INDEPENDENT EXPERT REPORT

Methodology Title	VM0016 Recovery and Destruction of Ozone-Depleting Substances and Hydrofluorocarbons VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerants
Version	VM0016 v1.2 VMD0048 v1.1
Sectoral Scope(s)	11: Fugitive emissions from industrial gases
Document Reviewed	Draft revision of *VM0016 Recovery and Destruction of Ozone-Depleting Substances and Hydrofluorocarbons* Draft revision of *VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerants*
Date of Issue	25 November 2025
Expert Assessor	Eng. Alberto Cruzado
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1 INTRODUCTION

Verra is managing the development of the revision of the VCS Methodology *VM0016 Recovery and Destruction of Ozone-Depleting Substances and Hydrofluorocarbons* (M0171). Per section 2.1.2 of the *Methodology Development and Review Process, v4.4*, this methodology revision is being developed through an alternative process that has been deemed more efficient and equally robust. The alternative process included:

- Replacement of Section 3.5 Step 5: Validation/verification body assessment of methodology with review by a group of independent experts.
- Conducting the review by a group of independent experts in parallel to the public consultation

Based on their experience in the Montreal Protocol, End-of-life management of ODS and project development for the carbon market, Verra hired Eng. Alberto Cruzado (independent expert) to provide an expert assessment of the proposed methodology. The independent expert's assessment focused on:

1. Appropriateness and consistency of the methodological approach for the use of other ODS sources, such as fire suppressants and propellants, and intact foam destruction
2. Expansion of the applicability to HFC and stockpiled HCFC, including appropriateness and stringency of the proposed restrictions and eligibility as per the phase out/down schedule for each substance group as detailed in the Montreal Protocol
3. Appropriateness of the updated positive list in VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerants
4. Any specific stakeholder comment that requires input from the expert

2 REVIEW APPROACH & FINDINGS

The independent expert reviewed the draft methodology and module that was published for public consultation and provided feedback to Verra. Verra and ICF prepared responses to the findings and updated the documents accordingly. The independent expert reviewed the responses and provided confirmation that the planned updates address the findings. See section 6 for detailed expert review feedback.

For the review, the independent expert also consulted the following standards: ANSI_AHRI ESTANDAR_700-2006, VT008-Additionally-Assessment-v1.0 and the Article 5 Ozone Depleting Substances Protocol v2 of the Climate Action Reserve (CAR).

3 REVIEW CONCLUSION

The independent expert has completed the expert review of the draft revision of *VM0016 Recovery and Destruction of Ozone-Depleting Substances and Hydrofluorocarbons* and Draft revision of *VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerants* and confirms the draft methodology and module, and proposed updates adhere to the criteria established.

4 EXPERT QUALIFICATIONS

Eng. Alberto Cruzado has a strong track record working with UNIDO, GIZ and Mexican federal government in ODS and HFC, involving inventories, baseline setting and end-of-Life management and destruction. He served as the lead consultant in the design of the roadmap to implement the Kigali Amendment in Mexico and as international expert for UNIDO in developing multi-country demonstration projects for ODS and HFC destruction in cement kilns, involving the identification and characterization of banks for destruction, potential reusable stocks, and evaluation of destruction process performance.

5 SIGNATURE

Signed for and on behalf of:

Name of entity: —

Signature: 

Name of signatory: José Alberto Cruzado Martínez

Date: November 25, 2025

6 EXPERT FEEDBACK

6.1 VM0016 RECOVERY AND DESTRUCTION OF OZONE-DEPLETING SUBSTANCES AND HYDROFLUOROCARBONS

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment or suggest	Developer's Response and/or Update
1	Destruction facility: Facility at which eligible substances are destroyed	Specify this definition – Destruction facility: Facility where eligible substances are destroyed by one of the technologies approved by Technology and Economic Assessment Panel (TEAP) under the Montreal Protocol **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will update the methodology accordingly.
2	Ozone-depleting substances (ODS): A family of man-made compounds that includes, but is not limited to, chlorofluorocarbons (CFCs), bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide, and hydrochlorofluorocarbons (HCFCs). These compounds deplete stratospheric ozone. Many ODS have high global warming potential and are therefore greenhouse gases. CFC ozone- depleting substances are listed in Tables A1 and A2 in Appendix 1.	Rewrite this definition – Ozone-depleting substances (ODS): A family of man-made compounds including, but not limited to, chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), which have a high GWP and are eligible for the application of this methodology, which deplete the ozone layer and are listed in Tables A1, A2 and A3 in Appendix 1. Bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide, are also ozone-depleting substances, but they do not have a significant GWP	Rd 1 responses: Thank you for your input. Verra does not believe that the methodology needs to be updated. This definition is meant to define all ODS, and the discussion of eligibility is reserved for Section 4.

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment or suggest	Developer's Response and/or Update
	HCFC ozone-depleting substances are listed in Table A3 in Appendix 1.	potential, so they are not eligible for this methodology. **Rd 2**: Ok - *Closed. No further edits requested.*	
3	Propellant: An ozone–depleting substances or hydrofluorocarbon used or intended for use in propellers systems such as aerosol equipment	Rewrite this definition–Propellant: An ozone – depleting substance or hydrofluorocarbon used or intended for use in propeller systems such as aerosol equipment, containers or cans **Rd 2**: Ok - *Closed. No further edits requested.*	Rd 1 responses: Thank you for your input. Verra does not believe that the methodology needs to be updated. Containers and cans are included in "aerosol equipment."
4	Reclaim: To reprocess used ODS or HFC refrigerants, blowing agents, fire suppression agents, or propellants, typically by distillation, to specifications similar to those of virgin product	Rewrite this definition – Reclaim: means to reprocess used ODS or HFC refrigerants, blowing agents, fire suppression agents, or propellants, typically by distillation, to reach specifications similar to those of virgin product under AHRI 700-2006 standard (Specifications for Refrigerants) **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will add reference to the AHRI 700-2006 standard.
5	Recovery facility: Facility at which the project proponent recovers ODS or HFC refrigerants, blowing agents, fire suppression agents, or propellants from appliances, appliance insulation foam, fire suppression systems, or aerosols, respectively, or a facility where collected refrigerant, blowing agent, fire suppression agent, and/or propellant is aggregated by the project proponent in preparation for destruction. A location at which refrigerant is recovered from stationary equipment, such as a chiller, is not a recovery facility.	1st option: – Recovery facility: Facility at which the project proponent recovers or consolidates ODS or HFC refrigerants, from refrigeration and air conditioned (RAC) equipment; blowing agents from insulation foams; fire suppression agents from total flooding systems and/or portable fire extinguishers, or propellants from aerosols, respectively, in preparation for destruction. 2nd option : Recovery facility: Facility at which the project proponent recovers or consolidates ODS or HFC refrigerants from eligible sources in preparation for destruction.	Rd 1 responses: Thank you for your input. Verra believes that the existing definition is clear and that the methodology does not need to be updated.

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment or suggest	Developer's Response and/or Update
		Rd 2: Ok – Closed. I believe that this paragraph is not needed: "*A location at which refrigerant is recovered from stationary equipment, such as a chiller, is not a recovery facility.*"	
6	Refrigerant: An ozone-depleting substance or hydrofluorocarbon used or intended for use in a cooling mechanism, such as an air conditioner or refrigerator, as the heat carrier that changes from gas to liquid and then back to gas	Rewrite this definition – Refrigerant: An ozone-depleting substance or hydrofluorocarbon used or intended for use in a cooling mechanism, such as refrigerators, air conditioners, heat pumps and chillers, as the heat carrier that changes from gas to liquid and then back to gas **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will update the methodology accordingly.
7	Refrigeration appliance: An appliance whose main purpose is the cooling of foodstuffs and other temperature-sensitive products: · Domestic refrigerator (type 1 appliance): Typical domestic design with a storage capacity of up to 180 liters, which may or may not be equipped with a separate deep- freeze compartment · Domestic refrigerator-freezer (type 2 appliance): Typical domestic design with a storage capacity ranging from 180 to 350 liters. Generally, it has a separate deep-freeze compartment. · Domestic chest freezer or upright freezer (type 3 appliance): Deep-freeze appliance of a typical domestic design with a storage capacity up to 500 liters	This definition is very large and very specific for domestic fridges. We recommend a definition that includes domestic, commercial and industrial appliances. **Rd 2**: Partially addressed – Suggested review: In Latin America, most of the insulation foams come from commercial refrigerators dismantling facilities	Rd 1 responses: Thank you for your input. Verra does not believe that the methodology needs to be updated. This definition is here for the purpose of determining insulation foam blowing agent eligibility, which is limited to domestic appliances.

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment or suggest	Developer's Response and/or Update

Section 4 – Applicability Conditions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	This methodology is applicable under the following conditions:	The countries, substances and sources eligible in this methodology are the following: **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will consider this proposal to clarify the applicability conditions.
	1) The project activity is implemented in countries that are party to the Montreal Protocol.2	1) **Eligible Countries** The project activity is implemented in countries article 2 and article 5 of the Montreal Protocol. (MP)[2]	
	2) The project activity destroys any of the following substances as specified in the Montreal Protocol for which the IPCC publishes a global warming potential (100-year time horizon) (see Appendix 1 for more information3): Annex A, Group I (CFCs) Annex B, Group I (other CFCs) Annex C, Group I (HCFCs) Annex F, Group I (HFCs	**2) Eligible substances** The project activity destroys any of the following fluorinated substances as specified in the MP 2.1) Ozone depleting Substances (ODS) CFCs -Annex A, Group I Other CFCs - Annex B, Group I HCFCs -Annex C, Group I 2.2) Non - Ozone depleting Substances HFC- Annex F, Group I	

Section 4 – Applicability Conditions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		For which the IPCC publishes a global warming potential (100-year time horizon) (see Appendix 1 for more information3):	
	3) The substances to be destroyed come from the following sources:	3) **Eligible Sources** The substances to be destroyed come from the following sources:	
	4) All ODS and HFC are collected, stored, and transported in cylinders or other hermetically sealed containers.	4) All ODS and HFC are collected, stored, and transported in cylinders or other hermetically sealed tanks that comply with the technical specifications and safety codes of local and international standards for gas pressurized containers. **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will add the requirement for cylinders and other containers to meet applicable specifications and standards.

Section 5 – Project Boundary			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
Table 1.	GHG sources accounted for in the project boundary	Why this methodology includes the fuel consumption of the recovery site and not the fuel consumption during destruction. This is the opposite of the CAR methodology for Article 5 countries. **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra will update the methodology to account for energy use at destruction facilities, with the exception of hazardous waste facilities and municipal solid waste incinerators, where ODS and HFC inputs have fuel value and make up only a small percentage of the input feed.

Section 6 – Baseline Scenario			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	BA2: Refrigerators containing foams (blowing agents) are disposed of at an incineration facility and thereby ODS or HFC blowing agents are destroyed.	For Latin America, this scenario is not real: refrigerators are commonly dismantled to recover metals and plastics, and the remaining gases are commonly released into the atmosphere. We have not refuse facilities. **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra does not believe that the methodology needs to be updated. Not all baseline scenarios will apply to all countries; additionally, this scenario is not eligible for crediting.
	BA4: Before final disposal, refrigerators containing foam are shredded or intact foam is removed from refrigerators and shredded. The foams are subsequently disposed of at a landfill/dump.	BA4: Before final disposal, refrigerators containing foam are shredded or intact foam is removed from refrigerators and shredded or cutting for reduce volume for transport. The foams are subsequently disposed of at a landfill/dump, and in some cases used as alternate fuels in cement kilns **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra does not believe that this requires updating. Disposal in cement kilns would result in destruction; therefore, it is considered under BA2.

Section 7 - Additionality			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		There are no comments or suggestions for this section, in this review	

Section 8 – Quantification of Estimated GHG Emission Reductions and Removals			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
1	Baseline Emissions from Refrigerants	It is recommended that the nomenclature used in the equations to be shortened, to make the equation more understandable **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. Verra may consider this in future methodology revisions but, given the number of parameters, notes that shortening the nomenclature may make equations more confusing.
2	Duration of cumulative emission rate	It is recommended to bring a more comprehensive explanation of the 10 year period **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. The VCS standard limits to 10 years the crediting of future avoided emissions even if they are expected to continue over longer timeframes.
3	MDESTR,foam,i,y = Quantity of blowing agent i contained in refrigerated appliance insulation foam and sent for destruction as intact foam by the project activity in year y (t)	MDESTR,foam,i,y = Quantity insulation foam contained in refrigerated appliance sent for destruction as intact foam by the project activity in year y (t) **Rd 2**: *Closed – Accepted. The definition has been updated accordingly. No further action requested*	Rd 1 responses: Thank you for your input. This parameter is meant to represent the quantity of blowing agent, not the quantity of insulation foam. Therefore, no changes are needed.

Section 9 - Monitoring			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
9.1	Data and Parameters Available at Validation	This section is too long, it is suggested to Include the as an appendix to the standard **Rd 2**: *Closed – Accepted. No further action requested*	Rd 1 responses: Thank you for your input. Verra may consider ways to make these sections more efficient in future methodology revisions.
9.2	Data and Parameters Monitored	Same than above **Rd 2**: *Closed – Accepted. No further action requested*	Rd 1 responses: Thank you for your input. Verra may consider ways to make these sections more efficient in future methodology revisions.
9.3	Where a project proponent imports ODS and/or HFC, they must provide documentary evidence, such as shipping manifests and bills of lading, to demonstrate the country of origin of the ODS and/or HFC.	This requirement can be very complicated when ODS-HFCs were recovered from very old eligible sources, Therefore, documenting the origin of the refrigerants would not be possible. **Rd 2**: *Closed – Accepted. No further action requested*	Rd 1 responses: Thank you for your input. Verra does not believe that the methodology needs to be updated. The documentation must verify the origin of the recovered ODS and/or HFC but not the origin of the source itself.
9.31	Composition and Quantity Analysis Requirements for Concentrated Sources	In this preliminary review, it is considered that the requirements for weighing, sampling, analysis and certification of laboratories are very oriented to Article 5 and therefore will be very difficult to comply with in Latin America. It would be recommended to propose certain thresholds and alternatives to be able to apply this methodology with simpler tests such as the use of portable analyzers, and simpler tests for the quantification of dilute sources. In Latin America there are significant numbers of banks with containers with contaminated mixtures which could hardly be reused or reclaimed, but these quantities do not represent more than 1% of the refrigerants that are released annually into the atmosphere. The incorporation of these banks into carbon markets could play a decisive role in reversing	Rd 1 responses: Thank you for your input. Verra believes that the existing requirements ensure credits remain high quality. However, Verra may reconsider alternative options if these requirements prove to be a hindrance to projects.

Section 9 - Monitoring			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		the large emissions of HFCs that take place in Latin America and Africa. **Rd 2:** *Closed – Accepted. No further action requested*	

Appendix #			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		In this review the appendices of the VM0016 methodology are very clear and comprehensive.	

6.2 VMD0048 ACTIVITY METHOD FOR THE DETERMINATION OF ADDITIONALITY FOR RECOVERED AND STOCKPILED ODS REFRIGERANTS

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	Consumer Quantity CFC or HCFC Stockpiled CFC or HCFC refrigerant in an external container with a capacity less than or equal to 250 pounds (approximately 113 kilograms) and not in the possession of the original manufacturer. Consumer	This definition is confusing, and its purpose is unknown. In banks in Latin America, SDGs are stored in tanks of very different capacities being very common 450 y 900 lb containers.	Rd 1 responses: Thank you for your input. The purpose of this activity method is to specify the eligibility of this type of stockpile, but larger stockpiles would still be eligible under the methodology, provided the applicability conditions of VM0016 are met.

Section 3 - Definitions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	quantity CFC or HCFC may exist in stockpiles totaling more than 250 pounds, provided no single container capacity exceeds 250 pounds.	Currently there are no stocks of CFCs, but there are stocks of HCFCs and HFCs. **Rd 2**: *Closed – Accepted. No further action requested*	Rd 1 responses: Verra will add an example of what "consumer" means in this context.
	1 Disposable containers of ODS are commonly described in imperial units. Typically, these include 10-14-ounce cans, or 30- pound or 50-pound cylinders, and 145-pound or 250-pound tanks.		

Section 4 – Applicability Conditions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	In addition to the applicability conditions set out in the revised VCS methodology *VM0016 Recovery and Destruction of Ozone-Depleting Substances and Hydrofluorocarbons v1.2*, this module is globally applicable under the following conditions: 1) The project activity consists of the collection and destruction of recovered CFC or HCFC refrigerant in any quantity; or 2) The project activity consists of the collection and destruction of CFC or HCFC	The difference between 1) and 2) is not clear Another question, HFCs are excluded from this standard? **Rd 2**: *Closed – Accepted. No further action requested*	Rd 1 responses: Thank you for your input. Condition #2 can include virgin material that had been purchased for use but is no longer needed (i.e., obsolete stockpiles). Rd 1 responses: HFCs are currently excluded from this activity method but may be considered in future revisions once the phasedown has progressed further.

Section 4 – Applicability Conditions			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
	refrigerant that meets the definition of consumer quantity CFC or HCFC.		

Section 5 – Procedures			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		No Comments on this Review	

Appendix #			
#	Paragraph from Draft Methodology	Comment	Developer's Response and/or Update
		No Comments on this Review	