VERIFICATION REPORT FOR RECAST ENERGY LOUISVILLE FUEL SWITCH FROM COAL TO BIOMASS FOR THERMAL ENERGY PROJECT

Document Prepared by First Environment, Inc.

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Summary:

This report is provided to Recast Energy Louisville, LLC (Recast) as a deliverable of the Verified Carbon Standard (VCS) project verification process for the Recast Energy Louisville Fuel Switch From Coal to Biomass for Thermal Energy Project (the Project) located in the Louisville, Kentucky.

The Project is a thermal energy generation project fueled with locally available forestry and agricultural cellulosic residues (i.e., primary mill residues, logging residues, and crop residues), and is located at the Lubrizol Advanced Material, Inc. facility (the Facility). The Project location is on land owned by one of the project customers (Lubrizol) and then subsequently leased back to the Project Proponent, Recast Energy Louisville, LLC. The Project is owned and operated by Recast Energy Louisville, LLC. Thermal energy from the biomass system displaces thermal energy generated by the coal-fired boiler system. The thermal energy generated from the biomass boiler is sold to Lubrizol and Zeon Chemicals (the project customers). The pre-project scenario consisted of the project customers receiving thermal energy that was generated by coal and supplemented with natural gas when needed.

The Project achieves GHG emission reductions by displacing thermal energy that would have been generated from a fossil fuel boiler.

The verification process and scope consists of the independent third-party assessment of the implementation of the project and emission reduction assertion against the criteria stated in the Verified Carbon Standard (VCS) Standard, 25 March 2015, v3.5; the approved Clean Development Mechanism (CDM) Methodology AMS-I.C "*Thermal energy production with or without electricity*", Version 19 and the validated VCS Project Description (VCS PD). The purpose of the verification is to ensure the project was implemented and monitored in accordance with the validated Project Description and underlying CDM Methodology.

During the verification process, First Environment, Inc. (First Environment) issued five corrective action requests and four Clarification requests which were all addressed sufficiently by Recast. No uncertainties were identified during the verification process. The Project claims emission reductions of 83,028 metric tonnes CO_2e for the period of April 1 2013 through December 31, 2014. First Environment is reasonably assured that the Project meets all relevant VCS program requirements and correctly applies the CDM Methodology AMS-I.C, Version 19 in accordance with the validated VCS PD.

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1 INTRODUCTION

1.1 Objective

This report is provided to Recast Energy Louisville, LLC (Recast Energy) as a deliverable of the Verified Carbon Standard (VCS) project verification process for the Recast Energy Louisville Fuel Switch from Coal to Biomass for Thermal Energy Project (the Project), located in Louisville, Kentucky. This report covers the verification of greenhouse gas (GHG) emission reductions achieved by displacing thermal energy that would have been generated from a fossil fuel boiler over the period from April 1 2013 through December 31, 2014. First Environment, Inc. (First Environment) conducted the verification from the date of the kick-off meeting through November 9, 2015.

1.2 Scope and Criteria

The specific scope metrics for the verification are outlined in the table below:

Reporting Period	• April 1, 2013 – December 31, 2014
Emission Sources Verified	*Baseline Sources* • Emission reductions of CO_2 resulting from displacement of fossil fuel (coal) consumption *Project Sources* • CO2 emissions from on-site consumption of diesel fuel in equipment used to move wood fuel within the facility. • CO2 emissions from electricity consumption by the project activity that is in excess of the electricity used by the boiler prior to the activity • CO2 leakage emissions from the offsite transportation and processing of biomass residue
Definition of Materiality	• Misstatements of greater than five percent of the Project's GHG assertion • Qualitative non-conformities with Standards of Verification described below

The following table outlines the guidance and protocols used to conduct this verification:

Standards of Verification	• VCS Standard: VCS Version 3, 25 March 2015, v3.5 (VCS Standard) • Validated VCS Project Description (VCS PD), December 4, 2014 • Approved CDM Methodology AMS-I.C "*Thermal energy production with or without electricity*", Version 19
Verification Process	• VCS Standard • VCS Program Guide, Version 3, 8 October 2013, v3.5 • ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

The Monitoring Report dated 17 November 2015; Version 1.5 titled *"Recast Energy Louisville Fuel Switch From Coal to Biomass"* was also reviewed to inform the verification assessment.

1.3 Level of Assurance

First Environment and Recast have agreed that a reasonable level of assurance be applied for the Project.

1.4 Summary Description of the Project

The Recast Energy Louisville Fuel Switch from Coal to Biomass for Thermal Energy Project consists of the conversion of a coal fired boiler to a biomass fired boiler at the Lubrizol facility located at 4200 Bells Lane, Louisville, Kentucky (latitude 38.2226280° and longitude -85.8235880°). The Project is owned and operated by Recast Energy Louisville, LLC. Biomass generated locally is used to produce thermal energy which is sold to Lubrizol Advanced Materials, Inc. (Lubrizol) and Zeon Chemicals, LP (Zeon), (the project customers). The pre-project scenario consisted of the Project customers' receiving thermal energy from the pre-retrofitted boiler which was fueled by coal. The Project achieves GHG emission reductions by displacing fossil fuel produced thermal energy with thermal energy produced by renewable biomass.

The VCS PD provides additional details regarding the project activity.

2 VERIFICATION PROCESS

The verification process was utilized to gain an understanding of the Project's GHG emission sources and reductions and to evaluate and verify the collection and handling of data, the calculations that lead to the results, and the means for reporting the associated data and results.

The following verification process was used:

- conflict of interest review;
- selection of Audit Team;
- kick-off meeting with Recast;
- review of the VCS PD;
- development of the verification plan and sampling plan;
- desktop review and evaluation of raw data, calculations, and supporting documentation for the period under review;
- follow-up interaction with Recast for corrective action, clarification, or supplemental data as needed; and
- final statement and report development.

2.1 Method and Criteria

The following verification method was applied when conducting the verification:

Conflict of Interest Review

Prior to beginning any verification project, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the project. No potential conflicts were found for this Project.

Audit Team

First Environment's Audit Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with renewable energy operations:

Jeff Daley – Lead Verifier
Luca Nencetti – Verifier
Michael Carim - Verifier
Jay Wintergreen – Internal Reviewer

Audit Kick-off

The verification audit was initiated with a kick-off conference call on June 15, 2015 between First Environment and Recast Energy. The communication focused on confirming the verification scope, objectives, criteria, schedule, and the data required for the verification.

Project Description Review

The Audit Team reviewed the VCS PD as a basis for developing the verification plan.

Development of the Verification Plan

The Audit Team formally documented its verification plan as well as determined the data-sampling plan. The verification plan was developed based on discussion of key elements of the verification process during the kick-off meeting. Recast was given the opportunity to comment on key elements of the plan for verification. Based on items discussed and agreed upon with Recast, the plan identified the First Environment team members, project level of assurance, materiality threshold, and standards of evaluation and reporting for the verification. It also provided an outline of the verification process and established project deliverables. A separate sampling plan was designed to review all project elements in areas of high risk of inaccuracy or non-conformance.

Site Visit

First Environment performed a site visit on July 21, 2015. The site visit included interviews with relevant site personnel and project stakeholders; review of the Project's operations; data collection procedures and information management systems; as well as assessments of the Project's controls for sources of potential errors and omissions. The site inspection included a tour of the entire Project facility including the fuel material receiving yard, Project Boiler No. 4, Ash Handling unit, and all associated ancillary equipment (i.e., metering and data recording systems), and process areas.

Desktop Review

The Audit Team performed a desktop review of the Monitoring Report, GHG emission reduction assertion, and supporting documentation, as further described in Section 2.2 below.

Corrective Actions and Supplemental Information

The Audit Team issued requests for supplemental information, corrective action, and clarification during the verification process. The corrective action and clarification requests and the responses provided by Recast are summarized in Section 2.5.

Verification Reporting

Verification reporting documents the verification process and identifies its findings and results. Verification reporting consists of this report and a separate Deed of Representation to be submitted to the VCS Association.

2.2 Document Review

During the verification process, First Environment reviewed the Project's Monitoring Report, GHG emission reduction assertion, and supporting documentation for the current verification period to ensure consistency with the VCS Standard, AMS-I.C, and the VCS PD. Discrepancies between project documentation and the verification criteria were considered material and identified for corrective action. Deviations required appropriate justification from Recast. Additionally, First Environment assessed the GHG emission reduction assertion and underlying monitoring data to determine if either contained material or immaterial misstatements. The results of these reviews are discussed in greater detail below.

2.3 Interviews

Through the course of verification activities, First Environment interviewed the following project personnel to inform the verification process:

- Donna Wirick – Recast Energy Louisville LLC; *Environmental, Health and Safety Manager;*
- Tom Harper - Recast Energy Louisville LLC; *Plant Manager;*
- Marinho Gonçalves – Recast Energy Louisville LLC;
- Matthew Markee – Recast Energy Louisville LLC; President.

2.4 Site Inspections

As described above, a site visit was performed on July 21, 2015 for the current verification process.

2.5 Resolution of Findings

The Audit Team issued five requests for corrective action and four request for clarification during the verification process. One forward action request was identified, as discussed in Section 2.5.1 below. Recast's responses were sufficient to resolve all requests. The corrective action and clarification requests and the responses provided are summarized in the tables found in Appendix A.

2.5.1 Forward Action Requests

One Forward Action Request was identified during the current verification. As described in Section 3.3 below, the temperature and pressure records for the period between April 1 and August 19, 2013 were inadvertently deleted and could not be recovered. Recast Energy has implemented updated data management procedures and data backup procedures, which include daily digital backups of relevant project data and storage of hardcopy daily reports. The following Forward Action Request is issued for the benefit of subsequent project audits:

- Recast Energy's updated data management procedures and data back-up process should be reviewed during the subsequent site visits to verify the proper measures have been put into place to ensure data loss issues do not become recurrent.

2.6 Eligibility for Validation Activities

First Environment is accredited to perform validation activities as described in Section 3 below for activities in Sectoral Scope 1 - Energy (Renewable/Non-Renewable), which is the applicable scope for the approved CDM methodology AMS-I.C.

3 VALIDATION FINDINGS

As described in Section 3.2 below, one new Project Description deviation was validated during the current reporting period. First Environment reviewed justification for the deviation, including supporting documentation, in order to confirm that it was consistent with the underlying methodology and did not negatively impact the conservativeness or accuracy of the emission reductions. The validation process for the deviation consisted of an assessment of the Project's implementation, as described in the Monitoring Report and from discussions with Recast, against the validation criteria. The validation criteria considered in the assessment of any deviations included the approved CDM methodology AMS-I.C, v19 and the VCS Standard.

3.1 Participation under Other GHG Programs

Not Applicable – The project is not seeking registration with any other GHG programs.

3.2 Methodology Deviations

Not Applicable – No new methodology deviations were applied during the current reporting period.

3.3 Project Description Deviations

The following project description deviation was identified in the Monitoring Report and approved for the Project during the current verification:

The VCS PD states that the parameters $h_{feedwater,}$ and h_{steam} (Steam and Feedwater enthalpies) will be calculated from continuously monitored temperature or pressure measurements. During the current reporting period, the temperature and pressure electronic records for the period between April 1 and August 19, 2013 were inadvertently deleted and could not be recovered. Since data for the remaining monitoring period is available, the most conservative values between August and November, 2013 were used in the calculations as substitute values. The data used to derive the substitute temperature and pressure values was selected based on conservativeness and thus provides a conservative enthalpy value for both the steam and feedwater. First Environment approved this deviation because the data substitution does not impact the applicability of the methodology, additionality, or appropriateness of the baseline scenario. First Environment confirmed that the substitute values represented the most conservative outcome for the calculation of enthalpy to ensure the overall emission reduction assertion is not falsely over reported.

The above mentioned deviation was appropriately described and justified in the Monitoring Report and remains in compliance with the VCS rules.

3.4 Grouped Project

Not Applicable – the Project is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The Project is implemented according to the description provided in the VCS PD, except where noted in Section 3 above, or as described below. The Project became operational on December 10, 2012. The 10-year project crediting period began on April 1, 2013 and ends on March 31, 2023. The Project's start date and crediting period were previously confirmed during validation.

No data and/or variables presented in the Monitoring Report differ from those stated in the VCS PD, except where noted in Section 3.2 above or as described below. Similarly, the data collection and recordkeeping procedures were found to be consistent with those outlined in the monitoring plan described by the VCS PD, and meet the requirements of AMS-I.C. Recast has adequate management and operational systems in place with respect to monitoring and reporting, as determined through observation during the site visit and the desktop review of project documentation.

First Environment confirmed during the verification process that GHG emission reduction credits had not been registered under another GHG program. Additionally, Recast provided an attestation, dated June 29, 2015, indicating that GHG emission reduction credits for the current verification period will be registered only with VCS and not under any other GHG program. As identified in the validated VCS PD, no other environmental credits are generated by the Project.

The following topics were discussed with Project personnel during the site visit:

- the data collection process used to generate reports, and
- internal documents and protocols that set guidelines for the data collection process.

The information gathered during these discussions and review was used to assess the Project's data management systems and its controls for sources of potential errors and omissions. The primary aspects of the Project's monitoring plan are described below.

The quantity of steam generated by the project activity (Boiler No. 4) is monitored by an ABB Vortex Flowmeter FV4000. The flow meter was calibrated during initial installation on June 6, 2012 in accordance with the manufacturer's specifications. The VCS PD states that flow meter will be serviced by a qualified technician at least once every three years; therefore the requirement is met for the current monitoring period.

The steam and boiler feed water enthalpies are calculated from the steam pressure and boiler feed water temperature, measured by a pressure sensor (ABB pressure transducer) and temperature sensor (ABB temperature probe). The pressure and temperature meters were last checked for calibration accuracy on June 9, 2015 in accordance with the manufacturer's specifications. The VCS PD states that these meters will be checked for accuracy at least once every three years; therefore the requirement is met for the current monitoring period.

Electricity consumption by the project activity is determined by comparing the electricity demand of Boiler No. 4 and the associated pollution control equipment before and after the biomass conversion based on a study conducted at validation, evaluating the specifications and usage rate of the power consuming equipment. The study determines the difference in electricity usage for the project, related directly to the changes in equipment on the boiler and pollution control equipment to combust biomass. All other electricity uses within the facility existed prior to the conversion and would have continued at the same rate had the conversion not occurred. The study was initially conducted in the fall of 2014 during the validation process and subsequently reviewed for updates in June 2015 for the current reporting period.

Fossil fuel consumption by equipment used to move biomass within the project facility is determined by the fuel supplier invoices for the purchase of fuel during the monitoring period.

The emissions from off-site consumption of diesel fuel during the collecting and processing of biomass residues are determined through review of biomass delivery records. Each load of biomass received for the project is identified by the source then tagged with an identifier indicating whether processing would have occurred pre-project, or whether the material was processed specifically for the project. For this verification period, no biomass was processed exclusively for the project. The justification being that the Louisville area has previously developed consolidation and distribution activities for the production of mulch, commercial aggregation, and landfilling that are considered "not processed for the project." This was further confirmed by reviewing a sample of biomass delivery tickets, none of which indicated that the biomass was processed specifically for the Project.

The emissions from biomass transportation are determined as the off-site consumption of diesel fuel due to transporting of biomass residues from more than 200km to the project site. The net biomass delivered to the facility with each load is measured by a truck scale, while delivery tickets record the net weight and the origin of the load and identify the distance travelled for delivery. Quality assurance and control procedures include calibration of the facility truck scale (Weigh Tronix E1310) at least once per year, in accordance with manufacturer recommendation. The scale was calibrated on February 26, 2013, June 15, 2013, and February 26, 2014. Each delivery ticket is reviewed and signed by a project employee upon receipt from the truck driver, reviewed during invoice matching, and then archived. First Environment reviewed a representative sample of biomass delivery tickets to confirm that transportation distances were correctly accounted for.

The emissions from off-site consumption of diesel fuel due to transportation of ash (combustion residuals) from the Project to final disposal or beneficial use outlets are determined according to the roundtrip distance to the disposal site. The round trip distance is determined for each disposal/end use destination according to the ash delivery tickets generated during the monitoring period. First Environment reviewed a representative sample of ash delivery tickets to confirm that transportation distances were correctly accounted for.

No Project Description deviations were previously validated for the Project.

The following methodology deviations were previously validated for the Project. The deviations were identified in the Monitoring Report and applied during the current reporting period.

Parameter	AMS-I.C. Requirement	Deviation from Requirement
Quantity of Steam (Qsteam)	In case the Project is exporting heat to other facilities, the metering shall be carried out at the recipient's end.	The quantity of steam, and thus thermal energy, exported to the project customers is measured at the biomass boiler rather than at the customers end.
Quantity of Electricity Consumed (ECy)	Directly meter the quantity of electricity consumed by the Project as required per the CDM "Tool to calculate baseline, project and/or leakage emissions from electricity consumption."	In lieu of monitoring Project electricity consumption, the difference between maximum electricity consumption capacity of the pre-project coal boiler and all associated ancillary equipment and the maximum electricity consumption capacity of the project biomass boiler and all associated ancillary equipment is applied as a conservative estimate of Project electricity consumption. The maximum electricity consumption capacity of the Project boiler will be reviewed with each verification period to identify any changes in project equipment and associated electricity consumption.
Emission Factor for Electricity Consumption ($EF_{grid, CM,y}$)	Apply the CDM "*Tool to calculate the emission factor for an electricity system.*"	In lieu of the application of the "*Tool to calculate the emission factor for an electricity system,*" the project applies the default US EPA eGrid emission factor for the SRTV sub-region.
Quantity of fossil fuel consumed by the Project (FC,y)	Directly meter the quantity of fuel consumed by the Project as required per the CDM "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion."	In lieu of directly metering diesel fuel consumption by Project equipment, the Project will rely on fuel delivery invoices. The diesel fuel is metered into the on-site storage tank during fuel deliveries and recorded on delivery invoices. The Project will conservatively assume that all purchased fuel is consumed.

The data collection and recordkeeping procedures were found to be consistent with those outlined in the monitoring plan described by the VCS PD and meet the requirements of the AMS-I.C.

There were no remaining issues or material discrepancies from the previous validation process.

The Project has not received or sought another form of environmental credit nor has it become eligible to do so since the validation. First Environment confirmed through an attestation provided by Recast that the Project has not participated in any other GHG program.

Overall, the Project is implemented according to the description provided in the VCS PD and the monitoring system implemented was found appropriate to the task of obtaining, recording, compiling, and analyzing the monitored data and parameters.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

Emission reductions are calculated ex post using the approach indicated in AMS-I.C and the validated VCS PD. Emission reduction calculations for the verification period were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. The formulas were tested and found to be consistent with the calculations described in AMS-I.C and the validated VCS PD.

Baseline emissions are calculated as the consumption of coal fuel that would have been used in the absence of the project activity multiplied by the emission factor for the fossil fuel displaced. The coal

consumption is determined as the net quantity of heat divided by the efficiency of the boiler that would have been used in the baseline scenario. The net energy is the result of the enthalpy gain reached in the boiler multiplied by the steam volume generated.

The net quantity of steam/heat supplied by the Project activity ($EG_{thermal,y}$) is determined by multiplying the difference between steam pressure enthalpy (h_{steam}) and boiler feed water temperature enthalpy ($h_{feedwater}$) by the quantity of steam generated by the project activity ($Q_{steam,y}$). In accordance with the methodology deviation approved at validation, the quantity of steam is measured as the output of biomass Boiler No. 4. Enthalpy of steam and boiler feed water are determined according to steam and water thermodynamic properties tables.

Project emissions from on-site fossil fuel consumption by equipment used to move biomass within the project facility and due to electricity consumption attributed to the project activity were accounted for.

The GHG emissions from electricity consumption (EC_y) is calculated by multiplying the electricity usage determined as described in the previous section by the appropriate grid emission factor in tCO_2/MWh.

The GHG emissions from fossil fuel consumption by the biomass loader ($FC_{Diesel, loader, y}$) is calculated by multiplying the fuel usage determined as described in the previous section by the diesel fuel emission factor in expressed in tCO_{2e}/GJ.

Project leakage emissions from biomass processing, biomass transportation, and transportation of ash combustion residues are accounted for in accordance with AMS-I.C. Leakage emissions due to competing uses for the biomass that might have occurred in the absence of the project were evaluated at validation and excluded.

As described in the previous section, the emissions from off-site consumption of diesel fuel during the collecting and processing of biomass residues into a transport-ready fuel format were excluded for this monitoring period.

The emissions from biomass transportation are determined as the off-site consumption of diesel fuel due to transporting of biomass residues from more than 200km to the project site ($DAF_{biomass\ delivery}$). For delivery distances greater than 200 km, the emissions are calculated by multiplying the roundtrip distance by the appropriate fossil fuel emission factor and the fuel efficiency of a typical tractor, based on US DOT data, updated each monitoring period. Delivery distances are recorded on the biomass delivery tickets during receipt of biomass deliveries ($Q_{biomass,j,y}$)

The emissions from off-site consumption of diesel fuel due to transportation of ash (combustion residuals) from the Project to final disposal or beneficial use outlets are determined according to the roundtrip distance ($DAF_{, ash\ delivery}$) to the disposal site multiplied by the emission factor for diesel fuel and the fuel efficiency of a typical tractor, based on US DOT data, updated each monitoring period.

The total GHG emission reductions for the monitoring period are determined by subtracting the project and leakage emission from the baseline emissions.

The verification process focused on the assessment of calculation spreadsheets to ensure that they were consistent with the formulas and equations described in the AMS-I.C methodology and the VCS PD. Copies of the raw data used in the calculations, including steam flow measurements, steam pressure, boiler feed water temperature, fuel and electricity purchase invoices, biomass, and ash delivery tickets were compared with the values used in the final calculations and tested for transcription or mathematical errors. The calculations for the entire period were reviewed as well to determine whether they were free of material misstatement. All calculation methods and emission factors used to determine emission reductions were consistent with those outlined in the validated VCS PD.

The Audit Team performed an independent recalculation of the emission reductions from the verification period using the available raw flow, methane, electricity, and propane consumption data. Material misstatements were identified for correction by Recast as described in Section 2.5.

No material misstatements were observed in the final GHG assertion.

Overall, the GHG emission reductions were quantified correctly in accordance with the VCS PD and the AMS-I.C methodology.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

Recast provided adequate documentation for the emission reduction calculations as well as its management systems around the data collection process. Specifically, First Environment was provided a Monitoring Report prepared in accordance with the VCS program template, transparent calculation spreadsheets, calibration records, and electronic data associated with steam generation, steam pressure, and steam temperature readings. Raw data was reviewed beginning from its original source of generation to confirm the accuracy of the information flow.

The evidence provided was consistent with the requirements of AMS-I.C and the VCS PD and meets generally accepted evidentiary standards for best practice in GHG accounting to sufficiently quantify the GHG emission reductions.

4.4 Non-Permanence Risk Analysis

Not relevant since the project is not an AFOLU activity.

5 VERIFICATION CONCLUSION

First Environment was retained to provide verification services for the Project's GHG emission reductions assertion based on the following fundamentals:

- *Level of assurance:* Reasonable assurance.
- *Objectives of verification:* To assure project conformance with the VCS Standard, the CDM methodology AMS-I.C and the VCS PD.
- *Verification criteria*: VCS Standard, the CDM methodology AMS-I.C and the VCS PD.
- *Definition of materiality:* Misstatements of greater than five percent of the GHG assertion and qualitative non-conformities with the validated VCS PD are considered material.
- *Scope, including:*
    - *Boundaries of the assertion:* thermal energy generation project fuelled with locally available forestry and agricultural biomass residues operations at the Recast Energy facility in Louisville, Kentucky as well as steam transfer to end users connected facility;
    - *The physical infrastructure, facilities, and activities within the assertion:* Recast Energy biomass boiler No. 4 and associated feed water systems, conveyors, fans, motors, instrumentation and control systems, and an electrostatic precipitator (ESP), to generate thermal energy, as well as steam delivery and condensate return systems from end users;
    - *GHG sources, sinks, and reservoirs included within the assertion:* carbon dioxide emission reductions due to displacement of coal fuel that would have been used in the absence of the project activity; carbon dioxide emissions from combusting fossil fuels to generate electricity purchased from the Kentucky power grid to operate the biomass boiler; carbon dioxide emissions from combusting fossil fuels while managing biomass fuel yard with the front-end loader; carbon dioxide emissions from combusting fossil fuels while collecting, processing

and transporting biomass to the facility; carbon dioxide emissions from transporting ash for offsite beneficial use or disposal; and

- *The time period for the assertion:* April 1, 2013 through December 31, 2014.

Based on the assessments performed and the historical evidence collected, First Environment concludes, with a reasonable level of assurance, that the emissions reductions of the Project resulting from the capture and combustion of methane gas for the period of April 1, 2013 through December 31, 2014 are:

- consistent with the VCS PD of December 4, 2014;
- in conformance with the VCS Standard, the CDM methodology AMS-I.C (Version 19);
- without material discrepancy; and meeting the minimum level of accuracy of at least 95 percent.

Verified GHG emission reductions or removals from April 1, 2013 through December 31, 2014:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2013	35,657	1,404	71	34,182
2014	50,362	1,444	72	48,846
Total	**86,019**	**2,848**	**143**	**83,028**

APPENDIX A: Findings

Corrective Action Requests and Responses

ID	Corrective Action Request	Participant Response	Verification Conclusion
1	The project description deviation identified in Section 2.2.2 of the Monitoring Report does not identify if the proposed deviation affects the applicability, additionality, or baseline scenario for the Project.	Section 2.2.2 of the Monitoring Report has been revised and now identifies if the deviation affects the applicability, additionality, or baseline scenario for the Project.	Response is acceptable.
2	The following issues were identified with the Monitoring Report: • Report ID and Project ID line items on the cover page are incomplete. • The Monitoring Period identified on the cover page is incorrect.t • Section 1.9 does not identify the "emissions trading programs and other binding limits" and "Other forms of environmental credits" requirements. • Section 3.3 does not identify the procedures used for handling any internal auditing performed and any non-conformities.	The Monitoring Report has been revised to correct all of the identified issues.	Response is acceptable.
3	The biomass fuel supply contract with Louisville/Jefferson County does not identify/discuss the ownership of environmental attributes with the associated biomass.	Since the existing contract with Louisville/Jefferson County was part of a public procurement process, it does not address the ownership of the environmental attributes. Recent email communication with the County includes written confirmation from the Director of the Office of Sustainability via email, that Recast does in fact own the rights for the biomass procured under this contract.	Response is acceptable.
4	The calculation of project emissions from electricity consumption applies an incorrect emission factor (EF_grid).	The emission reduction calculations have been revised and now apply the correct e-grid emission factor, 0.630 tCO2e/MWh from eGRID 9th edition V1.0 year 2010	Response is acceptable.

ID	Corrective Action Request	Participant Response	Verification Conclusion
5	The value for baseline boiler efficiency ($\eta_{BL,Therrmal}$) applied in the emission reduction calculations is inconsistent with the value identified in the validated Project Description.	The emission reduction calculations have been revised to identify and apply the correct value for boiler efficiency (ηBL) consistent with the validated PD and the Monitoring Report.	Response is acceptable.

ID	Clarification Request	Participant Response	Verification Conclusion
1	Please clarify if the deviation related to monitoring Boiler #4 steam output should account for steam loss during the delivery of steam to the recipients/customers.	The boiler No. 4 system includes a de-aerator tank where a portion of the steam produced is recirculated to pre-heat the make-up water and condensate return from the customer. Recast provided sample calculations demonstrating the heat balance between metering at the project Boiler No. 4 vs. at the customers end, which show there is no material misstatement in measuring the steam output at Boiler No. 4 instead of at the customer delivery point. This metering situation was approved during validation and as determined at that time, provides a more accurate representation of the Project steam produced by biomass.	Response is acceptable.
2	Please clarify the reasoning for the dates selected in the determination of Boiler Feedwater Temperature and Steam Pressure default substitution values according to the proposed project description deviation. (Specifically, October 17 and November 4, 2013 recorded lower average steam pressures than the value selected as default, but these dates were excluded.)	October 17 and November 4, 2013 were excluded because they were not normal operating days. On both days, the boiler went into extended shut downs days resulting in a wide difference in pressure over the 24-hour period.	Response is acceptable.
3	Please clarify how the 5.9 miles/gallon fuel efficiency value (EFF_tt) that is applied in the emission reduction calculations was obtained.	The emission reduction calculations have been revised to apply the correct value (5.8 mpg), which was obtained from Table 5.2 of the Transportation Energy Data Book, Edition 33, published by Oak Ridge National Labs on July 31, 2014, Chapter 5, Table 5.2, 2012 data.	Response is acceptable.

4	Please clarify the following questions related to the ash disposal shipment tickets: • Please clarify the link between the Voucher #, Bill of lading # and dates of shipment. • There are 31 ash shipments recorded for November 2014 but only 29 Bill of Lading documents. • Voucher 11923 for ash disposal shipment on 11/1/14 to Natural Products could not be reconciled with any Bill of ladings provided. • Voucher 11797; 11798 for ash disposal shipments on 11/30/14 to Koetter & Smith could not be reconciled with any Bill of ladings provided.	• The Voucher # is from our accounting (MAS) system. Each voucher matches a bill of lading. The SO # on the bill of lading will match the Order # on the voucher. The Date of Shipment is the date of the ash pull itself (see the Scale Date in the bottom section of the bills of lading). This comes from the bill of lading and is typically one to three days before the Invoice Date. • Two of the November vouchers (11923, 11276) were issued in reference to October shipments, invoiced (Voucher# assigned) later in November. • Recast provided the Invoice related to voucher 11923. Again, this is an October ash load, billed in November. • Recast provided supporting explanation regarding the voucher # and the actual BOL # they correspond to.	Response is acceptable.