FACTSHEET

TFA Concentrations in Austrian Groundwater More Than Doubled in Five Years

Analysis of official monitoring data from Austria's Ministry of Agriculture (BMLUK), 2018/19–2024

The finding

Austrian groundwater data disclosed by the Ministry of Agriculture (BMLUK), which is responsible for water protection, following an environmental information request by GLOBAL 2000 show a steep rise in levels of the forever chemical TFA (trifluoroacetic acid).

At all 16 monitoring sites with results from both 2018/2019 and 2024, TFA concentrations increased. On average, they **more than doubled over about five years**, from 1.36 to 2.86 µg/L (+110%; see Figure 1, left). Not a single site showed stable or decreasing concentrations. The largest increase at an individual site was +318%. The mean across all sites sampled in 2024, 2.42 µg/L, exceeds the Dutch drinking-water guideline value of 2.2 µg/L — the same value that BMLUK applied when assessing this campaign. Because TFA is extremely persistent and emissions are continuing, groundwater concentrations are expected to rise further.

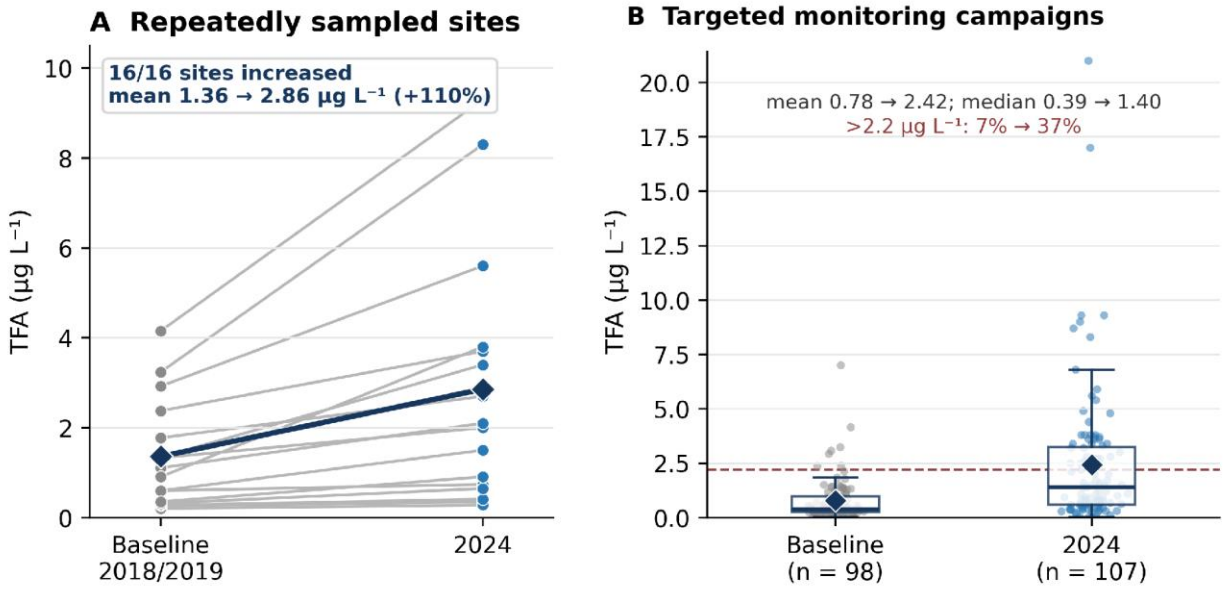

Figure 1. Left: direct site-by-site comparisons. Right: all sites from the two monitoring campaigns described by BMLUK as targeted ("belastungsorientiert"). Mean and median increased from 0.78 to 2.42 and from 0.39 to 1.40 µg/L, respectively. Because this comparison mostly involves different, targeted monitoring sites, this second finding provides supporting evidence and should not be interpreted as a representative trend for Austria. Red dashed line: RIVM drinking-water guideline value of 2.2 µg/L (a health-based value, not a statutory limit).

The comparison of the two complete monitoring campaigns, each with around 100 sites, also shows a clear shift towards higher concentrations (Figure 1, right). According to BMLUK, both campaigns used targeted site selection: locations were deliberately sampled where contamination was expected, rather than a representative cross-section of Austrian groundwater. In addition, the two campaigns covered mostly different sites. This comparison should therefore be read as an indication of a broader shift; the robust evidence for the increase over time comes from the 16 sites sampled in both surveys, spread across eight of Austria's nine federal states (details in the preprint, to be published on 15 September).

A clear agricultural signal

Where TFA concentrations were high, elevated nitrate and pesticide levels were also found (Figures 2A and 2B). By contrast, TFA shows no such relationship with the sum of the 27 other PFAS (Figure 2C). TFA therefore does not simply follow the pattern of other PFAS, but shows a clearly different pattern that points to a substantial agricultural contribution — without excluding other TFA sources and without allowing individual monitoring sites to be attributed to a specific source.

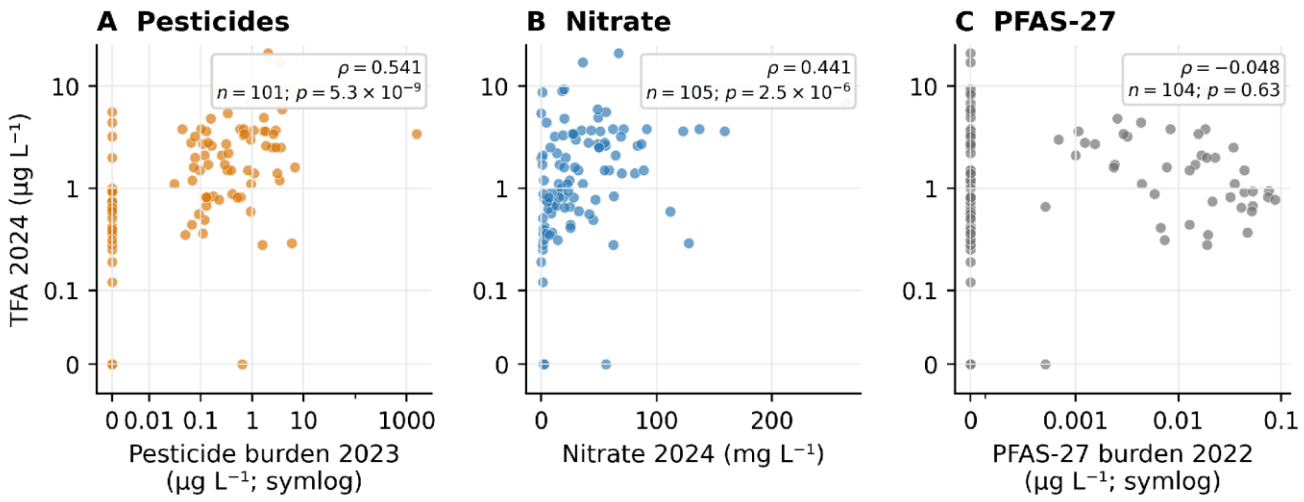

Figure 2. TFA in 2024 in relation to pesticide burden, nitrate and PFAS-27. Statistical details and robustness analyses: see preprint

The scale of TFA contamination is also exceptional: At the 104 monitoring sites with data on both parameters, the mean TFA concentration was **about 264 times as high as the mean PFAS-27 sum**.

The key findings remain invisible in the official water quality report

The first TFA monitoring campaign (2018/2019) was already documented in the official BMLUK Water Quality Report 2018–2020. The current campaign is detailed in the recently published Water Quality Report 2022–2024. The report uses the RIVM drinking-water guideline value of 2.2 µg/L, but makes no reference to the earlier investigation. As a result, the direct comparison and the steep increase remain invisible. The report also does not link the TFA data with the nitrate and pesticide records from the same sites — leaving the agricultural signal invisible as well.

The report therefore omits precisely the two findings that are linked to obligations to act under EU groundwater and pesticide law, both falling within the direct responsibility of the Ministry of Agriculture[1].

1. **the rapid increase**: The EU Groundwater Directive requires Member States to identify significant and sustained upward trends in pollutant concentrations and, where necessary, take measures to reverse them.
2. **the agricultural contribution**: Pesticides whose toxicologically relevant breakdown products can contaminate groundwater above 0.1 µg/L must be reviewed under EU pesticide law; if the review confirms that the authorisation requirements are no longer met, the authorisation must be amended or withdrawn.

The finding fits a long-term international trend

Repeated sampling of the same groundwater monitoring sites is rare; as a result, little is currently known about how quickly TFA contamination in groundwater is increasing. By contrast, the fact that environmental TFA contamination has been rising over decades is well documented in long-term archives — including ice cores, archived leaf samples, surface waters and wine.

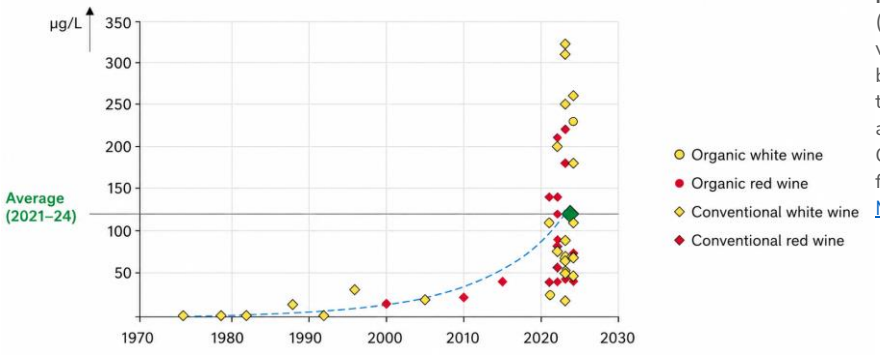

Figure 3. TFA in old and current Austrian wines (GLOBAL 2000/PAN Europe, 2025). Archived vintage wines serve as environmental archives because of their long shelf life. The underlying long-term trend was independently confirmed in 2025 in a peer-reviewed 78-year time series from Baden, Germany; the study also analysed current wines from 20 countries on five continents (Freeling and Mira de Orduña Heidinger, 2025).

[1] Further details are available in the legal opinion commissioned by GLOBAL 2000 from European law expert Peter Hilpold.

The Austrian data cannot tell us whether TFA in groundwater is developing similarly in other EU Member States. They do, however, suggest that existing monitoring series in other countries should be examined for comparable trends.

Why scientists warn against further delay

> ***"Due to TFA's extreme persistence and ongoing emissions, concentrations are increasing irreversibly. [...] The rational response to this is to instigate binding actions to reduce the emissions of TFA and its many precursors."***

Arp, Gredelj, Glüge, Scheringer and Cousins in Environmental Science & Technology, 2024

TFA at a glance

- **Extremely persistent and mobile:** TFA is the smallest and most mobile PFAS. It is formed through the breakdown of fluorinated pesticides, refrigerants, pharmaceuticals and industrial chemicals, or is released directly. TFA has been detected in a wide range of environmental media at concentrations that exceed those of other PFAS by orders of magnitude.
- **Hard to remove from water:** Conventional drinking-water treatment removes very little TFA. As long as emissions continue, it keeps accumulating in the water cycle.
- **Toxicological assessment has become more stringent:** Recent toxicological studies have strengthened the evidence for developmental and reproductive toxicity and additionally provide indications of disturbances of thyroid hormone homeostasis and immune function. In June 2026, ECHA's Committee for Risk Assessment (RAC) recommended that TFA be classified as toxic for reproduction (Category 1B) and as PMT and vPvM. In July 2026, EFSA lowered the acceptable daily intake (ADI) from 0.05 to 0.014 mg/kg body weight/day. As acknowledged by EFSA, the available evidence is still associated with considerable uncertainty.

Next steps

The scientific preprint was prepared jointly by Helmut Burtscher-Schaden, Thilo Hofmann, Angeliki Lyssimachou, Mattias Öberg and Hans Peter H. Arp. The findings are presented on 15 September 2026. Methodological details, statistical analyses, sensitivity analyses and references are documented in the preprint and in the Supporting Information. The underlying analysis dataset and the analysis code are also being made publicly available.

Scientific basis and sources

Preprint: to be published in ChemRxiv by 15 September 2026, [insert link]: methods, statistics, sensitivity analyses and references
Data and analysis code: [Zenodo link]
Legal opinion: [link]
BMLUK, Water Quality in Austria 2022–2024, Vienna 2026 [link]
BMLUK, Water Quality in Austria 2018–2020, Vienna 2023 [link]

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