

Oakwood Health Care Data Integrator Notes

Oakwood Health Care has two Waukesha 300 kW generators running on natural gas. The generators can run in parallel with the grid or in isolation. Heat is recovered using jacket water to provide energy for boiler pre-heat and domestic hot water.

Data Point Details

The data at this site was provided in the form of a Microsoft Excel spreadsheet containing daily data. All data for this site in the hourly online database is created from daily data and should be viewed on either a daily or monthly interval. The details for each individual data point are outlined below.

DG/CHP Generator Output (total kWh)

The data for Generator Output comes from daily values for the two generators separately. The columns of origin for this data point are labeled “Generator 1 Electric” and “Generator 2 Electric” in the daily data file. This energy data is added together and then divided evenly into hourly data between the current and the previous record for the hourly online database.

DG/CHP Generator Output Demand (peak kW)

This data point is the same as DG/CHP Generator Output.

DG/CHP Generator Gas Input (cubic feet)

The data for Generator Gas Input comes from daily values. The column of origin for this data point is labeled “Gas Meter Usage”. This gas data is then divided evenly into hourly data between the current and the previous record

Total Facility Purchased Energy (total kWh)

The data for Facility Purchased Energy comes from daily values for the total building load and the two generator outputs. The columns of origin for this data point are labeled “Building Power Usage”, “Generator 1 Electric” and “Generator 2 Electric”. The two generator outputs were subtracted from the total building load for the facility purchased energy. This energy data was divided evenly into hourly data between the current and the previous record for the hourly online database.

Total Facility Purchased Demand (peak kW)

This data point is the same as Total Facility Purchased Energy.

Other Facility Gas Use (cubic feet)

There is no data available for this data point from the data files.

Total Facility Energy (total kWh/h) and Total Facility Demand (peak kW)

These two data points are the sums of the DG/CHP Generator Output and Total Facility Purchased data points from the online database.

Unused Heat Recovery (total MBtu/h)

There is no data available for this data point from the data files.

Useful Heat Recovery (total MBtu/h)

The data for Useful Heat Recovery comes from daily values for Boiler Loop Heat Recovery and Domestic Hot Water Heat Recovery. The columns of origin for this data point are labeled “Boiler Loop HX Heat Removed” and “DHW Heat Removed”. These values are converted from displaced gas use in millions of cubic feet (MCF) to heat recovered in MBtus by using the Higher Heating Value (HHV) of the fuel which is 1.030 MBtu/cubic foot (Natural Gas). This data is added together and then divided evenly into hourly data between the current and the previous record for the hourly online database.

Status/Runtime of DG/CHP Generator (hrs)

The runtime of the generators comes from daily accumulator values for both generators. The columns of origin for this data point are labeled “Gen-1 Engine Run Time” and “Gen-2 Engine Run Time”. The differences between the individual accumulators are calculated and then those values are added together for the daily combined runtime. This daily runtime data is divided evenly into hourly data between the current and the previous record for the hourly online database.

Ambient Temperature (avg °F per hour)

The data for Ambient Temperature comes from daily values. The column of origin for this data point is labeled “Outside Air Temp Daily Avg”. These interval values are then assigned to all hourly data between the current and the previous record.

Total CHP Efficiency (%)

The Total CHP Efficiency is calculated from the online hourly database as the sum of the Useful Heat Recovery and the DG/CHP Generator Output, converted from kWh to MBtus, divided by the DG/CHP Generator Gas Input. The gas input is converted to MBtus using the Lower Heating Value (LHV) of the fuel which is 0.930 MBtu/cubic foot (Natural Gas).

Electrical Efficiency (%)

The Electrical Efficiency is calculated from the online hourly database as the DG/CHP Generator Output, converted from kWh to MBtus, divided by the DG/CHP Generator Gas Input. The gas input is converted to MBtus using the Lower Heating Value (LHV) of the fuel which is 0.930 MBtu/cubic foot (Natural Gas).

Data Quality Checks

The Data Quality Checks consist of three levels of verification: does the data exist, does the data pass reasonable range checking and does the data pass relational checks. The methodology for applying the data quality begins by creating a contiguous database. This is necessary to maintain compatibility between the many sites on the server. Next, the data received for this site is fit into a hourly database. For any period where there is data, the data quality level is set to 3 for “Passes Relational Checks”. We then work backwards to identify data that does not meet Relational and/or Range Checking.

The next step is to apply the relational checks. Relational checks attempt to identify data which is uncorroborated by the rest of the data set. For instance, data received indicating a DG/CHP Generator output when the gas use is zero is suspect. For data failing a relational check, the data quality level is set to 2 for “Data Passes Range Checks” or 1 for “Data Exists”.

The last step is evaluating the range checks. The range checks consist of reasonable high and low values based on facility and DG/CHP Generator information. Data that falls outside the defined range for the database value has its data quality level set to 1 for “Data Exists.”

It is necessary to work backwards when applying data quality checks to insure that data gets set to the lowest applicable data quality level. It is possible for data to pass the relational check and fail the range check and such data will be set to a data quality level of 1 for “Data Exists.”

Table 1. Data Quality Definitions

Data Quality Levels	Description	Definition
3	Passes Relational Checking	This data passes Range Checks and Relational Checks. This is the highest quality data in the data set.
2	Passes Range Checks	This data passes the Range Checks but is uncorroborated by Relational Checks with other values.
1	Data Exists	This data does not pass Range Checks. This data is found to be suspect based on the facility and/or CHP equipment sizing.
0	Data Does Not Exist	This data is a placeholder for maintaining a contiguous database only.

Details on the Range and Relational Checks are found below.

Relational Checks

There are no relational checks for this site since all of the data is daily.

Range Checks

These checks are applied to the hourly data.

Table 2. Range Checks for Oakwood Health Care

Data Point	Upper Range Check	Lower Range Check
DG/CHP Generator Output	600 kWh	0 kWh
DG/CHP Generator Output Demand	600 kW	0 kW
DG/CHP Generator Gas Use	7500 cubic feet	0 cubic feet
Total Facility Purchased Energy	400 kWh	0 kWh
Total Facility Purchased Demand	400 kW	0 kW
Other Facility Gas Use	N/A	N/A
Unused Heat Recovery	N/A	N/A
Useful Heat Recovery	4,000 MBtu	0 MBtu
Status/Runtime of DG/CHP Generator	1 hrs	0 hrs
Ambient Temperature	130°F	-30°F

Notes: Data failing the Range Check has the data quality level set to 1 for "Data Exists"

ASERTTI Protocol Adherence

This site does not adhere to the ASERTTI Long-Term Monitoring Protocol. Most required performance parameters are being collected. Ambient temperature was recorded in lieu of the generator air intake temperature. The data is available in daily logs which does not conform to the protocol.

Monitoring Notes

August 2004

We received a daily data file spanning from December 2001 to January 2003.