

R-6. Reduce Operational Leak Emissions



GHG Mitigation Potential



Up to 99.9% reduction in GHG emissions during operation

Co-Benefits (icon key on pg. 34)

None

Climate Resilience

Non-applicable

Health and Equity Considerations

Non-applicable

Measure Description

This measure reduces emissions from leakage of refrigerants during operation, decreasing emissions of refrigerants. A typical food retail store leaks an estimated 25 percent of refrigerants, or approximately 1,000 pounds annually (U.S. EPA 2013). Currently, under Section 608 of the Clean Air Act, corrective action must be taken when an appliance with a full charge of 50 or more pounds is discovered to be leaking ozone depleting substances that exceeds the applicable trigger rate. The trigger rate for industrial process refrigeration is 30 percent, commercial refrigeration 20 percent, and comfort cooling and all other appliances is 10 percent. Through implementing leak detection technology and preventative maintenance measures, leakages can be resolved before reaching trigger rates, thus significantly reducing GHG emissions (U.S. EPA 2020).

Scale of Application

Project/Site

Implementation Requirements

Under California's Refrigerant Management Program, leak inspections are required monthly for large refrigeration systems, quarterly for medium systems, and annually for small systems (CARB 2020). When reducing leak emissions, best practices include regularly conducted visual inspections to ensure no leakages occur. If a leak does occur, repairs must be made within 14 days of detection (CARB 2020).

Cost Considerations

Costs associated with reducing operational leak emissions may include installation of leak detection systems and increased staff time to monitor and maintain the detection system. The benefit of reducing leak emissions depends on the price of the refrigerant and the quantity of leaked refrigerant. Because many refrigerants carry a high cost, detecting and repairing leaks is expected to provide a net cost savings.

Expanded Mitigation Options

Non-applicable.





GHG Reduction Formula

$$A = \frac{B - C}{C}$$

GHG Calculation Variables

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from leak emissions	0–99.9	%	calculated
User Inputs				
B	Improved equipment leak rate with measure	[]	%	user input
Constants, Assumptions, and Available Defaults				
C	Annual equipment leak rate without measure	Tables R-1.2 through R-1.5	%	U.S. EPA 2016

Further explanation of key variables:

- (B) – The improved leak rate of the equipment after leak detection, leak repair, and leak prevention measures have been implemented. This varies on a case-by-case basis due to differences in equipment and leak control technologies used.
- (C) – The annual operational leak rate of the equipment.

GHG Calculation Caps or Maximums

This measure has a maximum GHG emissions reduction of 99.9 percent.

Example GHG Reduction Quantification

The user reduces operational leak rates by installing leak detection technology and increasing regular maintenance of the equipment. In this example, the user operates refrigeration and condensing units at a supermarket. The current operational leak rate is 25 percent (C) and the updated leak rate of the equipment (B) is decreased to 20 percent annually. Implementation of this project would reduce GHG emissions from the refrigeration and condensing units at this supermarket by 20 percent.

$$A = \frac{(20\% - 25\%)}{25\%} = -20\%$$

Quantified Co-Benefits

None.



Sources

- California Air Resource Board (CARB). 2020. *Refrigerant Management Program: Service Technicians & Contractors*. Available: <https://ww2.arb.ca.gov/our-work/programs/refrigerant-management-program/rmp-service-technicians-contractors>. Accessed: January 2021.
- U.S. Environmental Protection Agency (U.S. EPA). 2013. *The GreenChill Partnership. Refrigerant Leak Prevention through Regular Maintenance*. September 2013. Available: https://www.epa.gov/sites/production/files/2013-12/documents/gc_preventativemaintenance_20130913.pdf. Accessed: January 2021.
- U.S. Environmental Protection Agency (U.S. EPA). 2016. *Accounting Tool to Support Federal Reporting of Hydrofluorocarbon Emissions: Supporting Documentation*. October 2016. Available: https://www.epa.gov/sites/production/files/2015-09/documents/hfc_emissions_accounting_tool_supporting_documentation.pdf. Accessed: May 2021.
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