

REFRIGERANT MANAGEMENT



OVERVIEW OF A HIGH-IMPACT DRAWDOWN SOLUTION

Hydrofluorocarbons (HFCs) are chemicals used to cool refrigerators and air conditioners. They are also an extremely potent GHG. Efforts to control leakages and replace HFCs with alternative refrigerants and to properly dispose of and recycle existing HFCs would lower GHG emissions.

TECHNOLOGY AND MARKET READINESS

The technology is mature and market ready. The high global warming potential of refrigerants (as much as 22,800 CO₂-e) means that there are large opportunities available for reducing the emissions of refrigerants. Evidence from the EPA's Green Chill program and evidence from other corporate programs that improve refrigerant management or implement alternative refrigerants suggests that substantial reductions of refrigerant emissions are possible at relatively low cost [1]. Project Drawdown® calculates that globally, only 2.7% of refrigerants are destroyed or recycled at end of life [2]. Their technical potential assumptions suggest that nearly all refrigerants can be eliminated from developed countries. Further, the Kigali Accord of 2016 aims to phase out many synthetic refrigerants and move towards less harmful alternatives, suggesting significant political momentum aimed at reducing refrigerants.

LOCAL EXPERIENCE AND DATA AVAILABILITY

There is state level data available from EPA on emissions resulting from ozone depleting substance (ODS) substitutes, and leak rates for refrigerants can be approximated based on EPA guidelines. Local experience is also available; for example, Atlanta-based Coca-Cola Company has been switching to HFC-free natural refrigerants in their new cold-drink equipment, with stated plans to be 100% HFC-free by 2020. That said, there is little information about specific initiatives and strategies in Georgia to address refrigerants. It is assumed that technological and managerial strategies that exist globally are also available in Georgia.

TECHNICALLY ACHIEVABLE GHG REDUCTION POTENTIAL

The GHG reduction potential is high. According to EPA's 2016 Revised Section 608 - Refrigerant Management Regulations, the allowable leak rates of refrigeration and air-conditioning equipment containing 50 or more pounds of refrigerant was lowered from 35% to 30% for industrial process refrigeration, 35% to 20% for commercial refrigeration and 15% to 10% for comfort cooling equipment, effective January 2019 [3]. Preliminary analysis using these leak rates as a current baseline and EPA's ODS substitutes emissions data for Georgia [4] indicates that reducing the leak rates slightly below the new EPA guidelines by 2030, and to 5% or less by 2050 (similar to the targets specified by EPA's GreenChill program), can result in a reduction significantly greater than the 1 Mt CO₂-e annual reduction threshold.

COST COMPETITIVENESS

While there are ambitious national and international goals for improving refrigerant management, there are unclear economic incentives in place to accomplish these reductions. Refrigerants are highly distributed through a wide range of industrial, commercial and residential applications. Further, the strategies for reducing refrigerant leakage are highly distributed as well, with strategies relating to the reduction of usage of appliances that use refrigerants; the improved efficiency of these appliances; replacement of refrigerants; the improved management and operation of refrigerants; and improved collection and destruction of refrigerants at end of life. One challenge of estimating costs is that Project Drawdown® notes a lack of information on the costs of improving refrigerant management – and in particular any increases in operational costs in order to reduce leakage, switch to natural refrigerants, or improved efficiency of appliances [2]. Project Drawdown® relies solely on estimated costs of the safe disposal of existing refrigerants. Without clear economic incentives to improve refrigerant management, the cost-effectiveness of solutions is uncertain, and there are mixed results on cost-effectiveness of this solution based on global Project Drawdown® estimates and abatement curve data (e.g., McKinsey abatement curve). We will explore Georgia-specific cost effectiveness during the next phase of research.

BEYOND CARBON ATTRIBUTES

Reducing refrigerant leakage and replacing HFCs with HFC-free alternatives have beyond carbon benefits mainly in the form of improved air quality, which consequently leads to improved public health in the surrounding areas [5]. Improved cooling systems for residential communities would also help to reduce energy bills as HVAC costs account for a large portion of utility bills. A cost of the solution is retraining programs for HVAC professionals to promote HCF free refrigerants [6], and the development of proper installation and disposal procedure as these alternative refrigerants are still chemical agents [7].

References:

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Endnotes:

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