



FORT CARSON 25-YEAR SUSTAINABILITY GOAL PLAN ENERGY & WATER RESOURCES (EWR)

Goal Statement:

Sustain all facility and mobility systems from renewable sources and reduce total water purchased from outside sources by 75% by 2027

25-Year Vision

The long term goal for this 25-Year Plan is to sustain all facility and mobility systems from renewable sources by 2027 and reduce the total water purchased from outside sources by 75% from the 2001 baseline by 2027. The desired end-states are: secure sustainable energy sources; alleviation of dependence on fossil fuels and adverse air emissions; funding for life cycle costs; reduction of reliance on petroleum imports and vulnerability; water conservation through efficient consumption, reduce treated wastewater effluent, increase in the quantity of water re-use and development of sustainable water source solutions. Achievement of this goal supports Installation and force security.

Ownership and Involvement (Resources, Roles and Authority)

Goal Proponent: DPW Director

Goal Lead & Fort Carson Partners: DPW - Operations Division Chief, Utility Manager, Energy Manager, Stormwater Program Manager, Wastewater Program Manager; PAIO Strategic Planner, Sustainability Planners, Balfour Beatty Communities (BBC), Fort Carson Support Services

Off-post Partners: Colorado Springs Utilities, Southern Colorado Renewable Energy Coalition, National Defense Center for Environmental Excellence (NDCEE), National Renewable Energy Laboratories, U.S. Department of Energy (Federal Energy Management Program), Governor's Office of Energy Conservation, Corp of Engineers National Energy Team, Army Construction Engineering Research Laboratory, Colorado Renewable Energy Society, City of Colorado Springs, Pikes Peak Area Council of Governments, Colorado Department of Public Health and Environment (CDPHE), El Paso County Health Department, Lower Fountain Water Quality Management Association (LFWQMA)

Fort Carson SEMS – Significant Aspects and Impacts

Fort Carson's Sustainability and Environmental Management System (SEMS) sites eight aspects of activities on the Installation that have significant impacts on sustainability. Two of these aspects are consumption of water and energy use. Specifically, energy and water use as they relate to the following activities and operations:

- Water use for construction and dust control
- Water use in food service;
- Water use in landscape irrigation and maintenance;
- Water use in buildings and facility operations;
- Petroleum use and water use for vehicle and equipment maintenance
- Energy use in goods, services, storage and maintenance
- Energy use in buildings for vehicle and equipment maintenance and storage
- Energy use in business operations
- Energy use in construction operations
- Water quality in infrastructure: vehicle and equipment maintenance (repair/preventive maintenance & storage)
- Water quality in transportation and land use (tactical vehicles)

-
- Water quality in operations - business operation (waste water)

Legal and Other Requirements

- AR 420-1
- EO 13423
- EO 13514
- Energy Policy Act (EPACT) 2005
- Energy Independence and Security Act (EISA) 2007
- The U.S. Army Energy and Water Campaign Plan
- SEMS goal - Sustainable Transportation
- SEMS goal - Air Quality
- SEMS goal - Sustainable Development
- SEMS goal - Sustainable Training Lands
- SEMS goal - Sustainable Procurement
- SEMS goal - Zero Waste

Background

This goal is the result of the combination of two goals and a portion of another goal from the Sep 2002 sustainability conference. The original goals were:

- **Sustain all facility and mobility systems from renewable sources with the capacity to generate all facility energy on post.**
- **Total water purchased from outside sources will be reduced by 75% from the 2001 baseline.**
- **Reduce the total volume of wastewater and storm water treated by 75%.**

The intent of these goals is to:

- Efficiently utilize energy, mobility, and water resources.
- Reduce reliance on fossil fuels - especially petroleum imports.
- Reduce impact on the environment from fossil fuels.
- Reduce vulnerabilities and volatility of energy and water sources.
- Obtain reliable low cost utility, mobility, and water services.
- Not automatically turn to distributed energy sources.
- Not burden existing energy and water systems.
- Enhance well being.
- Achieve closer alignment with The Natural Step system conditions.

This goal is the result of the combination of two goals in addition to the transfer of the wastewater and storm water treatment goal from the Zero Waste Goal. The primary method to reduce the volume of treated wastewater is to reduce the volume of water used at the Installation. Thus, the wastewater treatment goal is a measure of the reduction of water purchased from outside sources.

The three objectives that make up this goal support sustainable utilities use. Reducing water usage will reduce the amount that is treated by the sewage treatment plant, thus supporting Zero Waste Goal 10. In fact, the only way to truly reduce the amount of water treated on the Installation is to reduce the amount used by the Installation. Reducing energy and water use will allow the Installation to continue its training mission even if the cost of fuel, energy, and water increase dramatically over the next 25 years or if current common sources of energy become scarce. In addition to saving money, reducing

reliance on non-renewable and polluting sources of energy also improves the quality of air in which Soldiers live and train.

Achievement of this goal supports Installation and force security. Distributed sources of energy are one way to enhance Installation security. With sources or backup sources of energy readily available and unlimited on Fort Carson, any problems with the centralized source will not affect training and readiness. Furthermore, if tactical vehicles have an available source of fuel that lasts longer than current fossil fuels, the vehicles will be able to go further without refueling, easing the logistics burden, as well as enhancing the vehicle's ability to safely return Soldiers.

Challenges & Barriers

Special Challenges to achieving energy efficiency: Energy efficiency, which is measured in thousands of British Thermal Units per square foot, or KBTU/SF, was improved by 30% in FY85 compared to FY75. The new goal is to reduce by 30% in FY17 from a FY03 baseline. The Installation is now operating at 6.2% efficiency improvement. Additional efficiencies and cost reductions are compromised by the energy intensive operations of the Evans Army Community Hospital, excessive use of air conditioning, difficulties in applying life cycle assessment in new construction and construction of new of battle/flight simulation facilities.

Training

- Building Energy Monitor (BEM) Training
- Environmental Protection Officer (EPO) Training
- SEMS Awareness

Communication

- Internal communication of energy and water program through Mountaineer articles, policy letters, education, training and awareness, other publications and announcements
- External Communication of the program with the Headquarters Department of the Army, IMCOM West, the Front Range Renewable Energy Consortium, the Governor's Energy Office, Colorado Springs Utilities and regional energy planners

Document Control

- Energy Management Plan – Stored on Energy Manager computer and shared network
- Energy Policy Letters – Stored on Energy Manager computer, shared network and Sharepoint
- Energy Program Continuity Book - Stored on Energy Manager computer and shared network
- Water Policy Letters – Stored on Energy Manager computer, shared network and Sharepoint

Operational Controls

- DPW Energy SOP – Under construction
- Hydrant Permits – Utility Manager Office
- Installation Design Guide

Monitoring & Measurement

Energy/water usage data stored in Army Energy and Water Reporting System (AEWRS) website; Data entered by Energy Manager at <https://aewrs.hqda.pentagon.mil/aewrs/>
Manual meter data stored in Utility Manager office
Meter collected from Smart meters stored in Utility Control System at Bldg 1860

Evaluation of Compliance

Inspections from Environmental Compliance Assessment Team
Evaluation of Fort Carson Support Service contract actions from Tech Monitors

Nonconformity

Tech monitor daily reports are completed for several facility maintenance program areas reviewed by DPW Operations for the Fort Carson Support Service contract;
nonconformity actions handled by COR of contract

Control of Records

Tech Monitor reports on DPW shared network
Hydrant Permits in DPW Utility Manager office
Utility Agreements in DPW Utility Manager office
Customer utility bills electronically and in the Utility Manager office
CSU utility bills electronically and in the Utility Manager office

Annual Review

Energy Management Plan is updated annually by Energy Manager
Annual Sustainability breakfast for Energy Program (each September)
SEMS annual review

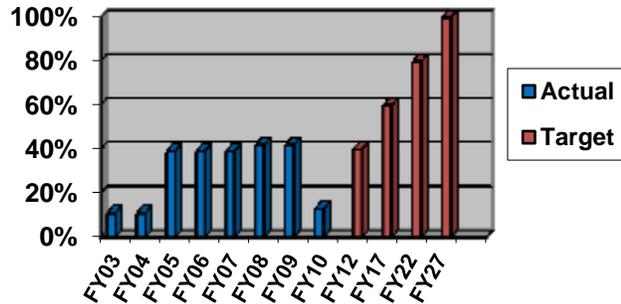
Goal Objectives and Targets

Objective EWR1: Increase renewable energy use in facilities compared to a FY03

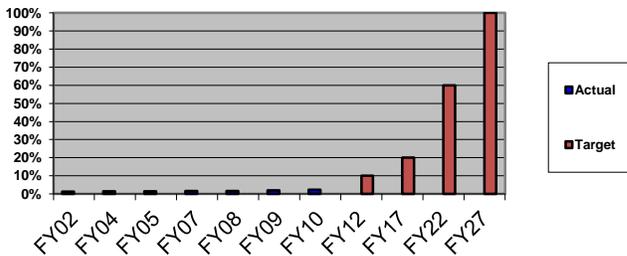
Target by FY12:
40% of facility electricity from renewable sources

Target by FY17:
60% of facility electricity from renewable sources

Fort Carson Renewable Energy Use vs. Total Energy Consumed



Facility Heat from Renewable Sources



Target by FY12:
10% of facility heat from renewable sources

Target by FY17:
20% of facility heat from renewable sources

Details on Objective EWR1 Target Graph

Measure: Percentage of renewable electrical energy consumed by Fort Carson compared to the total energy consumed.

Scope: Renewable Energy is defined as energy from non-petroleum sources such as wind, hydro and solar power.

Source: Colorado Springs Utilities and Renewable Energy Credits from WAPA.

Baseline: The FY03 base is 11% renewable energy usage at Fort Carson. Colorado Springs generates about 10% of its energy from hydro and wind power. Fort Carson generates about 1% of its power from solar power for traffic lights, heating, pumps and other equipment and another 2.5% from Fort Carson Solar I project completed in December 2007. In FY05, 28% of Fort Carson’s power was offset through WAPA by completing a Renewable Energy Certificate (REC) purchase for five years. This contract expires in FY10.

Facility heat from renewable sources has increased slightly since the FY03 baseline due to a solar wall project and three facilities either completed or being constructed that use ground source heating.

Limitations: Colorado Springs Utilities provides approximately 99 percent of Fort Carson’s energy and is a publicly owned utility. While Fort Carson can influence the utility company by being such a large customer, Fort Carson does not control the energy portfolio of Colorado Springs Utilities.

Verification & Validation: The DPW Utility Sales Officer is in frequent contact with the Fort Carson account manager from Colorado Springs Utilities.

Comment: In general, renewable energy is typically more expensive than traditional energy sources such as coal and natural gas. However, prices continue to fall and renewable energy is becoming a good decision in broadening an energy portfolio.

Initiatives in support of Obj. EWR1 (FY10/11)

Wind Power Purchase – Working with Colorado Springs Utilities and wind providers to potentially purchase 7.5% to 30% of electrical energy from a wind power purchase

Biomass Feasibility – Working with National Renewable Energy Laboratories (NREL) to research feasibility of biomass plant connected to the main heat plant

100 KW Photovoltaic System for Camp Red Devil – Energy Conservation Investment Program (ECIP) submittal completed in FY09 for funding consideration in FY11

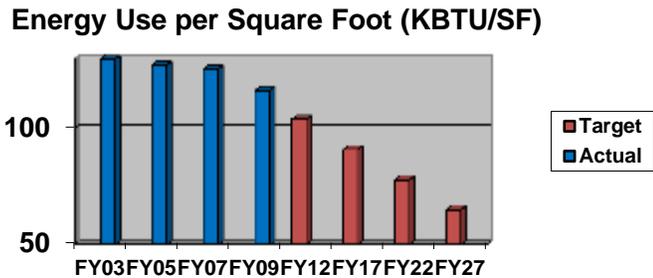
Microgrid Initiative – Partnering with NREL to potentially create a microgrid on Fort Carson with potential renewable projects to support the grid such as photovoltaics or electric vehicles

Participants involved: NREL, IMCOM, DPW

Objective EWR2: Improve facility energy efficiency by reducing energy use per square foot (KBTU/SF) from a FY03 baseline

Target by FY12:
20% energy use per square foot reduction

Target by FY17:
30% energy use per square foot reduction



Details on Objective EWR2 Target Graph

Measure: Energy use per square foot of floor space.

Scope: Energy Efficiency is defined as the combined energy use of natural gas and electricity per square foot of floor space (real property) not including housing (which is privatized).

Source: The DPW utility usage spreadsheets are based on Colorado Springs Utilities bills and real property floor space.

Baseline: The FY03 base is 129.737 KBTU/SF.

Limitations: Effects of weather on energy demand are not considered in the calculation. A severe winter will impact natural gas usage or a hot summer will impact electrical demand. New construction projects with year round climate control will also impact energy use. Demolition projects can have significant impacts on square footage and energy use calculations.

Verification & Validation: The DPW Utility Sales Officer validates utility bills. Bills are based on meter readings.

Comment: Energy Savings Performance Contract helps identify high payback energy conservation opportunities and implements them through alternative financing strategies. Projects and studies that identify and replace inefficient systems and equipment such as motors, fans, furnaces, air conditioners, lights, and heating systems can dramatically affect energy numbers. Command emphasis on elimination of waste has been documented to reduce consumption and costs.

Initiatives in support of Obj. EWR2 (FY10/11)

High Bay Lighting Retrofits – Contracted Ameresco through the COE Huntsville to replace inefficient lighting in multiple facilities on Fort Carson

Boiler Replacements – Contracted Johnson Controls to replace several inefficient boilers in multiple facilities on Fort Carson

Meter Data Management System (MDMS) Pilot Site – Working with COE, Calibre and the Fort Carson NEC to field a system that will allow manipulation of smart meter data via the internet to use for energy trending and opportunity analysis

Energy Audits – Perform audits of multiple facilities to identify opportunities. A night time audit to identify wasted exterior lighting use will also be completed



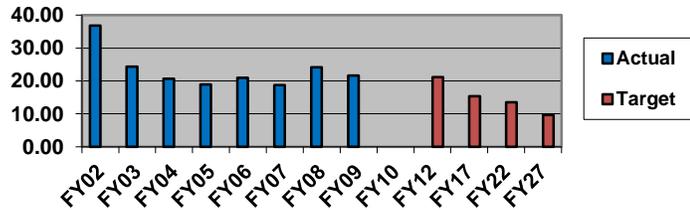
ECIP Participation – Continue to submit projects for consideration to include Energy Management Control System (EMCS) expansion, pursuit of energy opportunities identified under the Energy Engineering Analysis Program (EEAP) and re-commissioning opportunities
Participants involved: COE Huntsville, Ameresco, Johnson Controls, DPW, NEC

Objective EWR3: Reduce the amount of potable water consumed per capita (to include housing) based on FY02 baseline

Target by FY12:
Amount of potable water purchased from outside sources reduced by 45% per capita

Target by FY17:
Amount of potable water purchased from outside sources reduced by 60% per capita

Fort Carson Annual Water Use KGal (with housing)



Details on Objective EWR3 Target Graph

Measure: Water consumption per capita to include housing.

Scope: Water usage is defined as water purchased.

Source: The DPW utility usage spreadsheets are based on Colorado Springs Utilities bills.

Baseline: The FY02 baseline consumption is 962,366 KGal

Limitations: Water usage is very dependant on spring and summer watering conditions. A dry summer typically means higher water consumption

Verification & Validation: The DPW Utility Sales Officer validates utility bills. Bills are based on meter readings.

Comment: None.

Initiatives in support of Obj. EWR3 (FY10/11)

Water Audits – Completing water audits for multiple facilities on Fort Carson. Will determine course of action, to include funding stream, if cost effective solutions

Xeriscaping – Minimal watering requirements for new construction

Participants involved: DPW, BBC, Tenant Activities, Kira