



ATMO
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Refrigerants in Transition: Market Incentives
ATMOsphere 2017



EOS Climate

Founded in 2009 to create market-based solutions to reduce emissions of high GWP gases and accelerate the transition to advanced technologies

- GHG methodologies
- Project development
- California cap-and-trade compliance offsets

New business (Xpansiv Data Systems) uses blockchain technology to standardize and track environmental attributes across commodity supply chains (xpansivdata.com)

What is a carbon credit?

- AKA “Carbon Offset” or “Verified Emission Reduction”
 - Represents a reduction in business as usual of 1 metric ton of CO₂ equivalent (mtCO₂e)
 - Reduction in greenhouse gas emissions that are real, permanent, additional, and enforceable
 - Verified by certified 3rd party
- Financial instrument sold in compliance (e.g., CA) or voluntary markets
- Enables businesses to:
 - Meet carbon reduction goals or requirements (buyers)
 - Offset costs for technology transitions (project owners)

Carbon Credit Opportunities for Refrigerants

Class	Ozone Depleting Potential	GWP	Carbon Credits	GHG Market Status
CFCs	1	4,750-10,900	✓	Destruction credits in California cap-trade
HCFCs	.05	~1,800	✓	Some eligibility for destruction credits
HFCs	0	1,400 – 4,500	✓	Credits via recovery and reclamation for re-use
HFOs	0	<5	✓	VERs via deployment of low GWP refrigeration technology
Natural Refrigerants	0	<5	✓	

Destruction of CFC refrigerants

- >14 million verified emission reductions
- Important cost containment for CA cap-trade
- Helps finance retrofits, e.g.,



California Environmental Protection Agency

AIR RESOURCES BOARD

Compliance Offset Protocol Ozone Depleting Substances Projects

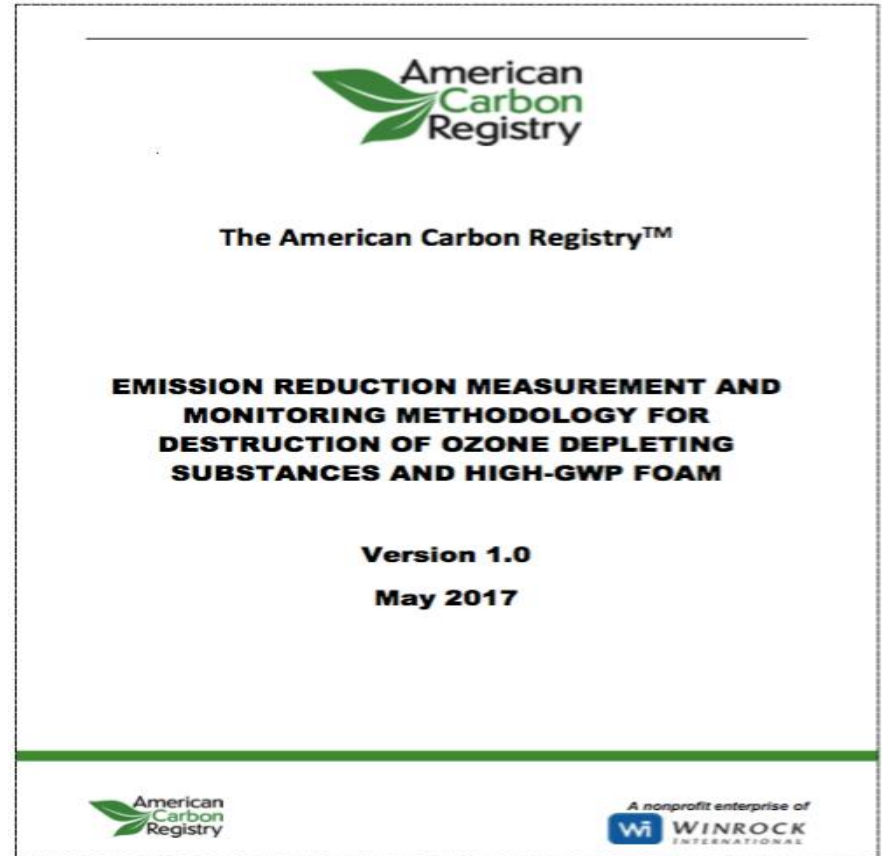
Destruction of U.S.
Ozone Depleting Substances Banks

Adopted: October 20, 2011



Updated ODS Destruction Methodology

- Expands eligibility to additional ODS classes, e.g.,
- **NEW: Credits for destruction of R-22 recovered from equipment that is de-commissioned**



New Methodology Enables 2 Types of Crediting

1- Recovery and re-use of reclaimed HFC refrigerants

2- Deployment of advanced refrigeration systems



The American Carbon Registry™

**EMISSION REDUCTION MEASUREMENT AND
MONITORING METHODOLOGY FOR USE OF
CERTIFIED RECLAIMED HFC REFRIGERANTS
AND ADVANCED REFRIGERATION SYSTEMS**

Version 1.0

October 2015

Credits for reclaimed HFC refrigerant

- Credits issued when HFCs are recovered, reclaimed and put back into commerce for re-use
 - Represent avoided GHG emissions from displacing additional virgin production
- A certified 3rd party verifies that the credits are generated in conformance with the ACR methodology
- **For businesses that use HFC-based refrigeration or air conditioning equipment:**
 - Credits can be purchased and retired against corporate HFC refrigerant emissions
- **Manufacturers can use credits to reduce carbon footprint of new HFC-based equipment**

New Revenue Opportunity with Natural Refrigerants

Deployment of advanced refrigeration systems

- Quantification and verification of GHG emissions prevented from using zero or low-GWP refrigerants



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Credits = Emissions Avoided

Calculated from HFC Baseline Scenario

$$BE_{HFCy} = \sum [Q_{BRi} * AL_{REF}] / 1000 * GWP_{REF} * LS/10$$

BE_{HFCy}	Baseline emissions of HFC refrigerant
Q_{BR}	Quantity of refrigerant in baseline system i (kg)
AL_{REF}	10-year loss rate of refrigerant (% per year)
GWP_{REF}	Global warming potential of baseline refrigerant
LS	Lifetime of equipment i (years)

- Monitoring/documentation requirements for 3rd party verifications

Food retailers and others installing natural refrigerant systems can offset their capital costs



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Thank you very much!

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