

ANODE

Quantitative evaluation of metals released into the marine environment from the galvanic anodes of ORE structures

DURATION: 18 months (2019-2020) | BUDGET: €311K

CONTEXT

The use of cathodic protection by galvanic anode is an effective and long used method to fight against corrosion of metal structures immersed at sea (e. g. ships, docks on piles, offshore platforms...). The oxidation of these anodes, often composed of zinc or aluminium, causes the release and diffusion of metal elements in the form of ions or oxyhydroxides. **With the development of ORE, the effects of anode degradation have been questioned within civil society and been relayed by government departments, so it is important to be able to provide scientifically substantiated answers to this question.**

OBJECTIVE

To quantify the chemical compounds emitted by the galvanic anodes of ORE structures and the risk associated with their dispersion in the marine environment.

MAIN ACHIEVEMENTS

- Literature review of cathodic protections and their potential impacts on the environment
- Modelling of the dispersion fluxes of metals released into the environment at different ORE sites located on French coasts
- Characterisation of the chemical risk linked to metals from galvanic anodes for aquatic species (living in the water column)

CONCLUSION

By combining ecotoxicological expertise and hydrodynamic modelling, the ANODE project has determined that there is no risk associated with most of the elements making up galvanic anodes, namely zinc, iron, copper and cadmium. On the other hand, concerning aluminium, additional experiments are necessary to conclude. The two currently available Predicted No-Effect Concentrations (PNECs) do not seem suitable for this assessment. These thresholds must therefore be refined and include data from in situ measurements in order to be able to estimate the possible risk associated with aluminium releases.



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TECHNOLOGIES



STAGES OF THE VALUE CHAIN



Preliminary studies

Design

RESOURCES GENERATED

- **Review of the different types of cathodic protection and their impacts** on the environment including an assessment of existing threshold values (such as Predicted No-Effect Concentration or PNEC) for metals released from anodes
- **Methodology for assessing the chemical risk of wind farms** by combining hydrodynamic modelling of metal releases with an ecotoxicological expertise
- **Public report of recommendations** (including implementation protocols) for future monitoring of metals in ORE farms

PARTNERS



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