Pepsi, College Point, NY Data Integrator Notes

This site is a bottling plant located in College Point, NY. The site has four 365 kW generators for generating power. Heat is recovered from the engines to produce steam through two heat recovery steam generators (HRSGs) for use in the building. The data includes facility power and gas use in addition to generator power, gas use and heat recovery. Data for this site is collected by Coned Solution and provided to CDH Energy.

Data Point Details

The data at this site is provided by Coned Solutions in the form of comma-separated value (CSV) files. There are two files for each 15-minute timestep interval each containing one reading for eight points. After 06/08/2009 the data file for generators 3 and 4 are only providing 7 data points and the boiler water supply for the entire facility is provided in the first data file. The data files are uploaded continuously and are processed once a day. From these 15-minute values, the hourly database is formed. The 15-minute data consists of all accumulated values. The details for each individual data point are outlined below.

Pepsi, College Point Engines 1 through 4

Table 1. Data Integrator Database Mapping for Generators 1 through 4

Integrated Data System Channel	Units of Measure	Raw Data Row Description [Label][1]	Raw Data Units	Raw Data Mult.[4]	Calculation Formula
DG/CHP Generator Output	kWh/int	Eng1Net-kWh [WG1], Eng2Net-kWh [WG2], Eng3Net-kWh [WG3], Eng4Net-kWh [WG4],	kWh	1.0	= (WG1 + WG2 + WG3 +WG4)
DG/CHP Generator Output Demand	kW	Eng1Net-kWh [WG1], Eng2Net-kWh [WG2], Eng3Net-kWh [WG3], Eng4Net-kWh [WG4],	kWh	1.0	= (WG1 + WG2+ WG3 +WG4)* (60 min/hour ÷15 min/int)
DG/CHP Generator Gas Input	cuft/int	Engine1Gas [FG1], Engine2Gas [FG2], Engine3Gas [FG3], Engine4Gas [FG4]	ccf	100	= FG1 + FG2 + FG3 + FG4
Total Facility Purchased Energy[2]	kWh/int	ElMtr-Totalizer [WT]	kWh	2.0	= WT
Total Facility Purchased Demand[2]	kW	ElMtr-Totalizer [WT]	kWh	2.0	= WT * (60 min/hour ÷15 min/int)
Other Facility Gas Use[2]	cuft/int	FirmGas [FTF]	ccf	100	= FTF
Total Facility Energy	kWh/int	Calculated			
Total Facility Demand	kW	Calculated			
Useful Heat Recovery	MBtu/int	BFd-Wtr-Tot	Gal	8.34	= FFW12*8.34
Unused Heat Recovery[5]	MBtu/int	N/A			
Status/Runtime of DG/CHP Generator	Hours	Calculated			
Ambient Temperature[3]	°F	N/A	°F		
Total CHP Efficiency	% LHV	Calculated	N/A		
Electrical Efficiency	% LHV	Calculated	N/A		

[1] – The Raw Data Row Description listed is from the Coned Solutions AST files, the label, in square brackets, is assigned by CDH Energy and used for reference in the calculation formula.

[2] – All Facility Purchased Energy and Demand is assigned to the first database. This data is only examined on a full facility basis.
[3] – Hourly Temperature from wunderground.com for the JFK airport in Brooklyn, NY has been used for the ambient temperature
[4] – Raw Data Multipliers are specified by Coned Solutions and are applied to the rawdata before using the calculation formula.
[5] – There is no data available for this channel from the Coned Solution data
int - interval

DG/CHP Generator Output (total kWh)

The data for Generator Output comes from two 15-minute accumulators for the energy produced by the engines. The rows of origin for these data points are labeled "Eng1Net-kWh", "Eng2Net-kWh", "Eng3Net-kWh", and "Eng4Net-kWh" in the data files received from Coned Solutions. The sum of the four generators is assigned as the energy produced for that interval. This 15-minute energy data is then summed into hourly data.

DG/CHP Generator Output Demand (peak kW)

The data for Generator Output Demand comes from two 15-minute accumulators for the energy produced by the engines. The rows of origin for these data points are labeled "Eng1Net-kWh", Eng2Net-kWh", "Eng3Net-kWh", and "Eng4Net-kWh" in the data files received from Coned Solutions. The sum of the four generators is assigned as the energy produced for that interval. The maximum for a given hour is assigned to the hourly database.

DG/CHP Generator Gas Input (cubic feet)

The data for Generator Gas Input comes from two 15-minute accumulators for gas flow. The rows of origin for these data points are labeled "Engine1Gas", "Engine2Gas", "Engine3Gas", and "Engine4Gas" in the data files received from Coned Solutions. The sum of the four generators is assigned as the gas used for that interval. This 15-minute gas data is then summed into hourly data.

Total Facility Purchased Energy (total kWh)

The data for Facility Purchased Energy comes from a 15-minute accumulator for the energy import to the facility. The row of origin for this data point is labeled "ElMtr-Totalizer" in the data files received from Coned Solutions. This 15-minute energy data is then summed into hourly data.

Total Facility Purchased Demand (peak kW)

The data for Facility Purchased Energy comes from a 15-minute accumulator for the energy import to the facility. The row of origin for this data point is labeled "ElMtr-Totalizer" in the data files received from Coned Solutions. The maximum for a given hour is assigned to the hourly database.

Other Facility Gas Use (cubic feet)

The data for Other Facility Gas Use comes from a 15-minute accumulator for gas flow. The row of origin for this data point is labeled "FirmGas" in the data files received from Coned Solutions. This 15-minute gas data is then summed into hourly data.

Total Facility Energy (total kWh) and Total Facility Demand (peak kW)
These two data points are the sum of the DG/CHP Generator Output and Total Facility Purchased data points.

Unused Heat Recovery (total MBtu/h)
There is no information for this data channel available from the Coned Solutions data.

Useful Heat Recovery (total MBtu/h)
The Useful Heat Recovery comes from a 15-minute accumulator for the steam produced from the engines. The row of origin for this data point is labeled "BFd-Wtr-Tot" in the data files received from Coned Solutions. This 15-minute heat recovery data is then summed into hourly data.

Status/Runtime of DG/CHP Generator (hrs)
The Runtime of the Generator comes from a 15-minute accumulator for the engine energy output. The rows of origin for these data points are labeled "Eng1Net-kWh" "Eng2Net-kWh", "Eng3Net-kWh", and "Eng4Net-kWh" in the data files received from Coned Solutions. For intervals where the generator energy produced is above 5 kWh for the interval, it is given a runtime of 100% for the interval. This 15-minute runtime data is then summed into hourly data.

Ambient Temperature (avg °F)
The Ambient Temperature comes from hourly sampled conditions at JFK International Airport available at http://www.wunderground.com. The hourly data from the weather underground (which is often recorded at irregular time intervals) is assigned to the closest hour for the Ambient Temperature in the online database.

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 the database, in this case we are using 15-minute data. 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 2. 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

These checks are applied to the 15-minute data before it is converted to hourly data. If any of the 15-minute data points fails the relational check, the data for the entire hour is marked as failed.

Table 3. Relational Checks for Pepsi Co, College Point

Evaluated Point	Criteria	Result
FG	WG > 5 and FG <= 0	DQ Level for FG set to 2

Notes: FG – DG/CHP Generator Gas Use
WG – DG/CHP Generator Output

Range Checks

These checks are applied to the 15-minute data before it is converted to hourly data. If any of the 15-minute data points fails the range check, the data for the entire hour is marked as failed. The same ranges are used for both of the engines.

Table 4. Range Checks for Greenpark Care Center

Data Point	Hourly Data Method	Upper Range Check	Lower Range Check
DG/CHP Generator Output	Sum	200 kWh	0 kWh
DG/CHP Generator Output Demand	Maximum	800 kW	0 kW
DG/CHP Generator Gas Use	Sum	2,500 cubic feet	0 cubic feet
Total Facility Purchased Energy	Sum	500 kWh	0 kWh
Total Facility Purchased Demand	Maximum	2,000 kW	0 kW
Other Facility Gas Use	Sum	1,250 cubic feet	0 cubic feet
Unused Heat Recovery	Sum	N/A	N/A
Useful Heat Recovery	Sum	7,000 MBtu	0 MBtu
Status/Runtime of DG/CHP Generator	Sum	0.5 hrs	0 hrs
Ambient Temperature	Average	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 adheres fully to the ASERTTI Long-Term Monitoring Protocol. Data is provided in 15-minute intervals satisfying the protocol. In addition, this site also has most of the optional performance parameters.

Monitoring Notes

March 7, 2007

CDH begins receiving daily file uploads from Coned Solutions for this site.

January 31, 2008

Coned Solutions finishes investigation of data issues. Data is identified as good going back to October 6th, 2007 and loaded into the DG/CHP Database for all channels except the Useful Heat Recovery. The heat recovery data will be masked until further notice from Coned Solutions

June 15, 2009

Coned Solutions is sending us data regarding the feed water usage for the heat recovery boilers. This is being used to calculate a value of heat recovery.

June 16, 2009

Calculating the heat recovery for the system using one set of generators causes the chp efficiency to be inaccurate. Since the heat recovery cannot be separated presently, the two monitoring units have been merged together and the efficiency is now calculated properly.