

MEETING MINUTES
LIGNITE RESEARCH COUNCIL
Thursday, May 14, 2020 - 1:30 p.m. (CT) via WebEx

LRC VOTING MEMBERS (or their authorized alternates) PRESENT:

Jason Bohrer – Lignite Research Council
Wade Boeshans – BNI Coal, Ltd.
Randy Christmann – North Dakota Public Service Commission
John Bauer – Great River Energy
Al Rudeck – ALLETE Energy (*Alternate W. Sawyer voted from ALLETE*)
William Sawyer – ALLETE Energy
Mark Hager – IBEW 11th District (ND)
Bryan Walther – North American Coal Company
Gerry Pfau – Minnkota Power Cooperative
Dave Glatt – North Dakota Dept. of Environmental Quality
Rita Faut – ND Farm Bureau
Ed Murphy – North Dakota Geological Survey
John Phillips – Coal Conversion Counties
Jay Skabo – Montana-Dakota Utilities Co.
Jeff Delzer, Representative – ND House of Representatives – District 8
Jay Kost – Falkirk Mining Company
Gavin McCollam – Basin Electric Power Cooperative
Brad Tollerson – Otter Tail Power Company
Don Hochhalter - North Dakota Department of Commerce
Charlie Gorecki - Energy & Environmental Research Center (EERC)
Rich Southwick – Great Northern Properties LP
Ray Holmberg, Senator – ND Senate District 17

OTHERS PRESENT:

Karlene Fine – North Dakota Industrial Commission
Mike Holmes – Lignite Research Council
Dave Allard – Lignite Energy Council
Angie Hegre - Lignite Energy Council
Jonathan Fortner – Lignite Energy Council
Andrea Pfennig- North Dakota Industrial Commission
Jeff Zueger – Midwest Ag Energy Group (presenter)
Adam Dunlap - Midwest Ag Energy Group (presenter)
Alex Azenkeng - Energy & Environmental Research Center (EERC) (presenter)

GUESTS:

Josh Stanislawski – Energy & Environmental Research Group (EERC)
Geoff Simon – Western Dakota Energy Association
Jason Ehlert – ND Building Trades Unions
Mark Strohfus – Great River Energy
Rudie Martinson – Primacy Strategy Group

I. CALL TO ORDER

Meeting called to order:

Lignite Research Council (LRC) Chairman, Jason Bohrer, called the LRC meeting to order at 1:38 p.m. (CT) on May 14, 2020 via WebEx conferencing.

II. APPROVAL OF MINUTES

Approval of November 14, 2019 LRC Meeting Minutes:

Bohrer asked for a motion to approve the minutes of the November 14, 2019, LRC meeting. Al Rudeck so moved; seconded by John Phillips. Motion carried.

III. PROGRAM FINANCIAL SUMMARY

Program Financial Summary:

Jason Bohrer shared the financial summary regarding the Lignite Research, Development and Marketing Program. (A copy of the financial summary is available in the Lignite Research Program files.)

Jason Bohrer shared the 2019-2021 budget spreadsheet with the group. He reviewed the current outstanding commitments of \$33.1 million and a balance of \$16.4 million. Angie Hegre emailed the financial spreadsheet one week prior to the meeting to the LRC members so the group saw all the details provided by Karlene Fine.

When the audio issues were resolved, Karlene Fine re-emphasized the projected funds that were available in the Lignite Research Fund were \$16.4 million. She stated that at previous meetings it had been pointed out that \$10 million of the 2019-2021 biennium projected revenues would be coming from oil taxes. Even with the recent downturn in the oil industry she was hopeful those funds will be received although it will be later in the biennium than originally forecasted. She indicated that the Office of Management and Budget has not prepared a new forecast for the 2019-2021 biennium. When that forecast is complete, she will provide that information to the Council.

IV. LIGNITE RESEARCH, DEVELOPMENT & MARKETING PROGRAM UPDATES

Mike Holmes shared his appreciation for the group joining in the web-based format for this LRC meeting. He reminded the group of the importance of communication as the interaction is valuable and critical to the process of this meeting.

Holmes shared the priorities of the Research and Development (R&D) program. He stated the continued support to enhance performance of the existing fleet, continue to look at investment in informational research in next generation lignite conversion systems, focus on CO₂ capture, utilization and storage. He also shared leveraging international R&D breakthroughs and the priority of additional value propositions for lignite, including also polygeneration opportunities. Holmes requested the group reach out to him if they want further project information or detail.

Holmes emphasized the growth we continue to see in the Lignite Research Program (LRP) program since legislation passed in 1987 and there continues to be a strong partnership between private and public sectors. Industry continues to make plant and mine improvements, addresses carbon management challenges and opportunities, and develops emerging markets. The LRP has seen continued growth through the years with the recent increase in funding under Project Prairie Dog (House Bill 1066), which provides up to \$10 million of additional funding per biennium, on top of the traditional base funding for the program. Holmes shared this growth has allowed nearly \$59 million in recent projects, which include just under \$23 million from the LRP of which the majority are pre-commercial evaluations and a lot of them have a CCUS focus.

Holmes selected a couple projects to highlight to the committee that tailored to the projects being presented in this grant round. The first focused on ND geology for CO₂ storage under the Plains CO₂ Reduction Partnership (PCOR). This has been in the works for over a decade and a half. It was shared that the PCOR program laid the groundwork to identify and address potential barriers to utilization and storage of CO₂ in ND. He stated the LRP also co-sponsored a complimentary project under the DOE's CarbonSAFE program to provide a more detailed evaluation of CO₂ storage in saline formations. Holmes explained that these projects continue while targeting commercial-scale CO₂ capture and storage in ND as industry works toward application for storage facility permits from the state's Department of Mineral Resources (DMR).

The second project highlighted by Holmes was the Rare Earth Elements (REE) that are targeted as an emerging market for lignite. He shared that there is a diverse range of R&D projects under the LRP that include development of emerging markets. Holmes relayed that ND has always been a leader in value-added used for coal (i.e. fertilizers, leonardite, activated carbon, etc.) and is engaged in a domestic effort to develop technologies focused on REE's and critical elements from coal and coal-related feedstocks.

Holmes went on to talk about Carbon Capture Utilization and Storage (CCUS) projects that are moving forward. He shared that CCUS technology has led to commercial interest in CO₂ capture from ND power plants. He also talked about CO₂ being used for Enhanced Oil Recovery (EOR) in the Williston Basin while stored in the geology or stored in saline formations. EOR showing double benefit of extending the life of plants and providing CO₂ for producing more oil from wells that are nearing the end of economic viability without EOR.

Mike Holmes reminded the group that if they are interested in further information on any of the projects, to contact Angie Hegre and that information can be easily provided.

V. GRANT ROUND XCII (92) APPLICATIONS

Grant Round Application LRC-XCII (92)

- **LRC-XCII (92) A: Laboratory-Scale Coal-Derived Graphene Process**
Submitted by: Energy and Environmental Research Center (EERC);
Request for: \$162,500; Total Project Costs: \$931,564;
Principal Investigator: Alexander Azenkeng; Project Duration: 36 months

Holmes shared the proposed project, submitted by the Energy & Environmental Research Center (EERC), which seeks to develop a technological process for converting North Dakota (ND) lignite and other U.S. coals into high-value solid carbon products such as graphene for use in multiple applications. The scope of work will also include an economic feasibility analysis and analysis of product target markets and technology gaps for scale-up or commercialization.

Holmes said that the three technical peer reviewers gave the proposal an average weighted score of 223.3 out of 250 points with very favorable reviews and comments. The weighted score was 225 out of 250 points from reviewer 22-01, 227 out of 250 points from reviewer 22-02, and 218 out of 250 points from reviewer 22-03. Technical peer reviewers 22-01, 22-02, and 22-03 all recommended to **fund** the project.

As the Technical Advisor for this project, Holmes recommended **fund** based on the three very positive technical reviewers' feedback. The project would focus on developing an additional use for North Dakota lignite (graphene). This would help address emerging markets which is a primary focus of the lignite industry R&D Roadmap. The project would represent a strong leveraging of our Lignite Research Program investment with an ask of \$162,500 out of a total project cost of \$931,564.

Holmes shared that funding would be subject to the Technical Advisor participating in project reviews and reviewing the project management plan with the project team.

Holmes said that EERC and North American Coal have conflicts of interest on this project.

Alexander Azenkeng, Energy and Environmental Research Center (EERC), presented on behalf of the applicant. (A copy of his Power Point presentation is available in the LRP files.)

- **LRC-XCII (92) B: Drill Stratigraphic Test Well & Determine Feasibility of Central ND Geology to Safely and Permanently Store Carbon Dioxide**
Submitted by: Midwest AgEnergy Group;
Request for: \$3,388,000; Total Project Costs: \$6,956,000;
Principal Investigator: Jeff Zueger; Project Duration: 12 months

Holmes described the intent of this proposed project is to provide critical information about central North Dakota geology as required to demonstrate the capacity for long term storage of carbon dioxide (CO₂). Midwest AgEnergy Group along with its partners have been studying the feasibility of CO₂ storage in the vicinity of the Blue Flint Ethanol plant near Underwood, ND. Several feasibility-level projects have been completed with results indicating very strong potential for sequestration in the vicinity of the plant. The intent of this phase of the project is to complete a stratigraphic test well. Drilling this well will enable collection of core samples of the formations currently believed to be suitable injection zones. The data collected from the test well will provide the final pieces of information needed to model and simulate CO₂ storage with a high degree of accuracy and confidence. Results of the project are expected to clearly define the porosity and permeability of target formations and their capacity to safely sequester CO₂.

Holmes said that the three technical peer reviewers gave the proposal an average weighted score of 218.3 out of 250 points. The weighted score was 213 out of 250 points from reviewer 22-04, 210 out of 250 points from reviewer 22-05, and 232 out of 250 points from reviewer 22-06. Technical peer reviewer 22-04 recommended **fund** and technical peer reviewers 22-05 and 22-06 both recommended **funding may be considered** for the project.

As the Technical Advisor for this project, Holmes recommended **funding may be considered** based on the three technical reviewers' feedback and review. Holmes stated one of the reviewers recommended **funding**, and two recommended that **funding may be considered**. The proposal and all of the elements received good scores and mostly good comments from the reviews. The proposal received an average score of 218.3 out of 250 in the review process. The proposed project focuses on the geologic storage of CO₂ adjacent to the Coal Creek Energy Park. While their near-term target is to ready the site for storage of CO₂ from ethanol, the information would as a minimum provide indirect benefits toward facilitating commercial CCUS for ND lignite which is a primary focus of the roadmap. Questions and concerns from the reviewers focused mostly on the direct value to North Dakota lignite. Comments included that there doesn't appear to be direct involvement of the lignite industry, a question about the direct benefit to the lignite industry, uncertainty on the amount of lignite impacted, and the potential effect of uncertainty at Coal Creek Station. Responses to these questions will be provided by the project team and should be considered in the vote.

Holmes shared that funding would be subject to the Technical Advisor participating in project reviews and reviewing the project management plan with the project team.

Holmes said that EERC, GRE and North American Coal all have conflicts of interest on this project.

Jeff Zueger and Adam Dunlop, Midwest AgEnergy Group presented on behalf of the applicant. (A copy of his PowerPoint presentation is available in the LRP files.)

John Bauer of GRE commented on the value. He stated this project is important to the possible sale of Coal Creek Station. Bauer stated when he spoke with some potential buyers back in January, they were interested in continued research in this area. He shared that this project continuing and understanding the geology below Coal Creek/Blue Flint area is important. Secondly, Bauer said in the previous presentation on Graphene it was mentioned that heat would be needed for that process, so if we would continue mining coal and Falkirk doing Graphene there would be knowledge then to sequester CO₂ from that heat stream. He stated it would likely be coal, because why bring in gas or something to produce Graphene when you have coal there.

Jason Bohrer said he thinks we are all on the same page right now in wanting to get to a place where Coal Creek continues to operate and continue to use that lignite and it continues to play a part in the regional economy and that justification is supported by this project. Bohrer stated it's hard to quantify the amount of incremental value this adds or how this will facilitate a sale but it's indisputable that this project does increase the value of CCS and increases the likelihood of transfer ownership while at the same time beginning to develop a CO₂ economy which can't happen soon enough for the coal industry.

Charlie Gorecki, EERC, shared he did manage the PCOR partnership program for the last several years and it is an area that they have evaluated from a perspective of logs, existing wells in the area. He said he does not have any direct evidence of the geology in this specific area. He shared it is important to get site specific data in order to adequately understand the geology suitability for injection.

Representative Delzer called Bohrer and asked him to relay to the group that he is in favor of this project.

Commissioner Christmann asked Dunlap when the seismic surveys were done at the mine. Dunlap responded the first survey was done last summer as a source test and 2D line. It was a 4-mile line west of CCS on Falkirk mine property. He also indicated that this past winter a 9.5-mile 3D seismic event was completed around Coal Creek and BlueFlint. The field work component was completed this last December/January. The collected high-quality information is now in the hands of EERC to develop locations.

Next, Commissioner Christmann asked Dunlap if we are aiming for a storage area where the CO₂ can be readily recovered for enhanced oil recovery or is this more of a saline type formation, where it is more of a disposal rather than a utilization and storage project. Dunlap responded that they view this project as permanent sequestration so the CO₂ would not be able to be recovered and utilized in another purpose.

Commissioner Christmann asked if the information that would be obtained from this project would include any new types of information that wasn't acquired in Oliver, Mercer Counties over the years or is there a distinction for this area. Dunlop responded likely similar information was gathered at other locations, but this would be unique because of its location. Gorecki shared the prime target in Stark, Mercer near Center and Beulah is the Broom Creek formation which is not the prime target in this location. He stated the geology varies widely being 50+ miles apart from those locations and there is substantial different geology. Gorecki stated it is necessary in order to have a permit that you have core and measurements from the area in which you are going to store. Gorecki shared that this information is needed in order to get a permit for this injection project.

Jay Kost from Falkirk Mine asked Dunlop what are the next steps if the well is successful to sequester the carbon and will there be any more grant requests between now and then or will this be the last one. Dunlop responded what they proposed was that they would drill the well and then temporarily abandon it. Dunlop shared there is a method where you can partially finish the well so that it can be used for a future purpose. He said you are not putting all the components in the well but you are putting it in a condition where it is safe. He shared their intent would be to go through the data and ascertain, if we followed this plan, what formation is the best target and what zone should be finished for injection. The intent would be if everything fell in place they would come back at some point and complete this well as an injector or potentially a long term well, but we are targeting it as an injection well. There is a little extra cost that goes into that process as part of this project, but not near the cost if you completed the entire well. Dunlop stated that in regards to the question of whether they anticipate coming back to this committee

for additional grants – he said, we view further funding as project implementation and are counting on our equity partners to move finishing and completing a well and concurrently they would be doing all the other things he didn't talk about in this study in terms of the permitting and completion of the design and the capital construction component of the capture compression and dehydration units adjacent to BlueFlint.

Next, Jay Kost asked Dunlop if this well became a well sequestering CO₂ if there would be some long-term benefits to watch how successful it was over a 3, 5, or 10 year period. Dunlop shared that Midwest AgEnergy could be the tip of the spear doing something that has never been done commercially in ND but he said he knows there are other folks also advancing this, but whatever happens on this project there is going to be a lot of long-term lessons that can be valuable to others.

Kost asked Dunlop from a financial standpoint if the well is successful, but Coal Creek Station is not operating at that time would BlueFlint consider reimbursing the Industrial Commission or would the benefits of the study warrant not having to reimburse those funds. Dunlop shared how this study is critical to the lignite industry and so to reimburse the Commission for information we have gathered and delivered and wasn't sure how that can be justified and accomplished. Jeff Zueger added that they hope CCS continues operations more than anybody. He stated they rely on it for thermal energy, water, and all of their utility infrastructure short of electricity. Zueger said unfortunately they are not sitting at the table for those long-term discussions of Coal Creek operations so it is a bit out of their control what happens to CCS. Zueger went on saying this project is valuable information both to the asset of Coal Creek and the lignite resources in that area and we hope it can unlock long term, continued use of those resources in that area.

Kost shared as an outside observer of this project the organization, overcoming of obstacles with timing, notifications, approvals and collaboration has been second to none by Midwest AgEnergy.

Wade Boeshans asked if approved, would this be funded through the Lignite Research Fund or the Advanced Energy Technology (AET) funding. Mike Holmes responded it would be the Advanced Energy Technology funding portion of the Lignite Research Program Fund. Boeshans commented it is hard to see the future of coal without carbon capture. He said while it is difficult not knowing the future of CCS, there is certainly indirect benefits as he sees this project and the industry moving forward. Boeshans stated he believes our agriculture and all of the energy industries are complimentary around the capture, sequestration and use of CO₂. He says that can't happen without 100% knowing how to do it and access to large amounts of CO₂. Lastly, Boeshans said the intent of the Advanced Energy Technology (AET) funding was to advance energy broadly, not just specifically lignite. He shared he felt this project fits squarely into that mission.

Commissioner Christmann complimented Midwest AgEnergy on what they were doing and recognized its importance. He also shared his admiration for the EERC and trust that geologists know what they are doing. Christmann suggested this did not fit in with the LRC and at the very least there probably ought to be a contingency like we did with Red Trail Energy years ago, where if the primary fuel source changed from anything other than ND lignite the money would

be returned. In that case they chose to go with natural gas and so they repaid that portion of the grant. Christmann shared maybe he would think differently with a refresher on the AET Fund, but he shared his concern with using lignite dollars to fund what he hopes would be a lignite beneficial plan, but based on the announcement of the ownership, he didn't think we could count on that for making decisions with this money.

Jason Bohrer said the AET funding is still funded with lignite coal taxes as well as some of those fund dollars that come in from the oil and gas "buckets". Those dollars are co-mingled to a certain degree so it's impossible to say where these dollars are originating from but Bohrer said he considers these to be lignite dollars and it was the intent when the AET funding was created that these are dollars created primarily from the lignite industry to benefit the lignite industry. Bohrer said they wound the Lignite Vision 21 program down and this was essentially the successor to that program and although we do get dollars from the Strategic Investment and Improvement Fund (SIIF) and the General Fund, Bohrer still considered these dollars primarily derived from lignite taxes.

Adam Dunlop raised his concern with sharing the data and information that would be useful to the lignite industry and the request to be refunded when you have already been delivered the information. In the event that we chose not to collaborate with lignite we would own all this data and not provide the information to lignite. He shared that he was just trying to understand how the provision would work.

Christmann shared that he is optimistic, hopeful and doing his part to help the plant go on, but the fact is that is not the announcement of the owner.

Bryan Walther shared he has the same concern that Christmann has. He shared that it could have a positive effect in the event that there is another buyer but with this opportunity it didn't seem to make a difference in the decision GRE made. Walther agreed there should be some type of contingency to advance lignite when you're looking at \$3 million in the event that there is no buyer.

A motion from Commissioner Christmann was made to direct Industrial Commission and Lignite Research Council resources to come up with claw back contingency containing language should the primary fuel source shift away from ND lignite in the next five years. John Phillips seconded the motion.

Jay Kost asked if it is a 100% claw back if Coal Creek shuts down or is it a different claw back if the well is not successful. Kost explained his measure of success is if the well is used to sequester carbon dioxide. Mike Holmes asked Kost if he was asking if the wording could be that there be a claw back if the facility is not operating on coal in five years and there is commercial storage of CO₂. Kost said that was correct and wasn't sure it reduces or eliminates the claw back.

Christmann acknowledged that there is some potential that this benefits lignite, and it helps get a buyer, and that's certainly a good thing. He stated the company is also putting their own money towards this as well so he wouldn't object to the claw back kind of have a double contingency.

One being the well be operational and the primary fuel source not be switched from lignite in the next five years at that point the \$3+ million would have to be repaid.

Zueger addressed the Council and stated he appreciated the significance of the dollar amount being requested but he wanted to point out that once we share the data and move forward with this project, the data shared can't be retracted. Zueger shared the spirit of this was to move carbon capture down the line and advance it in ND. He also shared the Coal Creek decision is entirely out of their hands, so it feels a bit far removed from their control.

Zueger asked if the Council if there could be a straight up vote on funding and then a secondary vote on whether a contingency should be required.

Bohrer asked Fine how the sequence works with this vote. Fine shared what they have done in the past when there has been contingencies added to the ballot is generally the contingency is voted on first; whether it should be included on the ballot and the vote include it, then the vote is on the project with contingency. If the roll call vote fails to include the contingency, then there is a vote just on the project without any contingency.

Chairman Bohrer stated the first order of business would be to conduct a roll call vote on the matter of adding the contingency. Fine agreed.

Bohrer stated the **motion** is to add a claw back should the well be successful and there be a fuel-switch in the next five years- that would require repayment. If the well were not successful, there would be no claw back and if there were no fuel-switch, there would be no claw back. Holmes asked that the caveat definition of successful means it's commercially viable enough that it is put to commercial use.

Roll Call Vote

Y	Jason Bohrer – Lignite Research Council
N	Wade Boeshans – BNI Coal, Ltd.
Y	Randy Christmann – North Dakota Public Service Commission
N	John Bauer – Great River Energy
N	William Sawyer – ALLETE Energy
Y	Mark Hager – IBEW 11 th District (ND)
Y	Bryan Walther – North American Coal Company
N	Gerry Pfau – Minnkota Power Cooperative
Y	Dave Glatt – North Dakota Dept. of Environmental Quality
Y	Rita Faut – ND Farm Bureau
N	Ed Murphy – North Dakota Geological Survey
Y	John Phillips – Coal Conversion Counties
Y	Jay Skabo – Montana-Dakota Utilities Co.
Y	Jay Kost – Falkirk Mining Company
Y	Gavin McCollam – Basin Electric Power Cooperative
Y	Don Hochhalter - North Dakota Department of Commerce
Y	Charlie Gorecki - Energy & Environmental Research Center (EERC)
Y	Ray Holmberg, Senator – ND Senate District 17

Roll call vote resulted in 13-yes and 5-no. Bohrer shared the process as now we will be voting to fund the project with the addition of the contingency language.

VI. 2020 CALENDAR

Bohrer announced that the next LRC meeting is scheduled for November 12, 2020. Bohrer reminded the group that the upcoming grant application deadline is October 1, 2020.

Voting: Due to the meeting being done in a WebEx format and not in person, there was two options for voting. A confidential email sent from a third-party voting site called Simply Voting was sent to the present voting members. The group also had the option to email Karlene Fine, ND Industrial Commission directly with their vote.

Adjournment: There being no further business, Bohrer requested a motion for adjournment of the LRC meeting at 4:40p.m. Wade Boeshans so moved; seconded Jay Kost. Motion carried.

GRANT ROUND XCII (92) Ballot Results: Jason Bohr announced (via email) following the meeting the results of the ballots concerning the LRC's recommendations to the NDIC regarding the Grant Round XCII (92) proposals as follows

LRC-XCII (92) A: Laboratory-Scale Coal-Derived Graphene Process

Submitted by: Energy and Environmental Research Center (EERC);

Request for: \$162,500; Total Project Costs: \$931,564;

Principal Investigator: Alexander Azenkeng; Project Duration: 36 months

Fund: 19 votes

Do Not Fund: 0 vote

Abstain: 0 vote

LRC-XCII (92) B: Drill Stratigraphic Test Well & Determine Feasibility of Central ND Geology to Safely and Permanently Store Carbon Dioxide

Submitted by: Midwest AgEnergy Group;

Request for: \$3,388,000; Total Project Costs: \$6,956,000;

Principal Investigator: Jeff Zueger; Project Duration: 12 months

A **contingency** has been added by roll-call vote that would require a 100% repayment of all state funds if the project is successfully/commercially operational and the project's fuel source is switched away from North Dakota lignite within the next five years.

Fund: 17 votes

Do Not Fund: 2 votes

Abstain: 0 vote

The North Dakota Industrial Commission meeting, when these recommendations will be considered, will be held on May 29, 2020.

Angie Hegre, recording secretary