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Accompanying document to the

Proposal for a

REGULATION (EU) No …/… OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending Regulation (EC) No 648/2004 as regards the use of phosphates and other phosphorous compounds in household laundry detergents

IMPACT ASSESSMENT

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Introduction

Phosphates are used in detergents to combat water hardness in order to allow efficient cleaning. Sodium tripolyphosphate (STPP[1]) (see section 9 for a glossary of acronyms) is the most commonly used phosphate. In conjunction with surfactants, STPP allows detergents to perform efficiently in all washing conditions.

More specifically, STPP has the following functions in detergents:

- efficient sequestering[2] of hardness salts (and keeping them in solution);
- removal and prevention of encrustation on fibres;
- enhancement of the washing process;
- carrier for other detergent ingredients.

Phosphates from detergents can contribute to certain adverse effects in the aquatic environment. They act as nutrients which, in excess, cause an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms, a phenomenon called eutrophication. Alternative water-softening ingredients are available, but with various performance limitations, particularly for the more demanding cleaning tasks.

Regulation (EC) No 648/2004 on detergents[3] harmonises the placing on the market of detergents, but only with respect to the labelling of detergents and the biodegradability of the surfactants they contain. Nevertheless, in view of concerns about eutrophication, Article 16 of the Regulation also required the Commission to "evaluate, submit a report on and, where justified, present a legislative proposal on the use of phosphates with a view to their gradual phase-out or restriction to specific applications". The Commission presented the report in 2007 and concluded that the state of knowledge concerning the contribution of phosphates in detergents to eutrophication was still incomplete, but was developing rapidly[4]. Further work conducted thereafter has been the basis for this impact assessment report, which analyses a number of policy options to address the use of phosphates in detergents.

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

The Commission initiated a number of studies to establish whether restrictions on phosphates in detergents would be justified in order to reduce eutrophication in the EU: WRc 2002[5], INIA pan-European eutrophication[6], RPA[7] (see Annex II). These studies provided the basis for the consultations mentioned below. The socio-economic impacts of possible restrictions of phosphates in detergents and the environmental risks of alternatives to phosphates have also been assessed based on information available from these reports or further direct contacts with stakeholders as discussed in detail in sections 5.3 and 5.4.

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1 STPP: Na5P3O10, CAS No 7758-29-4, EINECS No 231-838-7.

2 Sequestering: The process of involving a chemical compound or certain polymers that chemically tie up (sequester) other compounds or ions so they cannot be involved in chemical reactions.

3 Regulation (EC) No 648/2004 of the European Parliament and of the Council on detergents, OJ L104, 8.4.2004, p.1.

4 COM (2007) 234), available at: http://ec.europa.eu/enterprise/chemicals/legislation/detergents/index_en.htm.

5 Phosphates and alternative detergent builders. WRc (2002), Swindon, UK.

6 Available at: http://ec.europa.eu/enterprise/sectors/chemicals/files/docs/ceep_study_final_report_042009_en.pdf.

7 Available at: http://ec.europa.eu/enterprise/sectors/chemicals/files/studies/rpa_non_surf_organ_zeolites_en.pdf.

1.1. Consultation and expertise

1.1.1. Consultation of other Commission services

DG Enterprise and Industry set up an Impact Assessment Steering Group (IASG) on phosphates in detergents to which the following Services were invited: DG Environment, DG Health and Consumer Protection, DG Joint Research Centre, DG Agriculture, and the Secretariat General. The IASG met in December 2008, July 2009, January and March 2010 in order to accompany the preparation of the impact assessment.

1.1.2. Consultation of Member States

The findings of the various Commission studies concerning eutrophication and STPP use in detergents as well as the opinions of the Commission's Scientific Committees on them have been extensively discussed at meetings of the Working Group of the Competent Authorities responsible for the implementation of the Detergents Regulation, hereafter referred to as the "Detergents WG", namely in November 2006, July and December 2007, July 2008, February and November 2009.

In the meeting of December 2007, Member States' opinions were split regarding the need for legislative action at EU level. It was agreed that the Commission would continue working together with Member States and stakeholders to improve the knowledge base, by further improving the INIA model in line with the recommendations of the SCHER opinion of 2007. In the July 2008 and February 2009 meetings, the Commission consulted on the preparation of the impact assessment and the update of the INIA model. In the November 2009 meeting, the Commission consulted on the main conclusions of the SCHER opinion on the updated INIA model as well as on various policy options to be analysed in the Impact Assessment. Members States were invited to express their positions on their preferred option concerning the use of phosphates in detergents, either orally in the meeting or by sending written statements to the Commission in the subsequent weeks.

By mid-January 2010, 24 Member States had communicated their preferred policy option[8]. The majority (14) considered that an "EU ban of phosphates in laundry detergents" would be the most appropriate measure, where "ban" actually means a restriction to no more than 0.2 to 0.5% phosphorous per weight of detergent in line with existing national measures. Six Member States favoured stricter measures: either for a "total ban of phosphates" (3) or for "an EU restriction setting phosphates limit values in all detergents" (3). Four Member States favoured milder measures: "no EU action" (2) or "EU voluntary agreement" (2). The Member States with minority opinions could also agree with the option "EU ban of phosphates in laundry detergents", if such a measure were to be proposed.

1.1.3. Consultation of Industry and NGOs

The meetings of the Detergents WG were also attended by the relevant industry associations. The European Phosphates Producer Industry (CEEP) opposes restrictions on phosphates in detergents at EU level, claiming that the sector would be adversely affected to a significant extent. A similar statement was submitted by the VCI – Sector Group 'Phosphorsäure Salze' from Germany. The International Association for Soaps, Detergents and Maintenance Products (A.I.S.E.) would welcome an EU-wide ban on phosphates in laundry detergents, but not in formulations for dishwasher and Industrial and Institutional (I&I) detergents where the

[8] All Member State statements are available at: http://circa.europa.eu/Members/irc/enterprise/wgdet/library?l=/phosphates_detergents&vm=detailed&sb=Title

use of phosphates is still considered essential to ensure adequate cleaning performance. The European Zeolites Producers Association (EUZEPA)[9] confirmed that phosphate-free formulations have been developed by detergent formulators.

The European Policy office of WWF attended some of the Detergents WG meetings without making any interventions on a preferred policy option. DG Enterprise and Industry also contacted the European Consumers' Organisation (BEUC), who did, however, not convey a position with regard to possible restrictions on the use of phosphates in detergents.

1.1.4. Consultation of SMEs

Between July and September 2009, the Commission consulted small and medium size detergent formulators via the Enterprise Europe Network on their current use of phosphates and alternatives, and the impacts of potential restrictions of phosphates on the companies. Replies were received from 107 companies located in 11 Member States. 63% were located in Southern Europe and most of those (~70%) produced Industrial and Institutional (I&I) products, while about 40% also produced laundry and dishwasher detergents.

The majority of companies (58%) claimed that replacing phosphates with alternative substances would reduce cleaning performance, in particular for Industrial and Institutional (I&I) products, and a minority (20%) expected adverse economic impacts such as higher production costs, decreased sales, loss of market share, or need for new investments. See Annex III for further details.

Given the rather technical nature of the problem and the limited number of actors affected, an internet-based public consultation was not conducted.

1.2. Scrutiny by the Commission impact assessment board

The impact assessment board of the European Commission[10] assessed a draft version of the impact assessment and issued its opinion on 16 April 2010. The impact assessment board made several comments and, in the light of those suggestions, the final impact assessment report:

– clarifies the advantages of EU action in the light of the current downward trend in the use of phosphates in detergents and the upward trend in the connection of sewers to WWTP, and also that EU action is more efficient than actions of Member States in the context of regional cooperation.

– describes the expected costs and benefits and their development over time in more detail and ranks more clearly the options in terms of efficiency and effectiveness.

– gives further information on how the different options will affect consumers and professional users of detergents and provides more information on the impacts of restrictions on water quality in countries where the use of phosphates in detergents is already restricted.

[9] Zeolites are one of the possible substitutes of phosphates in detergents.

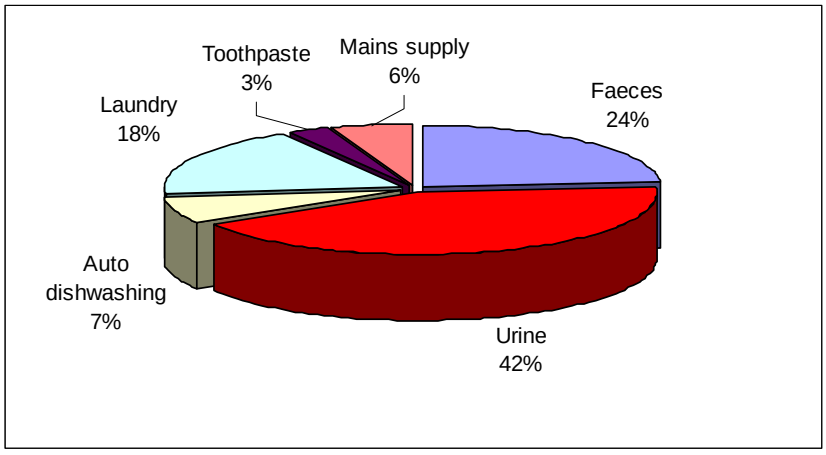
[10] http://ec.europa.eu/governance/impact/iab_en.htm.

2. PROBLEM DEFINITION

2.1. The use of phosphates in detergents and their contribution to the total phosphate load

The four main sources of phosphates in the environment are: fertilisers, metabolic waste from humans and livestock (urine + faeces), and detergents. Within the EU-25, the major use of phosphates is in fertilisers with an estimated consumption of around 3.5 million tonnes P_2O_5/year (equivalent to around 1.5 million t of phosphorous (P)/year)[11]. In comparison, about 1.8 million tonnes of phosphates-based detergents were used in 2006 in the EU-25 containing ca. 440,000 tonnes of P_2O_5, equivalent to 110,000 tonnes of phosphorous. The relative importance of each source varies from Member State to Member State and from one water catchment area to another but, overall, phosphorous from STPP based detergents represents less than 10% of the phosphorous used in fertilisers. However, all detergent phosphates are discharged into waste water, and therefore potentially contribute to eutrophication, whereas most fertiliser phosphates remain in agricultural soils and only a minor (but not fully quantifiable) fraction is washed out of the soil into surface waters. Figure 1 illustrates the significance of various phosphorus sources to domestic wastewater in the UK. Human inputs via urine and faeces dominate domestic loads of phosphorus to sewer, with main contributions arising from the metabolism of dairy products, meat and cereals. Laundry detergents contribute with approximately 18%. Including phosphorus from dishwashing detergents increases the overall loads from detergents to 25%[12].

Figure-1: *Sources of phosphorous in UK domestic waters*



2.2. Why the presence of phosphate in detergents is an environmental concern

2.2.1. Contribution of detergent phosphorous to eutrophication

There are no concerns over adverse effects on human health associated with the use of STPP in detergents. Due to their physico-chemical properties, STPP are not distributed or transported to the atmosphere, therefore no environmental risk related to STPP use in

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11 EFMA (2005): Forecast of Food Farming and Fertilizer Use in the European Union 2005-2015, available from the European Fertilizer Manufacturers Association (www.efma.org).

12 UK Water Industry 2008 report. Available at: http://www.sniffer.org.uk/Resources/WFD88/Layout_Default/0.aspx?backurl=http%3a%2f%2fwww.sniffer.org.uk%3a80%2fproject-search%20%20results.aspx%3fsearchterm%3dphosphorus&selectedtab=completed.

detergents is indicated in soil or air compartments (HERA, 2003[13]). As already discussed, the prime environmental concern over the use of phosphate in detergents is that they can lead to an excess of nutrients in the aquatic environment which, in turn, can contribute to problems of eutrophication. Elevated phosphate levels tend to pose a threat to the biodiversity of surface waters. The effects of phosphates on local ecology can be dramatic, particularly in smaller surface water bodies where there is less prospect of dilution. For example, high phosphate levels in the lower river Lea in London have caused the growth of excessive duckweed which needs to be removed regularly to maintain the ecological balance (DEFRA, 2008)[14]. Similarly, releases of phosphates to lakes and rivers can result in increased plant growth and an over-abundance of algae. Various species of algae produce potent toxins which can poison fish thereby influencing the fishery production, but also pets and humans.

Several EU Directives (Table 2 in Annex I contains an overview) aim to limit the concentration of nutrients such as phosphorus and nitrogen in surface waters in order to counter eutrophication, but there is no EU legislation that limits the use of phosphates in detergents. Detergents are discharged to the aquatic compartment via sewage systems which nowadays are increasingly connected to waste water treatment plants, following the implementation of the Urban Waste Water Treatment Directive (UWWTD). The proportion of STPP from detergents that enter the aquatic environment (rivers, lakes, and eventually the maritime environment) varies considerably across the Member States depending on the degree of tertiary treatment of waste water. Tertiary treatment removes phosphates but is costly and is not a legal requirement for all sewage discharges (in particular smaller settlements are exempted and lack such treatment). Table 3 in Annex I gives a picture of the variability of waste water treatment in various EU Member States and the phosphorous input into their surface water depending on the treatment processes in waste water treatment plants.

The Commission has attempted to quantify the contribution of phosphorus in detergents to eutrophication throughout the EU. The 2009 INIA pan-European probabilistic eutrophication model concluded that the combined contribution of both laundry and dishwashers detergents to eutrophication risks varies between the EU eco-regions, being relatively higher in Northern (5.3%) or Central Baltic (5.8%) eco-regions as compared to Mediterranean (2.3%) and Atlantic eco-regions (3.2%)[15]. The higher values obtained for the Northern and Baltic regions are in line with the well-established higher sensitivity of surface waters in those regions to phosphates.

In its opinion of November 2009[16], SCHER recognised the INIA model as an innovative tool to estimate the contribution of detergents to EU eutrophication risk, but stressed that the Committee was unable to check how representative the INIA data are for pan-European surface waters. Therefore, SCHER was not able to comment on the predictive capacity of the model (for more details see Annex II). SCHER also noted that the model is not suitable for estimating the contributions to eutrophication at regional or local level.

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13 Available at: http://www.heraproject.com/files/13-F-04-%20HERA%20STPP%20full%20web%20wd.pdf.

14 Consultation of options for controls on phosphates in domestic laundry cleaning products in the UK (DEFRA, UK, 2008), available at: http://www.defra.gov.uk/environment/quality/water/waterquality/diffuse/non-agri/documents/consultation2008-detergents.pdf.

15 Full report available at: http://ec.europa.eu/enterprise/sectors/chemicals/files/docs/ceep_study_final_report_042009_en.pdf.

16 Available at http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_116.pdf.

In some sensitive European areas deterministic models have been used to calculate the contribution of phosphates from detergents to eutrophication. Calculations for the Danube River Basin (DRB) (Water Research Project[17]) show that the replacement of phosphates in detergents can contribute significantly to the reduction of phosphates discharges by point sources[18]. Replacement of phosphates in detergents in the DRB countries was estimated to result in a 24% phosphorus (P) reduction from point sources and in a reduction of 12% from all sources.

In summary, although it has not been possible to quantify with confidence the contribution of phosphates from detergents to eutrophication at the EU level, both probabilistic and deterministic modelling agree that they do contribute to eutrophication to some extent. For some sensitive regions, the contribution of detergent phosphates to eutrophication has been reliably quantified and found significant. The use of phosphates in detergents, therefore results in a negative externality (eutrophication) the costs of which are born by society in general, rather than by detergent formulators, who have no incentive to design detergents that reduce the risk of eutrophication.

2.2.2. Costs for phosphate removal in waste water treatment

Sewage treatment plants with a tertiary stage should be capable of removing P down to a concentration of 1mg/l in the outflow according to the requirements of the UWWTD. This can require removal of more than 90% of the P present in inflows. However, only a part of the population is connected to municipal sewage treatment plants (as shown in Annex I, Table 3). EUROSTAT reports that 90% of the EU-25 population is connected to sewage treatment systems, but another source gives a lower estimate of 80% (E-Water 2007)[19]. Furthermore, not all existing plants are yet equipped with a tertiary treatment stage, nor is it feasible to connect low-density rural populations to WWTP. The European Environmental Bureau (EEB) concludes that the degree of connection to WWPT with a tertiary stage varies from about 90% in Northern Europe to about 20% in Eastern and Southern Europe.

Although biological nutrient removal is an option, the majority of phosphate removal processes rely on chemical precipitation, predominantly by dosing with iron salts during tertiary treatment. Phosphate elimination thus entails capital costs (for installing tertiary treatment) and operational costs, which depend on the total quantity of phosphates eliminated. Source control of phosphorus would thus lead to lower concentrations of phosphates entering WWTP and lower capital investment and operational costs. There are quite wide variations in the published costs for building and operating tertiary treatment in WWPT.

As an example RPA calculated in 2006 that in the UK about 75,000 t/year of STPP (equivalent to 19,000 t of phosphorous) are used in detergents, but only 27% of the population are connected to WWTP with tertiary treatment. Removal costs are estimated at about €30 per kg phosphorus for capital and operating costs combined. Removal of 27% of 19,000 t phosphorous in existing tertiary treatment plants was therefore costing about €154 million[20] annually. According to a DEFRA report in 2008, elimination of phosphates from detergents could lead to savings in operating costs at existing plants in the order of €2.5 million per annum (i.e. for the 27% of phosphorous being removed in tertiary treatment). Combining the

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17 Harmonised Inventory of Point and Diffuse Emissions of Nitrogen and Phosphorus for a Trans-boundary River Basin (available at: http://www.icpdr.org/icpdr-pages/phosphorus.htm).

18 Point sources of phosphorous involve detergents, human metabolism and industry, but not fertilisers.

19 E-water (2007). The role of Detergents in the phosphates balance of European surface waters http://www.ewaonline.de/journal/2007_03.pdf.

20 0.27 * 19.000.000 kg * € 30/kg = € 153.9 million.

figures from the RPA and DEFRA reports, (marginal) operating costs of €0.49/kg P can be calculated[21]. The same DEFRA report also gives costs in a range between €8.9 and €16.5 million/year for the UK if the total of 19,000 tonnes of P had to be removed, i.e. less than €1/kg P. These would therefore appear to be operating costs. Based on the UK figures, operational costs thus seem to be between €0.46 and €0.87/kg P. Extrapolation for the entire EU for a complete removal of 110,000 t P from detergents would lead to operational costs between €50 million and €96 million (assuming 100% connection to tertiary treatment). Taking into account the present degree of connection to tertiary treatment varying between 20% and 90%, the cost for P removal in WWTP would lie somewhere in the range of €10 million to €86 million.

A similar operating cost, namely €0.47/kg P, can be obtained by considering solely the costs for buying ferric salts for the chemical treatment of waste water. Results from one such calculation using the EFOR model[22] would give a total cost for annual ferric salt consumption for the EU of €51.3 million for the tertiary treatment of waste water if extrapolated for the treatment of 110,000 t P estimated to be in all detergents in the EU. For the present degree of connection to tertiary treatment varying between 20% and 90%, the cost for P removal in WWTP would lie somewhere in the range of €10 million to €45 million.

The European Federation of National Associations of Drinking Water Suppliers and Waste Water Services (EUREAU) has provided costs estimates for P removal in the range €1-7/kg P[23] i.e. 2 to 7 times higher than the figures above. With the same assumptions regarding connection to WWTP plants, total costs for P removal would be in the range of €20 million to €693 million.

Some interesting qualitative information concerning the tertiary treatment of phosphorus was provided by Ofwat[24] indicating that the price for chemicals used for P removal (e.g ferric salts) may increase in the future due to supply constraints while a switch in technology to meet stringent effluent standards maybe also required. In addition P removal will significantly increase the quantity and change the composition of sludge produced, which is likely to require additional investment in sludge treatment and disposal technologies, possibly including additional incinerators.

A report from the Swedish University of Agricultural Sciences[25] in 2008 gives some indication concerning the costs of nutrient reductions to the Baltic Sea as shown in Table 1 below. The main conclusion of that study is that restricting phosphates in detergents phosphates would be the most cost efficient measure to take in order to reduce phosphates in the Baltic.

In conclusion, phosphates from detergents in waste water lead to significant operating costs for existing tertiary waste water treatment. At current removal rates (taking into account connection rates to WWTP with tertiary treatment), operational costs are estimated between €10 and €693 million per year. Costs for full removal would be significantly higher, as investments into construction of tertiary treatment for 100% removal of phosphates from all wastewater would lead to very high capital costs and higher operational costs. Detergent phosphates thus constitute a negative externality not only with respect to the environment

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21 €2.5 million / (0.27*19,000,000 kg) = €0.487/kg.

22 A.O.Tanyi.Comparison of chemical and biological phosphorus removal in waste water – a modelling approach.

23 Sweden 1-5 €/kg P, Hungary 7 €/kg P, Belgium 4,2 – 5 €/kg P (including sludge disposal).

24 Ofwat (2007). Water Framework Directive Economic Analysis of Water Industry Costs.

25 Costs of nutrient reductions to the Baltic Sea (2008). Swedish University of Agricultural Sciences.

where tertiary waste water treatment is not in place, but also on the running costs of tertiary waste water treatment plants where they exist.

Table 1: *Calculated marginal costs for phosphorous reductions to the Baltic Sea from emission reduction at sources (€/kg P)*

	P free detergents	*Livestock Reduction*	*Fertiliser reduction*	*Sewage treatment Plants*	*Private sewers*
Denmark	10-42	2324-4413	0-10024	56-124	234-239
Finland	13-48	934-1591	0-1095	56-164	234-316
Germany	25-123	3950-5507	0-9131	56-304	234-585
Poland	16-26	456-540	0-506	38-130	197-317
Sweden	10-91	1092-4169	0-3797	56-229	234-447
Estonia	16-27	710-847	0-255	38-126	197-307
Lithuania	13-19	109-163	0-147	38-115	196-281
Latvia	17-33	424-596	0-269	38-135	196-328
Russia	12-42	879-1911	0-1855	38-202	197-491
Source: Costs of nutrient reductions to the Baltic Sea (2008). *Swedish University of Agricultural Sciences*					

Finally it should be noted that tertiary waste water treatment is required only for centres of population above 10,000 according to the UWWTD. Detergent phosphate discharges in rural areas would therefore continue to contribute to eutrophication even after when all WWTP are equipped with tertiary treatment.

2.2.3. Failure of regional initiatives to prevent eutrophication

Individual Member States alone cannot deal with eutrophication resulting from trans-boundary flows of phosphates into water bodies in their territories, or those shared with other countries. However, such problems could potentially be solved through co-ordinated action by the Member States concerned in the river basin management context of the WFD, or in regional co-operation strategies. In fact, regional co-operation to combat eutrophication in sensitive EU areas has been in place for a number of years and is supported by the EU or the United Nations. Nevertheless, progress has been slow and the negotiating position of EU Member States vis-à-vis their non-EU counterparts is weakened by lack of common rules at EU level.

2.2.3.1. EU Strategy for the Baltic Sea

This strategy has been established in a Commission Communication in 2009 and is complemented by a more analytical Action Plan[26]. Certain priority areas are identified in order "*to make the Baltic Sea Region an environmentally sustainable place*'. The first

[26] COM 2009 (248) final). The action plan is available at: http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/baltic/action2009.pdf

thematic priority includes reductions of nutrient inputs to the Baltic Sea to acceptable levels, such as of nitrogen and phosphorus which are both significant contributors to eutrophication of Baltic Sea waters. Among the Flagship project to achieve this target, it is recommended to '*remove phosphates in detergents in countries where this is not yet the case as recommended by HELCOM Baltic Sea Action Plan*'. Sweden and Estonia are the leading countries of this initiative with a deadline for action of 31 December 2012. Within the framework of HELCOM activities and recommendations, Latvia has implemented a ban of phosphates in laundry detergents (at 0.5% P w/w) since July 2009, while Poland has recently informed of their intention to take similar legislative action by imposing a limit value of 0.5% P in washing powders for consumer use (with a transition period until 2014).

2.2.3.2. International Commission for the Protection of the Danube River

The International Commission for the Protection of the Danube River (ICPDR), which has been established in 1998 and is supported scientifically by a number of United Nations Development Projects, has coordinated certain initiatives in order to reduce the environmental impact of eutrophication in the DRB Area. ICPDR adopted in December 2009 the policy recommendation to countries of the Danube River Basin *to proceed with national legislation and/or further voluntary agreements to replace phosphate-based detergents to protect the Danube and Black Sea from eutrophication while awaiting the outcome of the Commission's evaluation of the need for measures at the EU level.*

ICPDR has informed the Commission that the Danube countries have endorsed in December 2009 the Danube River Basin Management Plan (DRBMP)[27] which is a good example of international and integrated river basin management according to the EU Water Framework Directive. The emission of phosphates via household detergents is significant in the DRB area and in case of wastewater treatment without a tertiary stage the respective P loads find a direct way into the aquatic environment. P emissions due to laundry and dishwasher detergents in the DRB are estimated at 9,190 t/a. which accounts for 15.7% of total P emissions. A limitation of phosphates is identified as the most economical and effective means combined with the already existing measures. In reaching these conclusions, the ICPDR had extensive discussions over the past two years with the detergent producing industries and developed strong collaboration with DG Environment of the Commission and other stakeholders.

ICPDR[28] noted in 2008 that the ecological situation in the Black Sea has improved considerably in the last decade (reduced eutrophication, disappearance of anoxic conditions etc.) not only due to nutrient removal at WWTP but also due to the replacement of phosphate-containing laundry detergents in some DRB countries. Nevertheless, more than 10 years of cooperation has not yet succeeded in fully achieving the intended objectives. For example, the Black Sea Trans-boundary Diagnostic Analysis and the UNDP-GEF Black Sea Ecosystem Recovery Project – Danube impact on the status of the Black Sea (ICPDR, 2008), have indicated that the Danube River Basin is still the largest pollution contributor to the Black Sea in general and the Western part of the Black Sea in particular. A significant fraction of the nutrients (58% nitrogen, 66% phosphorus) received by the Black Sea come from the Danube River and these loads have resulted in severe eutrophication problems. For the period 1988-2005, the Danube, as one of the major rivers discharging into the Black Sea, was estimated to introduce on average about 35,000 tonnes of P into the Black Sea each year.

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27 Available at: http://www.icpdr.org/participate/danube_river_basin_management_plan

28 ICPDR (2008). P-free detergent: Issues and current status. 6th Standing Working Group Meeting of ICPDR.

Both of the above regional projects have called on the Commission to restrict the use of phosphates in detergents as a complementary measure essential for the success of their activities.

2.3. Fragmentation of the internal market and the impact of mutual recognition

Member States are concerned to a greater or lesser degree by the problem of eutrophication. Pending harmonisation at European level, some Member States have taken national measures (for details see Annex I, Table 1) restricting the use of phosphates in detergent formulations, which were notified and evaluated in accordance with the provisions of Directive 98/34/EC[29] to be justified and proportionate. Other Member States have relied on voluntary agreements with industry to reduce the use of detergent phosphate. Those combined national measures have resulted in a reduction in the use of phosphates from about 250,000 t P in the mid 1980s to about 110,000 t now. Phosphates in detergents are still unrestricted in ten Member States. Consequently, the internal market for detergents is fragmented at the moment regarding the phosphate content.

In the future, this fragmentation of the market could undermine the existing national restrictions if detergent manufacturers choose to make full use of the principle of mutual recognition. Although the principle of mutual recognition is long-established, its application has been rather limited due to uncertainties over its application. With the clarification brought by the entry into force of Regulation (EC) No 764/2008 on mutual recognition[30], Member States are obliged to accept any products (and thereby also detergents containing phosphates) that are lawfully placed on the market of another Member State unless they can demonstrate that there are specific reasons to the contrary. Member States could face significant pressure as they have only 20 working days (or 40 days in complex cases) to respond to manufacturers applying for mutual recognition. Member States administrations might be overwhelmed if many products lawfully placed on the market in other Member States, but with different phosphates content, were to be placed on their markets in a short period of time.

It is also unclear how the situation would develop in those Member States that rely on voluntary commitments by national industry associations to phase-out phosphates in detergents. New economic operators relying on the rule of mutual recognition might start placing products on their markets and they might not feel bound by the existing voluntary commitments.

Detergent formulators adjust the composition of laundry detergents to local water hardness conditions and washing habits (e.g. higher temperatures and harder water in Mediterranean countries, compared to lower washing temperatures and softer water in Nordic countries), and therefore have no incentive to use formulations complying with the strictest rules on phosphates in all Member States. Quite on the contrary, the existence of divergent rules in the Member States concerning phosphates may lead to higher costs for companies operating in several Member States as they have to manufacture products with different builders. A.I.S.E has informed the Commission that additional costs arise from:

- Research & Development costs: Separate/ additional formulation development involving P and P-free platforms, associated industrial validation.

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29 Directive 98/34/EC, OJ L 204, 21.7.1998, p. 37.

30 Regulation (EC) No 764/2008 of the European Parliament and of the Council of 9 July 2008 laying down procedures relating to the application of certain national technical rules to products lawfully marketed in another Member States and repealing Decision No 3052/95/EC. OJ L 218, 13.8.2008, p 21.

- Supply costs: The cost in lost economics of scale of buying less of one commodity (P), costs of managing orders and stocks of P and P alternative(s), costs of managing stocks of extra finished products etc.
- Manufacturing costs: Cleaning costs, handling because of promotional campaign production, additional installation of manufacturing line(s), labelling etc.
- Administrative costs: Monitoring different national legislations for potential changes, other regulated chemical management costs etc.

However, AISE has not been able to quantify these extra costs. SMEs operating only in Member States with no restrictions on phosphates have no incentives to develop phosphate-free formulations due to the fact that other Member States have taken legislative actions.

2.4. Drivers of the problem

Both, the costs caused by eutrophication and the ones incurred by waste water treatment companies for removing phosphates are borne by society at large. Detergent producers have, therefore, no economic incentive to replace phosphates with alternatives in detergent formulations.

Action by individual Member States is not capable of addressing eutrophication due to trans-boundary flows of phosphates in certain sensitive EU regions, e.g. the DRB area or the Black Sea.

In the absence of harmonisation, Member States will continue to maintain or adopt national measures with different scopes and limitations.

2.5. Who is affected, how and to what extent by the current situation?

- Detergent formulators who without a harmonised market for phosphates in detergents have to comply with different rules in the Member States and face extra costs. Only detergent formulators in the EU are affected as imports of detergents are insignificant.
- National public administrations in Member States having established legislation on phosphates in detergents to combat eutrophication might have increasing difficulties to enforce their legislation under their obligations on mutual recognition of detergents lawfully placed on the market in other Member States.
- Waste water treatment plant operators with tertiary treatment face costs for removal of detergent phosphates from waste water.
- Phosphates from detergents continue to contribute to eutrophication in several EU regions, which creates adverse effects in the environment and can lead to negative economic consequences for fishery and tourism industries. Neighbouring regions also suffer from phosphates outflows from the EU, e.g. the non-EU part of the Black Sea.

Information as to what extent the different stakeholders are affected is presented in section 5.1 (analysis of option 1).

2.6. How would the situation evolve if no action is taken?

As already set out in section 2.1 overall consumption of phosphates in detergents has declined in recent years and this trend is expected to continue, as a consequence of the combined effect of legislative and voluntary measures in the majority of EU Member States (see section 2.3). Table 1 in Annex I contains an overview of the measures taken in the Member States and the presence of phosphates in laundry detergents. With an average concentration of around 25% STPP in phosphate detergents, the peak consumption (in the early 1980s) was probably in

excess of 1 million tonnes of STPP/year (equivalent to 250.000 t P/year) which has now more than halved due to the introduction of alternatives. According to CEEP, there are currently 7 STPP production sites in the EU (compared to 9 sites in 2008) with an overall production of 270 000 tonnes in 2008 (compared to ~515.000 tonnes in 2007), and exports 100,000 tonnes in 2008 (compared to ~190.000 tonnes in 2007). This trend might be expected to continue because several additional Member States are preparing to adopt national legislation (e.g. Poland, United Kingdom).

The use of phosphates in the different categories of detergents products can be broken down as follows:

(i) Laundry detergents

According to data from CEEP[31], laundry detergents accounted for 60% of the total STPP use in the EU in 2007. However, during the last decade, the STTP consumption for household laundry products has significantly decreased as a result of legislative actions or voluntary agreements to phase out phosphates in a number of EU Member States. A further reduction of the use of phosphates in laundry detergents is triggered by the growing market share of phosphate-free liquid laundry detergents. Nevertheless, phosphate-based laundry detergents are still common in Eastern European countries.

(ii) Dishwashing detergents

Dishwashing detergents are still mainly phosphate-based and account for ~30% of the STPP use in the EU (CEEP, 2008).The consumption of phosphates for this application has been stable between 2004 and 2007. With the introduction of phosphate-free laundry detergents, the contribution of dishwashing detergents to the total detergent phosphates release has risen to about 25%.

(iii) I&I detergents

I&I detergents account for 8% of the STPP use in the EU-27 (CEEP, 2008). According to the European Detergent Formulator Association (A.I.S.E), this specific use of phosphates is more process- rather than product-driven. Therefore, if in a given process STPP is necessary, 100% of the products used in this process are STPP-based and if not applicable or not necessary, no STPP are used.

Eutrophication will continue in several sensitive EU regions with phosphates input from trans-boundary flows, albeit with a declining trend due to the decreasing use of phosphates in detergents.

Waste water treatment plant operators with tertiary treatment will continue to face costs for removal of detergent phosphates from waste water, albeit with a declining trend due to the decreasing use of phosphates in detergents.

Detergent formulators will face an increasing fragmentation of the internal market as additional Member States are planning to introduce national legislation on phosphates in detergents. However, faced with a greater diversity of national rules, detergent formulators operating across the EU may either decide simply to comply with the strictest rules or, on the other hand, they may decide to try to avoid compliance with them by application of the Regulation on mutual recognition.

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[31] CEEP (2008). Statement available at: http://circa.europa.eu/Members/irc/enterprise/wgdet/library?l=/phosphates_detergents/ceep_assessment

National public administrations in Member States having established legislation on phosphates in detergents to combat eutrophication might have increasing difficulties to enforce their legislation under their obligations on mutual recognition of detergents lawfully placed on the market in other Member States.

2.7. The EU right to act

2.7.1. Legal basis

The legal basis of the proposal to be accompanied by this impact assessment is Article 114 of the Treaty on the Functioning of the European Union (TFEU). Article 114 has the objective to establish an internal market while ensuring a high level of protection of human health and the environment.

2.7.2. Subsidiarity

Measures taken by individual Member States are an effective way to deal with eutrophication at a local / national level and may also be the most appropriate course of action given the fact that conditions, both in the environment and in the use of detergents, may well vary between the Member States. However, 60% of the EU are part of international river basins[32] and therefore action at local level may not be sufficient to address issues of trans-boundary importance. Pollution by nutrients may not be detrimental to the water bodies where the discharges are located but may affect water bodies downstream.

The WFD, which requires Member States to achieve good ecological and chemical status of surface water by 2015, also requires Member States to prepare programmes of measures which may include, where justified, mandatory action, or voluntary agreements to limit phosphates in detergents in order to tackle the eutrophication problem in their territories. According to the WFD, such measures have to be cost-effective and proportionate. In the recent meeting of WFD Strategic Coordination Group (February 2010), Hungary was the only Member State confirming planned action to reduce phosphates in detergents within the WFD Programme of Measures. More specifically, the National River Basin Management Plan of Hungary contains as complementary measure on nutrient removal actions for limitation of P content by 2012 in laundry detergents, and by 2015 in dishwasher detergents as legally binding restrictions. Where necessary, Member States sharing the same river basin can co-operate in the framework of the river basin management.

As set out in section 2.2.3, in larger river basins such as the Danube, which cover territories in several Member States, and in larger lakes or marine water bodies (such as the Baltic Sea) which receive inflows from many different Member States, combating eutrophication could in principle be achieved through the coordinated action of the individual Member States. However the experience at regional level in the Danube River Basin and the Baltic indicates that reliance on action by Member States only might not be fully sufficient despite a high level of cooperation over a number of years and action by most Member States concerned.

The Danube River Basin and Baltic Sea initiatives both believe that legislative action at EU level would be more effective in reducing inputs of phosphates from detergents than co-ordinated action by the Member States concerned. For instance, the International Commission for the Protection of the Danube River (ICPDR), has recently informed the Commission

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[32] Commission Staff Working Document accompanying the Communication from the Commission to the European Parliament and the Council 'Towards Sustainable Water Management in the European Union' First stage in the implementation of the Water Framework Directive 2000/60/EC SEC(2007) 363, available at http://ec.europa.eu/environment/water/water-framework/implrep2007/index_en.htm

(December 2009) that *"although the Danube River Basin includes both EU and non EU Member States, a limitation at EU level would provide a positive incentive to non EU countries participating in the ICPDR to take similar measures to limit the use of phosphates in detergents"*. In addition, the Environment Council in its conclusions of December 2009 on the Commission Communication on an EU Strategy for the Baltic Sea, has invited the Commission to present without delay proposals for EU legislation with a view to banning phosphates in detergents.

Thus, Member States accept that Community action is appropriate to achieve the eutrophication objectives of the WFD as earlier discussed in section 1.1.2.

3. OBJECTIVES

3.1. General Objective

The general objective is to ensure a high level of protection of the environment from the potential adverse effects of phosphates in detergents and to ensure a well functioning internal market for detergents.

3.2. Specific objectives

- To reduce the adverse environmental effects from eutrophication in surface waters, in particular due to the cross-boundary flow of waters containing phosphates from detergents, thus supporting the achievement of the objectives of the WFD by 2015.
- To contribute to a cost-effective solution to the reduction of phosphate discharges into surface waters.
- To improve the functioning of the internal market for detergents through a reduction of the divergence of existing rules concerning the content of phosphates in detergents, which create barriers to trade.
- To avoid possible future burdens for public administrations for developing and justifying national measures in the absence of harmonised Community measures.

4. POLICY OPTIONS

4.1. Option-1: No action at EU level, leaving the responsibility to act to the Member States (baseline option)

This would mean that the status quo would continue, i.e. no EU legislation concerning the use of phosphates in detergents would be introduced. Member States could maintain existing restrictions or take action as appropriate and justified under the circumstances in their territories, or in the context of regional cooperation.

4.2. Option-2: Voluntary action by industry

A voluntary EU-wide commitment for a phase-out and the substitution of STPP by zeolites or other substances would be made by detergents formulators. The commitment could be recognised by the public authorities and the results achieved would have to be assessed at regular intervals.

4.3. Option-3: Total ban of phosphates in detergents

This option would establish a ban of phosphates in all detergents at EU level. The need for a review of phosphates use in detergents was a requirement set under Regulation (EC) No 648/2004 on detergents (Article 16(1)), which harmonises the placing on the market of

detergents by considering the biodegradability of surfactants and setting additional labelling rules. Restrictions or bans under this Regulation can be imposed only on grounds of the (non-) biodegradability of surfactants. Therefore a change of the scope of the detergents Regulation would be required, or alternatively a new Regulation could be drawn up, or the ban could be imposed in the framework of the REACH Regulation[33].

4.4. Option-4: Restriction of phosphates in laundry detergents

This option would restrict the use of STTP in laundry detergents, which is the most common category of detergents used by consumers, while allowing further use in dishwasher detergents and I&I detergents. With regard to the possible legislation to be used, the same comments as for option 3 apply.

4.5. Option-5: Setting limit values for the content of phosphates in detergents

The content of STPP would be limited at one or several concentration levels in the various detergent formulations (laundry, dishwashing and I&I). With regard to the possible legislation to be used, the same comments as for option 3 apply.

5. ANALYSIS OF IMPACTS

The analysis of the impacts of the various policy options has been conducted taking into consideration results of the scientific analysis of the contribution of phosphates in detergents to eutrophication risks in the EU, as well as the criteria of effectiveness and efficiency (including practicality, socio-economic impacts, and monitorability). Information has been mainly derived from the INIA study on eutrophication risks associated with phosphates in detergents and the RPA report concerning zeolites and other builders as STPP alternatives, as well as the remarks of the SCHER on the evaluation of these reports. The marketing data and estimated costs refer to the latest information available to the Commission at the time of writing this impact assessment from discussions with all stakeholders at meetings of the Detergents WG and through further consultation of stakeholders.

5.1. Option-1: No action at EU level, leaving the responsibility to act to the Member States (baseline option)

If no legislative action will be taken at EU level, the current situation and trends would remain unchanged. The use of phosphates in detergents would continue to decline over time, due to the ongoing trend of phosphate replacement by detergents manufacturers and actions taken by Member States. However, as mentioned in section 2.6, the trend is slow; it has taken about 25 years to reduce phosphate use by 50%.

Member States having already measures in place could continue to maintain them and could proceed with the adoption of further national measures to replace phosphate-based detergents where this can be justified on environmental grounds (e.g. on the basis of the objectives to be reached under the WFD). Member States wishing to introduce "technical regulations" falling under Directive 98/34/EC will have to notify the Commission and justify that these measures are in accordance with the requirements of the Directive. It should be noted that the WFD provides a mechanism whereby Member States can demonstrate through a risk analysis (Article 5) and the establishment of a cost-effective programme of measures (Article 11) that restrictions on phosphates in detergents are justified and proportionate. Current experiences

[33] Title VIII and Annex XVII of Regulation (EC) No 1907/2006 on REACH provide for criteria and a procedure to restrict the production, placing on the market and use of substances that pose unacceptable risks to human health or the environment, that need to be addressed at EU level.

from Member States have indicated that measures at national level, such as restrictions of STPP in detergents via legislative actions or voluntary agreement (or a combination of both) can effectively tackle eutrophication when trans-boundary flows are not the issue. For instance, Italy has imposed legislative restriction of phosphates in detergents since early 80s, and this has resulted in a significant reduction in the phosphates load and subsequently an improvement in the eutrophication status of Italian lakes and the Adriatic Sea. Similarly, Switzerland reported improvements in the water quality of Lake Geneva after legislative restrictions on phosphates in laundry detergents were introduced in 1985.

Member States could also decide to act in a co-ordinated matter, where particular regional issues require such action. However, as described in section 2.2.3, experience shows that regional initiatives in the Baltic Sea and Danube River Basin have not yet succeeded in dealing with trans-boundary flows, and EU restrictions of phosphates in detergents are requested by those initiatives, most recently in the 2010 Council Conclusions on the Baltic Sea Action Plan and the Ministerial Declaration of the Danube River Protection Convention in February 2010. Furthermore, the absence of harmonised measures at EU level makes more difficult the task of EU Member States in advancing nutrient reduction measures with neighbouring non-EU countries for common water bodies such as the Black Sea or the Baltic Sea.

Phosphates from detergents would continue to contribute to eutrophication – in particular in sensitive areas where phosphates input is a result of trans-boundary flows- albeit with a declining trend due to the (slow) decrease in the use of phosphates in detergents as set out above. Waste water treatment companies would continue to face operational costs for removal of phosphates from detergents. The future development of these costs is more difficult to forecast: on the one hand, the (slow) decreasing trend in phosphate use will reduce costs over time, whereas on the other hand, it is expected that connection rates to WWTP with tertiary treatment will increase in the coming years in particular in EU-12 Member States, as transition periods for full compliance with the UWWTD requirements for wastewater collection and treatment expire only by 2015/2018. Overall costs will, therefore, likely see a peak around 2015, and thereafter a decreasing trend.

In addition, if no action is taken at EU level, the existence of different rules in the Member States would continue to constitute a failure in the establishment of a functioning internal market for detergents. This causes compliance costs for companies operating in several Member States, although they could decide to produce only phosphate-free detergents. Furthermore, current market trends show increasing shares for liquid laundry detergents, which do not contain phosphates. Fragmentation of the internal market would be an advantage for SMEs working only on national markets. On the other hand, Member States and industry would potentially face burdens related to the mutual recognition of products lawfully placed on the markets of other Member States, if these differ in phosphates content.

As mentioned in section 1.1.2, "no EU Action" was favoured by only two Member States during the meeting of the Detergents WG in November 2009. They argued that the complexity of eutrophication and the large regional differences within the EU militate against adopting uniform rules at EU level. Instead of STPP restrictions at EU level, they would prefer a mixture of measures such as: a better implementation of the WWTD and WFD, better practices in the use of phosphate fertilisers, and better information to the public.

Conclusion: The policy option *"no EU action"* is effective for tackling the eutrophication risk at national level. However, it does not seem to be effective to address the problem at short term at regional level, where co-ordinated action of several Member States involving considerable resources in each of them which could be more burdensome than single

Community action. Still, in the light of current market trends, the eutrophication risk would decline, albeit only slowly, whilst costs for P removal from wastewater might see a maximum at around 2015 before declining slowly. This option would not improve the functioning of the Internal Market, nor would it avoid the potential administrative burdens for authorities and industry linked to mutual recognition.

5.2. Option-2: Voluntary action by industry

In a number of EU Member States voluntary action by detergent formulators have been successful in tackling the problems caused by phosphates in detergents (see Annex I, Table 1), but there have also been failures.

Voluntary commitments face the risk of free-riding when one or more companies do not adhere to them. This can easily occur when the number of actors is high, and liability is collective rather than individual. Therefore, the effectiveness of any non-statutory controls such as voluntary commitments or marketing/advertising initiatives is reliant on support from all stakeholders. A voluntary commitment in the Czech Republic failed due to such a lack of support. In 1995, the Czech government and the Czech Association of producers of Soaps, Cleaning Agents and Detergents – CSDPA - which was set up by 5 companies representing 90% of the market agreed to a gradual decrease in the amount of phosphates and other substances in water[34]. The programme initially had some success so that the total amount of phosphates in laundry detergents decreased from 9,000 tonnes in 1995 to 5,065 tonnes in 2003, at which point 36.6% of the overall amount of detergents produced were phosphate free. However, this initial success was eroded by increasing sales of phosphate-based detergents by non-members of the association. As of 2000, the sale of phosphate-containing detergents from producers other than association members started to increase from a market share of 10%, at the time when the voluntary agreement was signed, to 50% by 2005 (as illustrated in Figure 1 of Annex I). The Czech authorities attribute this change mainly to the entry of new companies (in particular SME producers of P-based products) into their national market, and also to a change in consumer behaviour.

Sweden concluded an agreement with industry to reduce the content of phosphates in automatic dishwasher detergents by 40% per weight, but this was not respected in practice. A similar experience from a recent campaign on compact detergents was reported by Slovenia. In other Member States (e.g. Ireland, Germany), however, voluntary withdrawal of phosphate-based detergents from the market has proven to significantly reduce levels of STPP entering WWTP.

The European phosphate industry (CEEP) did not see itself in a position to participate in a voluntary commitment to eliminate or reduce phosphate use in detergents. For CEEP, the impacts for the participating companies of a "voluntary" industry phase-out of phosphates in detergents in Europe would be identical to those of a legal ban.

A.I.S.E represents detergent formulators at EU level. It comprises a network of 35 national associations throughout the EU and some of the multinational detergent formulators and covers a total of 942 member companies active in soaps, detergents or maintenance products. The estimated total market value of A.I.S.E.'s full membership (EU 27, plus Croatia, Montenegro, Norway, Russia, Serbia, Switzerland and Turkey) is around €41.1 billion (A.I.S.E annual review, 2008[35]). AISE possesses knowledge and experience in managing

[34] The full text of Agreement can be found on the Ministry of the Environment of Czech republic website: www.env.cz/AIS/web.nsf/pages/voda_ochrana

[35] Available at: http://www.aise.eu/downloads/AISE_AR2008FINAL.pdf

successful voluntary commitments. For example, in 2006-2007 A.I.S.E. carried out a two-year Laundry Sustainability Project (LSP) with the objective to foster the sustainable consumption of laundry detergents across Europe, placing particular focus on the countries of Central and Eastern Europe, where companies committed to reduce the dosage of a standard washing machine load by at least 33% in weight and 25% in volume. According to data presented in A.I.S.E.'s 2007 annual review, the project was a success and attracted interest from many local companies that participated reaching an average of 80% of total market share. Therefore, in theory such a sustainability project could serve as a template for a voluntary phase-out of phosphates in detergents in the EU. Such an expectation was, in fact, expressed by ICPDR in December 2008[36] indicating that '*further increase in phosphates-free detergents is strongly expected as a result of the Project Laundry Sustainability Program in the identified priority (DRB) countries'*.

However, A.I.S.E informed the Commission in 2008 that it could not commit to a voluntary phase-out of phosphates in household laundry detergents for the following reasons:

- *The ability of a trade association like A.I.S.E or its national association affiliates to enforce a ban is extremely limited since the decision to market phosphate-free products lies with the companies. In addition, while A.I.S.E represents more than 80% of the products on the market, not all detergent manufacturers are members of A.I.S.E or one of its affiliated national associations. Therefore, A.I.S.E cannot guarantee that such a voluntary action would deliver the phosphates reduction levels expected, or that it would be implemented effectively.*
- *In addition, a voluntary ban must be implemented in compliance with anti-trust law, which makes it all the more complicated.*
- *Even if a voluntary action focusing on phosphates in household laundry products was a workable option, it is unlikely that such an action would prevent certain Member States with the most pronounced eutrophication issues to develop more restrictive national legislation. This trend has already started. So the concerns of the companies with respect to the Single Market would remain.*

Conclusion: A formalised voluntary commitment at EU level, agreeing on the necessary standards, ensuring participation by all actors concerned and guaranteeing monitoring of compliance by all EU companies could be feasible and would in principle be capable of achieving all the intended objectives. However, the main actor required – A.I.S.E – is unwilling to do so. Furthermore, it would be rather complicated and may create a significant burden to companies and associations to ensure full market coverage, in particular also all small and medium-sized detergent formulators, and to the monitoring authorities.

5.3. Option-3: Total ban of phosphates in all detergent products

A total ban of phosphates in detergents throughout the EU is the option with the greatest potential to achieve the intended objectives within a short period of time. However, technical feasibility, potential environmental impacts of alternatives and socio-economic impacts on the industry need to be examined.

5.3.1. Benefits of reduced eutrophication

A benefit associated with a move to phosphate free detergents is a reduction in eutrophication through a reduction in the phosphate discharges into the aquatic environment by 110.000 t P

[36] All ICPDR statements and reports at: http://www.icpdr.org

annually (by contrast, most of the 1,5 million t of P used in fertiliser remains on arable land). However, the benefit is difficult to quantify or monetise.

The 2009 INIA model revealed that phosphates in laundry and dishwashers detergents would increase the likelihood of eutrophication in EU waters between 2.3% for the Mediterranean and 5.8% for the Central Baltic eco-regions, respectively. However, the accuracy of the INIA results is uncertain because it is not known whether the data on which the calculations are based are representative. Nevertheless, SCHER concluded that detergent phosphate does not play a major role in eutrophication in an overall EU perspective (see Annex II for more details on the INIA calculations and the SCHER opinion[37]). Greater contributions are calculated for sensitive regions with phosphates input from trans-boundary flows, such as the Baltic and Danube River Basins (see section 2.2.1 and Annex I, Table 4).

The costs of eutrophication are difficult to monetise because of, on the one hand, the complexity of the phenomenon and the number of different impacts it can cause, and on the other hand because these are non-market impacts for which prices cannot be attributed. Environmental impacts include, for example, reductions in the fish population due to algae toxicity, which can lead to a reduction in income for fishermen. Other impacts, such as reductions in attractiveness as tourism destinations, recreational value (for instance impacts on bathing due to algae bloom or increase in jelly fish populations) or impacts on species variety (biodiversity) are more difficult to express in monetary terms.

Available methodologies to infer values for non-market impacts are revealed or stated preferences, which try to derive the willingness to pay (or willingness to accept) a particular outcome. A number of studies have been undertaken to value reductions in eutrophication, for instance by directly asking individuals whether they would be willing to pay a certain amount to finance an improvement in the situation. However, the scenarios and parameters evaluated in the studies differ, which limits comparability of the results[38]. Some studies try to derive willingness to pay (WTP) estimates per household and year, others per kilogram of nutrient avoided and yet others per day trip to a particular area. The size of the environmental improvement (i.e. level of eutrophication reduction) being valued differs in each study, along with the baseline situation. Therefore, even where the same unit of measurement is used, values cover huge ranges (from for example 29 Euros per year and household to 727 Euros per year and adult in two different studies). There is therefore no generally accepted value for the valuation of the environmental damage caused by eutrophication or for the valuation of the benefit of reducing eutrophication. One of the reasons for the lack of a standard value is that impacts on the water environment are subject to significant temporal and spatial variation, i.e. the size of the impact of eutrophication will vary according to where and when the eutrophication occurs. In addition, results of economic valuation studies are highly context dependent and the estimates of willingness to pay are greatly dependent on income levels (i.e. a person's WTP is based on, among other things, their income). This means that the determination of a standard value that takes account of these variations is extremely difficult. Furthermore, the numbers of households that could be associated to different situations are unknown. Given these very significant uncertainties, the present impact assessment does not try to monetise the benefits of reduced eutrophication.

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37 Available at http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_116.pdf

38 Some relevant studies can be found at the following links: ENVALUE database http://www.environment.nsw.gov.au/envalue/, EVRI database http://www.evri.ca/, RED database http://www.red-externalities.net/, Ecosystem Services Database or ARIES database http://esd.uvm.edu/

The RPA report of 2006 contained a more simplistic analysis of the benefits of a move to phosphate-free detergents in the EU. According to this analysis the greatest benefits of a European ban of phosphates in detergents, in qualitative terms, would accrue in those Member States with:

- a high use of phosphates in detergents;
- a low provision of tertiary waste water treatment (resulting in significant phosphorus loads being discharged to rivers/lakes/seas) and
- existing severe problems of eutrophication.

Estimates of per capita consumption of phosphates-based detergents (used in both laundry and dishwashers) are given in Table 5 of Annex I, based on information from the RPA report. From the same study, approximate estimations of national populations connected to tertiary waste water treatment are presented in Table 6 of Annex I while an indication of the extent of (or, in a few countries, concern over) eutrophication within each country is illustrated in Table 7 of Annex I.

As an indicator of which countries would have the greatest potential benefits if they were to become 'phosphate-free', a combination of the three factors (by use of a scoring system) led to the results summarised in the following Table 2.

Whilst this approach is fairly simplistic, it demonstrates that the (potential) benefits associated with a ban of phosphates in detergents vary significantly among Member States. Obviously, in countries which are already 'phosphate-free', or which have a very good UWWTD implementation or have no eutrophication issues (e.g. Malta), there are generally few benefits to be obtained. In its statement[39] of January 2010, Denmark concurs with such a conclusion: "*In Denmark a restriction on phosphates in detergents would not benefit the aquatic environment to any large extent, as 90% of the sewerage is treated in WWTP with effective P -removal".* However, there could be significant benefits in some Member States (Czech Republic, Poland, Latvia, Lithuania, Hungary etc).

Table 2: *Qualitative benefits of Moving to Phosphate-Free Detergents*

Score	Description	Member States
>10	*Maximum Benefits*	Czech Republic, Poland, Spain, Latvia, Lithuania, Portugal, Slovakia
5-10	*Some Benefits*	Greece, Cyprus, Estonia, UK, Luxembourg, Hungary, Belgium, France
1-5	*Few Benefits*	Denmark, Finland, Austria, Sweden, Ireland, Slovenia, Italy, Netherlands, Germany
0	*No Benefits*	Malta

[39] Available at: http://circa.europa.eu/Members/irc/enterprise/wgdet/library?l=/phosphates_detergents/detergents_phosphatespdf/_EN_1.0_&a=d

In conclusion, although the benefits of a total ban of phosphates in detergents from reduced eutrophication can be assessed qualitatively, they cannot be satisfactorily quantified and will vary strongly across the EU. In the light of current market trends, the benefits of avoided eutrophication from a ban will decline, albeit only slowly, but will materialise much faster compared to option 1.

5.3.2. Benefits for Waste Water Treatment

As described in section 2.2.2, removal of phosphates from detergents has significant cost benefits for the operation of WWTP. At current treatment conditions, a ban of phosphates in detergents would save operators of existing WWTP between €10 million to €693 million annually in operating costs. The future development of these benefits is somewhat difficult to forecast: on the one hand, the (slow) decreasing trend in phosphate use in detergents (about 50% over the past 25 years i.e. 2% per year) will reduce benefits of a ban over time, whereas, on the other hand, it is expected that connection rates to WWTP with tertiary treatment will increase in the coming years in particular in EU-12 Member States, which will increase the benefits in terms of avoided treatment costs. Overall benefits of a ban will, therefore, likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits will materialise much faster through the implementation of this option.

5.3.3. Costs of a ban of phosphates in detergents

5.3.3.1. Impacts on the phosphates industry and on producers of alternatives

CEEP contends that STTP produced for use in detergents is a "commodity" product, and that a home market base is essential for the survival of any STPP manufacturer. Where a company loses its "home" STPP market, the resulting reduction in production/sales volumes destroys competitiveness for other markets where local producers still have a "home" sales base with lower transport and export costs. In particular, without a home market in Europe, a European producer cannot compete effectively outside Europe with Asian or South American producers. CEEP reported that there are now 7 STPP producing plants in Europe which would be affected in the event of a ban of phosphates in detergents. CEEP estimated that a total ban of STPP in all detergents could be expected to lead to a total of 3 000 – 5 000 job losses in the EU. Closures of STPP production will have knock-on effects leading to overall plant and site restructuring and closures, while other phosphates based products (e.g. in the food industry) will also be affected as they use common intermediates such as purified phosphoric acid. Without the use in detergents, it is probable that the production of phosphoric acid and its purification would no longer be economically viable in Europe, so that the EU would finally become dependent on imports (in particular from North Africa and other phosphates-rock producing areas). CEEP estimates that in 2007 around 190,000 t of STPP were exported from the EU leading to a contribution to the EU balance of payments at slightly over €100 million. The loss of the European laundry STPP markets would thus imply the loss of this export economy. However, it has to be noted that exports had already declined to 100,000 t in 2008 despite the absence of any legislative action on phosphates by the EU.

Purified (industrial grade) phosphoric acid has a wide range of uses. These include food grade phosphates (in low volumes, but requiring very high purity) and a wide range of different phosphates for different specific applications including also the pharmaceutical industry, ammonium phosphates (used in high-grade garden fertilisers, fire extinguishers, yeast products, for example), dicalcium phosphates (used in dental and other medical products, animal feeds), phosphates for the electronics industries, and in metal surface preparation prior to painting (e.g. car industry). According to CEEP, the termination of STTP production and the ensuing closure of phosphoric acid purification plants would probably lead to the termination of these high-technology, high-value-added products in Europe. However, this

claim seems somewhat exaggerated, as downstream users could replace domestic production of purified phosphoric acid with imports.

According to the report by WRc in 2006[40], the EU currently contributes to less than 10% of the world's STPP production. Therefore, while an EU ban on STPP use would transfer STPP manufacturing to countries outside the EU, such as China and India, the economic loss of this would not be considered great in overall EU terms.

RPA indicates in its report in 2006 that losses for phosphates producers would be offset, to a greater or lesser extent, by an expansion of activities of the EU producers of zeolites (as main alternatives to STPP at this time). There are currently nine EU zeolite manufacturers with plants in Hungary, Italy, UK, Spain (two), Germany, Belgium, Slovenia and Netherlands. However, this was not confirmed by the European zeolite producer association (EUZEPA) who claim that in case of an EU ban of phosphates in detergents no increases (or very limited) in the production of zeolites, the turnover of their companies, or the creation of new job in the sector should be expected. According to information provided by EUZEPA in January 2010 zeolites are no longer the main substitutes for phosphates in detergents. The trend is more towards use of various mixes of co-builders like citrates, polycarboxylates and/or polymers, and, therefore, STPP are not replaced by equal amounts of zeolites as alternative builders. Furthermore, the consumption of powder detergents is decreasing, as they are replaced by liquid detergents in which no builders are necessary.

5.3.3.2. Reformulation & other costs for detergent producers

It can be expected that larger detergent formulators operating in several or all Member States would find it relatively easy to substitute detergents containing phosphates with comparable alternative formulations as they normally already offer phosphate-free detergents in those Member States where phosphates have already been phased out. There might still be some marginal costs associated with re-branding.

The situation becomes more complex for smaller formulators (in particular SMEs) serving only their domestic markets with detergents based on phosphates. The SME consultation (details are presented in Annex III) yielded information on product reformulation. SME detergent formulators informed that they reformulate their products on average every 3.5 years with an average cost of about €5,600. The one-off reformulation costs for replacing phosphates were estimated to be on average at about €10,800. The large majority of SMEs (~60%) also claimed that possible modifications to their production lines would be required in case of STPP substitution. Moreover, ~25% of the SMEs informed of expected adverse economic impacts to their companies from a potential EU ban of STPP in all detergent products such as: 10-20% economic loss (e.g. higher cost of production due to use of more alternatives to achieve a similar cleaning performance), decreased sales, loss of market share, need for new investments, loss of clients etc.

According to the report of RPA in 2006, change in formulation may well place SME formulators at a disadvantage leading to a loss of their market share to the large international companies - particularly in those countries with limited experience of zeolite detergent formulation (such as Poland). However, such disadvantages might be reduced if a sufficiently long transition time would be foreseen before phosphates restrictions would apply.

Membership statistics for A.I.S.E suggest that there could be a few hundred SME formulators across the EU-27 (> 600 in 2007) each producing several formulations. Assuming that each of

[40] Available at: http://www.undp-drp.org/pdf/1.8_Detergents/1.8%20Detergent%20Inception%20Report_WRc-f.pdf

the 600 SMEs would formulate on average between 4 and 22 products (estimate based on the information contained in Annex III) and average reformulation costs of ca. €11.000, total (one-off) reformulation costs would be between €26 million and €142 million.

5.3.3.3. Technical feasibility of STPP alternatives in detergents

Adequate performance of alternative builders to phosphates is important for both private consumers and professional users. A.I.S.E considers that alternatives for phosphates are available and are widely accepted by consumers in the area of household laundry products. However, this is not yet the case for automatic dishwashing (ADW) products because of more demanding technical requirements. A report from A.I.S.E in 2009 based on a consultation of its members[41], identifies the following alternatives to STPP in ADW products: sodium citrates (in combination with polymers/polycarboxylates), sodium phosphonates, gluconate, polycarboxylates; methylglycin diacetic acid (MGDA). A majority of the respondents identified certain points of concern including:

- Limited production capacity/volumes in relation to a number of alternative substances for various reasons such as novelty of substances demand from other industries, limited number of suppliers.
- Greater difficulty in formulating tablets without phosphates due to limitations related to tablet production (e.g. stability, hygroscopy/water absorption).
- Key product performance attributes/dimensions that are impacted when replacing phosphates in ADW such as: soil suspension/dispersion, certain soils/stains, spotting and filming; reduced rinse aid function etc.

Consequently, in order to achieve complete phosphates-free ADW detergents that will have the current level of cleaning performance, further innovation and significant additional investments will still be required.

In the I&I sector, there are, according to A.I.S.E, no satisfactory replacement substances for phosphate available today that would not impact either on performance, or chemical load (e.g. higher surfactant use), or water and energy use, or would lead to increasing use of ingredients with potential adverse effects on health or environment, if they were to be used in higher quantities, e.g. nitriloacetic acid (NTA) and ethylendiammine tetra acetate (EDTA). Table 8 in Annex I contains further details.

Input on the technical feasibility of STPP alternatives was also provided during the 2009 SME consultation (details are given in Annex III). The situation was relatively balanced concerning the question as whether currently it is technically possible to replace phosphates in their detergent formulations, with 42% of SMEs replying positively. A clear majority of the total replies (58%) indicated, though, that SMEs expect less efficient washing and reduced cleaning performance as the main adverse effects of replacing phosphates.

According to this consultation, the main alternative builders, in decreasing order of use, were: phosphonates, citrates, polycarboxylates, zeolites, EDTA and NTA. It seems that zeolites are no longer the builders most commonly used by these SMEs, in contrast to what was noted by RPA in 2006 when zeolites dominated the market of STPP alternatives. This is consistent with information from EUZEPA in 2010 that zeolites are no longer the main substitute for

[41] Available at: http://circa.europa.eu/Members/irc/enterprise/wgdet/library?l=/phosphates_detergents/detergents_2009pdf/_EN_1.0_&a=d

phosphates in detergents as the trend is more toward use of various mixes of co-builders like citrates, polycarboxylates and/or polymers.

5.3.3.4. Economic feasibility of STPP alternatives in detergents

According to A.I.S.E, as for any product, it makes sense economically that changes in supply/demand balance of an ingredient such as STPP could encourage suppliers to commercialise alternatives that may not have been seen as economically viable previously. An assessment of the economics of phosphates *versus* possible alternatives is complicated by the frequent and often unpredictable changes in raw materials availability such as phosphate rock, oil, ethylene, etc. It should be noted that switching to alternatives may not only require full reformulation but may also entail process changes, especially in the I&I sector, with related additional costs. In that context, A.I.S.E argues that harmonised EU legislation regulating the use of phosphates would avoid distortion of the Single Market and undue costs to the consumer.

CEEP has claimed that the additional cost for the detergents industry (which will be passed to the consumer) of manufacturing phosphates-free detergents would correspond in a conservative estimate to 1% of detergents ingredient costs or 0.2% increase in price to the consumer. CEEP has recently (2009) informed that this figure refers only to the ongoing material costs, and does not include the "one-off" R&D, factory equipment and other change-over costs of reformulation. Considering that according to AISE the total market value of soaps, detergents and maintenance products (for both household and I&I products) for 2008 is estimated to be €36 billion (EU 27 + Norway), the above-mentioned 0.2% value would correspond to about €72 million.

In contrast, 60% of the SMEs that participated in the 2009 SME consultation reported that the price of phosphates was on average ~46% higher than the price of alternative builders in their products, although the situation was variable between the Member States. As a consequence, they claimed that the retail price of P-based products may actually be about 19% higher that that of products based on STPP alternatives. However given the problem of technical performance caused by the use of STPP alternatives in particular in ADW and I&I products as explained above, it seems that SMEs and their clients are ready to accept such difference of the retail price in the light of better performance.

5.3.3.5. Health and environmental aspects of STTP alternatives

Health and Environmental Risk Assessment (HERA) reports for STPP alternatives have demonstrated that their use of in household detergents does not cause significant health or environmental risks. Concerning zeolites both the HERA report[42] and the 2003 SCTEE opinion[43] concluded that their use in detergents does not pose any direct health or environmental risks although it would lead to an increase in the use of associated co-builders such as polycarboxylates and phosphonates. In addition, the 2006 RPA report reviewed the health and environmental effects of other STPP alternatives, and this report together with any other available scientific evidence was further evaluated by SCHER. In its opinion of 2007, SCHER identifies no problem for the use of citric acid, however indicated some uncertainties for: (a) phosphonates and EDTA for which further investigation would be required to clarify some uncertainties; (b) polycarboxylates and their co-polymers as particular emphasis was given on some existing uncertainties, mainly concerning the effects of these ingredients in aquatic and terrestrial environmental compartments. A summary of the SCHER opinion on

[42] Available at: http://www.heraproject.com/files/8-F-04-%20HERA%20Zeolite%20full%20V3%20web%20wd.pdf

[43] Available at: http://ec.europa.eu/health/ph_risk/committees/sct/sct_opinions_en.htm

the RPA and HERA reports is given in Annex II. In 2009, the producer industry has committed to further investigations in order to clarify the remaining concerns on polycarboxylates.

The main polycarboxylates producer in the EU (BASF) does not expect a significant increase of polycarboxylates use as a consequence of a phosphates ban in the EU due to a trend to an increased use of liquid laundry detergents which do not contain polycarboxylates (or other alternatives to STPP). A.I.S.E. confirmed this trend and noted that it is, in general, expected that use of liquid laundry detergents continues to grow (especially in Western Europe), which will reduce the consumption of polycarboxylates. In Eastern European countries there may be a time lag in this trend as consumers still mainly use powder laundry detergents. A phosphate-ban might lead to a short-term increase in polycarboxylate consumption, until liquid laundry detergents become established in these countries.

It should be noted also that countries with long-standing legislative restriction on phosphates (e.g Italy, Belgium) informed that no adverse health or environmental effects from use of STPP alternatives have been observed in their territories. Table 8 of Annex I summarises the main functions and environmental issues of the most commonly used STPP alternatives.

There are no significant differences in energy use between P-containing and P-free laundry detergents as washing temperature (the largest factor in energy use) is primarily influenced by the presence of other ingredients such as surfactants and enzymes.

Conclusion: A total ban of detergent phosphate would be the most effective policy option for reducing the eutrophication risk throughout the EU and would in particular also address trans-boundary flows of phosphates in river basins or marine waters shared by several Member States – quantification or monetisation of the benefits of this reduced risk is not feasible. In the light of current market trends, the benefits of avoided eutrophication from a ban will decline, albeit only slowly, but will materialise much faster than in option 1.

Elimination of all phosphates in detergents would reduce operational costs for WWTP under current conditions in the order of €10 million to €693 million per year. Due to the (slow) decreasing trend in phosphate use and increasing connection rates to WWTP with tertiary treatment the benefits in terms of avoided treatment costs will likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits will materialise much faster through the implementation of this option.

This option would ensure a fully harmonised internal market for detergents, thus eliminating any additional costs for industry and administrations due to the current fragmentation and avoiding potential new costs from the requirements for mutual recognition. The option would also be more efficient than individual action by all Member States concerned, where regional co-operation is required.

A ban of phosphates in the entire EU would cause adverse economic impacts on SME formulators (the majority of which mainly formulate I&I products) leading to a loss of their market share to the large international companies. Total reformulation costs (one-off) are estimated in a range of €20 – €142 million. When comparing the lower estimates of reformulation costs and benefits in avoided waste water treatment costs, net benefits would accrue after 2 years, whereas using the higher estimates would lead to net benefits within one year already. However, currently no technically feasible alternatives exist for I&I products, while issues of technical performance have not been completely resolved for ADW products. The actual costs for replacing phosphates in ADW and I&I would therefore be much higher as additional significant investments in research and innovation would be necessary. A ban of

phosphates despite the lack of alternatives for ADW and I&I detergents would also have negative consequences for consumers and professional users of detergents.

Phosphates producers would suffer from plant closures and job losses of 3000-5000, which would not be offset by additional production or jobs for zeolite producers. Producers of other alternatives might see such economic benefits, but no quantitative information is available.

At the discussions of the November 2009 meeting of the Detergents WG, this policy option was favoured by 3 Member States that have already restricted the use of phosphates in laundry detergents and see such a measure as a step forward to further combat eutrophication in their waters.

5.4. Option 4: Restriction of phosphates in laundry detergents

This option is similar to option 3, but as it would affect only laundry detergents and not ADW or I & I detergents, the magnitudes of benefits and costs will be different.

5.4.1. Benefits of reduced eutrophication

About 60% of STPP in the EU is currently used in laundry detergents according to CEEP. Their elimination will reduce the risks of eutrophication similar to option 3, albeit to a smaller extent. As in option 3, these benefits cannot be quantified or monetised. In the light of current market trends, they will decline, albeit only slowly, but will materialise much faster compared to option 1.

5.4.2. Benefits for waste water treatment

The benefits to WWTP are accordingly 60% of those of option 3, namely between €6 million to €415 million annually for the operating costs. Due to the (slow) decreasing trend in phosphate use and increasing connection rates to WWTP with tertiary treatment the benefits in terms of avoided treatment costs will likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits would materialise much faster through the implementation of this option.

5.4.3. Cost of a restriction on STPP in laundry detergents

5.4.3.1. Impacts on the phosphates industry and on producers of alternatives

CEEP has recently contended that the majority of EU STPP production goes into domestic laundry detergents, whereas the dishwasher detergent STPP market alone does not offer the demand necessary to absorb excess production in the case of an EU ban of phosphates in laundry detergents. In addition, industrial and food phosphates involve considerably lower volumes and different qualities of product, and could not take up excess detergent STPP production. Therefore, a laundry detergent phosphate ban would lead to closures of some STPP production units, and could lead to a total of 1000 – 1650 job losses in the EU. CEEP also considers that given that the zeolite industry currently faces over-capacity, and the significant STPP export markets which would be lost, it is improbable that these job losses would be compensated by job creation elsewhere. As mentioned in section 5.3.3.1, this has also been confirmed by EUZEPA.

5.4.3.2. Reformulation and other costs for detergent producers

From the consultation of SMEs formulators of laundry detergents concerning the impact of potential STPP restrictions, it emerged that replacement of phosphates in laundry detergents is in principle possible (feasibility of alternatives is explained in option 3) but some companies assert that the zeolite based products will have a lower performance and there will be problems with laundry powder in the clothes after washing. The problem is generally

perceived as more severe in the Mediterranean, where water is harder compared to the very soft water conditions in Scandinavia, and would therefore concern more the SMEs in these countries. Overall, it is possible that a small number of SMEs that are specialised in phosphates-based laundry detergents could loose their market share to the advantage of the large multinational companies.

The 2009 SME consultation revealed that 50% of the responding SMEs produced laundry detergents (solely or in addition to other types) with on average 4 production lines. With similar estimation as previously given in option 3 (for a total of 600 European SMEs and an average reformulation cost of ~€11.000) total reformulation costs for substituting phosphates for SMEs producing laundry detergents will be ~€13.2 million. However, it should be noted that detergent manufacturers need to reformulate their products on a regular basis to maintain competitiveness, so that allowing sufficient time for reformulation may be a more important issue than cost.

5.4.3.3. Technical and economic feasibility and health and environmental considerations for alternatives to phosphates in laundry detergents

These factors have already been examined as part of the analysis of option 3. A.I.S.E and SME's have confirmed that a replacement of phosphates in laundry detergents is technically feasible without loss of performance for private consumers, and is not expected to lead to higher product costs (apart from the reformulation costs mentioned in the preceding section).

Apart from the remaining uncertainties around polycarboxylates already discussed in option 3, no adverse effects on human health or the environment are expected.

Conclusion: A ban of phosphates in laundry detergents would reduce the eutrophication risk throughout the EU and would in particular also address trans-boundary flows of phosphates in river basins or marine waters shared by several Member States – albeit to a somewhat lesser extent than option 3. A quantification or monetisation of the benefits of this reduced risk is not feasible. Benefits will decline over time in the light of market trends, albeit only slowly, but will materialise much faster compared to option 1.

Elimination of phosphates in laundry detergents would reduce operational costs for WWTP under current conditions in the order of €6 million to €415 million per year. Due to the (slow) decreasing trend in phosphate use and increasing connection rates to WWTP with tertiary treatment the benefits in terms of avoided treatment costs will likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits would materialise much faster through the implementation of this option.

Total reformulation costs (one-off) for laundry detergent formulators are estimated at ~€13.2 millions, but there would not be any significant problems with regard to technical or economic feasibility otherwise. Neither private consumers nor professional users of detergents will be adversely affected. When comparing the reformulation costs and benefits in avoided waste water treatment costs, using the lower estimates for avoided costs in waster water treatment would lead to net benefits within 3 years, whereas using the higher estimates would lead to net benefits within one year already. Annex IV contains a sensitivity analysis for the comparison of costs and benefits of option 4 for various scenarios.

A transition period of ca. 3 years in line with normal reformulation cycles would reduce costs for adaptation by SME formulators of laundry detergents somewhat more, in particular for those located in new MS as recently underlined by Poland, Hungary and others. CEEP estimates job losses of ~1000-1650 in phosphates producing companies, which would probably not be offset by gains for zeolites producers.

This option would ensure a fully harmonised internal market for laundry detergents, thus eliminating any additional costs for industry and administrations due to the current fragmentation and avoiding potential new costs from the requirements for mutual recognition. The option would also be more efficient than individual action by all Member States concerned, where regional co-operation is required. Full harmonisation would not be achieved for ADW or I&I detergents. However, it should be noted that only very few Member States (e.g. Sweden, France) have informed of their intention to extend their existing legislative restrictions for phosphates in laundry detergents to I&I and ADW products in the future (with appropriate transition periods).

At the discussions of the November 2009 meeting of the Detergents WG, this policy option was favoured by 14 Member States, as the most appropriate and effective policy option. It should be noted that further consultation with Member States in 2010 revealed that, in spite of the availability of efficient alternatives, a requirement for a zero content of phosphorus in laundry detergents would be impractical for reason of technical performance (but also due to the use of phosphonates as co-builders to zeolites). Therefore, for regulatory purposes a certain limit value (expressed as elemental phosphorous) will have to be defined.

Member States would prefer a harmonised limit close to their existing national limits. Italy and the Czech Republic have imposed in their law a limit of 0.5% P w/w. Latvia and Poland are proposing the same limit in their draft national legislation, which is not yet adopted, whilst UK is envisaging a vey similar limit of 0.4% P w/w. Sweden and Norway restrict phosphates at 0.2% P w/w. The lower restriction level imposed by Nordic countries may be associated to their "soft water" conditions which therefore require fewer quantities of phosphonates as STPP alternative builders to achieve the same cleaning performance of the product. Looking beyond the EU, since the early 1970s and the Clean Water act of 1972, an increasing number of US States - starting first with voluntary agreement - implemented either complete or partial bans of phosphates in laundry detergents with phosphorous content usually limited to 0.5% by weight. More recently, Canada has informed of their intention to impose a 0.5% w/w limit for P in laundry detergents. An EU limit will therefore be set somewhere in the range of 0.2 – 0.5% w/w in further consultations with the Member States.

5.5. Option-5: Setting limit values for the content of phosphates in all detergents

5.5.1. Feasibility

At the meeting of the Detergents WG in November 2009, three Member States favoured setting different limit values for P in laundry, ADW and I&I detergents as most proportionate risk management measure. Whereas there is a large degree of consensus that limit values for P in laundry detergents should be in the range 0.2 – 0.5%, there is much less consensus on appropriate limits for P in ADW and I&I detergents.

Italy has set a limit of 6% P by mass for ADW detergents. Norway has adopted a limit value of 3.8% by mass for ADW detergents and 10% for I&I detergents. This shows already that opinions on the appropriate limit values are widely diverging and practical experience is not yet much developed. There would, therefore, be a risk that a final compromise at EU level would not be accepted by those Member States who have already set a lower limit in national legislation, which could lead to requests under Article 114 TFEU by these Member States to maintain the national legislation for ADW and I&I detergents. Such requests trigger significant work for the requesting Member State and the Commission to adopt a formal decision on the request within 6 months.

A.I.S.E favours a quite different approach for ADW detergents, namely, a limit value equivalent to 2,5 grams P per wash. A 'grams-per-wash' limit will allow more flexibility for

further compaction of ADW detergents, which is seen as a key to enhanced sustainability via reduced chemicals use, reduced packaging, and reduced transportation, thus enabling lower energy consumption and therefore lower CO_2 emissions. The limit value corresponds to the current phosphates ceiling criterion of the EU Ecolabel. A.I.S.E believes manufacturers could meet such a requirement by 2012. For I&I detergents A.I.S.E. believes continued use of phosphates is necessary given the performance level required for those applications and the diversity of formulations and therefore no technically acceptable limit can be proposed for the time being.

5.5.2. Cost and benefit considerations

In general, the cost and benefit estimations as indicated in the analysis of options 3 and 4 are also valid for this option, as the existing limits mainly impact the deliberate use of phosphates in detergents: at 0.5% (or lower) P w/w in laundry detergents, practically no phosphates can be added to laundry detergents, as solely P from phosphonates (co-builders for zeolites) will already come close to this limit value. Depending on where the limit values for ADW and I&I products would be set (if indeed harmonised values could be proposed at this time), impacts on companies from the adoption of this policy option at EU level would be similar to those of a total ban, because extensive reformulation would be necessary.

The benefits for eutrophication and for the reduced cost of waste water treatment would be intermediate between options 3 and 4.

Conclusion: This policy option could be effective, in theory, in reducing the eutrophication risk at EU level by reducing the STTP use in all detergent formulations. However, in terms of practicality, it would not be easy to agree on common EU restriction levels for ADW and I&I detergents that would be feasible and technically / economically viable. Given the current performance limitation in ADW and I&I products, further investigation would be required in order to agree on technically feasible phosphate levels. Setting limit values that are not accepted by all Member States could lead to high administrative burdens for submitting and deciding on requests for derogation under Article 114 TFEU.

6. COMPARING THE OPTIONS

A comparison of the examined policy options in terms of effectiveness, efficiency, environmental impacts, and economic cost/benefit estimations is given below in Table 3.

TABLE 3: *COMPARISON OF THE EXAMINED POLICY OPTIONS*

OPTION	**EFFECTIVENESS**	**EFFICIENCY**	**ENVIRONMENAL IMPACTS**	**COST/BENEFITS**
Option-1: ***No action at EU level, leaving the responsibility to act to the Member States (baseline option)***	**Neutral:** Current trends would continue, eutrophication risk maybe be effectively tacked only at national level, overall use of phosphates in detergents would gradually decrease.	**Neutral:** This option would not improve the functioning of the Internal Market (MS could still adopt diverging rules) nor would it reduce the administrative burdens to administrations and industry linked to mutual recognition.	**Neutral:** not sufficient to combat eutrophication at regional level, where co-ordinated action of several Member States would require considerable resources from each of them, but gradual decrease expected in the light of decreasing phosphates use.	**Neutral:** total costs in waste water treatment plants with tertiary treatment for phosphate removal would amount to €10-693 million per year (only for chemical treatment), maximum expected around 2015 due to increasing connectivity to WWTP but thereafter gradual decrease due to slowly decreasing phosphates use.
Option-2: ***Voluntary action by industry***	**(+)** A formalised voluntary commitment at EU level, agreeing on the necessary standards, ensuring participation by all actors concerned could be, in theory feasible and effective.	**(-)** Considering the current unwillingness of the relevant industry to organise such voluntary action, the measure does not appear to be feasible.	**(+)** In theory, it could reduce the eutrophication risk throughout the EU.	**(-)** Administrative costs for industry and local supervising bodies for setting up, enforcing and monitoring voluntary commitments can be significant.
Option-3: ***Total ban of phosphates in detergents***	**(++)** It would be an effective policy option in reducing the eutrophication risk throughout the EU.	**(++)** This option would improve the functioning of the Internal Market and would reduce the administrative burdens to administrations and industry linked to mutual recognition A single action at EU level would be more efficient than multiple actions by	**(++)** The option would yield the greatest benefits in terms of reduced eutrophication risks. It would reduce cross-boundary flow of phosphates in river basins or marine waters shared by several Member States. Benefits would decrease slowly over time due to decreasing trend in phosphates use, but would materialise much faster	**(--)** Total reformulation costs for SMEs are roughly estimated in a range of €20 – 142 million (one-off). Total savings in waste water treatment plants with tertiary treatment for phosphate removal would amount to €10 to €693 million per year. Due to the (slow) decreasing trend in phosphate use and increasing connection rates to WWTP with tertiary treatment the benefits in terms of avoided treatment costs will likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits would materialise much faster through the implementation of this option.

		Member States.	than in option 1.	When comparing the lower estimates of reformulation costs and benefits in avoided waste water treatment costs, net benefits would accrue after 2 years, whereas using the higher estimates would lead to net benefits within one year already. However, there are currently no technically feasible alternatives exist for I&I products, while issues of technical performance have not been completely resolved for ADW products. This would lead do significant costs for research and innovation. Consumers and professional users would be adversely affected. Job losses of 3000-5000 are expected by P-industry, which will only be partly offset by gains in the production of alternatives.
***Option-4:** Restriction of phosphates in laundry detergents*	**(+)** It would be an effective policy option in reducing the eutrophication risk throughout the EU considering that 60% of STPP is used in laundry detergents.	**(+)** It would ensure a fully harmonised internal market for laundry detergents, thus eliminating any additional costs for industry and administrations due to market fragmentation and the requirement for mutual recognition. A single action at EU level would be more efficient than multiple actions by Member States.	**(+)** The option would lead to benefits in terms of reduced eutrophication risks, albeit somewhat lower than option 3. It would be effective to reduce cross-boundary flow of phosphates in river basins or marine waters shared by several Member States. Benefits would decrease slowly over time due to decreasing trend in phosphates use but would materialise much faster than in option 1.	**(++)** Total reformulation costs for SMEs are roughly estimated in a range of €13 million and SMEs. Total savings in waste water treatment plants with tertiary treatment for phosphate removal would amount to between €6 and €415 million. Due to the (slow) decreasing trend in phosphate use and increasing connection rates to WWTP with tertiary treatment the benefits in terms of avoided treatment costs will likely see a peak around 2015, and thereafter are expected to diminish over time. However, compared to option 1, benefits would materialise much faster through the implementation of this option. Comparing the reformulation costs and benefits in avoided waste water treatment costs, when using the lower estimates net benefits would accrue within 3 years, whereas using the higher estimate would lead to net benefits within one year already Technically and economically feasible alternatives exist. Job losses of 1000-1650 are expected by P-industry, which will only be partly offset by gains in the production of alternatives.
***Option-5:** Setting limit values for the content of phosphates in detergents*	**(+)** Similar to Option 3.	**(-)** It would not be easy to agree on common EU limits that would be feasible, in particular for I&I and ADW detergents.	**(+)** Impacts somewhere between options 3 and 4.	**(--)** Impacts on companies would be somewhere between those of option-3 or 4 (dependent on the restriction limit) Significant administrative burden are expected for MS, that would submit requests under Article 114 of the Treaty to be authorised to maintain their current legislation.

In conclusion, **option 4 (restriction of phosphates in laundry detergents)** would be an effective and proportionate measure to reduce the eutrophication risk throughout the EU. It addresses the cross-boundary flow of phosphates from the main detergent source in river basins or marine waters shared by several Member States more effectively than Member States can do alone or in regional agreements. It would create a fully harmonised internal market for laundry detergents. Costs for industry and administrations due to the current fragmentation and the requirement for mutual recognition would be eliminated. This option would be easily accepted by Member States and detergent formulators.

The measure would be proportionate as technical and economically feasible alternatives for phosphates in laundry detergents are available (contrary to ADW and I&I detergents). Neither consumers nor professional users would be adversely affected. Detergent formulators would need to spend about €13 million on reformulation as a one-off cost, which would be largely offset by reduced costs for removal of phosphates in WWTP of the order of €6 to €415 million per year. Comparing the reformulation costs and benefits in avoided waste water treatment costs and using the lower estimates, net benefits would accrue within 3 years, whereas using the higher estimates would lead to net benefits within one year already. Removal of phosphates from laundry detergents appears thus to be a more cost-efficient measure for nutrient elimination in waste water than waste water treatment. In addition, compared to option 1, benefits would materialise much faster through the implementation of this option. To accommodate the reformulation into their normal product development cycle, SMEs would need several years to adapt their whole range of products.

The most significant negative impacts would be on phosphate producers who would loose part of their market with closure of some plants and expected job losses of 1000 - 1650. However, it has to be noted that use of phosphates in detergents has already declined significantly in the past and phosphates producers would have to adapt to this trend in any case.

Option 3 would generate high benefits when only comparing direct reformulation and waste water treatment costs. However, there are currently no technically feasible alternatives for I&I products, while issues of technical performance have not been completely resolved for ADW products. This would require significant additional efforts in research and innovation. A number of EU SMEs may be adversely affected. In addition, option 3 would result in 2000-3000 additional job losses compared with option 4. Option 4 would allow reaping significant net benefits without raising problems regarding performance or availability.

Option 4 was favoured by the majority of Member States, as indicated during the meeting of the Detergents WG in November 2009 and by written statements sent to the Commission.

The policy option could be implemented in a number of ways: by amending Regulation (EC) No 648/2004 on detergents, by an ad hoc regulation, or by imposing restrictions under Regulation (EC) No 1907/2006 (REACH), although the latter would mean that the procedures foreseen in REACH will have to be followed, which would lead to further delays in adopting the envisaged restrictions.

There would be no impact on the EU budget.

No significant impacts on administrative burden for enterprises are expected.

SME impacts have been described in various sections (see also Annex III B).

7. MONITORING AND EVALUATION

Monitoring the implementation of a ban of the use of phosphates in detergents should be relatively straightforward, given that suitable systems have been established either under the

Detergents Regulation or under other legislative frameworks that impose restrictions of chemicals (e.g. monitoring mechanisms under the REACH Regulation). Monitoring restrictions of phosphates in detergents will only be a marginal addition to obligations to monitor an existing range of restrictions on chemical substances already being monitored. Additional efforts might be required by customs services (or other authorities in the Member States in charge of monitoring imports), but again, the necessary structures and practices should already be in place with regard to a number of other substances which are already restricted and have to be monitored.

Eutrophication will be regularly monitored under the WFD (at least every 6 months for phytoplankton and every 3 years for other aquatic flora). The reports of the Member States on the design of the monitoring programmes (Art. 8 WFD) show that monitoring of eutrophication is largely in place.

The Commission will also monitor further developments with regard to technical and economic feasibility with regard to the replacement of phosphates in ADW detergents, and if appropriate, consider an extension of the restrictions for the use of phosphates to ADW detergents.

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9. GLOSSARY OF ACRONYMS

A.I.S.E	International Association for Soaps, Detergents and Maintenance Products
ADW	Automatic Dishwashers
BAT	Best Available Techniques
CEEP	European Detergent Phosphate Industry
CSDPA	Czech Association of producers of Soaps, Cleaning Agents and Detergents
DEFRA	Department for Environment Food and Rural Affairs
DRB	Danube River Basin
DRBMP	Danube River Basin Management Plan
EDTA	Ethylendiammine tetra acetate
EEB	European Environmental Bureau
EFMA	The European Fertilizer Manufacturers Association
EINECS	European Inventory of Existing Chemical Substances
EUZEPA	European Zeolites Producers Industry
JRC	Joint Research Centre
HELCOM	Helsinki Commission
HEDP	1-Hydroxy ethane diphosphonic acid
HERA	Human and Environmental Risk Assessment
IASG	Impact Assessment Steering Group
I&I	Industrial and Institutional
ICPDR	International Commission for the Protection of the Danube River
INIA	Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria
LSP	Laundry Sustainability Project
MGDA	Methylglycin diacetic acid
NGOs	Non-Governmental Organisations
NTA	Nitriloacetic acid
P	Phosphorous
P(AA-MA)	Copolymer of acrylic acid and maleic acid
PEC	Predicted Environmental Concentration
PNEC	Predicted No Effect Concentration
REACH	Registration Evaluation Authorisation of Chemicals
RPA	Risk & Policy Analysts
SCHER	Scientific Committee on Health and Environmental Risks
SCTEE	Scientific Committee on Toxicity, Ecotoxicity and the Environment

SMEs	Small Medium Enterprises
STPP	Sodium tripolyphosphates
TFEU	Treaty on the Functioning of the European Union
UNDP/GEF	United Nations Development Program/Global Environment Facility
UWWTD	Urban Waste Water Treatment Directive
WFD	Water Framework Directive
WTP	Willingness To Pay
WWTP	Waste Water Treatment Plants

ANNEX I: TABLES AND FIGURES

Table 1: *Degree to which EU Member States were Phosphate-Free in laundry detergents in 2009. Type of measures (combined data from RPA-2006 and other sources)*

Member State	*Population (~millions)*	*% P-free Detergents*	*Type of measures to reduce STPP in laundry detergents*
Belgium	10.4	100	National legislation
Czech Republic	10.2	35	National legislation (0.5% P w/w)
Denmark	5.4	80	No measures (initiative of producers for P free detergents)
Germany	82.5	100	Voluntary agreement + legislation
Estonia	1.3	20	No measures
Greece	11.0	50	No measures
France	59.9	100	National law (total ban)
Ireland	4.0	100	Voluntary agreement
Italy	57.8	100	National law (0.5% P w/w)
Cyprus	0.7	20	No measures
Latvia	2.3	From 15→100	Preparation of national legislation (0.5% P w/w)
Lithuania	3.4	20	No measures
Luxemburg	0.4	100	No measures
Hungary	10.1	30	No measures
Malta	0.4	20	No measures
Netherlands	16.2	100	National law
Austria	8.1	100	National law
Poland	38.2	From 15→100	Preparation of national legislation (0.5% P w/w)
Portugal	10.4	30	No measures
Slovenia	2.0	95	Voluntary agreement
Slovakia	5.4	20	No measures
Spain	42.2	40	No measures
Finland	5.2	90	Voluntary agreement
Sweden	9.0	100	National legislation (0.2% P w/w)
United Kingdom	59.5	From 55→100	Preparation of national legislation (0.4% P w/w)
EU-25*	**456.0**	**66**	

** There are no national measures to restrict the use of phosphates in detergents in either Bulgaria or Romania.*

Table 2: *Existing EU legislation to combat eutrophication*	
Directive	***Requirements for MS***
Directive 91/271/EEC (UWWTD) concerning urban waste water treatment	Tertiary treatment (which removes phosphates) is required at waste water treatment plants serving agglomerations of more than 10,000 population equivalents, and which discharge into areas sensitive to eutrophication;
Directive 91/676/EEC[44] concerning the protection of waters against pollution caused by nitrates from agricultural sources.	Member States are required to identify vulnerable zones and to establish and implement action programmes in order to reduce water pollution from nitrogen compounds.
Directive 96/61/EC[45] concerning integrated pollution prevention and control	Member States are required to issue permits for certain industrial installations according to the best available techniques (BAT). Annex III of the Directive, the indicative list of the main polluting substances to be taken into account for fixing emission limit values, includes substances which contribute to eutrophication, in particular nitrates and phosphates.
Directive 2000/60/EC[46]**, the Water Framework Directive (WFD),** has led to an increased focus on eutrophication and to a more holistic approach to water management[47].	Member States must enact programmes of measures to ensure that water bodies throughout the EU reach "good status" by 2015. In cases where WFD monitoring and assessment shows that phosphorus inputs are significantly contributing to eutrophication, Member States must implement measures to address this problem.

44 Directive 91/676/EEC, OJ L375, 31.12. 1991, p.1

45 Directive 96/61/EC, OJ L 257, 10.10.1996, p.26

46 Directive 2000/60/EC, OJ L327, 22.12.2000, p.1.

47 Directives 91/271/EEC, 91/767/EEC and 96/61/EC are "basic measures" under the WFD and must be coordinated and, where necessary complemented to achieve the mandatory objectives.

Table 3: Phosphorus sources (detergents and human wastes) from wastewater to surface water considering no treatment (gross loadings) or secondary (Scenario 1) and tertiary (Scenario 2) treatment, respectively (UK Water Industry, 2008)

Country	**Population connected to WWTP (%)**	**Gross input (%) No sewage treatment**			**Scenario 1 Secondary treatment**			**Scenario 2 Tertiary treatment**		
		P-Det	Human Wastes	Sum	P-Det	Human Wastes	Sum	P-Det	Human Wastes	Sum
Austria	86	8	66	74	7	57	64	4	31	35
Belgium-Luxembourg	40	7	72	79	6	65	71	6	57	63
Denmark	89	12	55	67	10	45	55	5	21	26
Finland	81	6	47	53	5	37	42	2	17	19
France	79	23	53	76	20	46	66	13	29	42
Germany	93	7	70	77	6	61	67	3	30	33
Greece	50	27	53	80	24	48	72	21	40	61
Ireland	70	3	53	56	2	42	44	1	25	26
Italy	75	2	76	78	2	67	69	1	46	47
Netherlands	99	7	72	79	6	63	69	2	26	28
Portugal	42	34	46	80	31	41	72	28	37	65
Spain	89	24	48	72	21	41	62	10	20	30
Sweden	93	7	53	60	6	42	48	2	15	17
United Kingdom	88	26	59	85	24	54	78	15	35	50
Czech Republic	72	16	63	79	14	56	70	10	40	50
Hungary	57	16	58	74	14	50	64	11	39	50
Poland	58	13	63	76	12	56	68	9	44	53
EU-18 mean	80	15	61	76	13	53	66	8	33	41

Source: Wind et al. (2007).

Note: Wastewater from population not connected to WWTP received 30% P-reduction by default. WWTP connection according to Eurostat (2006).

Table 4: *Summary results of the INIA model for the contribution of phosphates from detergents to the eutrophication risk in the tested EU eco-regions (Values are presented as percentages of the eutrophication risk)*

Risk contribution	Mean	Median	10thPercent	90thPercent
Central /Baltic				
Laundry (L)	3.1	0.8	0.0	9.6
Dishwashing (D)	2.7	3.1	0.6	4.8
L+D	5.8	4.5	2.0	10.4
Mediterranean				
Laundry (L)	1.2	0.9	0.0	3.2
Dishwashing (D)	1.1	1.1	0.0	1.9
L+D	2.3	1.7	0.5	4.5
Northern				
Laundry (L)	2.0	1.9	0.3	3.2
Dishwashing (D)	3.3	3.6	0.6	4.9
L+D	5.3	5.7	1.0	8.0
Atlantic				
Laundry (L)	1.5	1.6	0.5	2.3
Dishwashing (D)	1.6	1.8	0.6	2.5
L+D	3.2	3.5	1.2	4.9

Table 5: *Annual Use of Phosphates in Detergents Per Capita (RPA, 2006)*		
Score	**Description**	**Applicable Member States**
1	Very Low (<2 kg/person)	Slovenia, Luxembourg, Italy, Austria, Ireland, Belgium, Germany, Netherlands
2	Low (2-4 kg/person)	Lithuania, Slovakia, Estonia, Latvia, Hungary, Denmark, Sweden, Finland
3	Medium (4-6 kg/person)	France, Greece, UK, Malta, Czech Republic
4	High (>6 kg/person)	Cyprus, Portugal, Poland, Spain

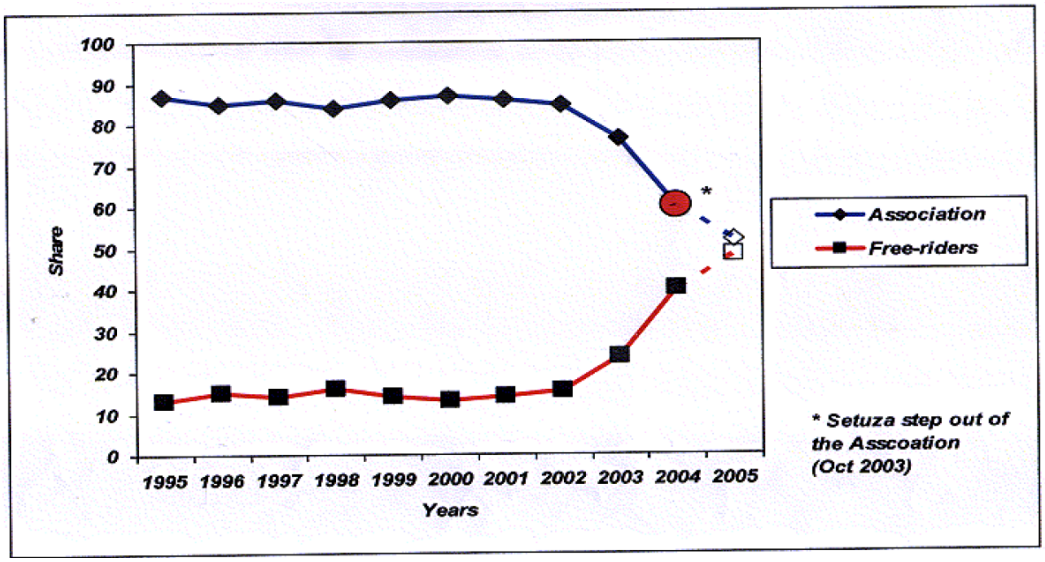
Table 6: *Percentage of Population Connected to Waste Water Treatment Plants with Tertiary Treatment (RPA, 2006)*		
Score	**Description**	**Applicable Member States**
1	High (>75%)	Denmark, Germany, Finland, Sweden, Netherlands
2	Medium (20-75%)	Austria, Estonia, Cyprus, UK, Italy, Poland, France (?)
3	Low (<20%)	Luxembourg, Belgium, Greece, Hungary, Spain, Portugal, Ireland, Slovenia, Malta, Czech Republic, Lithuania, Latvia, Slovakia

Table 7: *Extent of (Concern over) Eutrophication (RPA, 2006)*			
Score	**Description**	**EU-15**	**EU-10**
0	No sensitive areas		Malta
1	Some sensitive areas	France, Greece, Ireland, Italy, Portugal, Spain, UK	Hungary, Slovenia, Cyprus
2	Entire territory (effectively) designated as 'sensitive area'	Austria, Belgium, Denmark, Sweden, Luxembourg, Finland, Netherlands, Germany	Estonia, Latvia, Lithuania, Poland, Slovakia, Czech Republic

Table 8: *Properties of some alternatives to STPP in detergents (Sources: 2008 UK Water industry report & 2008 Commission report on non surfactant organic ingredients[48])*		
Name	Description	Environmental issues
Polycarboxylates	Polymers are used as co-builder in detergent because of their "threshold effect" which means that optimal effectiveness is obtain at low levels. In hard water they precipitate and the dispersing effect is lost. Therefore these are only effective in water softened by addition of a zeolite or complex. agent.	Although polycarboxylates do not readily biodegrade, it is unlikely that their use in detergents would lead to significant risks to consumers or to the environment due to their low toxicity and ecotoxicity. However, further clarification of the risk to the terrestrial compartment is on-going
Phosphonates	Phosphonates are mainly used in cleaning products as chelating agents and/or scale inhibitors	There is a broad consensus that phosphonates degrade slowly and may present a risk to the environment with concern being focused on the potential aquatic chronic toxicity of HEDP (and its salts) to Daphnia. Terrestrial toxicity is low and their presence in sewage sludge does not present a significant risk.
EDTA and EDTA tetrasodium salts	Used as a chelating agent to complex water-hardness ions in water.	Available data indicate that EDTA and its salts may be of certain concern to the environment with regard to their use in industrial and institutional (I&I) cleaning but not for household detergents (where their use is limited).
NTA and salts Nitrilotriacetic Acid (NTA)	NTA chelates water-hardness ions less strongly than EDTA but has a superior biodegradability	Although NTA appears not to be of concern to the environment, its presence in a detergent (as for EDTA) excludes the award of an eco-label due to its potential carcinogenicity (classified as a Category 3 Carcinogen with an R40 label)
Sodium citrate	Citrates are naturally occurring compounds which biodegrade rapidly and which have water-softening properties similar to those of NTA.	Sodium citrate is rapidly and completely biodegradable under aerobic and anoxic conditions, it is not expected to bio-accumulate in organisms and has a low toxicity to aquatic organisms
Sodium silicates	have good builder properties and stabilise the bleach system. They also inhibit the corrosion of stainless steel and aluminium by synthetic detergents.	Once soluble silicates reach the aquatic environment, they are diluted and depolymerise rapidly to give molecular species indistinguishable from natural dissolved silica. The removal of silica in several WWTP was measured ~10%

[48] Commission Report (COM_2009_0208) on non surfactant organic ingredients available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0208:FIN:en:PDF

Figure 1: *Development of market share of Association members and free-riders in the Czech Republic following the voluntary agreement for the phase-out of laundry P-based detergents 1995-2005 (UNDP, 2006).*



ANNEX II: Scientific studies and models

1. ESTABLISHING THE SCIENTIFIC KNOWLEDGE ON THE CONTRIBUTION OF PHOSPHOROUS IN DETERGENTS TO EUTROPHICATION - COMMISSION STUDIES AND THEIR EVALUATION BY THE SCIENTIFIC COMMITTEES

As one of its first activities with regard to phosphates in detergents, the Commission contracted a study to WRc to investigate the costs and benefits of substituting phosphorus[49] in household detergents with other builders, and to recommend the most appropriate methods of reducing phosphorus concentrations in surface waters. The study, published in June 2002[50], concluded that:

(i) a ban of phosphates in detergents, though it would result in P-load reductions of 40%, would not suffice alone to substantially improve eutrophication at EU level;

(ii) zeolite A is a suitable alternative to STPP, in terms of non-adverse effects on humans, energy used, and sludge production.

The Commission's Scientific Committee on Toxicity, Ecotoxicity and the Environment (SCTEE) gave a first opinion in March 2003 on the WRc report, identifying a number of weaknesses, in particular mentioning that the report's conclusions were not adequately substantiated. Following submission of additional data in the HERA reports on STPP and zeolites A, SCTEE adopted an updated opinion in November 2003, concluding that: "*within the EU area, the contribution of phosphate-based detergents to eutrophication is extremely variable country by country as well as in different hydrographic basins as a function of human activities and land use*". Furthermore, the SCTEE proposed that *a quantitative assessment of the extent of eutrophication in EU waters in relation to phosphorus load from different sources, and in particular in relation to STPP contribution, could be performed on the basis of a literature review on existing experimental and modelling information, produced on the evolution of the eutrophication problem and on the recovery of eutrophic water bodies.*

In line with the SCTEE opinion, a further study was undertaken to obtain quantitative estimates of the effects on eutrophication of switching from phosphate-based to phosphate-free detergents. The study was financed by the industry federation for detergent phosphates manufacturers (CEEP - Centre Européen d'Etudes des Polyphosphates), and performed by a consultant, Green Planet Research, in collaboration with INIA (Spanish National Institute for Agriculture and Food Research and Technology). A methodology for a probabilistic risk assessment was developed by INIA by September 2005, and was refined in the light of discussions with a group of 17 experts on eutrophication at a workshop held in Madrid in November 2005. The final report entitled "Development of a European Quantitative Eutrophication Risk Assessment of Polyphosphates in Detergents"[51] was published in October 2006 and concluded that:

- additional eutrophication risks related to detergent phosphates are very variable in the different regions of the EU as a result of factors such as the hydrological characteristics, population density and agricultural intensity;

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49 In environmental reports the term "phosphorous" denotes phosphorous compounds in general.

50 Report available at: http://ec.europa.eu/environment/water/phosphates

51 Available at: http://ec.europa.eu/enterprise/chemicals/legislation/detergents/index_en.htm

- in both analysed ecoregion types, i.e. (i) Atlantic, Northern and Central European shallow lakes, and (ii) Mediterranean water bodies, the eutrophication risk did not increase linearly at higher phosphorus concentrations.

The Scientific Committee on Health and Environmental Risks (SCHER) reviewed the INIA report and adopted an opinion in November 2007[52]. SCHER identified a number of key points which were not adequately addressed (e.g a limited and non representative data base to develop a European model, limited data used for the validation etc.). Overall, SCHER proposed that prior to the application of the model and the use of the results, the science presented in the INIA report should be further developed. In line with the SCHER remarks the INIA model was recalibrated and validated with data from the Intercalibration Exercise of the Water Framework Directive. The validated INIA model *("MODEL VALIDATION USING THE WFD INTERCALIBRATION DATA, MODEL RE-CALIBRATION, AND Pan-EUROPEAN ASSESSMENT OF THE EUTROPHICATION RISK ASSOCIATED TO THE USE OF PHOSPHATES IN DETERGENTS)* was submitted in April 2009 and was subsequently forwarded by the Commission to SCHER for its further evaluation and an updated scientific opinion. More detailed information about the INIA reports and the SCHER opinions are given in section 2.

In parallel, the Commission had asked RPA (Risk & Policy Analysts Ltd) to conduct a study in order to fill the data gaps concerning the use, properties and environmental impact for a range of non-surfactant organic detergent ingredients including STPP and zeolites and to assess the socio-economic impacts of switching from phosphate-based detergents to zeolite-based detergents.

The final RPA report was published in 2006 and found that some of the additional co-builders needed for zeolite-based detergents, are also used in STPP-based detergents, though in smaller concentrations. A switch to zeolite-based detergents would therefore not necessarily introduce a greater number of co-builder substances into the environment, but their concentrations might increase. An opinion of SCHER on the RPA report was published in June 2007[53], confirming its main findings and concluding that a move to zeolite-based detergents: (i) would not increase the health risks, (ii) would possibly increase environmental risks due to higher amounts of polycarboxylates and phosphonates, which are potentially harmful for the environment, but not to a significant extent. Taking into consideration that the use of polycarboxylates in the EU has significantly increased in the last decade (from 50,000 t/y in early 2000 to 80 000 t/y in 2007) linked to their application in quite larger quantities of phosphate-free detergents, the Commission asked SCHER to review an updated HERA report on polycarboxylates[54] from 2009 and to evaluate the remaining environmental concerns concerning the use of these ingredients in detergents.

In its opinion on polycarboxylates of January 2010[55], SCHER notes that the updated HERA report on polycarboxylates in detergents includes some new studies and addresses some of the drawbacks highlighted in the previous SCHER opinion[56]. However, SCHER considers that there are still some concerns related to data gaps and to inadequate interpretation of the available information in terms of risk characterisation:

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52 Available at: http://ec.europa.eu/health/ph_risk/committees/04_scher/scher_opinions_en.htm
53 Available at: http://ec.europa.eu/health/ph_risk/committees/04_scher/scher_opinions_en.htm
54 Available at: http://www.heraproject.com/RiskAssessment.cfm
55 Available at: http://ec.europa.eu/health/ph_risk/committees/04_scher/scher_opinions_en.htm
56 Available at/ http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_109.pdf

(a) for the terrestrial compartment: the proposed PNECs cannot be accepted, due to misinterpretations of the studies and the lack of information on soil microbial functions so that a PEC/PNEC ratio well above 1 could be estimated at least for P-AA/MA, and thereby a potential environmental risk for the soil compartment could result from the use of polycarboxylates in detergent formulations;

(b) for the aquatic environment: as the tonnage placed on the market has increased, and as additional uncertainties have been observed in the PEC estimation presented in the revised HERA report, current PEC/PNEC could be even higher, therefore, a potential regional risk for the aquatic environment cannot be disregarded.

Overall, SCHER considers that based on the available information, a potential environmental risk has been identified and refined risk assessments should be required before it can be concluded that these chemicals are of low environmental concern. Industry (BASF) has announced that further research will be carried out in order to clarify the remaining concerns.

10. DEVELOPMENT OF THE INIA PAN-EUROPEAN EUTROPHICATION MODEL - CONTRIBUTION OF STPP BASED DETERGENTS TO EU EUTROPHICATION RISK

According to INIA, the risk for eutrophication cannot be directly defined as the likelihood for nutrient enrichment, but as the likelihood for this enrichment to provoke undesirable disturbances. Therefore, the definition of which level of disturbance is considered as undesirable in EU waters would be a critical part of a risk assessment that could offer the scientific basis for considering risk management measures.

The major conclusion of the first INIA model calculations was that: "the difference between the total eutrophication risk and the risk without phosphate-based detergents is typically around 2.5-10% based on the Mediterranean effect assessment, and around 0.5-3% based on the Atlantic, North & Central shallow effect assessment"

SCHER recognised in its opinion of 2007 that the model developed by INIA presents a novel tool to assess, in a quantitative manner, the risks of eutrophication due to phosphorus release. SCHER supported the INIA conclusion that additional eutrophication risks related to detergent phosphates are very variable in different regional situations as a result of varying regional characteristics such as hydrology, population density and agricultural intensity.

In addition, SCHER underlined that:

1. As the values selected for some key factors (e.g P output) are not sufficiently representative for all EU situations, the final aquatic Total Phosphorus (TP) concentration from detergents and the resulting risk for eutrophication maybe underestimated by the INIA model;
2. more model validation using monitoring data is required before the estimations of overall risk can be supported;
3. considering the uncertainties and limitations identified in this opinion, more work is needed to accurately estimate the magnitude (and significance) of the eutrophication risk throughout the EU.

In line with SCHER's recommendations, DG Enterprise and Industry first encouraged an active collaboration between INIA and Joint Research Centre. In a meeting at Ispra (June 2008) it was agreed that INIA would consider the data obtained within the inter-calibration process of the WFD implementation, the analysis of which could be crucial for the further

refinement of the model. In addition, the Commission established contacts between INIA and scientists from regional eutrophication projects such as the Baltic Sea project and the Danube River Basin (DRB) project.

In a workshop organised in Madrid (March 2009), with the participation of eutrophication experts from these projects and DG Joint Research Centre, INIA presented the outcome of their validation and calibration exercise of the model, in particular concerning the effect assessment and risk characterisation tools. The final INIA report was submitted in April 2009 with the following significant developments as compared to the report of 2006:

- Following the inclusion of the WFD Intercalibration data, the 2009 INIA model contains an extensive dataset of 2000 points, covering 4 eco-regions (Northern, Central/Baltic, Atlantic and Mediterranean), instead of only 300 points and 2 eco-regions in the 2006 model. The statistical analysis confirmed clear differences between eco-regions, with the more northerly showing greater sensitivity to eutrophication, whereas the Mediterranean eco-region showed an adaptation to higher natural levels of phosphorous.
- Following the SCHER recommendations and the suggestions from the experts, a new set of deterministic scenarios has been included in this report using realistic total phosphorus (TP) concentrations. For facilitating the comparisons, the scenarios are based on a similar set of default environmental values, using European averages. For each eco-region, the population weighted average consumption of phosphate-based detergents is used. Comparisons are presented for three concentrations, 50, 100 and 150 μg phosphorus/L for the Northern eco-region, and 50, 150 and 300 μg phosphorus/L for Central Baltic, Atlantic, and Mediterranean eco-regions.
- The updated model apart from total risk also estimates the remaining risk excluding laundry or dishwashing detergents. Table 4 in Annex I summarises the INIA results for the contribution of detergents to the eutrophication risk in various EU eco-regions. According to the results, the combined contribution of both laundry and dishwashers detergents to eutrophication risk varies between the EU eco-regions, being relatively higher in Northern (5.3%) or Central Baltic (5.8%) as compared to Mediterranean (2.3%) and Atlantic eco-regions (3.2%).
- Other SCHER recommendations were also implemented in the new report such as the use of triangular distributions as a simplification in the probabilistic model, and the consideration of other European eutrophication projects (such as DRB and Baltic sea).

In May 2009, the Commission submitted a mandate to SCHER asking whether the scientific quality of the report has been significantly improved following the validation exercise. More specifically, SCHER was requested:

(a) to assess the new results of the INIA model, in particular, the differences between the total eutrophication risk and the risk without various types of phosphate-based detergents and to evaluate the statistical analysis of the whole model;

(b) to comment whether or not the results of the updated model indicate that the use of phosphates in detergents contributes significantly to the eutrophication risk at European level;

(c) to conclude whether all relevant aspects of the eutrophication process are sufficiently covered by the validated INIA report, in line with the earlier remarks of the SCHER opinion in 2007.

SCHER adopted an opinion on the updated INIA model in November 2009[57] In summary, SCHER concluded that overall the INIA (2009) report has been considerably improved in terms of the assumptions, default values and especially in the size and geographic coverage of the surface water data used to develop, re-calibrate and validate the model. SCHER is of the opinion that this modelling approach may be considered appropriate for the envisaged purpose. However, as a detailed evaluation of the new data taken from the Water Framework Directive data base was not presented in the updated INIA report, SCHER was unable to check how representative the data are for pan-European surface waters. Therefore, SCHER is not able to comment on the improved predictive capacity of the model. Actually, SCHER concluded that this possible weakness concerning data quality (e.g. EU relevance) may substantially influence the results of the model application.

More specifically, SCHER expressed concerns about the following issues.

(a) In the updated INIA database, the lake typology is not always described in a consistent and transparent manner (e.g. Mediterranean, Northern (macrophyte)). In addition, when the typology information is reported, the lake selection does not seem representative of pan-European lake typologies. For example (i) in Nordic and Baltic ecoregions the majority (1341 out of 1523) are shallow or very shallow lakes and (ii) in the Mediterranean ecoregion most (71 out of 90) lakes are reservoirs.

(b) The JRC database can be considered as complementary to the first INIA database in terms of European ecoregions covered. However the information provided is not sufficient for judging if the complete database is representative of the European situation as far as the ecological status (bad (G-) or good (G+) is concerned).

(c) In the INIA/ Green Planet report, the estimation of the P contribution from different sources is calculated from EU-27 data, including many countries where detergent P has already been banned or controlled up to very low levels. As such, the use of these data for the calculation led to the conclusion that at the pan-EU continental level, the reduction of risk due to elimination of detergent phosphorus is low. It should be clear that if only data are used from countries where detergent phosphorus is still used, the detergent phosphorus contribution may be much greater leading to different estimations of risk.

Overall, SCHER concluded that the results of the model indicate that, at the present time, at pan-European scale the contribution of phosphate based detergents does not play a major role in the eutrophication process. However, in coming to this conclusion SCHER underlines that it is important to be aware of all the reservations about the representativeness data used in the report. SCHER also commented that the model is not suitable for estimating the contributions to eutrophication at regional or local level.

[57] Available at http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_116.pdf

ANNEX III: SME consultation

(A) Summary of results of the consultation with EU SME detergent formulators via Enterprise Europe Network (SME Panel on use of phosphates in detergents)

The ENTR questionnaire which addressed to SMEs is given in section C of this Annex

1. ***Profile of the companies (question-1)***

Out of the responding 107 companies**,** 3 were producers of posphates/zeolites and one was a formulator from Israel. The rest of SMEs (**103)** matched the profile of EU SME formulators of detergents so the analysis below is based on their replies. They are distributed geographically in 11 EU Member States as following:

Italy: 25, France: 21, Spain: 12, Poland: 12 Sweden: 8, Portugal: 6, Germany: 6, Estonia: 5, Austria: 4, Lithuania: 2, Slovenia: 2. Therefore ~63% of the SMEs are located in southern Europe and ~37% in central/northern Member States.

Considering that according to A.I.S.E (European Detergents Formulators) there are ~600 SME detergents formulators in Europe (including no-EU countries), the number of 103 EU-SMEs seems quite representative (~20% of the total)

Out of the 103 SMEs, the majority (49%) employ between 10-49 people, followed by 33% micro-SMEs that employ less than 10 people, while the rest (~18%) employ between 50-249 people.

The SME questionnaire is attached (with the questions corresponding to their number in the tables).

2. Product Portfolio (question-2)

Types of produced detergents (question-2.1): Laundry-L, Dishwashers-D, Industrial & Institutional-I&I

40% produce all types of detergents (L,D and II), 16% L and D, 9% D and I&I, 2% L and I&I, 26% only I&I, 6% only L, 1% only D.

From the figures provided by the 40% of the SMEs that formulate all types of detergents, it emerged that in average they produce:

% of total SME production			average number of product lines		
L	D	I&I	L	D	I&I
25%	18%	35%	4	4	14

Both the average % values of total production and number of product lines seem to indicate that I&I detergents are the main product category of those SMEs.

Considering also that another 26% of SMEs produces only I&I detergents, it can be concluded that I&I is the most important detergent type (in terms of production) type for the majority of the European SMEs.

Use of phosphates as main builders or formulation with alternatives (question 2.2, 2.3)

Only 15% of the SMEs use phosphates as the only builders for the formulation of their products *(question 2.2i)*. 60% of these SMEs are located in Southern Europe (4 in Italy and 3 in Spain), which is reasonable considering that use of STPP is more essential under the "hard water" conditions in the Mediterranean area.

75 SMEs (73% of the total) also formulate detergents with alternative builders other than phosphates *(question 2.2ii)*. 25 SMEs are using only alternative builders *(question 2.2iii),* which corresponds to a higher percentage (25%) compared to that of the companies that use only phosphates (15%)

Out of the 85% of SMEs, which are not exclusively phosphate-dependent, 59 SMEs informed of the precise alternatives they use *(question 2.3),* the following being the most important ones (in order of decreasing use expressed *in number of SMEs*): phosphonates (18), citrates (18), polycarboxylates (17), zeolites (15), EDTA (10), NTA (9), surface active agents (6), silicates (3), sodium sulphate (3).

Interestingly, zeolites are not the most commonly used builders among these SME formulators, probably due to the fact that most of them were I&I formulators rather than producers of laundry detergents. Citrates, polycarboxylates and phosphonates are the most widely used builders. In most of the cases, those builders are used alone or in combination, but not very often as co-builders for zeolites (in contrast to their use in the laundry formulations). EDTA and NTA were also significantly used.

3. Reformulation of detergents (question 3)

60 SMEs gave information on the frequency of their product reformulation which is on average every 3.5 years. Furthermore 32 SMEs informed on the cost of reformulation, which was calculated on average at about €5600. In very few companies provided separate figures for each type of detergent, and these numbers were averaged in terms of both cost and time of reformulation.

4. Price of phosphates and consequences (question 4)

58% of the SMEs informed that the price of phosphates was on average ~46% higher than the price of alternative builders in their products, whereas the rest (42%) indicated no price difference in their markets *(question 4.1).* It should be noted that the situation was variable within the EU, as for instance in Germany, Austria and Spain, phosphates are sold at rather higher-than the average-prices while in France, Italy and Poland the differences are much lower and quite often zero.

76 companies provided feedback to the question as whether the difference of phosphate prices compared to the price of alternatives may influence the retail price *(question 4.2).* 55% of the responders answered positively and some provided figures which on average resulted in an 18.5% higher retail price of the detergents. Furthermore, 42% of the SMEs contended that the recent price increase for phosphates did not lead to an increased use of alternatives whilst 33% answered positively, whereas the rest had no opinion on this issue (*(question 4.3).*

5. Consequences of possible phosphate restrictions

The situation was relatively balanced concerning the question as whether it is technically possible for SMEs to replace phosphates in their detergent formulations *(question 5.1).* 89% of the SMEs gave their opinion: 42% of these companies replied YES, with no clear differences observed between Mediterranean or Central-Northern Member States. Spain and France represented the most extreme cases (accounting for ~75% of NO and YES respectively), although the water of both countries has similar hardness. A recent STPP ban in France for laundry detergents may explain this national tendency. Similarly, in other countries with long established legislative restrictions of STPP in laundry detergents, such as Italy and Sweden, YES was the dominant reply as expected (56 and 60% respectively) whereas, interestingly enough, in Poland, where the softness of water may make the use of STPP not crucial) 70% of SMEs replied NO.

An important question of this investigation was whether replacing phosphates with alternative substances would have an effect on the performance of the detergent product *(question 5.3)*. A clear majority of the total (58%) replied YES, and a few provided further feedback as to what such effects would be and any economic impact for their companies *(question 5.2)*. Even in countries with long-standing restrictions of phosphates in laundry detergents (e.g Italy, Germany) there is a clear majority of YES. 39 SMEs provided feedback about the adverse performance effect from a potential phosphates substitution in their products, the large majority of which claimed less efficient washing and reduced cleaning performance**.** Not surprisingly, almost all these SMEs produce I&I products claiming a non adequate function of the STPP substitutes. However, a few SMEs stressed that similar performance problems are observed in phosphate-free laundry or dishwashers formulations leading to corrosive products and reduced cleaning action (e.g spots in dishwasher etc.).

Furthermore, 24 SMEs informed of certain expected adverse economic impacts on their companies from a potential EU ban of STPP in all detergent products such as: 10-20% economic loss, due to higher cost of production due to use of more alternatives to achieve a similar cleaning performance, decreased sales, loss of market share, need for new investments, loss of clients etc.

46 SMEs provided figures about the costs for reformulation for replacing phosphates in their products. The one-off costs for reformulation was found to be on average at ~ 10.800 euros. The large majority of SMEs (~60%) also claimed that possible modifications to their production lines would be required in case of STPP substitution. Finally, 50 companies informed that they had already replaced some or all of the phosphates in their products *(question 5.5).* For 48% of those SMEs, the overall cost of the STPP substitution were greater than anticipated, for 18% less, whereas for the rest costs were as expected.

(B) Outline of the SME Test on phosphates in detergents as described in this IA report	
(1) Consultation with SMEs representatives	See sections 1.1.3., 5.3.3.1, 5.3.3.2, 5.4.3.1, 5.4.3.2. as well as Annex III.
(2) Preliminary assessment of businesses likely to be affected	See sections 1.1.3. and 2.5., as well as Annex III.
(3) Measurement of the impact on SMEs	See sections 5.2., 5.3.3., 5.3.4, Conclusions of 5.3 and 5.4 as well as Annex III.
(4) Assess alternative options and mitigating measures	Considering that (a) the one-off costs for replacing phosphates are estimated to be on average double to the normal cost of product reformulation occurring every 3.5 years, (b) no technically feasible alternative currently exist for certain detergents products (such as: I&I and ADW), it would be appropriate to envisage sufficiently long transition period in case the chosen option is Option -3; -4 or –5. (See conclusions of sections 5.3., 5.4., and 5.5).

(C) QUESTIONNAIRE FOR EUROPEAN SMEs CONCERNING THE USE OF PHOSPHATES IN DETERGENT FORMULATIONS

1. Company details

Company name: _____

Address: _____

Telephone/Email: _____

No of employees: _____

2. Product portfolio

2.1. What kind of detergents do you produce:

		No of product lines?	*% of your production?*
Laundry	_____(Y/N	------	------
Dishwasher detergents	_____(Y/N)	------	------
Industrial/Institutional (I&I)	_____(Y/N)	------	------

i. Do you use phosphates exclusively ? _____(Y/N)

or ii. do you also formulate detergents with alternative builders? _____(Y/N)

or iii. do you use only alternative builders (e.g zeolites)? _____(Y/N)

2.3. If you replied Y to 2.2. (ii), (iii), which alternative builders do you use and in which type of detergents? _____

3. Reformulation of detergents

Please specify by product category

	3.1 How often do you reformulate (in years)	**3.2** Average cost of reformulation (€)
Laundry	------	------
Dishwashers	------	------

I&I ------ ------

4. Price comparison

4.1. What is the price of phosphates compared to the price of alternatives in your products? _____ (%)

4.2. Does the difference influence the retail price? _____(Y/N)

If Y, please specify: _____ (%)

4.3. Has the recent price increase for phosphates led to an increased use of alternatives? _____(Y/N)

5. Consequences of possible phosphate restriction

5.1. Would it be technically possible to replace phosphates in all of the detergents that you produce, _____(Y/N)

or only in certain categories? (If so, please specify) _____

5.2. If Phosphate replacement is not possible, why not? _____

5.3. Would replacing phosphates with alternative substances have an effect on the performance of your detergents? _____(Y/N)

if (Y) please specify:

what are the effects on the performance? _____

any economic consequences for your company? _____

5.4. What costs would be involved for replacing phosphates in your products? please specify:

one-off costs for reformulation? _____ (€)

possible modifications to your production line(s)? _____(Y/N)

5.5. If you have already replaced some or all of the phosphates in your products,

were your costs greater or less than anticipated? _____

Any other comments? _____

6. ***Any other information/data which you would like to provide to the Commission on this issue?***

ANNEX IV: Sensitivity analysis for Option 4

By offsetting the one-off reformulation costs for laundry detergents against annual cost savings for WWTP operators (under the assumption that the connectivity to waste water treatment plants would remain stable over 10 years), using a discount rate of 4%, and assuming a trend to reduce phosphate consumption of 6% per year, the cumulative net savings in the years following the introduction of a ban on P in laundry detergents would be as set out in the tables below. The break-even year is highlighted in yellow background.

Scenario 1: WWTP costs = €0,48 / kg P removed, 20% of waste water treated

Year	1	2	3	4	5	6	7	8	9	10
Reformulation cost	-13,2	0	0	0	0	0	0	0	0	0
WWTP cost savings	6	5,4	4,8	4,2	3,6	3,0	2,4	1,8	1,2	0,6
Net cumulative effect	-7,2	-1,2	4,2	9,0	13,2	16,8	19,8	22,2	24,0	25,2

Scenario 2: WWTP costs = €4 / kg P removed, 50% of waste water treated

Year	1	2	3	4	5	6	7	8	9	10
Reformulation cost	-13,2	0	0	0	0	0	0	0	0	0
WWTP cost savings	132	119	106	92	79	66	53	40	27	13,2
Net cumulative effect	119	251	356	449	528	594	647	686	713	726

Scenario 3: WWTP costs = €7 / kg P removed, 90% of waste water treated

Year	1	2	3	4	5	6	7	8	9	10
Reformulation cost	-13,2	0	0	0	0	0	0	0	0	0
WWTP cost savings	415	373	332	290	249	207	166	124	83	41
Net cumulative effect	401	775	1107	1397	1646	1854	2020	2144	2227	2269