MEETING MINUTES

LIGNITE RESEARCH COUNCIL

Thursday, August 15, 2019 1:30 p.m. (CT)

Ramada Bismarck Hotel (Judicial Room), Bismarck, ND

Lignite Research Council Members (or their authorized alternates) PRESENT:

Jason Bohrer – Lignite Energy Council (LEC) via WebEx
Julie Fedorchak – North Dakota Public Service Commission
Wade Boeshans – BNI Energy
John Bauer – Great River Energy
William Sawyer – ALLETE Energy
Mark Hager – IBEW 11th District (ND)
Brad Erickson – North American Coal Company
Don Hochhalter – North Dakota Dept. of Commerce
Gerry Pfau – Minnkota Power Cooperative
Jay Kost – The Falkirk Mining Company
Dave Glatt – North Dakota Dept. of Environmental Quality
Rich Southwick – Great Northern Properties
Charlie Gorecki – Energy & Environmental Research Center (EERC)
Rita Faut – ND Farm Bureau
Ned Kruger – North Dakota Geological Survey
John Phillips – Coal Conversion Counties
Kelly Dolbec – Otter Tail Power Company
Jay Skabo – Montana-Dakota Utilities Co.
Gavin McCollam – Basin Electric Power Cooperative

OTHERS PRESENT:

Mike Holmes – Lignite Research Council
Dave Allard – Lignite Energy Council
Angie Hegre- Lignite Energy Council
Karlene Fine – North Dakota Industrial Commission
Andrea Pfennig - North Dakota Industrial Commission
Bruce Browers – Barr Engineering Co. (presenter)
Nicole Nguyen – Barr Engineering Co. (presenter)
Lai Kuku – Millenium SynthFuels
David Stadem – Microbeam Technologies, Inc.
Jonathan Fortner – Lignite Energy Council
Jonathan Russo – North Dakota Department of Commerce
Junior Nasah – Institute of Energy Studies, UND
Michael Mann – Institute of Energy Studies, UND
Nolan Theaker - Institute of Energy Studies, UND (presenter)
Srivats Srinivasachar - Envergex
Teagan Nelson – Envergex
Xiaodong Hou - Institute of Energy Studies, UND
Reice Haase – Office of the Governor

Meeting called to order:
Lignite Research Council (LRC) Chairman, Jason Bohrer, called the LRC meeting to order at 1:35 p.m. (CT) on August 15, 2019 at the Ramada Inn, Bismarck, North Dakota.

Approval of November 15, 2018 LRC Meeting Minutes:
Bohrer asked for a motion to approve the minutes of the November 15, 2018 LRC meeting. John Bauer so moved; seconded by Jay Skabo. Motion carried.

Program Financial Summary:
Karlene Fine gave a financial summary regarding the Lignite Research, Development and Marketing Program.

Fine stated the Lignite Research Program cash balance for the 2017-2019 biennium financial statement had a beginning balance of $21.4 million on July 1, 2017. Revenues that came in and expenditures over this two-year period as of June 30, 2019 was $29.7 million. She reviewed the current outstanding commitments which total $24.3 million for ongoing projects. If all were completed, we would have a cash balance of $5.4 million. She stated revenues that came in for the biennium are $15.5. We had estimated $15.6 million. The income is based on coal production and came in a little less than projected. The direct General Fund appropriation has been expended.

Fine reviewed the 2017-2019 budget of $37 million, with commitments of $31.5 million. Leaving a balance to fund other projects around $5.4 million when considering applications today.

For the 2019-2021 financial statement the beginning balance is $29.7 million. Fine stated we haven't had any revenues or expenditures yet because the accounting reports for July have not come in yet. $4.5 million will be available to fund the projects presented before you.

Fine shared that there is sufficient funding should you desire to fund the projects being shared today.

Grant Round LXXXIX & XC (89 & 90)

LRC XC-B: Co-Production of Multiple High Value Solid Products from Lignite Coals

Submitted by: Institute for Energy Studies
Principal Investigator: Michael Mann
Project Duration: 36 months
Request for: $157,500; Total Project Costs: $1,064,625

Holmes described the project as UND in collaboration with Clean Republic LLC, Microbeam Technologies, Inc. and Barr Engineering Co. proposing to develop a synergic process to co-produce multiple high-value solid products from ND lignite coals, through integration of several successful projects performed at the UND Institute for Energy Studies (IES).

Holmes stated that the objective of the proposed work was to build on current efforts to produce a high-value ore containing >90% REE and other critical elements, leaving a clean lignite by-product. To utilize the clean lignite by-product to make a humic acid and developing two innovative processes to prepare advanced anode materials for Lithium-ion batteries from the lignite-derived humic acid. And finally, to determine the chemical and physical properties of the lignite extraction residue for use as a char or activated carbon.

Holmes said that the three technical peer reviewers gave the proposal an average weighted score of 198.0 out of 250 points. The weighted score was 187 out of 250 points from reviewer 20-01, 204 out of 250 from reviewer 20-02, and 203 out of 250 from reviewer 20-03. Technical peer reviewers 20-02, 20-03 and 20-04 all recommended to **fund** the project.

As the Technical Advisor for this project, Holmes recommended to **fund** the project with consideration based on responses to review comments by the project team in the written materials and the presentation. Holmes said the three reviewers recommend funding and targeting additional uses for our vast lignite reserves is a primary focus of the R&D roadmap. Holmes also stated the project would provide strong leverage of NDIC / Lignite Research Program funding (requesting 15% of the total). 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 North American Coal and BNI Energy has conflicts of interest for this project.

Nolan Theaker, Institute of Energy Studies, UND presented on behalf of the application.

LRC-XC-C: Rare Element Extraction and Concentration at Pilot-Scale from North Dakota Coal-Related Feedstocks
Institute for Energy Studies
Principal Investigator: Michael D. Mann
Project Duration: 30 months
Request for: $900,000; Total Project Costs: $6,508,555

Holmes described the project as a collaboration with UND, Microbeam Technologies Inc. (MTI), Barr Engineering Co., Rare Earth Salts (RES) and MLJ Consulting is proposing to demonstrate at the pilot scale its novel technology for rare earth element recovery from ND lignite coals.

Holmes stated that the objectives of this project include:

1) Confirm coal seams found within active North Dakota mines have elevated REE content and collect a large sample (300-500 tons) for further processing
2) Design and construct a pilot-scale facility for REE extraction
3) Use existing bench-scale system to optimize the conditions for the extraction
4) Verify REE product quality with downstream REE refiners (RES) and reduce potential costs and time-to-market associated with coal-related REE materials.

Holmes said the expected technical and economic impacts are the following:

1) Develop a low-cost, environmentally friendly REE concentrate from ND lignite feedstocks
2) Verify scalability of the process proven at the bench scale and develop a baseline for future commercial demonstration
3) Perform rigorous economic modeling equivalent to a preliminary Front End Engineering Design for evaluation of the technology at a potential commercial demonstration site.

Holmes said that the three technical peer reviewers gave the proposal an average weighted score of 213.3 out of 250 points. The weighted score was 204 out of 250 points from reviewer 20-04, 221 out of 250 from reviewer 20-05, and 215 out of 250 from reviewer 20-06. Technical peer reviewers 20-05 and 20-06 recommended to **fund** the project. Technical peer review 20-04 responded with **funding may be considered**.

As the Technical Advisor for this project, Holmes recommended **fund** based on the three technical reviewer's feedback. The REE opportunity addresses new value added uses for lignite and the project is a strong leveraging of NDIC / Lignite Research Program funding. Two reviewers recommended funding and the third recommended funding be considered based on review of site planning, HAZOP review, and project plan reviews. Based on industry, State, and Federal interest in this REE opportunity, the fit within our R&D priorities, and the positive review results and comments, funding is recommended. 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 including, site planning, HAZOP considerations, and work/budget schedule breakout. Holmes said the for this and the first project Nolan presented, if we don't hear word back from the DOE by the time the Industrial commission meeting, the third contingency would be contingent upon receipt of the DOE cost share.

Holmes said that North American Coal, Great River Energy, Minnkota Power Cooperative, BNI Energy and Great Northern Properties all have conflicts of interest on this project.

Nolan Theaker, Institute of Energy Studies, UND presented on behalf of the application.

LRC XC-D: Mitigation of Alkali Promoted Ash Deposition and Emissions from Coal Combustion
Submitted by: Barr Engineering Co.
Principal Investigator: Nicole Nguyen
Project Duration: 36 months
Request for: $400,000; Total Project Costs: $4,999,412

Holmes described the project as Barr Engineering Co. is looking for ways to improve the operation and efficiency of power plants especially those with high alkali coals. He explained the way they are doing that is by addressing the aerosols and ways to capture the aerosols. In addition to those operating benefits, lower temperatures and better heat rate, it's also a way of preparing a coal-fired power plant upstream of adding CO_2 capture and so it has that added benefit as well. While Barr is providing a significant project management and engineering

support role for the project, the genesis of this technology concept lies with coal combustion expertise held with Microbeam Technologies Inc., Envergex, the University of North Dakota Institute for Energy Studies (UND-IES), and MLJ Consulting.

Holmes said that the three technical peer reviewers gave the proposal an average weighted score of 232.7 out of 250 points. The weighted score was 236 out of 250 points from reviewer 20-07, 239 out of 250 from reviewer 20-08, and 223 out of 250 from reviewer 20-09. Technical peer reviewers 20-07, 20-08 and 20-09 all recommended to **fund** the project.

As the Technical Advisor for this project, Holmes recommended **fund** based on the three technical reviewer's feedback. Holmes stated that the project meets the R&D priority from the lignite industry's technology roadmap and has a very high leveraging of the investment. The targeted improvements relate to operation and efficiency as well as would work as a precursor to improvements in carbon capture. The proposal received a very high review score and would provide a strong leveraging of NDIC / Lignite Research at a ratio of 1 to 11.5. 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 Minnkota Power Cooperative, Otter Tail Power and North American Coal all have conflicts of interest on this project.

Nicole Nguyen and Bruce Browers, Institute of Energy Studies, UND presented on behalf of the application.

LRC-LXXXIX (89)-A: "Enhance, Preserve and Protect, Research & Development, Environmental, and Transmission Planning Services" (July 1, 2019-December 31, 2022)
Lignite Energy Council
Principal Investigator: Michael Holmes
Project Duration: 42 months
Request for: $3,051,961

Fine shared six slides in the **public session**. Fine stated that while match for LRP funds is required by law, a portion may be used for projects without a match and this project does not have a match. The Enhance, Preserve and Protect Project (EPP) is seeking funding under that provision of the law.

Statute read by Fine: *"...Moneys appropriated pursuant to this section may...be used for the purpose of contracting for non-matching studies and activities in support of the Lignite Vision 21 Project; for litigation that may be necessary to protect and promote the continued development of lignite resources; for nonmatching externality studies and activities in externality proceedings; or other marketing, environmental, or transmission activities that assist with marketing of lignite-based electricity and lignite-based byproducts."*

Fine stated that this project falls in to that category and there will be no match dollars.

Fine shared the objective of the project was to build on previous work to preserve and protect the existing lignite fleet in ND. In addition to that, Fine shared the objective of the project was to employ and update Advanced Energy Technology (AET) Program, identify opportunities to enhance the future of the state's lignite resources, monitor regulatory policy that could jeopardize the future of lignite and be flexible and timely, working with industry and regulators to make the best use of lignite.

Fine shared opportunities already identified included Rare Earth Elements, utilizing excess process heat and CO_2 from power plants for greenhouses, developing carbon materials from lignite, using CO_2 for enhanced oil recovery, and developing technologies that can consume off-peak electricity for electric vehicles and data mining.

According to Fine, funding will allow for timely strategic studies to better understand the value of technology developments. Also, provide critical information on commercial potential of emerging markets and evaluate the economics associated with technologies and the impacts of outside factors on the industry and ND.

Fine spoke of development and implementation of R&D, environmental, legal and transmission strategies. Work with the ongoing AET Program partners. (Project Carbon and Project Tundra) Develop strategies and oversee legal activities regarding state and federal statutes and regulations. Participate in the planning processes focused on the development of new transmission infrastructure and other related transmission activities. John Weeda will be leading that effort.

Fine **concluded** noting the information that was shared on the web-site and that was available to the public. Fine said at **2:58pm that it was time to go into closed session.**

It was moved by Wade Boeshans and seconded by Rita Faut that under the authority of North Dakota Century Code Sections 54-17.5 and 44-04-18.4 the Lignite Research Council close the meeting to the public and enter executive session for the purpose of hearing and discussing the confidential portions of the Enhance, Preserve and Protect Project application. Motion carried.

Script read by Fine: *I remind the Council members and those present in the executive session that the discussion during executive session must be limited to the announced purpose for entering into executive session which is anticipated to last approximately 30 minutes. The Council is meeting in executive session to discuss the confidential portions of the EPP application and the related reviews. Any action by the Council will occur after it reconvenes in open session.*

The Council went into executive session at **3:07 p.m.**
Confidential application copies were distributed around the room.

During executive session the Council took up the following item:

LRC-LXXXIX (89): Enhance preserve and protect project, research & development, environmental and transmission planning services

Additional people present during Confidential Session outside of members/alternates:
Mike Holmes – Lignite Research Program
Dave Allard – Lignite Energy Council
Angie Hegre- Lignite Energy Council
Karlene Fine – North Dakota Industrial Commission
Andrea Pfennig - North Dakota Industrial Commission
Reice Haase – Office of the Governor
Jonathan Fortner – Lignite Energy Council

Approval to go back into regular session:
Bohrer asked for a motion to approve returning to open session. William Sawyer so moved; seconded by Don Hochhalter. Motion carried.

The Lignite Research Council meeting reconvened at **3:33 p.m.** and the public was invited to return to the meeting room.

2019 & 2020 Calendar
Bohrer announced that the next LRC meetings are scheduled for November 14, 2019 and May 14, 2020. Bohrer reminded the group that the upcoming grant deadlines are October 1, 2019 and April 1, 2020.

Ballot Results:

Mike Holmes announced the results of the ballots concerning the LRC's recommendations to the NDIC regarding the Grant Round LXXXIX & XC (89 & 90) proposals as follows:

Grant Round LXXXIX & XC (89 & 90)

- **LRC XC-B (90B): Co-Production of Multiple High Value Solid Products from Lignite Coals**
  Submitted by: Institute for Energy Studies; Principal Investigator: Michael Mann;
  Project Duration: 36 months; Request for: $157,500; Total Project Costs: $1,064,625

  Fund: 17 votes Do Not Fund: 0 vote Abstain: 1 vote

- **LRC-XC-C (90C): Rare Element Extraction and Concentration at Pilot-Scale from North Dakota Coal-Related Feedstocks**
  Submitted by: Institute for Energy Studies; Principal Investigator: Michael Mann;

Project Duration: 30 months; Request for: $900,000; Total Project Costs: $6,508,555

Fund: 17 votes Do Not Fund: 0 vote Abstain: 1 vote

- **LRC XC-D (90D): Mitigation of Alkali Promoted Ash Deposition and Emissions from Coal Combustion**
  Submitted by: Barr Engineering Co.; Principal Investigator: Nicole Nguyen;
  Project Duration: 36 months; Request for: $400,000; Total Project Costs: $4,999,412

  Fund: 16 votes Do Not Fund: 0 vote Abstain: 2 vote

- **LRC-LXXXIX (89)-A: "Enhance, Preserve and Protect, Research & Development, Environmental, and Transmission Planning Services" (July 1, 2019-December 31, 2022)**
  Submitted by: Lignite Energy Council; Principal Investigator: Michael Holmes;
  Project Duration: 42 months; Request for: $3,051,961

  Fund: 18 votes Do Not Fund: 0 vote Abstain: 0 vote

The North Dakota Industrial Commission meeting when these recommendations will be considered will be held on August 28, 2019.

Other Business: DOE is planning on coming currently October 2nd and 3rd and the NETL Director, Brian Anderson has agreed to be a keynote speaker at the Lignite Energy Council meeting on the 3rd. Tentatively we are looking at getting technical people together on the afternoon of the 2nd to hear what DOE is up to and present an overview of what we are working on.

Adjournment:

There being no further business, Bohrer requested a motion for adjournment of the LRC meeting at 3:44 p.m. Jay Skabo so moved; seconded Wade Boeshans. Motion carried.

Angie Hegre, recording secretary
