Report to
DG Environment

The impact of REACH on the environment and human health

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Executive Summary
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A proposal for a new EU chemicals regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) was presented by the European Commission in October 2003. REACH will require that manufacturers and importers of chemicals register their chemicals, that registrations are evaluated by authorities, that certain substances of very high concern are authorised and that restrictions are imposed in cases where risks cannot be adequately controlled by other means. REACH will replace and consolidate into one single regulation large parts of the current chemicals legislation.

The introduction of the new legislation will have an impact on human health and the environment and on society and business. Numerous studies have been conducted by the Commission, by national authorities and various stakeholders on the possible impact of REACH. Most of these studies have focused on the economic costs to industry, while only a few have dealt with the potential benefits. Therefore, the Commission has initiated and commissioned the current study on the impact of REACH on the environment and human health.

The possibilities for estimating the potential benefits of REACH on the environment and on humans exposed via the environment suffer both from a lack of a sufficiently developed methodology and from a lack of data. In the present study, we have tried to circumvent these knowledge gaps by using three different methodologies for assessing potential benefits and to use a number of data at a screening level. Of course, this influences the reliability of the conclusions that can be drawn on the basis of the study.

Three possible approaches have been identified that may be suitable for assessing the potential impact and benefits of REACH on the environment and humans exposed via the environment. These are:

- Willingness to pay (WTP) among the broad population for avoiding impacts of chemicals
- Damage function approach based on past mistakes where an empirical relationship between damage and cost might be established
- Avoided or saved costs approach where costs of mitigating current pollution is estimated as the upper limit for the possible benefit of REACH

The WTP approach is seen as the economically ‘correct’ way of estimating benefits. However, only two studies are available. One study from the UK elicits the population’s willingness to pay for clean drinking water, while another study reviews the willingness to pay for avoiding health effects of chemicals pollution, in particular cancer.

The information from the first study was used to estimate the potential benefits of REACH to €1,730 mill in year 2017 if only benefits to drinking water quality are considered. The study is not sufficient for extrapolating to the benefits of REACH on the environment in the whole of EU-25. It might be assumed that the population’s WTP for environmental benefits is lower than for direct health benefits, while the WTP for avoiding serious health effects of chemicals pollution is much higher. Due to the very limited amount of input data, the results obtained are judged to be uncertain.

The damage function approach based on past mistakes was tried out using four well-known substances[1] as the basis and extrapolating to all other substances that may be affected by REACH. A system was established, which was intended to rank all substances based on their environmental and health properties in combination with tonnage; e.g. persistent toxic substances that are produced in large amounts are ranked very high. The ranking system was based on the EURAM method with input data obtained from the European Commission's IUCLID database and from the Danish EPA QSAR[2] database. The information from the IUCLID database is restricted to substances manufactured or imported in quantities above 10 tonnes/year and information on properties and amounts was provided for 8,031 substances. QSAR calculations were available for 45,452 discrete, organic substances among which 4,368 were recorded in IUCLID with information on quantities. All of the input data are uncertain and can only be used with caution.

However, although the four substances selected as case substances are among those that are now restricted, the ranking showed that many other substances seem to be of similar or higher concern. Such a large number of substances cannot be assessed on a substance-by-substance approach, as any benefit resulting from reducing the release of one substance may be shadowed by impact from other substances. Instead, a conservative 10% reduction of costs due to REACH has been calculated. Due to the large uncertainty of the input data and the huge extrapolation, this approach is judged to be the weakest of the three approaches tried out in the current study.

The avoided or saved costs approach was used to assess the current costs of mitigating the chemical pollution for a number of cases[3]. The cost estimates for some of the cases are relatively robust, as it has been possible to obtain relatively detailed and precise information. This is in particular the case for purification of drinking water, disposal of dredged sediment and incineration of sewage sludge instead of disposing it on farmlands. Costs of building larger sewage treatment plants in order to obtain room for excess nitrification capacity due to toxic effects of chemicals in sewage water and costs of cleaning of fish products are considered weaker cases. From the cases, it is estimated that today the costs of measures already implemented for mitigating the impact of releases of chemicals are huge - in total up to €7 billion per year in 2005 for only those cases included in the study. Even assuming that the potential benefit of REACH would be only at 10%, the benefit is estimated to €150-500 mill in year 2017, which over the next 25 years adds up to €2,800-9,000 mill.

[1] 1,2,4-trichlorobenzene, nonylphenol, tetrachloroethylene and PCBs

[2] Quantitative Structure-Activity Relationship (QSAR). QSAR are methods for estimating the toxicity and other properties of a chemical from its molecular structure.

[3] Sewage treatment, drinking water purification, disposal of dredged sediment, sewage sludge incineration/disposal and cleaning of fish meal

An overview of the results is given in Tables A-C below. Most of the estimates are based on an assumed efficiency of REACH in reducing general environmental contamination levels by 10%.

Table A Overview of potential benefits of REACH (values in mill €) determined as potentially saved costs (most robust approach)

Case	2017	2017-2041
Building of sewage treatment plants	7.1-24	131-440
Drinking water purification	49-302	896-5,564
Disposal of dredged sediment	13.1-78 (78-470)*	241-1,450 (1,444-8.660)*
Sewage sludge	83	1,520
Cleaning of fish meal	0.9	16
Total potential benefits for cases	153-488	2,804-8,990

*) Based on 60% reduction of contaminated sediment.

Table B Overview of potential benefits of REACH (values in mill €) determined as the population's willingness to pay (weaker approach)

Case	2017	2017-2041
WTP for clean drinking water	1,730	34,000

Table C Overview of potential benefits of REACH (values in mill €) determined by extrapolation from case substances (weakest approach)

Case	2017	2017-2041
Avoidance of severe health effects	210-2,500	4,000-50,000
Improved reuse of sewage sludge	16-133	300-2,600
Total potential benefits for cases	226-2,633	4,300-52,600

It appears from the overview tables that the most robust approach results in the lowest estimate of benefits, while the weakest approach results in the largest estimate of benefits. However, the three different approaches estimate different costs and benefits, with the most robust approach estimating costs and benefits in relation to cleaning or handling of polluted matrices (water, sludge, sediment, fish products) and the weakest approach mainly estimating saved health costs. To obtain the best reflection of the different methodologies used and the level of uncertainty linked to the estimated impacts (i.e. indicative values), we preferred to keep them clearly separate.

Thus, in conclusion, the potential benefit of REACH on the environment and humans exposed via the environment is estimated by use of a robust approach to as a minimum €150-500 mill in year 2017 with a potential long-term benefit over the succeeding 25 years of €2,800-9,000 mill. These estimates are based on well-documented cases of costs in combination with assumptions on the potential benefits of REACH.

Using much weaker approaches, the benefit arising from saved health costs is estimated to €200-2,500 mill in year 2017, which aggregated over 25 years corresponds to €4,000-50,000 mill. Once again, these values can only be seen as indicative values for the potential benefits of REACH on the environment and humans exposed via the environ-

ment. ***The values are based on a very weak data set***; however, the best available. A more precise estimate would require generation of new data and a key role of REACH is to generate such data.

We are particularly grateful for the input and comments received from two groups of experts, which were established for the purpose of reviewing this report. Their particular expertise in the domain of public health and environment, risk assessment, QSAR and environmental evaluation has been crucial to the successful completion of this study.