Biodiesel Engine Generator Flow Diagram

Biodiesel → Biodiesel Engine-Generator → Coolant Heat Exchanger → Exhaust Heat Recovery (Steam Generator) → Steam Converter → Hot Water

Electricity → Exhaust

Coolant

Steam

Hot Water
Current Status

• Major Installation Completed
  – Began on April 5\textsuperscript{th}, 2007
  – Completed on August 30\textsuperscript{th}, 2007

• Startup Completed
  – Completed Engine Startup and Paralleling to Utility, September 7\textsuperscript{th}, 2007
  – Completed Heat Recovery, October 25\textsuperscript{th}, 2007

• Commissioning in Progress
  – Using Diesel fuel to test all components and sub-systems.
Commissioning In Progress

- Sensor glitches
  - Coolant and steam flow meter range not low enough
  - Engine exhaust temperature transmitter failed
  - Exhaust temperature sensors not in the correct range
- Steam control valve failed in first week
- Data exchange between transfer switch/engine with data acquisition system
- Unidentified coolant leak
- Coolant loop control: relatively low coolant temperature ~ 185°F
- Balancing dilution tunnel pressure and CO2 level
- Determining general operating parameters and temperature ranges
- Developing user interface
Preliminary Results

• Efficiencies
  – Engine = 36%
  – Plant = 67%

• Energy Availability at 25 kWe
  – Steam: 80 PSIG, 18 kW
  – Hot Water: 20 kW at 110 °F, 20 GPM

• Operations
  – Engine starts and parallels to the grid in 5 seconds
  – Generates 25 kW in less than 2 minutes
  – Hot water output in 30 minutes after cold start
  – Steam output in 9 hours after cold start
Future Work

• Install Pressure transducers for pressure-time curves.
• Installation of pressure and temperature sensors on the turbocharger by Lehigh University.
• Enable remote start of engine-generator.
• Complete Baseline tests
  – December 18th through 20th over four load settings: 100%, 75%, 50%, 25% of design, 25 kWe with emissions testing.
• First round of tests with soy based biodiesel in the first week of January with advanced emissions equipment provided by CAPS.
Questions?

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