

Technical Annex – Control at source of pollution

Water UK asked us to compile evidence related to costs, impacts and benefits of the current ‘end of pipe’ treatment approach and alternative source control (or ‘upstream’) options for reducing harm from selected pollutants. This technical annex explains our methodology. It also explains the cost, impact and benefit calculations for mercury and PFAS referenced by Water UK in ‘*A Reset for Water: Water UK’s response to the Independent Water Commission’s Call for Evidence*’.

Methodology

Central to our methodology was a literature review to address the questions set out. This review was primarily focused on publicly available data from sources including academia, industry, non-governmental organisations (NGOs) and government. We also took into consideration insights from research or projects undertaken directly by Water UK and WSP.

Where possible, our focus was on literature that was specific to the UK context, however, we have also considered literature that addresses other jurisdictions, notably the European Union (EU), for two reasons:

- To fill data gaps where information specific to the UK was not readily available, EU providing comparable demography, industrial and chemical legislations; and,
- To provide additional context where other jurisdictions have made more progress either in the investigation or implementation of interventions that are relevant to our scope, and, as such, signpost action that may be appropriate in the UK and provide supporting evidence.

We identified relevant literature through a combination of methods:

- Sources used by Water UK and/or WSP for previous relevant work;
- Keyword searches using internet search engines and publicly available databases, such as ResearchGate;
- Citations in relevant policy documents and/or the research that underpins these.
- All sources considered are listed in this annex.

We undertook a synthesis and a cross-check of the available literature to validate findings and improve confidence levels. Our team combined knowledge of policy development, economic evaluation and the relevant technical subject matters to ensure that our findings could be interpreted and synthesised accurately and effectively.

Limitations

The lack of comprehensive sources on this emerging topic has created some limitations:

- Data gaps exist; this may reflect the immaturity or research in some areas, and also time constraints of the exercise;
- Cost and benefit data is limited for some areas and/or may not relate directly to the UK market.

Calculations related to Mercury

Health benefits from reducing air emissions of mercury from crematoria (by removing mercury from dental amalgam) could equate to £1.2m:

Data from the UK-PRTR for 2023¹ shows that the water industry is releasing 95kg/year mercury; 85% of this is estimated to come from dental amalgam; the European Commission's impact assessment² calculates that abating 54kg of mercury associated with a dental amalgam phase-out would deliver human health benefits of €900,000; exchange rate at date of publication [23/04/25] applied:

$$95\text{kg} \times 85\% \times (\text{€}900,000 / 54\text{kg}) \times 0.86 = \text{€}1,154,321$$

Evidence shows that the number of companies producing amalgam is already reducing and will continue to do so; we consider that this will impact availability and price.³

Good chemical status of water bodies will not be reached before 2063; this is a modelling prediction by the Environment Agency on how long it will take for the levels to dissipate under the exemption.⁴

Calculation related to PFAS

Health benefits from abating PFAS could equate to £6.7-10.9bn/year:

Estimate based on avoided health costs from EEA⁵ and Nordic Council of Ministers 2019 studies⁶, and pro-rated for UK population (68.3m, vs. EEA population of 453m). The split of high / medium / low exposure level was kept identical as comparable to UK ; exchange rate at date of publication [23/04/25] applied.

$$\text{€}52\text{bn} \times (68.3 / 453) \times 0.86 = \text{€}6.74\text{bn}, \text{€}84\text{bn} \times (68.3 / 453) \times 0.86 = \text{€}10.89\text{bn}$$

The studies⁷ considered only health endpoints for which there was consensus in the science on being affected by exposure to PFAS, this included: liver damage, increased serum cholesterol levels (related to hypertension), decreased immune response (higher risk of infection), increased risk of thyroid disease, decreased fertility, pregnancy-induced hypertension, pre-eclampsia, lower birth weight, and testicular and kidney cancer.

¹ Defra, UK Pollutant Release and Transfer Register (PRTR) data sets

² European Commission, July 2023, Impact Assessment accompanying the proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2017/852 of the European Parliament and of the Council of 17 May 2017 on mercury as regards dental amalgam and other mercury-added products subject to manufacturing, import and export restrictions

³ Dentistry, January 2025, Dental amalgam – everything you need to know about its use and ban

⁴ Defra, December 2022, Coverage on water targets and River Basin Management Plans

⁵ European Environment Agency, December 2019, Emerging chemical risks in Europe — 'PFAS',

⁶ Nordic Council of Ministers, 2019, The Cost of Inaction – A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS

⁷ Nordic Council of Ministers, 2019, The Cost of Inaction – A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS

Exposure level	"Exposed" population and source	Health endpoint	Nordic countries		All EEA countries	
			Population at risk	Annual costs	Population at risk	Annual costs
Occupational (high)	Workers at chemical production plants or manufacturing sites	Kidney cancer	n.a.	n.a.	84,000–273,000	EUR 12.7–41.4 million
Elevated (medium)	Communities near chemical plants, etc. with PFAS in drinking water	All-cause mortality	621,000	EUR 2.1– 2.4 billion	12.5 million	EUR 41–49 billion
		Low birth weight	8,843 births	136 births of low weight	156,344 births	3,354 births of low weight
		Infection	45,000 children	84,000 additional days of fever	785,000 children	1,500,000 additional days of fever
Background (low)	Adults in general population (exposed via consumer products, background levels)	Hypertension	10.3 million	EUR 0.7– 2.2 billion	207.8 million	EUR 10.7–35 billion
<i>Totals</i>			<i>Nordic countries</i>	<i>EUR 2.8–4.6 billion</i>	<i>All EEA countries</i>	<i>EUR 52–84 billion</i>

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