

**Department of Ecology  
Compliance Offset Protocol  
Ozone Depleting  
Substances Projects**

**Version 1.0**

Destruction of U.S.  
Ozone Depleting Substances

*Note: This protocol is adopted, with alterations, from the California Air Resource's Board (CARB) Ozone Depleting Substances Projects Protocol, November 14, 2014*



































- (4) Prepare and submit an Offset Project Data Report (OPDR) in accordance with WAC 173-446-525~~section 95976 of the Regulation~~ and subchapter 7.2 of this protocol; and
- (5) Obtain offset verification services from an ARB-accredited offset verification body in accordance with ~~section 95977 of the Regulation~~WAC 173-446-530 and chapter 8 of this protocol.

### **3.2. Location**

- (a) Only projects located in the United States or its territories are eligible under this protocol.
- (b) All ODS must be sourced from stocks in the United States or its territories.
- (c) All ODS must be destroyed within the United States or its territories.
- (d) If any portion of the offset project is located on land over which the state of Washington does not have jurisdiction, the offset project operator must demonstrate that the landowner(s) consent(s) to regulation pursuant to WAC 173-446-520(3)(d) or has entered into an agreement with ecology pursuant to WAC 173-446-520(3)(e). Offset projects situated on the following categories of land are only eligible under this protocol if they meet the requirements of this protocol and the Regulation, including the waiver of sovereign immunity requirements of section 95975(l) of the Regulation:
  - (1) Land that is owned by, or subject to an ownership or possessory interest of a Tribe;
  - (2) Land that is “Indian lands” of a Tribe, as defined by 25 U.S.C. §81(a)(1); or
  - (3) Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands.

### **3.3. Offset Project Operator or Authorized Project Designee**

- (a) The Offset Project Operator or Authorized Project Designee is responsible for project listing, monitoring, reporting, and verification.
- (b) The Offset Project Operator or Authorized Project Designee must submit the information required by ~~subarticle 13 of the Regulation~~WAC 173-446 and in chapter 7 of this protocol.
- (c) The Offset Project Operator must have legal authority to implement the offset





















































































**Table B.6. CO<sub>2</sub> Electricity Emission Factors**

eGRID subregion acronym	eGRID subregion name	Annual output emission rates	
		(lb CO <sub>2</sub> /MWh)	(metric ton CO <sub>2</sub> /MWh)*
AKGD	ASCC Alaska Grid	1,256.87	0.570
AKMS	ASCC Miscellaneous	448.57	0.203
AZNM	WECC Southwest	1,177.61	0.534
CAMX	WECC California	610.82	0.277
ERCT	ERCOT All	1,218.17	0.553
FRCC	FRCC All	1,196.71	0.543
HIMS	HICC Miscellaneous	1,330.16	0.603
HIOA	HICC Oahu	1,621.86	0.736
MROE	MRO East	1,610.80	0.731
MROW	MRO West	1,536.36	0.697
NEWE	NPCC New England	722.07	0.328
NWPP	WECC Northwest	842.58	0.382
NYCW	NPCC NYC/Westchester	622.42	0.282
NYLI	NPCC Long Island	1,336.11	0.606
NYUP	NPCC Upstate NY	545.79	0.248
RFCE	RFC East	1,001.72	0.454
RFCM	RFC Michigan	1,629.38	0.739
RFCW	RFC West	1,503.47	0.682
RMPA	WECC Rockies	1,896.74	0.860
SPNO	SPP North	1,799.45	0.816
SPSO	SPP South	1,580.60	0.717
SRMV	SERC Mississippi Valley	1,029.82	0.467
SRMW	SERC Midwest	1,810.83	0.821
SRSO	SERC South	1,354.09	0.614
SRTV	SERC Tennessee Valley	1,389.20	0.630
SRVC	SERC Virginia/Carolina	1,073.65	0.487



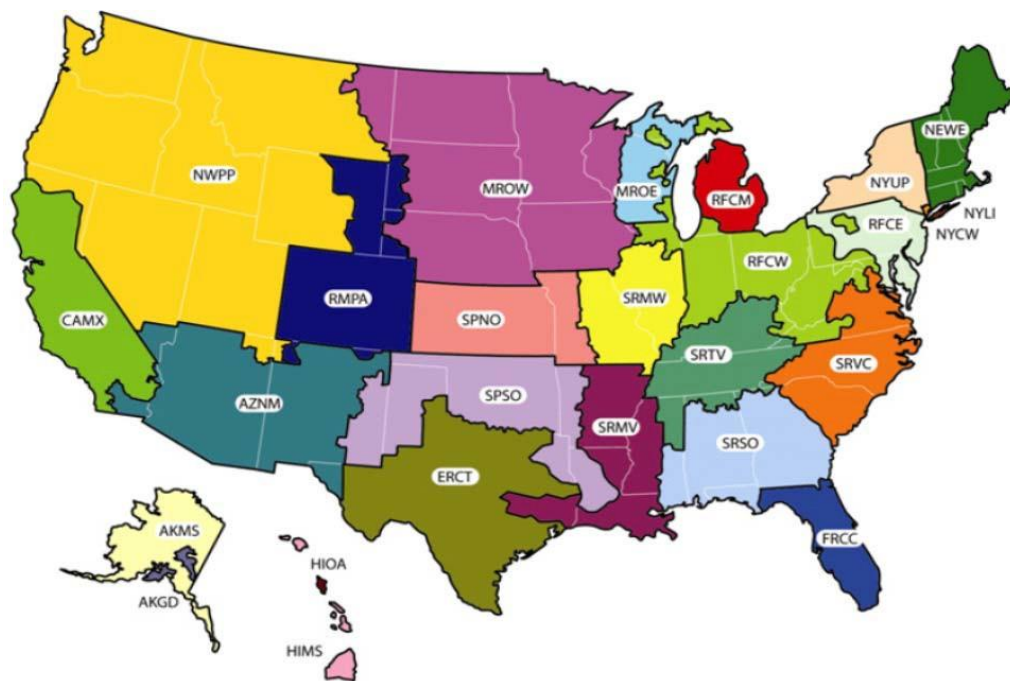


Figure B.1. Map of eGRID2010 Subregions

## **Appendix C. ODS Mass and Composition from Building Foam Projects – Quantification Methodology**

ODS blowing agent from building insulation foam must be destroyed intact following the procedures described in this appendix.

- (a) The foam's mass shall be determined on scales at the destruction facility. The scales must be calibrated at least quarterly with a demonstrated accuracy of +/- 5%.
- (b) To determine the composition and mass ratio of the ODS foam blowing agent present in the foam at least two samples per building surface (e.g., wall, roof) must be taken. The samples must conform to all of the following requirements:
  - (1) Each must sample must be at least 2 inches in length, 2 inches in width, and 2 inches thick;
  - (2) For storage and transport, each sample must be placed and sealed in a separate air-tight and water-tight container that is at least 2 millimeters thick;
  - (3) The analysis of ODS foam blowing agent content and mass ratio shall be performed at an independent laboratory unaffiliated with the Offset Project Operator or Authorized Project Designee. The analysis shall be done using one of the two following methods: (1) ASTM Method D 7132-05 Standard Test Method for Determination of Retained Blowing Agent in Extruded Polystyrene Foam or (2) the heating method to extract ODS blowing agent from the foam samples described in Scheutz *et al.* (2007). The Scheutz method must include all of the following steps:
    - (A) Each sample shall be prepared to a thickness no greater than 1 cm, placed in a 1123 mL glass bottle, weighed using a calibrated scale, and sealed with Teflon-coated septa and aluminum caps;
    - (B) To release the ODS blowing agent from the foam, the samples must be incubated in an oven for 48 hours at 140 degrees C;
    - (C) When cooled to room temperature, gas samples must be redrawn from the headspace and analyzed by gas chromatography;

- (D) The lids must be removed after analysis, and the headspace must be flushed with atmospheric air for approximately 5 minutes using a compressor. Afterwards, septa and caps must be replaced and the bottles subjected to a second 48-hr heating step to drive out the remaining ODS blowing agent from the sampled foam; and
  - (E) When cooled down to room temperature after the second heating step, gas samples must be redrawn from the headspace and analyzed by gas chromatography;.
- (4) The mass of ODS foam blowing agent recovered shall then be divided by the total mass of the initial foam samples prior to analysis to determine the mass fraction of each ODS foam blowing agent present; and
  - (5) The results from all samples from a single building shall be averaged to determine the mass fraction of blowing agent in foam (BA%) used in equation 5.4.

## Appendix D. ODS Mass and Composition from Refrigerant and Appliance Foam Projects – Quantification Methodology

Prior to destruction, the precise mass and composition of both ODS refrigerant and concentrated ODS foam blowing agent must be determined. The following analysis must be conducted:

- (a) Mass must be determined by individually measuring the weight of each container of ODS first when it is full prior to destruction and then after destruction is complete. The mass of ODS and any contaminants is equal to the difference between the full and empty weight, as measured. To be eligible to receive [EcologyARB](#) offset credits or registry offset credits, all of the following requirements must be met when weighing the containers of ODS:
  - (1) A single scale conforming with the requirements in subchapter 6.3 of this protocol must be used for generating both the full and empty weight tickets at the destruction facility;
  - (2) The full weight must be measured no more than 48 hours prior to commencement of destruction per the CEMS data, if available, or the Certificate of Destruction;
  - (3) The empty weight must be measured no more than 48 hours after the conclusion of destruction per the CEMS data, if available, or the Certificate of Destruction; and
  - (4) Each single compartment, cylinder, drum, or any other eligible ODS container that has been identified and destined for destruction must be weighed separately, sampled separately, and treated as a separate destruction event.
  - (5) Recovery, collection, and aggregation activities may occur until the container has been identified and destined for destruction. After the ODS container has been identified and destined for destruction, ODS must not be added or removed, except for the purpose of sampling and analysis.
- (b) The following procedures must be applied for the full and empty weights required within 48 hours of both the commencement and conclusion of destruction, pursuant to subsections (a)(2) and (a)(3) in appendix D of this protocol:

- (1) For refrigerant containers permanently affixed to a detachable trailer:
  - (A) The trailer must be detached from its transportation vehicle, and the trailer must be weighed separately from its transportation vehicle;
  - (B) Any accessories, such as spare tires or tire chains, or any part of the trailer's load other than the ODS refrigerant which are included in the trailer's full weight prior to ODS destruction must be included in the trailer's empty weight after destruction; and
  - (C) A refrigerant container with a capacity over 1,000 pounds must be placed on the scale motionless for at least 3 minutes to allow the weight to stabilize before the weight measurement is recorded.
- (2) For refrigerant containers not permanently affixed to a truck or detachable trailer:
  - (A) Each container may be weighed by placing it individually on the scale prescribed in subsection (a)(1) in appendix D of this protocol; and;
  - (B) A refrigerant container with a capacity over 1,000 pounds must be placed on the scale motionless for at least 3 minutes to allow the weight to stabilize before the weight measurement is recorded.
- (3) For refrigerant containers weighed with the transportation vehicle included:
  - (A) The driver and any other passengers must exit the vehicle such that their weight is not included;
  - (B) Any accessories, such as spare tires or tire chains, or any part of the truck's load other than the ODS refrigerant which are included in the truck's full weight prior to ODS destruction must be included in the truck's empty weight after destruction;
  - (C) If more than 1,000 pounds of ODS refrigerant is being transported for destruction, then the truck must be situated motionless on the scale for at least 3 minutes to allow the weight to stabilize before the weight measurement is recorded.

- (D) The transportation vehicle's weight classification and load rating must be recorded;
  - (E) The transportation vehicle's fuel capacity must be recorded. Its fuel level at the time of each scale recording must also be recorded. Fuel level must be recorded in an increment of one eighth of the fuel tank capacity. If the fuel level is in between two increments, the fuel level prior to ODS destruction must be rounded down and the fuel level after ODS destruction must be rounded up;
  - (F) If the transportation vehicle's fuel level is lower after destruction than the fuel level before destruction, the difference in fuel weight must be subtracted, as applicable from  $Q_{ref,i}$  in equation 5.3,  $Q_{ref,i}$ , in equation 5.6,  $BA_{app,i}$  in equation both equation 5.4 and equation 5.7, and  $Q_{TotalODS,i}$  in equation 5.8. The following fuel densities shall be used to adjust for weight:
    - 1. 7.0851 lb/gal for diesel; or
    - 2. 6.0023 lb/gal for gasoline; and
  - (G) If different transportation vehicles are used to transport containers to a destruction facility and to pick up the empty containers after destruction, each transport vehicle shall be weighed both upon its arrival and departure from the destruction facility. If the vehicle transporting the full ODS containers to the destruction facility weighs more than the vehicle carrying the empty ODS containers from the facility, the weight discrepancy must be subtracted, as applicable from  $Q_{ref,i}$  in equation 5.3,  $Q_{ref,i}$ , in equation 5.6,  $BA_{app,i}$  in both equation 5.4 and equation 5.7, and  $Q_{TotalODS,i}$  in equation 5.8.
- (c) Composition and concentration of ODS must be established for each individual container by taking a sample from each container of ODS and having it analyzed for composition and concentration at an AHRI-certified laboratory using the AHRI 700-2006 standard. The laboratory performing the composition analysis must not be affiliated with the Offset Project Operator or Authorized Project Designee. All of the following requirements must be met for each sample:

- (1) The sample must be taken while ODS is in the possession of the company that will destroy the ODS;
  - (2) Samples must be taken by a technician unaffiliated with the Offset Project Operator or Authorized Project Designee; if the destruction facility is either the Offset Project Operator or Authorized Project Designee, an outside technician must perform this task;
  - (3) Samples must be taken with a clean, fully evacuated sample bottle that meets applicable DOT requirements with a minimum capacity of one pound;
  - (4) Each sample must be taken in liquid state;
  - (5) A minimum sample size of one pound must be drawn for each sample;
  - (6) Each sample must be individually labeled and tracked according to the container from which it was taken, and all of the following information recorded:
    - (A) Time and date of sample;
    - (B) Name of Offset Project Operator and Authorized Project Designee;
    - (C) Name of technician taking sample;
    - (D) Employer of technician taking sample;
    - (E) Volume of container from which sample was extracted; and
    - (F) Ambient air temperature at time of sampling; and
  - (7) Chain of custody for each sample from the point of sampling to the AHRI lab must be documented by paper bills of lading or electronic, third-party tracking that includes proof of delivery.
- (d) All project samples shall be analyzed using AHRI 700-2006 to confirm the mass percentage and identity of each component of the sample. The analysis shall provide:
- (1) Identification of the refrigerant;
  - (2) Purity (%) of the ODS mixture by weight using gas chromatography;
  - (3) Moisture level in parts per million. The moisture content of each sample must be less than 75% of the saturation point for the ODS based on the temperature recorded at the time the sample was taken;

- (A) For non-mixed ODS, the saturation point is the saturation point of the major ODS species;
  - (B) For mixed ODS, the saturation point is the lowest saturation value of any species that makes up at least 10% of the composition;
- (4) Analysis of high boiling residue, which must be less than 10% by mass; and
- (5) Analysis of other ODS in the case of mixtures of ODS, and their percentage by mass.
- (e) If any of the requirements in sections (a) through (c) of this appendix are not met, no GHG reductions may be verified for ODS destruction associated with that container.
- (f) If a container holds non-mixed ODS, no further information or sampling is required to determine the mass and composition of the ODS. For non-mixed ODS, the analysis conducted for the sample taken at the destruction facility must be used for quantifying GHG emissions.
- (g) If the container holds mixed ODS, the Offset Project Operator or Authorized Project Designee must meet all of the following additional requirements:
  - (1) The required sampling may be conducted at the final destruction facility or prior to delivery to the destruction facility;
  - (2) Circulation and sampling activities must be conducted by a contracted third-party and by individuals who have been properly trained for the functions they perform;
  - (3) The offset project documentation must specify the procedures by which mixed ODS are analyzed;
  - (4) Prior to sampling, the ODS mixture must be circulated in a container that meets all of the following criteria:
    - (A) The container has no solid interior obstructions;
    - (B) The container was fully evacuated prior to filling;
    - (C) The container must have sampling ports to sample liquid and gas phase ODS;



- (D) The sampling ports must be located in the middle third of the container (i.e., not at one end or the other); and
  - (E) The container and associated equipment can circulate the mixture via a closed loop system from the bottom to top;
- (5) If the original mixed ODS container does not meet these requirements, the mixed ODS must be transferred into a temporary holding tank or container that meets all of the above criteria. The weight of the contents placed into the temporary container shall be calculated and recorded. During transfer of ODS into and out of the temporary container, ODS shall be recovered to the vacuum levels required by the U.S. EPA for that ODS (see 40 CFR 82.156);
- (6) Once the mixed ODS is in a container or temporary storage unit that meets the criteria above, circulation of mixed ODS must be conducted as follows:
- (A) Liquid mixture shall be circulated from the liquid port to the vapor port;
  - (B) A volume of the mixture equal to two times the volume in the container shall be circulated;
  - (C) Calculations converting between mass and volume shall use the densities provided in table B.3; if converting between mass and volume, the mixed ODS must be in a liquid state;
  - (D) Circulation must occur at a rate of at least 30 gallons/minute; and
  - (E) Start and end times shall be recorded;
- (7) Within 30 minutes of the completion of circulation, a minimum of two samples shall be taken from the bottom liquid port, and both samples must be analyzed at an AHRI approved laboratory; and
- (8) The Offset Project Operator or Authorized Project Designee must calculate the project GHG emission reductions using both sample results, and choose the sample resulting in the lower project emission reductions.