

2015 SENATE EDUCATION

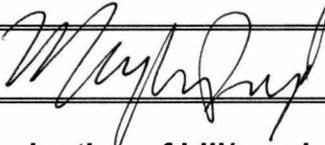
SB 2201

2015 SENATE STANDING COMMITTEE MINUTES

Education Committee
Missouri River Room, State Capitol

SB 2201
1/27/2015
Job # 22587 (1:11:51)

- Subcommittee
 Conference Committee

Committee Clerk Signature 

Explanation or reason for introduction of bill/resolution:

INITIAL HEARING

to provide an appropriation to the department of commerce for energy-related research and development grants

Minutes:

5 Attachments

Chairman Flakoll called the committee to order at 9:00am with all committee members present.

Lonnie J. Laffen, District 43 Senator (*see attachment #1*)

Chairman Flakoll: Your legislative intent is any kind of energy?

Senator Laffen: Correct.

(2:50) **Robert O. Kelley**, University of North Dakota President (*see attachment #2*)

Senator Davison: I have three questions. How was the number 15 million decided? Is this one time funding or ongoing? What was the thought of putting this in the university system as opposed to a singular bill?

President Kelley: I don't know how that number was arrived at. It seems like a reasonable number that would enhance research activities on a competitive base in the universities. I don't have an exclusive answer for the second question if it is recurring or one time. I would like to see a program for energy programs on a recurring base if I had to argue for one way or the other. For the third question, we have reviewed this with the state board. They are supportive, but I don't believe it is embedded within the university budget.

Senator Davison: We've begun to move towards partnerships and collaboration in which businesses and industries share costs. I don't see any matching funds or investments from industries.

President Kelley: I can only speak for UND, but the Harold Hamm School is partnered with continental resources for support. This covers faculty salaries, student support and some equipment. We are also seeing support coming in from HESS and other corporations in the oil and gas industry.

(11:30) **Kelly A. Rusch**, Vice President for Research and Creative Activity at North Dakota State University (*see attachment #3*)

Chairman Flakoll: Are we set up so we can take whatever we develop through research and carry it to commercialization?

Rusch: It depends on the exact research being undertaken. For North Dakota to take that step forward and be a true leader, we need fundamental research all the way through the development steps to commercialize. It depends on the topic at a given time. This source of funding combined with programs such as the research of North Dakota, provide opportunities not only to the University expertise, but companies to take an idea that may be fundamental in nature all the way through the commercialization stage. The mechanisms are in place. This is one of the last pieces of the puzzle. To answer the recurring or one time, I would argue that investing in new technologies now will pay long-term dividends. I am a strong proponent in a recurring fund to make sure we don't invest once and then have a gap coming after that where we fall behind in technology development. We are in a position in North Dakota for a potential of leadership in research and educating the future energy work force.

Chairman Flakoll: How do you see the dollars going? With the oil industry there could be more production which could be more dollars. There could be more dollars to the state as a result regardless of the price of oil, but from an IP standpoint, what is your thought to build a basis of dollars that could be utilized for other things, much like when new varieties of crops are developed there is some funding that is tied to that.

Rusch: We can compare what we can do with energy to what already exists in the agriculture sector, which is SBARE. When a plant variety arrives at a technology transfer office, it is ready to go to market. The reason for this is from the investment over the years that have come from the state to move it from fundamental research topic to readiness. A common complaint with companies and sector in the state is that comparison with technology and plant varieties. A lot of that technology comes into a technology transfer office in the early stages and still needs years of further refinement and development. The plant variety does not need that because it has had that investment already. You can draw parallelism to what energy type of similar SBARE program where that investment is there. When that technology gets to that point, it is ready to license. It doesn't require years after where the IP is sitting on the shelf and had a difficult time attracting companies to license it because it is not far enough along to put into the market place.

Chairman Flakoll: Do you have any opinion on the process of how the committee should be formed?

Rusch: There are infrastructures in place in the state that provide for competitive processes already through peer review and selection. The bill is broad based. This state has so many other resources, which puts us in a position where we can lead. To me, it is a wonder opportunity to push forward an entire front of energy resources. We have expertise at our Universities that collectively can be brought to cover the broad base for the complete energy resource spectrum. We don't limit it to one energy sector or another. We have momentum in a lot of energy sectors and I think we should continue that momentum and utilize expertise that exists within the University System in combination with the private sector that wants to drive some of those other energy sectors outside of oil and gas.

Chairman Flakoll: Numerically speaking do you know what the average research portfolio is nationwide for the various segments that we are talking about for a given year?

Rusch: Not from the federal level and states are variable. I would have to look that up, but it is collectively in the billions of dollars a year that all the federal agencies put toward energy in a broad spectrum. I just don't know the distribution across the states.

(30:15) **Thomas Erickson**, Director of the Energy and Environmental Research Center at the University of North Dakota (see attachment #4)

Chairman Flakoll: How would you see the universal availability?

Erickson: In regard to this funding, I view this as more fundamental energy research activities. That could be done in conjunction with industry, but would likely not have industry cost share. We need to create the underlying principles and the analytical techniques that allow us to then take the project to the next level. We need to create that underlying portion. If it utilizes public funds, it is by definition open records. There are just certain components of that work that may not be released.

Chairman Flakoll: What about the process? How will others have it available to them?

Erickson: The way we handle intellectual property is typically when we do a project with a client, the property is owned by the University of North Dakota. We then can reach whatever licensing deals with whomever regardless industry funding or not. Sometimes we would grant nonexclusive license to those entities or exclusive. It all depends what their ability is to move that technology to the market. Our focus is to get the technology distributed and utilized as possible. Whatever intellectual property commercialization strategy we would do would follow that. It depends on the industry, the client and the situation.

Senator Davison: What percentage of your EERC funds is generated from patents?

Erickson: Currently it is zero that comes through patents. We have a separate organization called the EERC foundation that houses our intellectual property. It actually pays for and administers all of the patenting expenses associated with that. To date there has not been a transfer of funding from the EERC foundation back to the EERC directly; however the EERC foundation plays a critical role in protecting intellectual property and patents that allow us to be competitive and go after new opportunities. I expect that within the next year, that that will change, and there will be significant funding in the foundation, largely due to the mercury control technology. It doesn't directly provide funding for the EERC, but it provides funding for patents that allow us to be more competitive in the market place.

Chairman Flakoll: What is the foundation generating?

Erickson: That revenue that is generated in there is completely consumed by the processing of patents. We have a patent portfolio that is around 50 existing patents and another 50 that are pending. The patent prosecution is very expensive. Of all the patents that are produced, less than 5% ever generate money and less than 2% ever generate enough funding to cover the expense of the patent to start with. It is expensive, long term and high risk. The foundation covers that expense for the EERC right now.

Chairman Flakoll: How much money are they generating?

Erickson: Anywhere from 3 quarter of a million to half a million annually.

(44) **Ron Ness**, President of the North Dakota Petroleum Council

Ness: We support the concept of this bill, but I have some proposed amendments that have not been drafted yet. Many energy research councils require a 50% match. At the end of the day, you must have a partner to bring forth a project that will go forward, typically meaning that there is a need and an interest. The federal landmarks for energy research

have dried up places like EERC. They used to have that discretionary money that they could use for real out of the box type research. Those moneys no longer exist. It is difficult for them to find a partner. The amendments I suggest is that we are not set up for this. We don't have a process. The councils have an entire process in determining the needs and ranks. They ultimately go to the industrial commission for approval, but it has been through a rigorous process by that time. On line 1 and 6, I suggest we replace Department of Commerce with North Dakota Industrial Commission and in line 7 replace the Energy Policy Commission with the Lignite Energy Council, the Oil and Gas Research Council, and Renewable Energy Research Council. The intent is to put this money into the hands of the research councils that are already in place and do not require the match. If you want true research, universities need the ability to tap funds that aren't matched.

(50) **Dr. Michael Mann**, Associate Dean for the College of Engineering at the University of North Dakota

Mann: This will help North Dakota Universities stay competitive for federal grants, help develop new intellectual property and new businesses for the state, and keep students and graduates in North Dakota. It is overall a good, long-term return for the state.

Chairman Flakoll: What is the prognosis on indirects if this were successful?

Mann: Some programs will allow indirect cost to be included the grant system. The advantage of the indirect cost to the University is that it provides some of the funding to develop the research infrastructure.

Chairman Flakoll: What is the average indirects in your Department?

Mann: 38.5% in the University, one of the lowest in the nation.

Chairman Flakoll: There is sometimes some reluctance by legislators to appropriate money and have indirects taken out when part of the funding formula covers some of those indirects already.

(57:40) **Joel Gilbertson**, Bismarck office of Vogel Law firm (*see attachment #5*)

Gilbertson: I am appearing on behalf of the Valley Prosperity Partnership. We are in support of this bill; it is a great bill to encourage more research.

Chairman Flakoll: I worry that if we were to pass this, we may regret what it comes to.

Gilbertson: The amendments that Ron Ness were made, would tie into the system we already have. The VPP hasn't looked at these amendments so I am speaking personally, but if we tie into a system that we already have, that will give you more relief. Whatever you can do to this bill to allow it to pass, we are in support.

(1:01:10) **Deana Wiese**, Executive Director for the North Dakota Ethanol Producers Association

Wiese: We are in support of this bill.

(1:01:50) **Jason Bohrer**, President of the Energy Lignite Council

Bohrer: Lignite Research Council funds a lot of the R&D technologies that deal with criteria pollutants. This is an opportunity to tackle energy problems that don't just narrowly affect our industry, but industry-wide. We support the amendments as well.

Chairman Flakoll: How do we make it less competitive and more for the best interest for the state?

Bohrer: By the time we come together as an empower group and propose legislative solutions or bills, those are ones that have unanimous agreement between the energy suppliers. If that were a similar, you would see the projects with wide agreement and broad impact being funded rather than ones that tilt exclusively toward benefiting one industry or another. That collaborative nature of empower can be applied to research funding. You would have projects funded that were beneficial to a wide range of industries.

Chairman Flakoll: There is probably 3 categories: oil/gas, coal and renewables. What would happen if we divvy it up 1/3, and they could figure out the best allocation?

Bohrer: That would be one way to do that. I can see good reasons for that. I can also see disadvantages. You may lose the joint nature of some of those collaborations.

Chairman Flakoll: Should we have advice and consent from Empower for the broader perspective?

Bohrer: That would be the way I visualize it happening. We have the infrastructure to sign off on these, but it would certainly benefit from a serious evaluation and discussion at the Empower level.

Senator Marcellais: Is there any intentions to combine these three councils in the future and making one team?

Bohrer: We have not had this discussion. I don't think combining the 3 research councils will happen for a long time. Our priorities are so different. If you are competing for money, it would be very difficult for collaboration.

Chairman Flakoll: Why do they need us?

Bohrer: That is the reason we have Lignite research council to screen those projects out, to identify those that have commercial potential and the need. It takes a lot to move a technology from lab to commercial deployment. Even if you are a billion dollar company, you are still evaluating risk versus reward. If the risk is high, you've got many other places you can invest those dollars. As a state industry, we are trying to give them a reason to make that invest in our state and industry rather than in another technology and location.

Chairman Flakoll: If independent institutions are doing some research in areas, there is a higher value placed on that based on the data generated.

Bohrer: Absolutely correct. Not only does it increase the oversight, but also the opportunities. You also leverage the research that is conducted better if done that way.

Chairman Flakoll ends the hearing on SB 2201.

2015 SENATE STANDING COMMITTEE MINUTES

Education Committee
Missouri River Room, State Capitol

SB 2201
2/2/2015
Job # 22963 (7:05)

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

COMMITTEE ACTION

Minutes:

No attachments

Vice Chairman Rust motions for a do pass and rereferred to Appropriations.
Senator Schaible seconds the motion.

Vice Chairman Rust: In my mind, there are great benefits in research and development. Time and again, you will find that the dollars that get returned for the dollars spent are huge. One never knows what particular new technology you may unlock that may have huge ramifications. With the oil industry and the technologies that have come about as a result of research and development, if we could do something that would increase the retrieval of oil from the Bakken by a percentage or two, that would be hugely beneficial. Hence my motion for a do pass.

Senator Schaible: I second this to get this going. Research is important, but I'm not sure that state needs to fund it. Private industries do a good job at this already. We already have a research facility which has caused several issues in the past. Part of that is empty and we had to buy the building and other resources with that. Research is important I just don't think we need to expend government to do it. We already have great steps taken for this in time and effort for research. We don't need to create another facility. I plan to vote against this.

Senator Oban: My struggle is with the word "development". If I was assured that it was going to research and that all players in energy would have a fair shake to get research done to benefit our state and individual energy source, I would be more inclined. I am not comfortable putting 15 million more dollars into something like that.

A vote was taken: Yes: 1, No: 5, Absent: 0

Senator Schaible makes a motion for a do not pass. For SB 2201.
Senator Davison seconds the motion.

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Senator Davison: I want this to be part of the University budget process as opposed to outside things coming in. We already invest quite highly in the University System, and these peripheral concepts should be a part of that discussion amongst the college presidents and their priorities.

A vote was taken: Yes: 5, No: 1, Absent: 0

Vice Chairman Rust votes "no" but the motion carries.

Senator Schaible will carry the bill.

REPORT OF STANDING COMMITTEE

SB 2201: Education Committee (Sen. Flakoll, Chairman) recommends **DO NOT PASS** (5 YEAS, 1 NAYS, 0 ABSENT AND NOT VOTING). SB 2201 was placed on the Eleventh order on the calendar.

2015 TESTIMONY

SB 2201

SB2201

TESTIMONY TO THE SENATE EDUCATION COMMITTEE

JANUARY 27, 2015

LONNIE J. LAFFEN, SENATOR, DISTRICT 43

#1

1/27/2015

Mr. Chairman: SB 2201 is pretty simple - it provides a \$15M Appropriation for Energy Grants to be administered by the Dept. of Commerce and approved by the Energy Policy Commission. It is my belief that just as Ag Research has created a better economy in ND - Energy Research could do the same.

Some years ago this body funded studies for horizontal drilling and hydraulic fracturing. Tax incentives followed which turned a struggling industry into our states largest. I wonder what the economic payback has been for those pieces of legislation.

Is it possible that new technologies could double or triple the production of a Bakken Well - remember we are currently only retrieving 5% recovery of the oil in the ground. Through research Norway improved their rate from 5% to 20% over a 20 years window. Imagine our Bakken wells producing 4 times the amount of oil than they currently do.

In the past 100 years our world has seen an industrial revolution and a technology revolution. I believe we are on the edge of an energy revolution and I'd like to see if we can't make that happen right here in ND. Where is the next great idea - I believe it is right here in this bill.

Mr. Chairman - there are many people here who know more about how this could work and I will let them take it from here.

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#2
1/27/15

TESTIMONY ON SENATE BILL NO. 2201

ROBERT O. KELLEY, PRESIDENT, UND

Good morning, Mr. Chairman, members of the committee:

For the record, I'm Robert Kelley, President of the University of North Dakota.

Thank you for permitting me the opportunity to support SB 2201. It is a bill that, if passed into legislation, will have a long-term positive impact for the state on finding solutions to the challenges facing North Dakota's extractive industries...both fossil fuels and renewables.

The bill outlines an appropriation that is intended to support research and development activities related to the state's energy sector. On the agriculture side of the state's economy, a State Board for Agricultural Research and Education (SBARE) has been developed. To the best of my knowledge, no similar entity has been developed that specifically addresses research and education for energy.

Along these lines, the North Dakota EmPower Commission, managed by the Department of Commerce, is an entity that was formed to support R&D that benefits the state's diverse and growing energy industry. Similar missions drive the Lignite Council and the Oil and Gas Research Commission. The North Dakota Industrial Commission might also be added. But no singular board or commission has either the same mission or goals for energy research and education as SBARE does for the agriculture sector of North Dakota's economy.

In addition, the state's research universities, UND and NDSU, have centers and institutes that have considerable expertise in developing solutions for industry through applied engineering and basic research. One premier example is the Energy and Environmental Research Center at UND. This center has a 50+ year track record of working with industry on issues ranging from the increasing lignite utilization and efficiency, enhanced oil recovery, carbon capture and emission management, all the way to developing new and innovative methods for land

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reclamation following mineral extraction. The EERC, in full collaboration with the resources in the UND College of Engineering and Mines, has yet to meet its full potential in finding solutions to some of the complex challenges inherent in the energy industry.

The portfolio of the EERC contains a wide range of expertise: clean coal technologies; carbon capture and sequestration innovations; enhanced oil recovery techniques; energy and water sustainability; biomass technologies; water and other liquid management strategies; and waste containment and clean up.

The portfolio of the College of Engineering and Mines is geared toward career preparation of students educated and trained to develop applied engineering solutions to problems in chemical engineering, petroleum engineering, geology and geological engineering (which incidentally is partnered with the Wilson Laird Core and Sample Library supported by the ND Geological Survey), and electrical, civil and mechanical engineering. The Institute for Energy Studies is the academic and basic research arm for engineering solutions at UND, and works in tandem with the applied engineering arm, the EERC. EERC Director, Tom Erickson, and IEC Director, Mike Mann, are with me this morning to tell you even more about the potential of these two centers.

SB 2201 speaks to the mechanism that will support even greater advances in finding solutions beneficial to both the state of North Dakota and the energy industry, upon which a significant piece of the state's economy is based. Although not defined in the bill, a mechanism for review of competitive applications targeted to specific energy solutions, perhaps through a request for proposal (RFP) program, would permit highest and best use of appropriated funds. And the state already has clearly identified commissions and councils that could administer such a program...a program that might take on some of the features supporting energy and extractive industry as SBARE does for agriculture.

To conclude, SB 2201 will be a major step forward by the Legislature in committing resources targeted to finding solutions for the technical challenges facing the state's energy industry. Like SBARE for the agricultural base of the

state's economy, SB 2201 will lay a foundation for similar support of basic and applied research and education for the future success of the energy industry in North Dakota. Much of the state's economic success will be dependent on technical advances and innovations coming from the state's research universities.

I enthusiastically support SB 2201.

I'll be happy to try to answer questions.

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1/27/15

North Dakota Senate – Senate Education Committee
Senate Bill 2201
Kelly A. Rusch
January 27, 2015

Good Morning Chairman Flakoll and members of the Senate Education Committee. My name is Kelly Rusch, and I am the Vice President for Research and Creative Activity (“RCA”) at North Dakota State University (“NDSU”). I am here to provide this committee with testimony in favor of Senate Bill 2201. It may seem counterintuitive to invest in energy related research with the current the oil prices. In my opinion, now is the time to look forward and towards technologies that help reduce production costs, increase recovery, move products further along the value chain, diversify the State’s energy portfolio and diversify the overall economy. The development of new technologies requires research, which can be provided wholly, and/or in partnership with the private sector, by the State’s university system.

As North Dakota’s land grant university, NDSU has been serving the needs of its citizens, private sector parties, and state government through student-centered education, research, and service. With employees located in every county of this great state, NDSU has been actively engaged in research and promoting economic development in many key industry sectors including, but not limited to, agriculture, energy, and high technology fields.

NDSU’s involvement in energy resources R&D is broad in scope and digs deeply into the challenges and opportunities that come with energy resources like oil, gas, coal, wind and solar. NDSU faculty, staff, and students are involved in a diverse array of research, development and other projects related to enhanced resource recovery, pipeline corrosion, energy storage, utilization, land management, and other aspects of North Dakota’s energy resources.

For example, NDSU’s **Oil Research** investigations include such topics as:

- Coatings for materials surface protection in the oil industry
- New polymeric materials for enhanced oil recovery
- Methods of unconventional hydrocarbon recovery
- Characterization of North Dakota clay as a potential source of proppants for use in hydraulic fracturing

NDSU is also pursuing research and development in other resource areas that are important to North Dakota citizens, businesses, and the state economy such as **Renewable Energy**. North Dakota is a leader in wind energy, and NDSU researchers have been working with the private sector on R&D for the development and testing of “anti-icing” coatings to prevent or eliminate ice on wind turbine blades. Likewise, NDSU agricultural researchers are engaged in R&D to further the use of renewable, crop-based biomass (e.g., straw) to produce energy.

Faculty in NDSU’s College of Engineering are engaged in R&D related to power and energy systems that can aid North Dakota’s utilities and other companies, including:

- Analysis and control of large scale power systems
- Analysis and control of distribution networks (interfaced with renewable energy sources)
- Design of efficient power-electronic interfaces for renewable energy resources
- Development of batteries for enhanced energy storage

While currently not active research, NDSU has also had discussions with a number of utility companies operating in North Dakota concerning protection of boilers and other related infrastructure from damage

by corrosion in the existing fleet of lignite based, electrical generation plants. Interest from companies lies in protective coating materials and embedded sensors to detect changes in the surface substrate of the boilers.

When it comes to the Environment, and Agricultural and Natural Resources, NDSU faculty, staff, and students are engaged in gaining a better understanding of hydrology, groundwater and water quality and quantity issues; assessment of environmental risks; air emission; pollution control; and, water and waste water remediation in the oil, gas, and coal producing areas of North Dakota. Researchers are also addressing concerns and needs involving reclamation, dust control, and better land management.

NDSU researches and/or extension personnel are gathering, analyzing and disseminating important information to communities for use as they seek practical solutions to growth challenges. Example of such efforts include, but are not limited to:

- Studying emergency management issues in oil and gas producing areas of western N.D. As a side note, Dr. Ciwak and her undergraduate student are here today with their research results as part of NDSU's Undergraduate Research Day. I invite you to visit with them in the Legislative Hall and see their exhibit.
- Assisting law enforcement and community leaders in assessing law enforcement needs with increased populations.
- Making population projections for western N.D. as it applies to governmental planning, school enrollments, etc.
- Investigating workforce characteristics in the oil and gas regions of western North Dakota.
- Studying the infrastructure needs and transportation logistics in energy-producing regions of N.D.

Other units, centers, and institutes at NDSU are engaged in R&D activities that may directly or indirectly assist in North Dakota energy resource development and utilization. For example:

- **Center for Computationally-assisted Science and Technology ("CCAST")** is home to one of the region's largest high performance computer centers that was approved as a Center by the State Board of Higher Education in 2003. In addition to state-of-the-art hardware and software, CCAST's expertise in algorithm development, modeling, and simulation accelerates and expands the capabilities and capacity of NDSU researchers to conduct R&D related to energy resources, which is important to the economy of the state of N.D, its private sector, and its citizens.
- **Center of Quality, Reliability and Maintainability Engineering.** This new center within NDSU's College of Engineering will allow NDSU faculty, staff, and other researchers plus students to work with industry partners to improve product quality and reliability of products and services including those involving energy resources like oil, gas, coal, and wind.
- **Center for Nanoscale Science and Engineering ("CNSE").** CNSE researchers are engaged in design, development, and testing of new sensors and sensor-network technologies. Such technologies can be used to detect changes in metals and/or coatings (that are used in oil and gas pipelines) that might lead to pipeline failures.

Why is SB 2201 critical to developing new technologies for the energy sector? The EmPower North Dakota Commission summed it up best when it stated in its 2014 Policy Updates and Recommendations (see pg. 11) that "*.....the state has been a leader in fostering R&D partnerships between private industry, higher education and research facilities. As R&D funding is reduced at the federal level, the state's role along with its partners is even more critical in finding ways to utilize North Dakota's vast energy resources....*". Thus, the state appropriation specified in SB 2201 is very timely and important to

research universities like NDSU as it permits and enables our faculty, staff researchers, and students to undertake new projects that will lead to better utilization and management of energy resources and thus promote economic diversity and development in concert with the private sector for the State of North Dakota. Such a statewide source of funds would also put North Dakota at a very competitive advantage when seeking federal Department of Energy research dollars, which usually require a substantial match. This use of the funds would also increase the return on investment of the State's dollars as they are leveraged by federal dollars obtained by university researchers.

The EmPower North Dakota Commission further stated in its 2014 Policy Updates and Recommendations (see pg. 11) that "... *the state has the potential to allow R&D to undertake a new role in understanding the synergies between renewable and traditional energy resources...*". The appropriation specified in SB 2201 would enable research universities like NDSU to assist the state in undertaking this new role.

Finally, the EmPower North Dakota Commission stated in the aforementioned document that "...*Research and development serves as the bridge for industry to move from concepts to new development and commercialization...*". As a land grant, research university, NDSU has a proven track record of engaging the private sector in public-private research partnerships that moves concepts to new development and commercialization. With the funding provided through this appropriation, NDSU can and will engage the private sector to move new energy resource concepts through to commercialization, which in turn will promote economic development and diversity within the State.

I would be remiss if I did not state another direct benefit of this appropriation – the new, expanded and enhanced learning opportunities our enrolled students would have by being afforded a chance to engage in cutting-edge research that develops an understanding and skill sets needed by our State's energy sector employers. This aspect of State investment should not be overlooked.

I fully support a Statewide, competitively distributed research fund that can bring university-level expertise to the service of the State's energy resource needs. I guarantee you that the dollars spent on this program will generate new innovations and help train the State's future energy workforce.

Thank you for the opportunity to testify before this committee. I welcome any questions or comments you may have.

#4
1/27/15

**Sixty-Fourth Legislative Assembly of North Dakota
Education Committee
Senate Bill No. 2201**

**Testimony of Thomas A. Erickson, Director
Energy & Environmental Research Center (EERC)
University of North Dakota
January 27, 2015**

Mr. Chairman (Senator Tim Flakoll) and members of the committee, my name is Thomas Erickson, Director of the Energy & Environmental Research Center (EERC) at the University of North Dakota. I appear before you today in support of Senate Bill No. 2201, which can catalyze the critical basic research needed both to address today's energy challenges and to prepare our state for a prosperous future.

North Dakota is fortunate to possess a wealth of natural resources ranging from fossil energy, to renewable energy, to abundant agricultural land, to clean water, to clean air, to beautiful landscapes. Ensuring wise stewardship and sustainable development of our resources requires significant investment in many different forms, including investment in basic energy research.

With a world-class staff of approximately 220 scientists, engineers, and support personnel, the EERC is focused on research projects serving the needs of industry, state, and federal organizations. The EERC has routinely worked with a wide variety of North Dakota entities, including the lignite industry, agricultural producers and processors, the oil and gas industry, the wind industry, municipalities, and regional manufacturers. It should be noted that basic research funding at the EERC has dropped significantly over the last 4 years, with the loss of as much as \$14 million annually in federal earmarks, resulting in a large decrease in North

Dakota-focused basic research and a significant staffing drop from a high of approximately 315 in 2010.

The EERC has routinely experienced how investments in research at the earliest stages of development can lead to tremendous economic and environmental successes. One example is the development of the EERC's patented mercury control technology, which includes over 35 patents and pending patents. Mercury control was a very complex topic to tackle. To develop new mercury control strategies, we first had to develop new analytical techniques to measure mercury. We then needed to do fundamental studies to understand the complex chemical transformations that mercury goes through within a power plant and the atmosphere. Once we understood these, only then could we begin to formulate new technologies which led to full-scale demonstrations in North Dakota and throughout the United States. What started as a relatively small basic research program grew into tens of millions of dollars in federal and industry funding and is now licensed to a North Dakota entity with over 15 power plants currently contracted for commercial deployment. This EERC-developed technology has the ability to capture over 90% of the mercury from coal-fired power plants and save each utility millions of dollars a year compared to competing technologies.

What are the opportunities that energy research can provide for North Dakota's future? The opportunities lie not just in advancing the resources as currently produced, but also in the development of more efficient production and utilization strategies and in the strategic combination of energy resources. North Dakota has the second-largest known reserves of lignite in the world (behind only Australia). It is estimated that the state's reserves will last more than 835 years at the current rate of consumption (*Strippable Lignite Deposits of North Dakota*, Edward C. Murphy, North Dakota Geological Survey, 2001). Despite these tremendous reserves, the long-range outlook for lignite use is in question because of regulatory uncertainty, especially

regarding CO₂ emissions. At the same time, demand for electricity is expected to increase 3 GWe over current production by 2032, based on needs largely related to oil and gas production.

In 2012, North Dakota surpassed both California and Alaska to become the second-largest oil-producing state, behind only Texas. In 2013, North Dakota received a total of \$2.9 billion in oil and gas extraction taxes (http://www.ndoil.org/image/cache/Facts_Figures.pdf) and produced 346 billion cubic feet of natural gas and sold 232 billion cubic feet of natural gas (http://www.ndoil.org/image/cache/Facts_Figures.pdf). North Dakota also has the only commercial-scale coal gasification facility in the United States that manufactures natural gas, the Great Plains Synfuels Plant near Beulah (<http://www.dakotagas.com/>). Wise stewardship of these tremendous resources, again, underscores the need for basic research.

For example, research holds the key to a potentially colossal synergy between the lignite and oil and gas industries as well as fertilizer production for the agricultural industry. The EERC is working to develop both the ways in which CO₂ can become a tool for enhanced oil recovery in the Bakken and the advanced electrical generating systems that can use lignite as a source of both electricity and economical CO₂. The Bakken petroleum system is conservatively estimated to hold 300 billion barrels of oil. With current production methods, recovery factors are estimated at 3%–10%. The EERC is working to develop methods that will significantly increase that recovery factor. How much of the generated oil is recoverable remains to be determined, but even an increase of 1% in the recovery would produce as many 3 billion barrels of additional oil. However, the Bakken is an unconventional resource that requires an unconventional approach to tap its full potential. To date, a limited set of laboratory experiments coupled with a detailed characterization of the Bakken petroleum system has yielded promising results at the EERC. But significant further funding is needed to support and advance this critical work.

We can all be proud of the significant agricultural and energy products that our hardworking state provides to the world. However, fluctuating commodity prices, societal pressures, and constricting regulatory controls, combined with a volatile global economy, mean that our state must also advance technologically.

I urge you today to support this investment into North Dakota's present and future prosperity. The investment will maximize the benefits that our state realizes from these incredible resources. Successful research will result in:

- Next-generation coal facility(ies) being built in the state of North Dakota.
- Recoverable oil from the Bakken growing by 100%, 200%, 300%, or more, with a smaller environmental footprint.
- Existing power plants in North Dakota continuing to produce economical, reliable, and environmentally responsible electricity.
- Cost-effective and reliable renewable technologies that can be integrated into existing infrastructure.
- Continued availability of low-cost energy for sustaining North Dakota's agricultural industry while increasing local fertilizer production, growing the production of biofuels and the utilization of agricultural residues.

The EERC is committed to being a leader for the state of North Dakota in the development of new technologies and methodologies for the economic, reliable, and environmentally friendly utilization of our vast resources. Senate Bill 2201 is a valuable investment ensuring funding is available to support this leadership and development.

Thank you for the opportunity to comment. I'd be happy to take any questions.

Date: January 27, 2015

To: North Dakota Senate Education Committee
Senator Tim Flakoll, Chairman
North Dakota State Capitol
Bismarck, ND 58501

From: Valley Prosperity Partnership (VPP)
Tammy Miller, CEO, Border States Electric, VPP Co-Chair
Steve Burian, CEO, AE2S, VPP Co-Chair

RE: S.B. 2201 Support

Thank you for the work you are undertaking in this 64th legislative session to set North Dakota's state budget and policy direction for the next two years.

Please accept this letter as the Valley Prosperity Partnership's (VPP) strong support for moneys to the Department of Commerce for research and development grants as outlined in S.B. 2201. The VPP formed to identify strategic economic development opportunities to bring the Red River Valley region together. Expanding research that is relevant to our economy is a top priority and one that has significant benefits to the Valley and the state of North Dakota.

There is a proven and strong relationship between an economy's ability to convert its science and technology assets into economic development and its standard of living. Our state's investments in research, as a percentage of gross state product, rank 35th among states. Increased state investment in research will demonstrate leadership and will lead to greater output in areas relevant to our state's diverse economic base, including energy.

North Dakota's productivity and competitiveness, our standard of living and our quality of life are directly and positively impacted by our ability to turn new ideas into products, processes and services. The businesses and industries the VPP represent rely on robust and relevant research being conducted in North Dakota to remain competitive in our global marketplace and fuel greater innovation, productivity and economic vitality.

Thank you for your consideration of the importance of additional research investment. If we can answer any questions, please do not hesitate to contact us.



Tammy Miller, CEO
Border States Electric
Co-Chair, VPP



Steve Burian, CEO
AE2S
Co-Chair, VPP



About the Valley Prosperity Partnership

Spurred by the vision and a \$100,000 investment from Forum Communications Company Chairman William C. Marcil, along with private industry and higher education steering committee members each investing \$20,000, the Valley Prosperity Partnership (VPP) formed to identify strategic economic opportunities to bring the Red River Valley region of North Dakota and Minnesota together to focus on workforce, job creation, infrastructure, and economic needs of the region.

Purpose Statement

Through its strategic planning efforts, the Valley Prosperity Partnership will identify collaborative, actionable economic development initiatives that can be implemented within five (5) years. Identified initiatives will build on community strengths and resources to ensure economic prosperity throughout the Red River Valley of North Dakota and Minnesota, which will contribute to the health and prosperity of both states.

Priorities

1. Attract, develop and retain talent
2. Ensure water security and management
3. Expand research capacity and relevancy
4. Accelerate entrepreneurial activity and output
5. Invest in critical infrastructure development and capital improvement
6. Define and improve the internal and external perception of the Valley

Steering Committee

- **William C. Marcil**, *Chairman*
Forum Communications Co.
- **Tammy Miller**, *CEO*
Border States Electric
Committee Co-chair
- **Steve Burian**, *CEO*
AE2S
Committee Co-chair
- **Dave Anderson**,
Dir. of Public Affairs
Sanford Health
- **Barry Batcheller**,
Chairman & CEO
Appareo Systems
- **Dave Berg**,
President & CEO
American Crystal Sugar
- **Karl Bollingberg**,
Exec. VP
Alerus Financial
- **Dean Bresciani**, *President*
North Dakota State
University
- **Doug Burgum**, *Founder & Chairman*
Arthur Ventures
- **John Eickhof**, *President*
Construction Engineers
- **Jim Galloway**, *Principal*
JLG Architects
- **Jim Gartin**, *President*
Greater Fargo-Moorhead
EDC
- **Hal Gershman**, *Owner*
Happy Harry's Bottle Shops
- **Tim Huckle**,
President & CEO
Blue Cross Blue Shield ND
- **Robert Kelley**, *President*
University of North Dakota
- **Dave Molmen**, *CEO*
Altru Health System
- **Mark Nisbet**,
N.D. Principal Mgr.
Xcel Energy
- **Ronald Offutt**,
Chairman & CEO
RDO Equipment
- **John Richman**, *President*
N.D. State College of
Science
- **Jim Roers**,
President & CEO
Roers Construction &
Development
- **Wes Rydell**, *Owner*
The Rydell Company
- **Jeff Sandene**, *COO*
Sanford Health
- **Thomas Shorma**,
President & CEO
WCCO Belting, Inc
- **Richard Solberg**,
Chairman & CEO
Bell State Bank & Trust
- **Steve Swiontek**,
President & CEO
Gate City Bank
- **Anne Temte**, *President*
Northland Community &
Technical College
- **Klaus Thiessen**,
President & CEO
Grand Forks Region EDC