

Noblehurst Farms – Database Notes

Table 1 Database Notes

| | | |
|--|---|---|
| Data Collection | <u>Data Logger:</u> <u>Data Collection Interval:</u> <u>Collection Method:</u> | Obvius AcquiSuite A8812 15 – Minute Nightly Obvius Building Manager Online upload to CDH servers. |
| Site Information | <u>Cogeneration Units:</u> <u>Nameplate Capacity:</u> <u>Heat Recovery Medium:</u> <u>Heat Recovery Uses:</u> <u>Excess Heat:</u> | One (1) Guascor HGM 240 Reciprocating Engine 440 kW Hot Water Digester heating, space heating, process heating Rejected to atmosphere using dump radiator |
| DG/CHP Generator Electrical Output | <u>Engineering Units:</u> <u>Energy Measurement (net/gross):</u> <u>Measurement Type:</u> | kWh Gross generator power Pulse output (0.32001 Wh/pulse) measured by Shark 200 revenue grade power meter. |
| DG/CHP Generator Electrical Output Demand | <u>Engineering Units:</u> <u>Measurement Type:</u> | kW Calculated from generator electrical output; max kW / int * # intervals |
| DG/CHP Generator Fuel Input | <u>Engineering Units:</u> <u>Measurement type:</u> | CF Calculated using pulse outputs from Sage engine gas meter. Multiplied by 0.586 correction factor because meter is sized for 4” pipe, but installed in 3”. |
| Flared Gas | <u>Engineering Units:</u> <u>Heat Measurement Type:</u> | - - |
| CH₄ in Biogas | <u>Engineering Units:</u> <u>Heat Measurement Type:</u> | % CH ₄ INCA gas analyzer |

Noblehurst Farms – Database Notes

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|---|---|---|
| H₂S Entering Scrubber | <u>Engineering Units:</u> <u>Measurement Type:</u> | ppm INCA gas analyzer |
| Generator Status | <u>Engineering Units:</u> <u>Measurement Type:</u> | Hours 0 to 1, system on / system off. Generator output must be above 100 kW to be considered on. |
| Ambient Temperature | <u>Engineering Units:</u> <u>Measurement Type:</u> | Deg. F Weather Underground airport code ROC. |

Table 2 Event Timeline

| Date | Event |
|-------------------|---|
| September 1, 2016 | CDH on site to install logger. Engine gas meter and gas analyzer not yet wired to PLC. |
| December 16, 2015 | Power data begins, but is incorrect due to improperly reading modbus register. Multiplier developed to correct data using logged power data from farm (see below). Engine gas meter was damaged and had to be replaced. |
| May 2, 2016 | Engine biogas flow, H ₂ S in biogas, and CH ₄ in biogas data begins. Power data now reading correct, no longer need to apply derived multiplier. |
| April 7, 2022 | Power generation stops. Engine taken down for major repairs. Site running a second, non-monitored, engine exclusively during the repairs. |

| | Noblehurst Log | | Obvius Data | Multiplier | Adjusted kWh | Adjusted kW |
|--------|-----------------------|------------|--------------------|-------------------|---------------------|--------------------|
| | Period | kWh | kWh* | | | |
| Jan-16 | 31 | 266,228.40 | 62,902,700,000 | 4.23238E-06 | 265,894.42 | 357.38 |
| Feb-16 | 29 | 238,610.80 | 56,519,200,000 | 4.22177E-06 | 238,910.89 | 343.26 |

* Monthly kWh data calculated in analysis_power_multiplier.pro

Avg: 4.22707E-06

** Multiplier applied to power data from 12/16/15 to 5/6/2016

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Range Checks

Table 3. Range Checks

| Data Point | Units | Hourly Data Calculation Method | Database Lower Range | Database Upper Range | Notes |
|---|--------------|---------------------------------------|-----------------------------|-----------------------------|--|
| DG/CHP Generator Output (WG_d) | kWh/int | Sum | 0 | 150 | |
| DG/CHP Generator Output Demand (WG_KW_d) | kW | Max | 0 | 600 | $WG_KW_d = WG_d * \# \text{ Intervals}$ |
| DG/CHP Generator Gas Use (FG_d) | Cfh/int | Sum | 0 | 5,000 | |
| H ₂ S Entering Scrubber (WT_d) | ppm | - | 0 | 4,000 | |
| Flared Biogas (FT_d) | cf/int | - | 0 | 5,000 | |
| CH ₄ in Biogas (QD_d) | MBtu | - | 0 | 1,500 | |
| Status/Runtime of DG/CHP Generator (SG_d) | hr | - | 0 | 1 | 0-1, System On/System Off |
| Ambient Temperature (TAO) | °F | Avg | -20 | 130 | WUG Airport Code: NYC |

Notes:

1. This table contains values from *noblehurst.csv*

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Relational Checks

Table 4. Relational Checks

| Evaluated Point | Criteria | Result |
|------------------------|-----------------|---------------|
| | | |
| | | |
| | | |

Notes:

1. This table contains values from *relational_checks.pro*