

# THE UNIVERSITY OF TEXAS AT AUSTIN

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## The Utilities and Energy Management Department Carl J Eckhardt Heating and Power Complex

Supporting the District Energy Requirements of LEED-NC v2009

*Demonstration of M&V requirements for EAc5*



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## Overview

All new construction projects pursuing LEED 2009 certification on the UT Austin Main Campus and connected to the thermal district energy system (chilled water and/or steam) must adhere to the requirements detailed in USGBC's guidance document *Treatment of District or Campus Thermal Energy in LEED V2 and LEED 2009 – Design & Construction*. The requirements are limited to Energy and Atmosphere and seek to ensure that upstream generation equipment meets the intent of LEED certification. The following prerequisites and credits are impacted:

- EAp2 & EAc1 – Energy Performance
- EAc3 – Enhanced Commissioning
- EAp3 & EAc4 – Refrigerant Management
- EAc5 – Measurement & Verification

The detailed requirements are outlined in the above referenced USGBC guidance document. This document provides the supporting information required to demonstrate compliance with EAc5 and provides the metrics and methods utilized by upstream district energy system equipment to quantify and verify the performance utilized in EAc1.

## Measurement & Verification

The USGBC guidance document requires that upstream DES equipment demonstrate ongoing metering and measurement to the extent that it can verify the supporting data provided for energy modeling performed in EAc1. This includes total building site metering for consumption and enough metering at the generation source to develop performance metrics. The available metering, its frequency, and the determined metrics for each utility are detailed below.

### Cooling

#### Site Metering

Chilled water consumption (flow, temperature, and tonnage) is digitally metered at the individual building level as part of the Building Utility Metering Project (BUMP).

This metered data is collected at a sub-one minute interval and also totalized into daily and monthly values. The interval and totalized data is collected in a data historian that can be accessed via direct data queries or via graphical interfaces. Monthly totals are validated each month and passed to a monthly billing database and dashboard.

#### Generation

Each chilling station, individual chillers, and thermal storage tank are digitally metered for total chilled water generation based on flow, temperature and tonnage and data recorded in sub one-minute intervals in a data historian. Electrical consumption for total station, individual chillers, and other supporting equipment is digitally metered and recorded at sub one-minute intervals. Instantaneous performance is measured in terms of kW/Ton and COP. Performance is tabulated and reported in a monthly Utilities Report.

## Combined Heat and Power

### Site Metering

Steam consumption (recorded in pounds, measured as condensate flow at the building) and electricity consumption (totalized kWh and kW demand) are digitally metered at the individual building level as part of the Building Utility Metering Project (BUMP).

This metered data is collected at a sub-one minute interval and also totalized into daily and monthly values. The interval and totalized data is collected in a data historian that can be accessed via direct data queries or via graphical interfaces. Monthly totals are validated each month and passed to a monthly billing database and dashboard.

### Generation

Electrical generation (kW) is digitally metered at each generator as well as a variety of other points, including the electricity leaving the plant, allowing for both gross and net calculations of instantaneous electricity generation. The metered data is recorded at sub one-minute intervals in a data historian.

Similarly, fuel flow of natural gas is digitally metered as volume flow and/or mass flow at each turbine and boiler and calculated into BTU per hour. Fuel flow is also metered by the gas utility for each power plant building, serving as a totalized flow and check against the other metered flows.

Extraction steam to campus is metered at the four tunnels radiating from the power plant to the campus distribution piping. Each of the tunnels is equipped with an insertion annubar meter, which delivers real-time and totalized flows to the plant's DCS system. The campus steam flows are continually checked against the total steam generated, the condensate returned from campus, and the total plant make-up water flow.

From the above measures, metrics are calculated to determine total thermal efficiency (%) and electrical generation heat rate (BTU/kWh), which are tabulated and distributed in a monthly Utilities Report.