

NORTH DAKOTA LEGISLATIVE COUNCIL

Minutes of the

ENERGY DEVELOPMENT AND TRANSMISSION COMMITTEE

Wednesday, October 24, 2007

Lewis and Clark/Maximilian/Stevens Rooms
Energy and Environmental Research Center
University of North Dakota
Grand Forks, North Dakota

Chairman Rich Wardner called the meeting to order at 8:30 a.m.

Members present: Senators Rich Wardner, John M. Andrist, Robert M. Horne, Ryan M. Taylor, Ben Tollefson, Herbert Urlacher; Representatives Scot Kelsh, Matthew M. Klein, Shirley Meyer, Dave Weiler

Members absent: Representatives Wesley R. Belter, Todd Porter

Others present: Bob Skarphol, State Representative, Tioga

Mark S. Owens, State Representative, Grand Forks

Louise Potter, State Representative, Grand Forks
Constance Triplett, State Senator, Grand Forks
See [Appendix A](#) for additional persons present.

It was moved by Representative Klein, seconded by Senator Horne, and carried on a voice vote that the minutes of the previous meeting be approved as distributed.

ENERGY STUDY

Overview of Energy and the Energy and Environmental Research Center

Mr. Gerald Groenewold, Director, Energy and Environmental Research Center (EERC), gave a presentation on activities of the center and global, national, and regional perspectives, challenges, and opportunities in energy. He said the research at the EERC is market-driven and does not receive any direct state-appropriated funding. He said two-thirds of the increased production in oil from 2002 to 2005 came from the area of the former Soviet Union. He said mandated carbon dioxide (CO₂) capture and sequestration may make coal gasification the least cost method. He said although coal-to-liquids can be competitive with oil at \$40 to \$50 a barrel, it would take approximately 8 to 10 years to build a facility. He said natural gas should be a chemical feedstock and not used for electrical generation. He said CO₂ is a resource that may be used for enhanced oil and gas production and as a versatile solvent. He said the EERC's Plains CO₂ Reduction Partnership (PCOR) is working on CO₂ sequestration. He said using current agricultural methods, 15 billion gallons of corn ethanol per year may be sustained. He said for over 15 billion gallons per year, there needs to be genetic

breakthroughs or cellulosic ethanol. He said the United States currently produces approximately 5.6 billion gallons of corn-based ethanol per year. He said renewables will play a significant role in energy policy. He said renewables can provide energy security. He said wind requires 100 percent backup and tax credits to be economical. A copy of his presentation is attached as [Appendix B](#).

In response to a question from Senator Horne, Mr. Groenewold said the state of Kansas did not allow cooperatives to build power plants in that state because of concerns about global warming.

In response to a question from Representative Skarphol, Mr. Groenewold said the EERC has technology that will provide for zero or near zero emissions from a coal-powered power plant. He said this technology is very expensive.

Mr. Chris J. Zygarlicke, Deputy Associate Director for Research, Energy and Environmental Research Center, answered questions for the committee. In response to a question from Senator Taylor, Mr. Zygarlicke said most ethanol plants do not provide the volume of CO₂ needed for enhanced oil recovery. He said six cellulosic ethanol plants have been funded by the federal government and should be running in three to four years. He said there are a few cellulosic ethanol plants in the demonstration phase.

Mr. John Harju, Associate Director for Research, Energy and Environmental Research Center, answered questions for the committee. In response to a question from Representative Klein, Mr. Harju said the Dakota Gasification Plant provides 240 million cubic feet of CO₂ per day. He said the typical ethanol plant produces 8 million cubic feet of CO₂ per day from fermentation and 10 million cubic feet per day from the combustion of fuel to run the plant. He said the economics of a pipeline require one million cubic feet of CO₂ for each mile of pipeline.

In response to a question from Representative Skarphol, Mr. Groenewold said each gallon of corn-based ethanol requires three gallons of water. He said this is wastewater that is not consumed but released.

In response to a question from Senator Horne, Mr. Groenewold said energy security will require a mix of energy sources. He said both renewables and fossil fuels are part of that mix. He said renewables may provide 20 percent to 25 percent of the energy in

the United States by 2030. He said grain ethanol has almost reached its limit for production.

In response to a question from Senator Urlacher, Mr. Groenewold said hydrogen can be produced easily; however, there are not enough automobiles available that use hydrogen for a reasonable price. He said the acceptance of hydrogen as a fuel is more important than the ability to produce hydrogen. He said if Saudi Arabian oil becomes unavailable, hydrogen will become a more-used energy.

In response to a question from Senator Andrist, Mr. Groenewold said the entire world needs to participate in CO₂ sequestration and reduction for meaningful CO₂ management.

Tour

Mr. Zygarlicke and Mr. Michael Holmes, Deputy Associate Director for Research, Energy and Environmental Research Center, provided a tour of the center. The committee visited the different laboratories and viewed present experiments and studies at the center.

Coal

Mr. Thomas A. Erickson, Associate Director for Research, Energy and Environmental Research Center, gave a presentation on the future of coal in North Dakota. He said coal produced 50.8 percent of the electric power in the United States in 2003. He said North Dakota contains an estimated 25 billion tons of economically minable coal. He said this is enough coal to last over 800 years at the present mining rate. He said lignite's positives include high reactivity and low mining costs. He said the major topics affecting coal on a national basis relate to greenhouse gases and water and in North Dakota the major issue is transmission. He said it is interesting that although there are entities willing to pay for transmission, nobody wants to be responsible for it. He said conventional coal power generation is second only to agriculture as the largest user of water in the United States. He said future coal gasification systems can be built to produce three energy sources--electricity, liquid fuel, and hydrogen. A copy of his presentation is attached as [Appendix C](#).

In response to a question from Representative Klein, Mr. Erickson said natural gas is used for peaking loads and backup power so much that it can be considered a base load. He said the United States is not replacing the nuclear infrastructure and the nuclear infrastructure is quite old.

In response to a question from Representative Klein, Mr. Erickson said the EERC is exploring technology for drying coal. He said it is difficult to control drying coal in a pile. He said the drying of coal has to be done in a controlled manner.

In response to a question from Representative Kelsh, Mr. Erickson said the amount of mercury naturally occurring dwarfs the amount of mercury that is emitted by coal-fired power plants. He said the increase in fish advisories is due to the better

analytical techniques used to measure mercury. He said the benefit in eating the selenium in fish outweighs the harm of mercury in most fish.

In response to a question from Senator Wardner, Mr. Erickson said the gases from a typical gas-fired power plant would fill the Houston Astrodome in one hour. He said this amount may be represented by 30 billion Ping-Pong balls. He said removing the mercury is like removing those Ping-Pong balls in one hour and collecting 30 of those balls that represent mercury. He said all the mercury that is emitted by coal-fired power plants in one year would fit in a Chevrolet Suburban.

In response to a question from Senator Horne, Mr. Erickson said mercury causes problems with mental development and birth defects. He said the release of mercury by coal-fired power plants could produce a mild decrease in the mental faculties of individuals. He said these individuals would get the mercury into their system through eating fish, not breathing the air.

In response to a question from Senator Andrist, Mr. Erickson said if Minnesota taxes power that is not green, this places an extra burden on power plants in North Dakota. However, he said, if Minnesota holds everyone to the same standard, this will increase power production in North Dakota because there are very few places besides North Dakota to sequester CO₂.

In response to a question from Representative Skarphol, Mr. Erickson said although Minnesota may collect tax from people in another state, North Dakota will be able to charge people in another state for the CO₂ sequestration.

CO₂ Reduction and Sequestration

Mr. Harju made a presentation on CO₂ reduction and sequestration. He said the current concentration of CO₂ in the atmosphere is around 380 parts per million. He said there were 250 parts per million in preindustrialized days. He said assuming a business-as-usual scenario, children born today will see levels of 1,000 parts per million before they die. He said the population has quadrupled and energy consumption has increased 16 times in the 20th century. He said greenhouse gas emissions may be reduced through renewable energy technologies, advanced high-efficiency energy systems, improved efficiency on existing systems, reduced consumption of energy, and sequestering of greenhouse gas emissions. He said the PCOR partnership includes nine states and four provinces and has over 70 partners representing public agencies, utilities, oil and gas companies, engineering firms, associations and nonprofit organizations, and universities. He said the partnership is in the first phase and is trying to gauge public understanding, develop data bases, identify sequestration opportunities, conduct public outreach campaigns, and develop an action plan. He said the goal of the Williston Basin test is to validate the sequestration of CO₂ in deep carbonate oil reservoirs

using cost-effective monitoring, mitigation, and verification approaches. He said the goal of the Zama Project is to validate the sequestration of CO₂ rich acid gas in a deep depleted oil reservoir. He said the goal of using CO₂ in lignite is to determine the feasibility of simultaneously sequestering CO₂ and producing natural gas from a lignite coal seam. He said the goal of the prairie potholes wetlands and grasslands project is to validate and quantify carbon sequestration potential in the prairie potholes wetlands and grasslands. A copy of his presentation is attached as [Appendix D](#).

In response to a question from Senator Andrist, Mr. Harju said historically CO₂ has increased when the temperature of the earth has increased. He said the increase in CO₂ may be attributed to volcanic periods, the cycle of the earth around the sun not being perfectly elliptical, or some other reason.

In response to a question from Representative Skarphol, Mr. Harju said when it is warmer and there is more CO₂, there is more vegetation which is a means of reducing CO₂. He said cooler weather allows more CO₂ to be dissolved into the ocean.

In response to a question from Representative Skarphol, Mr. Harju said PCOR has not been aggressive in targeting particular companies but has approached all companies in unison.

In response to a question from Representative Klein, Mr. Harju said Farmers Union carbon credits are related to CO₂ reduction but do not have a direct economic relationship.

In response to a question from Senator Andrist, Mr. Harju said there are winners and losers in global warming. He said economic prosperity correlates to better temperatures. He said last year the *Farmers' Almanac* had a story on the winners and losers of global warming.

In response to a question from Representative Skarphol, Mr. Harju said acid gas is a byproduct of sweetening natural gas.

In response to a question from Senator Horne, Mr. Harju said CO₂ may be used to displace methane gas in coalfields. He said this method would be used in areas where there is unminable coal.

In response to a question from Senator Wardner, Mr. Harju said there are nine taps on the CO₂ pipeline in the western part of the state and there is the possibility of adding six million cubic feet of CO₂ per day to the pipeline.

In response to a question from Representative Skarphol, Mr. Harju said because of carbon sequestration, the mineral owner will receive more money because there will be more oil produced. He said there is uncertainty to the storage rights.

In response to a question from Representative Meyer, Mr. Harju said the partnership is looking at storage rights and liability issues. He said there are some draft state regulations and model statutes. He said the first step in drafting a statute is to look at what is done for natural gas storage. He said the liability issues may be addressed with a fund like the orphan

well fund. He said the Industrial Commission drafted rules that were withdrawn.

In response to a question from Representative Skarphol, Mr. Harju said the CO₂ intensity in the United States has been decreasing for the last 100 years. He said intensity recognizes that the energy is linked to wealth and CO₂ relates to gross national product.

Enhanced Oil Recovery

Mr. Harju gave a presentation on enhanced CO₂ oil recovery opportunities. He said North Dakota is ideally located to lead in using CO₂ for enhanced oil recovery because of the coincident coal and oil resources. A copy of his presentation is attached as [Appendix E](#).

In response to a question from Senator Taylor, Mr. Harju said there is inadequate data as to the effectiveness of using CO₂ for enhanced oil recovery in horizontal wells.

In response to a question from Senator Andrist, Mr. Harju said there has been interest in using CO₂ for oil recovery in Bakken wells. He said CO₂ has been used in fracture jobs. He said an oil well removes 12 percent to 15 percent of the oil in the initial phase. He said another 12 percent to 15 percent may be removed through a water flood. He said water floods may not work in Bakken wells because they may push oil back into the rock.

In response to a question from Senator Urlacher, Mr. Harju said CO₂ may provide another 13 percent of oil in the ground. He said there has been more oil left in the ground than has been produced from oil wells.

In response to a question from Senator Horne, Mr. Harju said how much oil is in an area of a well may be determined from core samples and geophysical data.

In response to a question from Representative Skarphol, Mr. Harju said that CO₂ has not been used for fracture jobs in this state because of the lack of availability.

In response to a question from Representative Meyer, Mr. Harju said some CO₂ used for oil recovery comes out with the oil. He said the oil that comes out of the well is less viscous than the oil in the reservoir.

In response to a question from Representative Skarphol, Mr. Harju said reclaiming the CO₂ used in enhanced oil recovery is essential to the financials. He said CO₂ costs \$1 per thousand cubic feet and this may cost \$80,000 per day. He said the CO₂ and water has to be removed from the oil regardless of whether the CO₂ is used again. He said recleansing natural gas from CO₂ is very expensive.

In response to a question from Senator Urlacher, Mr. Harju said over time oil has been getting heavier and heavier. He said heavier means sulfur-poor and hydrogen-poor.

Renewable and Alternative Fuels

Mr. Zygarlicke gave a presentation on the opportunities and challenges associated with wind

energy, biopower, alternative fuels, and other renewable energy forms. He said current United States-installed wind capacity is 1 percent of the total energy in the United States. He said with aggressive growth, this number could reach 5 percent by 2020. He said North Dakota is ranked first for wind resources. He said the United States has little incentive for large utilities cofiring with biomass. He said utilities need supply guarantees, low financial risk, and bottom-line profits that biomass does not provide. He said the collocation of ethanol plants at power stations could provide lower production cost for both the ethanol plant and the power plant. He said ethanol plant residues are primarily lignin and this could provide 10 percent to 15 percent of the coal in a 500-megawatt pulverized coal-fired coal boiler. He compared the costs of biofuels on a British thermal unit (BTU) basis with gasoline. He reviewed energy, biomass feedstocks, biopower, corn ethanol, cellulosic ethanol and integrated biorefinery, other renewable energy forms, and renewable hydrogen. A copy of his presentation is attached as [Appendix F](#).

In response to a question from Senator Urlacher, Mr. Zygarlicke said there is a cottage community of Californians in Montana that are very sensitive to environmental concerns.

In response to a question from Senator Tollefson, Mr. Zygarlicke said not having long-term subsidies is a major deterrent to wind development. He said the public is willing to pay more for wind energy.

In response to a question from Senator Wardner, Mr. Zygarlicke said the price of ethanol generally follows the price of gas at the retail level.

In response to a question from Representative Skarphol, Mr. Zygarlicke said ethanol is subsidized at 51 cents per gallon. He said there is a subsidy for capital investment in ethanol plants. He said biodiesel is subsidized \$1 per gallon which follows the production tax credit for wind. He said the subsidies for gasoline are difficult to figure.

In response to a question from Senator Taylor, Mr. Zygarlicke said over 50 percent of the passenger vehicles in Europe are biodiesel-based because of country-by-country mandates.

In response to a question from Senator Urlacher, Mr. Zygarlicke said switchgrass would require between four and five gallons of water for a gallon of cellulosic ethanol.

In response to a question from Representative Weiler, Mr. Zygarlicke said to have enough biomass for 600 billion gallons of ethanol per year, the residue from crops could be used.

In response to a question from Senator Andrist, Mr. Zygarlicke said a subsidy of approximately \$2.50 per gallon would be required for cellulosic ethanol to be competitive at the present cost.

In response to a question from Senator Urlacher, Mr. Zygarlicke said the cellulosic feedstock would compete with feedstock for cattle, e.g., wheat straw. However, he said, there would be competition for the land to plant mixed grasses instead of food for people.

In response to a question from Senator Urlacher, Mr. Zygarlicke said conservation reserve program land is approximately 10 percent of the tilled land nationally. He said it is not near being 200 million acres.

In response to a question from Representative Klein, Mr. Zygarlicke said the six locations for the federal cellulosic ethanol plants will be California, Georgia, Kansas, Idaho, Florida, and Colorado.

Distributed Energy

Mr. Darren Schmidt, Research Manager, Energy and Environmental Research Center, made a presentation on distributed energy. He said distributed energy, cogeneration, combined heat and power, and trigeneration are terms to describe opportunities to utilize local fuels and create value for the energy consumer while simultaneously enhancing the domestic ability to create energy in a market with a growing demand. He said there is potential for distributed energy in North Dakota with the associated gas in oilfields, solid fuel-fired heating opportunities for schools, wind, and biomass. He said a truss plant in Grand Forks generates electricity out of sawdust and scrap lumber. He said the energy is generated from a small power plant that is a microgasification plant that gasifies wood so that it can fire in a generator. He said there are opportunities in the oilfields and gas fields, in forests, in landfills, with agricultural processing residue, with state-owned boilers, with conservation reserve program land and energy crops, and with the distributed production of alcohols, ammonia, and other valued chemicals. A copy of his presentation is attached as [Appendix G](#).

In response to a question from Senator Taylor, Mr. Schmidt said there are many difficulties in burning the methane from the vents of a feedlot barn. He said a covered manure pit would produce approximately 70 percent methane.

In response to a question from Senator Horne, Mr. Schmidt said some electricity plants fire tire residue.

In response to a question from Representative Skarphol, Mr. Schmidt said there are two 60-watt turbines using flare gas in North Dakota. He said one is located on the North Dakota side of the North Dakota-Montana border at Baker and one is at a Hess well by Newburg. He said the turbines are on the company's side of the grid in the oilfield.

No further business appearing, Chairman Wardner adjourned the meeting at 4:30 p.m.

Timothy J. Dawson
Committee Counsel

ATTACH:7