:</b>					
2007	1	3	3	2	9
2008	0	0	0	0	0
<b>Devils Lake City:</b>					
2007	1	3	3	2	9
2008	0	0	0	0	0

## School Impacts

Among the various public services likely to be affected by growth and development, the public schools are often of greatest concern. At least two factors explain the high level of interest in the effects on schools: (1) the high priority placed on primary and secondary education by state and local leaders and (2) the substantial portion of local government expenditures that the public schools typically represent.

Projections of the impact of construction and operation of the Langdon Wind Energy Center project on school enrollments are summarized in Table 15, for individual school districts, as well as for the region. During both construction and operation periods, the effects are negligible – during construction because few nonlocal workers brought families to the area and during operation because of the small work force that was mostly filled by local residents.

Table 15. School Enrollment Increases Associated with the Langdon Wind LLC Project, 2007 and 2008

District/Year	School Enrollment Increase		
	K-8	9-12	Total
<b>Regional Impact:</b>			
2007	13	5	18
2008	0	0	0
<b>Langdon:</b>			
2007	6	1	7
2008	0	0	0
<b>Lakota:</b>			
2007	1	0	1
2008	0	0	0
<b>Cavalier:</b>			
2007	1	0	1
2008	0	0	0
<b>Devils Lake:</b>			
2007	1	1	2
2008	0	0	0

## **Public Service Impacts**

Impacts of the in-migrating population on a variety of public service dimensions are estimated by the MEDAM model, using a series of per capita rates applied to the in-migrating population of each affected jurisdiction. The rates used to estimate additional requirements and demands on medical services, social services, law enforcement, fire protection, water, and solid waste are shown in Appendix, Table 7. The impact estimates that result when these rates are applied to the in-migrating population associated with Langdon Wind Energy Center development are shown in Table 16. During project construction, public service requirements were quite small, as most workers did not bring families to the region. During project operation, public service effects are negligible.

## **Fiscal Impacts**

The fiscal impact component of MEDAM develops estimates of a project's effects on the revenues and expenditures of state and local governments (counties, municipalities, and school districts). Estimates of changes in public sector revenues are based on changes in (1) income – personal income tax, (2) business receipts – corporate income tax, (3) retail sales – sales and use tax, (4) property value – property tax, and (5) population – highway, liquor, and tobacco taxes and user fees (Coon et al. 1993). State transfer payments to local governments are estimated from changes in population and school enrollments. Estimates of capital costs for new public facilities (if required) are based on the estimated needs of the in-coming population. Capital costs that cannot be funded from current revenues are assumed to be amortized over 20 years at 7 percent. Changes in operating expenses for the various levels of government are estimated based on changes in population or school enrollments. The impact estimation procedure is based on the experience of communities that were affected by large-scale coal development, as well as other types of industrial and resource development (Leistritz and Murdock 1988, Leistritz and Sell 2000).

Estimates of the effects of the Langdon Wind project on state government revenues and expenditures are summarized in Table 17. During construction, the state is expected to receive substantial revenue from sales and use and personal income taxes. State revenues exceed added state costs by more than \$2 million. During operation, most of the added state revenue comes from these sources, while added state costs are virtually nonexistent because of the minimal population influx.

Fiscal impact projections also were prepared for local jurisdictions which were anticipated to experience substantial population effects from the project. Fiscal impact estimates for Cavalier County are presented in Table 18. Projections for the Langdon school district are shown in Table 19, and projections for the city of Langdon are summarized in Table 20. Cavalier County experienced little effect on either its revenues or costs during the construction phase. During operation, the county is expected to receive \$191,000 in direct property tax payments and \$194,000 in total increased property tax revenues while having negligible increases in costs. The same pattern is repeated for the Langdon school district, where an estimated \$265,000 in property tax revenues will be received annually from the project during the operations period, and the district's net fiscal balance is expected to be \$271,000. The City of Langdon receives no revenue directly from the project, but is projected to have a small but positive net fiscal balance for both the construction and operations phase.

Table 16. Public Service Requirements Associated with the Langdon Wind LLC Project, 2007 and 2008

County/ Year	Medical Services			Law Enforcement		Crimes			Fire Departments		Water Consumption gallons/day	Solid Waste lbs/day
	Physicians	Hospital Beds	Social Workers	Officers	Total Workers	Total	Violent	Property	Fighters	Trucks		
	-----number-----											
<b>Regional Impact:</b>												
2007	0.1	1.1	0.2	0.4	0.4	3.8	0.2	3.6	0.4	0.0	37,240	902
2008	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	760	18
<b>Cavalier County:</b>												
2007	0.0	0.7	0.1	0.2	0.2	2.4	0.1	2.3	0.2	0.0	23,180	561
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	380	9
<b>Nelson County:</b>												
2007	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	2,470	60
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
<b>Pembina County:</b>												
2007	0.0	0.1	0.0	0.0	0.0	0.4	0.0	0.4	0.0	0.0	3,610	87
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
<b>Ramsey County:</b>												
2007	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	1,520	37
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0

Table 17. Changes in State Tax Revenues and Expenditures Resulting from the Langdon Wind LLC Project, 2007 and 2008

Year	Tax Revenues			Expenditures				Net Fiscal Balance	Capital Expend	Net Fiscal Balance after C.E.
	Sales & Use Tax	Personal Income Tax	Other State Taxes <sup>1</sup>	Education Transfers	Highway Maintenance	General Government	Highway & Other Transfers <sup>2</sup>			
\$000										
2007	1,628	669	683	285	33	225	74	2,363	310	2,053
2008	48	31	8	0	0	2	0	85	0	85

<sup>1</sup>Includes corporate income tax, highway taxes, cigarette and tobacco taxes, and liquor and beer taxes.

<sup>2</sup>Includes highway, personal property tax replacement, and cigarette and tobacco taxes.

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Table 18. Changes in Revenues and Expenditures for Cavalier County Resulting from the Langdon Wind LLC Project, 2007 and 2008

Year	Revenues		Expenditures			Net Fiscal Balance
	Property Taxes	State Transfers <sup>1</sup>	General Government	Roads	Other <sup>2</sup>	
\$000						
2007	37	8	8	11	11	15
2008	194	0	0	0	0	194

<sup>1</sup>Includes highway fund transfers and personal property tax replacement.

<sup>2</sup>Includes health and human services, law enforcement, education, emergency services, environment, and miscellaneous.

Table 19. Changes in Revenues and Expenditures for Langdon School District Resulting from the Langdon Wind LLC Project, 2007 and 2008

Year	Revenues		Expenditures		Net Fiscal Balance
	Local Property Taxes	State Transfers	School Operating Costs		
			K-8	9-12	
\$000					
2007	79	27	37	14	55
2008	271	0	0	0	271

Table 20. Changes in Revenues and Expenditures for Langdon City Government Resulting from the Langdon Wind LLC Project, 2007 and 2008

Year	Revenues			Expenditures				Fiscal Balance
	Local Property Tax	User Fees & Special Assessments	Other Revenues <sup>1</sup>	General Government	Public Safety	Net Public Works	Other <sup>2</sup>	
\$000								
2007	38	50	5	11	15	32	6	29
2008	3	1	0	0	0	1	0	3

<sup>1</sup>Includes highway fund transfers, cigarette and tobacco tax transfers, and personal property tax replacement.

<sup>2</sup>Includes health and welfare, culture and recreation, and miscellaneous expenditures.

## **Conclusions and Implications**

Wind energy development has been viewed as a promising rural development opportunity for North Dakota for a number of years. North Dakota is estimated to have the greatest wind generating potential of any state, but development was relatively slow until recently. Remoteness from major markets and a transmission grid operating near capacity were frequently cited as factors limiting wind development. In 2007, wind development picked up substantially, and North Dakota's installed wind generating capacity increased three-fold during the year. The purpose of this study was to examine the effects of developing the Langdon Wind Energy Center on nearby communities and the state economy.

Construction of the Langdon Wind Energy Center was completed over a 6 month period and resulted in expenditures of \$9.4 million within the multi-county area and an additional \$47 million elsewhere in the state. The bulk of the expenditures made elsewhere in the state were purchases of towers and blades. When the multiplier effects of these expenditures are included, the total contribution to the North Dakota economy was more than \$225 million. This level of economic activity would support about 1,650 secondary jobs, in addition to the project construction work force. (Given the short duration of the construction phase, some of the estimated secondary employment likely represented additional hours for existing employees, rather than new jobs.)

During project operation, local economic effects will stem from (1) project jobs and operating expenses, (2) lease payments to landowners, and (3) property tax payments. The 10 maintenance workers are expected to live in the Langdon area, and project operation will support about 8 secondary jobs in Langdon, as well as a few in other communities. Thus, project payrolls and operating expenditures should help support local businesses. The lease payments will represent a substantial increase in landowner incomes (\$413,400 for year 1). Finally, the project will add substantially to local tax revenues, with the county government expected to receive more than \$190,000 and the Langdon school district more than \$260,000.

For some projects, an important question is whether project-related revenues will be sufficient to offset project-related costs (i.e., costs of providing services to in-migrating workers and their families). However, in the case of the Langdon Wind Energy Center, these costs were negligible because (1) very few construction workers brought families to the area and (2) project and secondary employment during the operation phase was quite small with most of the jobs filled by local residents. Finally, most local services have substantial excess capacity because of past population decreases.

Local leaders were asked about area residents' reaction to the project. The reaction has been very positive. Local leaders felt the community did well accommodating the temporary housing needs of construction workers but cautioned that other communities might have more difficulty. Langdon has more infrastructure than many communities its size, dating from the early 1970s when an antiballistic missile defense site was constructed south of town. The mobile home park, which was full at the peak of wind farm construction, dates from the defense site

construction. Developers planning projects in remote locations may need to assess housing and accommodation availability and perhaps explore alternatives for worker accommodation and transportation.

To summarize, wind energy has been viewed with interest for a number of years not only as a promising source of renewable energy but also as an opportunity for rural economic development. Commercial scale wind farms could benefit nearby communities by creating stable, well-paid jobs, through lease payments to land owners, and by adding to the local tax base. This case study of the Langdon Wind Energy Center quantifies these local economic benefits and shows them to be substantial. Further, construction of a wind farm results in a very substantial, albeit one-time, contribution to the state economy, primarily through purchases of towers and blades manufactured in North Dakota.

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**Appendix**

## **MEDAM Computer Model Update - 2008**

The original MEDAM impact assessment model was developed in 1992 to 1993 with the documentation published in June 1993 (Coon et. al., 1993). Coefficients in the model were updated in 2002 in response to the prospects for additional energy development in western North Dakota. These updates provided a more accurate tool that can be used for economic, demographic, services, and fiscal impact analysis. With potential large-scale energy development in North Dakota, updating the parameters of the MEDAM assessment model in 2008 will continue to provide the most accurate impact estimates. In the nearly 16-year period since the model was developed, many tax rates, etc. have changed. Many of the default values in the model (particularly in the services and fiscal models) are presented for approval or change, but productivity ratios and tax rates are constant values within the model. These locked-in rates were changed to reflect current rates and values. The updated version of the model has been named MEDAM08.

This text is not a complete documentation of the MEDAM08 assessment model, but rather a listing of updated values entered into the model's source code, and the data sources used. All methodology and algorithms remained the same as for the original model. Changes were made to the economic module (the user will not be able to see these changes because rates are not presented) and the fiscal module. Fiscal model default values were changed, but as with the previous versions, the default values may be altered by the user. Public service requirements for the services module were updated, but no changes were made to the demographic model parameters.

### **Economic Module**

Changes to the economic module consisted of updating the productivity ratios (Table 1) and tax rates associated with the input-output portion of the model (Table 2). Productivity ratios were calculated using input-output model generated gross business volumes and employment data (Coon and Leistriz 2008). State-level productivity ratios were used by MEDAM08 to estimate secondary employment. Tax rates in 2002 were determined using gross business volumes generated by the input-output model, and actual tax calculations. (Coon and Leistriz 2002, Office of the Tax Commissioner 1995-2000; Strombeck 2002). Similar methodology was used to determine 2008 tax rates (Coon and Leistriz 2008; Office of the Tax Commissioner (2001-2006); Office of the Tax Commissioner (2007). Tax rates calculated for the 2008 update were virtually unchanged from these used in 2002. This is consistent with public policy, because major tax rates have not changed during that period.

**Table 1. Productivity Ratios Used by MEDAM08 to Estimate Secondary Employment**

Sector	2006 Productivity Ratio
Ag, Livestock	211,300
Ag, Crops	211,300
Nonmetallic Mining	282,800
Construction	146,400
Transportation	24,000
Communications & Public Utilities	143,000
Ag Processing & Misc Manufacturing	117,300
Retail Trade	202,000
Finance, Insurance, Real Estate	159,800
Business & Personal Service	49,100
Professional & Social Services	23,900
Households	--
Government	24,500
Coal Mining	319,200
Coal Conversion	941,200
Petroleum Exploration/Extraction	815,700
Petroleum Refining	891,500

Source: Coon and Leistritz (2008).

**Table 2. Tax Rates Used by MEDAM08 to Estimate Tax Revenues Associated with Input-Output Algorithm**

Tax	Base	Rate
Sales & Use	retail trade sector	4.63%
Personal Income	household sector	1.50%
Corporate Income	all business sectors	0.31%

Sources: Coon and Leistritz (2002); Office of the Tax Commissioner (1995-2000); Strombeck (2002); Coon and Leistritz (2008); Office of the Tax Commissioner (2001-2006); Office of the State Tax Commissioner (2007b).

## Fiscal Module

The fiscal module consists of revenues and expenses for the state government, for the county government, for the city government, and for the school district. Summary tables present the new rates for state government (Table 3), county government (Table 4), city government (Table 5), and school districts (Table 6). These values were updated from MEDAM02 version which used 2000 or 2001 data for all items. Data for all items were updated using the most current information available. The most recent data for many categories was still from census reports. These items could not be changed because the necessary census data reports have not been updated since 2002.

**Table 3. MEDAM08 Default State Government Rates for Revenues, Expenses, and Capital Investments**

Item	Rate
<b>State Government Revenues:</b>	
Sales and Use Tax	4.63% x Retail Sales
State Personal Income Tax	1.50% x Personal Income
State Corporate Income Tax	0.31% x All Business Sectors
Highway Taxes	\$383.18 per Capita
Cigarette & Tobacco Taxes	\$36.89 per Capita
Liquor & Beer Tax	\$9.70 per Capita
<b>State Government Expenses:</b>	
Educational Transfer to School District (K-8)	\$2,990.07 per Student
Educational Transfer to School District (9-12)	\$3,182.93 per Student
Highway System Operating Expenditures	\$88.38 per capita
General Government Operations	\$389.69 per Capita
Highway Fund Transfers	\$80.83 per Capita
Cigarette & Tobacco Transfers	\$2.21 per Capita
Personal Property Tax Replacement Trans. (County)	3% Incr. Property Tax Rev. (County)
Personal Property Tax Replacement Trans. (City)	4% x Incr. Property Tax Rev. (City)
<b>State Government Capital Investment:</b>	
Highway System	\$536.74 per Capita

**Table 4. MEDAM08 Default County Government Rates for Revenues, Expenses, and Capital Investments**

Item	Rate
<b>County Government Revenues:</b>	
Local Property Tax	1.99% x Market Value of Property
Highway Fund Transfers	\$53.45 Per Capita
Personal Property Replacement Transfer	3% x Increased Property Tax Revenue
<b>County Government Expenses:</b>	
General Government	\$65.79 per Capita
Law Enforcement	\$27.72 per Capita
Education	\$14.12 per Capita
Emergency	\$3.54 per Capita
Health & Human Services	\$39.65 per Capita
Environment	\$4.97 per Capita
Highway and Roads	\$91.01 per Capita
Miscellaneous	\$3.17 per Capita
<b>County Government Capital Investment:</b>	
Roads	\$190.93 per Capita

**Table 5. MEDAM08 Default City Government Rates for Revenues, Expenses, and Capital Investments**

Item	Rate
<b>City Government Revenues:</b>	
Local Property Tax	1.99% x Market Value of Property
Highway Fund Transfers	\$27.38 per Capita
Cigarette & Tobacco Transfers	\$3.71 per Capita
User Fees (Water, Sewer, Solid Waste)	\$337.56 per Capita
Special Assessments	\$76.06 per Capita
Personal Property & Tax Replacement	4% x Increased Property Tax Revenue
<b>City Government Expenses:</b>	
General Government	\$92.51 per Capita
Public Safety	\$125.62 per Capita
Public Works	\$264.05 per Capita
Health & Welfare	\$16.09 per Capita
Culture & Recreation	\$20.36 per Capita
Miscellaneous	\$18.66 per Capita
<b>City Government Capital Investment:</b>	
Roads	\$236.13 per Capita

**Table 6. MEDAM08 Default County Government Rates for Revenues, Expenses, and Capital Investments**

Item	Rate
<b>School District Revenues:</b>	
Local Property Tax	1.99% x Market Value of Property
Educational Transfers from State (K-8)	\$2,990.07 per Student
Educational Transfers from State (9-12)	\$3,182.93 per Student
<b>School District Expenses:</b>	
School Operating Expenditures	\$5,924.96 per Student
<b>School District Capital Investment:</b>	
School Facilities (K-8)	\$14,437.50 per Student
School Facilities (9-12)	\$23,375.00 per Student

**State Government Revenues:**

1. Sales and Use Tax - Revenue is estimated by applying 4.63 percent sales and use tax estimates to the retail trade sector gross business volume. -  
Sources: Coon and Leistritz (2008); Office of the Tax Commissioner (2001-2006)
2. State Personal Income Tax - Personal income tax estimator is (1.5 percent) applied to the gross business volume of the household sector.  
Sources: Coon and Leistritz (2008); Office of the Tax Commissioner (2007b).
3. State Corporate Income Tax - the corporate income tax estimator of 0.31 percent is applied to the gross business volume of all business sectors.  
Sources: Coon and Leistritz (2008); Office of the Tax Commissioner (2007b).
4. Highway Taxes - Highway taxes included revenues from motor vehicle excise and use tax, motor vehicle fuel and special fuel tax, and motor vehicle license fees. Highway tax revenues were estimated to be \$383.18 per capita.  
Sources: Schatz (2008); Olzweske (2008); Bureau of the Census (2007).
5. Cigarette and Tobacco Taxes - Cigarette and tobacco tax revenues were divided by population to obtain per capita revenue (\$36.89).  
Sources: Office of the Tax Commissioner (2007b); Bureau of the Census (2007).
6. Liquor and Beer Taxes - Liquor and beer tax revenues were divided by the state's population to determine per capita revenue (\$9.70).  
Sources: Office of the Tax Commissioner (2007b); Bureau of the Census (2007).

County Government Revenue:

1. Local Property Tax - The local property tax estimator is 1.99 percent of the market value of the property (Office of the Tax Commissioner 2007a). State average mill rate for 2006 was 397.41. The calculation is as follows:

\$1.00	True & full value
<u>x .50</u>	Assessment factor (50%)
.50	
<u>x .10</u>	State average assessment ration (10%)
.05	Taxable Value
<u>x 397.41</u>	State average mill rate
.019870	Property tax
<u>x 100</u>	To convert to percent
1.99%	Property Tax Rate

Estimated housing costs for the three types (homes, apartments, and manufactured homes) used in the model are as follows:

Homes	\$156,800
Apartments	\$ 46,000
Manufactured homes*	\$ 45,000

\*Mobile homes prefer to be known as manufactured homes. Housing costs for manufactured homes was obtained from a survey of local manufactures.

Sources: Multiple Listing Service (2007), Ericksmoen (2007); Van Redan Homes (2004).

Disbursement of property tax revenues to counties (24 percent), cities (25 percent), and school districts (51 percent) is based on 2005 data from the Office of the Tax Commissioner (2005).

2. Highway Fund Transfers - County revenue from highway fund transfers were calculated per capita. Data to update the 2002 per capita highway fund transfers (\$53.45) were not available.  
Sources: Bureau of the Census (2002b); Bureau of the Census (2002a).
3. Personal Property Replacement Transfer - 3% x increased property tax revenue.

**City Government Revenues:**

1. Local Property Tax - 1.99 percent of market value of property
2. Highway Fund Transfers - \$27.38 per capita; Bureau of the Census (2000b)
3. Cigarette and Tobacco Transfers - \$3.71 per capita; Office of the Tax Commissioner (2005).
4. User Fees (Water, Sewer, Solid Waste) - \$337.56 per capita; Bureau of the Census (2000b).
5. Special Assessments - \$76.06 per capita; Bureau of the Census (2000b).
6. Personal Property Replacement Transfer - 4% x increased property tax revenue.

**School District Revenues:**

1. Local Property Tax - 1.99 percent of market value of property
2. Educational Transfers from State (K-8) - \$2,990.07 per student
3. Educational Transfers from State (9-12) - \$3,182.93 per student

Educational transfers were based on 2006-2007 school year base payment per student of \$2,879.00. A weighting factor is used to determine the payment per student for different categories. The K-8 and 9-12 categories were averaged to determine an average school district revenue. The calculations were as follows:

<u>school</u>	<u>weight factor</u>	<u>payment</u>
preschool	1.1258	\$3,241.18
kindergarten	0.6710	1,931.81
elementary (<100)	1.3854	3,988.57
elementary (>100)	1.0064	2,897.43
grades 7-8	1.0043	2,891.38
	average =	\$2,990.07
high school (less than 120)	1.2864	3,703.55
high school (120 - 299)	1.0303	2,966.23
high school (300 or more)	1.0000	2,879.00
	average =	\$3,182.93

Source: Department of Public Institution (2007a)

**State Government Expenses:**

1. Educational Transfer to School District (K-8)	\$2,990.07
2. Educational Transfer to School District (9-12)	3,182.93
3. Highway System Operating Expenditures	\$88.38 per Capita
4. General Government Operations	\$389.69 per Capita
5. Highway Fund Transfers	\$80.83 per Capita
6. Cigarette & Tobacco Transfers	\$2.21 per Capita
7. Personal Property Tax Replacement Transfer (County)	3% x Increased Property Tax Revenue (County)
8. Personal Property Tax Replacement Transfer (City)	4% x Increased Property Tax Revenue (City)

Several sources provided data used to calculate state government expenses. Education transfers to school districts were per student, and other expenses on a per capita basis.

Sources: Department of Public Instruction (2007a); North Dakota Department of Transportation (2008); Bureau of Census (2001b); Bureau of the Census (2002b); Bureau of the Census (2000b); Bureau of the Census (2001a); Office of Tax Commissioner (2005); Bureau of the Census (2002a); Bureau of Census (2007).

**County Government Expenses:**

1. General Government	\$65.79 per Capita
2. Law Enforcement	\$27.72 per Capita
3. Education	\$14.12 per Capita
4. Emergency	\$3.54 per Capita
5. Health & Human Services	\$39.65 per Capita
6. Environment	\$4.97 per Capita
7. Highway & Roads	\$91.01 per Capita
8. Miscellaneous	\$3.17 per Capita

Census Data provided expenditures for all categories of county government expenses. All county government expenses were calculated per capita.

Sources: Bureau of the Census (2002b); Bureau of Census (2002a).

**City Government Expenses:**

1. General Government	\$92.51 per Capita
2. Public Safety	\$125.62 per Capita
3. Public Works	\$264.05 per Capita
4. Health & Welfare	\$16.09 per Capita
5. Culture & Recreation	\$20.36 per Capita
6. Miscellaneous	\$18.66 per Capita

All city government expenses were based on Census data for local government finances, and were calculated on a per capita basis.

City per capita expenses were calculated using urban population as a proxy for city population.

Data were not available to update the 2002 expenses to 2008 levels.

Sources: Bureau of the Census (2000b); Bureau of Census (2002).

**School District Expenses:**

1. School Operating Expenses \$5,924.26 per Student  
Source: Department of Public Instruction (2007b).

**State Government Capital Investment:**

1. Highway System \$536.74 per Capita  
Sources: North Dakota Department of Transportation (2008); Bureau of the Census (2007).

**County Government Capital Investment:**

1. Roads \$190.93 per Capita  
Sources: Bureau of the Census (2001b); Bureau of the Census (2000a).

**City Government Capital Investment**

1. Streets \$236.13 per Capita  
Sources: Bureau of the Census (2000c); Bureau of the Census (2000a).

**School District Capital Investment:**

1. School Facilities (K-8) \$14,437.50 per student  
2. School Facilities (9-12) \$23,375.00 per student

Expansion costs of school facilities were estimated to be \$137.50 per square foot for 2007. Per pupil required space was 105 square feet per elementary student and 170 square feet for secondary student.

Construction cost per student was calculated as follows:

Elementary: 105 square ft/student x \$137.50/sq ft = \$14,437.50

Secondary: 170 square ft/student x \$137.50/sq ft = \$23,375.00

Sources: Department of Public Instruction (2007c); Shultz (2008).

## Services Module

The services module contains a set of default per capita service requirements that are used to estimate additional service needs likely to be associated with a project. Service areas for which needs are estimated include housing, schools, medical services, social services, law enforcement, fire protection, roads, water and sewer, and solid waste disposal. Default values for the initial model were drawn from national standards believed to be applicable to rural areas, or state standards for North Dakota when available. Service requirements estimated by MEDAM are only for the impact population (i.e., additional or in-migrating population associated with a specific project).

Default housing requirements by worker type used in MEDAM are presented in Table 7. These values are based on data from previous economic impact analyses (Coon et al 1993) and are to be used as a guideline. These values can be changed when running an analysis, and the user is encouraged to do so if they have better information regarding a specific project.

Public service parameters built into the MEDAM model are presented in Table 8. These coefficients have not been updated since the original 1993 version of the model was developed. The default value and source for each item is as follows:

**Physicians -** The persons per physician was set at 2,500 per capita (Garland 2008). This value is based on federal standards for areas with physician shortages. Currently, 80 percent of North Dakota counties are in this category. In 2006, North Dakota reportedly had 1,747 physicians (1 per 364 persons), but a large majority of these were concentrated in a couple urban counties (Kaiser Family Foundation, 2008a). The ratio of one physician per 2,500 persons was used in MEDAM08 because it represents a threshold number to add a physician for the large portion of North Dakota, and is more in line with the value used in the previous version of the model.

**Hospital Beds -** The number of hospital beds per 1,000 people in North Dakota was 5.5 in 2005 (Kaiser Family Foundation 2008b). This translates into 1 bed per 182 people in North Dakota.

**Table 7. MEDAM08 Default Housing Types for Construction, Operational, and Secondary Workers**

Type of Housing	Type of Worker		
	Construction	Operational	Secondary
	-----percent-----		
House	15	60	40
Apartment	10	20	33
Mobile Home	60	15	25
Other	<u>15</u>	<u>5</u>	<u>2</u>
	100	100	100

**Table 8. MEDAM08 Default Values for Public Service Requirements**

Category		Number Required	Population Base	Decimal Equivalent
Medical:	Physicians/Population	1	2,500	.0004
	Hospital Beds/Population	1	182	.0055
Social Services:	Workers/Population	1	1,000	.001
Law Enforcement:	Law Officers/Population	1	539	.00186
	Total Workers/Population	1	394	.00194
Crimes:	Total Population	1	51	.0197
	By Males/Population	1	69	.0146
	By Females/Population	1	194	.0051
	Percent Violent		--	.060
	Percent Property		--	.940
Fire:	Fire Fighters/Population	1	2,083	.00048
	Trucks/Population	1	10,000	.00010
	Pumpers/Population	1	10,000	.00010
Roads:	Highways (miles/person)	.0133	1	.0133
	County/Township (miles/person)	.1188	1	.1188
	City Streets (miles/person)	.0061	1	.0061
Water:	Daily Consumption (gallons/person)	190	1	--
Solid Waste:	Daily Total (pounds/person)	4.6	1	--

Social Services - The national average of 1 licensed social worker per 1,000 people was used for North Dakota (Center for Health Workforce Studies 2006).

Law Officers/Total Workers - The actual number of law enforcement officers and total law enforcement workforce numbers were available for North Dakota for 2006 (Stenhjem 2007). These workers were divided by estimated 2006 population (Bureau of Census 2007) to obtain one law officer per 539 people, and one total law enforcement worker per 394 people.

Crimes - North Dakota crime data (Stenhjem 2007) provided crimes per total population (Bureau of Census 2007) (one crime per 51 persons), one crime by a male per 69 people, one crime by a female per 194 people, with 6 percent violent crime, and 94 percent property crime.

Fire - Full-time fire fighters in North Dakota was 304 in 2006 (Bureau of the Census 2008) Dividing fire fighters by 2006 population (Bureau of Census 2007) resulted in a ratio of 2,083 people per fire fighter. The one fire truck and one pumper per 10,000 population determined by the Denver Research Institute (1979), and used in the 1993

version of MEDAM, will also be used for this update. Data to update this parameter were not available at this time for a rural region like North Dakota.

**Roads** - The number of highways, county/township roads, and city streets were available for North Dakota in 2006 (North Dakota Department of Transportation 2006). These values were divided by 2006 population (Bureau of Census 2007) to obtain .0133 highway miles per person, .1188 county/township miles per person, and .0061 city streets per capita.

**Water** - Daily consumption of water per person was unchanged at 190 gallons per person per day. Current water use in North Dakota for consumption use (North Dakota State Water Commission 2005) remains nearly the same as the usage incorporated in the 1993 version of MEDAM.

**Solid Waste** - The national average solid waste generation was a rate of 4.6 pounds per person per day in 2006 (Environmental Protection Agency 2007).

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Testimony to the House Natural Resources Committee

2 - 12 - 09

In opposition to HB 1426

Brian Rau, representing the *North Dakota Agricultural Aviation Association*

Chairman Porter and members of the House Natural Resources Committee:

For the record, my name is Brian Rau and I farm and operate a commercial aerial application business near Medina, North Dakota. I am here today on behalf of the *North Dakota Agricultural Aviation Association (NDAAA)*. The NDAAA represents 86 aerial applicators in the state. We work to promote aerial application and the safe use of pesticides in the state.

We oppose HB 1426 primarily because of the preemption of local zoning without considerations for others who are affected by wind turbines. Most of the language appears to be only considering the wind industry. Land owners adjacent to wind industrial sites are also affected. They are limited in their ability to use aerial application to protect their crops.

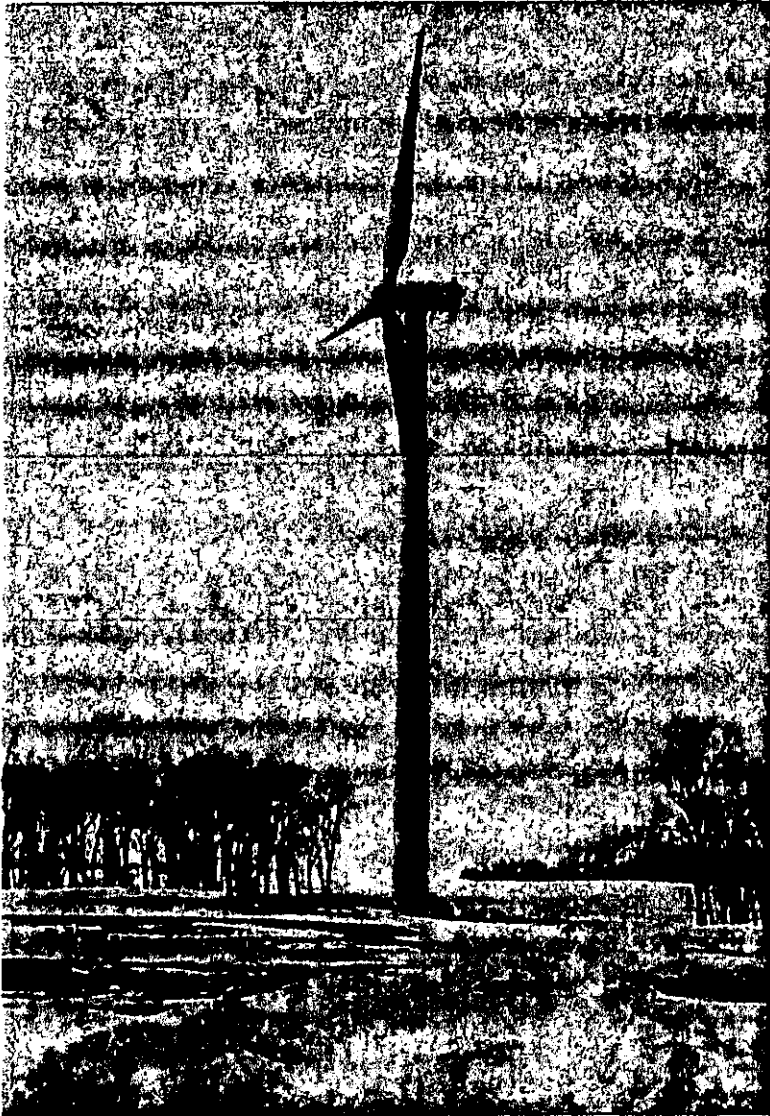
Aerial application is very important to agriculture in North Dakota. A 2004 study showed that aerial applicators contributed \$82 million to the economy of North Dakota, and this number does not include the value of the crop protected. In 2008 almost 5 million acres of land in North Dakota was protected by aerial application.

Adjacent landowners who are not involved in the projects or developments need some setback to allow them to properly care for their crops. Besides the physical obstruction, wind turbines also create turbulence that may affect our spray pattern. In addition to the effect on aerial applicators, there are other reasons to keep these machines away from the property of others: Noise and visual disturbances (light flickers from the blades).

We oppose state requirements if they don't set at least minimum required setbacks and we oppose requirements that don't allow for larger setbacks by local zoning. We consider a five times rotor diameter (5xRD) as a very minimum setback from all sides of a wind industrial site, larger setbacks should be required in certain cases. For example: the private airstrips that most of us operate from require at least 1 mile from the ends of the runway and 1 mile laterally from the sides to be free of obstructions. A picture of a 5xRD setback is provided on the back of this page to give a visual perspective; this is not too much to ask of the wind industry.

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This picture is taken from a 5xRD set back of 1150 feet, note the full sized 1 ton service truck parked at the base.



## Information on the effects of Wind Turbines, Transmission Lines, and other Structures on Aerial Application and Agriculture in North Dakota

Agricultural production is forecasted to need to double by the year 2050. This will be done with high production agriculture of which aerial application is an important part. Aerial application of crop protection products is very important to the state of North Dakota. A study conducted by the North Dakota Aeronautics Commission in 2004, showed that the aerial spray industry in North Dakota contributes 850 jobs and \$82 million annually to the North Dakota economy. This number does not include the increased value of the crops protected by aerial application. In 2008 there were 145 aerial application companies flying 242 aircraft (15% of the registered aircraft in the state.) and they protected almost *five million acres* of land in North Dakota. Aerial applicators also perform mosquito vector control and assist in the suppression of wildfires in the state. The aerial application of crop protection materials is used both in conventional high production and organic production agriculture.

At certain stages of growth many crops such as corn and sunflowers can only be treated by aerial application. Other crops such as potatoes that need multiple applications require the use of aerial application to prevent compaction of the soil and resulting increased disease pressure and decreased yield caused by ground application. Wet conditions sometimes require the use of aerial application in all crops. Additionally, aerial application is the preferred method once a high value crop reaches a maturity stage where it will not recover from drive-down. Often aerial applicators are requested to work on short notice during outbreaks of pests and wet weather. During most conditions, an aircraft can accomplish three times the amount of work in a day than any other form of application.

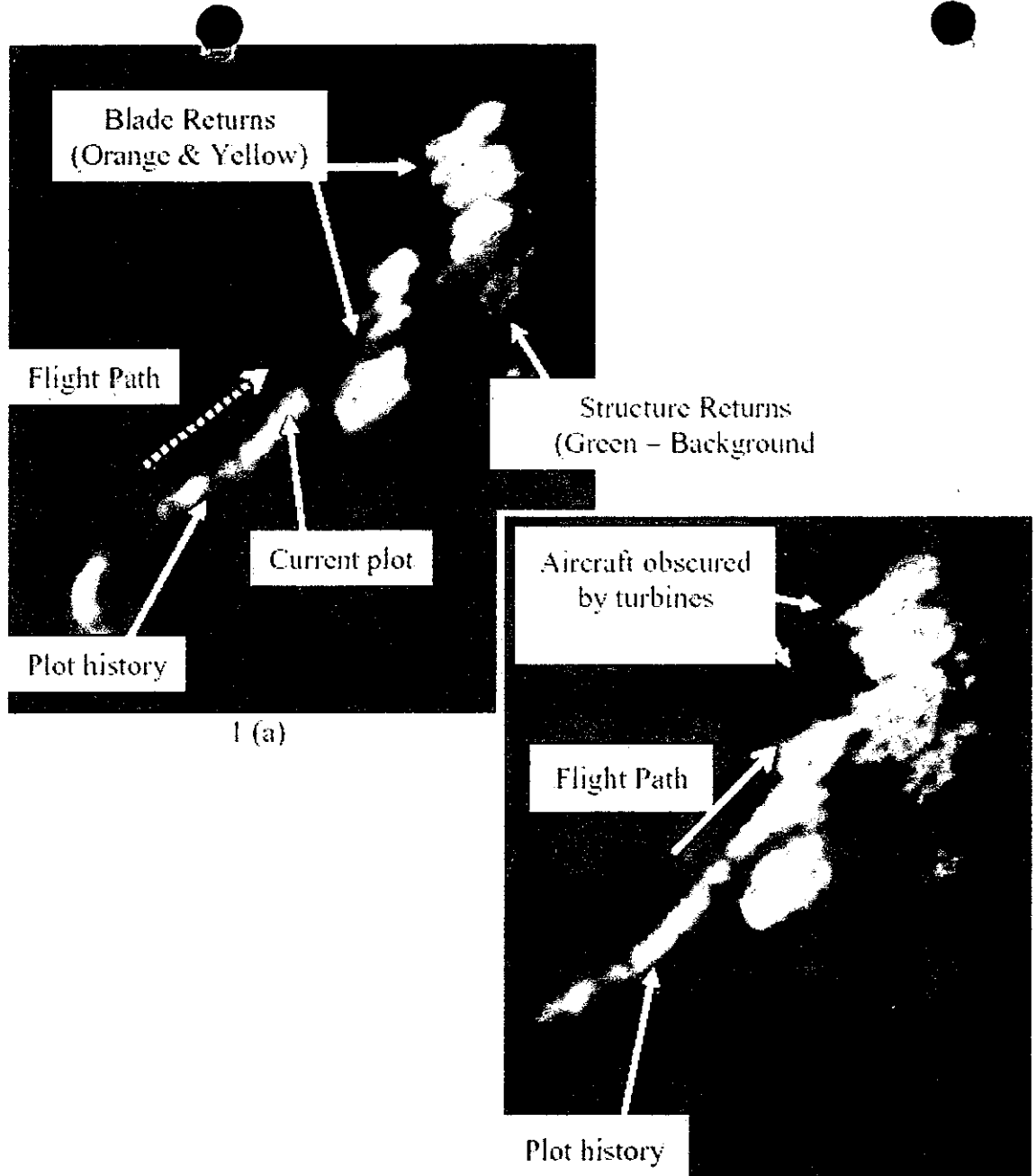
The environment that aerial applicators fly in is becoming increasingly obstructed due to the placement of structures such as communication towers, transmission lines, wind turbines and meteorological testing towers. Structures located on cropland may cause this land and adjacent land to be inaccessible by aerial applicators or require additional time to complete. The additional time equates to increased costs for the growers. Landowners who have placed obstructions on their land have made their decision and have been compensated for it. However, adjacent landowners have not been compensated and are still affected. Most importantly, towers are dangerous obstacles for aerial applicators. With additional wind turbine construction and power lines to deliver the electricity, aerial applicators will be more at risk.

(Please see the reverse side pertaining to how the effects of aerial structures on agricultural can be minimized.)

### Minimizing the effects of aerial structures on agriculture and aerial application.

- Keeping structures back from property lines of others not involved in a project or development at least 2000 feet will leave the aerial applicator with some room to maneuver.
- Keeping structures from being closely spaced with each other or other structures will also help.
- When structures are located closely, placing them in a linear fashion would be helpful.
- Meteorological testing towers need to be painted or lighted. If this is not done, they are very difficult to see, and dangerous. Entities that place hard to see obstructions in areas used by aerial applicators may be liable in the event of an accident.
- Landing and takeoff areas used by aerial applicators need a minimum of one mile from the ends of the runway and laterally from the sides to be free of tall obstructions to allow for efficient maneuvering during landing and takeoff. Entities that place obstructions near known aviation sites may be liable in the event of an accident.
- Electrical transmission lines in agricultural areas should be placed underground whenever possible.
- Above ground transmission lines should be run in the same direction (parallel) to the section lines in ND; this will minimize the disruption of agriculture and aerial application.
- Transmission line construction should be planned with capacity in mind to minimize the number of lines needed.
- Any guy wires on transmission line poles or towers should be marked with high visibility warning spheres or sleeves on the lower ends extending at least 8 feet above the crop canopy.
- Above ground transmission line wires should be 25 feet or less above the ground, or 50 feet or greater above the ground, this will allow an aerial applicator to go over or under the transmission line.

# Obscured Effects



5A-1

See Attachment 8



**House Bill 1426**

**Presented by:** Annette Bendish  
Staff Counsel  
Public Service Commission

**Before:** House Natural Resources Committee  
Honorable Todd Porter, Chairman

**Date:** February 12, 2009

**TESTIMONY**

Mister Chairman and committee members, I am Annette Bendish, Staff Counsel for the North Dakota Public Service Commission. The Commission asked me to appear today in opposition to House Bill 1426.

House Bill 1426 gives the Commission limited discretion when determining setbacks for wind towers. Under current law, the Commission can evaluate the site plan in each case and determine the appropriate setback distances for all wind towers. If we want to maintain a balance of wind development and stakeholder concerns, we must maintain this flexibility in our siting process. This flexibility allows companies to pick the best location for wind turbine sites.

This Bill could negate the ability to exploit a good wind resource in order to protect a bad wind resource. There may be situations where a prime location is within the excluded area and a landowner ends up unable to have a turbine even though no harm is anticipated and the adjoining landowner has no objection.

Further, the threshold of five hundred kilowatts for a commercial wind energy conversion facility as used in this Bill to define commercial wind energy conversion facility would require Commission action for all commercial wind

generators, not just those that are sited by the Commission. This would increase Commission workload and would require a developer of a single turbine or two to control all land within the setback zones around the turbines.

House Bill 1426 does not give the Commission any discretion to designate a setback shorter than the fall down distance from the base of a device to the perimeter of a wind farm in case the device were to fall. The implication of this language is that the turbine cannot be within a fall-down distance from the perimeter equal to the height of turbine including the tip of the turbine blades, unless the developer holds "wind rights" for the land surrounding the site.

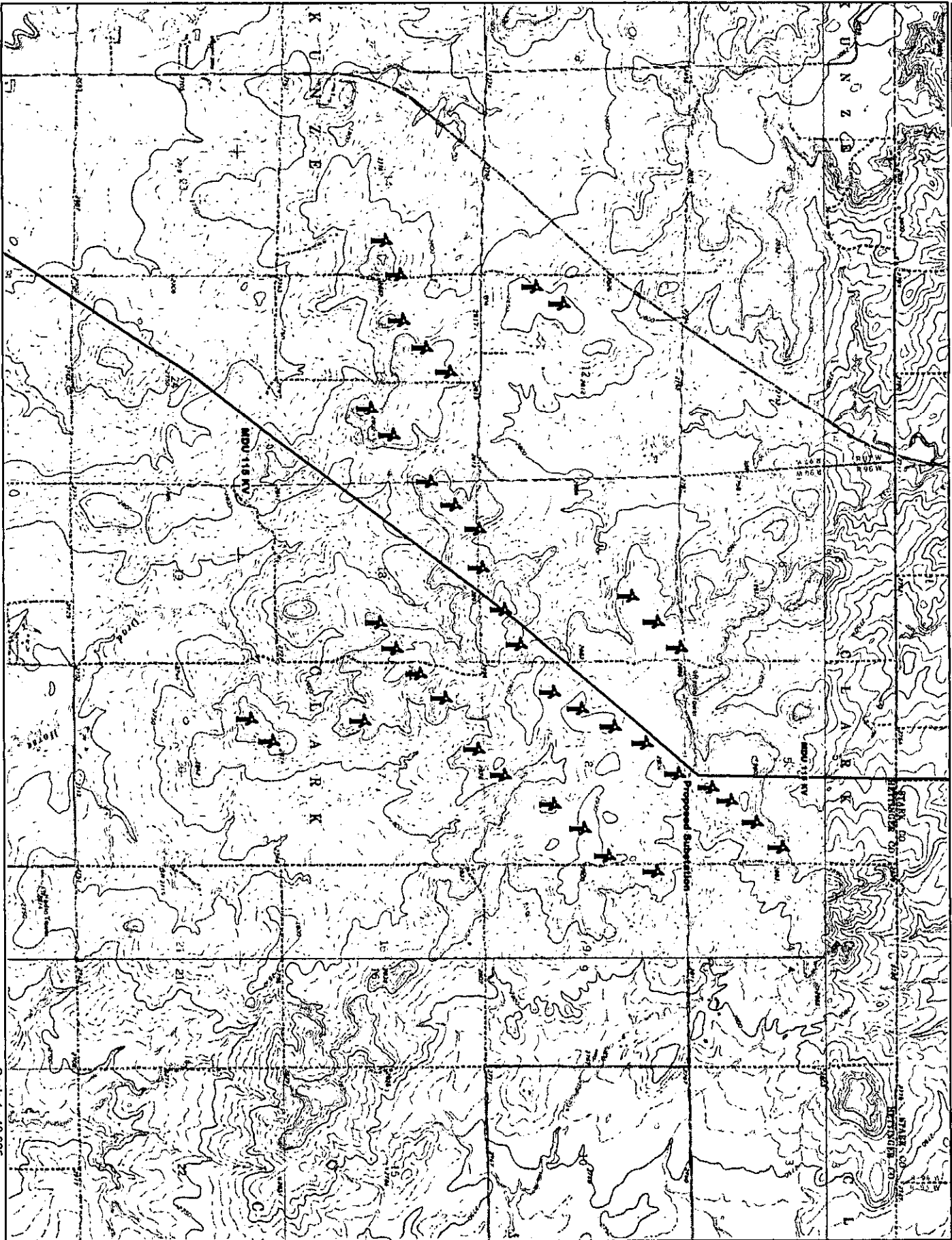
Generally, if structural damage to a wind turbine were to occur, a wind turbine will not simply fall over or be severed at the base. It would be likely that the tower crumples or twists. This means that the turbine height would not be representative of the expected fall down distance. Another possibility is that over speed causes the turbine to fly apart and again the height is not a good indicator of how far the pieces could fly.

Flexibility in the siting should be the bottom line of the Commission's siting process. Each project is unique and the siting process needs to accommodate the needs of each project.

The Commission did receive a copy of the proposed amendments to this bill. The Commission reviewed these amendments and still has the same concerns.

Mister Chairman, this concludes my testimony. I will be happy to answer any questions you may have.

*AT Acknowled #10*



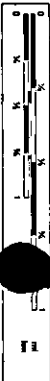
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DATA ZOOM 12-3

# 11

HB 1426

**wind towers & met tower markings**

mkratz@drtel.net [mkratz@drtel.net]

④ You forwarded this message on 2/11/2009 8:42 PM.

To: Mary Horner

Cc:

To Whom this concerns,

My name is Michael Kratz, I am an Aerial Applicator in Southeastern ND and have been in business for 26 years. With the advent of Wind Farm Projects in the Dakota's, I have made several adjustments to accommodate Wind towers being place on farm land.

I have had to slow down, make more turns to go around the towers to do the job safely – this equates to more expense in time and fuel. However, I do find that an 800 foot setback zone is more than adequate to safely be able to maneuver my aircraft.

My greatest concern with Wind Farm development relates to safety issues concerning MET tower placement. When MET towers are without appropriate markings to alert the pilot it does create a dangerous and hazardous situation, since they are almost invisible to me as a pilot I have found it is extremely dangerous. If something is not done to mark them someone is bound to lose their life.

I have sprayed in Minn. and have seen the extreme danger in the almost invisible MET towers. To me they look like *they are almost camouflaged.*

Thank You,

Mike Kratz  
Kratz Aerial Ag Service  
7342 County Rd 60  
LeMoore, ND 58458

# 12

Sixty-first  
Legislative Assembly  
of North Dakota

HOUSE BILL NO. 1426

My name is Fritz Fremgen, if amended, I favor HB 1426.  
My address is 511 2<sup>nd</sup> Ave. SE, Jamestown, ND  
I've attached the proposal for amendments to these comments.

**Add definitions**

Please amend 1426 to define "site perimeter" and "owner".

**Strike prohibition on local political subdivisions zoning**

Please amend 1426 to remove the language precluding a local political subdivision from exercising its own zoning power on setbacks.

In August of 2008, I was asked to draft a proposed wind turbine zoning ordinance for Stutsman County. I am the State's Attorney for Stutsman County.

I spoke with people around the state and heard from some who have wind farms in their county, not all, that hard feelings arise when an operator places a turbine so close to a property line that the wind wake from my turbine close to our border makes it unfeasible for you to have a turbine near the edge of your property.

Stutsman County is considering now, and have held several hearings on, whether to adopt a county zoning ordinance with a 5 rotor diameter (RD) set back from the boundary of the host site, that is my turbine needs to be 5 rotor diameters from our boundary unless you waive the setback and allow me to place it closer than 5 RD to our mutual boundary.

Apparently, you may get problems, not only on the site's boundary, but also inside the site. Apparently if both you and I sign option agreements, I get a turbine, you don't, the power company exercises their option agreement with me, signs a lease, pays me well, they place the turbine next to the boundary, you get no turbine, no lease, no lease payment, your air is dirty, and no one wants to put a turbine on your land. Apparently, some folks who are approached by the power company don't know anything about wind wakes. Nothing I've seen in any option agreement mentions wind wakes.

I would like to ensure that those who sign options are compensated when a turbine is put so close to the border that it takes the wind out of their sails. I've drafted a zoning ordinance to ensure the power company has to obtain a waiver from my neighbors if the power company is going to put a turbine closer than 5RD to their border. I want my constituents to be able to consider whether they'd like that ordinance implemented. HB 1426 seems to preclude a county from requiring setbacks inside a site. I am concerned that the legal rights for the sites are gained before those signing away their rights know the full ramifications of what they're doing.

**Proposal from Fritz Fremgen for amendment to HB 1426**

A BILL for an Act to create and enact a new section to chapter 49-22 of the North Dakota Century Code, relating to the wind tower setbacks; and to provide for application.

**BE IT ENACTED BY THE LEGISLATIVE ASSEMBLY OF NORTH DAKOTA:**

**SECTION 1.** A new section to chapter 49-22 of the North Dakota Century Code is created and enacted as follows:

**Wind tower setbacks.** As used in this section and in lieu of the definitions in section 49-22-03, "commercial wind energy conversion facility" means any device that converts wind energy to electrical energy, including wind chargers, windmills, or wind turbines and associated facilities, that exceeds five hundred kilowatts. As used in this section "site perimeter" means the outside boundary of the contiguous parcels all having either an option, easement, and/or lease agreement for a wind energy facility or accessory which interest is given to the same to the same facility owner. As used in this section "owner" means the person(s) having an equity interest in the wind energy facility. The owner or operator of a commercial wind energy conversion facility to be constructed shall apply to the commission and receive approval from the commission to ensure that each device is located at least five rotor diameters from the perimeter of the site as to prevailing winds and two rotor diameters as to the nonprevailing winds unless the owner or operator of the site has the wind rights for the area of setback surrounding the site or an exemption has been approved by the commission. The commission may allow an exemption to the owner or operator of a site if the commission finds that the setback should be a shorter

distance due to topography making an area within the standard setback not commercially viable for a device or the commission receives consent of the owner of wind rights within the original setback. The commission may not designate a setback shorter than the distance from the base of a device to the point at which physical damage would occur if the device were to fall.

~~Notwithstanding any other provision of law or any ordinance or resolution of a political subdivision, including a political subdivision operating under home rule charter, a political subdivision may not enact or enforce any regulation as to setbacks other than as approved by the commission under this section.~~

**SECTION 2. APPLICATION.** This Act does not apply to an existing commercial wind energy conversion facility. An existing facility includes a facility that has applied for a conditional use permit from the county.