

Final Report
Period Ending 30 September 2010

Project Title: Connecticut Biodiesel Power Generation Project

Award Number: DE-FG36-08GO88030, A000

Recipient: Greater New Haven Clean Cities Coalition

Project Location: During the period of performance, work was conducted in Bethlehem, CT; Bethany, CT; Reston, VA; Englewood, CO; Denver, CO; Ider, AL; Columbia, SC; and, Rossville, GA.

Reporting Period
July 1 - September 30, 2010

Date of Report
October 30, 2010

Project Period of Performance
1 August 2008 - 30 September 2010



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Reporting Period: July 1, 2010 to September 30, 2010

Date of Report: 31 October 2010

Written by: Co-Principal Investigators Lee Grannis and Carla R. York, with task inputs from all members of the project Team engaged in work product during the reporting period

Status:

During the 1 July – 30 September reporting period, the Team completed and submitted the quarterly report for the period ending 31 June 2010.

During the quarter, the remaining work on the operations and safety manual were completed and released for publication after screen shots were verified. The goal of this effort to provide an accurate set of precautions and procedures for the technology system that can be replicated to other similar system.

As of 30 September 2010, the project has expended \$1,462,184.11; \$738,000.00 in federal share, representing 100% of total expenses to date and 100% of total federal share funding; and, \$724,184.11 in non-federal cost share, representing 100% of total expenses to date and 100% of total non-federal share committed to the project.

During the reporting period, the project Team completed one (15) milestones, and seven (7) project deliverables. Additionally, several key activities within various tasks and subtasks were also accomplished contributing to the overall status of the project.

Summary of Task Status and Subtask Completions/Status as of 30 September 2010

Task/Subtask No. ML, DL, and GN Points	Description	Planned or Actual Start Date	Original Planned Completion Date	Revised Planned Complete	Actual Completion Date	Actual % Complete this Period
A.	Contact/Award	1-Aug-08	31-Aug-08	31-Aug-08	31-Aug-08	100%
B.	Project Kick-off	1-Aug-08	31-Aug-08	27-Aug-08	27-Aug-08	100%
C	Site and Procurement	1-Aug-08	30-Nov-09	27-Feb-09	3/31/2009	100%
D	Design, Develop, Engineer: System Controls, Integration & Monitoring	1-Aug-08	31-Dec-09	31-Mar-10	16-Sep-10	100%
E	Survey of Existing and Near-term Systems	1-Aug-08	31-Dec-09	31-Dec-09	12-Mar-10	100%
F	Establish Geographically Diverse Industry Peer Review Group	15-Oct-08	31-Dec-09	15-Aug-09	25-Sep-09	100%
G	Develop Detailed Demonstration and Data	1-Oct-08	20-Feb-09	31-Dec-09	28-Dec-09	100%

	Collection Plans					
H	Education and Outreach	1-Aug-08	31-Jan-10	30-Sep-10	28-Sep-10	100%
I	Deploy Project Technologies	20-Oct-08	31-Jan-09	22-Sep-09	19-Oct-09	100%
J	Demonstrate, Collect Data, Report	1-Jan-09	31-Jan-10	30-Sep-10	30-Sep-10	100%
K	Develop Technical and Economic Analysis	1-Aug-08	31-Jan-10	31-Jul-10	16-Aug-10	100%
L	Develop Technical Information	1-Aug-08	15-Jan-10	30-Sep-10	28-Sep-10	100%
M	Develop Roadmap to Mitigate Commercial Implementation Barriers	1-Oct-08		28-Sep-10	28-Sep-10	100%
N	Project Management and Reporting	1-Aug-08	31-Jan-10	30-Sep-10	30-Sep-10	100%

Task number: A — Contact/Award

This task was completed during the first project quarter.

Task number: B — Project Kick-off

This task was completed during the first project quarter.

Task number: C — Site and Procurement

This task was completed during the third project quarter with regard to procurements and site work; however, actual installations were not completed and fully tested until September 2009.

Task number: D — Design, Develop, Engineer: System Controls, Integration & Monitoring

1. Planned Activities

Sabre will continue support of the emissions equipment and VARS issues to ensure all are resolved and the system is functioning as expected. The remote data collection to become more automated. Final project reports for data collection and system performance to be generated.

2. Actual Accomplishments

Sabre continued to support the emissions equipment and VARS issues to ensure all are resolved and the system is functioning as expected. The remote data collection became more automated. Final project reports for data collection and system performance were generated and are part of this final report. Some Systems Sensors were replaced due to a lightning strike. Sample data charts are shown at the end of the report.

3. Explanation of Variance

None

4. Plans for next quarter

This task is complete and no activities are planned.

During the project, Sabre Engineering provided support to the project team with regarding to troubleshooting technical issues and system integration with the local power utility company. The resulting lessons learned through Sabre's participation in the project have been valuable to the integrity of the data collected as well as in providing BioPur Light & Power valuable insights into future operations and planning for possible expansion.

The system monitoring and data collection system has been operating as designed and continues to provide relevant information to the system operators. The information routinely gathered automatically by the system also contributes to the REN and REC validations which are required to secure credit for these items.

Task number: E — Survey of Existing and Near-term Systems

This task is complete and no activities are planned.

Task number: F — Establish Geographically Diverse Industry Peer Review Group

This task is complete and no activities are planned.

Task number: G — Develop Detailed Demonstration and Data Collection Plans

This task is complete and no activities are planned.

Task number: H — Education and Outreach

1. Planned Activities:

During the period of performance, the Team plans to complete a number of key activities in the education and outreach portion of the project. The following list summarizes the planned activities for the next quarter.

- Collect, evaluate and disseminate performance data of the generators while online, supplying power. Publish those findings in a white paper on the web site and translate into press release(s) for further dissemination;
- Continued enhancement of the project web site and populate with all available information and implement plan for regular updates as data from the demonstration becomes available;
- Complete and produce the first project results fact sheet to provide basic findings about the project, project planned activities and results;
- Continue updates to FaceBook and other social networking site pages.
- Distribution of information to relevant stakeholders, industry officials, potential implementers, decision makers, policy makers, general public, academia, and government; and,
- Prepare information for submittal of white papers and abstracts to appropriate industry conferences and symposiums as the project technologies are proven.

2. Actual Accomplishments

During the quarter, web updates were completed; updates to social networking sites occurred. Project findings were assimilated and prepared for dissemination to relevant agencies and organizations. The team at the BioWatz project hosted several educational groups which were afforded a complete tour of the facility and its many unique features. Project results and lessons learned have been grouped to allow project host and grant recipient to submit relevant white papers to appropriate outlets and conferences.

3. Explanation of Variance:

None.

4. Plans for Next Quarter:

This task is now complete, however, the project web site will be maintained and data will be collected and posted on a regular basis for the next two years.

Task number: I — Deploy Project Technologies

This task was completed preliminarily in September 2009; however, remaining issues with VARS from the CL&P transmission lines created issues that prohibited full system operation until December 2009.

Task number: J — Demonstrate, Collect Data, Report

1. Planned Activities:

Continue with full scale demonstration of the system technologies, publish data collected and host one or more outreach events. Compile final results of demonstration period for final report

2. Actual Accomplishments:

During the final reporting period, significant runs of various fuel blends were completed and power generated to power the facility and return additional power to the CL&P grid. The final results of the demonstration period have been compiled and are included as part of this final report sample data charts are included at the end of this report.

A separate file of all data points collected for each criteria is included as a separate attachment to this report.

3. Explanation of Variance:

None.

4. Plans for Next Quarter:

This task is complete and no activities are planned.

At the close of the quarter, the system is still in operation almost on a daily basis with positive results. BioPur Light & Power, the operator of the BioWatz technology system, continues to

work with local and state regulatory agencies to ensure proper credit for the production of renewable energy and emissions reductions can be secured.

Long-term plans include the possible expansion of the system to include 1-3 more 225kW generators to allow for additional on-site power production for sale back to the local electrical grid.

Task number: K — Develop Technical and Economic Analysis

1. Planned Activities:

Continue collecting data for project site and other locations to complete the requirements of this task and draw final conclusions. Incorporate all information as appropriate into final report.

2. Actual Accomplishments:

During 4QFY10, the Team assimilated final information which has been incorporated into the operations manual. The economic analysis is included in the following:

ITEM	Description	ANALYSIS RESULT
Feedstock - Virgin	Oils not previously used	Results in excellent fuel, however – COST PROHIBITIVE
Feedstock - Recycled	Oils that have been previously used (such as restaurant cooking oils) or out-of-date, not-to-specification oils (such as imported Olive Oil with a higher than allowed level of non-Olive based oils)	Results in excellent fuel and in all cases: recycle oils from restaurants, out of date and not to specification oils are ECONOMICALLY FEASIBLE
Local Codes	Local requirements for all related systems/installations	ECONOMICALLY and TECHNICALLY FEASIBLE – not overly cumbersome in the local area
State Codes/Regulatory	State requirements governing installations of power generation and transmission equipment and those dealing with fuel handling.	FEASIBLE – however, there seems to be some duplicated responsibilities within state agencies, leading to additional requirements of time and financial resources to complete the requirements.
Other Local Codes	Local requirements for all related systems/installations	ECONOMICALLY and TECHNICALLY FEASIBLE – not overly cumbersome in other localities checked across the country
Other State Codes/Regulatory	State requirements governing installations of power generation and transmission equipment and those dealing with fuel handling.	FEASIBLE – every state reviewed seems to have some variables in the stated requirements. While more information is known about the project state, the review of other states indicates that states in the South and Midwest are easier to navigate than are states in the Northeast and Western parts of the country. While requirement levels vary significantly, it is feasible to meet the requirements.
Project Technology System	Integrated system installed for demonstration and data collection as part of the project	The system as identified, developed and installed has proven to be TECHNICALLY FEASIBLE. While there were excessive overruns in the required hardware components to effectively connect the system to the local power utility, survey of other systems indicate

		clearer rules and a more straightforward path to completion of system Interconnection. The final determination regarding economics is the current system is MODESTLY FEASIBLE in the local area.
Other Technology System	Other technology system, utilizing power generation, switching and transmission of generated power	Other systems reviewed as installed or planned for other regions of the country have proven to be no more economically feasible than the project system installed. The majority of other systems reviewed included the installation of much higher kW systems; resulting in a much higher up-front capital costs with modest recovery in operational costs.
Local Power Utility Provider	Connecticut Light & Power (CL&P)	All utility providers have specific requirements for interconnection to the grid; however, in the experience of this project team, the local utility is not very organized or forthright in making the requirements clear, nor in providing adequate staff resources knowledgeable with the internal, local and state requirements for such connections to the electrical grid. While the process was cumbersome, costly and frustrating, it is TECHNICALLY and somewhat economically feasible to complete an Interconnection relationship with the local utility.
Other Power Utility Providers	Power utility provider in other	All power utility providers surveyed exhibit some level of obtuse requirements that would typically be dismissed in prudent commercial operations. However, in comparing the requirements, level of straightforwardness and adequacy of staff resources, we found no other power utility to be as difficult to deal with as the local power provider at the project site in Connecticut. Navigating the requirements to complete a viable Interconnection with the electrical grid is both technically and economically feasible with technology systems the same or similar to the one installed as part of the BioWatz project.

3. **Explanation of Variance:**

None.

4. **Plans for Next Quarter:**

None.

Task number: L — Develop Technical Information

This task is complete and no activities are planned.

A copy of the technical information developed is included as a Publication to this report.

Task number: M — Develop Roadmap to Mitigate Commercial Implementation Barriers

1. Planned Activities:

Complete all task requirements.

2. Actual Accomplishments:

As part of the project work, the Team evaluated a variety of implementation barriers to commercial deployment of systems such as the one completed and demonstrated during this project. The following represent the findings:

ITEM	Mitigation Advice
Feedstocks	Identify multiple sources BEFORE undertaking a venture of this nature
Transportation Costs	Identify high, low and trending averages in transportation costs of feedstocks into the facility prior to finalizing budget requirements and ROI.
Codes/Regulatory	Identify all vested stakeholders, requirements, outstanding or unclear requirements and key points of contact prior to finalizing project plan and budget
Power Utility	Identify the following early in the planning and budgeting process: 1. Determine the nearest access point to the proposed site for 3-phase transformers as they will be required regardless of what system is installed. 2. Determine what local companies can provide testing services and IT connections as both will be required as part of the Interconnection agreement with the local utility. 3. Find a local champion for the effort! While projects should stand on their own merit, more often than not, personal beliefs and politics play a key role in determining which projects succeed and which ones are never afforded the opportunity. 4. All points of contact at local utility for interconnection with the grid 5. All written applications, requirements (including additional hardware and testing), any arbitrary clauses in requirements, and similar items of technical merit 6. Establish the level of cooperativeness on behalf of the utility to have an Interconnection agreement with an outside firm to provide power into the electrical grid – this is very important. Do not underestimate the level of difficulty that can be encountered when a key point of contact at the local utility does not want to cooperate with a new effort to establish an interconnection with the grid. 7. Any hard requirements such as specific equipment, components or brand names that are either required for use or not allowed by the local utility. 8. Maintain open and frequent communications with power utility personnel as the project process moves forward. Continually ask “is there anything else that we need to do in order to meet your requirements”. While this should not be required, it could very well save time and money in the long run of the project commissioning.

3. Explanation of Variance:

None.

4. Plans for Next Quarter:

This task is complete and no activities are planned.

Task number: N — Project Management and Reporting

1. Planned Activities:

During 4QFY10, Innovation Drive will work with other Team members to complete and submit the final report and financial statements as required by DOE.

Oversight of project activities, including, but not limited to system demonstration, final contracts for Renewable Energy Credits, and long-term data collection of project technologies performance and outputs will be completed during the upcoming quarter.

The project's technical PI and business officer will conduct at least one site visit per month during 4QFY10.

Innovation Drive will work with all members of the project Team as needed or required to complete the planned work for the project during the quarter and will assist in addressing any issues that may arise during the course of the work.

The final project report will be generated and submitted.

2. Actual Accomplishments:

During the quarter, the Technical PI made two (2) site visits as part of the management requirements.

One Form 270 submission to DOE was completed for the period of performance for reimbursement. The financials for the period ending 30 September 2010 and included as part of this report represents the final financial status of the project; with significantly more non-federal cost share than was originally planned for the award.

The total project costs were:

TOTAL:	\$1,507,057.73
Federal:	\$738,000.00 (48.97% of total costs)
Non-Federal:	\$769,057.73 (51.03% of total costs)

All regular quarterly reports for the previous period of performance were completed and submitted to the USDOE.

3. Explanation of Variance:

None.

4. Plans for Next Quarter:

This task is complete and no activities are planned.

Patents:

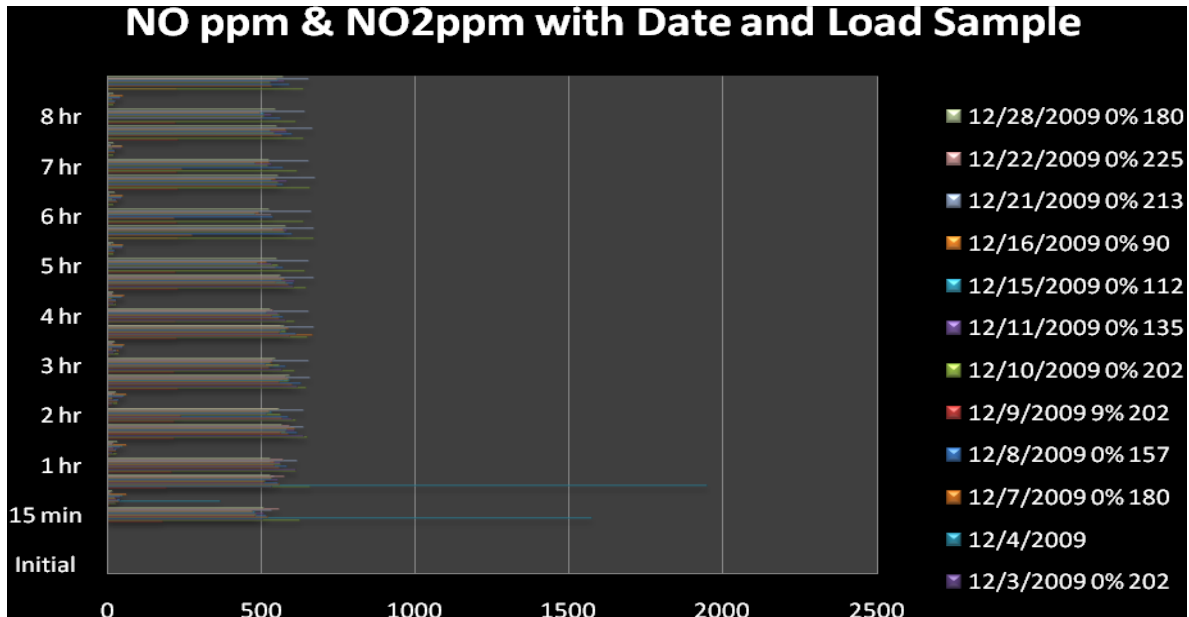
None

Publications / Presentations:

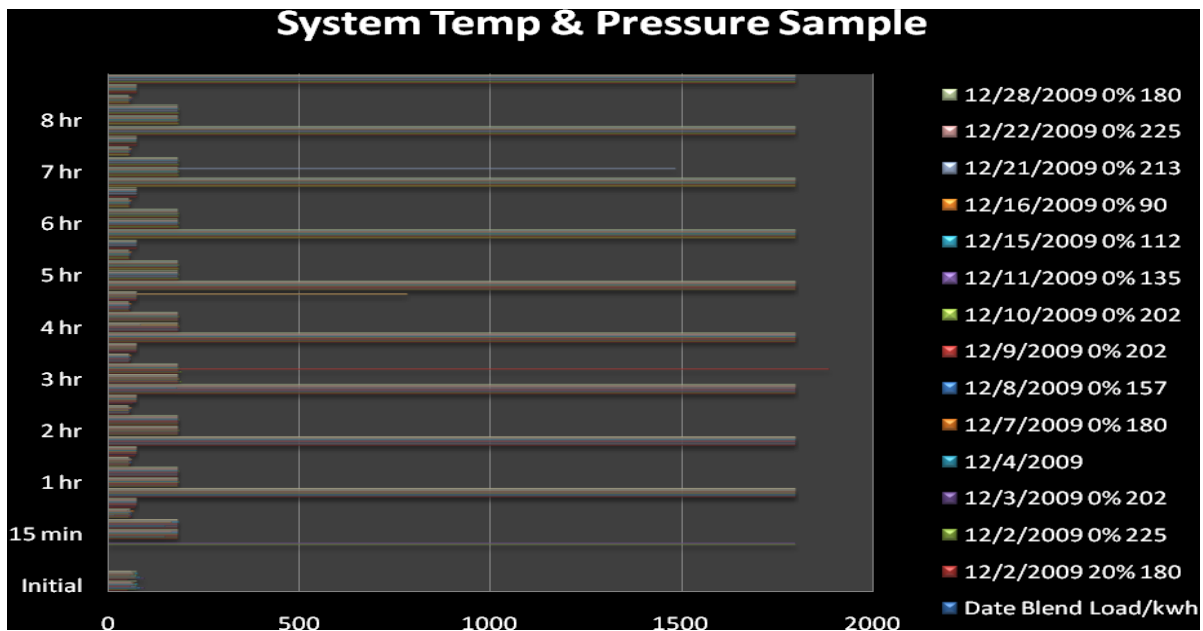
The Operations Manual developed as part of the Technical Information task is included as an additional attachment to the final report..

Sample Data Charts:

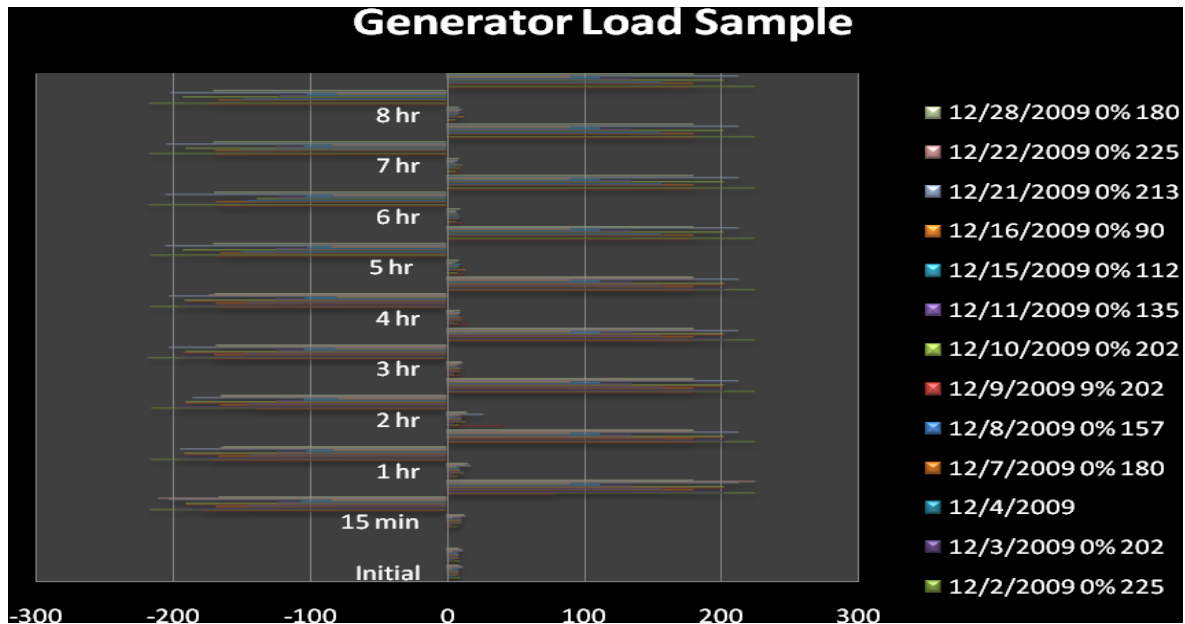
The following charts were created with data collected during the program. They are a sampling from the December 2009 time frame and represent what can be done with the data collected.



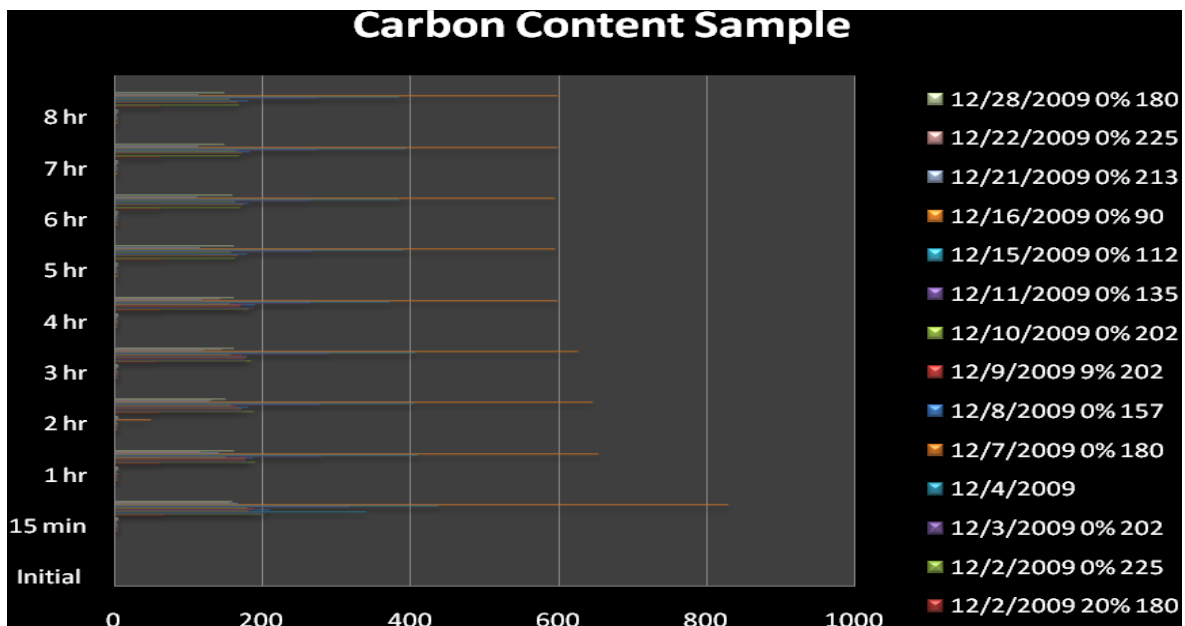
Sample data chart for December 2009 Nitrogen Oxide



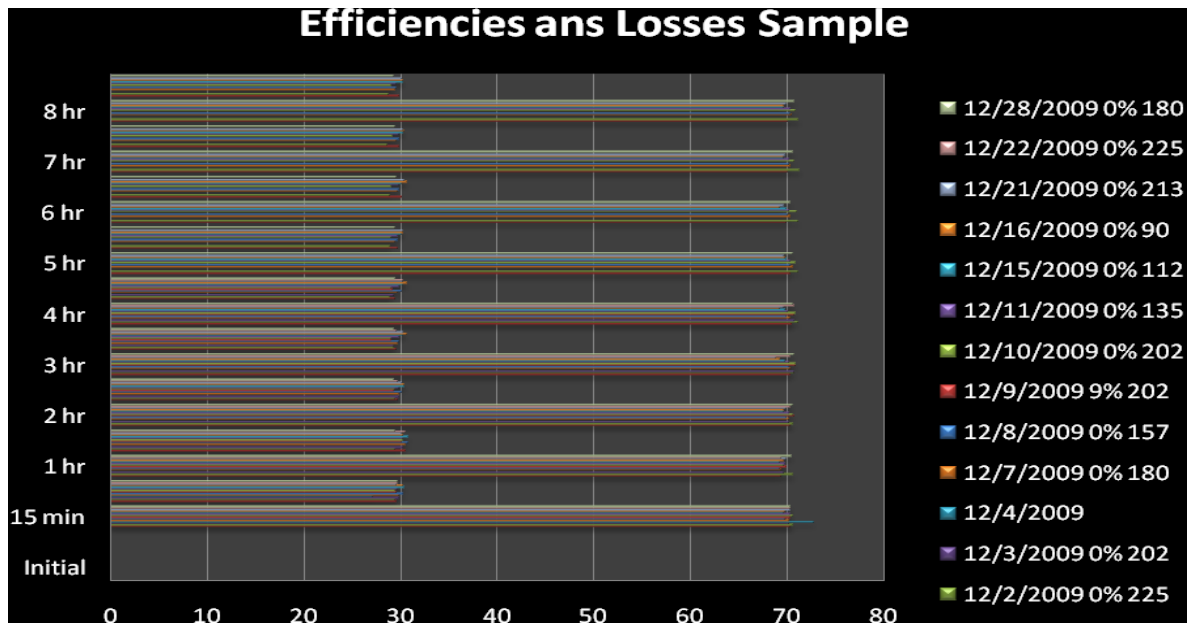
Sample date for December 2009 Temps and Pressures



Sample date for December 2009 Generator Load



Sample date for December 2009 Carbon Content



Sample date for December 2009 Efficiencies and Losses