Front End Engineering and Design (FEED) Study for Creosote Treated Railroad Ties

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Spiritwood Station Plant Manger
Great River Energy

- Generation & Transmission Cooperative
- Second Largest Utility in MN
- Owned by 28 Cooperatives
  - 700,000 Member Consumers
    - 1.7M People
  - 3,200 MW Generating Capacity
  - 4,600 Miles of Transmission Lines
    - 100+ Substations
Spiritwood Energy Park

Stutsman County
Jamestown

DEVELOPMENT JAMESTOWN / STUTSMAN COUNTY

GREAT RIVER ENERGY

AG ENERGY GROUP

Green Bison Soybean crushing facility 2023
Spiritwood Energy Park Cont.

- Spiritwood Station
  - Electricity and steam generation

- Dakota Spirit Biorefinery
  - Steam supply from SWS (200,000 lbs./hour)
  - Electricity supplied from SWS (5MW’s)
  - 25 million bushels of corn consumed annually

- ADM/Marathon Green Bison Soy Processing
  - Negotiating a steam supply (~110,000 lbs./hour)
  - 50 million bushels of soybeans consumed annually

- Rail System
  - Capacity of ~500 rail cars
Spiritwood Station

- Spiritwood, ND
- 103 MW Gross Capacity
- 92 MW Net Capacity
- Combined Heat and Power (CHP)
  - ~66% thermal efficiency when fully subscribed
Boiler Overview

- Circulating Fluidized Bed (CFB) Boiler
  - 785,000 lb/hr of steam at MCR
    - 1,780 psig and 1,006 °F
    - 1600 GPM of water; 3.5 Olympic swimming pools per day
  - 1,100 MMBtu/hr heat input
  - CFB is capable of multiple fuel sources - with appropriate fuel handling equipment; currently designed for coal (¼" or smaller)
Controlling Emissions

- SWS has one of the newest air permits in the state
  - We permitted the facility (air permit) with the Best Available Control Technology (BACT) and that our limits are determined utilizing the technologies capabilities
- Spiritwood Station has state-of-the-art pollution control
- Past and current work
  - Jansen Combustion and Boiler Technologies, Inc.
    - Analysis predicts we will be able to meet permitted coal combustion emissions
    - Boiler limited to 81% MCR
    - Chlorine levels will not increase enough to cause adverse boiler effects
  - Energy & Environmental Research Center, EERC
    - Working to run a test burn with CTRTs and predicted consumable injection rates
    - Allows for physical testing of exhaust gas and ash from burning CTRTs
Spiritwood Station is currently seeking alternative fuel supplies:

- **Natural gas**
  - Started partial natural gas testing in 2020
  - Completing 100% natural gas testing in 2022

- **Renewable fuel**
  - Agricultural waste – study completed in 2009 showed shipping constraints and high costs
  - Creosote Treated Railroad Ties (CTRT) – current FEED study seeking grant funding
FEED Study Details

FEED Study Deliverables:

- Fuel availability assessment report
- Detailed cost estimate for modifying Spiritwood Station to accommodate processed CTRT's
- Drawings – including general arrangements and P&IDs
- Electrical load list
- Project schedule
- Summary report
Jobs

- Spiritwood currently staffs 34 employees plus contract help
- CTRT fuel handling system will add five additional GRE staff located at Spiritwood Station
- CTRT processing facility located adjacent to Spiritwood Station will require several additional staff
### Project Execution

#### Methodology

- Project Management
- FEED Kick-off Meeting and Site Visit
- Determine CTRT Regional Availability
- Conceptual Design and Detailed Costs
- Economic Feasibility Evaluation
- Seek approvals & grants for full CAPEX project execution
- Project budget is $133,000
- Grant application is for $66,500 with a project completion expected by July 2022