



New Yorkers for Cool Refrigerant Management  
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Draft Scoping Plan Comments  
NYSERDA  
17 Columbia Circle  
Albany, NY 12203-6399

Sent via email: [scopingplan@nyserda.ny.gov](mailto:scopingplan@nyserda.ny.gov)

June 30, 2022

Re: Estimating Emissions of Ozone-Depleting Substances in New York State

Dear Members of the Climate Action Council,

[New Yorkers for Cool Refrigerant Management](#) is a citizen-run climate organization that is fiscally sponsored by Sustainable Hudson Valley. Since 2018, this active group of expert volunteers has focused on mitigating emissions of refrigerant gases such as hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), and chlorofluorocarbons (CFCs). These comments specifically address persistent emissions of ozone-depleting substances, HCFCs and CFCs.

## Summary Points

- The New York State Greenhouse Gas Inventory mentions ozone-depleting substances (ODS) as greenhouse gases, but explains that they are not typically reported in greenhouse gas inventories and that they have no good way to report them.
- We took data provided by EPA about the tonnage of emissions of ODS and calculated the carbon dioxide equivalent (CO<sub>2</sub>e) emissions using 20-year global warming potential (GWP) figures. We then compared emissions of CFCs and HCFCs to EPA's reported emissions of HFCs. In 2019, for every 100 MTCO<sub>2</sub>e of HFC emissions, there were 13 MTCO<sub>2</sub>e of CFC emissions and 67 MTCO<sub>2</sub>e of HCFC emissions.
- If we apply the same ratios to New York State's refined HFC inventory from July 2021, we can see that ODS are a non-trivial contributor to greenhouse gas emissions. If ODS were added to New York State's greenhouse gas inventory, HFCs would comprise 5.3 percent of the total inventory and ODS would comprise 4.3 percent of the inventory.
- Adding greenhouse gas emissions from ODS to the 1990 baseline greenhouse gas inventory would distort the baseline in ways that would not be helpful to addressing the climate crisis. At the same time, policymakers should be aware of persistent atmospheric damages from emissions of ODS in New York State.
- This analysis should motivate stronger and more robust policy on refrigerant management. First, the potential emissions reduction benefits of transitioning to low-GWP refrigerants or preventing refrigerant emissions at equipment end-of-life may be higher when considering the continued threat of CFCs and HCFCs. Second, the persistent

use of previous generation ODS refrigerants may suggest that grocery stores and building managers – particularly in disadvantaged communities – need financial assistance in replacing equipment using ODS with climate-friendly alternatives.

## Emissions of Ozone-Depleting Substances

### Analysis

New York State does not report emissions of ozone-depleting substances (ODS), such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). These gases are commonly used as refrigerants, aerosol propellants, and foam-blowing agents. ODS gases are particularly environmentally damaging because they pack a dual threat: ozone depleting potential (ODP) and global warming potential (GWP). Emissions of ODS gases are not commonly reported in emissions inventories, since ODS gases are covered under the Montreal Protocol, rather than the UNFCCC's Kyoto Protocol.<sup>1</sup>

Since the 1987 Montreal Protocol that phased out ODS gases, annual releases of CFCs and HCFCs have fallen significantly from their peak concentrations in the atmosphere.<sup>2</sup> However, CFCs and HCFCs continue to be emitted from older equipment in meaningful quantities. Minx et al. (2021), for example, noted that the inclusion of ODS gases in global greenhouse gas inventories *more than doubled* the amount of fluorinated gas emissions in 2019.<sup>3</sup> The traditional exclusion of ODS gases may result in an understatement of the impact of chlorinated refrigerant gases on the climate.

This section outlines a methodology for estimating emissions from ODS gases in New York State and provides a path forward for acknowledging these emissions in state climate policy. We also have included a spreadsheet with emissions data and calculations for reference.

New Yorkers for Cool Refrigerant Management examined the Environmental Protection Agency's (EPA) greenhouse gas inventory to gather national estimates for emissions of ODS gases in 2019. Table 1 shows emissions as EPA originally reported them converted to GWP<sub>20</sub>, excluding emissions from ODS.

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<sup>1</sup> Page 7, [2021 Statewide GHG Emissions Report](#).

<sup>2</sup> Page 8, [2021 Statewide GHG Emissions Report](#).

<sup>3</sup> [Paper from Minx et al.](#)

**Table 1. USA Greenhouse Gas Emissions (GWP<sub>20</sub>)<sup>4</sup>**

<b>Gas</b>	<b>2019, MMTCO<sub>2</sub>e</b>	<b>%</b>
CO <sub>2</sub>	5,259.1	65.5%
CH <sub>4</sub>	1,926.1	24.0%
NO <sub>2</sub>	443.0	5.5%
HFCs	394.0	4.9%
PFCs	3.9	0.0%
SF <sub>6</sub>	4.2	0.1%
NF <sub>3</sub>	0.4	0.0%
<b>Total</b>	<b>8,030.8</b>	<b>100.0%</b>

EPA reports ODS emissions separately in their annex to their annual greenhouse gas inventory, in kilotons of ODS. We then converted these emissions to MMTCO<sub>2</sub>e, using GWP<sub>20</sub> figures consistent with New York State’s greenhouse gas inventory.

The conversion from kilotons of ODS to MMTCO<sub>2</sub>e follows the simple formula:

$$kt_{ODS} \times 1,000 \times GWP_{20} \div 1,000,000 = MMTCO_2e$$

Results from this conversion are in Table 2.

**Table 2. USA Greenhouse Gas Emissions (GWP<sub>20</sub>), including ODS<sup>5</sup>**

<b>Gas</b>	<b>2019, MMTCO<sub>2</sub>e</b>	<b>%</b>
CO <sub>2</sub>	5,259.1	63.0%
CH <sub>4</sub>	1,926.1	23.1%
NO <sub>2</sub>	443.0	5.3%
HFCs	394.0	4.7%
HCFCs	265.4	3.2%
CFCs	51.4	0.6%
PFCs	3.9	0.0%
SF <sub>6</sub>	4.2	0.1%
NF <sub>3</sub>	0.4	0.0%
<b>Total</b>	<b>8,347.6</b>	<b>100.0%</b>

As seen above, the inclusion of ODS gases in the national greenhouse gas inventory nearly doubles the percentage of fluorinated gases, from 4.9 percent to 8.5 percent. Clearly, the greenhouse gas emissions of ODS gases are occurring at non-trivial levels.

Using national figures, we constructed ODS emissions estimates for New York State. In the national inventory, we found that for every 100 MTCO<sub>2</sub>e of HFC emissions, there were 67

<sup>4</sup> See the “US GHG Inventory, w no ODS” spreadsheet for the calculations where we converted Table ES-2 found in the [2022 USA Greenhouse Gas Inventory](#) from GWP<sub>100</sub> to GWP<sub>20</sub>.

<sup>5</sup> See the “US GHG Inventory, including ODS” spreadsheet for the calculations where we used data from Table A-247 found in the [2022 USA Greenhouse Gas Inventory](#) to calculate GHG emissions from ODS in GWP<sub>20</sub>.

MTCO<sub>2</sub>e of HCFC emissions. For every 100 MTCO<sub>2</sub>e of HFC emissions, there were 13 MTCO<sub>2</sub>e of CFC emissions. We assume the continued use of ODS relative to HFCs in New York State is no different from the national average. Using this proportionality, we estimated corresponding ODS emissions estimates for New York State in 2019.

New York State has previously used a similar methodology to calculate HFC emissions in the annual greenhouse gas inventory. In prior years, for example, all HFC emissions in the inventory were calculated as a percentage of national emissions. Although our calculations for ODS emissions may have low precision relative to the outputs of the New York State-specific HFC emissions model used for 2021, our analysis shows in broad strokes how much ODS could contribute to New York’s greenhouse gas emissions (Table 3).

**Table 3. New York State Greenhouse Gas Emissions, including ODS<sup>6</sup>**

<b>Gas</b>	<b>2019, MMTCO<sub>2</sub>e</b>	<b>% (incl. ODS)</b>
CO <sub>2</sub>	221.89	56.0%
CH <sub>4</sub>	133.07	33.6%
NO <sub>2</sub>	3.35	0.8%
HFCs	20.89	5.3%
HCFCs	14.07	3.6%
CFCs	2.72	0.7%
PFCs	0.10	0.0%
SF <sub>6</sub>	0.13	0.0%
<b>Total</b>	<b>397.65</b>	<b>100.0%</b>

From this analysis, we can see that the inclusion of CFCs and HCFCs in the statewide greenhouse gas inventory could increase the total contribution of fluorinated refrigerant gases to 9.6 percent overall.

### Takeaways and Next Steps

This analysis shows that ODS greenhouse gases continue to be widely emitted across the United States and in New York State. Accounting for these emissions would dramatically increase the reported contribution of fluorinated refrigerant gases to greenhouse gas inventories at the state and national levels.

The continued emission of ODS greenhouse gases has several policy implications. First, New York State has a large opportunity to reduce environmental damages by fast-tracking replacement of equipment containing ODS refrigerants. Ideally, this equipment could be replaced with new equipment using low-global warming potential refrigerants.

<sup>6</sup> See the “NY GHG Inventory, including ODS” spreadsheet for the calculations where we add estimates of ODS emissions to the data from “Table ES.2: 2019 New York State GHG Emissions, by IPCC Sector,” page iv of [2021 Statewide GHG Emissions Report](#).

Second, replacement of equipment using ODS refrigerants also represents an opportunity to improve energy efficiency. Older equipment using ODS refrigerants is notoriously energy inefficient, posing burdens to the operator's pocketbook and the environment. Retiring this older equipment may therefore save equipment operators money in the long run.

Policymakers should *not* take the underreporting of HCFCs and CFCs as a signal that HCFCs and CFCs should be folded indiscriminately into state greenhouse gas inventories and reporting targets. Since emissions of ODS refrigerants *are not* included in New York State's 1990 emissions baseline, counting future emissions reductions from HCFCs and CFCs would reduce the amount that the state needs to mitigate other major greenhouse gases, such as CO<sub>2</sub> and methane, in order to meet its climate targets. Therefore, New York State should preserve its existing baseline and target-setting practices, but separately aim to mitigate emissions of ODS.

NYSERDA could also collaborate with EPA and Guidehouse to construct more robust estimates of ODS emissions in New York State. EPA uses a proprietary equipment vintaging model to estimate ODS emissions nationally. NYSERDA could modify this model with state-specific parameters to generate estimates of ODS emissions. It should also be technically feasible to update the existing Guidehouse vintaging model to generate estimates of ODS emissions.

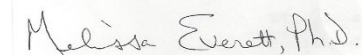
Thank you for reviewing our letter. We would be delighted to answer any questions it might raise.

Gratefully,



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