

SUSTAINABILITY AND ECONOMICAL ANALYSIS OF ODOUR ABATEMENT TECHNOLOGIES

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Atmospheric pollution, and more specifically odour pollution, has traditionally received less attention than solid or liquid pollution. However, this situation is starting to change as odour nuisance complaints are gradually increasing due to the encroachment of residential areas on potential odour sources, the increasing lifequality standards, and to the enforcement of stricter legislations. Therefore, there is an increasing need for odour abatement in an economic and sustainable way. However, the selection criteria for odour abatement technologies are often based on the extrapolation of industrial VOC treatment facilities experience, and this know-how can not be directly applied to odour abatement.

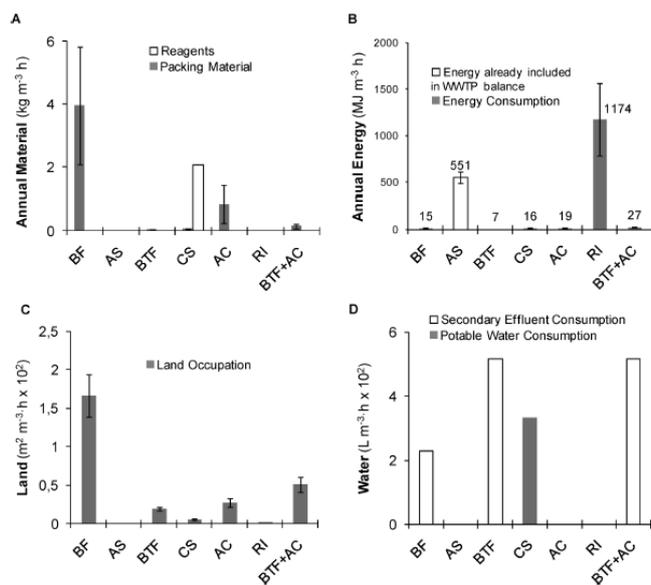


Fig. 1 Environmental impact results from a sustainability analysis

Nowadays, environmental and social concerns are gaining importance, gradually shifting selection criteria from the traditional economic parameters to a more sustainable approach. In this context, sustainability analyses based on the triple bottom line concept (environmental, social and economic aspects) become a powerful tool to comparatively assess the performance of odour treatment technologies (Fig. 1). Moreover, under the current global economic uncertainty, an in-deep analysis of economic data from full-scale facilities is necessary to fully understand the geographical variations of the operating costs over the long term and their responses to market fluctuations. These data are often not available for industry professionals or academics, increasing the interest of these integrated analysis.

This project aims to develop a platform for comparative technology evaluation from a sustainability and economic perspective based on full scale facility data in order to provide up-to-date guidelines for odour treatment technology selection. Two main approaches will be addressed:

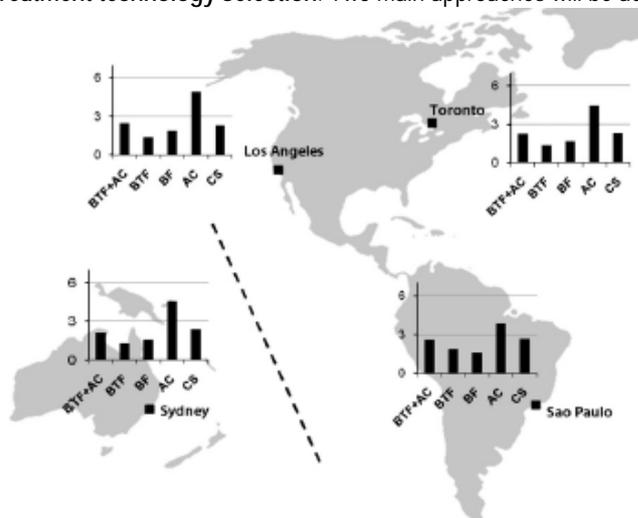


Fig. 2 World-wide economical analysis results

A) Comparative sustainability analysis of the most commonly applied odour treatment technologies: biofiltration, biotrickling filtration, chemical scrubbing, adsorption, activated sludge diffusion. Sustainability will be assessed following the IChemE Sustainability Metrics using full scale facility data provided by manufacturers and governments in

terms of environmental, social and economic performance. The results obtained will constitute a valuable decision making tool for both facility managers and law / policy professionals.

- B) **Economic sensitivity analysis addressing the impact of design parameters and commodity prices on the overall operating costs** in order to elucidate the most stable technologies and sensitive parameters where significant cost reductions can be obtained. The Net Present Value (NPV) concept is the most useful tool to reach this goal since it integrates both investment and operating costs. In addition, the influence of the geographical location on the overall costs of the different odour treatment technologies will be assessed using a world-wide compilation of economic data (Fig. 2). This know-how will allow to accurately predict technology expenses in hypothetic odour abatement scenarios or to assess the economic performance of new emerging technologies.

Relevant publications

Estrada J M, Kraakman N J R, Muñoz R, Lebrero R (2011) A Comparative Analysis of Odour Treatment Technologies in Wastewater Treatment Plants. *Environmental Science & Technology* 45-3 1100-1106.

Estrada J M, Kraakman N J R, Lebrero R, Muñoz R (2012) A Sensitivity Analysis of Process Design Parameters, Commodity Prices and Robustness on the Economics of Odour Abatement Technologies. *Biotechnology Advances*, (Accepted for Publication).