VCS METHODOLOGY ELEMENT ASSESSMENT REPORT

Infra-red Automatic Refrigerant Leak Detection Efficiency Project

REPORT NO. 2009-9189
REVISION NO. 02

DET NORSKE VERITAS

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VCS METHODOLOGY ELEMENT ASSESSMENT REPORT

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Date of first issue: 14 August 2009	Project No.: 99800011
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Client: Giant Eagle, Inc.	Client ref.: Robert P. Garrity

Name of Methodology: Infra-red Automatic Refrigerant Leak Detection Efficiency Project
Version: 1E
Assessment Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Assessment Status
☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval by DNV
☐ Rejected

In summary, it is DNV's opinion that the proposed VCS methodology element "Infra-red Automatic Refrigerant Leak Detection Efficiency Project" as described in version 1e MED of February 10,2010, meets all relevant VCS requirements for VCS methodology elements. DNV thus recommends the methodology element for approval and request VCSA to finally approve the methodology element.

Report No.:	Date of this revision:	Rev. No.
2009-9189	10 Feb 2010	02

Report title:
Infra-red Automatic Refrigerant Leak Detection Efficiency Project

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Key words:
VCS
Methodology Element
Validation

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Abbreviations

CAR	Corrective action request
CDM	Clean development mechanism
CL	Clarification request
DNV	Det Norske Veritas
EB	Executive Board
GWP	Global warming potential
IR	Infra-red
MED	Methodology element documentation
ODS	Ozone depleting substance
VCS	Voluntary Carbon Standard
VCSA	VCS Association
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

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1 ASSESSMENT STATEMENT

Det Norske Veritas Certification AS (DNV) has performed an assessment of the proposed VCS methodology "Infra-red Automatic Refrigerant Leak Detection Efficiency Project". The validation was performed on the basis of VCS criteria for methodology development.

The review of the methodology element documentation and the subsequent follow-up interviews has provided DNV with sufficient evidence to determine the fulfillment of stated criteria.

The methodology element was prepared based on the requirement of VCS 2007.1 and VCS Program Normative Document: Double Approval Process. The methodology element also refers to the requirement in the "Tool for the demonstration and assessment of additionality" by CDM EB and "The GHG Protocol Project Accounting" by WRI/WBCSD.

The methodology element belongs to the scope of *Fugitive emissions from production and consumption of halocarbons and sulfur hexafluoride*.

In summary, it is DNV's opinion that the methodology element "Infra-red Automatic Refrigerant Leak Detection Efficiency Project" as described in the MED of version 1e of February 10,2010, meets all relevant VCS requirements for VCS methodology elements. DNV thus recommends for approval the methodology element and request VCSA to approve the methodology element as a VCS methodology element.

2 INTRODUCTION

Giant Eagle, Inc. has commissioned Det Norske Veritas Certification AS (DNV) as the first validator to perform an assessment of the methodology element "Infra-red Automatic Refrigerant Leak Detection Efficiency Project". This report summarizes the findings of the assessment of the methodology element, performed on the basis of VCS criteria for methodology elements. VCS criteria refer to VCS 2007.1 and the subsequent VCS Program Normative Documents.

3 METHODOLOGY

The assessment consisted of the following three phases:

I a desk review of the new methodology

II follow-up interviews

III the resolution of outstanding issues and the issuance of the final assessment report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the New Methodology

The following table lists the documentation that was reviewed during the assessment:

/1/ Giant Eagle, Inc., Methodology element documentation "Infra-red Automatic Refrigerant Leak Detection Efficiency Project", Version 1a, June 30, 2009

/2/ VCSA, Voluntary Carbon Standard 2007.1.

/3/ VCSA, VCS Program Normative Document: Double Approval Process, v1.0.

/4/ CDM EB, Tool for the demonstration and assessment of additionality, version 5.2.

/5/ WRI/WBCSD, The GHG Protocol Project Accounting.

/6/ EPA Advanced Green Chill Program Documents
http://www.epa.gov/greenchill/ptnrresources.html

/7/ Giant Eagle, Inc., Methodology element documentation "Infra-red Automatic Refrigerant Leak Detection Efficiency Project", Version 1c, July 28, 2009

/8/ TÜV Rheinland Japan Ltd.: Methodology Assessment Report for the proposed VCS methodology "Infra-red Automatic Refrigerant Leak Detection Efficiency Project", Report Version No. 2.1. 2009-12-02

/9/ Giant Eagle, Inc., Methodology element documentation "Infra-red Automatic Refrigerant Leak Detection Efficiency Project", Version 1e, February 10,2010

3.2 Follow-up Interviews

	Date	Name	Organization	Topic
/10/	2009-06-23	Sue Hall	Climate Neutral Business Network contractor for Giant Eagle, Inc.	1. The methodology element's eligibility criteria; 2. The baseline approach and additionality; 3. Project boundary; 4. Emissions, including leakage; 5. Monitoring, data and parameters.
/11/	2009-07-22	Keilly Witman	U.S.EPA Green Chill Partnership	1. EPA Green Chill Program and relevant documents including leak flow detection methods

3.3 Resolution of Outstanding Issues

The objective of this phase of the assessment was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the methodology element. The assessment findings relate to the methodology element as documented and described in the initial methodology element documentation./1/

In order to ensure transparency the issues raised and the methodology element developer's response are documented in Appendix A.

Findings established during the assessment can either be seen as a non-fulfillment of VCS criteria or where a risk to the fulfillment of methodology element objectives is identified. Corrective action requests (CAR) are issued, where:

I. mistakes have been made with a direct influence on methodology application;
II. VCS specific requirements have not been met; or
III. there is a risk that the methodology element would not be accepted as a VCS methodology.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

Assessment Table: Resolution of Corrective Action and Clarification Requests		
Draft report clarifications and corrective action requests	***Summary of methodology element developer response***	***Assessment conclusion***
If the conclusions from the draft assessment are either a CAR or a CL, these should be listed in this section.	*The responses given by the methodology element developer during the communications with the assessment team should be summarized in this section.*	*This section should summarize the assessment team's responses and final conclusions.*

Figure 1 Assessment Table

3.4 Internal Quality Control

The assessment report underwent a technical review before the approval of the methodology element by DNV. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme.

3.5 Assessment Team

			Type of involvement					
Role/Qualification	***Last Name***	***First Name***	Desk review	Interviews	Reporting	Supervision of work	Technical review	Expert input
Project Manager	Toole O'Neil	Barbara	√	√	√	√		
GHG auditor	Yang	Weidong	√	√	√			
Technical Reviewer	Michael	Lehmann	√				√	

In addition, DNV interviewed Keilly Witman of the U.S.EPA Green Chill Partnership to seek his expert input on the proposed methodology element.

4 ASSESSMENT FINDINGS

The findings of the assessment are stated in the following sections. The final assessment findings relate to the methodology element as documented and described in the revised methodology element documentation.

4.1 Eligibility Criteria

The eligibility criteria for the methodology element are clearly defined in the methodology element documentation (MED). DNV was able to confirm that the eligibility criteria were appropriate and adequate requirements for the project technology, resulting changes due to project activities, existing operation conditions prior to project activities, project industry sector, and project geography are all defined clearly and properly. The eligibility criteria were defined as below /1/:

- Applies to the installation of infra-red (IR), real-time automatic leak detection/management systems installed in commercial refrigeration systems in the United States supermarkets
- When installed onto DX refrigeration systems, so that there is no change in underlying refrigeration system technologies
- Including any associated HVAC systems in these same locations which are managed using the same IR systems
- Focused, in the US, only on refrigeration systems containing less than 2000 lbs refrigerant charge (to be consistent with California (CA) proposed legislation)
- Supported by data systems for leak reporting/management which are used for ozone depleting substance (ODS) compliance purposes

4.2 Baseline Approach

The methodology element's approach to determine the baseline scenario is clearly defined as below:

1) Identify potential alternatives;
2) Assess regulatory requirements;
3) Conduct barrier analysis or an investment analysis comparison to determine the most likely baseline scenario.

The approach for determining the project baseline is deemed by DNV appropriate and adequate.

4.3 Additionality

"The Test 1 – The project test" in VCS 2007.1, "Tool for the demonstration and assessment of additionality" by CDM EB, and "GHG Protocol Project Accounting" by WRI/WBCSD are used in the MED as the approaches and tools to determine project additionality. Additional information is provided in the MED to provide guidance for additionality assessment. This is deemed by DNV as appropriate and adequate.

4.4 Project Boundary

The project's physical boundary is clearly and properly defined as the site of retail stores in which HFC refrigerants are used and infra-red, real-time leak (IR) detection systems have been installed in the refrigeration systems, with HVAC systems included when they are supported by these same IR detection systems.

The sources and types of gases included are also clearly and properly defined as below /1/; the justification to include or exclude certain type of gases is justified reasonably.

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from Retail Refrigeration Equipment	HFC's	Yes	HFC leaks to atmosphere in the absence of the project activity determined based on historical leaks prior to project implementation (or if no historic data is available based on the leaks observed during the first three years of the project). The baseline leak rate is capped by an alternative baseline cap determined using data from the U.S. EPA Green Chill Program
		Other: CO_2 CH_4	No	IR systems do not impact energy efficiency of underlying DX systems; rather, more timely maintenance of refrigerant levels enables refrigeration equipment to run more efficiently and thus positive CO_2 gains are conservatively set to zero.
	Upstream/ Downstream	HFC's	No	The project activity has no impact on the supply of the HFCs. Project activity has no impact or influence on separate end of life decisions regarding refrigerant disposal as equipment is decommissioned: separate credit methodologies exist for these actions taken in this realm
Project activity	Emissions from Retail Refrigeration Equipment	HFC's	Yes	HFC leaks to atmosphere after installation of the IR, real-time automatic leak detection/management systems
		Other: CO_2 CH_4	No	Electricity required to run IR systems can be neglected (about 91 kWh / year).
	Upstream/ Downstream	HFC's	Yes/No	Project activity produces positive gains upstream, which are conservatively set at zero. Project activity has no impact or influence on separate end of life decisions regarding refrigerant disposal as equipment is decommissioned: separate credit methodologies exist for these actions taken in this realm.

4.5 Emissions

The approach provided for calculating baseline emissions, project emissions and emission reductions are deemed appropriate by DNV.

The emission reductions are estimated as per the following steps:

1) The leak rate of HFC's in the baseline scenario is estimated;
2) The leak rate of HFC's in the project scenario is estimated;
3) The emission reductions are estimated by multiplying total charge of HFC refrigerants with the difference of leak rate in baseline scenario and project scenario.

4.5.1 Baseline emissions

Leak rate in the baseline scenario is calculated as per the following steps:

1) Data period: a period of three years prior to the installation of the IR equipment, or a three year consecutive period including the IR installation year which can extend at most three years subsequent to such installation if data records for emission rates are not accessible for the period of three years prior to the installation of the IR equipment.
2) Leak rate: the leakage rates include both HFC's and HCFC. As HCFC leak rates are lower than those for HFC's as confirmed by both EPA and leading companies, with HFC's gradually substituting for HCFC's, to adopt a baseline emissions based on both HFC's and HCFC leak rates is conservative.
3) Data source: data inputs will be based upon those which the project owner uses for its ODS/refrigerant compliance purposes. This can help to ensure the data quality.
4) Leak rate renewal: leak rate will be renewed every year to reflect baseline emissions from the additional stores added into the project activities.

To make the emission reduction estimates more conservative, the calculated leak rate as described in the steps above will be compared with the leak rate provided by the US EPA Green Chill Program. The leak rate is based on its members' annually reported leak rates, which EPA estimates are approximately 50% lower than the industry average. . The lower one of these two leak rates will be used in the emission reduction estimates, which is the more conservative assumption. If the leak rate from the US EPA is not available, the calculated leak rate will be used in the emission reduction estimates /7/.

4.5.2 Project emissions

Leak rate in the project scenario will be determined using the average leak rate arising from the total HFC emitted for a specific year within the crediting period.

4.5.3 Emission reductions

The emission reductions are estimated by multiplying total charge of HFC refrigerants with the difference of leak rate in baseline scenario and project scenario, and with weighted average global warming potential of HFC's installed/used in year. The calculation of weighted average global warming potential of HFC's installed/used in year is clearly and properly defined.

4.6 Leakage

No leakage needs to be addressed for this methodology; this is justified properly in the MED from the aspects of upstream processes, operation processes and decommissioning processes related to the refrigeration systems.

4.7 Monitoring

The activity parameters to be monitored are quantity (weight) of the HFC's leak and charge capacity in the refrigerating equipment; the monitoring approach for this type of parameters is simple and straight forward. The monitoring approach defined in the MED is deemed appropriate and adequate by DNV. Proper quality assurance requirement is also defined in the MED, mainly including cross-check with data in the ODS compliance reporting system.

4.8 Data and Parameters

Both monitored and not monitored data and parameters used in emissions calculations are defined in the MED clearly and appropriately to make it possible for the emission reductions to be estimated and verified in the verification periods.

Not monitored data and parameters include GWPs of HFC's and leak rate of HFC's provided by the US EPA. Monitored data and parameters include HFC's leak and charge capacity in the refrigerating equipment.

4.9 Data Quality Management

Requirements for data and calculation reviews are clearly defined in the MED; these requirements are deemed proper by DNV for uncertainties related to the emission reductions to be reduced reasonably.

4.10 Adherence to the project-level principles of the VCS Program

The MED was developed in line with the project-level principles of VCS 2007.1 as elaborated in the above. It is also deemed by DNV that the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness are properly addressed in the MED.

4.11 Comments by Stakeholders

This is not relevant, as the methodology element was contracted with DNV as the first validator before 18 June 2009. According to the methodology element developer, the second validator was also contracted before 18 June 2009.

4.12 Comments by Second Validator

TUV Rheinland Japan Ltd completed the second assessment of the proposed methodology on 2 December, 2009 /7/. This second assessment concluded that the proposed VCS methodology element "Infra-red Automatic Refrigerant Leak Detection Efficiency Project" meets all relevant requirements of the VCS. The Corrective Action Requests (CAR) were minor issues consisting of editorial remarks and minor clarifications. One item was considered resulted to minor

modifications to the methodology, and was implemented. The review met the VCSA requirements. All CARs were closed satisfactorily. DNV agrees with all comments and consequent revision by the methodology developer.

APPENDIX A

RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Draft report clarifications and corrective action requests by assessment team	Summary of methodology element developer response	Assessment team conclusion
CAR 1 **General requirement:** The methodology element documentation (MED) shall state clearly the date on which it was issued and its version number.	Vs 1 June 2009 as suggested now included.	The issuance date and version number was included in the MED. The CAR is closed.
CAR 2 **Baseline determination:** The MED does not conform to the following requirement in the VCS 2007.1 (Page 18); this can result in improper determination of the baseline scenario for a project. "Methodologies shall be informed by a comparative assessment of the project and its alternatives in order to identify the baseline scenario. Such an analysis shall include, at a minimum, a comparative assessment of the implementation barriers and net benefits faced by the project and its alternatives."	The barriers analysis has been expanded and a note added No.12, and in the Additionality	. The CAR is closed
CAR 3 **Additionality:** There is no requirement for double approval by VCS for common practice analysis in additionality assessment.	This has been removed.	The CAR is closed.
CL 1 **General requirement:** The eligible criteria are properly defined. But, the approval processes for methodology	First note: If it is clear that the introduction of a different region's conservative cap is a methodology refinement, then VCS has already covered this	The explanation for the methodology revision in the MED has no negative influence for the integrity of the MED, and it can help to provide guidance.

Draft report clarifications and corrective action requests by assessment team	Summary of methodology element developer response	Assessment team conclusion
revision, including scope expansion, is under the domain of VCS; it is not necessary to explain the processes in the methodology.	contingency and I agree the note can be removed. Originally in discussions with Michael and Barbara we had considered not limiting the scope to the US, as is currently framed. So assuming the boundary limit on "US only" remains then I agree that the phase could be dropped. However, this conservative cap structure is a) rare in offset methodologies and b) not been used in a VCS context before. Thus, especially if the "US only" boundary is loosened at some point, it would be conservative to include this comment. Alternatively, one could insert, "Provided there is no conflicting guidance issued by VCS" so that both consistency with VCS policy changes and clarity are both protected. This is DNV's call. Note 2: Given potential changes in any independent agency's agendas and funding, it is prudent to include a default provision should such "conservative cap" data not be forthcoming at a future date. This note does not relate to VCS's actions or policies re double approval so no contingencies arise (as in note 1). Thus, it is more prudent for it to stay in order to avoid future confusion.	The CL is closed.

Draft report clarifications and corrective action requests by assessment team	Summary of methodology element developer response	Assessment team conclusion
CL 2 **General requirement:** Project crediting period shall be determined by VCS; it is not proper to define this in a methodology.	This comment was included as supporting guidance only for developers who will themselves elect grouped or ungrouped project structures and thus relevant crediting periods. This phrase can be removed to avoid confusion if this is preferable.	The explanation for the crediting in the MED has no negative influence for the integrity of the MED, and it can help to provide guidance. The CL is closed.
CL 3 **Emission sources:** Justification is needed if there is any additional energy consumption in the project activity, that is, if project emissions related to the additional energy consumption need to be addressed in the emission sources.	Clarification provided in Table on this point, per: "IR systems do not impact energy efficiency of underlying systems; rather, more timely maintenance of refrigerant levels enables refrigeration equipment to run more efficiently and thus positive CO2 gains are conservatively set to zero. Electricity required to run IR systems is de minimis (91kwh/year vs 3-4m kwh/year for each store of which 1.5-2m kwh/year for refrigerant equipment/HVAC systems: less than 0.01%)	The justification for the exclusion of project emissions related to the additional energy consumption is proper. The CL is closed.
CL 4 **Baseline determination:** Justification is needed if all realistic and credible alternatives available to the project participants that provide services comparable with the proposed VCS project activity have been identified.	If a new different alternative technology were to become available in the future that would also retrofit onto DX refrigeration systems to make them more efficient, then it would either a) be beyond business as usual (BBAU) and face significant barriers or b) it would be BAU and be taken up widely across the industry. For a), the new technology would not be the business as usual baseline default due to the barriers it faced; this retrofit methodology, as with all	This CL is closed.

Draft report clarifications and corrective action requests by assessment team	Summary of methodology element developer response	Assessment team conclusion
	retrofits, therefore would justifiably continue to take as its baseline the historical emission rate presuming, as calibrated in the methodology already, that it faces no barriers. For b), the new technology would improve the industry average "business as usual" leakage rate (or efficiency rate) and companies would report these leak rate improvements to the EPA Green Chill Program thereby reducing the conservative cap. This methodology already takes into account any industry trends towards such improvements in leak rate efficiencies via the EPA conservative cap, which, set at the 50th percentile level, establishes a maximum baseline (which would be improving over time) should the project developer's historical emissions rate be higher than this level. Thus this retrofit project already takes into account the gradual improvement in industry leak rates which would be the only requirement needed to ensure appropriate adjustments for any potential new BAU retrofit technologies that would mainstream rapidly	

Draft report clarifications and corrective action requests by assessment team	Summary of methodology element developer response	Assessment team conclusion
CL 5 **Monitoring:** Measurement procedures for those data and parameters monitored should be described appropriately.	Further clarification incorporated in both the Baseline Emissions section and the "Data And Parameters Monitored" tables: "The total leaks volumes are derived from the database systems used for ODS management purposes. These measure the amounts of refrigerants used to refill the refrigeration equipment each time a leak occurs during year x, reflecting the amount of refrigerant leaked out. Thus each entry will describe the number of pounds of refrigerant installed into the equipment at the time of a leak during year x – thus providing the data inputs which summarized over year x give the total leak volumes for L_x. These same ODS management data systems also document the refrigerant charges for each piece of equipment in the stores. Thus, again, adding these refrigerant charges for each piece of relevant equipment as itemized for year x will give the totals for C_x."	The measurement procedure is clearly and properly defined in the revised MED. The CL is closed.

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