

Committee for Socio-economic Analysis (SEAC)

Opinion

on an Annex XV dossier proposing restriction on

Bis(pentabromophenyl) ether (DecaBDE)

Draft

10 June 2015

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Opinion of the Committee for Socio-economic Analysis

on an Annex XV dossier proposing restrictions of the manufacture, placing on the market or use of a substance within the EU

Having regard to Regulation (EC) No 1907/2006 of the European Parliament and of the Council 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (the REACH Regulation), and in particular the definition of a restriction in Article 3(31) and Title VIII thereof, the Committee for Socio-economic Analysis (SEAC) has adopted an opinion in accordance with Article 71 of the REACH Regulation on the proposal for restriction of

Chemical name(s):	Bis(pentabromophenyl) ether (DecaBDE)
EC No.:	214-604-9
CAS No.:	1163-19-5

This document presents the draft opinion agreed by SEAC. The Background Document (BD), as a supportive document to both RAC and SEAC opinions, gives the detailed ground for the opinions.

PROCESS FOR ADOPTION OF THE OPINIONS

ECHA on a request from the Commission has submitted a proposal for a restriction together with the justification and background information documented in an Annex XV dossier. The Annex XV report conforming to the requirements of Annex XV of the REACH Regulation was made publicly available at <http://echa.europa.eu/web/guest/restrictions-under-consideration> on 17 September 2014. Interested parties were invited to submit comments and contributions by **17 March 2015**.

ADOPTION OF THE OPINION

ADOPTION OF THE OPINION OF SEAC

The draft opinion of SEAC

The draft opinion of SEAC on the suggested restriction has been agreed in accordance with Article 71(1) of the REACH Regulation on **10 June 2015**.

The draft opinion takes into account the comments of and contributions from the interested parties provided in accordance with Article 69(6) of the REACH Regulation.

The draft opinion was published at <http://www.echa.europa.eu/web/guest/restrictions-under-consideration/-/substance-rev/1897/term> on **17 June 2015**. Interested parties were invited to submit comments on the draft opinion by **17 August 2015**.

OPINION

THE OPINION OF SEAC

SEAC has formulated its opinion on the proposed restriction based on information related to socio-economic benefits and costs documented in the Annex XV report and submitted by interested parties as well as other available information as recorded in the Background Document. SEAC considers that the proposed restriction on **Bis(pentabromophenyl) ether (DecaBDE)** is the most appropriate EU wide measure to address the identified risks in terms of the proportionality of its socio-economic benefits to its socio-economic costs provided that the scope and/or conditions are modified.

The conditions of the restriction proposed by SEAC are:

Designation of the substance, of the group of substances or of the mixture	Conditions of the restriction
<p>Bis(pentabromophenyl)ether (decabromodiphenyl ether; decaBDE)</p> <p>CAS No 1163-19-5 EC No 214-604-9</p>	<ol style="list-style-type: none"> 1. Shall not be manufactured, used or placed on the market: <ul style="list-style-type: none"> ○ as a substance, ○ as a constituent of other substances, or in mixtures after [date of entry into force], if the concentration is equal or greater than 0.1 % by weight. 2. Articles or any parts thereof containing decaBDE in concentrations equal to or greater than 0.1 % by weight shall not be placed on the market after [date of entry into force]. 3. By way of derogation, paragraph 2 shall not apply: <ul style="list-style-type: none"> ○ to articles placed on the market for the first time before [date of entry into force] ○ to electrical and electronic equipment within the scope of Directive 2011/65/EU 4. By way of derogation, paragraphs 1 and 2 shall not apply to manufacture, use and placing on the market for the production, maintenance, repair or modification of any aircraft or article eligible for installation on an aircraft: <ul style="list-style-type: none"> ○ produced in accordance with a type certificate or restricted type certificate, issued under Regulation (EU)216/2008, provided the application for such certificate was done before [date of entry into force], or ○ produced in accordance with a design approval issued under the national regulations of an ICAO contracting State, provided the application for such approval was done before [date of entry into force], or ○ for which an ICAO contracting State has issued a Certificate of Airworthiness under the provisions of Annex 8 of the Chicago Convention, provided that such State issued the first Certificate of Airworthiness for an aircraft of the same aircraft type before [date of entry into force].

JUSTIFICATION FOR THE OPINION OF SEAC

JUSTIFICATION THAT ACTION IS REQUIRED ON AN EU WIDE BASIS

The restriction proposal is based on the concern of decaBDE being transformed to lower molecular weight polybromodiphenyl ethers (PBDEs) which have PBT/vPvB properties. Hence, it is not possible to establish a safe level of exposure for decaBDE meaning that emissions of decaBDE are to be minimised (REACH recital 70/ Annex I, para 6.5). DecaBDE is released to the environment during the production, disposal and in particular during the service life of articles containing decaBDE. These articles are placed on the market and used across all EU Member States. Furthermore, decaBDE has a potential for long-range transport once it has entered the environment. Hence, emissions of decaBDE contribute to transboundary pollution reflected by widespread environmental occurrence of this substance in the EU.

With regard to the functioning of the internal market, the dossier highlights that action on an EU-wide basis would avoid the potentially distorting effects of national regulation of decaBDE. Articles treated with decaBDE as a flame retardant (textiles, plastics) are traded across EU Member States and are also imported from outside the EU. Therefore, action is required on an EU wide basis to maintain the free circulation of goods on the internal market as well as a level playing field for industry within the EU as well as between EU and non-EU companies. This conclusion is supported by the fact that the use of decaBDE in electrical and electronic equipment already has been regulated on an EU wide basis, i.e. in the RoHS directive.

SEAC supports the conclusion of the Dossier Submitter that action is required on an EU wide basis.

JUSTIFICATION THAT THE SUGGESTED RESTRICTION IS THE MOST APPROPRIATE EU WIDE MEASURE

DecaBDE is used as an additive flame retardant in plastic and textile articles, which are used in transport, building/construction and mining applications. To reduce the emissions of decaBDE as far as possible the **proposed restriction** covers the manufacture, use and placing on the market of decaBDE as a substance, in articles and mixtures. The Dossier Submitter originally proposed exemptions for second hand articles, articles covered by the RoHS directive and the aviation sector (manufacture, maintenance and repair of aircraft in accordance with an existing type approval certificate). In addition, there has been a request by the European Automobile Manufacturer's Association (ACEA) in the Public Consultation for a derogation for the automotive sector (along the lines of the proposed derogation for the aviation sector) for the manufacture of vehicles based on a type approval certificate issued before 2020, spare parts for these vehicles and legacy spare parts (vehicles made with type approval certificates issued in 2020 and after would not be covered). The broad scope of the proposal is close to a total ban and will remove all significant emission sources of decaBDE (apart from those originating from the existing stock and from the derogated uses). In the dossier, it is estimated that the proposed restriction will result in 4.74 t of emissions reduced per year with a cost-effectiveness of 464 € per kg emission reduced. A transition period of 18 months is proposed to allow industry to clear their stocks before the restriction will enter into force.

In addition to the proposed restriction, the Dossier Submitter has screened a set of targeted options for restrictions in terms of their potential to reduce emissions (effectiveness) and

their costs to achieve this emission reduction (cost-effectiveness). The options for restriction are based on the main uses of decaBDE in textiles and plastics as well as on information on emissions during the different life-cycle stages (i.e. production, service-life, waste) in the use of decaBDE. The following **targeted restriction options** have been considered in the dossier (see BD Annex E.1.1):

- Restriction on **plastics** used **indoors** (Option 1, emissions reduced: 1.37 t/y, 29 % of emission reduction of the proposed restriction, cost-effectiveness: 773 €/kg)
- Restriction on **plastics** used **outdoors** (Option 2, emissions reduced: 0.04 t/y, 0.08 % of emission reduction of the proposed restriction, cost-effectiveness: 30 €/kg)
- Restriction on **textiles** used **indoors** (Option 3, emissions reduced: 1.44 t/y, 30 % of emission reduction of the proposed restriction, cost-effectiveness: 756 €/kg)
- Restriction on **textiles** used **outdoors** (Option 4, emissions reduced: 1.9 t/y, 40 % of emission reduction of the proposed restriction, cost-effectiveness: 30 €/kg)

In addition to these options targeting the different uses of decaBDE, the Dossier Submitter has also considered the restriction of the use of decaBDE in the EU (production and placing on the market of articles containing decaBDE, Option 5 in BD) and the restriction of placing on the market of articles containing decaBDE (i.e. production for export would still be possible, Option 6 in BD).

The dossier concludes that a targeted restriction would not be effective, because it would not reduce emissions of decaBDE as much as practically possible (either not all uses or no imported/exported articles are covered). It is also argued that the gain in cost-effectiveness (= lower cost per kg reduced) of any of the different targeted restriction options would not justify the loss in overall effectiveness (= emission reduction) compared to the proposed restriction. In addition, a targeted restriction could be difficult to enforce (e.g. identification of articles for outdoor vs indoor use).

SEAC notes that a targeted restriction of the most cost-effective options (30 €/kg for outdoor uses of plastics and textiles) will only cover about 40 % of total emissions. To abate the remaining 60 % of decaBDE emissions (indoor uses of textiles and plastics) the cost per kg emission of decaBDE reduced is much higher (756 to 773 €/kg). However, SEAC considers that it is still cost-effective to include indoor uses in the restriction (see discussion on cost-effectiveness of the proposed restriction later). Therefore, SEAC accepts the conclusion of the Dossier Submitter that the proposed restriction is the most appropriate EU-wide measure to reduce decaBDE emissions.

Furthermore, **other EU-wide risk management options** than restriction are considered in the dossier but are discarded for the following reasons (BD E.1.3.1):

- **Authorisation:** Authorisation would not lead to a sufficient risk reduction, because emissions from imported articles would not be covered, which do contain decaBDE in relevant amounts (the related volume is estimated to account for about 10 % of volumes used in the EU). Furthermore, the potential regulation of decaBDE under the Stockholm Convention (see below) would exclude authorisation as a possible RMO for the use of decaBDE.
- **Waste management:** Mandatory incineration of articles containing decaBDE would only cover emissions from the waste phase (6% of total emissions). Also, such a scheme would be difficult to implement and enforce across all EU Member States. There are at present no established effective screening and separation techniques at industrial scale to distinguish PBDE containing waste streams from waste streams that contain other brominated flame retardants which are not restricted.

Implementation is furthermore difficult as there is a shortage of incineration capacity in some EU Member States, but there are overcapacities in some other MSs.

- **POP regulation:** DecaBDE has been proposed by Norway as a POP to be included in the Stockholm Convention. This proposal is still under consideration in the appropriate body of the Stockholm Convention. Presuming the proposal is accepted by this body, the earliest opportunity for consideration by the Parties to the Stockholm Convention for inclusion of decaBDE will be in 2017. When included, the EU POP Regulation should be amended accordingly. As a consequence decaBDE will then be taken out of Annex XVII REACH. The REACH restriction process will be finalised already in 2015 and information gained in this process can be fed into the process under the Stockholm Convention.

SEAC concurs with the arguments given by the Dossier Submitter that the proposed broad restriction is the most effective measure to reduce emissions of decaBDE compared to other possible RMO such as a targeted restriction or measures other than restriction (e.g. authorisation or waste management conditions).

SEAC has assessed the **derogations** that have been proposed by the Dossier Submitter or that have been requested by industry in the Public Consultation.

As regards the derogation for the **aviation industry** SEAC notes that the replacement of decaBDE would be difficult for aircrafts currently in service (i.e. in spare parts), or that will be manufactured in the future based on an existing type certificate, due to high costs related to the testing requirements, and the time needed to switch to alternatives, also because of the complexity in the supply chain. Information provided by industry confirms that it will be feasible to completely replace decaBDE in aircrafts with a type approval issued after 2017. Accordingly, the derogation is only proposed for type approvals issued before the entry into force of the restriction. Due to the low tonnage (< 10 t/y), the derogation will represent only a small fraction of total emissions by the foreseen date of entry into force of the restriction. This fraction is expected to drop even further as old aircrafts are replaced by new ones. As there is no figure of the exact costs to the aviation sector available, SEAC cannot assess the cost-effectiveness of this derogation in order to conclude on its proportionality. However, SEAC considers that the information provided is sufficient to conclude that it is likely that the derogation will improve the cost-effectiveness of the restriction, especially taking the low tonnage of decaBDE used into account.

Overall, SEAC supports that the derogations proposed by the Dossier Submitter will improve the proportionality of the restriction by facilitating efficient use of resources preventing the costs for articles that would need to be replaced prematurely, i.e. prior to the end of their service life (second hand articles), by avoiding double regulation (articles covered by RoHS directive) and by reducing potentially high cost to industry for additional testing and difficulties to switch to alternatives in time for the entry into force of the proposed restriction (aviation industry).

During the Public Consultation, comments and data were received from the **automotive industry** highlighting that the use of decaBDE in vehicles is continuously decreasing but the total replacement in the manufacturing of **new vehicles** would only be feasible for type approvals issued starting from 2020. DecaBDE would continue to be used in vehicles with type approvals issued before 2020 and for the related spare parts. Similar justifications as the ones mentioned above for the aviation sector have also been provided for the automotive sector. However, the overall tonnage of decaBDE that is used in the automotive sector is much higher than in aviation¹, which may have a more significant impact on the

¹ Amounts in the uses considered for derogation:

effectiveness of the restriction. ACEA has not yet provided sufficient information on the costs to industry due to the proposed restriction. **Hence, SEAC considers that sufficient evidence has not been provided to justify the derogation requested by the automotive sector.** The justification for this derogation will be re-assessed in the light of any new information to be provided by stakeholders in the Public Consultation on the SEAC draft opinion.

SEAC notes that no comments on the **transition period** were received during the public consultation (apart from the comments received from the automotive industry). This lack of response suggests that 18 months seem to be sufficient for industry to substitute and clear their stocks of articles containing decaBDE, as suggested by the Dossier Submitter.

The results of the Public Consultation do not indicate that the proposed restriction will have significant negative impacts on the **recycling** of plastic (and potentially textile) waste. There have been no contributions by the recycling sector addressing this issue, despite asking a specific question on this issue. However, SEAC notes that recent data on decaBDE in shredder fractions of plastic waste in the Netherlands show that the concentrations in the waste material (from WEEE) can exceed a concentration limit of 0.1 % (IVM, 2013) in some cases, which would mean that these fractions could not be used for material recycling (only for energy recovery) according to the proposed restriction. The study in the Netherlands only covered two selected waste streams and did not cover all the waste streams and potential concentrations of decaBDE in those streams. The study therefore has limitations to serve as underpinning of a possible concentration limit of 0,1%. Another observation is that at least in some EU Member States, it is common practice to exclude plastic waste containing brominated flame retardants from the general waste stream to be incinerated (with energy recovery). SEAC notes that waste incineration capacities differ between EU Member States and that there could be a lack in capacity in several Member States. If the proposed restriction would result in a significant increase in waste that will be going to incineration it would contribute to this general problem.

However, the available data on decaBDE concentrations in plastic waste is not sufficient to make a robust estimate of the share of plastic waste that contains decaBDE in concentrations above 0.1 %. Overall, the measurement data imply that it seems to be a small fraction of waste, mainly from electrical and electronic equipment (WEEE) that is highly contaminated with decaBDE. Information provided by the automotive industry indicates that waste fractions containing decaBDE will comply with the 0.1 % limit (based on the total non-metal fraction of a vehicle).

Overall, SEAC concludes that the available evidence seems to suggest that the proposed restriction will not have a significant negative impact on the recycling of materials, because only a small fraction of waste streams seems to contain decaBDE above the concentration limit proposed of 0.1 %. This conclusion is however not substantiated by sufficient data. SEAC recommends to undertake further studies to come to a better picture of the actual concentrations and the potential economic impact for recycling. This conclusion is supported by the fact that there has been no reaction by the recycling industry in the Public Consultation. The ACEA confirmed that a concentration limit of 0.1 % w/w decaBDE content would be respected for the total non-metal fraction in recycling of materials from end-of-life vehicles (ELV) and will not hamper to achieve the recycling targets set by the ELV directive. In addition, SEAC also

Automotive: a total of approximately 1000 tonnes from 2017 to 2035, out of which approximately 60 tonnes are for spare parts. The use is expected to occur predominantly in the early years after the entry into force and decline progressively to < 1 tonne per year from 2030 as vehicles which are currently in production are replaced with new models that will not contain decaBDE.

Aviation: the use of decaBDE in the aviation sector, in the EU, is estimated at significantly less than 10 tonnes per year.

notes that 0.1% is also the concentration limit recycled materials have to comply with in the RoHS directive and in the POP regulation (for the lower brominated PBDEs).

In case a derogation for the recycling of materials would be required, i.e. by setting a higher concentration limit than 0.1 %, SEAC notes that this could lead to a lower emission reduction of decaBDE. It is not possible to assess the size and significance of the emissions from the recycling of waste containing more than 0.1 % decaBDE. SEAC also notes that a derogation of the recycling of materials would complicate the enforcement of the proposed restriction. The justification for this derogation will be re-assessed in the light of any new information to be provided by stakeholders in the Public Consultation on the SEAC draft opinion.

Effectiveness in reducing the identified risks

Proportionality to the risks

As the proposed restriction is based on the PBT/vPvB concern related to decaBDE the quantification of the benefits (in terms of damage) is not possible in order to assess the proportionality of the proposal. Hence, the Dossier Submitter has carried out an analysis of the cost-effectiveness of the proposed restriction complemented by qualitative information and arguments on the concerns related to decaBDE to facilitate the proportionality assessment.

SEAC concludes that the approach taken by the Dossier Submitter is in line with the approach to evaluate PBT/vPvB substances in SEAC (see [SEAC/24/2014/04](#)).

Cost assessment

In the dossier compliance costs are assessed based on the estimation of substitution costs to producers/importers to replace decaBDE. Although SEAC agrees with the Dossier Submitter that substitution costs are likely to be the main cost triggered by the proposed restriction, SEAC considers that information on other relevant cost elements such as enforcement costs or compliance control costs would have been helpful to get a more complete picture of the economic impact of the proposal. However, as no information on other relevant cost elements has been received in the Public Consultation SEAC considers that this lack of comments indicates that other costs are less relevant compared to substitution costs.

The calculation of substitution costs is based on the following assumptions (for details please see Table 97 in BD):

- EBP will be used to replace decaBDE in all applications (textiles + plastics)
- EBP is a 'drop in' alternative, i.e. there will be no/minimal investment costs to switch to EBP
- EBP is slightly more expensive (i.e. 12%, 0.5 €/kg) than decaBDE
- the loading of EBP is the same as for decaBDE

On this basis, the **annual compliance costs** are estimated to be **2.2 million €**.

Even though EBP is a 'drop in' alternative and already widely used to replace decaBDE, the Dossier Submitter highlights that there are indications that the market will not completely switch to the use of EBP, but that other, also non-brominated, substances as well as non-chemical alternatives may be applied (especially in plastics), which usually are much more expensive than EBP. SEAC notes that in case other alternatives than EBP are used there must be some additional benefits to industry (e. g. a gain in reputation by green marketing) compared to using EBP of decaBDE, because EBP is technically feasible to replace decaBDE in all uses considered by the Dossier Submitter at the lowest additional cost. However, these additional benefits cannot be quantified based on the information available. As the prices of potential alternatives vary significantly, the alternative to be used to substitute decaBDE will have a major influence on the size of the overall compliance cost of the proposed restriction. To reflect the uncertainties related to the responses of industry to the proposed restriction and the possibility that other alternatives than EBP may be used, the Dossier Submitter has developed a second scenario assuming that users of decaBDE in plastics would switch to a variety of alternatives (see BD Annex F.2.1). The magnitude of costs for R&D and other investment needed to implement other alternatives than EBP are still not considered in this scenario due to lack of available information. This scenario would result in considerably higher compliance cost (9.6 million € per year) representing these additional benefits.

There are several factors in the analysis that are beset with uncertainties (information on price difference of the alternative and decaBDE, loadings). These are of varying importance for the overall order in magnitude of the cost estimates. Accordingly, the main driver of the analysis is the choice of the alternative used by industry (as explained earlier). No trend in the prices and in the amounts of the alternatives and decaBDE is considered in the cost calculations carried out by the Dossier Submitter due to the lack of information on price development. As a consequence, compliance costs are considered to be representative for all years after the restriction will enter into force. SEAC accepts this approach.

The Dossier Submitter has reflected the effect of these uncertainties on the overall results by using sensitivity analysis of the price difference of the alternative and decaBDE (see Table 14 in BD). SEAC considers this approach appropriate, because the choice of the alternative (representing the price difference to decaBDE) seems to be the most important driver of substitution costs (in the absence of quantitative information on other cost elements such as R&D and reformulation costs). Accordingly, substitution costs range between 0.5 and 12 Mio. €/y.

SEAC supports the overall approach of the Dossier Submitter to estimate substitution costs to assess the compliance costs of the proposed restriction.

However, SEAC notes that there is a lack of information on important drivers of the costs (i.e. alternative used by industry, price development). SEAC considers the sensitivity analysis included in the dossier as a useful tool to reflect the uncertainty arising from this lack of information.

Benefit assessment

The restriction proposal is based on the concern that decaBDE is transformed to substances with PBT/vPvB-properties (lower brominated congeners) in the environment and biota. As the risk/impacts of PBT/vPvB substances cannot be quantified with sufficient reliability, **abated emissions are used as a proxy to describe the benefits** of the proposed restriction. RAC considers that some alternatives could pose hazards similar to decaBDE. However, the 'drop-in' alternative EBP has not been identified as a PBT/vPvB substance so far and there are some alternatives that are likely to be less hazardous overall, at least in a PBT context. **SEAC bases its benefit assessment on the abated emissions of decaBDE as a PBT/vPvB substance.**

The emissions were estimated based on:

- the volumes of decaBDE used in the EU (4000 t/y) as well as in imported articles (400 t/y)
- different emission factors for all life-cycle stages (production, service-life, waste) of the uses of decaBDE (textiles and plastics)

Accordingly, **total emissions are estimated to be 4.74 t per year**, with the major amount of emissions (87%) occurring during the service-life of articles containing decaBDE.

To reflect uncertainties of the emission factors used, the Dossier Submitter has included sensitivity values to assess the potential effect on cost-effectiveness estimates (see discussion on proportionality).

When considering the overall benefits of the proposed restriction SEAC notes that the impact on emission sources outside the EU is uncertain, although some reduction in use is likely because the restriction will apply to articles imported to the EU. As decaBDE is a transboundary pollutant with the potential for long-range environmental transport any emissions occurring outside the EU can contribute to decaBDE exposure within the EU. In this respect, global action (the Stockholm Convention) would be more effective to eliminate decaBDE in the long-run. However, the potential for long-range transport does not adversely affect the benefits of the proposed restriction because, as decaBDE is a PBT-substance, any reduction in emissions has to be considered as a benefit, even though other emission sources may remain (see also RAC opinion, conclusion 8). Equally, as this long-range transport potential is acknowledged to be limited, the proposed restriction will effectively reduce European exposure to decaBDE irrespective of uses outside of the EU.

In addition to the emission estimates, the Dossier Submitter has included qualitative information on the **specific factors of decaBDE that contribute to the overall concern related to decaBDE** (in addition to the general PBT-concern). This information contributes to get a better picture of the benefits of the proposed restriction such as:

- **Extent and trend of environmental exposure and distribution**

- Long range transport potential of decaBDE and findings in remote areas. Apart from its PBT/vPvB properties the reason decaBDE has been proposed as a POP to be included in the Stockholm Convention.
- DecaBDE mainly affects sediments and soils at concentrations up to several milligrams per kilogram (parts per million, on a dry weight basis). Overall, decaBDE is the most abundant PBDE congener in sediments, sewage sludge, soil, dust and air (See section B.9 of BD).
- DecaBDE is also present in many types of aquatic and terrestrial wildlife species (including the eggs of predatory birds) at numerous geographical locations.

- **Human exposure and hazards**

- DecaBDE is frequently detected in human matrices, demonstrating that humans are extensively exposed to decaBDE.
- DecaBDE can cause developmental neurotoxicity and breaks down to substances with neurotoxic properties.

- **Stock of decaBDE in society and the environment as well as timescale of emissions' occurrence**
 - Monitoring data show no clear decreasing environmental trend in concentration levels over the last decade, despite the risk management measures already introduced (industry voluntary emission reduction programme (since 2004) and the restrictions in RoHS on decaBDE in EEE (since 2008)). Some studies indicate that the levels of decaBDE in the Arctic atmosphere are increasing.
 - The stock of decaBDE is considerable and present in a large variety of articles, with a potential to accumulate in society depending on the service life of the article. Consumption of decaBDE is estimated at 150 K tonnes in the EU in the period 1991-2010 (Earnshaw et al., 2013).
 - The timescale of emissions' occurrence is differing between the life-cycle steps (production, service life, waste) of articles that are placed on the market. Emissions from article production occur immediately, whereas emissions from article service life and from waste in landfills occur over much longer time periods (estimated in the BD to 10 to 40 years).
- **Transformation of decaBDE to lower molecular weight PBDEs (PBT/vPvB substances)**
 - It is well demonstrated that emissions of decaBDE will lead to exposure to the environment and humans to lower molecular weight PBDEs. Furthermore, there is evidence that decaBDE also breaks down to other substances with potential PBT/vPvB properties in the environment or biota. However, according to RAC's assessment the transformation rate of decaBDE is uncertain and cannot be quantified with sufficient reliability to use it for a quantitative analysis of the contribution of decaBDE to the formation of PBT/vPvB substances. As the transformation rate is considered to have a significant influence on the overall impact of decaBDE in the environment, SEAC recognises that it may also affect the cost-effectiveness of the proposed restriction. However, taking into account that this effect cannot be quantified and that RAC considers the emissions of decaBDE as a suitable proxy for the risk of hazardous transformation products, because of the potential for decaBDE to act as a long-term source of PBT/vPvB transformation products, SEAC supports to use the total emissions of decaBDE reduced as a basis for the cost-effectiveness analysis.

With regards to the valuation/monetisation of the benefits of reducing the emissions of decaBDE, it is pointed out in the dossier that there has been recent research on this issue. The results of a recent study looking at the valuation of precautionary control of decaBDE provide some indications regarding the proportionality of the proposed restriction (along with the other evidence provided in the section). Although the results of the study are not directly applicable to the proposed restriction, the study indicates a clear and potentially substantial willingness-to-pay amongst the general public for precautionary reductions in environmental accumulation and human health concerns for decaBDE (see BD, Annex F 1.2). Therefore, SEAC considers that the results of this study further corroborate the proportionality of the proposed restriction.

SEAC agrees with the approach taken by the Dossier Submitter to assess the benefits of the proposed restriction. It is in line with the current framework of SEAC to evaluate PBT/vPvB substances.

Proportionality

The proportionality assessment includes as part of the evaluation cost-effectiveness analysis as recommended by SEAC (see [SEAC/24/2014/04](#)).

Based on the substitution cost estimates (see above under 'cost assessment') and the emission estimates (see above under 'benefits assessment') the Dossier Submitter has calculated the cost of one kg of decaBDE emissions avoided (= cost-effectiveness) by the proposed restriction and also other restriction options (see above). Accordingly, the central estimate of the **cost-effectiveness of the proposed restriction is 464 € per kg emission avoided**.

SEAC notes that there are considerable uncertainties related to the underlying assumptions of the cost-effectiveness analysis (see cost and benefits assessment). These may have a significant impact on the cost-effectiveness estimates. The Dossier Submitter has described these uncertainties in the dossier (F.7) and has reflected the potential effect of these uncertainties by using sensitivity analysis combining a low emission factor with a high cost estimate and vice versa (Table 14 of BD). Accordingly, the cost-effectiveness of the proposed restriction ranges between 125 and 4000 € per kg decaBDE emitted. SEAC considers this approach as appropriate to assess the probable range of cost-effectiveness scenarios. The analysis indicates that the selection of the alternative used by industry as well as the emission factor do have a major influence on the cost-effectiveness of the proposed restriction. The difference of the sensitivity values of the cost-effectiveness was up to one order in magnitude.

SEAC highlights that the cost-effectiveness estimates *per se* do not give any indication on the proportionality of the proposed restriction. In order to conclude on proportionality, the cost-effectiveness has to be considered in relation to the benefits of the proposed restriction. So far, SEAC has not been able to establish a benchmark (range) of proportionate costs to reduce emissions of PBT/vPvB substances.

In the original dossier, the conclusion on proportionality is mainly based on the argument that the cost-effectiveness of the proposed restriction is in the same order of magnitude as the cost-effectiveness of recent restrictions of PBT-like substances (Hg, Phenyl-Hg) under REACH. SEAC agrees that data on the cost-effectiveness of former measures to reduce emissions of PBT/vPvB substances is of relevance to assess the proportionality of the proposed restriction.

However, SEAC highlights that the usefulness of this kind of data to conclude on the proportionality of the proposed restriction of decaBDE is limited due to, among other factors

- differences in the reference mass applied (volumes emitted vs volumes used)
- differences in the kind of costs incurred by a certain risk management measure (e.g. substitution vs clean up costs)
- difficulties to quantitatively compare the 'welfare consequences' (damage potential) of decaBDE and other PBT/vPvB substances in a meaningful and consistent way

Therefore, in addition to information on the cost-effectiveness of former regulation on PBT/vPvB substances SEAC proposes to base the proportionality assessment of the proposed restriction also on qualitative information and arguments more specifically describing the concern related to decaBDE and the benefits of the proposed restriction in a weight-of-evidence approach. Accordingly, the following **additional arguments** should be taken into account in addition to cost-effectiveness data when assessing the proportionality of the proposed restriction:

- the specific factors of decaBDE that contribute to the **overall concern related to decaBDE in the environment and humans** (see above 'benefits assessment')
- based on the comparison with other risk management options presented in the dossier the proposed restriction seems to be the **only effective measure to reduce emissions of decaBDE** E. g. voluntary risk management measures by industry (i.e. VECAP initiative) was not sufficient to minimise the emissions.
- DecaBDE has already been **phased out in the US** by the end of 2013 based on a voluntary agreement with industry.
- the **overall substitution costs** are **moderate and society is expected to put a significant value on reducing decaBDE emissions** (in relation with the recent study indicating a clear and potentially substantial willingness-to-pay amongst the general public) .

Taking into account the cost-effectiveness of the proposed restriction and the qualitative arguments presented, SEAC concludes that the proposed restriction is a proportionate measure to reduce emissions of decaBDE.

Practicality, incl. enforceability

In the dossier, it is concluded that the proposed restriction is implementable and practicable, because alternatives are available and technically and economically feasible for all uses of decaBDE covered by the proposal. This conclusion is supported by the fact that a significant part of the market has already phased out decaBDE.

In the following, the practicality of the proposal is assessed in more detail.

Clarity of the scope of the proposed restriction

The Forum highlights in their draft advice that the wording originally proposed in the dossier does not clearly reflect the intention of the Dossier Submitter to exempt the production, placing on the market and use of aircraft components containing decaBDE. The exemption as it has been phrased in the dossier will not allow these articles to be produced using decaBDE within the EU, only their import and placing on the market from outside the EU. The Dossier Submitter has revised the proposed wording based on the draft Forum's advice.

SEAC concurs that the new wording improves the clarity of the proposed restriction.

Enforceability

In the dossier several analytical test methods are given that could be used to enforce the proposed restriction.

The limit of detection of different **analytical methods** (with varying complexity to use) is suitable to use these methods for enforcement activities. In addition, sampling and preparation methods to facilitate enforcement are available. Some information on test costs has also been collected (from a Danish laboratory). However, these data are not sufficient to assess the magnitude of enforcement costs (see below). The derogations proposed for the use of decaBDE in **aircraft** as well as second hand articles requires enforcement authorities to identify these articles. The Dossier Submitter has proposed a way to enforce the derogation on the basis of type certificates. SEAC considers this approach to be feasible,

however it may lead to difficulties in the practices of enforcement authorities (as pointed out by Forum in its draft advice). Hence, the enforcement practices for aircraft component should be clarified as much possible to ensure the effective enforcement of the proposal.

SEAC notes that **enforcement costs** have not been quantified in the dossier. Also, no information on enforcement costs has been received during the Public Consultation. Hence, SEAC cannot evaluate their relevance (compared to substitution costs).

Monitorability

The dossier concludes that there are suitable analytical methods to monitor the effectiveness of the proposed restriction through enforcement activities. This conclusion is confirmed by the Forum in its draft advice. SEAC expects that the cost of monitoring will be mainly incurred by enforcement authorities. However, it is not clear to what extent industry will undertake monitoring activities. Also, the overall size of monitoring costs is uncertain (see text on enforceability above).

BASIS FOR THE OPINION

The Background Document, provided as a supportive document, gives the detailed grounds for the opinions.

The main changes introduced in restriction as suggested in this opinion compared to the restrictions proposed in the Annex XV restriction dossier submitted by ECHA on a request from the Commission are a minor change to the derogation related to aircraft and a clarification that articles placed on the market for the first time before the date of entry into force are exempted. These changes are introduced based on submissions during the public consultation and advice from the FORUM.