

# Biomonitoring research results

**Czech Republic | Lithuania | Spain | 2021**

## Executive Summary



Thanks to Zero Waste Europe for making it possible to perform this toxicology research on persistent organic pollutants (POPs) in the Czech Republic, Lithuania, and Spain.

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**HARLINGEN, THE NETHERLANDS, TOXICOWATCH FOUNDATION, December 2021**

**PUBLICATION NUMBER: 2021-P01**

**CLIENT: Zero Waste Europe**

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Zero Waste Europe gratefully acknowledges financial assistance from the European Union and The Robert H.N. Ho Family Foundation Limited. The sole responsibility for the content of this event materials lies with Zero Waste Europe. It does not necessarily reflect the opinion of the funders mentioned above. The funders cannot be held responsible for any use that may be made of the information contained therein.

## In Europe, waste incinerators are often promoted as a safe way to dispose of our waste, both for human health and the environment. But is it really so?

### The toxic toll of waste incineration

**The truth is that the complexity of the chemical content of today's household and industrial waste presents a challenge to eliminate the multitude of persistent organic pollutants (POPs) in waste incinerator residues and flue gases.**

Moreover, there are still loopholes in the regulation of emissions of pollutants by incineration, resulting in an underestimated registration of persistent organic pollutants. Mandatory measurements for waste incineration relating to toxic pollutants is limited, and their measurement is not representative of real emissions. These regulations are based on chemical analyses of only a few chlorinated dioxins and furans, while many other POPs remain outside the scope, such as brominated dioxins and PFAS. The limitations of the chemical analysis could be overcome with the application of bioassays.

**Persistent organic pollutants (POPs)**, sometimes known as "forever chemicals", are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes. They are toxic chemicals that adversely affect human health and the environment around the world.

There is a growing public awareness and concerns over the potentially toxic effects of persistent organic pollutants on human health and the environment. In particular, people living near waste incinerators need to be reassured about their health risks, the safety of such combustion facilities, and compliance with regulations - not only under normal operating conditions, but also in other than normal operating conditions, such as start-ups, shut-downs, and periods of abnormal operation.

### The biomonitoring project

To assess the real impact of waste incineration on human health and the environment, this research looked to analyse the presence of POPs in biomatrices in the surroundings of incinerators by using bioassays. This biomonitoring research focused on POPs like Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans (PCDD/F and PXDD/F); Polycyclic aromatic Hydrocarbon (PAH); and Per- and PolyFluoroAlkyl Substances (PFAS).

A **bioassay** is an analytical method to determine the concentration or potency of a substance by its effect on living animals or plants or on living cells or tissues.

The research was based on a careful sampling of biomarker samples in an area. The biomatrices for this study were primarily eggs of backyard chicken eggs, pine needles, and mosses.

This study is part of a Europe-wide biomonitoring research project on POP emissions in possible relation to waste (WtE) incineration. The project is running simultaneously in 2021 and 2022 in three countries: Lithuania, Spain, and the Czech Republic. ToxicoWatch Foundation, based in the Netherlands, is participating as a scientific partner together with three environmental organizations, Ecologists in Action Spain, in Žiedinė Ekonomik Lithuania, and Hnutí DUHA in the Czech Republic, all coordinated by Zero Waste Europe.

## Research Findings

The research analysis around three waste incinerators shows an environment under threat by contamination of substances of very high concern in eggs of backyard chicken, pine needles, and mosses. The key findings are summarised in the table below.

**Table 1 - Biomonitoring research findings for waste incineration emissions in the Czech Republic, Lithuanian and Spain**

Kaunas (Lithuania)	Pilsen (Czech Republic)	Valdemingomez (Spain)
<p>83% of the sampled eggs exceed the EU action limits for food safety.</p> <p>33% of sampled eggs exceed the EU action limit for Dioxin-Like Polychlorinated Biphenyls (dl-PCB).</p> <p>Since those eggs are produced for consumption, there is a significant health risk.</p>	<p>89% of the sampled eggs do not comply with the EU limit for dioxins in eggs.</p> <p>50% of eggs sampled do not comply with the EU limits for safe food consumption.</p> <p>75% of eggs exceed the EU action limit for dl-PCB and 38% for PCDD/F.</p> <p>High levels of PFAS in eggs.</p>	<p>Eggs do not comply with the EU limits for dioxins and dioxin-like PCB for safe egg consumption.</p> <p>Since private consumption of backyard chicken eggs could be high, this poses a serious health risk.</p>
<p>75% of pine needles have elevated dioxin (PCDD/F) levels in comparison with the reference source.</p>	<p>High elevation of dioxins in pine needles compared to the reference source (3x).</p>	<p>High levels of dioxins (PCDD/ found in pine needles (75x) in comparison with the reference source.</p>

	Very high elevation of PAH in pine needles (87x) in comparison to the reference source.	There are remarkably high levels of PFAS contamination in the Aleppo pine needles (10x) in comparison with the reference source.
High levels of dioxins in mosses. High levels of PAH in mosses. High levels of Benzo[a]Pyrene in mosses.	High elevation of dioxins in mosses (7x) compared to the reference source. High levels of PFAS in mosses.	The results of the dioxin analyses in the mosses show strongly elevated dioxins (20x) and dl-PCB (50x) in comparison with the reference source.

**The analysis of chicken eggs around incinerators shows that the majority of eggs exceed the EU action limits for food safety as regulated in the [EU Regulation 2017/644](#).** The EU regulations urge for action on these sampled egg locations to find out the source of POP contamination, in order to eliminate or - at least - do the utmost to reduce dioxins (PCDD/F) to minimum levels. Moreover, a high percentage of eggs exceed the safe level for consumption. If these eggs were intended for the commercial market, they should have been withdrawn from the market.

**The results of the analysis of the vegetation, pine needles and mosses also show high elevation of dioxin levels in the vicinity of the waste incinerators.** Although there is no legal obligation to take action, it's a sign of pollution. Moreover, people living in the vicinity of incinerators could be under threat if they grow vegetables for consumption.

**This biomonitoring research gives a warning sign for contamination of the environment with toxic substances such as dioxins (PCDD/F), dioxin-like PCBs, PAHs and PFAS.**

## Zero Waste Europe's recommendations

Based on the findings of this biomonitoring research, Zero Waste Europe recommends to:

- **Make biomonitoring research mandatory** for all existing incineration projects across Europe - communities living near waste incinerators need to be reassured about the health and safety risks of all operation stages of an incinerator.
- **Mandate continuous measurements of chlorinated and brominated dioxins**, including under "other than normal operating conditions" such as start-ups, shut-downs, and technical accidents.
- **Put a moratorium on new waste incineration projects** and develop phase-out plans for the existing ones.
- **Promote and fund circular, healthy, sustainable alternatives to waste incineration.**



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