INDUSTRIAL COMMISSION OF NORTH DAKOTA
RENEWABLE ENERGY PROGRAM

TECHNICAL REVIEWERS' RATING SUMMARY

R-49D
FRONT END ENGINEERING and DESIGN (FEED) STUDY for
CREOSOTE TREATED RAILROAD TIE
Principal Investigator: Great River Energy
Request for $66,500; Total Project Costs $133,000

TECHNICAL REVIEWERS' RATING SUMMARY

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| Maximum Weighted Score | 250.00 |

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Renewable Energy Council goals are: 1 – very unclear; 2 – unclear; 3 – clear; 4 – very clear; or 5 – exceptionally clear.

**Reviewer 1D (Rating 2)**

Though the proposal should preserve the existing jobs at the Spiritwood Station it may have an impact on the employment levels at the Coal Creek Station due to the loss of lignite sales. The reduction of lignite mined will decrease the tax revenue to the State of North Dakota. On the site www.epa.gov/ingredients-used-pesticide-products/creosote, the EPA states “Do not burn creosote or other preservative-treated wood in a residential setting to avoid possible inhalation of toxic chemicals in the smoke and ash.” The Spiritwood Station is not in a residential area but there may be some concern to the surrounding facilities that utilize the auxiliary steam as well as the farming communities downwind of the facility.
Reviewer 2D (Rating 2)
The project is only peripherally connected to the NDIC/REC goals. While the railroad ties are wood, they are a product manufactured for a different purpose. The ties should be thought of as a waste product.

The project does have a connection with the sixth goal in that its success could help “agriculture producers to build and maintain a robust rural economy.

The application also notes the cessation of coal purchase from the Coal Creek Station without acknowledging the potential loss of jobs at that location due to the Spiritwood Station fuel change.

Reviewer 3D (Rating 4)
Quite Clear: The primary purpose is to evaluate a lower carbon alternate boiler fuel in terms of availability, cost, boiler conversion, fuel handling, and ash handling to replace coal with biomass and CTRTs (Creosote Treated Railroad Ties). Alignment with the Renewable Energy Council goal is to promote the growth of ND renewable energy industries through research, development, marketing, and education. The implication is that Spiritwood Station won’t survive on lignite coal only! Is that their belief?

2. With the approach suggested and time and budget available, the objectives are: 1 – not achievable; 2 – possibly achievable; 3 – likely achievable; 4 – most likely achievable; or 5 – certainly achievable.

Reviewer 1D (Rating 4)
This request is only for high level engineering evaluation of converting the Spiritwood Station to an alternative fuel, specifically creosote railroad crossties.

Reviewer 2D (Rating 4)
Black & Veatch is a stable company with the expertise to achieve the objectives. B&V does mention the uncertainty associated with COVID variants and its possible delays.

The one-week review and response periods allowed by Black & Veatch for comments from the draft report seems overly optimistic unless the number of reviewers is limited.

Further, there is nothing to suggest that the applicant’s comments will be of such a limited scope that B&V can address the comments and respond in a week’s time.

Reviewer 3D (Rating 4)
The schedule presented is dependent on comments returned in a timely manner from stakeholders. Roughly, this equates to a 5-month timeline. The budget is $133,000; half or $66,500 is being asked for from the Industrial Commission. It is interesting that Black & Veatch portion is estimated at $83,500. It’s not clear where the additional $49,500 (plus or minus 20%) might come from?
3. The quality of the methodology displayed in the proposal is: 1 – well below average; 2 – below average; 3 – average; 4 – above average; or 5 – well above average.

**Reviewer 1D (Rating 5)**
The proposal outlines the use of Black & Veatch as a consulting engineering group. They certainly have expertise in biomass conversions of steam boilers and their staff was outlined in the proposal.

**Reviewer 2D (Rating 3)**
There is no special or unique methodology being proposed only the typical hard work associated with this kind of project. “Average” equates to the usual standard of work expected of the investigator and subcontractors.

**Reviewer 3D (Rating 4)**
Appendix “A” breaks the project into five logical tasks which is primarily the collection of information to support the objectives and interim and final reports.

4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Renewable Energy Council goals will likely be: 1 – extremely small; 2 – small; 3 – significant; 4 – very significant; or 5 – extremely significant.

**Reviewer 1D (Rating 2)**
This proposal only identifies a single biomass item to utilize and the associated supply investigation along with specific equipment and storage facilities required. Such a high-level engineering study could have included other fuel possibilities.

**Reviewer 2D (Rating 2)**
The project is only peripherally connected to the NDIC/REC goals. While the railroad ties are wood, they are a product manufactured for a different purpose. The ties should be thought of as a waste product.

The project does have a connection with the sixth goal in that its success could help “agriculture producers to build and maintain a robust rural economy.

The application also notes the cessation of coal purchase from the Coal Creek Station without acknowledging the potential loss of jobs at that location due to the Spiritwood Station fuel change.

Further the proprietary nature of this study prevents and of the research from being beneficially used by any other organization.

**Reviewer 3D (Rating 3)**
If the net emissions at Spiritwood Station is significantly reduced and enough biomass/CTRT’s can be located to maintain the capacity & availability to the steam and energy customers, the results should prove valuable for future similar projects while addressing the Renewable Council’s goals.
5. The principal investigator’s awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

**Reviewer 1D (Rating 4)**

The included resumes and project responsibilities of the Black & Veatch personnel certainly indicates that they have the experience in this type of retrofits.

**Reviewer 2D (Rating 4)**

The investigator’s subcontractor appears to have created much of the current research activity even if it has not been publicly available. The investigator did not reference any of the work performed by the Electric Power Research Institute of Palo Alto California.

**Reviewer 3D (Rating 4)**

Mr. Hauk’s refuse boiler and plant experience as well as that of his staff seem adequate to lead the project. The addition of Black & Veatch and their experience engineering similar conversion globally, should guarantee a successful evaluation.

6. The background of the investigator(s) as related to the proposed work is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

**Reviewer 1D (Rating 4)**

Black & Veatch have qualified personnel to conduct this type of FEED study in the agreed to time frames.

**Reviewer 2D (Rating 4)**

Black & Veatch has proposed participants that appear to be experienced in their proposed roles and are cited as having had leadership positions in projects of similar scope.

The proposed Great River Energy personal also have demonstrated expertise although not specifically in these areas. However, their backgrounds do provide the ability to judge the quality and feasibility of the Black & Veatch work.

**Reviewer 3D (Rating 4)**

As stated previously the combination of GRE refuse boiler experience, Spiritwood operational experience, and Black & Veatch’s prior renewable energy conversion experience does appear to be a “better than average” group of investigators for this type of evaluation

7. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – very good; or 5 – exceptionally good.

**Reviewer 1D (Rating 4)**

Being this proposal is only for an engineering evaluation, the cited milestones are readily achievable with the proposed Black & Veatch personnel.
Reviewer 2D (Rating 3)
All of the task durations are identified although there was not mention of interim progress reports.

Reviewer 3D (Rating 4)
The plan defines 5 primary tasks: Work definition & project management, FEED kick-off/site visit, Design concept and budget, CTRT availability/distance/price, and Feasibility/net emissions/Final Report. It is paramount NDIC engineers be present at each Task summary!

8. The proposed purchase of equipment is: 1 – extremely poorly justified; 2 – poorly justified; 3 – justified; 4 – well justified; or 5 – extremely well justified. (Circle 5 if no equipment is to be purchased.)

Reviewer 1D (Rating 5)
This proposal is only for the cost of a front-end engineering design, so no equipment is to be purchased.

Reviewer 2D (Rating 5)
There is no equipment proposed for this application.

Reviewer 3D (Rating 5)
No equipment to be purchased.

9. The facilities and equipment available and to be purchased for the proposed research are: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – notably good; or 5 – exceptionally good.

Reviewer 1D (Rating 3)
The facilities at the Spiritwood Station are acceptable for this retrofit. The additional equipment required will be determined by the front-end engineering design.

Reviewer 2D (Rating 4)
The Black & Veatch facilities and personnel appear to be more than adequate for the project.

Reviewer 3D (Rating 5)
Spiritwood Station is the only facility involved and an excellent place for this type of evaluation.

10. The proposed budget “value” relative to the outlined work and the financial commitment from other sources is of: 1 – very low value; 2 – low value; 3 – average value; 4 – high value; or 5 – very high value. (See below)

Reviewer 1D (Rating 2)
This proposal is to request support from the North Dakota Industrial Commission Renewable Energy Council to fund one half of the FEED study for GRE to determine if they should pursue an alternative fuel source for the Spiritwood Station. No economic rate of return for the State of North Dakota will be realized by funding this project.
\textbf{Reviewer 2D (Rating 4)}

The proposed budget appears to be more than satisfactory for the subcontracted work. The investigator, however, has not identified the in-kind contribution for Tasks 1, 2, & 5; this should not be taken as a recommendation that the requested funds be increased to cover 50\% of the total project. The NDIC expectation is that investigators provide at least 50\% of the funding.

\textbf{Reviewer 3D (Rating 4)}

Emissions/carbon reductions, more jobs, CTRT/biomass availability are all important unknowns to have defined and $66,500 seems a small price to pay for clarifying those. Does Black & Veatch see any benefit to them as a company? Would it be worth it then for them to also contribute?

\textbf{Section C. Overall Comments and Recommendations:}

Please comment in a general way about the merits and flaws of the proposed project and make a recommendation whether or not to fund.

\textbf{Reviewer 1D}

The funding requested for this project helps offset the cost of hiring a consulting engineering firm out of Kansas. They are to provide a preliminary evaluation the feasibility of switching the fuel of the Spiritwood Station to creosote treated railroad ties. This step in the investigation process alone does not promote any of the goals and purposes set forth by the North Dakota Industrial Commission Renewable Energy Council.

\begin{itemize}
  \item It may be of a concern that the consumption of such a vast amount of railroad ties in the area may also have an adverse effect on other small businesses that utilize these for landscaping or the rural community that use them for fencing.
  \item Used railroad ties are already a recycled product and the amount of them available will possibly decline due to the utilization of composite and concrete railroad ties.
  \item The EPA has warned individuals not to consume produce grown in the proximity of raised bed gardens due to possible toxic contamination of the soil leading to produce unfit for consumption. The EPA also cautions about the burning of treated wood due to the possible release of toxic fumes in residential areas.
  \item Funding this engineering study will not produce any additional employment in the Spiritwood area.
  \item The State of North Dakota, if this retrofit proceeds forward at the completion of this study, stands to lose the royalties of over 600,000 tons per year of lignite being mined.
  \item There may be a reduction in the mining work force.
\end{itemize}
It is of my opinion that this proposal, if carried through, will be detrimental to the State of North Dakota and the workforce. Companies tend to do what they determine necessary to remain competitive or increase profitability in the marketplace regardless of local employment consequences or economic impacts. Great River Energy is investigating alternative fuel possibilities to maintain environmental compliance or economic feasibility. This study is an investigation.

It is not research, development, marketing, or education as stated in the Renewable Energy Council’s mission statement. Perhaps, if railroad ties are determined to be part of the North Dakota’s renewable energy resources, the Renewable Energy Council may wish to revisit supporting this retrofit if Great River Energy pursues altering the fuel source for the Spiritwood Station. However, at this stage of the process, the cost of this determination should be the responsibility of Great River Energy.

**Reviewer 2D**

It is recommended that this project be funded at the level proposed. The project prepares usable deliverables that have a defined fixed scope to judge further investment in the Spiritwood Station.

While the project as proposed has limited application, it has the potential to provide a pathway for future low to modest cost energy to support two agricultural processing plants that provide benefit to the state of North Dakota.

**Reviewer 3D**

Overall, the project looks like it can deliver on the objectives in a timely way and appears to be a good value for the money.

From my perspective a few questions remain:

- How much overall benefit to the environment will there be?
- What is the primary driver to switch…global or more localized pressure?
- Efficient baseload is still needed to maintain electric system stability and reliability. How might this fuel change affect that?
- How does supplemental biomass figure into the MCR? Is there a best operational point for CTRT/biomass balance?
- Ash characteristics and its new chemical makeup…where will it be landfilled if it can’t be used? Any new hazards to the environment introduced?
- Any increase in boiler tube/furnace corrosion potential due to a new set of flue gas volatiles