


Concepts for the Phasedown of Hydrofluorocarbons (HFC)

Air Quality Technical Advisory Committee Meeting
April 16, 2020
Harrisburg, PA

Tom Wolf, Governor

Patrick McDonnell, Secretary

Agenda

- What are HFCs?
- History of Atmospheric Chemical Phasedowns
  - Montreal Protocol – Success in Phasedown of CFCs and HCFCs
  - Kigali Amendment – Focus on Phasedown of HFCs
- HFC Phasedown
  - Federal: EPA's Significant New Alternatives Policy (SNAP) Program
  - State-level: U.S. Climate Alliance (USCA) Model Rule and State Initiatives
- HFC Emissions and Trends in Pennsylvania
- USCA HFC Model Rule Sectors
- Anticipated Timeline for Proposed Rulemaking

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What are HFCs?

- HFCs are gaseous organic compounds containing hydrogen and fluorine.
- HFCs are used in a variety of applications:
  - Air conditioning
  - Refrigeration
  - Foam blowing
  - Aerosol propellants
- HFCs are also used for solvent cleaning.
  - Solvent cleaning is not one of the end uses under consideration for phasedown.

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What are HFCs?

- HFCs are potent greenhouse gases (GHG) with high global warming potentials (GWP).
- GWP_{100} is a relative factor used to compare the climate-based impact of a substance to the impact of 1 ton of CO_2 on a 100-year timeframe.

Example HFCs	GWP_{100}
HFC-134A	1430
HFC-245fa	1030
HFC-227ea	3220
HFC-236fa	9810
HFC-125	3500

IPCC 2007, Fourth Assessment Report (AR4)

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History of Atmospheric Chemical Phasedowns

- Montreal Protocol in 1989 – focused on ozone depleting substances (ODS).
  - The ODS chemical groups chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) phased down.
  - HFCs began replacing ODS.

CFCs and HCFCs Pre-Montreal Protocol 1930s-1990	**HFCs** Post-Montreal Protocol 1990s-2010s
- Generally longer atmospheric lifetimes - Ozone depleting - Significant global warming impact	- Generally shorter atmospheric lifetimes - Non-ozone depleting - Significant global warming impact

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History of Atmospheric Chemical Phasedowns

- Kigali Amendment (2016) to Montreal Protocol, focus is now on HFCs.
  - Countries now reducing their use of HFCs.
- Today, many HFC alternatives are available with zero ozone depleting potential and very low global warming potential, including Hydrofluoroolefins (HFOs) and natural refrigerants.

CFCs and HCFCs Pre-Montreal Protocol 1930s-1990	**HFCs** Post-Montreal Protocol 1990s-2010s	**HFOs & Natural Refrigerants** Post-Kigali Amendment 2010s-Present
- Generally longer atmospheric lifetimes - Ozone depleting - Significant global warming impact	- Generally shorter atmospheric lifetimes - Non-ozone depleting - Significant global warming impact	- Generally shorter atmospheric lifetimes - Non-ozone depleting - Less global warming impact

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Significant New Alternatives Policy (SNAP)

- Section 612 of the Clean Air Act (CAA) addresses safe alternatives to the use of ODS.
- EPA's SNAP program consists of a series of regulations under Section 612 of the CAA.
- Under SNAP, EPA evaluates substitutes to ODS to reduce overall risk to human health and the environment with the goal of smooth transition to safer alternatives as they become available.
- SNAP lists acceptable and unacceptable substitutes for each major industrial use sector.
- HFCs previously listed as acceptable.

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SNAP HFC Prohibitions Challenged

- In 2015 and 2016, EPA SNAP Rules 20 and 21 included a phasedown schedule for certain HFCs in specific end uses.
  - More than one acceptable substitute is available for each category.
- The HFC prohibitions in the 2015 and 2016 EPA SNAP rules were challenged.
- August 8, 2017 – U.S. Court of Appeals for the D.C. Circuit ruled EPA lacks authority under CAA Section 612 to require the phase down of HFCs because HFCs are not ODS.

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SNAP – Next Steps

- Industry was already implementing the phasedown of HFCs according to the implementation schedule in the EPA SNAP rules.
  - January 1, 2016, through January 1, 2025.
  - Based on sector and end-use.
- In the absence of federal action, state efforts are underway to support industry progress and prevent increasing HFC emissions in the U.S.
- Industry and environmental groups have been supportive of state efforts to provide HFC phasedown requirements.

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Governor Wolf's Executive Order

- On January 8, 2019, Governor Wolf issued Executive Order 2019-1, "Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance."

- Reducing HFCs is a recommended strategy for reducing GHG emissions in the 2018 PA Climate Action Plan.

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Air Pollution Control Act

- Section 5(a)(l) of the Air Pollution Control Act (35 P.S. § 4005(a)(l)).
- Provides statutory authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth.

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U.S. Climate Alliance (USCA)

- April 29, 2019 – Governor Wolf joined the USCA.
- The USCA is a bipartisan coalition of 25 governors committed to reducing GHG emissions.
- Basic mission of the USCA is to meet the goals of the Paris Climate Agreement.
- Nearby states that are USCA members include MD, NJ, NY, and DE.

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USCA Model Rule

- The USCA developed a model rule to support development of state requirements to implement the HFC phasedown to replace the EPA SNAP HFC prohibitions.
- Pennsylvania is working with other USCA states to develop consistent HFC requirements based on the USCA model rule.
- Industry feedback on other state proposals has emphasized the importance of consistency in state requirements.

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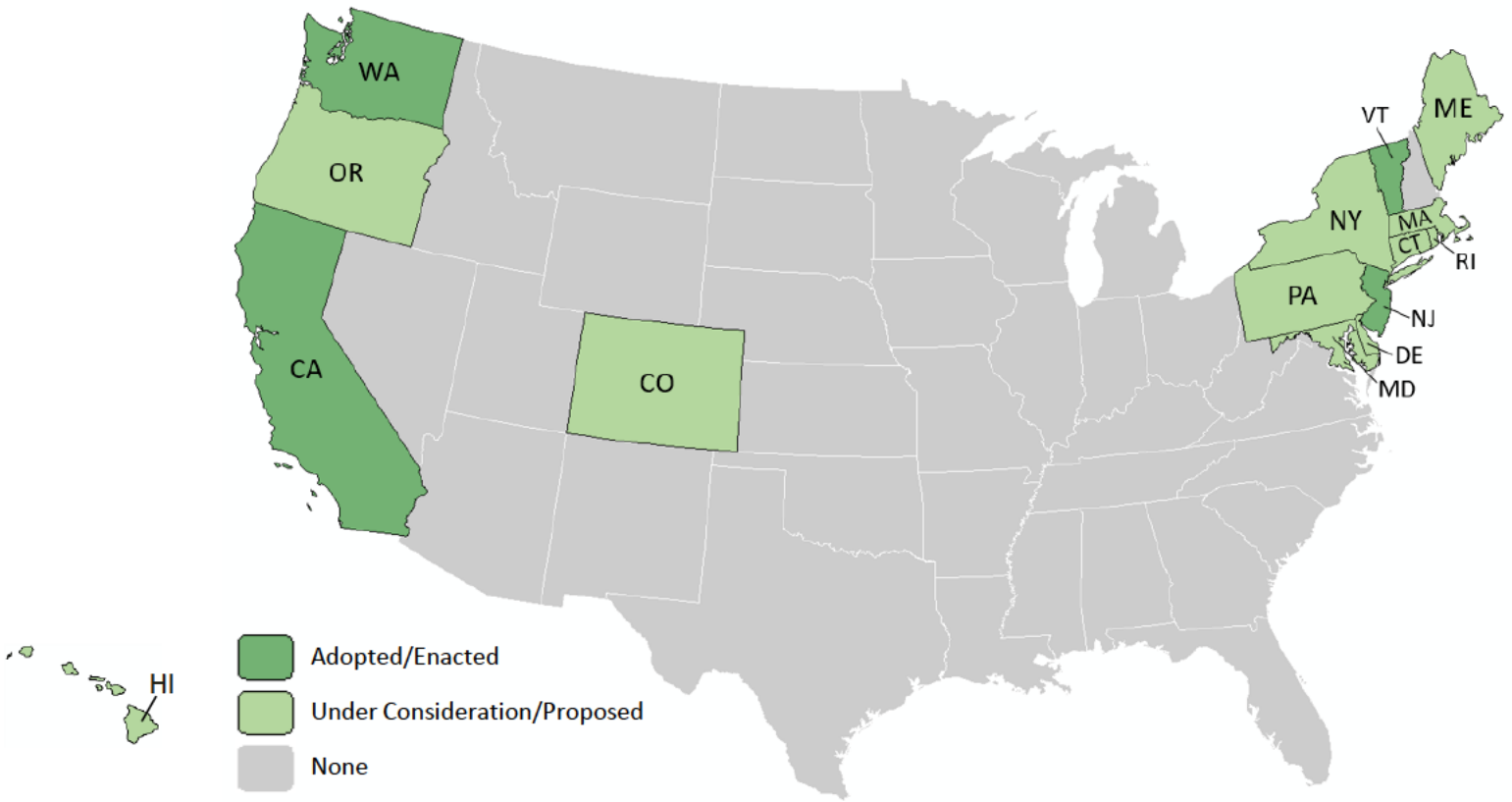
State HFC Initiatives



- Pennsylvania joins 14 other states in developing regulations and/or legislation to phase down HFCs, including most states in the Northeast and Mid-Atlantic.

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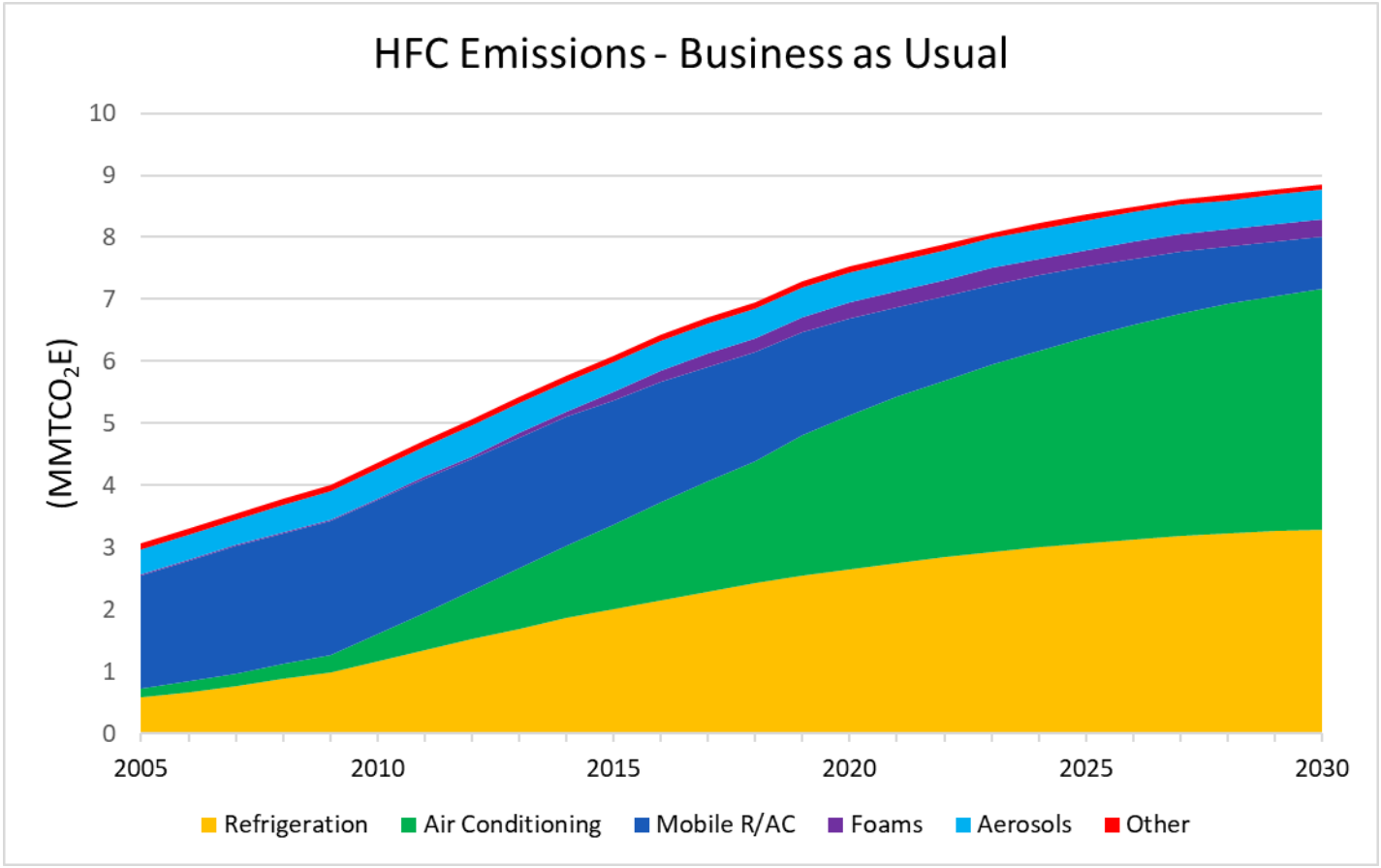
Pennsylvania Projected HFC Emissions



Source: Inventory trend and projection generated using the USCA HFC Inventory Tool

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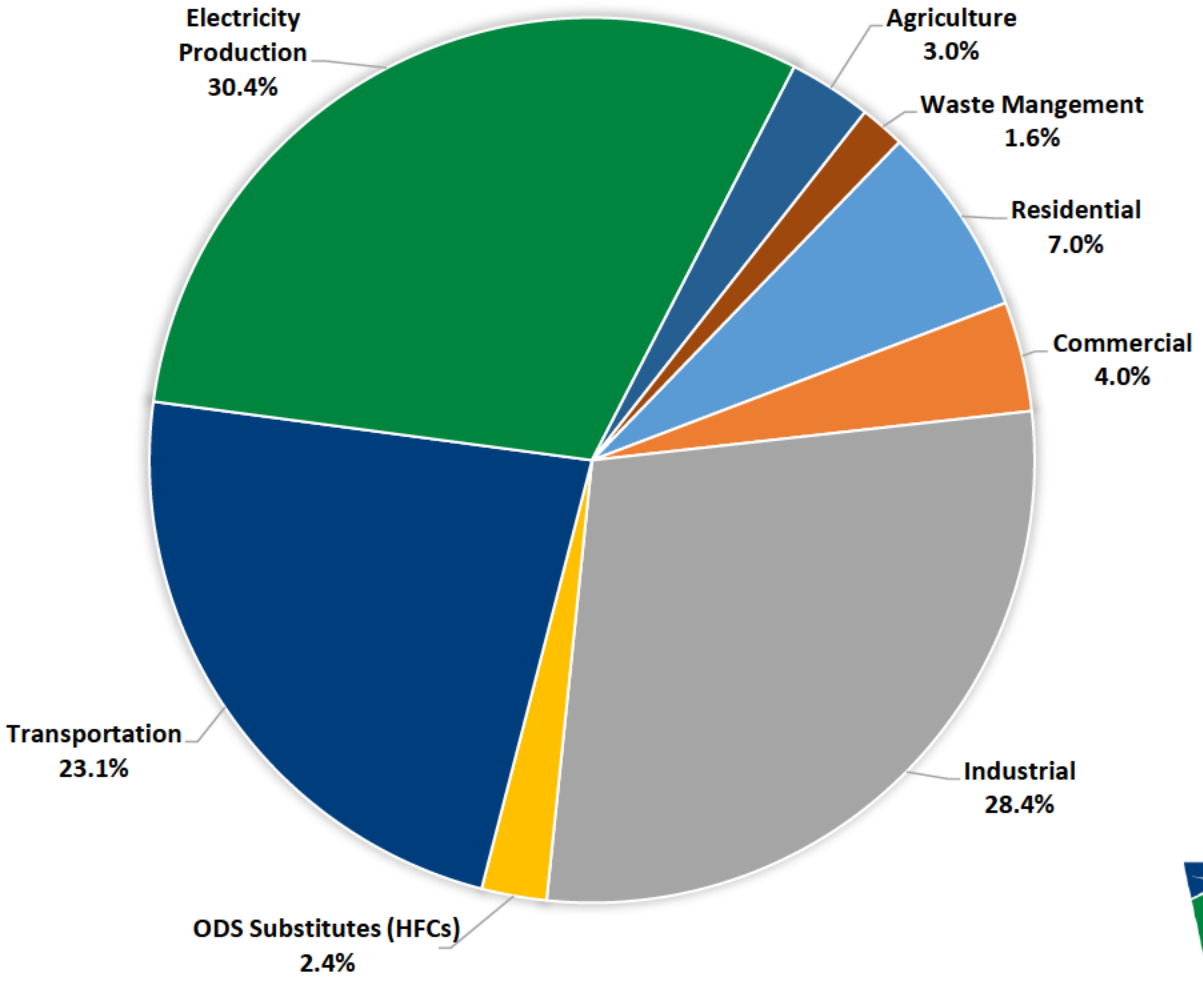
Pennsylvania GHG Breakdown by Sector



Total Pennsylvania GHG Emissions (2016):
264.4 MMTCO$_2$E

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Source: 2019 Pennsylvania Greenhouse Gas Inventory Report
https://www.dep.pa.gov/citizens/climate/Pages/GHG-Inventory.aspx

USCA Model Rule

End-Use Sectors Addressed by the USCA Model Rule:

- Aerosol Propellants
- Air Conditioning
- Refrigeration
- Foams

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Anticipated Timeline

- April 2020 – Regulatory concepts presented to advisory committees.
- Fall 2020 – Present draft proposed rulemaking Annex A to advisory committees.
- Winter 2021 – Present draft proposed rulemaking to Environmental Quality Board for consideration.

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