NATURAL SYSTEMS UTILITIES

Water ✦ Energy ✦ Naturally

Ridgewood New Jersey an Energy Positive - Cash Positive Wastewater Treatment Plant

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Leader in Distributed Wastewater Systems

Certified B Corporation

Contents

- Ridgewood PPP
- Codigestion Process
- The Way to Energy Neutrality
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Village of Ridgewood WWTP

- 5 MGD design
- 2.2 MGD
- Conventional Activated Sludge
- Nitrification
- Sludge thickened and sent to Digestion

Village of Ridgewood AD-Codigestion

- Co-thickening
- Primary and Secondary Digesters
- Mesophilic

Village of Ridgewood FOG receiving

- Started Operation in February 2013
- 10,000 gallons
- Screening
- Heated
- Mixed

Village of Ridgewood Gen Set

- 240 kW
- CHP to heat digesters
- No ORC

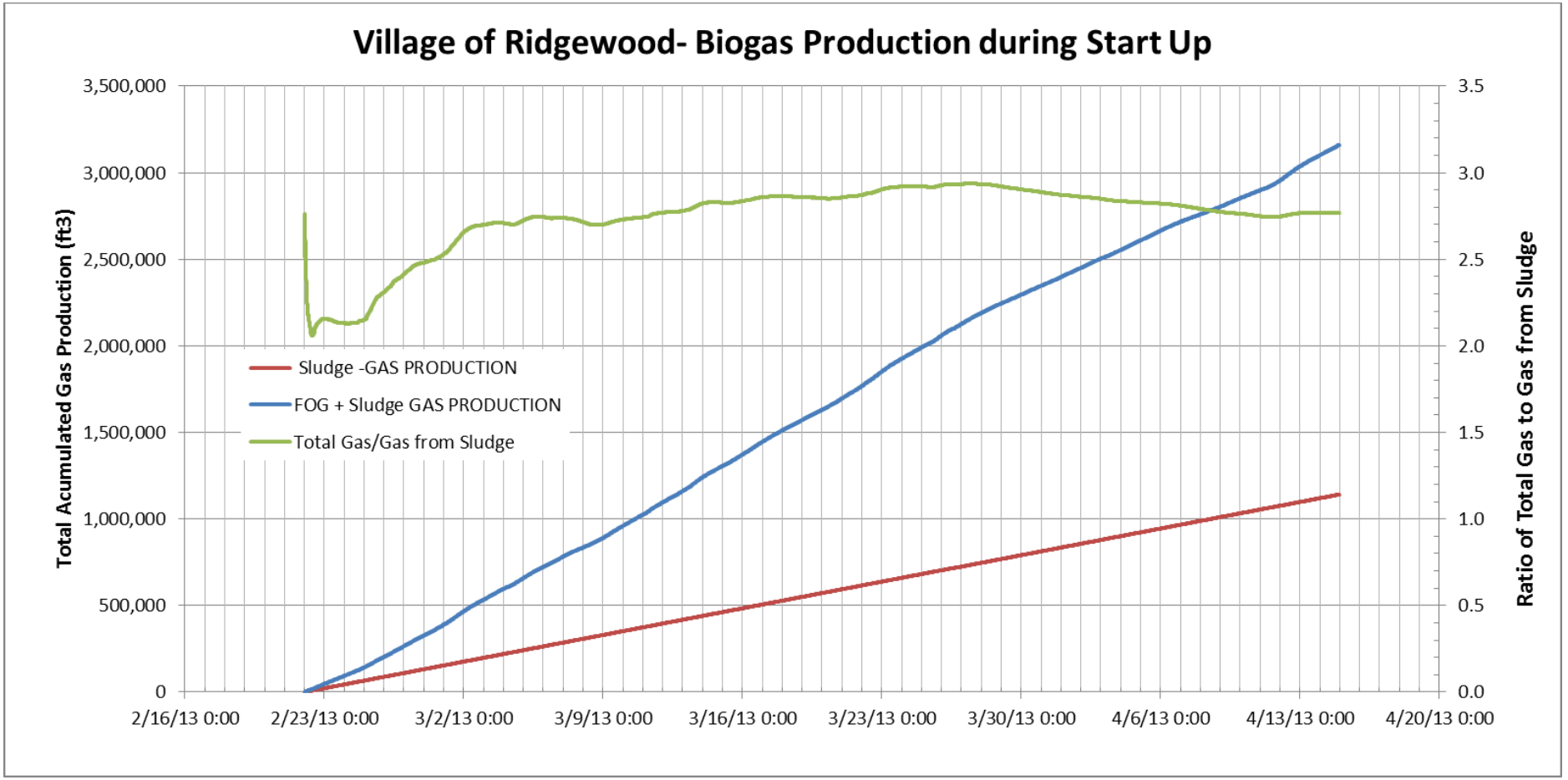
Village of Ridgewood Gas Storage

- Double Membrane
- OK

Public Private Partnership

- Ridgewood Green Responsible Management Entity (RGRME) is providing the following on a turnkey basis:
  - Host utility risk mitigation
  - Increase in methane produced and therefore heat and power production
  - Alternative energy sources to achieve Positive Net Energy
  - Reduce cost of energy for operations
  - Increase revenues to the Village

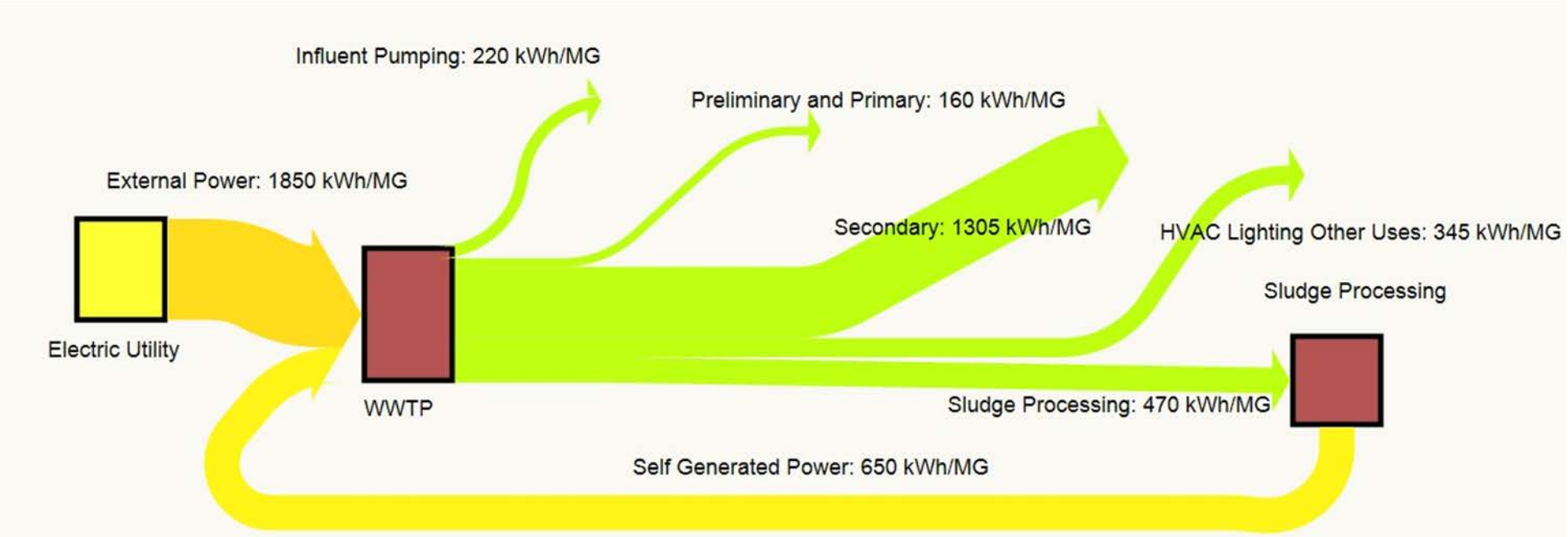
Village of Ridgewood Biogas Production



Ridgewood WWTP Energy Balance No-CHP

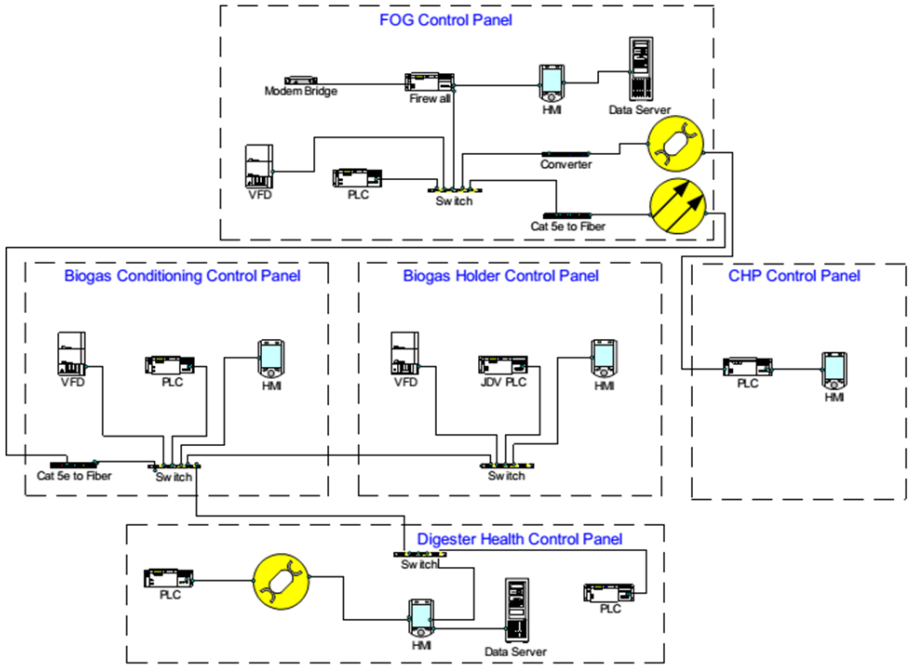
- Gas Flaring
- No Renewable Energy
- Higher Energy Costs
- Subject to Energy Price Risk
- Less Resilient

Ridgewood WWTP Energy Balance CHP



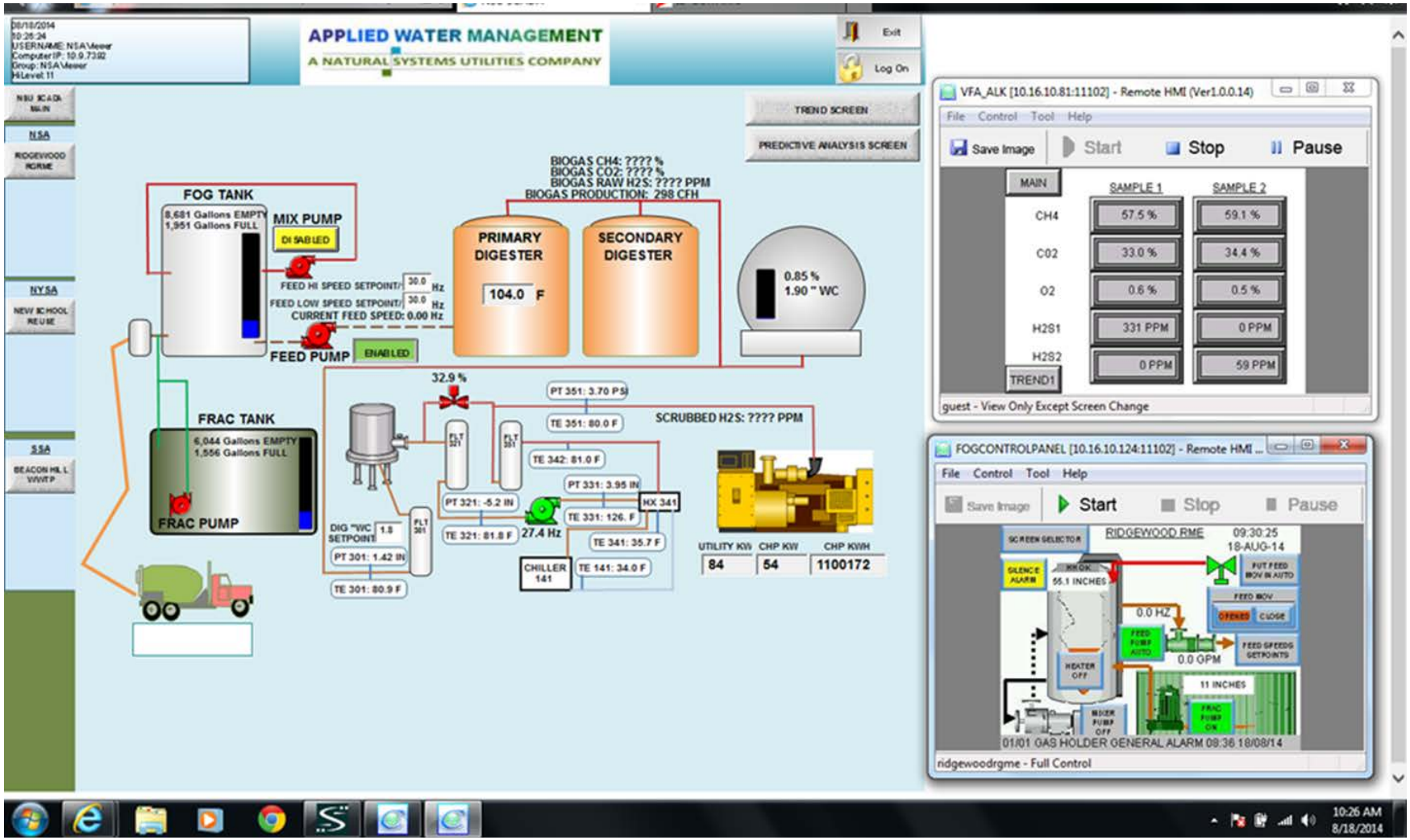
- Increased Sustainability
- About 30% External Power offset
- Some Reduction in Energy Costs
- Reduction in Energy Price Risk
- Enhanced Resiliency

AD Monitoring and Control



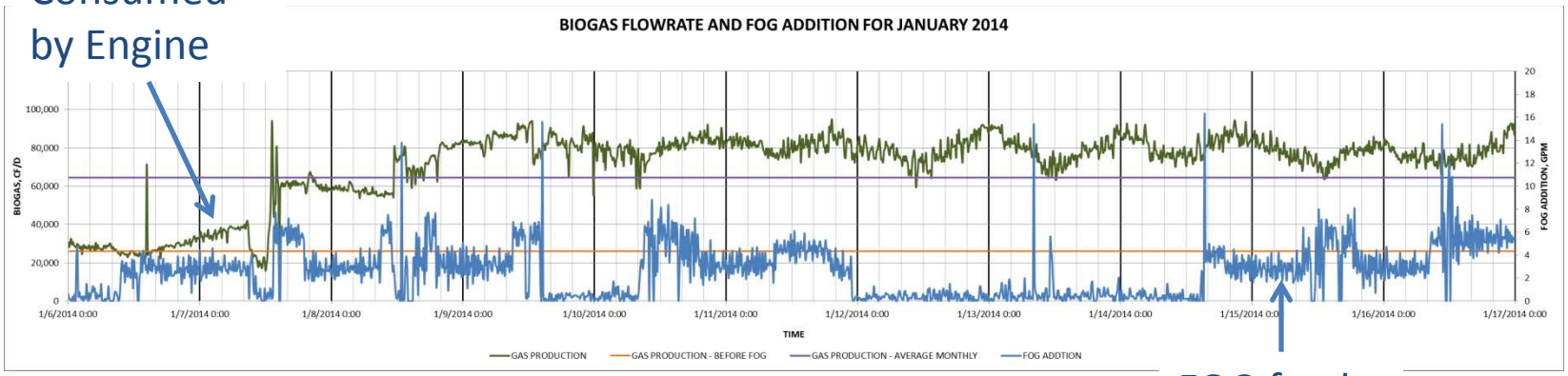
- Control for Power tracking
- Control for Power export
- On-Line Monitoring Biogas, pH, Alkalinity, VFA
- Interactive Decision Support Tool for Feed Scheduling

Beyond SCADA – Monitoring and Automatic Control



Achieving Energy Neutrality

Gas Consumed by Engine

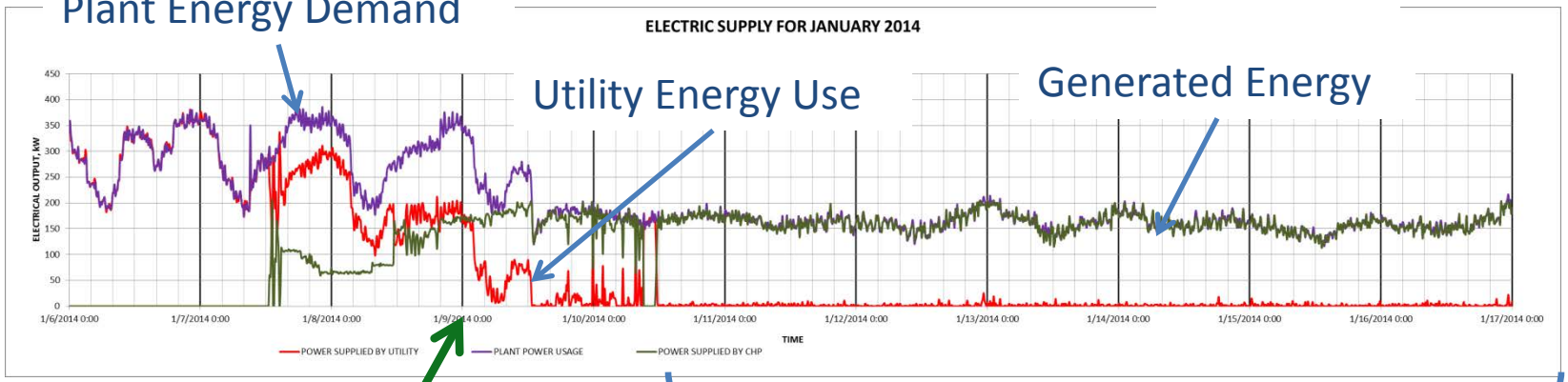


FOG feed

Plant Energy Demand

Utility Energy Use

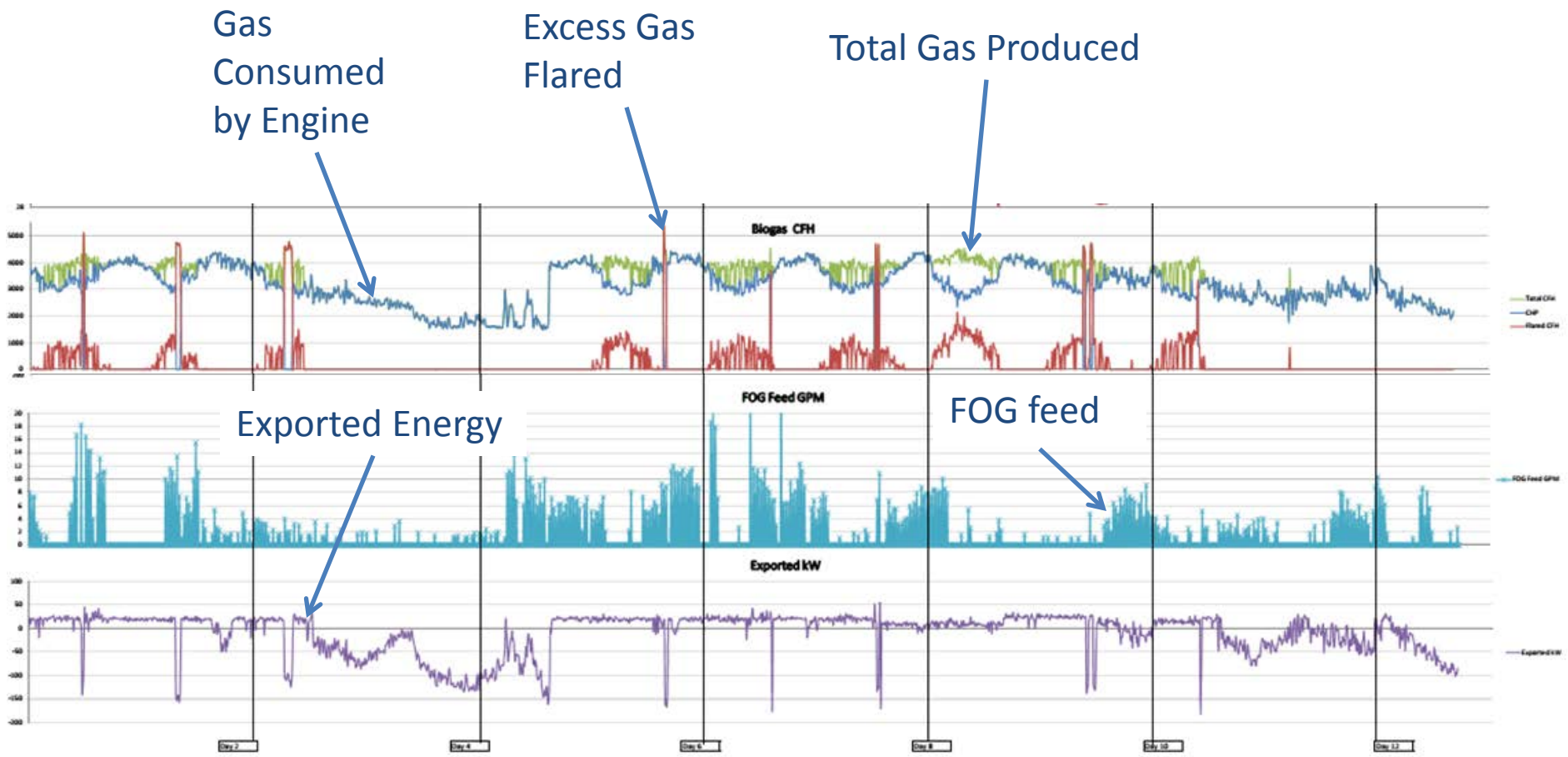
Generated Energy



Aeration Control Started

100% of Plant Electric Demand Offset by CHP

Energy Positive Operation



- Minimize Operations Disturbance -Maximize Power Production

Ridgewood WWTP Energy Balance Codigestion

- Increased Sustainability
- 100% External Power Offset
- Lower Energy Costs
- Reduction in Energy Price Risk
- Enhanced Resiliency

Conclusions

- Successful PPP.
  - Increased Revenues,
  - Reduced Energy Costs,
  - Locked price of energy
  - Increased Resiliency
  - Increased Sustainability
- Self-Generated Power not enough for Energy Neutrality
- Codigestion Successfully Achieved Energy Positive Operation

CONTACT INFORMATION

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