

2017 Project Abstract

For the period ending June 30, 2021, The Camp Ripley Biomass District Heating project will demonstrate, on a significant scale, sustainable forest management practices for the purpose of generating renewable biomass thermal energy. To facilitate these forest management practices, this project will construct and demonstrate the operation of a woody biomass district heating system for 7 facilities within the Camp Ripley Training Center, located in central Minnesota.

PROJECT TITLE: District Heating with Renewable Biomass at Camp Ripley Training Center

PROJECT MANAGER: Jay Brezinka

AFFILIATION: MN Department of Military Affairs (DMA)

MAILING ADDRESS: 15000 HWY 115

CITY/STATE/ZIP: Little Falls, MN 56345

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2017, Chp. 96, Sec. 2, Subd. 07d

APPROPRIATION AMOUNT: \$1,000,000

AMOUNT SPENT: \$74,455

AMOUNT REMAINING: \$925,545

Sound bite of Project Outcomes and Results

Project was canceled due to budget constraints.

Overall Project Outcome and Results

Back Ground: The scope of this project was to install a biomass heating plant that would service 7 Buildings including mechanical and distribution systems. We received an architect estimate and the base cost for the project in total was \$7,122,035.

Issue: Due to these headwinds, Current Project estimates (Steel prices, metal prices in particular; (Piping), and lumber prices, etc), we lowered the scale of the project to just the biomass heating plant and underground piping and connections to just 2 facilities, and that bid estimate came in at \$4,407,008.

National Guard Bureau and DMA leadership requested that we reassess the Life Cycle Cost Analysis (LCCA's) numbers on this project. The Saving's to Investment Ratio (SIR) changed from 2.31 during the planning phase to .32 currently. Again, this is largely due to the current cost of construction and the reduction in buildings being included. Since we only have \$2.5 million available from federal sources and \$1 million in state LCCMR funds, we legally can no longer implement this project. We will be crossing budget thresholds. Only the design of the biomass facility has been completed.

Project Results Use and Dissemination

- The funds spent for the Biomass project enabled the MNARNG to design a 5,000,000-BTU centralized biomass boiler system that was intended to heat 2 building on Camp Ripley. The design process started with 7 buildings but due to increase in material cost we had to decrease the scope to only 2 buildings. The design is complete and on the shelf and available to others.
- No information or the project design has been disseminated.



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2017 LCCMR Work Plan "Final Report"

Date of Submission 9/8/2021

Final Report

Date of Work Plan Approval: June 30, 2017

Project Completion Date: Project was cancelled

PROJECT TITLE: District Heating with Renewable Biomass at Camp Ripley Training Center

Project Manager: Jay Brezinka

Organization: MN Department of Military Affairs

Mailing Address: 15000 Highway 115

City/State/Zip Code: Little Falls MN, 56345

Telephone Number: Jay Brezinka (320) 616-2618

Email Address: jay.a.brezinka.nfg@mail.mil

Web Address: www.minnesotanationalguard.com

Location: Central Minnesota, Morrison County

Total ENRTF Project Budget:

ENRTF Appropriation: \$1,000,000

Amount Spent: \$74,455

Balance: \$925,545

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 07d

Appropriation Language:

\$1,000,000 the first year is from the trust fund to the commissioner of military affairs to install a 5,000,000-BTU centralized biomass boiler system utilizing the forestry management at Camp Ripley. This appropriation must be matched by at least \$900,000 of nonstate money and must be committed by December 31, 2017. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: District Heating with Renewable Biomass at Camp Ripley Training Center

PROJECT STATEMENT:

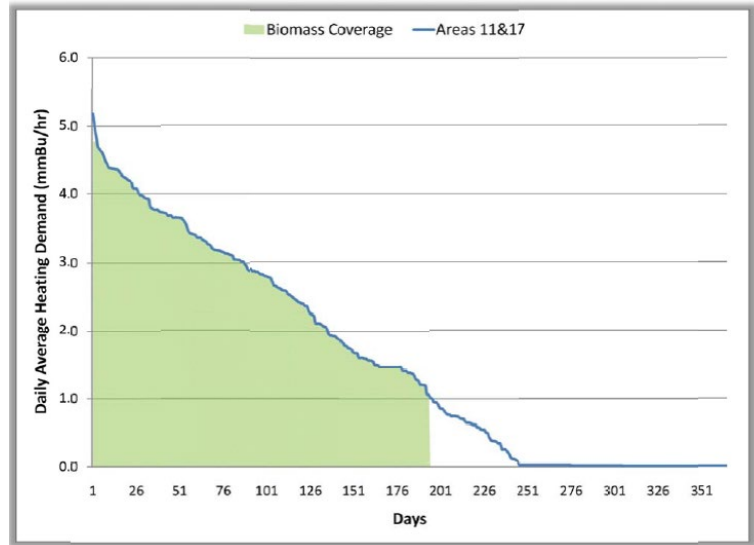
The Camp Ripley Biomass District Heating project will demonstrate, on a significant scale, sustainable forest management practices for the purpose of generating renewable biomass thermal energy. To facilitate these forest management practices, this project will construct and demonstrate the operation of a woody biomass district heating system for facilities within the Camp Ripley Training Center, located in central Minnesota. Camp Ripley is a 53,000 acre state owned facility with the capability to demonstrate an environmentally sound and sustainable process to heat numerous buildings. Selective harvesting paired with the utilization of storm blow-down material will be implemented and managed with assistance from the Minnesota Department of Natural Resources. Significant ecological benefits will be targeted in thinning of regenerative aspen in parallel with wildlife habitat improvement. A map of forested parcels within Camp Ripley Training Center available for selective harvest of biomass fuel is included in section IX, figure 1. There is an urgent need to find revenue-generating uses for forest biomass to mitigate environmental stressors and offset the public burden of funding their removal and utilization. Forest management practices that promote sustainability, if coupled with qualified industrial expertise, can provide opportunities for stable employment and economic growth in the Nation's forest products industry. The case for woody biomass can be made when it is used in a manner that enhances the environment and the well-being of the people, communities, and businesses dependent upon it. The result will be a vibrant forest products industry and resilient forests capable of providing an array of ecosystem goods and services.

A preliminary feasibility analysis for the Camp Ripley Biomass project was completed through a grant from the United States Forest Service and the Wood to Energy Resource Center in 2013. In Addition, the Minnesota Army National Guard was successful in receiving funds in May of 2015 for an engineering analysis and validation of the initial feasibility study. This effort was conducted by the National Renewable Energy Lab. Both studies regarded the project to be beneficial through both environmental and economical perspectives.

There is direct economic benefits and stimulus to the regional forestry industry by using locally-harvested biomass, generating a market demand that drives sustainable forest management practices. Camp Ripley Training Center has an integral role in the continuation of government for the state of Minnesota in the event of a major disaster; the Camp's federal and state military missions also necessitate resilient energy infrastructure for national security. A biomass district heating system at Camp Ripley would simultaneously address both aspects by providing a local, renewable and resilient energy source.

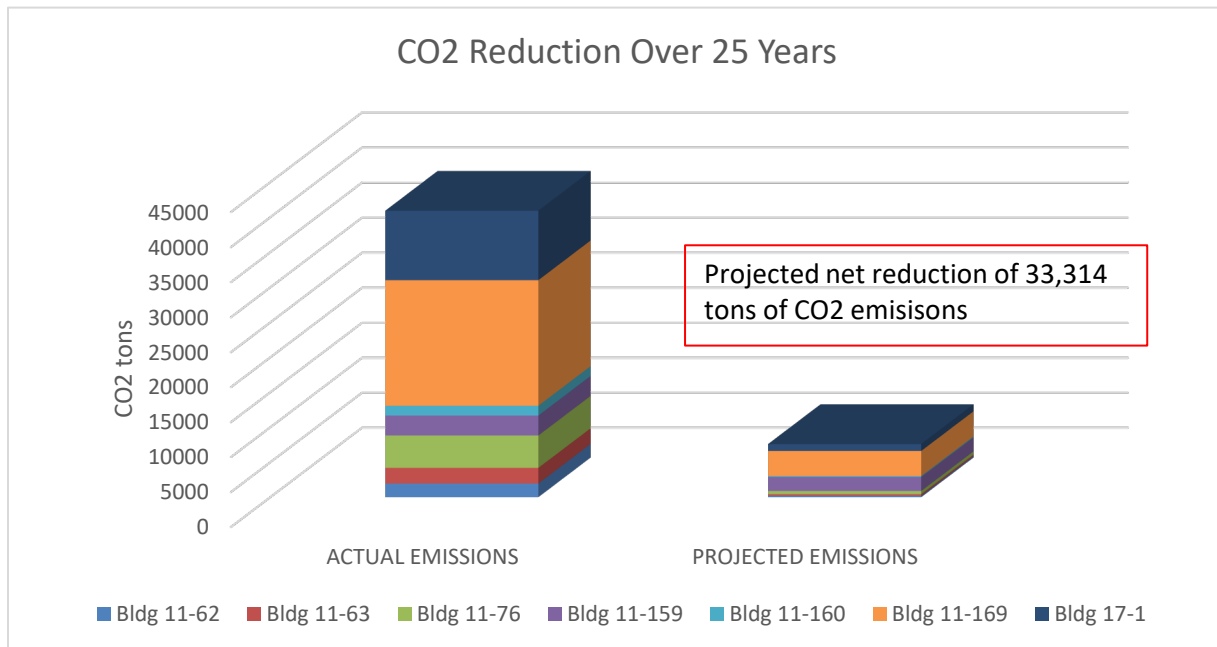
This project will install a 5.0 million Btu/hour advanced biomass combustion unit and hot water boiler capable of replacing 90% of the total natural gas usage at seven buildings within Camp Ripley Section IX Figure 2). The advanced biomass combustion unit and hot water boiler will be used to heat a 5,000 gallon thermal storage tank located in a biomass building. This high temperature water in the tank will be blended with return water and pumped from the biomass building to seven buildings in Areas 11 and 17. Buried pre-insulated piping will be installed to connect the central biomass plant to the existing heating systems at each building. The piping will tie into the existing hot water heating systems in the mechanical rooms within buildings in Areas 11 and 17. A schematic describing this system is provided in section IX, Figure 3. Also included in the project is the construction of a building to house the biomass system. This building will also include a lean-to covered day-bin for biomass storage, and will be an inexpensive pre-engineered steel building or of pole barn-type construction. This storage is needed to accommodate multiple fuel deliveries from forest management operations and to provide the flexibility to take advantage of other opportunity fuels. There are many potential configurations for the layout of the biomass system and may be revisited during the engineering design process.

This biomass system will operate most efficiently between 25% and 100% of the rated heating output of the boiler (1.25 to 5.00 million Btu/hour). This will enable the system to replace approximately 90% of the combined natural gas usage from buildings interconnected in Areas 11 and 17. The existing heating systems will remain and operate during periods of high heating demand to supplement the biomass system. The shaded area in this Figure illustrates the estimated biomass system coverage of the daily average heat demand.



In addition to the benefits described above, a biomass district heating system will mitigate the effects of climate change by reducing greenhouse gas emissions. The difference between biomass and fossil fuel combustion is the amount of carbon emissions being released in the atmosphere. Woody biomass is stored energy. The carbon released into the atmosphere when the wood burns is the same carbon the tree absorbed from the atmosphere when it was growing. As long as that tree is replaced with new growth and the soil biology is not significantly altered, the cycle is renewable. Camp Ripley’s biomass district heating system will utilize on-site regenerative aspen harvests and other supplemental fuel sources that is critical in declaring carbon neutrality.

The Camp Ripley biomass district heating system is projected to offset approximately 33,314 net tons of CO2 emissions over the life of this project. The chart below illustrates the difference between a 25 year net average emissions for the seven facilities on Camp Ripley using natural gas and the projected emissions with a biomass district heating system.



The facilities in this project currently use a combination of natural gas fired hydronic, forced air, and radiant heating systems to satisfy the heating demand. The table below lists the facilities and current heating equipment.

These heating systems will remain in the facility as a supplemental heat source. The biomass district heat system will provide avoided costs of replacing the independent heating systems as they reach their end of useful life. Prior reports show significantly long payback periods for this type of project. Simple payback analysis however does not capture the avoided costs for the replacement of existing boilers over the life of the plant. The average replacement cost of these boilers is \$400,000. The table below represents the existing heating equipment in each facility and the age of that system.

Building	Sq. Ft.	Heating Equipment	Equip. Age (years)
17-001 Maintenance Facility	63,568	Two 1.75 mmBtu/hr output boilers	39
		One 4.25 mmBtu/hr output boiler	22
11-169 Maintenance Facility	146,376	Two 960,000 Btu/hr output boilers	18
11-159 Maintenance Shop/Office	23,168	Two 330,000 Btu/hr output boilers	23
11-160 (Maintenance)	9,120	Two 724,000 Btu/hr output boilers	38
11-062 (Supply and Services Warehouse)	50,200	Two 840,000 Btu/hr output boilers	30
11-063 Warehouse and Administrative Facility	62,736	Two 1.8 mmBtu/hr output boilers	30
11-076 Maintenance and classroom Facility	29,250	Two 2.2 mmBtu/hr output boilers	28

The specific requirement for this funding recommendation is the utilization of matching funds for the remainder of the project. The costs are shown in detail in the project budget.

The Minnesota National Guard is pursuing matching funds through the Energy Resiliency and Conservation Investment Program (ERCIP). ERCIP is an appropriated military construction (MILCON) program, but funded separately by the Office of the Secretary of Defense (OSD). ERCIP projects compete with other projects across national and international military installations. Projects are designed to dramatically change energy consumption at an installation or joint base, implement renewable energy technologies, and generate and store energy to improve resilience for critical loads. ERCIP projects are competitively ranked by the federal savings to investment ratio (SIR). Without contributing funds, the Camp Ripley Biomass Project has an SIR of 1.0. Eligibility for ERCIP funding requires a 1.0 or better SIR. This project does not compete well due to the relatively inexpensive fuel costs in Minnesota compared to the global energy market. Furthermore, ERCIP does not account for the environmental and sustainability benefits in the decision making process. However, with the \$1,000,000 ENRTF as supporting dollars, the project competes for federal funds with a 3.5 SIR, making it among the most competitive ranked projects in the program. The MNARNG was successful receiving \$2,500,000 in ERCIP funds for construction. In addition to the \$2,500,000 for construction; \$250,000 dollars in federal funding was also provided for the design of the project. This will meet the matching fund requirement for the project. This was Military Construction (MILCON) funds and are available from 1 Oct 2018 to 30 Sept 2023.

II. OVERALL PROJECT STATUS UPDATES:

Project Status as of July 1 2018

Project is pending approval from National Guard Bureau for federal funding. Currently don't have bid authority to move forward. No funds have been obligated.

Project Status as of January 01 2019

Project has been approved from National Guard Bureau for federal funding. \$2.5 Million of ERCIP funding was received for construction along with \$250,000 for design funds. The state design selection board (SDSB) advertised for a design bid on 31 Dec 2018 and interviews will occur on 19 Feb, 2019.

Amendment Request February 8, 2019:

The MNARNG would like to request a funding extension for the state funds to better align with the federal funding. See attached letter. The federal funds are available from 1 Oct 2018 to 30 Sept 2023.

Amendment Approved by LCCMR 3/7/2019

Amendment Request February 8, 2019

Request to increase Unallocated Amount from \$11,500 to \$28,200 an increase of \$16,700 by shifting funds from Professional/Technical/Service Contracts. Since additional funding was provided by the federal government to cover the costs associated with the professional design services. Funding was then reallocated to the primary distribution piping. The estimated cost of that is \$16,700 less, which increased our unallocated amount to \$28,200. Amendment Approved by LCCMR 3/7/2019.

Project Status as of June 30 2019

Amendment Approved by LCCMR 3/7/2019.

The Minnesota Department of Military Affairs (DMA) has selected KFI Engineering Group to be the designer for this project. The DMA expects to have a signed contract with KFI by July 31st with a start design 1 August 2019.

Project Status as of January 01 2020

The DMA signed a contract with the design firm KFI Engineering on 23 Oct, 2019. On 5 Dec, 2019 all the project stakeholders met at a design charrette to collaborate on the vision for project development. From the information gathered at the charrette, the design firm was able to solidify their understanding of the project requirements and start working on the predesign documents. Currently, the design team is wrapping up the Predesign Phase and will be moving into the Schematic Design Phase starting 1 Jan, 2020.

Project Status as of June 30 2020

Submittal packages consisting of drawings, specifications, cost estimates, and schedules were submitted to the DMA for review at the conclusion of both the predesign and schematic design (SD) phases. During the predesign and SD phases the design went through multiple iterations to optimize the design and minimize costs. Currently, the design team is working through the detailed design phase. Notice to proceed was issued for the detailed design phase on 8 July, 2020 after the National Guard Bureau approved the SD submittal. The current schedule has construction starting early 2021.

Project Status as of January 01 2021

The design is not complete, it is currently in the Detailed Design phase. The current schedule has design completed in Feb 2021 and construction starting spring of 2021.

Project Status as of June 30 2021

The design is complete. Engineer estimate came back way over budget. Waiting until Oct of 2021 to bid this project.

Overall Project Outcomes and Results:

Back Ground: The scope of this project was to install a biomass heating plant that would service 7 Buildings including mechanical and distribution systems. We received an architect estimate and the base cost for the project in total was \$7,122,035.

Issue: Due to these headwinds, Current Project estimates (Steel prices, metal prices in particular; (Piping), and lumber prices, etc), we lowered the scale of the project to just the biomass heating plant and underground piping and connections to just 2 facilities, and that bid estimate came in at \$4,407,008.

National Guard Bureau and DMA leadership requested that we reassess the Life Cycle Cost Analysis (LCCA's) numbers on this project. The Saving's to Investment Ratio (SIR) changed from 2.31 during the planning phase to .32 currently. Again, this is largely due to the current cost of construction and the reduction in buildings being included. Since we only have \$2.5 million available from federal sources and \$1 million in state LCCMR funds, we legally can no longer implement this project. We will be crossing budget thresholds. Only the design of the biomass facility has been completed.

III. PROJECT ACTIVITIES AND OUTCOMES:

This project will demonstrate sustainable forest management for the purpose of generating thermal energy using a locally harvested renewable energy. Onsite biomass as a fuel source can reduce carbon emissions by more than 33,000 tons over the life of the project. Utilization of onsite biomass will generate a demand for implementation of forest management practices, increase habitat restoration initiatives, decrease dependence on non-renewable gas and increase energy resiliency as an adaptation goal for a changing climate. A map of forested parcels within Camp Ripley Training Center available for selective harvest of biomass fuel is included in section IX.

In May of 2015, the National Renewable Energy Laboratory (NREL) conducted an analysis of the biomass fuel supply available to Camp Ripley. The 53,000 acre installation has an abundant, sustainable supply of biomass fuel, consisting largely of an adjacent 35,000-acre forest primarily of aspen trees. The proposed system would utilize approximately 2000 tons of wood chips per year, (equivalent of 900 cords of wood). Without supplemental fuel from storms or other activities, Camp Ripley would need to harvest less than 100 acres (approximately .9% of the targeted harvestable areas) every year to meet the fuel demands of the proposed systems. Aspens grow relatively quickly and a harvested area would be ready for harvesting again in approximately 20 years. Camp Ripley also has access to forested land adjoining the training area. These forested areas are accessible by paved highway, contributing to a lower fuel cost.

In order to facilitate these forest management practices, a biomass district heating system at Camp Ripley will be constructed. This project will install a 5.0 million Btu/hour advanced biomass combustion unit and hot water boiler capable of replacing 90% of the total natural gas usage at seven buildings within Camp Ripley. The advanced biomass combustion unit and hot water boiler will be used to heat a 5,000 gallon thermal storage tank located in a biomass building. This high temperature water in the tank will be blended with return water and pumped from the biomass building to seven buildings in Areas 11 and 17. Buried pre-insulated piping will be installed to connect the central biomass plant to the existing heating systems at each building. The piping will tie into the existing hot water heating systems in the mechanical rooms within buildings in Areas 11 and 17. A schematic describing this system is provided in section IX, Figure 3. Also included in the project is the construction of a building to house the biomass system (example of a site building layout included in section IX Figure 4). This building will also include a lean-to covered day-bin for biomass storage, and will be an inexpensive pre-engineered steel building or of pole barn-type construction. This storage is needed to accommodate multiple fuel deliveries from forest management operations and to provide the flexibility to take advantage of other opportunity fuels. There are many potential configurations for the layout of the biomass system and may be revisited during the engineering design process.

ACTIVITY 1: Competitive bid for the design and construction of biomass district heat system

Description:

Professional and technical contract for the design and construction of a biomass district heating system. This includes the architectural, mechanical, electrical and structural services for the engineering design, contractor material and labor, overhead, and site work. Budget and cost summary is developed by Department of Military Affairs Mechanical Engineer. All contracting will occur through the State of MN contractual process.

The ENRTF budget will be matched >100% by funding activities from the Minnesota Army National Guard (MNARNG).

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 1,000,000
Amount Spent: \$ 74,455
Balance: \$925,545

Outcome	Completion Date
1. Biomass District Heating System Design	June 2021
2. Site Work and Construction	NA
3. Implementation and Demonstration	NA

Activity 1 Status as of July 1 2018:

The RFP for the design of the Biomass district heating System is pending based on federal funding availability. Currently don't have bid authority to move forward. No funds have been obligated.

Activity 1 Status as of January 1 2019:

Project has been approved from National Guard Bureau for federal funding. \$2.5 Million of ERCIP funding was received for construction along with \$250,000 for design funds. The state design selection board (SDSB) advertised for a design bid on 31 Dec 2018 and interviews will occur on 19 Feb, 2019.

Activity 1 Status as of June 30 2019:

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Activity 1 Status as of January 1 2020:

The DMA signed a contract with the design firm KFI Engineering on 23 Oct, 2019. On 5 Dec, 2019 all the project stakeholders met at a design charrette to collaborate on the vision for project development. From the information gathered at the charrette, the design firm was able to solidify their understanding of the project requirements and start working on the predesign documents. Currently, the design team is wrapping up the Predesign Phase and will be moving into the Schematic Design Phase starting 1 Jan, 2020.

Activity 1 Status as of June 30 2020:

Submittal packages consisting of drawings, specifications, cost estimates, and schedules were submitted to the DMA for review at the conclusion of both the predesign and schematic design (SD) phases. During the predesign and SD phases the design went through multiple iterations to optimize the design and minimize costs. Currently, the design team is working through the detailed design phase. Notice to proceed was issued for the detailed design phase on 8 July, 2020 after the National Guard Bureau approved the SD submittal. The current schedule has construction starting early 2021.

Activity 1 Status as of January 1 2021:

The design is not complete, it is currently in the Detailed Design phase. The current schedule has design completed in Feb 2021 and construction starting spring of 2021.

Activity 1 Status as of June 30 2021:

The design is complete. Engineer estimate came back way over budget. Waiting until Oct of 2021 to bid this project.

Final Report Summary Sept 2021:

Back Ground: The scope of this project was to install a biomass heating plant that would service 7 Buildings including mechanical and distribution systems. We received an architect estimate and the base cost for the project in total was \$7,122,035.

Issue: Due to these headwinds, Current Project estimates (Steel prices, metal prices in particular; (Piping), and lumber prices, etc), we lowered the scale of the project to just the biomass heating plant and underground piping and connections to just 2 facilities, and that bid estimate came in at \$4,407,008.

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IV. DISSEMINATION:

Description: The Department of Military Affairs and Minnesota National Guard will use the final project as an example of cost effective locally-produced renewable thermal energy for other campuses and installations to replicate. A project of this magnitude will offer tremendous educational outreach for the tens of thousands of our Soldiers and other customers (including state agency staff) who train at Camp Ripley. The project will also serve as a national model since it will be the first biomass facility on a National Guard Installation. Additionally, Camp Ripley environmental staff sponsor over 100 presentations a year and reach about 6,000 students and visitors. This biomass project will be showcased as one of many sustainable initiatives underway at Camp Ripley in addition to a 10 megawatt solar array that has been installed on Camp Ripley by Minnesota Power which is also the largest of its kind on any National Guard Installation.

Status as of July 01 2018:

No change

Status as of January 01 2019:

No Change

Status as of June 30 2019:

No change

Status as of January 01 2020:

No Change

Status as of June 30 2020:

No change

Status as of January 01 2021:

No Change

Status as of June 30 2021:

No Change

Final Report Summary: No Change

V. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview:

**This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.*

The estimated budget below represents the total estimated project cost of the biomass district heating system at Camp Ripley. This estimate was produced through the MN Department of Military Affairs mechanical engineer utilizing the State of MN’s construction cost estimate works program.

ENRTF Budget		
Budget Category	\$ Amount	Overview Explanation
Professional Design Services		
Professional Design Services- \$277,300	\$74, 455	73% Covered by Federal Funding and 27% covered by ENRTF Funding
TOTAL ENRTF BUDGET:	\$1,000,000	

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
DoD Energy Resiliency Conservation Investment Program (ERCIP)	\$2,500,000		Construction Funds
ERCIP Design Funds	\$250,000	\$202,845	Design funds for project
<i>TOTAL OTHER FUNDS:</i>	<i>\$2,750,000</i>	<i>\$202,845</i>	

VI. PROJECT STRATEGY:

A. Project Impact and Long-term Strategy:

Camp Ripley’s Biomass district heating can stimulate economies, create jobs, offset imported fossil fuels, and promote the sustainable use of natural resources for the 25+ years of the biomass project life expectancy. This project will demonstrate sustainable forest management for the purpose of generating thermal energy using a locally harvested renewable energy. Onsite biomass as a fuel source can reduce carbon emissions by more than 33,000 tons over the life of the project. Utilization of onsite biomass will generate a demand for implementation of forest management practices, increase habitat restoration initiatives, decrease dependence on non-renewable gas and increase energy resiliency as an adaptation goal for a changing climate. Utilization of onsite biomass resources decreases the dependence on non-renewable natural gas and increased heating system redundancy for up to seven buildings at Camp Ripley.

According to the USDA Community Biomass Handbook (Becker, D.; Lowell, E.; Bihn, D.; Anderson, R.; Taff, 2014) Greater Minnesota has a surplus of underutilized biomass abundantly available from our forests and other public and private lands and in some locations this biomass fuels the catastrophic wildfires experienced in the last two decades. The potential benefits of using woody biomass are significant, but there is a lack of uniform knowledge about successful project siting and operation, how to coordinate investments with ongoing public and private forest management activities, and other critical project development tasks. There is an urgent need to find revenue-generating uses for forest biomass to mitigate environmental stressors and offset the public burden of funding their removal and utilization. Forest management practices that promote sustainability, if coupled with qualified industrial expertise, can provide opportunities for stable employment and economic growth in the Nation’s forest products industry. The case for woody biomass can be made when it is used in a manner that enhances the environment and the well-being of the people, communities, and businesses dependent upon it. The result will be a vibrant forest products industry and resilient forests capable of providing an array of ecosystem goods and services.

B. Funding History:

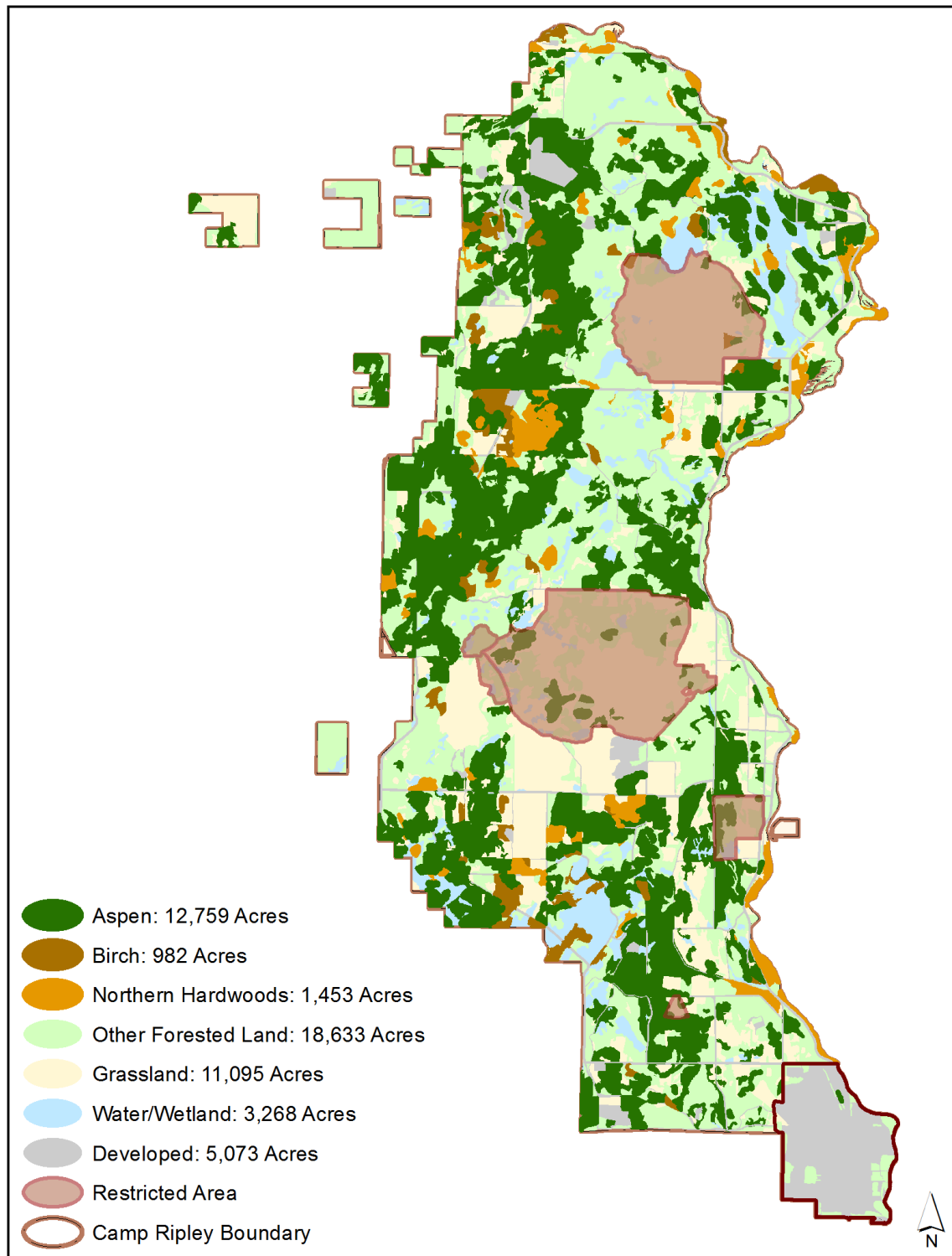
Funding Source and Use of Funds	Funding Timeframe	\$ Amount
DoD ERCIP	1 Oct 2018-30 Sept 2023	\$2,500,000
Design Funds	1 Oct 2018-30 Sept 2023	\$250,000

VIII. REPORTING REQUIREMENTS:

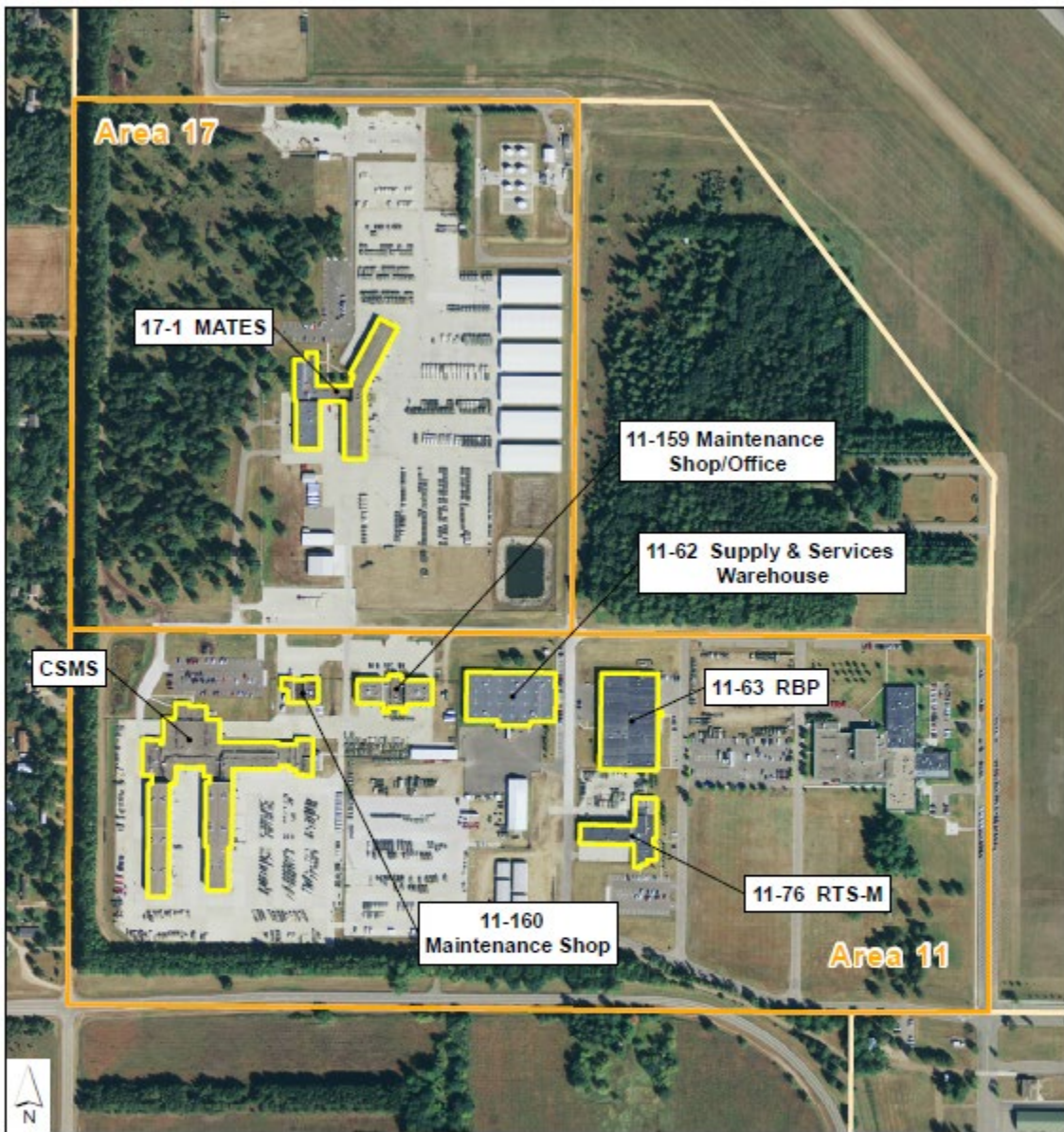
- The project implementation period is 5 years, will begin on 1Oct 2018, and be completed/implemented by 30 Sept 2023.
- Periodic project status update reports will be submitted *[January/01]* and *[June/30]* of each year.
- Project has been cancelled, a final report and associated products will be submitted September 2021.

IX. VISUAL COMPONENT or MAP(S):

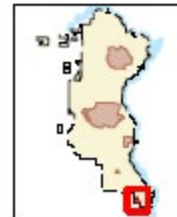
1. Map of forested parcels within Camp Ripley Training Center available for selective harvest of Biomass fuel.



IX. 2. Buildings that will be serviced in the project scope.

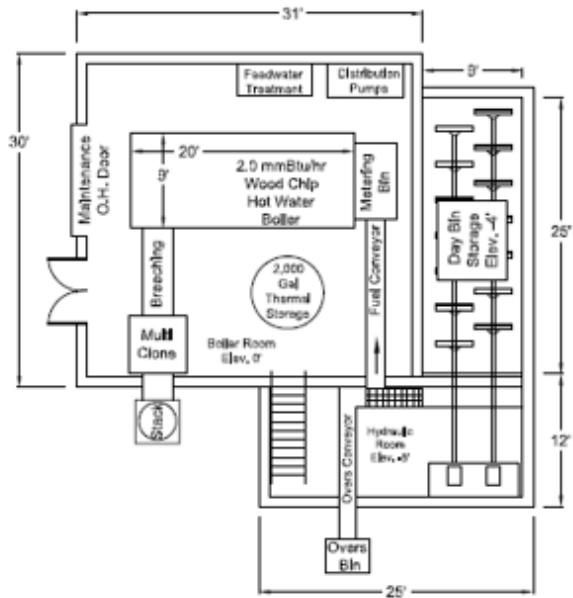


Buildings outlined in yellow are included in the district heating proposal.

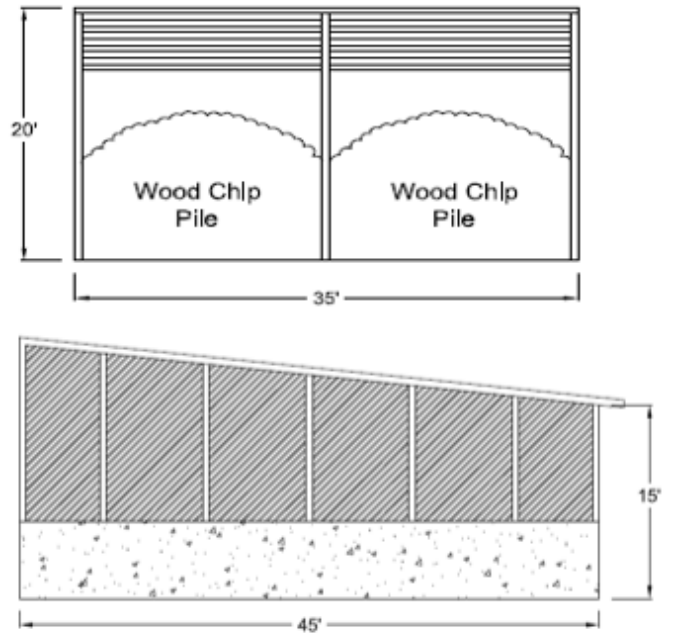


IX 4. Schematic describing the boiler and storage facility

Boiler room and wood handling facility



Wood chip storage steel building



**Environment and Natural Resources Trust Fund
M.L. 2017 Final Project Budget**



Project Title: District Heating with Renewable Biomass at Camp Ripley Training Center

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 07d **Appropriation Language:** \$1,000,000 the first year is from the trust fund to the commissioner of military affairs to install a 5,000,000-BTU centralized biomass boiler system utilizing the forestry management at Camp Ripley. This appropriation must be matched by at least \$900,000

Project Manager: Jay Brezinka

Organization: Department of Military Affairs

M.L. 2017 ENRTF Appropriation: \$ 1,000,000

Project Length and Completion Date: 6 years, Dec 2023

Date of Report: Sept 8, 2021

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget 1 July 2021	Amount Spent	Activity 1 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM					
Professional/Technical/Service Contracts	\$1,000,000		\$1,000,000	\$1,000,000	\$1,000,000
<i>Contract TBD with engineering firm on design through construction. Contractor will be responsible for all sub contracts related to construction activities. All contracts will follow State competitive process and guidelines and will be administered through DMA contracting office.</i>					
KFI Engineers (27% of Design Costs) \$74,455		\$74,455			\$74,455
Biomass Boiler and labor estimated \$516,245					
Boiler Room piping and pumps estimated \$60,000					
Primary Distribution Piping \$349,300					
COLUMN TOTAL					\$925,545

The estimated total cost is \$3,621,200 for the contract to be put out for bid for the Camp Ripley five million BTU centralized boiler system. The costs within the estimate have been prorated between ENRTF (\$1,000,000) and the MNARNG (\$2,621,200) to align with ENRTF eligible costs. Federal funding requirement has been met.

ITEM DESCRIPTION	MATERIAL COST	LABOR COST	TOTAL COST
Biomass Boiler	\$506,250.00	\$56,250.00	\$562,500.00
Auxiliary Natural Gas Boilers	\$225,000.00	\$25,000.00	\$250,000.00
Boiler Room Piping & Pumps	\$60,000.00	\$20,000.00	\$80,000.00
Material Handling & Storage	\$200,000.00	\$40,000.00	\$240,000.00
Thermal Storage Tank	\$45,000.00	\$5,000.00	\$50,000.00
Primary Distribution Piping	\$157,500.00	\$191,800.00	\$349,300.00
Branch Distribution Piping	\$66,000.00	\$109,600.00	\$175,600.00
Trenching and Backfill	\$51,700.00	\$51,700.00	\$103,400.00
Horizontal Boring	\$19,200.00	\$8,800.00	\$28,000.00
6" Elbow Kit	\$1,160.00	\$1,160.00	\$2,320.00
6" Anchor Kit	\$1,400.00	\$1,400.00	\$2,800.00
Tee/Main Tap	\$1,200.00	\$1,200.00	\$2,400.00
Building Connections	\$133,000.00	\$7,000.00	\$140,000.00
MATERIAL SUB-TOTAL			
	\$1,467,410		
LABOR SUB-TOTAL			
		\$518,910	
MATERIAL AND LABOR SUB-TOTAL			
			\$1,986,320.00
Site work, demolition, connections, hangars, etc	1%		\$19,863.20
Sub-Contractor's Overhead	10%		\$198,632.00
Subcontractor's Profit	10%		\$198,632.00
Sub-Contractor's Estimate			\$2,403,000.00
Prime Contractor's Overhead			
	10%		\$240,300.00
Prime Contractor's Profit			
	10%		\$240,300.00
Prime Contractor's Bond			
	1%		\$24,030.00
Contractor Estimate			\$2,908,000.00
Contingency			
	5%		\$145,400.00
Total Contractors Cost			
			\$3,053,000.00
SIOH	5.70%		\$174,000.00
Design Cost	12.00%		\$366,000.00
Total Project Cost			
			\$3,593,000.00