MEETING MINUTES

LIGNITE RESEARCH COUNCIL – GRANT ROUND 103

Thursday, November 9, 2023 - 1:30 p.m. (CT)

Bismarck State College – National Energy Center of Excellence Room #335

LRC VOTING MEMBERS PRESENT:

Jason Bohrer – Lignite Research Council, Chairman
Brenden Brinkman – Coyote Creek Mining Company
Jay Kost – The Falkirk Mining Company
Mike Heger – BNI Energy
Bryan Walther – North American Coal Company
John Bauer- Rainbow Energy Center
Jay Skabo – Montana-Dakota Utilities Co.
Charlie Gorecki – Energy & Environmental Research Center (EERC)
Ed Murphy – North Dakota Geological Survey
Randy Christmann – North Dakota Public Service Commission
Tom Oakland – North Dakota Commerce
Todd Porter – North Dakota House of Representatives
Dale Patten – North Dakota Senate
Bill Sawyer – ALLETE
Al Christianson – Nexus Line LLC
Joseph Heringer – Land Board
Rita Faut – North Dakota Farm Bureau

OTHERS PRESENT:

Reice Haase – North Dakota Industrial Commission
Brenna Jessen – North Dakota Industrial Commission
Mike Holmes – Lignite Research Council
Angie Hegre - Lignite Energy Council Jonathan Fortner – Lignite Energy Council
Kay LaCoe – Lignite Energy Council
Jim Sheldon – Basin Electric Power Cooperative
Brad Zimmerman – Otter Tail Power Company
Randy Bartsch – IBEW 11th District (ND)
Geoff Simon – ND Coal Conversion Counties Assoc.
John Weeda – Quail Hollow Consulting
Rep. Anna Novak – ND House of Representatives
Craig Bleth – Minnkota (presenter)
Claire Vigessa – NDTA (presenter)
Bill Easter – Semplastics EHC LLC (presenter)
Sue Easter - Semplastics EHC LLC (w presenter)

I. CALL TO ORDER

Meeting called to order:
Lignite Research Council (LRC) Chairman, Jason Bohrer, called the LRC meeting to order at 1:35 p.m. (CT) on November 9, 2023.

II. APPROVAL OF MINUTES

Approval of July 19, 2023, LRC Administrative Meeting Minutes:
Bohrer asked for a motion to approve the minutes from the above-listed meeting. Al Christianson so moved; seconded by Charlie Gorecki. Motion carried.

III. UPDATES

Program Management & Financial Report:

Reice Haase 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, and the meeting packet provided.)

During the committee's meeting, Haase presented a diagram outlining the Industries, Agencies, and Programs under the North Dakota Industrial Commission (NDIC), highlighting the changes made during the 68th Legislative Assembly. Notably, he drew attention to the recent inclusion of the IIJA Grid Resilience grant program. Furthermore, he emphasized the legislative-directed studies undertaken by the State Energy Research Center, alongside the ongoing research activities of the Oil and Gas Research Program and CSEA.

Haase announced that NDIC received legislative approval for two additional FTEs. One of which is Erin Stieg the new grant administrator, with her start date being December 4, 2023.

Haase displayed a high-level dashboard view summary of all the Industrial Commission-managed funds to the committee. Haase shared that the Lignite Research Fund availability as of November 9, 2023, is $1.8 million which is dollars available to commit to new projects. Haase shared that there is one project before the committee today with an ask of $100,000.

Haase brought forth to the committee the Lignite Research fund cash balance of $29 million with $25 million of that being outstanding project commitments. Haase also mentioned a one-time cost for grant management software, technical advisor expenses, and funds being held for litigation purposes.

For the Lignite Research Fund, Haase provided a cumulative view of the fund. Since the program's inception in 1987, 254 cumulative projects have been funded. Each of those projects bring private capital, private match back to the state of North Dakota. That private match has equaled $2.7 Billion project value that has been invested in the state of ND thanks to projects

approved through this program. Currently there are 28 active projects.

In addition, Haase shared the 2023-2025 biennium appropriation and forecasted income. Sharing a graphic showing the Lignite research fund money coming from the Coal Severance Tax, Coal Conversion Tax, Research Tax and formula funding from Oil Production and Extraction Taxes showing a total of $18.5 million through the course of the biennium.

The financial data was emailed before the meeting to the LRC members.

Carbon Capture & Utilization Education and Marketing Special Grant Round Update:
Haase shared that Section 10 of HB 1014 passed by the 68th Legislative Assembly included an appropriation of $300,000 "to contract for carbon capture and utilization education and marketing". The lignite research fund, oil and gas research fund, and renewable energy development fund have been directed to each contribute $100,000 to the effort. The Commission is directed to develop the contract in consultation with each of the fund's respective research councils. A combined special grant round would facilitate a thorough review of applications and would allow the Commission to efficiently consult with all three councils prior to considering a contract that would meet the legislative intent of HB 1014.
Haase suggested that the meeting with all three research councils would take place at the end of January or the beginning of February 2024.

IV. GRANT ROUND 103 APPLICATION

LRC-103A: High-Value Products from Produced Water Mineralization via Reaction with Anthropogenic CO_2
Submitted by: Semplastics EHC LLC
Request for: $100,000
Total Project Costs: $356,494
Principal Investigator: Walter Sherwood
Project Duration: 12 months

Holmes shared Semplastics is teamed with the EERC and requesting funding to perform a project focused on the production of building materials from produced water and CO_2. The objective is to develop and demonstrate a cost-effective method to mineralize sodium, lithium, and other elements in the brine while capturing and storing CO_2. The carbonates would be used to produce samples of building products such as panels, coated mixed carbonates in polypropylene, and sodium carbonate or other commercially useful sodium compounds. The request is for $100,000 from the lignite research program, with the balance from Semplastics for a total project cost of $356,494.

As the Technical Advisor for this project, Holmes recommended funding. He shared that the proposed project focuses on the development and demonstration of value-added products from lignite utilization while storing CO_2. This would be the first step of demonstrating the technology for producing additional building materials. Two of the technical reviewers

recommended funding while the third reviewer recommended funding may be considered. The proposal received an average score of 204 out of 250. The project provides good leveraging state funding by including roughly 72 percent of funding as commercial cost-share.

Holmes stated that funding be subject to the Technical Advisor participating in project reviews, the Technical Advisor reviews the project management plan with the project team.

Holmes stated conflicts of interest include EERC.

Bill Easter, Semplastics presented on behalf of the applicant. (A copy of their PowerPoint presentation is available in the LRP files.)

V. RESULTS

LRC-103A: High-Value Products from Produced Water Mineralization via Reaction with Anthropogenic CO_2
Submitted by: Semplastics EHC LLC

Fund: 15 votes
Do Not Fund: 1 vote
Abstain: 1 vote

Jason Bohrer asked for a motion to bring this recommendation forward to the North Dakota Industrial Commission. Al Christianson so moved, seconded by Jay Kost. Motion passed.

Holmes reminded the committee members that at the July Administrative meeting, he shared a full Research and Development progress report. He shared that he wanted to focus today on the Tundra FEED and Tundra CREST results and introduced Craig Bleth to the committee.

VI. Briefing on completed Tundra FEED and CREST studies

Craig Bleth, Minnkota Power Cooperative shared a PowerPoint presentation showing key outcomes of the FEED Study. Some of these findings were listed for the committee.

- Costs higher than targeted - need to reduce contingency through further study, and evaluation of cost-cutting options
- Ultrafine particulate can be managed effectively with a WESP, included in the FEED design
- Although the design basis was NG boilers, extracting steam was likely cheaper with less risk
- To enable EOR in the Foreman Butte Field a new pipeline and EOR infrastructure is required
    - Costs estimated at $300M and $160M respectively.
- Saline storage site characterization (CarbonSAFE)
    - Detailed characterization, including two seismic surveys and two stratigraphic test wells
    - Enabled two Class VI storage facility permit applications
    - Broom Creek and Deadwood Formations

Bleth continued to the CREST study that was proposed in February 2022. The project had several partners on board, including NDIC, Minnkota, and Fluor Enterprises. The total funding requested for the project was $10.8 million, but only $5.9 million was required to complete it. The NDIC was asked to provide $5.4 million initially, but only $2.9 million was utilized. Bleth shared with the group that the total funding used was significantly less than what was originally requested. Tasks and outcomes were shared with the group.

CREST Key Outcomes

- Task 1 – Project Management and Technology Transfer
- Task 2 – Steam Extraction Studies
    - Both Units - Completed the preliminary evaluations begun in FEED
    - Thermal modeling at various load temperatures, Integration of extraction parameters into Fluor process design
    - Evaluation of STG control systems and instrumentation, ensure safe operation in all operating scenarios
    - Sargent & Lundy – design of the steam delivery piping and condensate return system
    - No fatal flaws
- Task 3 – Aerosol Measurement in Support of Dual Flue Gas Supply - EERC
    - Previous efforts concentrated on characterizing Unit 2 only
    - Generally, reduced plant load tends to reduce fly ash PM, while increasing the content of FGD carryover
    - Cyclic production of aerosols was identified, coinciding with the addition of lime slurry to the FGD absorber modules (cause unidentified).
    - Coal quality and varying cyclones in/out of service did not impact FGD carryover.
- Task 4 – Evaluation of Specific Value Engineering and Cost Reduction Opportunities
    - 70 Items were identified as potential cost reductions with Fluor, 55 were ultimately accepted. Three most impactful:
    - Use of extraction steam instead of capex associated with NG Steam Boilers & NG cost risk
    - Rearrangement and reduction in the size of the plot plan
    - Elimination of redundant pumps
- Task 5 – Analysis of Potential Impacts of Flue Gas Ductwork Pressure Transients
    - Contracted with Trax, LLC., who evaluated 22 separate transient scenarios
    - Predict the behavior of the Units in their future configuration, given existing equipment and equipment added by CCS
    - Condition assessment of existing FRP ductwork was included
    - 33 control recommendations for the Units and the CCS
- Task 6 – Icing Studies
    - Performed by Nels Consulting Services
    - Existing chimneys – full flow to less-than-full flow (no modifications indicated, have extensions)
    - Absorber stack – provide corrosion protection for top 10’
    - Cooling tower (S&L) – will be fogging and rime ice impacts, minimize by optimally locating
- Task 7 – Gaseous Dispersion Modeling
    - AECOM - absorber outlet and the startup/emergency vent stack (plus startup and shutdown scenarios) at various unit load combinations
    - Total concentrations for all pollutants were below the ND requirements and NAAQS

- Task 8 – Construction Project Definition and Documentation
    - Construction-ready EPC Contract template – 140 pages
    - Prepared by MPC legal and technical contract teams
    - Includes list of exhibits

Bleth ended the presentation by sharing the current status of Tundra. He shared these bullet points with the committee.

- Working with a joint development partner through FID – TC Energy
- Completing a FEED study with MHI and Kiewit
    - Ends with a lump-sum turn-key price offer (not an indicative price)
    - Negotiating EPC contract in parallel with the FEED
- Holder of two storage site permits
- Completing legal and financial work
- Applied for Demonstration Funding from DOE-OCED (BIL)
- Awarded $250M in loans from CSEA
- Final decision in 2Q24

- (A copy of the full PowerPoint presentation is available in the LRP files.)

VII. Transmission Authority Update:

During the committee's meeting, Claire Vigessa reported on the recent changes that have occurred within the North Dakota Transmission Authority. Specifically, he mentioned that John Weeda has stepped down as the Director and that he has assumed the role. Vigesaa shared that Weeda is still helping him and working through EPP as well. Vigessa shared that his office is on the 14th floor of the capital.

Vigessa shared the award of a two-year IIJA Federal Grant in the amount of $7.4 million with a state cost share of $1.1 million for a total of $8,623,893. Vigessa shared the tentative NDIC award being December 19, 2023, with an application deadline of November 20, 2023.

Vigessa shared that he attended the Energy Development and Transmission Interim Committee meeting at Coal Creek Station in August and shared some highlights from Isaac Orr's Generation Adequacy studies and MISO and SPP also were there with studies to share. In addition to this meeting, there will also be a meeting at the Capitol in the future. That meeting will share factors that impact grid reliability, areas of congestion, what increased transmission capacity means for North Dakota, and approved transmission projects.

Vigessa shared upcoming studies including the Transmission Capacity Study conducted by Power Systems Engineering and a ND Grid Resilience plan being prepared by EERC to demonstrate the risks faced by the grid in North Dakota. He displayed NERC graphics showing the reduced capacity with increased demand. He went on to discuss transmission projects approved in ND for 2025 to include 345kV Roundup to Kummer Ridge – 35 miles; 345kV Leland Olds to Tioga – 175 miles. In addition to this, he shared upcoming transmission projects.

- (A copy of the full PowerPoint presentation is available in the LRP files.)

VIII. 2023-2024 CALENDAR

Bohrer announced that the next NDIC meeting is scheduled for November 28, 2023. Bohrer reminded the group that the spring grant application deadline is April 1, 2024, and the next LRC meetings are tentatively scheduled for May 9, 2024, and November 14, 2024.

IX. OTHER BUSINESS

None

X. ADJOURNMENT

There being no further business, Jason Bohrer requested a motion for adjournment of the LRC meeting. Charlie Gorecki so moved; seconded by Jay Skabo. Motion carried.

The North Dakota Industrial Commission meeting, when these recommendations will be considered, will be held on November 28, 2023.

Angie Hegre, recording secretary