

Assessment and comparison of the potential impacts of EPS/XPS and their alternatives

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Résumé (250 mots max.)

OceanWise is an European projet that aims to reduce impacts of foamed PS in the North-East Atlantic. Along the European coasts, 13% of the collected plastics during surveys are expanded polystyrene (EPS) and extruded polystyrene (XPS) items. We conducted a case study with six materials (two EPS, one XPS, and three alternatives) to compare the environmental impacts between conventional foamed PS and their alternatives. Field experiments conducted in a harbour area revealed that conventional foamed PS and alternatives are colonized rapidly by macrofauna without apparent difference among the materials after 9 weeks of deployment. However, all conventional materials absorbed more organic contaminants than alternatives in the harbour area, suggesting that conventional foamed PS have higher abilities to concentrate contaminants at their surface in comparison to the substitutes. Laboratory analyses found higher concentrations of chemicals (PAHs and additives) in conventional foamed PS than alternatives. In addition, toxicity experiments performed on different organization and trophic levels (bacteria, algae, invertebrates, fish) suggested a higher toxic potential for conventional foamed PS, especially for the EPS not used as food contact material. By compiling all results, an Impact Score (IS) calculation suggested higher environmental impacts for conventional foamed PS ($IS = 11 \pm 2$) than alternatives ($IS = 4 \pm 1$). Therefore, based on the environmental impacts assessment only, it is recommended to use the foamed PS substitutes. This recommendation should be validated by the screening of more conventional and alternative materials to consider the variability of impacts between several products of the same material.

Mots clés : Expanded Polystyrene, Alternatives, Impacts, Plastics

Thème(s) :

- ~~1/ Sources, Niveaux de contamination, Modélisation~~
- ~~2/ Mécanismes de transformation des plastiques~~
- 3/ Impacts des plastiques et risques sur les organismes et les écosystèmes
- ~~4/ Conception de polymères à plus faible impact environnemental, Solutions~~
- ~~5/ Approches sociologique, socio-économique, nouveaux modèles économiques~~