To: Vice President Timmermans, Commissioner Sinkevičius, Commissioner Simson, Commissioner Breton and Commissioner Kyriakides

Cc: Directors General for Environment, Energy, Internal Market and Health

23 January 2020

RE: Fluorescent Lamp Exemptions List under the RoHS Directive

Dear Vice President and Commissioners,

Last month, the European Commission adopted its Communication on the European Green Deal (EGD), setting out an ambitious framework and roadmap for 'a set of deeply transformative policies' that aim at addressing what the Communication described as 'this generation's defining task', namely to tackle climate change and other environment-related challenges. This flagship policy announcement was widely welcomed by stakeholders, while it was also recognised that delivery on the objectives of the EGD will depend on a series of further decisions and instruments in specific policy areas.

One such decision, which will be regarded as an early test of the EGD's ability to deliver, concerns the review of the exemptions for fluorescent lamps under the Restriction of Hazardous Substances for Electric and Electronic Products directive (RoHS). With this letter, we urge the European Commission to move without delay to discontinue these exemptions, which we believe are no longer needed or justified and which are clearly incompatible with the EGD's objectives.

Phase out should take place at the earliest possible date, but no later than September 2021, in particular for the larger categories including Compact Fluorescent Lamps (CFLs) and Linear Fluorescent Lamps (LFLs). Although the validity of the existing exemptions expired in July 2016, the delay in an actual decision from the Commission has led to these lamps still being allowed on the EU market, contributing eventually to mercury pollution, while mercury-free alternatives (Light Emitting Diodes – LEDs) are available[1]. A recent study showed that LED replacements do exist and are widely available on the European market, and since LED lamps are now roughly twice as efficient as fluorescent lighting and last 2-3 times longer than fluorescent lamps, LED replacement lamps save end-users money while also eliminating mercury. Furthermore, the study showed other important environmental benefits in terms of energy savings and reduction in CO_2 emissions, if at least the CFLs and the largest LFL categories were phased out by that date.

We are aware that decisions have been taken under the Ecodesign directive to phase out some of the same lamp categories at a later date[2]. However, these were decided and adopted before the European Green Deal was adopted and should therefore not constrain the possibility to set an earlier deadline under the RoHS Directive.

[1] SEA/CLASP report Evidence of the availability of mercury-free alternative products to certain fluorescent lamps , 12 December 2019 (Revision, v.2) https://meta.eeb.org/wp-content/uploads/2019/11/SEA-and-CLASP-analysis-of-RoHS-exemptions-for-fluorescent-lamps-v2-1.pdf

[2] Commission Regulation (EU) 2019/2020 of 1 October 2019 laying down ecodesign requirements for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 (Text with EEA relevance.) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.315.01.0209.01.ENG&toc=OJ:L:2019:315:TOC

Mercury and its compounds are highly toxic to the developing nervous system, as well as harmful to ecosystems and wildlife. Methylmercury, its most toxic form, has the capacity to bioaccumulate and bioconcentrate, especially in the aquatic food chain.

The EU via its 2005 mercury strategy, accompanying measures and as Party to the Minamata Convention on Mercury has as its objective to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

Furthermore, most recently, under the European Green Deal, the EC has pledged '*to ensure a toxic-free environment*', to '*help to protect citizens and the environment better against hazardous chemicals and encourage innovation for the development of safe and sustainable alternatives*'.

Taking, rather than avoiding, pertinent decisions such as ending the exemptions for CFLs and LFLs will confirm the EU's commitment to the above objectives. This will be one of the first hands-on examples implementing the European Green Deal and touching upon the commitments related to the *Chemicals Strategy for Sustainability to ensure a Toxic Free Environment* within the *Zero Pollution ambition*, as well as the *Industrial Strategy for a clean circular economy*. Given the overlaps with the Ecodesign directive it would further contribute to the priority to '*Align all new Commission initiatives in line with the objectives of the Green Deal and promote innovation*' and for '*Stakeholders to identify and remedy incoherent legislation that reduces the effectiveness in delivering the European Green Deal*'.

Action to combat mercury use and emissions from all relevant sources would be an appropriate follow-up to the conclusion of the recent State of Environment Report 2020 from the European Environment Agency, which asks for an urgent change of direction to face climate change challenges, reverse degradation and ensure future prosperity. The report confirms, among other things, that '*Diffuse pollution remains a problem in Europe. It is mostly due to excessive emissions of nitrogen and phosphorus to water and to both historical and current emissions of mercury to the atmosphere and subsequently surface waters*'[3].

As Director General Calleja mentioned in a recent[4] reply to the EEB, European citizens have a strong interest in the environmental factors affecting their health and expect Europe to act forcefully in this area. Given that the Commission is well aware of the gaps and challenges that risk undermining their policy objectives including inter alia issues on the implementation and enforcement of chemical legislation, burdens and pace of procedures and consistency (as per the same letter), this is an opportunity to move in the right direction and send a strong message of the real meaning of the European Green Deal.

More technical details on the issue can be found in our letter dated 19 December 2019 addressed to Unit B2, DG Environment, here in annex.

Thank you in advance for considering our concerns.

Yours sincerely,

Jeremy Wates
Secretary General

[3] The European environment - state and outlook 2020 https://www.eea.europa.eu/highlights/soer2020-europes-environment-state-and-outlook-report , p.105
[4] 13/1/2020 ENV B2/EM/ARES(20202) 190659

Annex

To: Silvija Aile
Acting Head of Unit
ENV.B.3 – Waste Management & Secondary Materials
Directorate B – Circular Economy & Green Growth
DG Environment
European Commission

19 December 2019

RE: Fluorescent Lamp Exemptions List under the RoHS Directive

Dear Ms. Aile,

Writing on behalf of the European Environmental Bureau's (EEB) Zero Mercury Campaign, with this letter, we would urge DG Environment to carefully review and remove exemptions for fluorescent lamps under the Restriction of Hazardous Substances for Electric and Electronic Products directive (RoHS), which we conclude are no longer needed or justified.

Phase out should take place at the earliest possible date, but no later than September 2021, mainly for the larger categories including Compact Fluorescent Lamps (CFLs) and Linear Fluorescent Lamps (LFLs). Although the validity of the existing exemptions expired in July 2016, the delay in an actual decision from the Commission has led to these lamps still being allowed on the EU market, contributing eventually to mercury pollution, while mercury free alternatives are available.

Mercury and its compounds are highly toxic to the developing nervous system, as well as harmful to ecosystems and wildlife. Methylmercury, its most toxic form has the capacity to bioaccumulate and bioconcentrate, especially in the aquatic food chain.

The EU via its 2005 mercury strategy, accompanied measures and as Party to the Minamata Convention on Mercury has as its objective to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

Furthermore, most recently, under the European Green Deal, the EC has pledged '*to ensure a toxic-free environment*', to '*help to protect citizens and the environment better against hazardous chemicals and encourage innovation for the development of safe and sustainable alternatives*'.

Taking, rather than avoiding, pertinent decisions such as ending the exemptions for compact fluorescent and linear fluorescent lamps, will confirm the EU's commitment to the above objectives.

To that end we would like to bring to your attention:

1. The evident incoherence between EC processes and policy decisions with respect to fluorescent lamps, and
2. The fact that scientific data based on current – 2019 - market information, fully supports a decision for a swift phase out of outdated fluorescent technology, both addressing the energy and zero pollution objectives of the recently adopted European Green Deal.

In more detail:

1. Incoherence between EC processes

Since the RoHS review process started back in 2015, examining the future of the lamps containing mercury, the EEB had already researched and submitted evidence[5] showing that for the larger fluorescent lamp categories, LED mercury free alternatives were available in the market. This evidence was further supported by the independent consultant Oeko Institute's 2016 report[6], which advising the Commission, recommended revoking the exemptions and therefore phasing out the biggest categories of fluorescent lamps – CFLs and most LFLs as early as January 2018.

An Ecodesign related process, was however taking place almost in parallel, looking at the same products. The first study by independent consultants VHK advising the EC, dated December 2017, led to a recommended draft EC decision that CFLs and many LFLs would be phased out by September 2020[7].

Given that the background research for both of these processes and policy proposals has taken place more or less at the same period and using the same market data, the inconsistency and eventual incoherence of the policy recommendations is striking.

Under the RoHS, the process was frozen because of apparent pressure of industry stakeholders which lead in the meantime in the request of an additional Socio-Economic Analysis (published in July 2019, but also based on 2016 data). On the other hand, under the Ecodesign directive, Commission Regulation 2019/2020, 1st October 2019[8] agreed to ban LFLs T2 and T12 and CFLs with integrated ballast in September 2021, and certain lengths (2-foot, 4-foot and 5-foot) of T8 linear fluorescent lamps in September 2023. Other types of lamps containing mercury were not allocated phase out timelines under Ecodesign (e.g. T5 fluorescent and CFLni).

As a result, the Ecodesign decision appears to have not considered all the data and studies under the RoHS process, and political compromises meant that the initially proposed dates were again pushed down the road. The phase-out dates for these products were delayed for years due to an industry lobby that sought to keep the more profitable[9] mercury-lighting in the European market – putting profits before people.

Given the situation, we would invite the Commission to develop a table showing clearly the interlinkages between the two legislative pieces – the Ecodesign related regulation and RoHS with respect to the mercury containing lamps.

2. Swift decision is needed to ban outdated fluorescent technology

[5] https://www.zeromercury.org/download/6/position-paper/1317/151016_eep-rpn-mpp_comments_on_rohs_request-final.pdf

[6] https://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/RoHS-Pack_9_Part_LAMPS_06-2016.pdf

[7] https://www.eceee.org/ecodesign/products/2452009linear-and-compact-fluorescent-lamps/

[8] 2 Commission Regulation (EU) 2019/2020 of 1 October 2019 laying down ecodesign requirements for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 (Text with EEA relevance.) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.315.01.0209.01.ENG&toc=OJ:L:2019:315:TOC

[9] For information on the profitability of mercury lighting, which explains why industry is so insistent on keeping it in the market, please see: https://meta.eeb.org/2019/12/05/mercury-spotlight-the-toxic-lamps-that-shall-not-be-turned-off/

New evidence[10] (published by the Swedish Energy Agency (SEA) and CLASP) has recently come to our attention highlighting the fact that the data previously reviewed by the Ecodesign Committee and the RoHS expert group are out of date and do not reflect the current European lighting market. Indeed, the RoHS and Eco-design 2016 and 2017 studies respectively, were based on market data from between 2013 and 2016, and therefore do not capture the innovation that took place over the last three years. We have reviewed the new research, including the citations and references, and conclude that mercury-free drop-in (direct retrofit) alternatives to fluorescent lamps do exist for over 90% of the sockets in Europe, and thus the RoHS exemption for fluorescent lighting is no longer justified. The executive summary of the SEA-CLASP report can be found in Annex to this letter, but we would invite you to thoroughly look into the full report.

Looking at both the RoHS lamp categories and the Ecodesign requirements it appears that with respect to the single and double capped fluorescent lamps:

RoHS categories Annex III	**Ecodesign Regulation**	
	Lamp Type	**Treatment by Ecodesign**
Single capped (compact) fluorescent lamps not exceeding (per burner) n. 1(a-e) and 1f and 1 g	**If CFL integrated ballasted (CFLi)**	**Banned from September 2021**
	If CFLni – non-integrally ballasted (CFLni) with certain energy characteristics n[lm/w] and L [W] values	No phase-out date; allowed to remain on the market
	If T5 circular - with certain energy characteristics n[lm/w] and L [W] values	No phase-out date; allowed to remain on the market
Double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp)		
2(a)(1) – T2		**Banned from September 2021**
2(a)(2) – T5	LFL T5, HE, HO, 4000<=F<=5000lm, HO, other lm output - with certain energy characteristics n[lm/w] and L [W] values	No phase-out date; allowed to remain on the market
2(a)(3) – T8	**LFL T8 2-, 4- and 5-foot length**	**Banned from September 2023**
	LFL Other than T8 2-, 4- and 5-foot length - with certain energy characteristics n[lm/w] and L [W] values including t8 U shape one	No phase-out date; allowed to remain on the market

[10] "Evidence of the availability of mercury-free alternative products to certain fluorescent lamps", revision v.2 published by the Swedish Energy Agency and CLASP Europe. 12 December 2019. Link: https://meta.eeb.org/wp-content/uploads/2019/11/SEA-and-CLASP-analysis-of-RoHS-exemptions-for-fluorescent-lamps-v2-1.pdf

2(a)(4) – T12		**Banned from September 2021**
2(a)(5) – long lifetime		Depending on above diameters banned or not.
2(b)(3) Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9)		No phase-out date; allowed to remain on the market
2(b)(4) Lamps for other general lighting and special purposes (e.g. induction lamps)		No phase-out date; allowed to remain on the market

Given that for **T2 and T12 Linear Fluorescent Lamps** and **CFLs with integrated ballast**, a phase out decision for September 2021 is already planned under the Ecodesign related regulation, these will not be discussed further.

Due to time and resources restriction, the RoHS categories covered in this letter and the new SEA-CLASP study, are the following three main types of fluorescent lamps:

- Single capped (compact) fluorescent lamps – 1(a-g) - CFL non-integrally ballasted (**CFLni**)
- Double-capped linear fluorescent lamps for general lighting purposes - 2(a)(2)-**T5**, and 2(a)(3)-**T8.**

The report provides links to, and information from manufacturer websites that confirms there are cost effective direct retrofit LED replacements on the market today that operate on the existing fluorescent ballast (magnetic or electronic) and are the same size and base type. These LED retrofit lamps not only eliminate mercury from lighting, but they also will save the end users money by energy bills and the need to replace lamps. LED retrofit lamps are on average twice as efficient as the fluorescent lamps and last at minimum 2-3 times longer.

The SEA-CLASP report further quantifies the following benefits[11] for Europe from removing these exemptions (for CFL ni, T5 and T8) by 2021:

- 4.8 metric tonnes of mercury are avoided; 2.6 metric tonnes from the lighting supply chain and 2.2 metric tonnes avoided emissions from power stations (coal);
- €12.5 billion in energy and replacement lamp savings for businesses and consumers across Europe;
- 138.3 TWh of electricity savings; and
- 40.9 million metric tonnes of CO_2 emission savings.

We note that all these benefits are aligned with the recently announced European Green Deal which we are certain you would not wish to undermine.

As mentioned earlier, the initial RoHS 2016 study had shown that T8s could be phased out by January 2018. This was followed by an Ecodesign study/recommendation in 2017 for phase out by 2020 and then 2021, which eventually got pushed back to 2023, without any scientific reasons, under the current Regulation, due to pressure by industry stakeholders and without the evidence of market evolution during the period 2016-2019.

This delay comes at a very high social and environmental cost, as evidenced by the SEA-CLASP study which had the same consultancy (VHK) conduct runs to verify such costs if the phase-out of T8 lamps took place in 2021 instead of 2023. Outside of the policy forum, industry agrees with

[11] Benefits in this modelling were calculated for Sweden and CLASP by VHK, the consultants who conducted the lighting market analysis for DG ENER. The estimates were calculated using the same European lighting market model.

SEA-CLASP; as an example please see article from OSRAM/LEDVANCE[12] "SubstiTUBE LED lamps", which outperform conventional T8, T5 and T9 fluorescent lamps." OSRAM describes these LED tubes as simple to replace without rewiring, lasting up to 3 times longer, reducing energy bills by 50%, immediately reaching full brightness, flicker-free, and paying for themselves in as little as four months through energy savings.

To that end, the EEB does not support the position promulgated by LightingEurope that the Commission should be aligning the exemptions list in RoHS with the recent Ecodesign measures.

First of all, the Ecodesign regulation measure is based on a study that was completed in 2017, based on 2016 data and it does not reflect the 2019 market. Secondly, RoHS has a different focus from Ecodesign. As you well know, RoHS is about removing toxic and harmful products from electrical and electronic equipment (EEE) with a view to contributing to the protection of human health and the environment, including the environmentally sound recovery and disposal of waste EEE; exemptions need to be adapted to scientific and technical progress in order to achieve this objective.

We would further like to draw your attention to Annex C of the SEA-CLASP v2 report dated 12 December 2019- where answers responding to the LightingEurope claims are further analysed.

It is our view that these exemptions for fluorescent lighting are not justified any more given the mercury-free alternatives which exist on the market today. The timeline in the Ecodesign goes against the strong case made under the 2016 RoHS study and the SEA-CLASP report to phase out T8s earlier. This effectively means that the Ecodesign timeline continues to ignore the rationale behind the RoHS and this would need to be rectified.

Beyond health benefits, climate and consumers would also benefit from ending the exemptions as revealed by the SEA/CLASP report, with lower running costs for businesses and households, and the reduction in CO_2 emissions.

To that end we would propose that:

1. RoHS categories below are banned as early as possible and latest by September 2021, and certainly before the Zero Pollution action plan promised in the European Green Deal is launched in 2021.
    - 1 (a-g) CFLs (As per ecodesign regulation and new SEA-CLASP report),
    - 2(a)(1) – T2 (As per ecodesign regulation)
    - 2(a)(2) -T5 (As per new SEA-CLASP report)
    - 2(a)(3) -T8 (As per new SEA-CLASP report)
    - 2(a)(4)-T12 (As per ecodesign regulation)
    - 2(a)(5) – Long lifetime (As per ecodesign regulation and new SEA-CLASP report)
2. For the lamp categories where maximum limits for **mercury content** will potentially need to remain - the applicability should change from 'may' to 'shall'. We do hope to have additional time which will allow us to look into the remaining categories as relevant, but in all cases our 2015 EEB comments[1] concerning the High-Pressure Sodium lamps still remain.

In that perspective, we would like to ask the following key questions so that we have a clear view of what the next steps are, and how we can actively participate in that work:

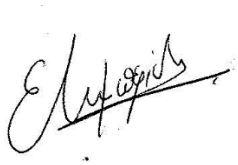
- Before finalising the draft Delegated Act decision, will the Commission gather current market evidence to better assess what mercury-free alternatives to fluorescent (and other) lighting technologies exist, as per the RoHS lamp categories?

[12] Article from OSRAM: https://www.ledvance.com/professional/products/product-stories/led-tubes-online-special/index.jsp

- What schedule do you expect to follow concerning your decisions on how to treat the fluorescent lamps, and other remaining exemptions?
    - We understand that a draft is currently under interservice consultation (ISC). After ISC feedback, will DG ENV make a new proposal and by when can this be expected?
    - Will this proposal be consulted with the RoHS expert group?
    - Will this new draft open for public consultation? For how long and when is this to be expected?
    - If there is a public consultation, will DG ENV consider revising again the proposal depending on comments received? When could this be expected?
    - Will this new proposal be consulted with the RoHS expert group?

Thank you for your time and consideration of the issues we are raising in this letter. We look forward to your response and wish you a very restful holiday season.

Sincerely yours,



Elena Lymberidi-Settimo
Project Manager “Zero Mercury Campaign”
European Environmental Bureau
International co-ordinator Zero Mercury Working Group

Annex

SEA-CLASP report – v2- 12 December 2019

The Swedish Energy Agency and CLASP conducted a review of several categories of fluorescent lighting products which are exempted in Annex III of the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.[13] This review found that there are mercury-free alternative products which can replace these fluorescent lamps, enabling these on-going exemptions from RoHS to be retired.

Through continued investment and on-going breakthroughs in light emitting diode (LED) light sources and drivers alike, the market now enjoys LED retrofit lamps that can be installed directly into existing luminaires without the need for rewiring. These lamps can operate on the existing fluorescent ballast, whether it is magnetic (line frequency) or high frequency. Pictures of examples of some of these lamps can be found in Annex A of this report.

The table below summarises our proposals for consideration based on our findings of the existence of alternative LED replacements for the exempted fluorescent lighting in Annex III of the RoHS Directive. These alternative products are cost-effective and can be installed directly into the fluorescent sockets without the need for rewiring.

Table 1. Proposals for Consideration on the Exemptions for Certain Fluorescent Lamps

RoHS Annex Exemption	Proposals for consideration
Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):	
1(a) For general lighting purposes < 30 W: 2,5 mg shall be used per burner after 31 December 2012;	Consider setting the exemption to expire on 1 September 2021
1(b) For general lighting purposes ≥ 30 W and < 50 W: 3,5 mg may be used per burner after 31 December 2011;	
1(c) For general lighting purposes ≥ 50 W and < 150 W: 5 mg;	
1(d) For general lighting purposes ≥ 150 W: 15 mg;	
2(a) Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):	
2(a)(2) Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g. T5): 3 mg may be used per lamp after 31 December 2011	Consider setting the exemption to expire on 1 September 2021
2(a)(3) Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (e.g. T8): 3,5 mg may be used per lamp after 31 December 2011	
2(a)(4) Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g. T12): 3,5 mg may be used per lamp after 31 December 2012	
2(a)(5) Tri-band phosphor with long lifetime (≥ 25 000 h): 5 mg may be used per lamp after 31 December 2011	
2(b) Mercury in other fluorescent lamps not exceeding (per lamp):	

[13] DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast) (Text with EEA relevance) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02011L0065-20190722

2(b)(3) Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9): 15 mg may be used per lamp after 31 December 2011	Consider setting the exemption to expire on 1 September 2021

The analysis is based on four key questions which explore the technical and economic feasibility of the alternatives to mercury lighting. These four questions and abbreviated answers are shown in the table below. More detail and information underpinning these answers is provided in the body of this report.

Table 2. Four Key Questions and Summaries of our Findings

Key Question	Summary of Findings
Are there alternative mercury-free replacements for fluorescent lamps?	**Yes**. There are thousands of mercury-free LED replacement lamps available today to replace fluorescent lamps – different sizes, lengths, ballast types (i.e., magnetic/starter and high frequency electronic), colour temperatures, and regular, high output and ultra-high light output levels. Lamps are also available which are "universal" and can operate on a variety of input power configurations. Many of these LED products are designed as direct retrofits into existing fluorescent fixtures to avoid the need to rewire. For example, Philips/Signify states[14] that there is "No need to change drivers or rewire", noting that they offer a "plug and play solution that works straight out of the box". OSRAM/LEDvance state[15] that their "SubstiTUBE" product is a "Quick, simple and safe lamp replacement without rewiring." Sylvania lighting advertises that their SubstiTUBE product is "engineered to operate on existing instant start and select programmed rapid start electronic T8 ballasts, these lamps minimise labour and recycling costs."[16] Tungsram reports that in addition to "the 2.5-3x longer life (compared to T8 fluorescent lamps operated on electro-magnetic gear) and lower wattages, Tungsram LED T8 tubes provide lower system loss while existing fixtures remain intact."[17]

[14] https://www.lighting.philips.com/main/support/support/tools/ledtube-selectortool
[15] https://www.ledvance.com/professional/products/product-stories/led-tubes-online-special/index.jsp
[16] https://assets2.sylvania.com/media/bin/asset-1377974/asset-1377974
[17] https://tungsram.com/en/products/led-retrofit/led-tubes

Key Question	Summary of Findings
Will removing the exemption result in a reduction in mercury in the environment?	**Yes**. Each fluorescent lamp contains several milligrams of mercury and our research has found that more than half of the fluorescent lamps sold in Europe are never recovered and instead end up being discarded with regular municipal waste, contaminating landfill sites and run-off. A 2014 European Commission study on collection rates found that the collection rate was only 12% in 2010 for all lamps under the WEEE Directive.[18] The WEEE Directive sets a target of 80% recycling, however some studies show that the actual rate of separate collection at the end-of-life is less than 50%, thus while reported recycling rates are high, these percentages are not based on total lamps removed from service, but are instead only considering those lamps that are delivered to the correct waste treatment facility. The Minamata Convention encourages the sharing of information around mercury-free alternative products and calls for periodic reviews of the exemptions list. In Europe, by not renewing the exemptions for many of these fluorescent lamps for which there are cost-effective, mercury-free, direct replacement alternatives, RoHS would be aligning with the objective of the Convention and removing 2.6 metric tonnes of mercury from our homes and offices across Europe.
Is it cost-effective for LED lamps to replace linear fluorescent lamps?	**Yes**. Economic calculations are presented in section 3 for the most popular lamps. The payback period for replacing a 36W T8 linear fluorescent lamp with an LED retrofit lamp in Europe today is between 5 and 11 months, and the service life of these lamps is 1.5 to 2.5 times longer than fluorescent, saving on replacement costs. LED replacements for T5 fluorescent lamps have longer payback periods of approximately 3 to 3.5 years, however they will operate for approximately 16 years and represent the best option for the end-user, with a net present value life-cycle cost savings of between €55 and €67 for each T5 fluorescent lamp replaced. LED replacements for compact fluorescent lamps not integrally ballasted (CFLni) offer very attractive payback periods of between 1.3 and 3.0 years and will last 2-3 times longer than the fluorescent lamp. For European businesses and households, there is a very strong value proposition in switching to LED, and lighting manufacturers' websites highlight the cost-effectiveness and energy savings potential of LED alternatives to fluorescent lamps.

[18] https://ec.europa.eu/environment/waste/weee/pdf/Final_Report_Art7_publication.pdf

Key Question	Summary of Findings
Are the societal benefits in terms of energy, CO_2 and cost savings significant?	**Yes**. The consultants who prepared the one-lighting regulation review study and impact assessment for the European Commission conducted some new runs of the MELISA market model for this study to help quantify the benefits of phasing out certain fluorescent lamps in 2021. The cumulative benefit through the year 2030 for these specific lamp types are reported as follows: • T8 phase-out: Saves 64 TWh electricity, avoids 18.9 MMT CO_2 and has a net saving of €5.0 billion in electricity bills and lamps • T5 phase-out: Saves 60 TWh electricity, avoids 17.8 MMT CO_2 and has a net saving of €4.7 billion in electricity bills and lamps • CFLni phase-out: Saves 14 TWh electricity, avoids 4.2 MMT CO_2 and has a net saving of €2.8 billion in electricity bills and lamps Taken together, phasing out these three lamp types offers significant societal benefit. In addition, the total electricity savings of 138.3 TWh also avoids the release of mercury from the power stations which burn coal. Using the Commission's estimate of 0.016 mg Hg/kWh of electricity generated in Europe, a further 2.2 metric tonnes of mercury emissions from European power stations would be eliminated.

Results Summary

If the RoHS exemptions for T8, T5 and CFLni lamps were limited to 1 September 2021, this would move both of those markets to LED earlier than in the business as usual case, accruing the following benefits across Europe:

Table 3. Summary of the Benefits from a Scenario where RoHS exemptions for T8, T5 and CFLni Lamps are Limited to 1 September 2021

Metric for T5 and T8 compared to Business as Usual*	Savings from limiting RoHS exemption to 1 September 2021 (cumulative through 2030)
Hg Reduction: Avoided quantity of mercury put into the lighting supply chain, with the risk of breakage or improper disposal (2.6 metric tonnes) and avoided mercury emitted from power stations due to electricity savings (2.2 metric tonnes).	4.8 metric tonnes Hg
Energy Bill Savings: Billions of Euros saved by businesses and consumers on their lighting bills through the use of more energy-efficient LED lamps	€12.5 billion
Energy Reduction: TWh of cumulative energy reduction	138.3 TWh electricity
CO_2 Reduction: Metric tonnes of CO_2 reduction from the avoided generation of electricity for lighting	40.9 million metric tonnes CO_2

*Business as Usual is calculated on the basis of the one-lighting ecodesign regulation adopted by the European Commission on 1 October 2019 becoming law and taking effect. The one-lighting regulation will phase-out T8 fluorescent lamps in September 2023, however it was found to be cost-effective to phase-out T8 fluorescent lamps faster than this, thus this analysis considers a scenario phase-out date of September 2021 for T8 (an acceleration of 2 years). T5 and CFLni do not have a phase-out date in the one-lighting ecodesign regulation, however they are also considered for phase-out in September 2021 through the end of their exemptions in the RoHS Directive.