

## THE CLEAR WATERS FROM PHARMACEUTICALS (CWPHARMA) PROJECT POLITICAL ACTION PLAN

This political action plan summary has been developed based on the findings of the three-year Clear Waters from Pharmaceuticals (CWPharma) project funded by the EU's Interreg Baltic Sea Region Programme. The aim of CWPharma was to provide tools and recommendations to policy makers, authorities and municipalities on methods for reducing active pharmaceutical ingredient (API) emissions in the Baltic Sea Region. The project focused on increasing the awareness of policy makers, regulators and permitting authorities to the environmental risks of APIs, investigating effects of various emission reduction approaches, and ultimately, proposing political actions for decreasing API emissions into the Baltic Sea Region environment.

CWPharma investigated API loading into the Baltic Sea from six river basin districts in collaboration with partners from seven countries in the Baltic Sea Region (BSR): Denmark, Estonia, Finland, Germany, Latvia, Poland and Sweden. Advanced wastewater treatment (AWT) options for API removal were tested at full and pilot scale. In addition to AWT, other API load reduction measures, such as the improved collection and disposal of unused pharmaceuticals and increased sewer network coverage, were analysed. The single and combined effects of these reduction measures were computationally modelled to visualize and assess the effects on API loads to the Baltic Sea. Even though AWT plays a crucial role, it was concluded that different types of measures must be taken to decrease the API load.

This summary highlights the most important political recommendations derived from the CWPharma project, organized into three action groups for targeted implementation. More detailed information can be found in the project reports available on the project website (<https://www.cwpharma.fi/en-US/Publications>).

### Awareness actions for avoiding API emissions to the environment

To decrease and ultimately avoid API discharges to the Baltic Sea, environmental awareness must be increased within the healthcare sector and amongst the general public. Therefore, all BSR countries should have a take-back system for unused human and veterinary medicines from households. The public, as well as doctors, pharmacists, veterinarians and farmers, should be educated on the negative effects of pharmaceuticals in the environment through national information campaigns. These should be conducted at least annually during the next five years, after which the effectiveness of the information campaigns should be re-evaluated. These topics should also be covered in the educational programs of these professions.

This also requires reducing emissions from sectors using APIs. Namely, large livestock farms, hospitals, medical clinics, elderly care homes and other healthcare institutions should be obliged by law to collect their pharmaceutical waste and send it directly to waste incineration facilities to avoid releasing emissions to the water cycle.

## Technical measures for minimizing API emissions to the environment

Municipal wastewater treatment plants (WWTP) are important point sources of APIs and API metabolites and play a key role in emission reduction strategies. Even though some APIs are already removed in existing conventional wastewater treatment, the remaining compounds still pose a significant risk to aquatic ecosystems, which need to be addressed by AWT.

However, numerous BSR countries are not yet compliant with the current European Union Urban Waste Water Treatment Directive (UWWTD). Therefore, the first step to reducing APIs in WWTP discharge is for all BSR countries to be compliant with both the current UWWTD (before 2022) and the revised UWWTD when it is published. In parallel, WWTPs larger than 250 000 PE should be equipped with the appropriate AWT technology for removing APIs and other environmentally hazardous products no later than between 2025–2030. WWTPs above 50 000 PE should implement AWT no later than between 2035–2040.

Additionally, all BSR countries should be encouraged to establish national knowledge platforms in order to share technical information on API removal and speed up implementation of WWTP and AWT upgrades. CWPharma reports provide guidance on the decision and implementation process for AWT at WWTPs.

## Actions for improving knowledge on emissions, environmental concentrations and ecotoxicity of APIs

As producers of APIs, pharmaceutical plants must also be considered in the process of reducing API emissions. Pharmaceutical plants should be required to obtain environmental permits that mandate the plants to estimate their API emissions and impacts on WWTPs and surface waters. When necessary, these requirements should be further supplemented with industrial wastewater contract requirements. APIs posing environmental risks should be included in regular environmental monitoring programmes managed by national or regional authorities to improve knowledge and management of risks. In case API concentrations in surface water bodies exceed toxicological risk thresholds, operators of wastewater treatment and pharmaceutical plants should be additionally required to monitor their emissions to enable appropriate political and technical actions to reduce emissions.

Finally, numerous actions can be taken to both broaden and deepen knowledge about APIs not yet analysed in prior and ongoing research projects, as well as the effects of APIs on the ecosystem. Future EU and national project funding should focus on a) the further development of analytical methods for API detection, especially for metabolites, hormones and antibiotics, prioritising those seldom analysed so far; b) more comprehensive screening and monitoring campaigns to produce a representative overview of API concentrations in the environment; and c) assessing the ecological risks of mixtures of API through more ecotoxicological data on single substances and on mixture toxicity.