ET Summit 2024

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Natural Refrigerant Research at EPRI

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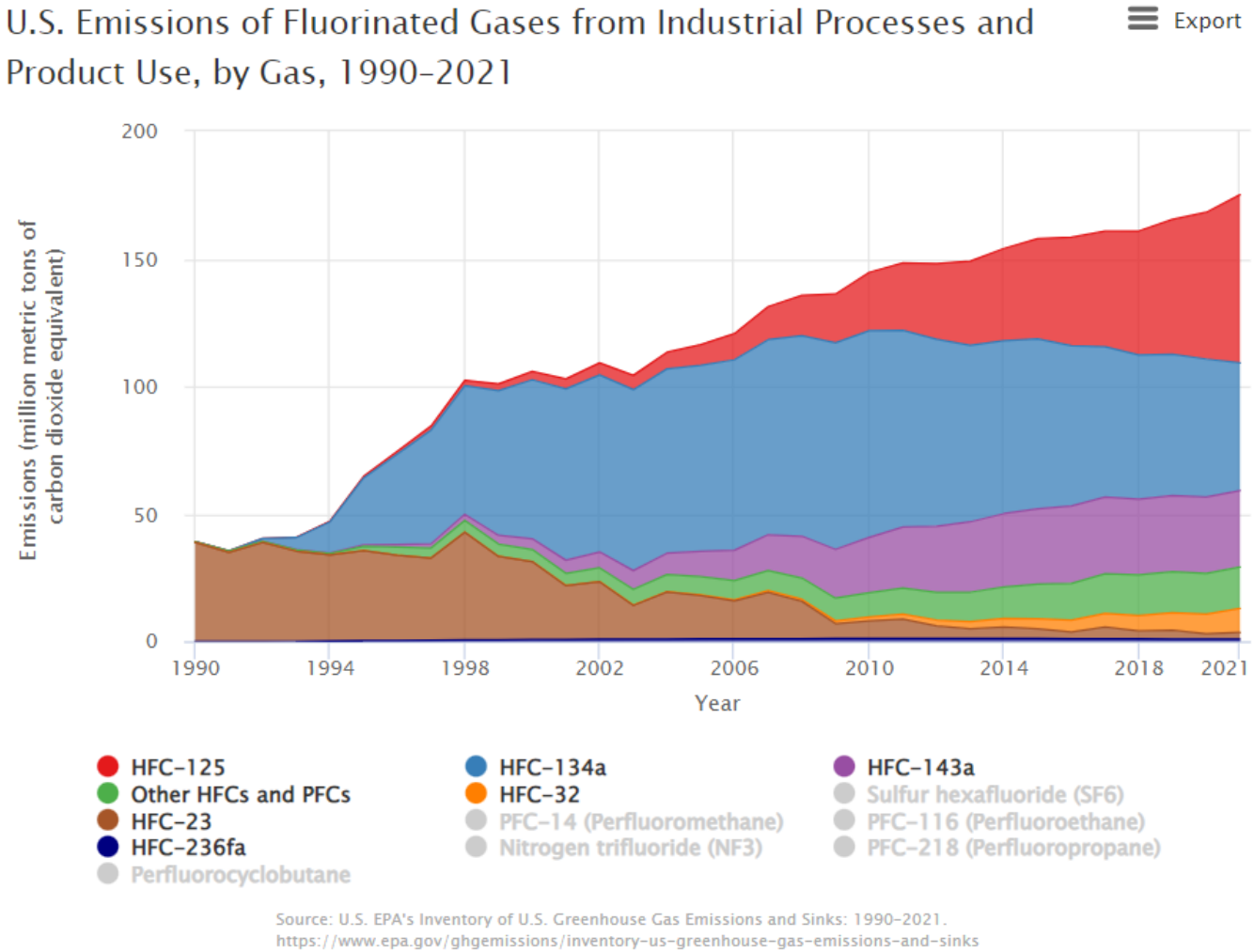
Utility Focus on Refrigerants

- Addressing refrigerant GWP is critical in reaching utilities' carbon-reduction targets and state-level requirements

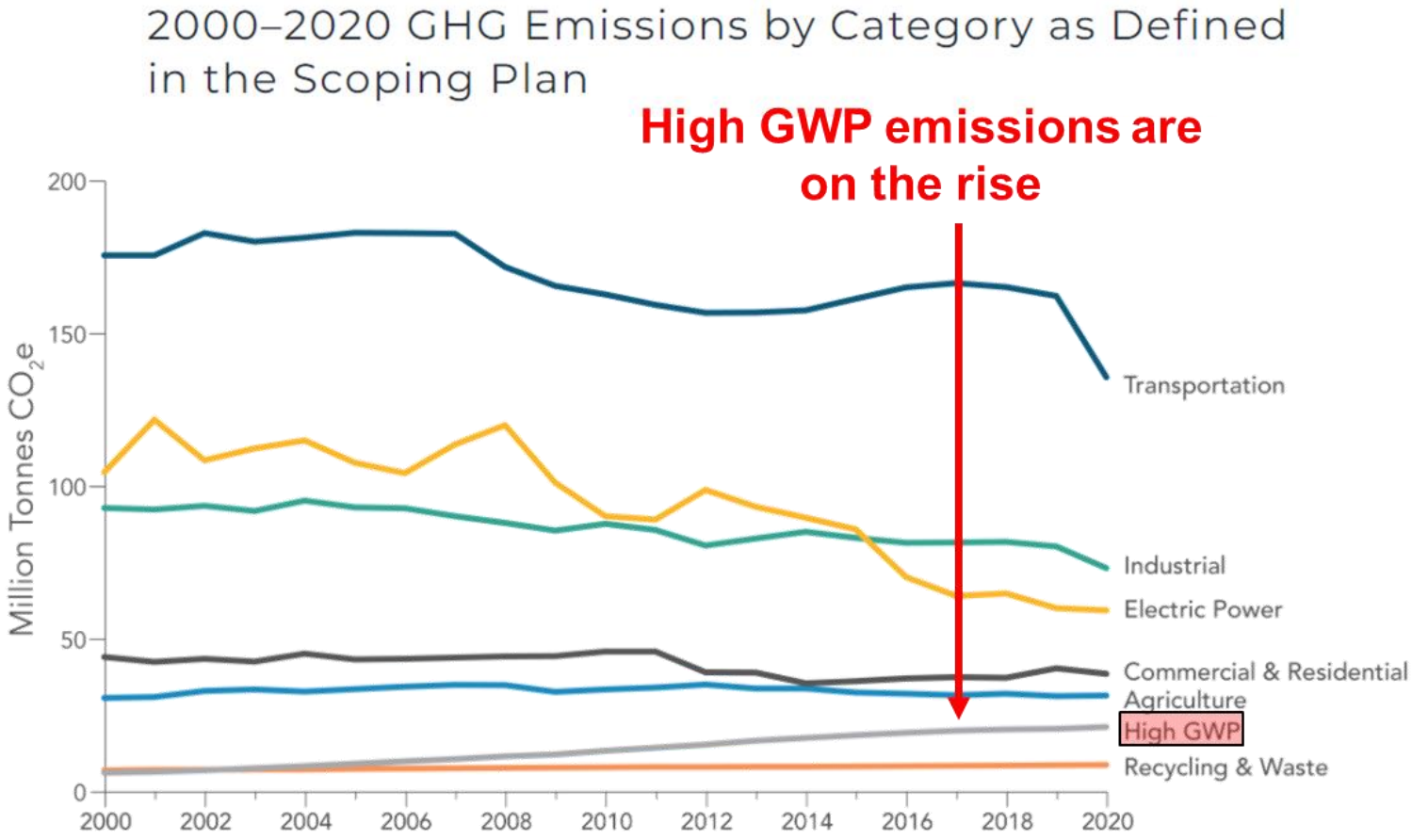
- Federal (e.g. AIM Act) and state level regulations gradually reduces reliance on high GWP refrigerants but may not be sufficient.



Utility Focus on Refrigerants

- Energy efficient ultra-low GWP and natural refrigerant technologies must also be considered to fully meet emissions targets

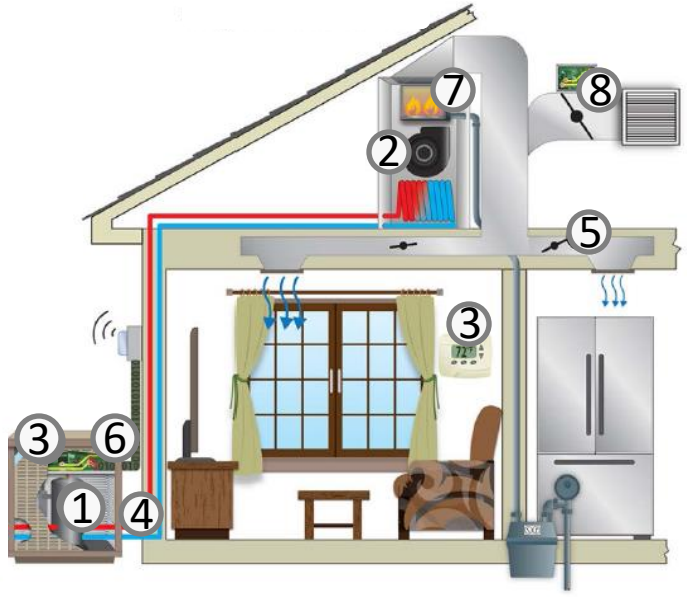
- Europe and Asia have already embraced natural refrigerants and the U.S. may follow down a similar path to achieve decarbonization goals



Source: CARB GHG Emission Inventory Graphs

EPRI natural refrigerant projects

- R-32 residential heat pump laboratory and field evaluation
  - **Status:** Complete (2015-2021)
  - **Funder:** California Energy Commission, EPRI
  - **Objective:** Develop a residential HVAC System that integrates several energy-efficient technologies for California consumers, including alternative refrigerant (R-32) and variable speed compressor



- R-717 chiller field evaluation
  - **Status:** Complete (2017-2022)
  - **Funder:** California Energy Commission, EPRI
  - **Objective:** Pilot test an energy and water saving, natural refrigerant based process cooling system, offering over 20% improved energy efficiency compared to HFC-based cooling system in a food processing industrial application

EPRI natural refrigerant projects

- R-717 (ammonia) chiller with CO_2 distribution loop laboratory evaluation
  - **Status:** Complete (2017-2019)
  - **Funder:** Southern California Edison
  - **Objective:** Evaluate a first-of-its-kind, natural refrigerant based HVAC system, and investigate alternative refrigerants to enable utilities to understand the effects of alternative refrigerants on energy efficiency and demand

EPRI natural refrigerant projects

- R-717 heat pump with CO_2 distribution loop
  - **Status:** Ongoing (2020-)
  - **Funder:** California Energy Commission, Southern California Edison, San Diego Gas & Electric, Southern Company
  - **Primary Objective:** Develop, test, and demonstrate an advanced HVAC system for multi-family (MF) or small commercial (SMC) applications with R-717 as the primary refrigerant and CO2 is as a distribution fluid.

EPRI natural refrigerant projects

- R-290 heat pump with CO_2 distribution loop
  - **Status:** Ongoing (2024-)
  - **Funder:** California Energy Commission, Southern California Edison
  - **Primary Objective:** Develop, test, and demonstrate a natural refrigerants based high performance heat pump system for commercial applications with propane (R-290) as the primary refrigerant and carbon dioxide (CO2 / R-744) as a distribution fluid.

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