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Brussels, 30 January 2020

Dear Mr Baron,

**RE: i2a Comments on RoHS Annex II Dossier for Diantimony trioxide (flame retardant);
Restriction proposal for substances in electrical and electronic equipment under RoHS
Report No. 1, Version 2 (dated 04/12/2019)**

With this letter, the International Antimony Association (i2a) welcomes the opportunity to participate in the Stakeholder Consultation and provide comments on the second version of the RoHS Annex II Dossier for Diantimony Trioxide (ATO).

i2a strongly supports the consultants' conclusion that there is no need to restrict the use of ATO. i2a is nevertheless concerned that some contents of the Annex II Dossier are incorrect, incomplete and/or outdated, and that some conclusions have been reached without the proper scientific systematism and objectivity.

The various concerns have been described in detail by providing comments on specific parts of the Dossier, in Table 1. of Annex I to this letter. Additional Annexes are provided with this letter, that are referred to in Annex I (cf. Table 3). Annex I also contains i2a's responses to the "questions for stakeholders participating in the stakeholder consultation" made on pages 21, 48 and 55 of the Annex II Dossier (cf. Table 2).

Some answers to the consultants' questions regarding flame retardancy, and namely on how the type and quantity of flame retardant (formulation) is selected according to the application, may be found in "Introduction to Flame Retardancy", edited in October 2016 by Masuri Kitano (Professor of the Shukutoku University in Japan), and translated to English in 2017. i2a would

be happy to make copies of the book available to the relevant experts involved in the finalization of the Annex II Dossier.

We are particularly concerned that while the evidence available on ATO does not meet any of the four RoHS Article 6 criteria, the consultants miss to clearly report such a conclusion. Instead, for no justified reason (since no risk has been demonstrated), the consultants recommend to reassess ATO following a group approach, in a next Annex II review exercise. This indicates that the scientific mandate assigned to the consultants is being overstepped by a political one, and puts the overall credibility of the consultants and their report at high risk.

In order to prevent confusion in future assessments, we believe it is essential that the content of the report is corrected, updated and/or rephrased in the final version of the Annex II Dossier. In particular, where insufficient information is available, this should lead to a call for evidence, rather than to an arbitrary/political conclusion.

We very much look forward to exchange with you about our concerns and our comments, and remain available for any questions or comments you may have.

Yours respectfully,

Caroline Braibant
Secretary-General
International Antimony Association

Annex I to i2a Comments on RoHS Annex II Dossier for Diantimony trioxide (flame retardant)

Table 1. Specific comments on the RoHS Annex II Dossier for ATO, Report No. 1, Version 2 (dated 04/12/2019)

Page	Section	Paragraph/Content	Comment
10	CONTEXT AND SCOPE	Footnote 2: “[...] Among others, revisions have been made to clarify when Article 6(1) criteria are considered to be fulfilled [...]”	The report does not, at any time, make a specific and concrete assessment of how the presence of ATO in EEE meets or not Article 6(1) criteria. Please summarize in the conclusion how and how not ATO meets the criteria according to the assessment.
12	Table 1-2	Partition coefficient	Please replace ‘no data available’ by ‘This study does not need to be conducted for inorganic substances (cf. Annex VII section 7.8 Column 2 of regulation 1907/2006).’
12	Table 1-2	Dissociation constant	Please replace ‘no data available’ by ‘The substance does not contain relevant functional groups for which an assessment of the dissociation behavior would provide information for risk assessment purposes. Therefore, the determination of a dissociation constant is not considered to be required (Guidance on information requirements and chemical safety assessment Chapter R.7a: Endpoint specific guidance, section R.7.1.17.1).
15	1.3.2	“Antimony is listed on the 2017 list of Critical Raw Materials of the EU [...]”	Please note that the recent review of the CRM List confirms Sb’s status as CRM. May we invite you to contact DG GROW and reflect this in the report in order to be up to date?
16	1.3.3	“Furthermore, diantimony trioxide is added to the SIN List [...] because ‘reprotoxic effects have been reported’”	Please remove the reference to diantimony trioxide in the SIN List: <ul style="list-style-type: none"> • The SIN List has no more authority than any other NGO list • The information it brings on the carcinogenicity of ATO does not add to what is already indicated by EU regulation • It provides misleading information on the reproductive toxicity of Sb, which is specific to some compounds, administered in doses beyond the concentrations used in EEE plastics, and administered via routes which are not relevant for the assessment of the safety of EEE (i.e. injection).
18	2.1	“However, the stakeholders [...] stress that UL 94 V-0 [...] indicates the highest flame-retardant level”	Please add that stakeholders have also indicated that the ATO+halogen based-formulations offer the highest flame retardancy performance (i.e. UL 94 V-0) with the lowest disruption of the polymer’s original and/or desired technical and functional properties.

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			This is important to take into consideration when addressing the substitutability of ATO (and halogens) as flame retardants in EEE
18	2.2	“Printed Wiring Boards”	Please add (as a footnote) the definition of PWB, which is less commonly used than PCB. One possible definition is, for example: “PCB refer to the completed circuits on a board, while PWB refers more to the board itself.”
19	2.2	“To conclude, [...] there were no backgrounds given for this variation [...]”	Please correct this statement. Stakeholders have previously indicated that there are multiple reasons to use different amounts of ATO in plastics. The primary one is the nature of the polymer and its inherent flame retardancy. Following this, the intended application or use of the component, its potential for exposure to contact/erosion, the compatibility with technical and functional properties of the polymer, including color, weight, flexibility, etc., as well as price (these chemicals are costly and will not be added unless they are necessary). The EEE sector is very rich in terms of components and qualities. Different FR formulations can be used depending on a multitude of reasons. The statement in the report underestimates the complexity of the combined performance of the various criteria the EEE producers aim to meet and should be corrected.
19	2.2	“As for PVC as halogen-containing polymers [...], no flame retardants need to be added.”	Please complete this statement. Whereas for rigid PVC, indeed little or no flame-retardant synergists are needed, for flexible PVC, this is not the case. Indeed, the plasticizers added to soften the PVC decrease its inherent flame retardancy and in such cases, flame retardants are added to recover the lost flame retardancy.
19	2.3	“There was no specific nor actual quantities provided by the stakeholders”	Please revise this statement and the content of that section based on the work reported by Roskill in 2019; the report is made available as Annex I to this comment (please note that this report should not be made publicly available and is shared on a confidential basis). Figure 3 in the report shows that 85000 tonnes of ATO were produced globally for use in flame retardants in 2018. From these, 27000 tonnes were used in PVC, and 43000 tonnes in thermoplastics. Most of the ATO added to PVC ends up in construction applications, whereas around a third of the thermoplastics containing ATO are used in EEE (Figure 6). As regards industrial test & measurement equipment (Category 9 industrial), ATO is anticipated to be present in multiple components of all these, from board mountable

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			components and cables, to plastic enclosures. Consequently, the whole product portfolios would be impacted by a restriction and therefore require incremental effort comparable to that required to meet entry into scope of RoHS. This will necessitate a detailed supply chain investigation to gather information on substance presence, quantity and planned transition timeframes. From the experience of the industrial test & measurement sector, experience of the efforts and engagements necessary both to bring its portfolios into RoHS compliance, this will take years.
20	2.3	“[...] It is understood from this varying information that considerable amounts of ATO are used in EEE applications”	Please revise this statement based on the work reported by Roskill (Annex II - please note that this report should not be made publicly available and is shared on a confidential basis). And please note that presence in EEE does not automatically involve risk. Only exposure to the ATO present in the EEE can entail a risk for producers, consumers or recyclers. Members of i2a will provide additional information on the limited blooming of ATO in their individual response to the consultation. This shows that the mere presence of a chemical in a polymer does not imply it will become available for exposure; the blooming of Sb is generally below detection level, i.e. negligible for consumers of EEE.
21	3.1	“In the EU RAR... [...]”	‘rout’ should read ‘route’
23	Table 3-1	Germany: 0.006 mg/m ³	Please specify that, contrary to the other limit values, this one applies to the respirable fraction of the workplace (< 4 µm) rather than to the inhalable one (< 100 µm). The values for Germany and the other jurisdictions are not comparable and without this clarification, their presentation may be misleading.
23	Table 3-2	Guidance values for diantimony trioxide	Please revise this table and the content of that section based on the updated REACH dossiers which have been submitted in 2019, with updated DNELs; the DNELs are made available as Annex II to this comment (please note that this report should not be made publicly available as it is REACH Proprietary data, and is shared on a confidential basis).
24	3.2	“As for dermal exposure, the DNEL provided by the registrants will be taken into account”	Please can you clarify whether or not and why the dermal route is considered? In section 3.1, the inhalation exposure route was clearly indicated to the relevant route of exposure to consider in the assessment.

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24	4	“The Canadian Ministries of the Environment and of Health [...]. This is the most recent environmental assessment publicly available for antimony trioxide.”	Cf. more recent assessment conducted on ATO by the US EPA, available from https://www.epa.gov/sites/production/files/2015-09/documents/ato_ra_8-28-14_final.pdf , and even more recent (health) assessment conducted by Health Canada, available from: https://www.canada.ca/en/health-canada/services/chemical-substances/chemicals-management-plan-3-substances/antimony-containing-substances-group.html . The conclusion that ATO is not of environmental concern is confirmed/maintained in these two more recent assessments.
24	4	“To conclude, potential releases of ATO from EEE manufacturing and use would dissolve in the environment and would be part of dissolved antimony species found in the environment.”	Please rephrase this conclusion so it meets those of the assessments referred to (above). The conclusion should rather confirm that ATO does not pose an environmental concern (even if it may be present in the environment, it does not pose a concern; contrary to other chemicals, ATO is not ecotoxic). FYI, the insolubility of Sb prevents it from causing harm to the environment, contrary to more soluble chemicals used in flame retardant formulations, e.g. phosphorous-based ones.
25	4.1	“There are companies notifying self-classifications [...] that classify diantimony trioxide for being hazardous to the aquatic environment [...], among them a joint submission of a REACH registration dossier.”	Please remove this statement. Joint submissions can only carry one classification in the Lead Registrants’ dossier. There are two joint submissions for ATO (cf. https://echa.europa.eu/information-on-chemicals/registered-substances/-/disreg/substance/100.013.796) and none of them reports an environmental classification. Please note that the display of self-classifications in the brief profiles (cf. https://echa.europa.eu/brief-profile/-/briefprofile/100.013.796) have been very much criticized by Industry as it compiles a number of sources of information which cannot be separated out. As such, only the classifications reported in the joint submissions should be considered, as they are the only ones supported by data available to authorities.
25	4.1	“According to the above mentioned, there is clear evidence that antimony and its compounds have adverse effects on aquatic life, which should be taken into	Please remove this subjective, false and unsupported conclusion. None of the authoritative body reports referred to in the introduction to section 1 or in section 4.1 support this statement. To the contrary, they support the fact that ATO is of no concern for the environment, in terms of ecotoxicity and environmental fate.

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		account if exposure to the environment will be looked at.”	Also, it is not in line with the statement made earlier in section 1.2.2: “the harmonized classification is assumed to have a higher standard of scrutiny [...]”.
27	5.1	“This fraction is of today’s state [...]” and following paragraph	Please update these two paragraphs. A number of projects are being launched and/or arriving at pilot plant stage to actually make the recycling and recovery of BFR+ATO containing plastics viable. More information is available for example on Fraunhofer’s webpage: https://www.ivv.fraunhofer.de/en/recycling-environment/recycling-of-contaminated-plastics/polystyreneloop.html . A dedicated project is on-going and more information can be found on: https://plast2bcleaned.eu/ .
31	5.4	“[...] During shredding processes [...] substances like ATO may occur [...]”	Please rephrase this paragraph or add a stronger conclusion to it. Please note that the exposure to dust is a general hazard to be avoided, and not one specific to the shredding of EEE containing ATO. The presence of ATO bound to airborne particles cannot be assessed in isolation from the physical and chemical harms of inhaling an excess of dusts of various particle sizes. Dust exposure should be minimized and control no matter the origin and/or chemical composition of the dust, and cannot be given any specific weight in the assessment of one specific chemical. For more information please visit and review: https://www.who.int/occupational_health/publications/en/oehairbornedust3.pdf .
33	6	Whole section	Please revise and correct this section on the basis of the specific comments formulated by EBRC, expert in exposure assessment of metals and their compounds on the workplace, that are available in Annex V. In short: ECETOC TRA is not fit to model the exposure to metals and their compounds; and there is only one of the three literature references that is relevant and reliable, and can be used for the assessment.
43	8.1.1	“It can be concluded that there are alternative synergists available on the market [...]”	Please complete this assessment of alternatives, which is rather poor. It only refers to some applications where ATO can be replaced, and does not take account of the life-cycle impact of the compared chemicals (some of which have their own human health and/or environmental issues!) nor of the cost impact of such change. This does not constitute a

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			robust and scientifically valid assessment of alternatives and should not be considered in the assessment.
43	8.1.2	“Substituting both, halogenated FR and the synergist ATO, seems the most promising alternative to ATO, entailing a double positive effect through the additional elimination of the halogenated substance.”	<p>Please remove this statement from the report.</p> <p>It is biased and subjective; it assumes without any prior robust and objective assessment of the various chemicals named that they need to be eliminated!</p> <p>This does not consider any of the input provided by the stakeholders and which clearly demonstrate that there are safe solutions to achieve very high fire safety performance levels, which in order to be achieved without affecting the other properties of the polymer, requires a combination of halogenated FRs and ATO.</p>
44	8.1.2	“The companies’ lists of some computer manufacturers confirm the restriction of ATO for all their materials: [...]”	<p>Please complete/correct this statement with the additional information published by these companies:</p> <p>Apple’s phase-out is actually a restriction of max 1000 ppm which applies to ATO (and a couple of brominated and phosphate flame retardants) to Apple products, accessories, and packaging. The Apple Policy is based on best industry practices or toxicological properties, and not on publicly documented risk assessments. It is furthermore unclear whether the maximum concentration applies to each individual part or to the final article (ATO is typically present in small quantities and hence the 1000 ppm threshold can be complied with if the total mass of the article is considered).</p> <p>Dell’s specification specifies that the ATO restriction (also at 1000 ppm) applies to mechanical plastic parts above 25 grams. The restriction on brominated flame retardants applies to mechanical plastic parts; plastic parts greater than 25 grams and products designated as Halogen Free or BFR/CFR-Free. An exemption applies to internal plastic components such as circuit boards, electronic components, fans, cables, printer fuser assembly and electrical, assemblies contained in Dell products unless designated as Halogen Free or BFR/CFR-Free products.</p> <p>As regards Samsung, their restriction on ATO also include many exceptions:</p> <ul style="list-style-type: none"> • TVs: internal wires (except LCD/LED panel and PDP module) • Notebooks (except power cord and adapter) • Monitors: internal wires (except panel)

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			<p>The voluntary restrictions imposed on ATO cannot be considered as evidence that substitution is possible, as this should be risk assessed on a per application basis. Although some Apple, Dell or Samsung products may function with small amounts of/no ATO in some parts, for other EEE applications and their manufacturers, ATO may not be replaceable.</p> <p>The evidence available shows that full substitution in all applications is not possible. There are many exceptions remaining. As such the statement is incorrect.</p>
44	8.1.2	“[...] It can be concluded that the voluntary phase-out of ATO by these companies means the simultaneous phase-out of halogenated flame retardants. [...]”	<p>Please remove this statement.</p> <p>This is not a scientifically justified conclusion. ATO can be used without brominated flame retardants (in conjunction with other flame retardants and synergists) and some brominated flame retardants can also function without ATO.</p>
45	Table 8-1	“Halogen-free (thus ATO-free) flame retardants [...]”	<p>Please remove the sentence in parenthesis.</p> <p>Cf. comment above.</p>
45	8.1.2	“From the table above a trend can be seen towards halogen-free organo-phosphorous compounds (among others) [...]”	<p>Please remove this statement.</p> <p>The TCO Certified Accepted Substance List is a list of chemicals composed by a private organization, based on risk assessments (independent verifications) that are not publicly available for free. For a verification to be made, and a substance to be listed, companies should have requested and paid for such a verification to be made, as part of a market access strategy. The TCO List contains substances which have undergone a verification; those not included in their list are not necessarily not accepted.</p> <p>Furthermore, TCO covers categories of products used in IT, which is only a subset of the EEE covered by RoHS.</p> <p>TÜV Rheinland is also a private organization inspecting technical equipment and products. Their approach towards assessing the safety of chemicals is not made available and as such is likely a case-by-case assessment.</p> <p>As regards EPEAT, it is again, a privately owned registry of electronics rated / ranked according to, again, an ‘independent verification’ yielding no publicly available reports.</p>

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			These private organizations alone cannot be considered as trend-setters; as such any of their lists should not be used as a source of evidence to compare well-known ATO FR applications with other applications, which require more market visibility and as such, make more active use of such private platforms.
45	8.1.2	“The outlined findings allow the conclusion to be drawn that halogen- and ATO-free are available and already being applied. [...]”	Please remove this statement. The findings do not support that conclusion. The assessment of alternatives should be done on a per application basis, and considering full life-cycle and costs, rather than just market trends and private organizations’ findings.
48	8.1.3	“[...] Literature provides these alternatives, but the actual application in products recently placed on the market cannot be confirmed properly, the reason being that the consultants would require concrete confirmation by stakeholders which is still missing.”	Please correct this statement. Stakeholders have clearly indicated and repeated that alternatives exist for some applications, but not for most of those requiring a high flame retardancy performance. Again, there is no way of performing a general assessment of alternatives, but rather this should be done for each application separately. Trade-offs vary per application and producer. If fire safety is the most important priority, the ATO+halogen combination remains the preferred choice. The main reason for this is that they can be added without affecting the original and/or desired technical and mechanical properties of the polymer; which is not the case of many other available solutions.
49	Table 8-2	“Additional comments”	Please complete this column with the following information: The absence of a harmonized classification is not sufficient to determine the non-hazardousness of these zinc compounds. Please note that in the three REACH registration dossiers for zinc stannate, zinc (hydroxo)stannate, and zinc borate (firebrake 415), respectively, ‘data lacking’ is provided for almost all endpoints; meaning that no evidence has been generated to assess the hazard. Zinc and borate individually are known to have, as a minimum, ecotoxicological properties (cf. classifications of other forms of zinc borate registered under REACH). Some suppliers actually note possible reproductive toxicity concerns too (Annex III - please note that this SDS should not be made publicly available and is shared on a confidential basis).

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			Also, please note additional evidence beyond the claimed non-hazardousness aspect: considering the very few REACH registrants there are (and the confidentiality of the tonnages registered), it is important to consider the availability of supply and cost of this flame-retardant synergist before concluding it is a viable alternative.
50	Table 8-3	“(ECHA Brief Profile)”	Please remove references extracted from the ECHA Brief Profiles. Only hazard / classification information reported in the REACH Registration Dossiers published on the ECHA website should be considered, as the self-notified classifications reported on the Brief Profiles are not supported by any submitted evidence.
50	Table 8-3	“Red phosphorus; CAS 7724-14-0”	Please correct the CAS number by using the following: ‘7724-13-0’.
50+51	Table 8-3	“Human Health and Environmental Concerns”	<p>Please complete this column with the following information:</p> <ul style="list-style-type: none"> Aluminium diethyl phosphinate and phenoxyphosphazene have not been REACH registered. This may mean they are not supplied to the EU market or not supplied in sufficient quantities. As such, it also means they have not undergone any risk assessment, so their hazards remain unassessed (to a level which is comparable to the level of assessment undergone by ATO) and they cannot be compared with ATO. Red phosphorus’ has not been assessed for high tier endpoints such as genotoxicity or carcinogenicity (data lacking noted in registration dossier) and as such cannot be compared to ATO (which has been assessed). Environmental fate/Water concerns relative to Phosphorous are also increasing, and many (organo)phosphates are actually classified as ecotoxic acute/chronic. Substituted amine phosphate mixture: more information can be found in the REACH Registration Dossier. Please note that the generation and release of phosphines (of health concern) has not been investigated yet. Again, ATO cannot be compared with this alternative. Siloxanes and silicones: these have not been REACH registered as a group, and should be investigated individually rather than as a group. Again, there is no such thing as an alternative assessment looking at groups of chemicals.
51	8.2	“[...] Still, phasing out halogenated flame retardants including ATO as	Please complete/correct this statement.

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		a synergist by using inherent inflammable polymers could be a step forward as far as a conclusion on the polymer's suitability is possible."	Polymers have different degrees of inherent resistance to fire, with the most rigid ones typically having higher resistance than flexible ones. However, not all polymers are fit for all applications in terms of technical performance. The use of inherently resistant polymers is recommended as far as possible, but is not recommended only to avoid the use of certain flame-retardant formulations. Furthermore, a full life-cycle approach should take account of the recycling potential and actual recycling levels applicable to each polymer, hand-in-hand with the other criteria under assessment. This again, goes beyond their supplemental flame-retardant composition (which has been proven to be well-established and both effective and efficient as regard ATO+halogen compositions). This statement is biased and subjective and should be rephrased or removed.
52	8.3	"As earlier pointed out, uncertainties exist [...]"	Please rephrase according to the comment above.
52	8.4	"To conclude on possible alternatives for ATO, the analysis of the various information sources indicates two most promising steps forward: [...]"	Please rephrase this subjective statement. The steps proposed are not promising, they are in place where the application allows this; where it is has not taken place, this is due to technical, fire safety and cost performances, all very legitimate to the continued use of existing solutions, which have been demonstrated and continue to be demonstrated to be safe. The fact that consultants 'miss concrete confirmations by stakeholders' is due by the fact that the assessment needs to be done per application, and cannot be done in general for EEE covered under RoHS. The consultants should first identify the uses of ATO which pose a risk, and then assess alternatives for these specific uses, in which case stakeholders would be in a better position to provide more specific and concrete input.
53	8.4	"The application of substitution is confirmed by waste stream analysis: Halogen-free enclosures [...] is assured because phosphorous-based flame retardants in EEE enclosures [...]"	Please deepen the investigations on the presence (and adverse effects) of phosphorous sources in waste water: <i>"Too much phosphorus can cause increased growth of algae and large aquatic plants, which can result in decreased levels of dissolved oxygen—a process called eutrophication. High levels of phosphorus can also lead to algae blooms that produce algal toxins which can be harmful to human and animal health."</i> Cf. https://www.epa.gov/national-aquatic-resource-surveys/indicators-phosphorus .

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		are reported to be found in the waste stream.”	
53	9.1	“In this respect, it is noted that some EEE will already be compliant with the new restriction, seeing that some OEMs already specify ATO as a restricted substance in components and materials purchased from the supply chain [...] and have completed the phase-out of ATO. [...]”	Please rephrase this statement. The phase-out is actually a limit of 1000 ppm imposed on the levels of ATO allowed, and it does not apply in many cases, which are recognized as exceptions by these OEMs. Please also note that these production methods using less ATO most probably have a cost impact which cannot be underestimated (cf. end of first paragraph of section 8.3).
53-54	9.2-9.4	“Impacts on the Industry [...]”	Please either remove or deepen this section. The three paragraphs given in this section are highly superficial and subjective, and do not belong to a robust socio-economic analysis. There are typically five steps to be followed in an iterative manner: <ul style="list-style-type: none"> • Stage 1: Set the aims of the SEA (why is the SEA being developed?) • Stage 2: Set the scope of the SEA (what are the “continued use” and the “restriction” scenarios and what are the supply chains involved) • Stage 3: Identify and assess the impacts (what are the expected impacts of being restricted compared to non-restricted – i.e. what are the differences between the “continued use” scenario and the “restriction” scenario) • Stage 4: Interpretation and drawing conclusions (bring the human health, environmental, economic, social and other impacts together to assess the net benefits and net costs of (not) restricting) • Stage 5: Present the results (prepare a report that transparently documents the results and assumptions used in the analysis) Cf. Figure 2 in the ECHA Guidance on the preparation of

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			<p>socio-economic analysis as part of an application for Authorisation available from: https://echa.europa.eu/documents/10162/23036412/sea_authorisation_en.pdf/aadf96ec-fbfa-4bc7-9740-a3f6ceb68e6e.</p> <p>It is important to note that a SEA is performed after the risk of a chemical has been demonstrated and the need for a restriction confirmed. The risk of ATO has not been demonstrated up to this page of the report, so investing in a SEA is irrelevant. Conducting it in such an improper manner can only lead to a confusing, unilateral and unrealistic 'opinion' of the consultants.</p> <p>The consultants are cordially invited to review the Roskill SEA report provided in Annex II (please note that this report should not be made publicly available and is shared on a confidential basis), to have a better idea about the size and importance of the Industries depending upon ATO uses as flame-retardant synergist. This would only be a first step in starting to evaluate the actual socio-economic impact on the value chain, would ATO be restricted under RoHS.</p> <p>The whole industrial test & measurement equipment (Category 9 industrial) product portfolios would be impacted by a restriction and therefore require incremental effort comparable to that required to meet entry into scope of RoHS.</p> <p>With the whole product portfolio just redesigned for RoHS compliance, which took 12 years, restricting additional new RoHS substance would mean starting the whole process over from scratch. This would result in substantial costs and administrative burden for the test & measurement sector. This shows that the impact of a restriction has been very much underestimated and furthermore, that in the event Category 9 industrial fall in the scope of a potential future restriction of ATO, a differentiated timeline is necessary and additional time should be granted (12 years minimum).</p>
55	9.5	"On the other hand, plastics sorted out based on the presence of ATO for the most part are incinerated or declared as	Please cf. comment on page 27 made above and update this statement accordingly.

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		hazardous waste and landfilled at appropriate sites, constituting a loss of antimony which is considered a critical raw material. [...]"	
55	9.6	"[...] Additional costs may be relevant in the longer-term, depending on whether exemptions would be requested and how long such exemptions would remain valid (frequency of revaluations). [...]"	Please rephrase this statement. If ATO is restricted, it is very highly likely that exemptions will be requested and necessary, and that these will be necessary over a long period, with several revaluations. This should be clearly reflected in the cost assessment both for authorities, as well as for Industry (section 9.2, 9.3 and 9.4).
57	10	"[...] Substantial information was missing with regard to the question which halogenated flame retardant requires which concentration of ATO. [...]"	Please complete this statement. Please note that there is no top-5 formulation recipes and that the formulation recipe is a tailored one, prepared to fit the specifications and quality, technical, fire-performance, safety and price requirements requested by the customer for each application. There is no possibility to provide such a list of formulations because it simply does not exist. Information which cannot be compiled or generated is not missing. The applications are far too complex and numerous.
57	10	"With regard to risks for human health [...]"	Please rephrase or remove this whole paragraph. Cf. Specific comments formulated by EBRC, expert in exposure assessment of metals and their compounds on the workplace, are available in Annex IV.
57	10	"In light of the precautionary principle, there is some reason for appropriate measures to take due to the fact that ATO is a recognized carcinogen."	Please correct and complete this statement. First, ATO is a suspected carcinogen, and not a demonstrated carcinogen. Second, as any suspected carcinogens, those handling or producing ATO are subject to workplace legislation which imposes a hierarchy of controls. This is unrelated to RoHS. RoHS should not duplicate existing legislation as this would go against the principle of better regulation. The need for proper workplace controls can be recommended but is in no way an argument to justify a RoHS (future) assessment or restriction recommendation.

Page	Section	Paragraph/Content	Comment
57	10	“[...] Voluntary approaches by industry or ecolabel schemes show that substitution rather targets halogenated flame retardants (and thereby ATO as well).”	Cf. comment on page 45: Private organization decision and inspections alone cannot be considered as trend-setters; as such any of their lists should not be used as a source of evidence to compare well-known ATO FR applications with other applications, which require more market visibility and as such, make more active use of such private platforms.
57	10	“[...] In order to avoid this, the consultant proposes not to exclusively restrict ATO, but instead to carry out a joint assessment of the system of halogenated flame retardants and the ATO synergist with high priority.”	<p>Please remove this statement, which is not at all justified by the assessment reported. First, nothing in the report actually demonstrates that ATO poses a demonstrated risk in light with Articles 6(1) criteria, according to which ATO:</p> <p>(a) could have a negative impact during EEE waste management operations, including on the possibilities for preparing for the reuse of waste EEE or for recycling of materials from waste EEE; NO, Oeko concludes that it actually brings an advantage!</p> <p>(b) could give rise, given its uses, to uncontrolled or diffuse release into the environment of the substance, or could give rise to hazardous residues, or transformation or degradation products through the preparation for reuse, recycling or other treatment of materials from waste EEE under current operational conditions; NO, the evidence put forward in the report is that ATO poses no risk for the environment</p> <p>(c) could lead to unacceptable exposure of workers involved in the waste EEE collection or treatment processes; YES, but monitoring of recycling facilities is in place/recommended (Industry agrees that this is an acceptable and more proportionate measure (especially compared to a RoHS restriction))</p> <p>(d) could be replaced by substitutes or alternative technologies which have less negative impacts. YES, but Oeko recognizes that there are many exceptions and that cost may be an issue, so Oeko’s conclusion should read NO (Industry points towards the need to</p>

Page	Section	Paragraph/Content	Comment
			<p>perform a more in-depth alternatives assessment for the uses in EEE which are deemed to pose a risk, which has so far not been demonstrated!)</p> <p>Second, although group restrictions are possible under RoHS, only chemicals which are present in the EEE and demonstrated to pose a risk can be subject to a restriction. Assuming all ATO + halogenated flame-retardant formulations meet these conditions is incorrect; in particular various brominated flame retardants have been demonstrated to be safe, and polymeric applications (rather than additive ones) are increasingly developed to further increase this safety.</p> <p>If a group approach were to be proposed and implemented, this should be done as per the approach defined in the 'Manual Methodology for Identification and Assessment of Substances for Inclusion in the List of Restricted Substances (Annex II) under the RoHS 2 Directive' (dated 26.09.2019), and in particular according to Appendix A6 of this Methodology. Section A.6.2 'Grouping of substances under RoHS' of that Appendix provides a list of similarities which substances should ideally share before deciding that they belong to a group, whether this is for assessment purposes, or for the purpose of recommending or deciding upon a possible group restriction. This step being completely omitted in the Annex II Dossier for ATO, the recommendation formulated by Oeko is void of scientific robustness and should be removed from the report.</p> <p>Third, the report is rather incomplete and superficial, or false in various places, as it assumes ATO is always used with brominated flame retardants. ATO can be added to other flame-retardant formulations and some brominated flame retardants can also function well in small quantities without ATO.</p> <p>In summary, nothing in the report (or in the input provided by stakeholders) allows to objectively, robustly, scientifically support such a recommendation. This is a subjective and politically-driven recommendation which does not belong in a scientific report.</p>

Table 2. Answers to questions for stakeholders participating in the stakeholder consultation made on pages 21, 48 and 55 of the Annex II Dossier

Page	Question	Answer
21	<p>Specific information is requested to the ratio of ATO to the flame retardant, e.g. weight or volume ratio and specification of the flame retardants.</p> <p>It should be further specified which halogenated flame retardant requires which concentration of ATO.</p> <p>Specific information is requested on the concentration of ATO used in most relevant applications which are</p> <ul style="list-style-type: none"> • Plastics for housings / enclosures, • Cables, • Printing Wiring Boards. <p>Specific information is requested on the amount of ATO in the above listed applications. The amounts should at least include estimations on the total amount placed on the European market. The estimations should be detailed so that the numbers given can be followed.</p>	<p>This information is end-use specific and cannot be provided in general terms more than by saying that the ATO provides the most cost-efficient performance to the halogenated flame-retardant formulation when it is added in a 1:3 ratio with the halogen.</p> <p>ATO works well with any halogen added or present in the polymer. The need to add ATO will be dependent on the ultimate function of the polymer and the fire safety performance that is required for this polymer (without undermining its other technical performances). This varies from EEE to EEE. It is a quality aspect which varies across brands and the expectations of the customers/consumers.</p> <p>As regards the total amounts of ATO, ATO containing PVC/thermoplastics used in EEE in the EU, this information is available in Annex I.</p>
48	<p>1.) Can you confirm the conclusion that the most promising substitution routes for ATO are (a) substituting the halogenated flame retardant together with ATO as synergist ATO, and (b) alternative technologies?</p>	<p>No, this cannot be confirmed.</p> <p>Such a co-substitution would be done at the expense of the fire safety performance and overall quality of the polymer used in the EEE. It would furthermore have a negative impact on recycling, since other formulations are not as easy to sort, recycle, and recover/reuse with minimum environmental impacts.</p> <p>More details are provided in Table 1.</p>
48	<p>2.) The outlined findings indicate that substitution of some components and parts of EEE might still be challenging. If this is the case, please provide evidence for which parts substitution is seen to be difficult. Please provide details on reasons.</p>	<p>Indeed, substitution of ATO or co-substitution of the ATO+halogen remains a challenge because:</p> <ul style="list-style-type: none"> - Other formulations do not achieve the same fire safety performance at the same concentrations - Other formulations adversely impact the other technical performances of the polymer they are added to

Page	Question	Answer
		Where substitution has not occurred, despite years of research following 'ATO-free and/or halogen-free trends' (research has never been pushed by anything else, as their performance has always exceeded that of other formulations), it is a demonstration that it is technically not viable. The exceptions included in some of the biggest brands' ATO/halogen-free standards provide the list of parts or conditions which require ATO/halogen to function at the expected level of fire safety performance and polymer technicity.
48	3.) Which technical criteria are relevant for substitution?	End-use of the FR, compatibility of the polymer's technical properties, recyclability, among others. Cf. the RoHS Expert WG paper on substitution, which applies to any chemical (which is why it was produced in the first place, and stakeholders requested that it would be included in the Manual Methodology).
48	4.) To what extent does line density affect substitution, especially regarding power cords, power adapters and display panels?	The polymer should be able to 'resist' a number of mechanical impacts while being fire retardant. This combined goal requires the use of flame-retardant formulations which preserve the polymer's performance against mechanical impacts. More details can be provided by the relevant downstream user sectors.
48	5.) Please provide information on actually applied alternatives, especially on the application of inherent flame-retardant materials.	More details can be provided by the relevant downstream user sectors.
55	In order to understand the socio-economic impacts of a potential restriction of ATO in the various fields of applications as described in section 2 more in depth, stakeholders are requested to provide information on the costs and benefits that can be associated with such a restriction of this substance in electrical and electronic substances under RoHS. Within this context, please make available quantitative data wherever possible. However, also	We agree, and it is why the socio-economic assessment reported by Oeko in the Annex II Dossier should be removed. A socio-economic assessment should be done after the risk of the chemical has been demonstrated, and a restriction recommended, and can certainly not be done qualitatively, but with quantitative input to be generated and collected over a longer (specified) timeframe. In order to contribute to such an exercise, i2a commissioned Roskill, in order to map the socio-economic value of the ATO/Sb market. This is

Page	Question	Answer
	<p>qualitative information is considered to be helpful for the assessment of the socio-economic impacts. Concerning the impacts, information should be distinguished and specified according to the following scheme as far as possible:</p> <ul style="list-style-type: none"> • impact on chemicals industry; • impact on EEE producers; • impact on EEE users; • impact on waste management; • impact on administration. 	<p>available in Annex I (please note that this report should not be made publicly available and is shared on a confidential basis). This is an essential first step in determining impacts of regulatory changes.</p> <p>We invite Oeko to look at Annex I and formulate a SEA questionnaire specific for ATO, after the risk of using ATO has been properly assessed and demonstrated.</p>

Table 3. Annexes aimed to support and complement i2a’s contribution to the consultation

Annex	Title	Date
I.	Roskill SEA report (CONFIDENTIAL)	September 2019
II.	New DNELs ATO (CONFIDENTIAL)	April 2018
III.	Example SDS for Zinc borate hydrate (CONFIDENTIAL)	2016
IV.	EBRC Comments on exposure assessment	January 2020