The Sustainability Team members bring together expertise across MNARNG directorates and offices, allowing them to cohesively address the sustainability goals of the organization in more cost-effective and resource-efficient ways. Environmental objectives are embedded into the operations and designs of the MNARNG's facilities, and the Team has implemented comprehensive sustainability plans and policies aimed to achieve eMS sustainability goals.

- The Joint Sustainability Master Plan, MNARNG Environmental Protection and Enhancement Policy – Regulation 200-1, and the MNARNG Campaign Plan outline goals and strategies for achieving benchmark reductions in energy use, increasing recycling, promoting a "greener" fleet with reduced emissions, and eliminating waste streams.
- The Adjutant General's Campaign Plan also emphasizes sustainability projects vital to the MNARNG's mission, particularly areas related to energy conservation, renewable energy production, building new facilities to the LEED or SB2030 design standards, and furthering the Camp Ripley Army Compatible Use Buffer (ACUB) & Sentinel Landscape programs.
- The Team maintains and updates all conventional management plans, including hazardous waste management, spill management, wellhead protection, etc.

Team members are also participants in the MNARNG Sustainability Working Group (SWG), a cross-directorate group that meets biweekly to promote and track sustainability measures. They work with the Minnesota Pollution Control Agency (MPCA) on compliance activities and maintain licensing or permitting current for stormwater, underground storage tanks, hazardous waste, and National Pollution Discharge Elimination System.

Sustainability goals are explicitly reflected in the MNARNG's eMS, and the Team leads efforts on the current identified aspects:

Encroachment • Aspect: Degradation of training ability and habitat loss at Camp Ripley Training Center • Impact: Potential loss of training area • Objectives: Enroll 3,000 acres annually in ACUB & CRSL	Municipal Solid Waste • Aspect: Generation, accumulation and disposal of MSW statewide • Impact: Reduction in land quality and use of non-renewable resources • Objective: Achieve 75% solid waste diversion from landfill by 2030.
Energy Use Intensity • Aspect: Use of non-renewable resources for heating, cooling and lighting in MNARNG facilities • Impact: Reduction of non-renewable resources • Objective: Achieve and maintain a 30% energy use intensity reduction by 2027 relative to a 2017 adjusted baseline	Water Use Intensity • Aspect: Use of non-renewable resource in MNARNG facilities • Impact: Reduction of non-renewable resources • Objective: Reduce water consumption per square foot 2% annually

The Team's work has accomplished cost savings for the MNARNG. Their partnership with Green Corps has helped the installation to assess additional waste diversion opportunities and evaluate the efficacy of the recent composting program at Camp Ripley at lower cost than contracted auditing. The expansion of solar PV power is also a net benefit to the MNARNG's energy costs. The standalone arrays produce energy that is used directly by the facility. In calendar year 2018, MNARNG's solar arrays in use on facilities throughout the state saved $23,190 in utility bills.

The MNARNG and the State of Minnesota have set ambitious goals for energy resilience and independence and the reduction of waste and water use. State energy goals exceed federal objectives, calling for 15% water use reduction and 25% increase in sustainable procurement purchases by 2025, 30% reduction in fleet petroleum use and energy use intensity reduction of 30% by 2027, and solid waste diversion rates of 75% by 2030. To meet these goals, the Team continuously works toward 3% annual energy reduction and 2% water use reduction across the MNARNG installation, in conjunction with expanded recycling and composting to reduce waste and conversion to greener vehicle fleets.

Renewable Energy: Over the past two years, the Team has made its most significant gains in green construction and renewable energy use. Energy intensity continues to drop dramatically from the 2017 baseline measure. In FY19, the Team achieved energy use intensity of 73.51 kBtu per square foot; in FY20, intensity dropped to 59.08 kBTU per square foot, a year-to-year reduction of 17.83% and a drop of 19.63% from 2017. Including Renewable Energy Certificates, the Team accomplished renewable electric consumption of 49.02% in 2020, with cumulative renewable energy use of 14.35%

Much of this renewable energy can be attributed to existing and expanding solar PV arrays. The Team has overseen arrays at five locations, including:

AHATS FMS (solar PV, solar Thermal) • 40 kW solar PV and solar thermal • provides 6.5% of electrical needs for 100,00 square foot facility	**CRTC 6-76 Education Center** • Solar thermal accounts for 30% of the facility's domestic hot water supply
Bemidji TACC • 40kW solar PV • Provides 24% of electrical needs • 11,000 kWH of produced energy was exported to the utility, excess to immediate needs of building	**Stillwater RC** • 50kW solar PV • Provides 6% of electrical needs
Rochester TACC • 54kW solar PV • Provides 26% of electrical needs	

To these renewable resources, the Team has added arrays at St. Cloud TACC, AHATS Division Headquarters and Inver Grove Heights TACC. The St. Cloud TACC was completed this year and includes an array of 52 panels arranged in two strings feeding two inverters. Mounted on the roof of the vehicle maintenance bays, the array produces 20kW. The St. Cloud TACC also features a thermal storage system allowing for a small air conditioning chiller. The chiller runs overnight to freeze 1300 gallons of water in two adjacent tanks; during the day, the ice meets the cooling loads for the building in tandem with the chiller but results in less demand to the utility provider during peak use hours. At the AHATS site, completing construction now, the Team has overseen installation of a 60 kW solar PV system. The monthly output over July and August 2020, the first two months of operation, has exceeded 10,000 kW hours. The Team also contributed to the design phase of this building, to integrate features like geothermal heating and cooling, daylighting, and water-conserving fixtures. Ground has just broken at Inver Grove Heights TACC, where the Team is managing installation of an 80kW solar PV array.

The Team is working to transform the MNARNG's overall energy footprint. Many systems that were running on natural gas are being converted as maintenance or end-of-life replacement to pair with renewable energy sources. At Camp Ripley, the Team is pursuing a microgrid that will permit energy islanding in emergency situations, with several one-megawatt generators linked to the solar field. The Team is in the process of acquiring the switch equipment that will allow the MNARNG and Minnesota Power to take the installation off the municipal grid. Camp Ripley's existing 10-megawatt solar field currently feeds power to the municipal grid. The Team has encouraged geothermal systems at new construction; based on the existing sites where these have been installed, energy savings of around 45% have been documented. The Team also continues to pursue construction of a biomass district heating plant at Camp Ripley, a long-term project that has been partially funded by the State of MN and is now fully designed.

Sustainability Features of the newly constructed Arden Hills Division HQ include a 60 KW solar PV system, expected to meet 2.5% of the expected electrical load, daylighting, solar tube style skylighting, and a ground source heat pump system that will provide for all the heating and cooling needs of the building.

FLEET/ Green vehicles: Executive Order 13693 requires Federal agencies that operate a fleet of at least 20 motor vehicles to plan for and implement appropriate charging or refueling infrastructure or other power storage technologies for zero emission vehicles or plug-in hybrid vehicles and opportunities for ancillary services to support vehicle-to-grid technology. In response to this and similar mandates from the State, the Team has obtained 4 Chevy Volt PHEV for use on Camp Ripley by the housekeeping staff and a charging station with four outlets on one electric meter has been installed. Energy consumption is monitored monthly and tracked for periodic reporting. In 2019, the Team also replaced older fleet vehicles with more fuel-efficient models, purchasing two Chrysler Pacifica, two Toyota Camry, and one Toyota Rav4 to replace 2012-13 Chevy Equinox, Chevy Impala, Dodge Caravan, and Ford Focus models.

Waste Reduction: The Team has previously piloted composting programs at the dining facilities most heavily used on Camp Ripley, and they continue to explore the opportunities to expand and improve composting as a waste diversion strategy. In 2019, the Team was augmented with support from a GreenCorps specialist; the GreenCorps program places members with host organizations like local government, schools, public education institutions, and nonprofits. GreenCorps is an environment-focused AmeriCorps program implemented by the MPCA. The Team's GreenCorps member assisted with increasing waste diversion through education and outreach, and in program development with the organics and comingled recycling programs on Camp Ripley. Through this partnership, the Team obtained campus-wide waste stream assessment at AHATS, recycling surveys at Camp Ripley, and research on the use of compostable cutlery, Styrofoam reduction, and organic recycling expansion. While some of these

New signage on waste containers, signage in utility rooms and on exterior doors leading to dumpsters, as well as expansion to the new AHATS Division HQ building are all current initiatives to achieve 75% waste diversion by 2030.

efforts have been delayed by pandemic response, the composting program is being rolled out at the AHATS new Division Headquarters building and then to the full campus in October.

The composting program represents one of the few areas where the Team can still achieve significant reduction rates in already reduced waste streams throughout the state. Organic material diversion from landfill disposal will effectively achieve management of all possible waste streams. Per eMS goals, the Team strives for 75% solid waste diversion by 2030. Though operations have been disrupted by the pandemic, in FY20, they tracked over 37% diversion by the third quarter, with 110.55 tons of material recycled. They also achieved 100% diversion rates for non-hazardous construction and demolition materials, recycling 62.54 tons of this debris in FY20.

Water Conservation: The Team pursues water reduction as a course of operations; in FY19, cumulative water use intensity was 0.0123 kGal per square foot, and in FY20, the intensity dropped to 0.0088 kGal per square foot. This is a one-year reduction of 8.65% and a cumulative 35.29% water use intensity reduction from the 2017 baseline. A turfgrass feasibility study to further reduce water use was begun in July 2020.

The Team has identified potential harms to water resources through the unavoidable use of salt to treat icy roads, sidewalks, and parking lots during Minnesota winters. Salt is the most cost effective treatment available, but overuse of salt leads to sodium chloride washing off roads and into surface and groundwater sources. Once chlorides enter groundwater, they persist indefinitely, with desalinization the only treatment possible. MPCA water monitoring shows that salt concentrations are increasing in lakes, streams, and groundwater around the state. In the glacial aquifer system, which extends across the northern United States, chloride concentrations were highest in shallow groundwater beneath cities and urban areas, in some cases exceeding the standard for drinking water (250 mg/L) affecting taste and odor. During low-flow conditions, when groundwater is the dominant source of water to streams, high concentrations of chloride in groundwater can cause chloride in streams to exceed the chronic aquatic criterion developed to protect fish and other aquatic life. Soils and vegetation are impacted as well. Chlorides are among the biggest pollutants of water in the state. Overuse of salt also corrodes vehicles and infrastructure, posing significant long-term costs.

The Team has responded to this by launching the “Smart Salting” program across all MNARNG facilities, focusing on better application training and awareness. More salt causes more harm, but it does not actually cause faster melting. The Team’s new protocols call for a one- to three-inch spread between granules using a hand spreader to avoid over-application. Roughly one pound of salt is needed for 250 square feet of pavement, and it will only be applied to ice patches. The training also advises that sand should be substituted at temperatures below 15

degrees and that when using salt, MNARNG staff should create brine to jumpstart melting rather than spreading pellets in solid form. Any excess salt material should be swept up to avoid runoff into storm sewers. The new training and guidance will be put into effect this coming winter; the Team will be able to track its efficacy initially by comparing volumes of salt used compared to FY20.

Installation of Army Metering (MDMS) allows FMO Sustainability Team members to monitor building energy usage down to 15-minute intervals for more precise energy management.

The Team is the cornerstone of the MNARNG's long-term sustainability strategy, prioritizing resilience and independence to safeguard operations throughout the state. The Team's work has helped to slash waste and grow efficiencies across waste, water, and energy; their efforts translate into avoided utility and disposal costs and more effective use of MNARNG funds for the mission. The Team continues to seek out ways to become more impactful. This year, several members took RCX Academy training on building operations and energy efficiency so that they could better communicate with facility managers and support them in their sustainability efforts. They have begun conducting their own inspections and audits for energy efficiency in the process, updating the site visit checklists already in use to take improvement opportunities into account. Throughout the MNARNG, the sustainability ethic is well-rooted, and all personnel can join in the Team's mandate for continuous progress in stewardship.

The Team has helped to foster this shared commitment through the training and hands-on assistance they provide to implement best management practices throughout the state. Team members conduct the Site Assistance Visit for Environmental Requirements (SAVER), they are able to complete one-on-one training and resolve any issues a unit may be having; typically during these visits, they will spot-check dumpsters and review systems to ensure that recyclables are being recaptured and there are no indications of leaks or energy waste due to equipment issues. The Sustainability Team also coordinates both classroom and online environmental training to keep environmental compliance officers certified and ensure staff and soldiers have had the appropriate briefings. As partners in the state's Buildings, Benchmarks and Beyond program (B3), the Team has also been able to integrate monitoring and auditing tools that create a more comprehensive record of MNARNG facilities, which in turn promotes programmatic continuity for tracking trends and setting goals. To encourage better resource use among soldiers and staff, the Team continues to conduct its Energy Efficiency Challenge for all MNARNG facilities.

While the Team partners with MPCA, GreenCorps, and the B3 program, their primary stakeholders are the staff and soldiers of the MNARNG itself. To support environmental awareness and sustainability initiatives in particular, the Team has focused on educational outreach over the past two years. The Smart Salting program is one example of this, but they have also designed and rolled out signage and posters to promote composting and recycling in those facilities where these processes are less normalized. They have created waste points with designated receptacles to encourage uptake and help soldiers form new waste diversion habits for ordinary activities like having lunch. Team members presented on this initiative at the Commanders Breakfast this year to help publicize it as well.

At Camp Ripley, the Team has partnered with the University of Minnesota on a turf grass study; a graduate student also attending officer candidate school is evaluating the potential of a better seed mix for sustainable landscaping in the cantonment area. The proposed fescue and clover mix will decrease dust, reduce heat, and help stormwater infiltrate more easily. For families of deployed soldiers, the Team participates in the Family Training Readiness weekend events, presenting information on resilience, mindfulness, and environmental engagement as strategies for preserving mental health—the sustainability of the MNARNG rests not just in net zero initiatives, but also in its human contributors.

MNARNG was able to host a MN GreenCorps Member, Zack Sonntag, for FY20. MN GreenCorps is an Americorps program offered through the MN Pollution Control Agency. The MNANRG GreenCorps Member assisted the agency with increasing waste diversion through education and outreach, expansion of organics to Arden Hills, and other waste reduction opportunities.

Team members continue to take part in the four State working groups from the Office of Enterprise Sustainability (OES). The OES supports state agencies by helping to ensure state government operations save money by implementing socially and environmentally responsible solutions. The OES uses Results Based Accountability practices to identify current condition/status baselines, develop metrics for implementation and execution across state agencies, and is a leading force in the state for sustainability. Two Team members sit on the OES committee working groups and take an active role in assisting state regulators in defining objectives for state agencies. The Team assists in hosting the annual Water Festival for school children on Camp Ripley each year; the event teaches participants about water conservation and water quality measures enacted by the MNARNG. Each year, the Team publishes the MNARNG Environmental compliance report outlining all compliance programs, initiatives, and successes. Their *Steward* Environmental newsletter is another avenue for outreach to communicate informational, scientific, and educational articles relevant to environmental programs for the MNARNG.