

Assessment of the policy and legal framework related to the products obtained from brine valorization

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Introduction

Brines are wastewater streams containing dissolved salts combined with hardness ions, organic content, nutrients or other metals depending on the industry from which they are produced. Brines are produced mainly from food, oil and gas, tannery, textile, pulp and paper, mining industry and desalination plants [1]. These saline effluents, consist one of the largest portions of the wastewater from industrial processes. Until recent years, the most common discharge options were (i) direct discharge (ii) energy-intensive discharge, (iii) Evaporation-treated discharge, (iv) land application [2]. However, all these types of discharge have a strong environmental impact. An increase in salt concentration in the ocean or sea areas where brines are discharged leads to oxygen depletion and very important changes to benthic life. Salinization of rivers and lakes affects all the sectors depending on these waters, such as industry, agriculture, and farming, leading to the loss of millions of euros and flora and fauna degradation [3].

Recently, due to the rapid growth of industrial activities and the world population, a global challenge for water supply maintenance has emerged, which includes both water quantity and quality. Since available freshwater quantity is decreasing, the need to consider wastewater as a water source is growing. This growing need does not only involve water, but also many other resources, such as metals and salts. Thus, the transition to circular economic models seems to be a necessity for world sustainable development. Many issues arise from this transition. One critical is the legal framework for the market exploitation of the recovered products.

REACH

The market of chemicals in Europe is subjected to legislation to ensure their safe transportation, use, and disposal. REACH is the main regulation for the improvement of human health and environmental protection from risks caused by chemicals. Regulation 1907/2006 concerning Registration, Evaluation, Authorization and Restriction of Chemicals was proposed by European Chemicals Agency (ECHA) to improve the protection of human health and the environment from risks that can be caused by chemicals. REACH also enhances the competitiveness of the European Union chemicals industry.

According to REACH, each industry that produces a chemical should compile a dossier including all the appropriate safety and toxicological data and submit it to ECHA. Upon completion of dossier inspection, the producer of the chemical can be granted permission for its commercialization. In case this procedure has been already performed by another producer (registrant) and the ECHA platform contains all the appropriate data about the chemical, only an access letter must be sent to ECHA asking for this information. ECHA will help to contact the registrant who first uploaded these data. The producer will pay a fee to the registrant and get access to the dossier of the substance. The data must be kept in his facilities and be used for compiling the Safety Data Sheet (SDS) of the chemical substance.

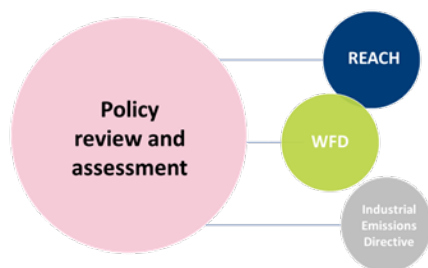


Figure 1: Policy review and assessment pillars

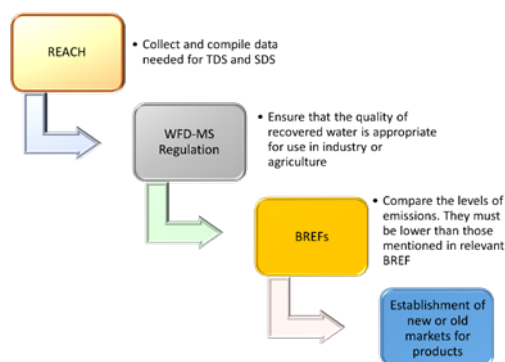


Figure 2. Steps to be followed before products market exploitation

Water Framework Directive

WFD aims at the good qualitative and quantitative status of water bodies and their dependent wildlife/habitats. Water recovery and reuse are encouraged and shown as alternative water sources. This philosophy is mainly adopted for urban wastewater but not for industrial. The WFD and National water legislation are mainly oriented to the use of recovered water in agriculture and not in the industrial sector. This use of water is not the most appropriate in an industrial zone as the water should be transferred far away, something that rarely happens and finally, it is rejected to the closest water body losing a significant part of its value. No specific standards are proposed in the WFD for recovered water used in the industrial sector and many gaps appear in this issue in both European and National Legislation. Thus, before the use of recovered water for industrial or irrigation purposes the producer should examine the MS legislation and the minor qualitative characteristics demanded in each industrial process.

Industrial Emission Directive

IED is one of the main legislative tools for controlling and mitigating industrial impacts on human health and environment. IED does not refer to specific standards for water emissions. However, it is clearly mentioned that an industry should be based on BATs (Best Available Techniques) as these referred to BREFs (Best Available Techniques Reference Documents) and National legislation about emission levels, to obtain operation permission from the EU Members authorities. Concluding, all the techniques that a producer decided to apply for the treatment of brines must be mentioned to the relevant BREF or have better efficiency and environmental footprint than those mentioned in the BREF as BATs.

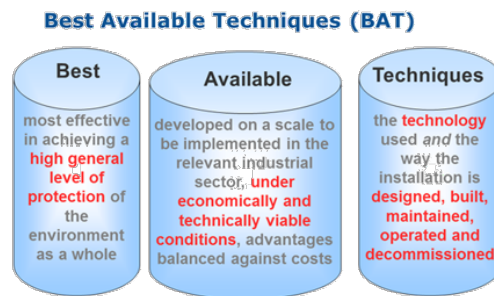


Figure 3: Best Available Techniques

Conclusions

The four steps to be followed before products market exploitation are:

1. Collect and compile data needed for TDS and SDS
2. Ensure that the recovered water is appropriate for industrial or agricultural use
3. Compare the levels of emissions with these referred to BREF. Ensure that they are lower or at least equal than those mentioned in relevant BREF
4. Establish new or old markets for water and salts.

References

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