



Brussels, 29.5.2015  
COM(2015) 229 final

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND  
THE COUNCIL**

**Pursuant to Article 16 of Regulation (EC) No 648/2004 of the European Parliament and  
of the Council of 31 March 2004 on detergents, concerning the use of phosphorus in  
consumer automatic dishwasher detergents**

**(Text with EEA relevance)**

## 1. INTRODUCTION

Regulation (EU) No 259/2012 of the European Parliament and of the Council of 14 March 2012<sup>1</sup> states that there is need for limitation of the use of phosphates in consumer laundry detergents and consumer dishwasher detergents. The regulation sets in its Annex VIa a limitation of 0.3 grams of the total phosphorus content in the standard dosage in consumer automatic dishwasher detergents (CADD) as from 1<sup>st</sup> January 2017. For laundry detergents, this annex outlines a limitation of maximum 0.5 grams of the total phosphorus content, which already applied as of June 2013.

The regulation states that by 31 December 2014, the Commission shall evaluate by way of a thorough assessment in light of new information on the CADD markets in Member States and new scientific information whether the restriction for CADD should be modified. This report presents the Commission's analysis of the impacts on the environment and health, on industry and on consumers of CADD with phosphorus levels above and below the limit value of 0.3 grams, taking into account matters such as the costs for producers, the availability of alternative substances to phosphates, the comparative cleaning efficiency of the detergents complying with this restriction and the impact on waste water treatment practices and efficiency.

To respond to this request, a study<sup>2</sup> (hereinafter referred as the “CADD study”) has been carried by the Commission.

## 2. COMMISSION EVALUATION OF THE USE OF PHOSPHATES IN CONSUMER AUTOMATIC DISHWASHER DETERGENTS (CADD)

### 2.1. Methodology of the CADD study

Data was collected primarily through a literature review and a stakeholder consultation. For the latter, a questionnaire was sent to Member State authorities, water management facilities, NGOs, industry associations, detergent manufacturers and suppliers. Overall, 35 responses were received with each type of stakeholder being represented. Some stakeholders also provided additional information besides the questionnaire responses, which was incorporated in the analysis.

### 2.2. Alternatives to phosphate: assessment of the availability, technical feasibility of the substitution and performance of the compliant CADD

Phosphate in the form of Sodium Tri-Poly-Phosphate (hereinafter referred as “STPP”) is the most commonly used compound of modern domestic and industrial detergents due to its cleaning-enhancing properties and the fact that it is cost-effective. Complex phosphates such as STPP 'deflocculate', i.e. they break up large particles of dirt such as mud or clay into smaller ones. Additionally, they keep fine particles in suspension in the washing water and prevent them from recombining, thus avoiding redistribution on dishes.

To replace phosphates, several alternative substances are available on the market. Since phosphates provide a variety of functions, the alternative substances need to address each one of those functions. Therefore, normally it takes a number of different ingredients to achieve the

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<sup>1</sup> OJ L 94, 30.03.2012, p 16 – 21

<sup>2</sup> See the final report at <http://ec.europa.eu/enterprise/sectors/chemicals/documents/specific-chemicals/detergents/#h2-4>

same results. Alternatives include chelating agents, dispersant polymers, surfactants and enzymes. Manufacturers confirm the technical feasibility of the substitution of phosphates by a range of alternative compounds.

Technical feasibility for phosphates-free automatic dishwashing detergent is confirmed by the CADD study which observes that a large number of patents have been placed on substitution approaches since 2012 for replacing phosphates. Moreover consumer associations from various Member States have performed tests comparing performance of phosphates-free and phosphates-containing CADD. Overall, phosphates-free CADD and phosphates-containing CADD perform similarly as regards their cleaning efficiency. The majority of stakeholders remarked that the performance of CADD relies on many factors (formulation, raw material prices variations and new technology development) that remain true whether or not phosphates were used.

## **2.3. Market review**

### **2.3.1. Market and prices of CADD**

The overall European household detergents and maintenance products industry market for 2013 is estimated to have reached €28.5 billion. Dishwashing products make up 15.1% of the market, and the European CADD market in 2013 sharing about 60% of this market was amounting to €2,489 million. The other 40% of the dishwashing detergents involves maintenance products for industrial application and hand washing detergents.

Many manufacturers already offer phosphate-free CADD in some Member States of the EU. The prices of CADD seem to be based mostly on performance and do not depend on the presence of STPP seeing as both types of CADD are sold within approximately the same price range. With a complete switch to phosphates-free CADD, the majority of the stakeholders expect prices for the alternative substances to further decline, in turn lowering phosphate-free CADD prices.

### **2.3.2. The phosphorus market and shares occupied by CADD**

Phosphates are derived from phosphorus rock and are used in both the fertiliser industry and the chemical industry. Approximately 90% of the global phosphate demand goes to fertilisers and other agricultural uses. The price of phosphorus rock is driven at global level by the fertiliser demand and supply.

The European STPP manufacturing industry represents less than 10% of the worldwide STPP production. The biggest market share of EU STPP domestic production went to export in 2007, closely followed by domestic use in laundry detergents. Since that time, the laundry detergents market has evolved due to the restriction on phosphorus use in laundry detergents.

## **2.4. Analysis of impacts**

Approximately 78% of the 35 stakeholders who responded to the questionnaire survey said that it is possible to meet the requirement of limiting phosphorus content in CADD to 0.3 grams per dosage as of 2017 and 69% even found the limit desirable. No stakeholders claimed that the requirements were not possible to comply with.

### **2.4.1. Economic impacts**

#### *Impact on phosphate suppliers*

Impacts on STPP suppliers are difficult to evaluate due to a lack of data as limited information was made available by the suppliers. Using the 2007 figures for European STPP production as well as the global breakdown of phosphate uses and the division among detergents in the EU, an estimation of the EU CADD market in 2013 was made in the CADD study. It is assumed that the

share of STPP use in CADD is similar to that of STPP exports. In recent years, the number of suppliers in the EU has been reduced from four to three. As a consequence there was a job loss of 450 jobs at a site located in the Netherlands. There is however no established link with the Regulation (EU) No 259/2012 to the best of Commission services' knowledge.

Pursuing further the projection exercise after 2017 (in comparison with 2013) and taking into account the potential disappearance of the STPP use in CADD market while all other markets remain the same, it is estimated that the total EU STPP production would decrease with ca. 37 % compared to before the ban on phosphate use in CADD would come into effect. Around 57% of production would go to export, while the remaining 43% is estimated to be redirected to detergents for industrial and institutional use and to non-detergent uses. This estimation is supported by the fact that certain non-detergent uses of STPP have seen increases in recent years; one company stated in their annual report that demand for other products has compensated for the decline in the detergents sector. However, one stakeholder contested this scenario of absence of major impacts on phosphate suppliers. It claimed that it is very unlikely that companies will be able to compensate the loss of EU STPP sales income by export, and it is furthermore very difficult to maintain 'export only' production for a bulk chemical such as STPP in the absence of a home market.

#### *Impact on detergent manufacturers*

According to the CADD study the relatively small reduction in phosphorus production due to a phosphorus restriction in CADD would not significantly impact the global price of phosphorus. Furthermore, a restriction of phosphates will create a level playing field for EU CADD manufacturers/importers/traders as phosphates-containing CADD have already been restricted or banned in other parts of the EU (e.g. Sweden) and of the world (e.g. several states in the USA, such as Illinois, Indiana, Maryland, Massachusetts, Michigan and New York). The phase-out of phosphates-containing CADD placed on the EU market would therefore foster innovation and create business opportunities for CADD manufacturers and suppliers in the EU to play a leading role in the global context, thus contributing to the competitiveness of EU industry.

Manufacturers who responded to the questionnaire were divided on the issue of additional costs due to switching to phosphates-free CADD. 54% of stakeholders stated that costs are mainly based on the formulation, and other raw material prices variations, regardless of phosphate use or not. It is also important to note that detergent manufacturers reformulate their products regularly (averaging every 3.5 years) in order to maintain competitiveness and as such reformulation to restrict phosphates use would not necessarily engender additional costs. The other stakeholders (18%) indicated that there is no alternative technology with the same cost to performance profile, while others (27%) still simply said that costs are higher for phosphates-free formulations.

There is an overall trend of going phosphates-free by major players all over the world, including countries where regulations are less strict, which suggests that costs are not so high as to inhibit manufacturers from making the switch. European manufacturers are also producing and selling phosphates-free CADD in other big markets such as the USA where a restriction of phosphorus is already in place in some States since 2013. Furthermore, some phosphates-free formulations outperformed phosphates-containing CADD. Therefore, the European phosphates-free detergents manufacturers should remain competitive regardless of regulations.

#### *Impact on consumers*

Consumers can expect little to no change in the price to performance ratio in switching to phosphates-free CADD. The price range of both types of CADD currently available on the market is similar (consumer tests showed costs per wash ranging from €0.08 for phosphates-containing and €0.11 for phosphates-free up to €0.33 for both phosphates-free and phosphates-containing CADD). With a complete switch to phosphates-free CADD, the majority of the

stakeholders expect prices for raw materials to decline, in turn lowering the phosphates-free CADD prices.

Based on observations made in Sweden, where a restriction on phosphates in CADD has already been in place since 2011 and where prices of CADD have not increased due to the phase-out of phosphates it is reasonable to assume that consumers should not expect any negative economic impacts related to a restriction in the use of phosphorus in CADD.

#### *Impact on wastewater treatment operators*

Removal of the total amount of phosphorus from detergents (laundry and CADD) in the EU wastewater would lead to a calculated cost of somewhere between €10-86 million for the entire EU. Reducing the phosphorus load would mean that less chemicals are needed to perform chemical tertiary treatment. A study carried out for the EU Ecolabel in 2009<sup>3</sup> found that a ban on phosphates use in CADD would have a positive effect for wastewater treatment plants by lowering operation costs related to a reduction in the use of chemicals for phosphate precipitation. The same study also found that the current existing alternatives are not expected to affect the biological process of wastewater treatment. It is therefore concluded that while restricting the phosphates content in CADD as outlined in Regulation (EU) No 259/2012 would not prevent the entry of phosphorus into the wastewater altogether, there would be a reduction nonetheless and therefore a decrease in costs associated with phosphorus removal.

#### *Impact on Small and Medium-sized Enterprises*

Detergent manufacturers reformulate on average once every three and a half years to remain competitive with new technologies, so the cost incurred by this restriction in CADD may be considered a business as usual, especially as the detergents manufacturers would have had in total 5 years to prepare themselves to the phosphates-free CADD. Since some of the alternatives are proprietary molecules, this could potentially impact SMEs, who may be unable to obtain access to these alternatives depending on exclusivity or supply priority contracts negotiated with the suppliers by major CADD producers. However, in Sweden it has been shown that small producers adapted very well. When restriction plans were announced, concerns were raised that the restriction would pose an obstacle to market entry for smaller domestic producers. Yet, during the transitional period the domestic production of phosphates-free CADD grew to a share of 96%, suggesting that small Swedish producers adapted to the restriction easily. The lion's share of the market in Sweden is held by companies and brands that also market products in the rest of the EU. It therefore suggests that the phosphate restriction in CADD at the EU level will not benefit large companies over smaller ones, but might well be a business opportunity to smaller enterprises.

#### *Impact on Employment*

Possible impacts on employment were difficult to evaluate due to a lack of data. Limited information was made available by STPP suppliers. The three EU STPP producers provide in total approximately 2000 jobs directly in the EU, either in the whole company (where company is phosphates centred) or in phosphates business (for companies with other different activities). They also generate around three times this number of jobs indirectly in related suppliers and services.

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<sup>3</sup> European Ecolabel. 2009. "Revision of Ecolabel Criteria for Dishwashing Detergents Background report."

## 2.4.2. Environmental impacts

### *Eco-toxicity*

The 2010 Impact Assessment study for the Amendment to the Detergent Regulation found that a total ban of phosphate in detergent would be the most effective policy option for reducing the risk of phosphorus related eutrophication of surface water throughout the EU. While completely eliminating phosphorus in CADD would decrease the eutrophication risk even further, this is technically not feasible. However, the limit of 0.3% grams per standard dosage already reduces the amount of phosphorus in CADD by more than 75% on average.

The CADD study observed that some data gaps remain for certain specific alternatives to complete a comprehensive assessment of the environmental impact of the alternatives to phosphates in CADD. In this respect, some concerns and unknowns were identified by stakeholders reflecting diverging views on scientific evidence or different levels of awareness of the efficacy of phosphates-free CADD.

For most of the commonly cited alternatives for STPP information on ecotoxicity and environmental fate was available and assessed. Information was obtained from REACH registration dossiers, stakeholder information and other assessment reports. Only three alternatives (sodium gluconate; L-aspartic-N,N-diacetic acid, sodium salts and B-alaninediacetic acid) appeared to have data gaps. According to the study, all the other alternatives that were assessed do not pose an unacceptable environmental risk based on current scientific knowledge. It was moreover found that STPP substitution by phosphonates, sodium silicate or IDS(A)<sup>4</sup> would lead to environmental concentrations of these substances still below their corresponding Predicted No Effect Concentrations (PNEC), so not presenting an environmental risk.

### *Wastewater treatment*

The Urban Waste Water Directive<sup>5</sup> (hereinafter referred as “UWWT Directive”) requires Member States to include removal of phosphorus in the wastewater treatment in sensitive areas under certain conditions, which is also known as “tertiary treatment”. Besides this tertiary treatment obligation, a part of phosphorus is also already removed in the earlier steps of the wastewater treatment process. Approximately 50% of the phosphorus is taken up via biomass and/or partitioning to solids during secondary treatment. Biological nutrient removal or chemical precipitation which are considered tertiary treatment, increase the removal rate of phosphorus to over 90%.

Based on total phosphorus load data in the EU, the proportion of phosphorus coming from detergent use and the distribution between laundry and automatic dishwasher detergents, it has been estimated in the CADD study that phosphorus from CADD made up about 10% of the phosphorus load in wastewater treatment in the EU in 2013. A limitation on phosphorus use in CADD to 0.3 grams per wash would lead in a similar estimation exercise to the conclusion that phosphorus coming from CADD would eventually account for ca. 1.6% of the total phosphorus load in wastewater in the EU in 2017.

While the UWWT Directive does require phosphorus removal, it does not require phosphorus to be removed in a reusable form. Despite the numerous ways to reuse the phosphorus contained in wastewater, only about 25% is being reused, with the most common method being direct application of sludge to fields according to Directive 86/278/EEC<sup>6</sup> on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture.

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<sup>4</sup> IDS(A) stands for iminodissuccinic acid, sodium salts and has the function in CADD of a chelating agent. It has excellent calcium binding properties and good complexation of heavy metal ions.

<sup>5</sup> OJ L135, 30.05.1991, p.40

<sup>6</sup> OJ L 181, 4.07.1986, p.6

### **2.4.3. Health impacts**

A few data gaps exist relating to the health effects of certain alternatives. Data are lacking for three substances (sodium gluconate; L-aspartic-N,N-diacetic acid, sodium salts and B-alaninediacetic acid). Based on current scientific knowledge, the study concludes that for the remaining alternatives to STPP there is no significant risk to human health (information was retrieved from REACH registration dossiers, stakeholders and other assessment reports). It can be concluded that the substitution of phosphates with alternatives would not add further risk to human health.

## **3. SUMMARY AND CONCLUSIONS**

The Commission has thoroughly assessed whether the restriction of phosphorus in consumer automatic dishwasher detergents (CADD) to 0.3 grams/dosage should be modified, taking into account matters such as cost for industry and consumers, availability of alternatives to phosphates, cleaning efficiency of the detergents complying with this restriction, the impact on waste water treatment practices and efficiency as well as the overall health, environmental and socio-economic impacts to be expected by the time of entry into force of this restriction.

After consideration of both benefits and disadvantages, it is concluded that alternatives for phosphates-containing CADD are available and it is technically feasible to produce phosphates-free CADD in a similar performance and price range as phosphates-containing CADD. Many manufacturers already offer phosphates-free CADD in some Member States of the EU. Regarding risks to the environment and/or human health, a few data gaps exist for three of the commonly listed alternatives. However, for the remaining alternatives, based on current scientific knowledge, it was concluded that these do not seem to pose a significant risk to the environment or to human health.

Based on this assessment, the Commission finds no evidence that a revision is required of the limit value for phosphorus in CADD of 0.3 grams/standard dosage which will become applicable as of 1 January 2017. In order to strengthen the hazard and risk assessment of the alternatives, the Commission encourages all manufacturers to generate further toxicity test data and assess all relevant scientific information once they are made available in the context of REACH and to share with the Commission any relevant risks that they could identify from a particular alternative substance to phosphates in CADD.