



ASSESSMENT REPORT

BELGIUM DEVELOPMENT AGENCY

UGANDA'S SUGAR INDUSTRY WASTEWATER
STANDARDIZED BASELINE & UGANDA'S MUNICIPAL
WASTEWATER STANDARDIZED BASELINE

Report No: 8000446437 – 15/100

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	Non Annex 1 country:		Annex 1 country:	
	Republic of Uganda		Kingdom of Belgium	
	PP from non-Annex 1 country:		PP from Annex 1 country:	
	N/A		N/A	
Related methodology/ies:	Title:		No.:	Scope(s) / TA(s)
	Methane recovery in wastewater treatment Avoidance of Methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems		AMS III.H ver.17.0 AMS III.I ver 08.0	13 / 13.1
Assessment team / Technical Review and Final Approval:	Assessment Team:		Technical review:	Final approval:
	Stefan Winter (TL, David Lubanga TE)		R. Winter	R. Winter
Key dates of validation Assessment:	Draft Report Issued:		On-site (from):	On-site (to):
	2015-08-31		2015-08-26	2015-08-28
Summary of Assessment opinion	<p>Belgium Development Agency has commissioned the TÜV NORD JI/CDM Certification Program to carry out the assessment of the: "Uganda's Sugar Industry Wastewater Standardized Baseline & Uganda's Municipal Wastewater Standardized Baseline", with regard to the relevant requirements for CDM standardized baselines.</p> <p>As a result of this of the assessment, the DOE confirms that:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> all data acquired for the purpose of SB development is relevant, current and consistent <input checked="" type="checkbox"/> data gaps identified have been filled through conservative means such as extrapolation <input checked="" type="checkbox"/> the data delivery protocol is complete and consistent with the data template, <input checked="" type="checkbox"/> the QA/QC protocol is in place and functional <input checked="" type="checkbox"/> the SBs are calculated without material misstatements in a conservative and appropriate manner. 			
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Abbreviations:

AMS	Automated Measuring System
AST	Annual Surveillance Test
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO₂	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CL	Clarification Request
DVerR	Draft Verification Report
DWRM	Directorate of Water Resource Management
ER	Emission Reduction
ETS	Emission Trading Scheme
FAR	Forward Action Request
GHG	Greenhouse gas(es)
MP	Monitoring Plan
MR	Monitoring Report
NWSC	National Water and Sewage Corporation
PA	Project Activity
PCS	Process Control System
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
QA/QC	Quality Assurance / Quality Control
SB	Standardized Baseline
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

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1. INTRODUCTION

Belgium Development Agency has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the assessment of the proposed

“Uganda’s Sugar Industry Wastewater Standardized Baseline & Uganda’s Municipal Wastewater Standardized Baseline”

with regard to the relevant UNFCCC requirements. The assessment team has reviewed the corresponding data collection procedures, processes and compilation used in the establishment of the proposed standardized baselines.

Related data and vintages for the proposed standardized baseline was validated in a detailed manner applying the set of requirements, audit practices and principles as required under the Validation and Verification Standard ^{/VVS/} as well as related Guidelines^{/GUIDE/} and Procedures^{/PROC1//PROC2/} of the UNFCCC.

This report summarizes the findings and conclusions of this assessment of the above mentioned standardized baselines.

1.1. Objective

The objective of the assessment is the review and determination by an independent entity of the data acquisition procedures and the development of the standardized baselines. It includes the assessment and validation of the:

- Completeness, consistency, accuracy, and relevance of all data vintages
- Data acquisition processes applied & steps taken to fill identified data gaps
- All reference sources & quality of evidence,
- QA/QC system
- Roles and responsibilities
- Management System

1.2. Scope

The assessment of standardized baselines is based on the SB reports^{/SB1//SB2/}, SB calculation spread sheet ^{/XLS/}, supporting documents made available to the DOE, and information collected through performing interviews and during the on-site assessments. Furthermore publicly available information was considered as far as available and required.

The assessments were carried out on the basis of the following requirements, applicable for this project activity:

- Article 12 of the Kyoto Protocol ^{/KP/},
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 ^{/MA/}, and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,



- CDM Validation and Verification Standard^{/VVS/},
- Approved CDM Methodologies^{/AMS/}.
- Relevant SB Procedures^{/PROC1//PROC2/}.

2. GHG PROJECT DESCRIPTION

2.1. Description of the Standardized Baseline

The standardized baselines determine the COD_{inflow} value of wastewater in both Municipal and the Sugar Industry wastewater treatment sectors. The standardized baseline (COD_{inflow}) value can be conservatively applied in the calculation of methane abatement potential of future CDM projects in The Republic of Uganda.

The COD_{inflow} and COD_{outflow} of a project activity can also be used to demonstrate the COD removal efficiency, and therefore, the methane emission reduction potential of a particular CDM or voluntary project activity.

2.2. SB Location

The details of the project location are given in Table 2-1:

Table 2-1: Project Location

No.	Project Location
Host Country	Republic of Uganda
Region:	All regions
Project location address:	Uganda
Latitude:	0° 18' 58" N
Longitude:	32° 34' 55" E

3. METHODOLOGY AND ASSESSMENT SEQUENCE

3.1. Assessment Steps

The assessment consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- A desk review of the draft SB Reports^{/SB1//SB2/} submitted by the client and additional supporting documents with the use of customised checklist protocol consistent with appropriate guidelines and procedures
- Assessment planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft reporting
- Resolution of corrective actions (if any)
- Final reporting
- Technical review
- Final approval of the assessment.

3.2. Contract review

To assure that

- the assignment falls within the scopes for which accreditation is held,
- the necessary competences to carry out the assessment can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

3.3. Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities an assessment team, consisting of one team leader and 1 additional team member, was appointed.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the Table 3-1 below.

Table 3-1: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Validation competence ⁵⁾	Host country Competence	On-site visit
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Stefan Winter	TN CERT GmbH	TL	SA	<input checked="" type="checkbox"/>	13.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	David Lubanga	TN CERT GmbH	TM ^{A)}	LA	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Rainer Winter	TN CERT GmbH	TR/FA ^{B)}	SA	<input checked="" type="checkbox"/>	13.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	-

¹⁾ TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

²⁾ GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ GHG auditor status (at least Assessor)

⁴⁾ As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

A) Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

B) No team member

All team members contributed to the review of documents, the assessment of the project and to the preparation of this report under the leadership of the team leader.

Statements of competence for the above mentioned team members are enclosed in annex 2 of this report.

Assessment Protocol

In order to ensure consideration of all relevant assessment criteria, a validation assessment protocol is used. The protocol shows, in a transparent manner, criteria and requirements, means of assessment/validation and the results from pre-validating the identified criteria. The validation protocol reflects the generic requirements each standardized baseline has to meet as well as project specific issues as applicable. The protocol serves the following purposes:

- It organises, details and clarifies the requirements that a SB is expected to meet;
- It ensures a transparent assessment process where the DOE will document how a particular requirement has been validated and the result of the determination.

The assessment protocol is described in Figure 3-2.

SB specific checklist

In order to ensure transparency and consideration of all relevant assessment criteria, an assessment protocol has been developed. The protocol shows, in a transparent manner, criteria and requirements, means and results of the SB assessment. The assessment protocol serves the following purposes:

- It organises, details and clarifies the requirements a standardized baseline is expected to meet
- It ensures a transparent assessment process where the DOE documents how a particular requirement has been proved and the result of the validation.

The basic structure of this project specific validation protocol is described in Table 3-2.

Table 3-2: Table A-2; Structure of the SB checklist

Validation Protocol Table A-1: Requirement checklist				
Checklist Item	Validation Team Comment	Reference	Draft Conclusion	Final Conclusion
<i>The checklist items in Table A-1 are linked to the various requirements the SB should meet. The checklist is organised in various sections. Each section is then further sub-divided as per the requirements of the topic.</i>	<i>The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the validation team and how the assessment was carried out. The reporting requirements of the VVS if applicable shall be covered in this section.</i>	<i>Gives reference to the information source on which the assessment is based on</i>	<i>Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft validation stage.</i>	<i>In case a corrective action or a clarification the final assessment at the final validation stage is given.</i>

The completed assessment protocol is enclosed in Annex 1 to this report.

3.4. Desk review

The completed draft reports and supporting background documents related to the proposed SBs were reviewed.

Furthermore, the assessment team used additional documentation by third parties like host party legislation, technical reports referring to the SBs or to the basic conditions and technical data.

3.5. On-site assessment

The assessment team has carried out a site visit in order to assess the information included in the SB documentation and to gain additional information regarding the

compliance of the proposed SBs with the relevant criteria applicable for CDM. A selection of the most important sites has been visited.

Before and during the on-site visit the assessment team performed interviews with the client to confirm selected information and to resolve issues identified in the document review.

Representatives of the Belgium Development Agency (Climate Focus), the local consultant (Ecosan), and the Host Country DNA were interviewed. The main topics of the interviews are summarised in Table 3-2.

Table 3-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Designated National Authority 2. Representatives of BTC 3. SB consultant	<ul style="list-style-type: none">- General aspects of the SBs- Quality management system- Involved personnel and responsibilities- data management- Data collection, data sources, relevance, quality, vintages- Data uncertainty, gaps, and residual risks- SB calculation- Procedural aspects of the assessment- SBs additionality criteria

The list of interviewees is included in chapter 7.4.

3.6. Draft Assessment reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the SB assessment protocol is completed. This protocol together with a general procedural description of the assessment and a detailed list of the assessment findings form the draft assessment report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

3.7. Resolution of CARs, CLs and FARs

Non-conformities raised during the assessments can either be seen as a non-fulfilment of criteria ensuring the proper establishment of a reliable SB.

Corrective Action Requests (CARs) are issued, if:

- Non-conformities with the guidelines and procedures are found in data acquisition and reporting, or if the evidence provided to prove conformity is insufficient;

- Mistakes have been made in applying assumptions, data or calculations which will impair the final result of the SBs;

The assessment team uses the term Clarification Request (CL), which is issued if:

- information is insufficient or not clear enough to determine whether the applicable requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further assessments. Forward Action Requests are issued, if:

- the reporting requires attention and / or adjustment for the next SB update period.

For a detailed list of all CARs, CLs and FARs raised in the course of the assessment pl. refer to chapter 4.

3.8. Final reporting

Upon successful closure of all raised CARs and CLs the final assessment report including a positive assessment opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative assessment opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

3.9. Technical review

Before submission of the final assessment report a technical review of the whole assessment procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is not considered to be part of the validation or assessment team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the assessment opinion and the topic specific assessments as prepared by the assessment team leader may be confirmed or revised. Furthermore reporting improvements might be achieved.

3.10. Final approval

After successful technical review of the final report an overall (esp. procedural) assessment of the complete assessment will be carried out by a senior assessor located in the accredited premises of TÜV NORD.

Only after this step the request for approval can be started (in case of a positive assessment opinion).

4. ASSESSMENT FINDINGS

In the following paragraphs the findings from the desk review of the standardized Baseline reports^{/SB/}, the calculation spreadsheet^{/XLS/}, datasets^{/SB1/SB2/} and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

Table 4-1: Summary of CAR, CL and FAR

Assessment topic	No. of CAR	No. of CL	No. of FAR
A – Description of Standardized Baseline	0	0	0
B – Data Acquisition Procedures	2	2	0
C – Management System (QA/QC)	2	0	0
D – Data and parameters	1	1	0
E – Roles and Responsibilities	0	1	0
SUM	5	4	0

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the assessment team. For an in depth evaluation of all assessment items it should be referred to the assessment protocols (see Annex).

Finding	1		
Classification	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p><i>Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines</i></p> <p>It has been identified that Table 2 in the SB documents include a GWP of 21 tCO₂e/tCH₄. Clarification is requested whether the value from first commitment period is still to be applied under the SB.</p>		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<p>True, the value of the first commitment period will not be valid for the SB approved in the second commitment period, therefore the value for the second commitment period (GWP_{CH₄}=25) will be used. The text is corrected.</p>		
	<input type="checkbox"/> Changes in	Section(s):	New version No.:
	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:

Finding	1
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	No ok. The SB documents have not been fully updated e.g. Table 2 of municipal and industrial WW SB reports still refers at several places to GWP=21.
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	All GWP values in the reports are now updated to represent the value applicable in the second commitment period (i.e. 25).
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	All GWP values have been correctly included
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed

Finding	2
Classification	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines During onsite visits to several locations it has been identified that the data sets presented in the two standardized baseline reports are not complete considering data that is currently available. Further data acquisition, update and revision is requested.

Finding	2						
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<p>Some of the stakeholders who claimed during the site visit to have further updated data were not all responsive to provide what they promised. However, the DOE's visit and their assessment approach was very useful in the sense that made several of stakeholders provide more complete sets of data. Those additional datasets that stakeholders have submitted to consultants after intensive follow up (up to 6 weeks after the site visit, till 11 October 2015) are all updated and incorporated into the final SB calculations and reports.</p> <p>The data right now is mainly complete, NWSC has provided their most recent and available data for all municipal ponds and the major sugar factories have submitted latest data. All data sets at least cover one most recent year. Where data gaps were discovered (rare situations), the gaps were filled using extrapolation methods based on available data from other sugar factories. It was assured that the method used is conservative and will lead to a conservative SB result.</p> <p>The overall understanding of the consultants is that for such an underrepresented sector it is not possible to get hold of complete sets of data for the past most recent years. In some sugar factories they did not have any treatment systems until 2013 or 2014. In other cases, they had interruption in data gathering or their back up data storage broke down etc. Despite all the prevailing issues with the data, the consultants did their utter best to collect the most up-to-date data sets in the sector and followed conservative approaches to fill the data gaps were possible.</p> <table><tr><td><input type="checkbox"/> Changes in</td><td>Section(s):</td><td>New version No.:</td></tr><tr><td><input type="checkbox"/> Changes in XLS</td><td>Worksheet(s):</td><td>New version No.:</td></tr></table>	<input type="checkbox"/> Changes in	Section(s):	New version No.:	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Changes in	Section(s):	New version No.:					
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:					
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The standards as well as excel spreadsheet calculations have been updated in accordance with new received & current data. DOE has checked the updated data with data collected during site visit and can confirm that the values used are consistent. Further DOE checked the method of determining related output figures and confirms that the calculation method is correct and provides related required information.</p> <p>However in spreadsheet for Sugar Industry in Sheet SCOUT the calculation of total discharge in cell M20 includes also cell M19 which is incorrect. Appropriate revision in all affected documents is requested.</p> <p>Besides spreadsheet for Municipal WWT includes links to external files esp in Sheet "NWSC all municipal ponds" which should be removed. Finally the related data documents which have been provided by NWSC should be forwarded to DOE for crosscheck.</p>						
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<p>Indeed, the M20 cell in the Industrial excel sheet is now corrected and all relevant values are updated in the reports.</p> <p>The Municipal sheet has also been updated and all external links in the cells are removed.</p> <p>The files provided by NWSC contacts will be forwarded to the DOE via email for double check.</p>						

Finding	2
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>The value of the total discharge has been corrected and all linked calculated values updated. External links have been removed</p> <p>The files have been provided. No errors have been noted</p>
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed

Finding	3
Classification	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p><i>Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines</i></p> <p>Following issues w.r.t. the QC report have been identified:</p> <ol style="list-style-type: none"> 1. QA/QC system is not presented so far and a related detailed description is to be specified in the SB / QC report. 2. Clear structure of the related entities, related persons at those entities and their responsibilities have to be further specified in the QC report e.g. organizational chart for municipal and sugar industry to improve transparency. 3. The description refers to data gaps and doubts, however how these data gaps have been closed is not described in detail. Further the report lacks related corrective actions to prevent such data gaps in future. 4. Please clarify whether there are already DNA based previous studies. If so pls provide. 5. It is stated that data is archived electronically for at least three years. Please specify whether this is three years from data collection or three years after update of the SB or any other reference date. 6. Clarification is requested whether any back-up of data is considered. 7. Under consistency it is referred to "other similar programs". Please specify. 8. Further under consistency it is referred to data vintage 2012 which would be the latest available data. However during site visit it has been identified that further data is available. Update is requested. 9. Under transparency it is stated that the DNA intends to set-up a related website. Please specify the related timeframe and current status. 10. No corrective actions have been stated in regards to the data gaps stated in the beginning of the report, please clarify that this is adequate as well as it is stated that data availability is an issue 11. The client is requested to clarify the steps taken to improve data gathering efforts for future updates of the SB in light of the difficulties faced during the SB establishment efforts

Finding	3
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<div><div><div>1. The QA/QC system is now included in the QA/QC report and added to the SB documents as Annex.</div><div>2. The structure has been added to the QA/QC and representatives of organisations who have to be in constant touch and communicate in relation to data collection, have been introduced in a flowchart.</div><div>3. The data gap issues are now fully explained and the manner they are tackled is elaborated. Also instruction is given how to avoid these types of data gaps in future.</div><div>4. No DNA based studies is available.</div><div>5. Specified more clearly now: three years from the date the SB is approved and/or updated.</div><div>6. It is mentioned in the report that data must be stored for three years, the PCs at the DNA of Uganda have back up and the stored data in the DNA will be automatically backed up. DNA will take measures to assure back up system will cover SB data storage as well.</div><div>7. The text is revised to clarify.</div><div>8. The most recent and up-to-date data received until 12 October 2015 has been considered and incorporated into the calculations and SB reports. After the site visit where the stakeholders promised to submit more data, now there is indeed data up to 2015 as well (e.g. in SCOUL facility among sugar factories).</div><div>9. We removed the website topic as there is no initial steps towards the design and operation of the dedicated website. If there is any approval and/or update it will simply be mentioned on the DNAs webpage under the Ministry of Water and Environment web portal. Text is revised.</div><div>10. Text added to increase clarity on the actions taken in regards to data gaps.</div><div>11. Indeed, added and taken into account in the new text. Furthermore, the CCD has added an extension to this assignment in order to train specific personnel within CCD responsible for data collection, communication with stakeholders, update the calculations and submission of the SB update. This will improve the SB updating and data collection structures to a large extend and will avoid similar data gaps in future updates. In addition, there is a data template to be introduced during data collection efforts by CCD, similar to what consultants provided for this assignment. However, this time the data collection template will be accompanied by an SB update tool that will be designed and carried out as part of the assignment's extension by the end of 2015.</div></div><div><div><div><div><input type="checkbox"/> Changes in</div><div>Section(s):</div><div>New version No.:</div></div><div><div><input type="checkbox"/> Changes in XLS</div><div>Worksheet(s):</div><div>New version No.:</div></div></div></div></div>

Finding	3
<p>DOE Assessment #1</p> <p><i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<ol style="list-style-type: none"> 1. An updated Quality Assurance and Quality Control (QA/QC) protocol for the wastewater treatment Standardized Baselines has been presented in Annex IV of the revised SB reports. The protocol describes steps taken to ensure transparency (including public consultation), correctness, data quality, relevance, completeness, and conservativeness in the current and future estimation of the standardized baselines, in line with EB 79, Annex 07) 2. The DNA will implement an organizational structure including roles and responsibilities for information flow between focal points at data sources and the DNA focal point and the UNFCCC. This has been included in the QA/QC protocol 3. Information on data gaps and how they have been filled is included in the QA/QC protocol. The DOE appreciates the challenges of data acquisition especially for the sugar industry SB, and accepts the steps taken by PP to conservatively estimate missing values based on known related data 4. OK, no DNA prior based studies have been conducted 5. Data used in the calculation of the SB is archived electronically for at least three years since SB approval. This is included and deemed sufficient. 6. DNA will initiate measures to back up vital data used in the SBs and data collected as part of updating the SBs. This is considered crucial to secure data completeness and accuracy 7. OK as revised 8. Please make necessary corrections as several paragraphs in the report do not refer correctly to the data vintage 9. No dedicated website. This information is now expunged from the report 10. The text has been revised and the SB reports include detailed information on steps taken to fill any data gaps conservatively 11. The DNA shall implement measures to improve data acquisition, drawing from challenges lessons learned in the efforts to establish the current SBs. These measures include upgrading the data delivery protocols, carrying out trainings of key personnel and improving communication, especially with regards to sugar industry data.
<p>Corrective Action #2</p> <p><i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i></p>	<ol style="list-style-type: none"> 8. The reports are revised to refer to the latest data vintage received from the stakeholders.
<p>DOE Assessment #2</p> <p><i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i></p>	<p>OK as revised</p>

Finding	3
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed

Finding	4
Classification	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p><i>Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines</i></p> <p>The SB is designed in a way to consider COD inflow and COD outflow from the entire WWT. However as per related methodology AMS III.H it is to be determined between affected and unaffected parts of a WWT. The COD in and out of the affected part of the WWT would have to be considered for a regular project activity. It is unclear how this has been considered during the design of the SB. Esp. if only one step within the WWT is upgraded by a more efficient technology and related methane is captured the approach of COD in at very beginning and final effluent of the WWT and use is unclear.</p>
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<p>The SB is designed to calculate and introduce a Standardized COD inflow that can represent the whole sector, one for the municipal ponds and one for the sugar industries. The standardized COD inflow is benchmarked in a sectoral approach taking into account the annual discharge and annual methane generation potential from each of the facilities in order to calculate, in a conservative manner, a COD inflow that is deemed as the SB and can be used by future CDM projects without getting into the trouble of COD inflow baseline determination. There are no affected and non-affected segments in the sector and this is not discussed in the Guidelines for the establishment of sector specific standardized baselines. In fact, the SB will never replace a methodology, specifically those eligibility and applicability parts of the methodology that discuss (in detail) the types of projects and the baseline scenarios and relevant eligibility criteria will still have to be discussed and scrutinized in enough details.</p> <p>In this case, the COD inflow, that is the wastewater as the result of sugar production processes in the sugar factories, will always be introduced as COD inflow, no matter what technologies the facility will use to replace the baseline scenario; the COD inflow will remain more or less the same value. In other words, the indicator this SB is trying to fix and standardized are independent of the downstream WWT technologies. This also applies to the wastewater discharge data used in the SB calculations and other process related indicators.</p> <p>Besides, the SB will only introduces a baseline indicator that may be replaceable by a sector based representative value. This does not mean that all wastewater treatment projects who are potentially applying for CDM are eligible to use this figure. They will still have to justify the use of this baseline value and pass all the applicability and eligibility criteria within the methodology, to be validated and approved by the UNFCCC.</p>

Finding	4		
	<input type="checkbox"/> Changes in	Section(s):	New version No.:
	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	DOE has understood and endorses the approach taken in introducing the related SBs. According to the specification response provided and the interviews conducted during site visit this issue is now sufficiently clarified and resolved.		
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed		

Finding	5		
Classification	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines Following documents or data could not be provided during onsite visit and is still requested: <ol style="list-style-type: none"> 1. Analysis on wastewater treatment systems on UNEP DTU 20 Nov 2014 2. Public consultation report (Ref. EB79 Annex 7 §29 (b)) 		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<ol style="list-style-type: none"> 1. This is a visit to the UNEP DTU CDM pipeline website, we looked over similar wastewater treatment systems to see the capacity of their power generators (if any), and see if mostly are below 5MW capacity. This is not an official document to submit to the DOE. It is a visit/review made to UNEP DTU pipeline list only. 2. Public consultations have been conducted two times during the SBs development, once 17-18 December 2014 and the second time just before the DOE's assessment site visit on 25 August 2015. The reports of both sessions are included as index in the SB reports and mentioned as well in the QA/QC protocol. 		
	<input type="checkbox"/> Changes in	Section(s):	New version No.:
	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:

Finding	5
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>1. Clarification has been provided. The reference made is to the publicly available database via http://www.cdmpipeline.org/. DOE checked the pipeline and found that on 21/10/2015 258 projects are listed as registered under subtype wastewater. Only 47 (18.2%) thereof apply a large scale methodology. Further 209 of the 258 projects have emissions of 60ktCO₂e/a or lower. Based on that and own experience as well as technical knowledge of assessment team can confirm that the most WWT projects have a capacity below 5 MW.</p> <p>2. Standards have been checked and a summary of the workshops has been provided under chapter 6.10 including goal of the workshops, invitation list, attendance list, agenda as well as how outcomes have been taken into account. Further related PowerPoint presentations have been provided as well as case studies conducted during the workshop.</p> <p>Based on the stated and check of documents provided as well as interviews taken during site visit the public consultation is taken due account and the reports can be considered as included in the SB document itself.</p>
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed

Finding	6								
Classification	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR						
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines The SBs refer to related procedure for development of SB ver 3.1. Please clarify whether the ver 4 will be applied which will become effective from 1 Sept 2015.								
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	Indeed, revised the version number. <table><tr><td><input type="checkbox"/> Changes in</td><td>Section(s):</td><td>New version No.:</td></tr><tr><td><input type="checkbox"/> Changes in XLS</td><td>Worksheet(s):</td><td>New version No.:</td></tr></table>			<input type="checkbox"/> Changes in	Section(s):	New version No.:	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Changes in	Section(s):	New version No.:							
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:							
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Procure for the <i>Development, revision and clarification and update of standardized baselines</i> version number has been revised in both footnotes from version 03.1 to version 04.0								
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed								

Finding	7
Classification	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR
Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines As per Guidance on Quality Assurance EB79 Annex 7 §29 (a) a procedure for data collection has to be developed and implemented. However the related procedure is yet to be provided. As no procedure has been provided yet the procedure could not be assessed whether it is sufficient w.r.t. the following topics: 1. QA/QC procedures were: (i) developed in accordance with the QA/QC Guidelines; and (ii) effectively implemented (e.g. met the data quality objectives); 2. whether all data and information relating to the datasets and procedures for standardized baselines were clearly documented
Corrective Action #1 This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.	In regards to the development of the first SB, the consultants have assisted the DNA of Uganda to produce a data template in order to collect data from respective organisations. This data template along with the sample request letters to respective organisations/stakeholders were presented to the DOE. As you are aware there has been no SB QA/QC protocol before the start of this SB development assignment, and the data used for the SB calculations are those that have been tested, measured, collected and stored/managed before the start of this assignment. Therefore, the QA/QC protocol presented to the DOE is the QA/QC protocol that will be fully followed for the update and renewal of the current SB calculations and documents in future. The DOE has noticed the issues related to the wastewater indicators (COD, discharge etc.) testing, data availability, data storage and has witnessed that such a sector is underrepresented when it comes to data collection of required information for SB development. The QA/QC expected by the EB is not fully considered/respected by the stakeholders before this SB assignment, for the very clear reason that stakeholders were not managing their data for SB development purposes, but for other internal and/or official reasons (e.g. double check with DWRM test results for checking the effluents). Hence we believe that for the base data that is used to establish the very first SB, having the QA/QC implemented fully for the historic/past data, in all sectors, among stakeholders and in data collection efforts, is almost impossible as these data are already available and have been collected using each organisation's existing (or non-existing) protocols. What the DNA and consultants foresee is that the present QA/QC report along with the data collection protocol and data template will be playing an important role towards the update of the SB using the most valid, credible and up-to-date data in accordance with the QA/QC procedures approved by the UNFCCC. In regards to this CAR: 1. a. QA/QC report is now updated in accordance with QA/QC guidelines, b. the first time the QA/QC will be fully implemented

Finding	7
	<p>will be at the renewal and update of the first SB (as well as the time between the first approval and renewal when data collection effort has to be carried out). As explained above, in this SB only available historic data has been used and the testing of WWT indicators, data collection on site and the site measurements and protocols were not in control of the DNA. The DNA however developed a data template and a request letter in order to ask stakeholders to contribute to the first SB development.</p> <p>2. All the data for municipal and sugar factories are documented in the calculation excel sheet and the DOE can verify the quality and credibility of these data through direct contacts with the stakeholders involved. The issue with the data management in many public organisations including the WWT sector is that there is no appropriate centrally managed data protocol within each of these organisations. This results in a very slow pace and time consuming process in collecting necessary data for SB development. After almost a year of data collection efforts, the consultants could get hold of enough data and information to run the SB calculation for both municipal and sugar factory sectors.</p>
	<input type="checkbox"/> Changes in Section(s): New version No.: <input type="checkbox"/> Changes in XLS Worksheet(s): New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<p>DOE understands the host country specific circumstances and is also aware that two SBs have already been approved by the UNFCCC.</p> <p>Besides based on interview with stakeholders during site visit, information received and circumstances found it is considered that the approach taken is sufficient and most appropriate for the host country.</p> <p>The DOE has checked the proposed QA/QC protocol included in Annex IV of both SB reports. The QA/QC protocol has been developed in accordance with the guideline: <i>Quality Assurance and Quality Control of data used in the establishment of standardized baselines</i> (version 02). This protocol will guide future updates. Nonetheless, the efforts by the DNA and consultant to acquire quality and relevant data is considered sufficient to secure the correct values for the SBs. As described in finding 3, the proposed QA/QC protocol is considered appropriate</p>
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed

Finding	8
Classification	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	<p><i>Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines</i></p> <p>Following issue w.r.t. the SBs has been identified:</p> <p>The output is described as treated/safer wastewater. Please clarify how this is consistent w.r.t. the stated measures which also include methane destruction.</p>

Finding	8						
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	Text is revised to increase clarity <table border="1"> <tr> <td><input type="checkbox"/> Changes in</td><td>Section(s):</td><td>New version No.:</td></tr> <tr> <td><input type="checkbox"/> Changes in XLS</td><td>Worksheet(s):</td><td>New version No.:</td></tr> </table>	<input type="checkbox"/> Changes in	Section(s):	New version No.:	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Changes in	Section(s):	New version No.:					
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:					
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The stated "Output" under 3.1.2 has been updated and specified and is now clear also w.r.t. clean wastewater and methane emissions and methane generation potential						
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed						

Finding	9						
Classification	<input checked="" type="checkbox"/> CAR <input type="checkbox"/> CL <input type="checkbox"/> FAR						
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Municipal Wastewater and Sugar Industry Wastewater Standardized Baselines <ul style="list-style-type: none"> As per site visit interviews the list of sugar factories either active or inactive is not complete and no statement of the same (active/inactive) is offered. Years since operation, as well as dates of installation of wastewater treatment facilities are not included to demonstrate presence or absence of data vintages. Please update for transparency. 						
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	<ul style="list-style-type: none"> The list has been completed to add the other smaller size or inactive sugar factories as well. The requested data has been added to the table. <table border="1"> <tr> <td><input type="checkbox"/> Changes in</td><td>Section(s):</td><td>New version No.:</td></tr> <tr> <td><input type="checkbox"/> Changes in XLS</td><td>Worksheet(s):</td><td>New version No.:</td></tr> </table>	<input type="checkbox"/> Changes in	Section(s):	New version No.:	<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:
<input type="checkbox"/> Changes in	Section(s):	New version No.:					
<input type="checkbox"/> Changes in XLS	Worksheet(s):	New version No.:					
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	<ul style="list-style-type: none"> The list has been completed and also includes now also GM Sugar Ltd. Table 3 has been revised to reflect the active and inactive sugar factories as determined onsite. During onsite, it was confirmed that roughly 6-8 sugar factories were still in operation. This is now reflected in the report. 						
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next SB update <input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed						

5. SUMMARY OF SB ASSESSMENTS

The following paragraphs include the summary of the final validation assessments after all CARs and CLs are closed out. For details of the assessments pl. refer to the discussion of the assessment findings in chapter 04 and the assessment protocol (Annex 1).

5.1. Involved Parties

The proposed standardized baselines (SB) are submitted for a single Host Country, Uganda, and for the purpose of baseline emission estimation for CDM projects in the sugar industry and municipal wastewater treatment sectors. The SBs have been developed by the Belgium Development Agency on behalf of Designated National Authority (DNA) of The Republic of Uganda.

5.2. Related methodology (ies)

- Methane recovery in wastewater treatment (AMS III.H ver.17)
- Avoidance of Methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems (AMS III.I ver 08.0)

These proposed voluntary SBs do not supersede any sections including applicability criteria set by the eligible methodologies above. The result of these SBs (baseline COD_{inflow}) can only be applied as the baseline COD_{inflow} of the prospective CDM projects only if they comply with the methodology in all relevant aspects.

5.3. Data Management and acquisition

Sugar industry data was acquired directly from the sugar industries that had a WWT facility in place. However, not all plants had complete datasets, and therefore conservative estimates have been used in filling up the data gaps

For the municipal waste water treatment ponds, data is sent monthly and consolidated by the Directorate. Therefore, the accuracy of this data is not in doubt. Data was acquired directly from the directorate

5.4. Assessment of Sampling (if applicable)

No sampling approach has been applied in the estimation of any parameters used in determining the SBs. All data has been checked and applied, hence, sampling is not applicable.

5.5. QA/QC Management System

As per the requirements of the Guideline: *Quality assurance and quality control of data used in the establishment of standardized baselines* (EB79 Annex 07) §34-39, the DOE has assessed the following elements of the QA/QC protocol against the data quality objectives outlined in the guideline. The QA/QC protocol is included as Annex IV in both SB reports.

Table 5-1

	Element	DOE Assessment
a.	System availability	A standardized data collection system is in place and procedures outlined in the data delivery template. The template is assessed as complete and consistent in the acquisition of relevant, complete, and current data
b.	Conformity	The QA/QC protocol ensures that data quality objectives are met. Where there were data gaps, conservative estimates based on existing data and/or extrapolation of values was consistently applied. The datasets were acquired transparently and cross-checked by the assessment team
c.	Traceability	Information and data used in determination of the SBs was cross-checked by EcoSan, the SB consultant as well as the host country DNA. All the data has been critically assessed for relevance, completeness and consistency, and the calculations for the COD _{inflow} were found to be clear and traceable. The laboratory analysis reports from data sources and focal points were available for validation
d.	Security	A security system for data management is in place in the DNA office. All data collected is saved electronically and paper reports are filed away securely. The DNA office did not show any possible lapses in terms of data protection. No incidents related to data security have been reported
e.	Error tolerance	The DNA, through the QA/QC system has sought to minimize errors and has established procedures to identify and correct errors. These procedures as outlined in the reports have been assessed to be sufficient.

5.6. Overall Aspects of the Assessment

The data used for the estimation of the sugar industry WWT SB were collected directly from individual sugar plants by BTC and Ecosan Consulting teams.

For the municipal wastewater SB, data was collected directly from the National Water & Sewerage Corporation (NWSC), which is a government entity mandated to collect, analyse, and monitor the same for all municipal ponds in the country.



The DOE assessment team was given full access to selected plants and accorded the necessary interviews from key personnel relevant to the datasets acquired, during the site visits.

5.7. DOE Recommendations

It was noted during site visit that the difficulty in sourcing datasets from relevant data sources specifically from the sugar industry was occasioned by inadequate or lack of advance formal communication and sufficient explanation of the use of datasets. Formal communication directly from the DNA (the Government) appeared to be more effective than through consultants, as suspicions in the use of the data would be minimal.

There were also concerns in the sugar industry that insufficient explanation on the use of their data and lack of engagement with the data providers (focal points) in the course of the SB development. E.g, enhancing transparency by sharing a draft and/or final SB report to demonstrate the practical application of acquired data, and including a thank you note. This can help with their cooperation and time saving in future data requests.

6. VALIDATION AND ASSESSMENT STATEMENT

Belgium Development Agency has commissioned the TÜV NORD JI/CDM Certification Program to carry out the assessment of the: *“Uganda's Sugar Industry Wastewater Standardized Baseline & Uganda's Municipal Wastewater Standardized Baseline”*, with regard to the relevant requirements for CDM standardized baselines.

In the course of the assessments 5 Corrective Action Requests (CAR) and 4 Clarification Requests (CL) were raised and successfully closed. The assessment is based on the draft SB reports, revised SB reports, the provided datasets, the SB calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the client.

As a result of this assessment, the DOE confirms that:

- all data acquired for the purpose of SB development is relevant, current and consistent
- the SB have been developed in accordance with the approved SSC CDM methodologies; AMS III.H ver.17.0 & AMS III.I ver 08.0
- identified data gaps have been filled through conservative means such as extrapolation.
- the data delivery protocol is complete and consistent with the data template.

As the result of the assessment, the assessment team confirms that the proposed standardized baselines are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the proposed SBs can be applied for CDM GHG abatement projects utilizing the applied methodology(ies) for the sugar industry and municipal wastewater treatment sector in Uganda as follows: -

- I. SB for sugar industry wastewater sector in Uganda is set at $\text{COD}_{\text{inflow}} = 1500 \text{ mg/l}$
- II. SB for municipal wastewater sector in Uganda is set at $\text{COD}_{\text{inflow}} = 740 \text{ mg/l}$

Essen, 2015-12-09



Winter, Stefan

TÜV NORD JI/CDM Certification Program

Assessment Team Leader

Essen, 2015-12-09



Winter, Rainer

TÜV NORD JI/CDM Certification Program

Final Approval

7. REFERENCES

Table 7-1: Documents provided by the project participant(s)

Reference	Document
/DPP/	Data Delivery Protocol
/FSR/	Feasibility Study “Development of standardized baselines for methane recovery from wastewater treatment projects in Uganda” February 2015
/SB1/	Draft Municipal Wastewater Standardized Baseline Report, dated April 2015 (Climate Focus) Municipal Wastewater Standardized Baseline Report, dated October 29, 2015 (Climate Focus)
/SB2/	Draft Sugar Industry Wastewater Standardized Baseline Report, dated May 2015 (Climate Focus) Municipal Wastewater Standardized Baseline Report, dated October 29, 2015 (Climate Focus)
/GUIDE/	Guidelines for the Establishment of Sector Specific Standardized Baselines (EB65 Annex 23) Guidelines for the QA and QC of Data used in the establishment of Standardized Baselines (EB66 Annex 49)
/PCR/	Public Consultation Report
/PPT/	Presentations “Kakira Sugar Ltd.” Company presentation, 24 August 2015
/QC/	Quality Control Report
/WS/	Documentation prepared for conducted workshops: <ul style="list-style-type: none"> - Ugandan Wastewater Treatment Standardized Baseline Stakeholder Workshop Agenda - List of attendees - Presentation “Standardised baselines in the context of the Clean Development Mechanism (CDM)” by Hilda Galt, 1 October 2015 - Presentation “Wastewater treatment in Uganda” by Hilda Galt and Francis Okello, 1 October 2015 - Presentation “Developing two standardized baselines for wastewater treatment in municipal and industrial sectors” by Hilda Galt, 1 October 2015 - Case Study 1: Bob’s Brewery and related solution - Case Study 2: SB development - Presentation “Standardized Baseline for municipal and sugar wastewater treatment sectors in Uganda”, Kampala, 25 August 2015 by Bamshad Houshyani
/XLS/	<ul style="list-style-type: none"> • BTC industrial wastewater SB sheet 20May2015 • BTC municipal wastewater SB sheet 3April2015

Reference	Document
	<ul style="list-style-type: none"> BTC industrial wastewater SBL sheet 7Oct2015 BTC municipal wastewater SBL sheet 7Oct2015 WWT Data Sheet template industrial WWT Data Sheet template municipal <p>Other</p> <ul style="list-style-type: none"> COD data all Areas-23.9.15 Sewage Flows WWT Data Sheet template municipal

Table 7-2: Background investigation and assessment documents

Reference	Document
/AMS/	<ul style="list-style-type: none"> Methane recovery in wastewater treatment (AMS III.H ver.17): "Avoidance of Methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems" (AMS-III.I ver. 08.0)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/GUIDE/	<ul style="list-style-type: none"> Guideline "Quality assurance and quality control of data used in the establishment of standardized baselines" (EB79, Annex 07) version 2.0 Guidelines for the establishment of sector specific standardized baselines" (EB65 Annex 23) version 2.0
/IPCC/	<ol style="list-style-type: none"> 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/KP/	Kyoto Protocol (1997)
/MA/	Decision 3/CMP. 1 (Marrakesh – Accords)
/PCP/	Procedure version 3.1 and version 4.0
/PIC/	Pictures taken during site visit by the assessment team
/PROC1/	Procedure for the submission and consideration of Standardized Baselines (EB68 Annex 32)
/PROC2/	<p>Development, revision, clarification and update of standardized baselines (EB63 Annex 28)</p> <p>Development, revision, clarification and update of standardized baselines (EB84 Annex 10)</p>
/PS/	CDM Project Standard (Version 9.0)

Reference	Document
/VVS/	CDM Validation and Verification Standard (Version 09.0)

Table 7-3: Websites used

Reference	Link	Organisation
/dna-HP/	http://www.mwe.go.ug/	Ministry of Water and Environment /DNA of Uganda
/cd4cdm/	www.cd4cdm.org	UNEP Riso Centre
/unfccc/	http://cdm.unfccc.int	UNFCCC
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications

Table 7-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Bamshad Houshyani	Climate Focus/ Associate Senior Advisor
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Charles Omona	Ecosan Consulting/ Director and Consultant
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Martha Ntabadde Kasozi	National technical Advisor at Designated National Authority of Uganda
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Daniel Lubanga	Project Focal Person / BTC
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Enos Malambala	Quality Control Officer Lubigi / National Water & Sewage Corporation (NWSC)
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Martin Orwing	Plant Eng. Lubigi / NWSC
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Richard Elwelu	Plant Eng. Lubigi/ NWSC
/IM02/	V	<input checked="" type="checkbox"/> Mr.	Joseph Paberf	NWSC Jinja

Reference	Mol ¹		Name	Organisation / Function
		<input type="checkbox"/> Ms.		
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Susan Ajok	Water Officer / Dept of Water Resource Management (DWRM) Entebbe
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Sophie Luwano	Water Officer / DWRM
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Juliet Nabukora	Water Officer / DWRM
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Lilian Muviime	Water Officer / DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Simon Etimu	Principal Water Analyst/ DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Duncan Kikoyo	Ag. Senior Water Officer / DWRM
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Christelle Kyatengerwa	Water Officer EIA / DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Joseph Odong	Env. Scientis / DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Peter Obubuj	Senior Analyst / DWRM
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms	Gwendolyn Kyoburung	Ag. Principal Water Officer / DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Paskuale Kerubong	Water Officer / DWRM
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Muwonge Timothy	Deputy GM Process / Sugar Corporation of Uganda Limited (SCOUL)
/IM02/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Harriet Nakitende	Env. Officer / SCOUL
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	James Ayella	Dept. Project / SCOUL
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Nicholas Ssemomi	Quality, Safety, Health and Env. Office / SCOUL



Reference	Mol ¹		Name	Organisation / Function
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Chris Strathern	Works Manager / Kakira Sugar Ltd.
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Kenneth Musinga Barungi	Assistant to General Manager / Kakira Sugar Ltd.
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Geoffrey Wabomba	SHE Manager / Kakira Sugar Ltd.
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Pacoto W.O.	Production Manager / Kakira Sugar Ltd.
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	R. Ravi	Kinyara Sugar Ltd/ Engineering Manager
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Enzama Moses	Kinyara Sugar Ltd/ Site Supervisor
/IM02/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Langoya Jack	Kinyara Sugar Ltd/ Lab Supervisor

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)

ANNEX

- A1:** Assessment Protocol
- A2:** Statements of Competence of
involved Personnel

ANNEX 1: ASSESSMENT PROTOCOL

Table A-1: Assessment Checklist

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
Description of the Standardized baseline				
<p>Assess if the description of the standardized baseline is correct and accurate</p> <ul style="list-style-type: none"> a) host country, b) level of aggregation, c) measure (s), d) output and sector (s) <p>(EB65, Annex 23) §§8, 15</p>	<p>/SB1/ /SB2/</p>	<p>Description:</p> <p>The standardized baseline has been correctly and accurately described. Host country is The Republic of Uganda, level of aggregation, measures applicable and sector and output all defined in the draft SB reports</p> <p>Assessor's action:</p> <p>The draft SB reports have been reviewed</p> <p>Conclusion:</p> <p>The SBs have been correctly and accurately described.</p>	OK	Ok
A. QA/QC System				
<p>A.1. Description of the QA/QC System</p> <p>(GUIDE, §27)</p> <p>As part of the QA system, the DOE should check whether the QA/QC system is put in place and assess the QA/QC system against the data quality objectives established in this document. It also includes assessing whether the QA/QC system has been implemented as designed.</p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p>Description:</p> <p>At time of onsite visit the QA system is not a digital set up system. The responsibilities however are clear and it is clear which entities and stakeholders are to be addressed to obtain required information and/or data.</p> <p>The overall responsibility is with the host country DNA. They have contracted a consultant to develop and establish the QA system.</p> <p>The DNA can request data for municipal WWTs from Senior</p>	<p>CL-3 CAR-7</p>	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		<p>Water Manager at the NWSC headquarters. The Senior Water Manager is responsible to collect inter alia all related COD inflow and outflow data besides WW quantity on a monthly basis.</p> <p>At each site personnel is trained and dedicated to take related samples and obtain related information. Further personnel at the labs operated by NWSC are also instructed to forward related data to the Senior Water Manager.</p> <p>W.r.t. sugar industry the DNA can obtain the data either directly from the sugar companies or from DWRM. At the sugar companies dedicated persons take related samples as they have to report related data to the DWRM office on monthly basis. DWRM is conducting checks (regular or spot-checks) to the companies to crosscheck the provided data. At DWRM also a dedicated person can be approached to obtain the data.</p> <p><i>Assessor's action:</i></p> <p>DOE has assessed the same by check of draft QC report, SB documents, onsite visit to municipal and sugar companies and esp. based on interview with related personnel responsible and/or their superiors.</p> <p><i>Conclusion:</i></p> <p>Even though there is no dedicated digital QA system at related levels personnel is well aware of how to obtain data and process data. The data is regularly and in time forwarded to the next level (Senior Water Manager or DWRM). Based on that the QA system is adequate and represents the host country circumstances. Further it is to be noted that already another two SBs have been developed for the host country with the involvement of the DNA. Based on that DOE is confident that</p>		

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		the QA/QC system will be as required. Related CL 3, & CAR 7 have been raised.		
A.1. Elements of the QA/QC System				
(a) System availability – identify whether a “standardized” data system (collection, consolidation and maintenance) is currently in place and a procedure for reporting activities conducted as part of the QC system has been developed and implemented;	/SB1/ /SB2/ /QC/ /IM01/	<p>Description:</p> <p>Please refer to checklist item above.</p> <p>Assessor's action:</p> <p>DOE has assessed the same by checking the included QC report, SB documents, onsite visit to municipal and sugar companies and esp. based on interview with related personnel responsible and/or their superiors.</p> <p>Conclusion:</p> <p>Pls see also above. However no procedure for reporting activities has been developed and implemented as well as laid down. Hence Finding CAR 7 has been raised.</p>	CAR-7	OK
(b) Conformity - assess whether the QA/QC system, the procedures and all the approaches to develop the datasets met the data quality objectives. In particular, DOEs should assess whether a conservative approach has been applied in a consistent manner; whether the data delivery protocol was consistent with the data template if applicable; and whether the transparency was ensured, based on the public consultation report and the QC report. DOEs should check whether the QA/QC procedures were:	/SB1/ /SB2/ /QC/ /IM01/	<p>Description:</p> <p>The SB is designed in a way to consider only WWT plants which are operating open lagoons and where no regulation is established which enforces them to change the current WWT system. Further it is considered that a related project activity would not only exchange one or part of the steps of the baseline WWT but the entire WWT system with or w/o methane capture and destruction. For that the COD inflow and COD outflow is considered as well as the WW quantity. The COD outflow is set at 100 mg/l in accordance to the national standard.</p> <p>As per check of provided data, interview with stakeholders as well as site visits it can be confirmed that none of the current</p>	CAR-7	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<i>(i) developed in accordance with the QA/QC Guidelines; and (ii) effectively implemented (e.g. met the data quality objectives);</i>		WWT system operating a lagoon system have a COD outflow of below 100 mg/l. Based on that and considering the baseline equation to set the COD outflow to the value to be complied with is considered conservative. Further on only project activities which comply with the host country standard will be considered under the standard. Therefore project activities applying the SB will have a COD outflow below the 100 mg/l.		
<i>(c) Traceability – check whether all data and information relating to the source of datasets and procedures for standardized baselines were clearly documented;</i>	/SB1/ /SB2/ /QC/ /IM01/	<i>Description:</i> QC report states related documents to be used as crosscheck of datasets. However a related procedure has yet to be provided.	CAR-7	OK
<i>(d) Responsiveness – does the data delivery protocol meet the provisions of the QA/QC guidelines? Was the communication of the DNA with data providers timely and more efficient?</i>	/DDP/ /QC/ /XLS/ /IM01/	<i>Description:</i> The data delivery protocol (in excel) captures all required data to ensure quality, correctness, completeness, and relevance in line with provisions of the QA/QC guidelines (EB66, Annex 49). However, at the time of draft assessment and site visits, no QA/QC system has been presented by the DNA	OK	OK
<i>(e) Adaptability – was the system modified in order to address the major issues identified. Does the modified system meet the data quality objectives and the provisions of the QA/QC guidelines?</i>	/SB1/ /SB2/ /QC/ /IM01/	<i>Description:</i> At the time of draft assessment and site visits, no QA/QC system has been presented by the DNA.	CAR-7	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
(f) Security – check whether a security system for data management is in place and has operated effectively. Identify whether any issues related to security occurred;	/SB1/ /SB2/ /QC/ /IM01/	<p><i>Description:</i></p> <p>As the data management system is yet to be established at DNA level the current data is managed by contracted consultants. The consultants store the files in clouds. After finalization of the SB the data and system will be handed over to the DNA. The DNA stores the data on a file server which has automatic data back-up.</p> <p>Further all data is also available at related laboratories in hard copy.</p> <p><i>Verifiers action:</i></p> <p>By means of interview with DNA representative as well as consultants during site visit.</p> <p><i>Conclusion:</i></p> <p>The security of data is deemed sufficient based on the description above. Even though the digital data gets lots the data is still available in hard copy at the related laboratories.</p>	OK	OK
(g) Error tolerance – check whether DNAs planned to minimize errors and established and implemented procedures to identify and correct errors proactively.	/SB1/ /SB2/ /QC/ /IM01/	<p>Description & Conclusion:</p> <p>No QA procedure has been developed and provided yet. Due to this DOE could not assess whether minimization of error tolerance has been considered by the DNA adequately. Further as per related QC report has to be updated accordingly. Hence CAR has been raised.</p>	CAR-7	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
B. Algorithms and/or formulae used to determine the SB <i>It is assessed whether the steps taken and the equations and parameters applied in the SB to calculate the standardized baseline comply with the requirements of the selected methodology including applicable tool(s).</i>				
a) Are the equations applied correctly according to the applied/or proposed new CDM methodology?	/SB1/ /SB2/ /QC/ /IM01/ /XLS/	Description: The client approaches in calculation of the SBs, based on data acquired is deemed correct and traceable. However, it was established during DOE site visits that not all available data was procured <i>Assessor's action:</i> The calculations have been checked and onsite visit was carried out <i>Conclusion:</i> Calculations correct but based on incomplete data. Finding CAR 2 and CAR 9 have been raised	GAR-2 CAR-9	OK
b) <i>Have conservative assumptions been used when calculating the standardized baselines?</i>	/SB1/ /SB2/ /DDP/ /QC/ /XLS/ /IM01/	Description: Please see above <i>Assessor's action:</i> <i>Conclusion:</i>	CAR-2	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
<p>c) <i>Are all data sources and assumptions appropriate and conservative estimation of the standardized baseline (s)?</i></p> <p><i>How have data gaps been addressed?</i></p> <p><i>Check if the correct data vintage has been selected for the sector</i></p> <p><i>EB65 Annex 23, Appendix 1</i></p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p>Description:</p> <p>Please refer above</p> <p>Assessor's action:</p> <p>Conclusion:</p>	CAR-2	OK
<p>d) <i>Are all data sources appropriately referenced?</i></p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p>Description:</p> <p>Not all data sources (public) as referred to in the SB has been correctly referenced or provided</p> <p>Assessor's action:</p> <p>The SBs have been assessed</p> <p>Conclusion:</p> <p>CAR 2 has been raised</p>	CAR-2	OK
B.1. Additionality				
<p>a) <i>Is the additionally criteria correctly demonstrated?</i></p> <p><i>(EB65, Annex 23) §§§13, 14, 15, Section IV.</i></p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p>Description:</p> <p>Additionality criteria for projects seeking to utilize the standardized baseline have been set and deemed sufficient</p> <p>Assessor's action:</p> <p>The draft SB reports and methodology have been checked</p> <p>Conclusion:</p>	OK	OK

Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Additionality criteria is sufficient as per guidelines		
B.2. Sampling				
<p><i>Check whether the client has applied a sampling approach to determine the calculated values (as per section D.2 above).</i></p> <p><i>If this is the case, please provide an assessment whether the PPs have correctly and sufficiently described the implemented sampling plan including</i></p> <p><i>a) Description of the implemented sampling design</i></p> <p><i>b) Collected data</i></p> <p><i>c) Analysis of collected data</i></p> <p><i>Demonstration on whether the required confidence/precision has been met.</i></p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p><input checked="" type="checkbox"/> No sampling approach has been used by the PP to determine the monitored parameters</p> <p>OR.</p> <p><input type="checkbox"/> A sampling approach has been taken for the following monitored parameter:</p> <p>Parameter:</p> <p><i>Description:</i></p> <p><i>Assessor's action:</i></p> <p><i>Conclusion:</i></p>	N/A	OK
<p>b) Sampling during Assessment</p> <p><i>In case the assessment team has applied a sampling approach in the course of the validation assessment the approach shall be described for each parameter.</i></p>	<p>/SB1/ /SB2/ /QC/ /IM01/</p>	<p><input checked="" type="checkbox"/> No sampling approach has been used by the VT to verify the monitored parameters</p> <p>OR.</p> <p><input type="checkbox"/> A sampling approach has been applied by the VT for the following monitored parameter:</p> <p>Parameter:</p> <p><i>Description:</i></p> <p><i>Conclusion:</i></p>	N/A	OK



Checklist Item (incl. guidance for the assessment team)	Reference	Assessment Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.

ANNEX 3: STATEMENTS OF COMPETENCE OF INVOLVED PERSONNEL

TÜV NORD
Certification

Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JI/CDM Certification Program

Mr. David Lubanga

SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification)	2018-10-20
VCS / ISO 14064-2	Lead Assessor	2018-10-20

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
3.1	Energy demand

251 - Rev. 4, Date: 2015-10-21

TÜV NORD
Certification

Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JI/CDM Certification Program

Mr. Stefan Winter

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2017-07-27
VCS	Senior Assessor (Validation, Verification) Technical Reviewer	2017-07-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA	TR SUBCATEGORIES
1.1	Thermal energy generation	1.2.1 Hydro 1.2.2 Wind 1.2.3 Geothermal 1.2.4 Solar 1.2.5 Total
1.2	Renewable Energy	
2.2	Heat distribution	
3.1	Energy demand	
13.1	Waste handling and disposal	13.1.1 Waste management 13.1.2 Waste water management
13.2	Animal waste management	
16.2	Animal waste management	

163 - Rev. 3, Date: 2014-07-28

163_S01-F003_2014-07-28_rev3.docx

TÜV NORD
Certification

Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD JI/CDM Certification Program

Mr. Rainer Winter

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2016-07-01
JI	Senior Assessor Technical Reviewer	2016-07-01
VCS / ISO 14064-2	Senior Assessor Technical Reviewer	2016-07-01

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA	TR SUBCATEGORIES
1.1	Thermal Energy Generation	
1.2	Renewables	
4.1	Cement and lime production	
4.2	Paper	
5.1	Chemical Industry	
5.2	Caprolactam, nitric and adipic acid	
8.1	Mining/mineral production	
9.1	Aluminium and magnesium production	
9.2	Iron, steel and Ferro-alloy production	
11.2	Refrigerant gas production	
12.1	Chemical industry	
13.1	Solid waste and wastewater	

003 - Rev. 9, Date: 2015-05-18

003_S03_S01-VA060-F20_2015_05_18_rev9.docx