

FACT-CHECKING ATMOSPHERE REPORT

ATMOsphere recently released a report that included misinformation and misleading statements related to our HFO portfolio. Below are just a few of the inaccurate statements backed by the facts about our portfolio.

MYTH:	“HFO-1234yf is considered a PFAS (forever chemical) by the Organisation for Economic Cooperation and Development (OECD),” and “(TFA) is also a PFAS, according to the OECD.”
FACT:	OECD also says: “The term ‘PFAS’ is a broad, general, non-specific term, which does not inform whether a compound is harmful or not, but only communicates that the compounds under this term share the same trait for having a fully fluorinated methyl or methylene carbon moiety.”

HFOs HAVE A PROVEN TRACK RECORD OF BEING:

- **Safe:** HFOs are safe for human health and the environment throughout their life cycle. They are not persistent, bioaccumulative or toxic. They are a class of materials with low global warming potential and provide life-cycle sustainability benefits that support U.S. climate ambitions.
- **Essential for society:** HFOs are essential for everyday applications such as refrigeration, air conditioning, building insulation, personal and household care, aerosols and solvents.
- **Already regulated:** The U.S. EPA has listed many HFOs and HFCs as acceptable for use after an extensive review of the literature surrounding human and environmental effects.



MYTH:	“Even the chemical industry acknowledges the potential for harm by TFA after 2040.”
FACT:	The UNEP states in the 2016 EEAP report, “Using data from worst-case measured concentrations as well as those based on extrapolations to 2050 of inputs from sources of TFA regulated and monitored under the Montreal Protocol, it was found that TFA is not expected to exceed these toxicity values. The conclusion is that the current and estimated concentrations of TFA and its salts the environment that result from the degradation of HCFCs, HFCs and HFOs in the atmosphere do not present a risk to humans and the environment.” ¹

MYTH:	“Natural refrigerants are considered future-proof because they exist in the environment and pose no threat to it.”
FACT:	<p>CO₂ is a global warming gas with a GWP of 1, similar to most HFOs. Hydrocarbons, which are volatile organic compounds (VOCs), are well known to cause photochemical smog. Ammonia is well known to be highly toxic. According to the ECHA substance infocard on ammonia, “According to the harmonized classification and labeling (CLP00) approved by the European Union, this substance causes severe skin burns and eye damage, is toxic if inhaled, is very toxic to aquatic life and is a flammable gas.”²</p> <p>Ammonia also has a host of environmental issues, including the destruction of biodiversity and contribution to particulate pollution. According to a paper by the Royal Society, “Ammonia itself and the nitrogen deposition resulting from ammonia emissions negatively affect biodiversity. Ammonia is one of the main sources of nitrogen pollution, alongside nitrogen oxides. A major effect of ammonia pollution on biodiversity is the impact of nitrogen accumulation on plant species diversity and composition within affected habitats.” This paper also notes, “In the atmosphere, ammonia can bind to other gases, such as sulphur dioxide (SO₂) and nitrogen dioxide (NO_x), to form ammonium containing fine particulate matter (PM). This fine PM causes health impacts when inhaled. Particulate matter has particularly negative impacts on cardiovascular and respiratory health, contributing to various chronic conditions such as heart attacks, cerebrovascular disease, chronic obstructive pulmonary disease (COPD), asthma and lung cancer.”³</p>

MYTH:	“It is known that halogen molecules influence the thyroid function. Therefore, HFO and TFA might also have the possibility to cause hypothyroidism and other consequences such as the brain development of children due to iodine deficiency during pregnancy.”
FACT:	<p>There is no evidence showing TFAs or HFOs would have a mode of action that would cause thyroid hormone fluctuation in either experimental animals or humans. Evidence via animal Repro-developmental toxicity study in animals (ECHA dossier on TFA) concluded no adverse effects on the thyroid.⁴</p> <p>A one-year study performed with TFA in animals showed changes in liver enzymes only at very high concentrations (120 ppm). It is not unusual for any molecule to have some effect on experimental animals at such high concentrations. For example, even common table salt would be toxic at high consumption. It is unfair and entirely biased to single out TFA without taking into consideration exposure levels and risks thereof. UBA reviewed the toxicological information, conducted a human health risk assessment and recommended the TFA target value of 10 µg/L (10 ppb) for drinking water. Based on this health hazard threshold, TFA levels do not pose any health risk at current or projected environmental levels.</p> <p>The statement about the brain development of children due to iodine deficiency is related to free fluorine or fluorides in the body. In addition to experimental evidence, TFA is known to be stable in the human body and is also rapidly excreted in unchanged form. There are no free fluorine or fluorides produced, which means that TFA cannot be part of any mechanism that involves free fluorine or fluoride in the human body.⁵</p>

1. <https://ozone.unep.org/sites/default/files/2019-08/TFA2016.pdf>

2. <https://ozone.unep.org/sites/default/files/2019-08/TFA2016.pdf>

3. <https://royalsociety.org/~media/policy/projects/evidence-synthesis/Ammonia/Ammonia-report.pdf>

4. <https://echa.europa.eu/registration-dossier/-/registered-dossier/5203/7/9/2>

5. <https://echa.europa.eu/registration-dossier/-/registered-dossier/5203/7/9/2>

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