



**OSPAR**  
**COMMISSION**

*Protecting and conserving the  
North-East Atlantic and its resources*

# Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria

## Second Overview assessment

**OSPAR Convention**

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**Convention OSPAR**

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

**Acknowledgement**

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# Contents

Executive Summary .....	4
Récapitulatif .....	4
<b>1. Introduction .....</b>	<b>6</b>
1.1 OSPAR Recommendation 2003/4.....	6
1.2 EC legislation.....	6
1.3 Implementation reporting.....	6
<b>2. Overview of compliance .....</b>	<b>6</b>
<b>3. Overview of effectiveness .....</b>	<b>7</b>
3.1 Crematoria applying mercury removal techniques.....	7
3.2 Crematoria not applying mercury removal techniques .....	10
3.3 Additional information provided on crematoria abatement, calculation of loads, proportion of people cremated and the number of small crematoria in use .....	13
3.4 Assessment of reported loads of dispersed mercury.....	16
Calculation of loads.....	16
Calculated loads of mercury emitted to the environment.....	16
<b>4. Assessment .....</b>	<b>16</b>
<b>5. Overall conclusion .....</b>	<b>17</b>
<b>Annex 1: Belgium .....</b>	<b>18</b>
<b>Annex 2: France .....</b>	<b>21</b>
<b>Annex 3: Germany .....</b>	<b>22</b>

**Annex 4: Iceland ..... 25**

**Annex 5: Ireland..... 28**

**Annex 6: Luxembourg ..... 32**

**Annex 7: Netherlands..... 35**

**Annex 8: Norway..... 37**

**Annex 9: Spain ..... 40**

**Annex 10: Sweden ..... 42**

**Annex 11: UK ..... 45**

## Executive Summary

This document provides an overview and assessment of the implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria in the OSPAR Convention area in 2016. It is based on national implementation reports received from eleven of the 15 Contracting Parties in the 2015/2016 meeting cycle and also makes reference to implementation reports submitted by 9 Contracting parties in 2005. Denmark<sup>1</sup>, Finland, Portugal and Switzerland did not provide an implementation report in 2016, but taking account the last round of reporting in 2005 all Contracting Parties have supplied evidence on how the measure has been implemented in their territories.

Most Contracting Parties reporting have regulations in place which control the emissions of mercury from crematoria. These generally require crematoria to have permits dealing with polluting emissions. A significant number of crematoria already apply mercury removal techniques. A number of Contracting Parties have specific mercury emission standards for new plants. A number of Contracting Parties have set remediation programmes for existing crematoria which have led to further reductions of mercury emissions during the ten years since the last implementation reporting round in 2005.

It is clear that the implementation of this Recommendation has led to a significant reduction in mercury emissions and has contributed towards the OSPAR 2020 cessation target for priority hazardous substances.

The overall conclusion is that all Contracting Parties have implemented Recommendation 2003/4, and that measures to control the dispersion of mercury from crematoria already in place, or planned have already led to significant reductions in releases that might reach the Convention Area, and that there will be further reductions as older crematoria are phased out or upgraded.

A third overview assessment of the implementation of Recommendation 2003/4 will take place in 2026.

## Récapitulatif

Le présent document fait la synthèse et présente une évaluation de la mise en œuvre de la Recommandation OSPAR 2003/4 concernant la lutte contre la dispersion du mercure émis par les crématoriums dans la zone de la Convention OSPAR en 2016. Il se fonde sur les rapports nationaux de mise en œuvre communiqués par onze des quinze Parties contractantes au cours du cycle de réunions 2015/2016 ; il se réfère également aux rapports de mise en œuvre présentés par neuf Parties contractantes en 2005. Le Danemark<sup>2</sup>, la Finlande, le Portugal et la Suisse n'ont pas présenté de rapport de mise en œuvre en 2016, cependant si l'on tient compte de la dernière campagne de notification en 2005, toutes les Parties contractantes ont fourni des données concernant la façon dont la mesure a été mise en œuvre dans leurs territoires.

La plupart des Parties contractantes qui présentent des rapports ont mis en place une réglementation visant à limiter les émissions de mercure provenant des crématoriums. Cette réglementation exige généralement que les crématoriums possèdent des autorisations relatives aux émissions polluantes. De nombreux crématoriums utilisent déjà des techniques d'élimination du mercure. Un certain nombre de Parties contractantes possèdent des normes spécifiques qui s'appliquent aux émissions de mercure des nouvelles installations. Plusieurs Parties contractantes ont mis en place des programmes visant à améliorer

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<sup>1</sup> Denmark provided revised figures for its 2005 report

<sup>2</sup>Le Danemark a présenté des chiffres révisés pour son rapport de 2005.

les crématoriums existants ; ceux-ci ont permis de réduire davantage les émissions de mercure au cours des dix années écoulées depuis la dernière campagne de notification de la mise en œuvre en 2005.

Il apparaît clairement que la mise en œuvre de cette Recommandation a produit une réduction significative des émissions de mercure et a permis d'avancer vers l'objectif de cessation de 2020 d'OSPAR concernant les substances dangereuses prioritaires.

On conclut, d'une manière générale, que toutes les Parties contractantes ont mis en œuvre la Recommandation 2003/4, que les mesures déjà en place ou prévues pour lutter contre la dispersion du mercure émis par les crématoriums ont déjà produit des réductions significatives des rejets susceptibles de parvenir à la zone de la Convention, et qu'il y aura d'autres réductions au fur et à mesure que les crématoriums plus anciens seront progressivement fermés ou améliorés.

Une troisième évaluation de synthèse de la mise en œuvre de la Recommandation 2003/4 aura lieu en 2026.

## 1. Introduction

### 1.1 OSPAR Recommendation 2003/4

Mercury has been selected and prioritised by OSPAR as chemical for priority action because of its persistence, liability to bioaccumulate and toxicity. OSPAR has taken a number of measures to reduce discharges, emissions and losses of mercury from point and diffuse sources and identified crematoria as a significant source for releases of mercury, especially from dental amalgam from human remains.

Recognising that the practice of cremation raises sensitive cultural and societal issues, and that there are different attitudes and approaches among Contracting Parties that need to be respected in addressing the problems of discharges, emissions and losses of mercury from crematoria, OSPAR Recommendation 2003/4 recommends Best Available Techniques (BAT) which could be taken at crematoria to prevent and control the dispersal of mercury to the environment.

### 1.2 EC legislation

The EC Mercury Strategy (COM (2005) 20 final) acknowledges crematoria as a source for mercury dispersal but so far, no control measures or monitoring of emissions specifically from crematoria apply at Community level.

### 1.3 Implementation reporting

#### 1.3.1 General reporting requirements

Under Article 22 of the OSPAR Convention, Contracting Parties shall report to the Commission at regular intervals on the national measures (legal, regulatory, or other) taken by them to implement the provisions of the decisions and recommendations adopted under the OSPAR Convention and on the effectiveness of these national measures. This implementation reporting forms the basis for OSPAR to assess the compliance by Contracting Parties with the Convention and ultimately to evaluate the effectiveness of programmes and measures adopted under the Convention.

Detailed provisions on implementation reporting and related assessments by OSPAR are laid down in OSPAR's Standard Implementation Reporting and Assessment Procedure (reference number 2003-23, update 2005). Unless stated otherwise in the OSPAR instrument concerned, the practice has been in general that an implementation report should be submitted to the appropriate OSPAR subsidiary body in the inter-sessional period four years after the adoption of a measure and every four years thereafter until fully implemented. Implementation reporting does not apply to Contracting Parties with reservations (or non-acceptance) on an OSPAR measure unless and until the reservation (or non-acceptance) is lifted.

#### 1.3.2 Reporting requirements under OSPAR Recommendation 2003/4

This overview assessment of the implementation of OSPAR Recommendation 2003/4 has been prepared by the lead country United Kingdom based on national reports submitted by Contracting Parties in the 2015/2016 meeting cycle. This is the second round implementation reporting and assessment on Recommendation 2003/4, following the first in 2005, and the conclusions of the first reporting round in 2005 have been used to assess progress.

## 2. Overview of compliance

All Contracting Parties were invited to submit implementation reports on OSPAR Recommendation 2003/4 by 20 January 2016. An overview of implementation reports received is included in Table 1. The national

reports received are appended to this overview assessment. A summary of national information on the effectiveness of measures taken is given in section 3.

Combined with the first round of reporting in 2005, this overview assessment gives a reasonable picture of implementation in the Convention Area. Finland reported in 2005 that they had not implemented the measure as the crematoria were so small that installations of mercury removal processes would be financially unfeasible. The Recommendation allows for such situations.

**Table 1: Overview of implementation of OSPAR Recommendation 2003/4**

Measure applicable	Contracting Party	Reserva tion	Report in 2006 <sup>*</sup>	Report in 2016	Means of implementation by		
					Legislation	Administrative action	Voluntary agreement
Yes	Belgium	No	Yes	Yes	Yes	Yes	No
Yes	Denmark	No	Yes	No	Yes	Yes	Yes
Yes	Finland <sup>1</sup>	No	Yes	No	No	No	No
Yes	France	No	No	Yes	Yes	Yes	
Yes	Germany	No	Yes	Yes	No	Yes	No
	Iceland	No	No	Yes		Yes	
	Ireland	No	No	Yes	not stated in report how measure is implemented		
	Luxembourg	No	No	Yes	Yes	Yes	Yes
Yes	Netherlands	No	Yes	Yes	Yes	Yes	No
Yes	Norway	No	Yes	Yes	Yes	No	No
	Portugal	No	[Yes] <sup>*</sup>	No	Not stated how the measure is implemented		
	Spain	No	[Yes] <sup>*</sup>	Yes	Yes	Yes	Yes
Yes	Sweden	No	Yes	Yes	Yes	No	No
Yes	Switzerland	No	Yes	No	Yes	No	No
Yes	United Kingdom	No	Yes	Yes	No	Yes	No

\* Portugal and Spain provided some information on the implementation of OSPAR Recommendation 2003/4 at the HSC 2006 meeting, but no formal report.

### 3. Overview of effectiveness

Contracting Parties were asked to estimate the load of mercury entering the environment from crematoria in their countries, if possible using the tables of the reporting format appended as Annex 2 to OSPAR Recommendation 2003/4. All Contracting Parties reporting fulfilled this requirement.

#### 3.1 Crematoria applying mercury removal techniques

Table 2 shows for each Contracting Party the number of crematoria which apply mercury removal techniques, the number of cremations per year and an estimate of load of mercury dispersed to the environment. For each country, the situation is shown for the first round of reporting in 2005, and the second round in 2016 to give an indication of progress.

<sup>1</sup> Finland reported in 2006 that the small nature and number of crematoria in Finland meant that it was not practicable to implement this Recommendation



Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

**Table 2:** loads from crematoria which apply mercury Removal Techniques

Contracting Party	Number of crematoria applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Contracting Party Comments	Observations by Lead Country
<b>Belgium 2004</b>	6 (Flanders)  1 (Brussels-Capital Region: 5 ovens)	26998 (2004)	27.0 (2004)	An emission factor of 1g Hg per cremation was used	
<b>Belgium 2014</b>	6 (Flanders)	39086 (2014)	0.001930336	An emission factor of 0,049 g Hg/ cremation was used according to measurements by the crematoria. Installation of filtration system in progress	
<b>Denmark 2004</b>	3	42500	85	The large crematories have air abatement. Denmark use an estimation of 2g Hg per cremation	
<b>Denmark 2014</b>	Denmark provided revised figures for 2004				
<b>Finland 2004</b>	0	21			
<b>Finland 2014</b>	no implementation report provided				
<b>France 2004</b>	no implementation report provided				
<b>France 2014</b>	no information on the current situation			by 2018 all crematoria in France will be equipped with mercury-reducing filters (in 2013 160 crematoria were in operation and 30 additional projects were developed). Data on number of cremations and loads not currently available	
<b>Germany 2004</b>	105	337 845	17.7		
<b>Germany 2014</b>	144	485714	26.5		
<b>Iceland 2004</b>	no implementation report provided				
<b>Iceland 2014</b>	0	629	0.88 <sup>1</sup>		
	no implementation report provided				

<sup>1</sup> This is based on the calculation of 1,4 gram per body.

Contracting Party	Number of crematoria applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Contracting Party Comments	Observations by Lead Country
Ireland 2014	1	1893		Number of cremations in one crematorium currently applying abatement. Load of mercury dispersed not available as no emission factor available for plant applying abatement technology	
Luxembourg 2004	no implementation report provided				
Luxembourg 2014	1	2404	2.5 kg annually maximum value	Measurements are done every three years (permission) Limit value for mercury (permission): $\leq 0.1 \text{ mg/Nm}^3$ Measured value of mercury in 2014: $\leq 0.01 \text{ mg/Nm}^3$ Exhaust gas volume flow measured in 2014: 2000 m <sup>3</sup> /h Mass flow calculated: $\leq 0.001 \text{ kg/h}$ Operating hours per year: 2032 hours	
Netherlands 2004	56	70000	100		
Netherlands 2014	77	86018	8		
Norway 2004	2	Not known (2001)	Not known		
Norway 2014	13	13591	2.2 kg Hg	Number of cremations is based on 2012-data if the crematorium did not report data for 2014.  Load of mercury: 9 crematoria have reported data for 2014. For the 4 crematoria not reporting data, it was estimated 0.5 gram Hg per cremation	
Spain 2004	no implementation report provided				
Spain 2014	13	4.996	No information		

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

Contracting Party	Number of crematoria applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Contracting Party Comments	Observations by Lead Country
Sweden 2004	33	49 500	7.5		
Sweden 2014	42	62 800	9.4	42 crematoria utilise flue gas cleaning with coal powder. It is estimated that the emission of Hg is 0.15 g/cremation	
Switzerland 2004	15 furnaces remediated in 2004	12106		27 crematoria and 59 furnaces in total in Switzerland (2004)	
Switzerland 2014	no implementation report				
UK 2004	??			In 2003, only a few crematoria had abatement technology	
UK 2014	>135	approx. 400 000  approx. 4000 in Northern Ireland		The data received from Local Authorities recorded in 2013 for England and Wales showed there were more than 330 000 cremations with around 75% of those recorded abated.	

\* Information provided at HSC 2006.

### 3.2 Crematoria not applying mercury removal techniques

Table 3 shows for each Contracting Party the number of crematoria which do not apply mercury removal techniques, the number of cremations per year and an estimate of load of mercury dispersed to the environment.

**Table 3:** Loads from crematoria that are not applying mercury Removal Techniques

Contracting Party	Number of crematoria not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Contracting Party comments	Observations by Lead Country
Belgium 2004	0				assume there are no crematoria without abatement
Belgium 2004	0				
Denmark 2004		41 000 in 2001	170		Verbal report at HSC 2006
Denmark 2014	no implementation report provided				

<b>Contracting Party</b>	<b>Number of crematoria not applying mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Contracting Party comments</b>	<b>Observations by Lead Country</b>
Finland 2004	21	21	4-5 kg/year from the biggest crematoria in Finland		
Finland 2014	no implementation report provided				
France 2004	no implementation report provided				
France 2014				No information currently available	
Germany 2004	21	87155	18.3	These crematoria are equipped with BAT for the abatement of other air pollutants (like dust, dioxin) but were not considered BAT for the mercury removal.	
Germany 2014	15	50595	12.7	Please refer to additional information below in table 4.	
Iceland 2004	no implementation report provided				
Iceland 2014	1	629			
Ireland 2004	2	2415	3.6 kg	This reflects total number of cremations with only 2 crematoria operational in 2004 in Ireland. Mercury emissions are calculated using EMEP emission factor of 1.49kg per corpse (EMEP)	These figures are based on information sent in the 2016 report and assumes that in 2004, mercury abatement was not installed in all crematoria.
Ireland 2014	3	2624	3.9 kg	These Crematoria do not have specific mercury abatement in place due to the small number of cremations currently performed. Mercury emissions are calculated using EMEP emission factor of 1.49kg per corpse	For information on loads, see table 2
Luxembourg 2004	no implementation report provided				
Luxembourg 2014	0				
Netherlands 2004	0				No information reported
Netherlands 2014	0				assume there are no crematoria without abatement
Spain 2004	No implementation report				

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

Contracting Party	Number of crematoria not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Contracting Party comments	Observations by Lead Country
Spain 2014	345	132.592	197.6	Emission factor: 1.49 g/body	
Sweden 2004	36	16500	49.5	Reported 2004 (emission 3.0 g/cremation)	
Sweden 2014	17	8500	25.5	It is estimated that the emission of Hg is 3.0 g/cremation.	
Norway 2004	40	10 000 – 14 000	70		
Norway 2012	12	2084	10.42	Number of cremation is based on 2012-data Load of Hg is estimated at 5g Hg per cremation	
Switzerland 2004	44	31390 (in 2000)		As table 1	
Switzerland 2014	no implementation report provided				
UK 2003	??	440000 (2003)	396		
UK 2014				The data received from Local Authorities recorded in 2013 for England and Wales showed there were more than 330 000 cremations with around 75% of those recorded abated.	
Portugal 2004	5	3540			Information provided at HSC 2006
Portugal 2014					

### 3.3 Additional information provided on crematoria abatement, calculation of loads, proportion of people cremated and the number of small crematoria in use

**Table 4** gives a summary of other information supplied, including on crematoria abatement, calculation of loads, proportion of people cremated and the number of small crematoria in use

**Table 4:** Additional information provided on crematoria abatement, calculation of loads, proportion of people cremated and the number of small crematoria in use

<b>Contracting Party</b>	<b>Information</b>
<b>Belgium</b>	No additional information reported in 2016
<b>Denmark</b>	No implementation report provided in 2016
<b>Finland</b>	No implementation report provided in 2016, However in 2004 Finland reported that because the crematoria in Finland are so small, installation of mercury removal processes would be financially unfeasible.
<b>France</b>	France adopted on the 28th of January 2010 a legal text (arrêté) regarding the height of chimneys of crematoria and the maximum threshold of pollutants in emissions to the atmosphere. For mercury the mandatory limit is defined at 0,2 mg/normal m <sup>3</sup> . This provision is already in force for crematoria built or extended after the 28th of January 2010, and will have to be implemented by all crematoria before 28th of January 2018.
<b>Germany</b>	<p>Since the reporting year 2009, the total number of crematoria in Germany has increased by 4% to up to 159 in 2014. Thereof, 144 are equipped with effective flue gas cleaning techniques which are considered BAT according to the OSPAR Recommendation 2003/4 (e.g. “co-flow” techniques using different adsorbing materials or “solid-bed filters”).</p> <p>The residual 15 crematoria are operated with less effective flue gas cleaning techniques regarding mercury emissions (mainly fabric filters, partially combined with oxidising catalysts for the removal of dioxins and other organic compounds) – considered not BAT (at least one of the 16 crematoria without BAT reported in 2009 is meanwhile out of operation).</p> <p>As for the reporting year 2009, the number of cremations has been estimated based on 2004 figures. Regarding the calculation of loads, the emission factors for the annual mercury load emitted from a single crematorium applied in the previous reports are still considered up-to-date and therefore have been used for the calculation of loads in 2014, as well. By applying 184 g Hg/a for crematoria using BAT and 844 g Hg/a for crematoria not being equipped with BAT, about 26.5 kg Hg and 12.7 kg Hg have been emitted in 2014, respectively. Accordingly, the total annual mercury load from German crematoria is estimated to amount to approximately 39 kg and is slightly higher than in 2009.</p>
<b>Iceland</b>	<p>For the year 2015: Of the total of 2.116 deaths in Iceland, 629 are cremations that gives 29.73% of total.</p> <p>Crematoria is small (total 629 people) and ovens are old but have been improved. In the year 2012 a research was conducted on possible Hg. pollution in the area closed to crematoria but samples showed very low amount of Hg.</p>

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

Contracting Party	Information
<b>Ireland</b>	<p>There are four Crematoria in Ireland, Glasnevin Cemetery &amp; Crematorium (also operates Newlands Cross Crematorium) and the Mount Jerome Crematorium in Dublin, and The Island Crematorium in Cork.</p> <p>Estimates of heavy metal emissions from crematoria are based on an EPA funded study conducted by AEA Technology (UK) and Clean Technology Centre, Cork (Feb 2006).</p> <p>Calculations were also undertaken using the EMEP/EEA air pollutant emission inventory guidebook – 2013 (EEA 2013). This assumes a standard conversion factor for all year of 1.49 g mercury per cadaver.</p> <p>The Mount Jerome crematorium now has a 3-stage filtration system fully integrated with the cremator and the cooled flue gases then pass through firstly a dust bag filter. This filter collects all the dust, which is produced from the cremation process and is free of any additives of any kind. The collected dust is then interred in cemetery common ground.</p> <p>Thirdly the flue gases pass through a fixed bed filter unit, which is comprised of activated carbon and sodium bicarbonate, which captures 99% of all dioxins, mercury and acid gases (HCL). When the fixed filter bed materials are spent, they are removed to Belgium for specialised incineration and landfill.</p> <p>The remaining Crematoria do not have specific mercury abatement in place due to the small number of cremations currently performed. Glasnevin Trust will open a new crematorium facility in Dardistown (Dublin) in 2016, which will have abatement technology in place.</p>
<b>Luxembourg</b>	<p>Number of dead in the reporting year was 3840.</p> <p>Approximately 40% of the dead were buried</p>
<b>Netherlands</b>	<p>In 2014 77 crematoria in the Netherlands were in operation.</p> <p>Rec 2003/4 is implemented in the Netherlands in the Environmental Management Act regulation under the activities degree art. 4.119 (regulation for crematoria).</p> <p>The amendment to incorporate Rec 2003/4 has been agreed with the Dutch association of crematoria and is based on a national BAT study.</p> <p>Fixed bed activated carbon filtration has been identified as BAT and results in emission levels for mercury lower than 0.01- 0.02 mg m<sup>3</sup>. The choice for activated carbon is also based on the removal efficiency for other pollutants (i.e. VOC, dioxins) and on the cost effectiveness of the measure. The investment costs are approximately 250 000 euro per installation. All crematoria fulfil the regulation set in the activities decree.</p> <p>The Dutch National Association of Crematoria LVC reports that in 2014 139223 people died and 86018 people were cremated. The implementation of the measures at crematoria resulted into an emission factor of 0.1 g Hg/cremation (Jimmink et al., RIVM report 680355015/2014). This resulted into an estimated emission to the atmosphere of slightly more than 8 kg Hg.</p>

Contracting Party	Information
<b>Spain</b>	<p>Spain is developing a Guide to Best Environmental Practices apply to the cremation sector. Spain has created a working group on environmental issues between the Administrations and Sector Cremation.</p> <p>All cremation installations require an environmental authorization for its operation. Each authorisation is granted by the Regional Environmental Authority.</p> <p>b. Spain has many crematoriums whose operating volume can reach less than 50 bodies per year. The main problem is to implement measures in such furnaces, because they function under the circumstances, rather continuous phase, making it difficult to obtain objective measurements, since the operating time of the furnace is not sufficient to obtain realistic measurements, if only one body is burned every two or three days.</p> <p>Spain will implement the measures in crematoria ovens with a volume of operation is less than 350 cremations per year. To do this, we are writing a Guide to Best Environmental Practices apply to the cremation sector, where residence times of corpses, coffins materials, best available techniques, etc. are taken into account. This guide prepared by Spain will be shared with European countries that are interested.</p> <p>Cremations in Spain have reached 35% of deaths nationwide and it is growing every year. Most of the existing crematoria in Spain are small and the number of cremations performed is less than 350 per year.</p> <p>In Spain the total number of cremations performed in <b>2014</b> was 137.588 bodies.</p>
<b>Sweden</b>	<p>The emission factor in crematoria without mercury abatement is 3.0 g Hg/cremation. It is derived from the estimated amount of amalgam fillings per cremated body. The emission factor in crematoria utilising activated carbon abatement is 0.15 g Hg/cremation, assuming a removal efficiency of 95 %.</p>
<b>Norway</b>	<p>The emissions are estimated by an average of 5 g mercury per corps for crematoria not applying mercury removal techniques. For emissions from crematories applying mercury removal techniques reported data from the crematoria are used. If no data have been reported, emissions are estimated by assuming that these techniques will reduce the emissions with 90 % (thus 0.5 g Hg per cremation).</p> <p>The scale of cremation compared to burial was 37%</p> <p>12 crematoria are small with 200 cremation per year or less, 5 crematoria have between 200-1000 cremation per year, 6 crematoria have between 1000-1200 cremation per year, and the largest one in Oslo has more than 3000 cremations per year</p>
<b>Switzerland</b>	<p>No implementation report provided in 2016 – Report provided in 2004</p>



Contracting Party	Information
<p><b>United Kingdom</b></p>	<p>In England and Wales, statutory guidance requires abatement of mercury from 50% of all cremations from 31 December 2012. This is achieved by requiring pre-existing (prior to 1 October 2006) crematoria to either fit mercury abatement equipment or to take part in a ‘burden sharing’ scheme whereby a crematoria which does not have abatement equipment contributes to the costs of the abatement equipment fitted to a partner cremator. This approach ensures that across England and Wales, abatement of mercury is in place at 50% of all cremations at the same time as sharing the cost. All new crematoria (operating from 1 October 2006) have been required to fit mercury arrestment equipment since 31 December 2012.</p> <p>Regulators in England and Wales must include a condition in each environmental permit for a crematorium that requires operators to submit written confirmation of any abatement equipment fitted or otherwise, provide details of burden sharing arrangements. A national scheme, CAMEO (derived from Crematoria Abatement of Mercury Emissions Organisation) was set up in 2006 to support the burden sharing arrangement. Crematoria may also make individual burden sharing agreements.</p> <p>Northern Ireland: The crematoria are regulated by a district council under the Pollution Prevention and Control (Industrial Emissions) regulations (Northern Ireland) 2013 and the regulator uses the same statutory guidance.</p>

### 3.4 Assessment of reported loads of dispersed mercury

Based on the national reports received, the following analysis of information provided on loads emitted from crematoria can be made.

#### Calculation of loads

Several methods are reported for calculating loads emitted from crematoria in the 2016 reports. The most common is to use an estimate of the amount of mercury released per cremation. This ranges from 5 grams per cremation for unabated crematoria to 0.049 gm for abated crematoria, but there is still considerable variation between the factors which Contracting Parties use. In some cases the emission factor is based on actual monitoring results at the crematoria concerned.

#### Calculated loads of mercury emitted to the environment

Most Contracting parties gave very clear figures for loads, whereas others were less precise. Therefore on the basis of the information provided it is not possible to provide a reliable figure for the total load of mercury emitted to the OSPAR Convention Area from the crematoria of those Contracting Parties who reported. However, it is significantly less than in 2006 due to the increase in abated crematoria and a very rough and provisional estimate would be that it is now significantly less than 1 tonne.

## 4. Assessment

Adding the current 2016 implementation reports to those from 2006 provides a better picture of the state of implementation of Recommendation 2003/4 in those Contracting Parties who have reported. The following broad conclusions can be drawn:

- a. most Contracting Parties have regulations which control the emissions of mercury from crematoria. These generally require crematoria to have permits dealing with polluting emissions;
- b. an increased number of crematoria already apply mercury removal techniques;
- c. a number of Contracting Parties have specific mercury emission standards for new plants;
- d. the remediation programmes set up by Contracting Parties for existing crematoria have led to significant further reductions of mercury emissions over the ten years since the 2006 report;
- e. there are significantly more crematoria which have mercury abatement techniques than in 2006.

## 5. Overall conclusion

The overall conclusion is that Contracting Parties have implemented Recommendation 2003/4, and that the measures which have been put in place as a result of the Recommendation have significantly reduced the loads of mercury from crematoria entering the Convention area. When the Recommendation was adopted, it was common that crematoria had no or limited abatement processes installed, whereas now there is a general recognition by Contracting Parties that where it is economically justified, abatement should be the norm.

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
Yes	Yes	No

Please provide information on:

*specific measures taken to give effect to this measure;*

An emission limit value of 0.2 mg Hg/Nm<sup>3</sup> has been imposed

*b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;*

*c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.*

## II. Implementation Report on Effectiveness

Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

Number of crematoria in the country which apply mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
6 (Flanders)	25 667 (2002)	25.7	An emission factor of 1gHg/cremation was used, according to the emission factor used by TNO (The Netherlands)
	26 698 (2003)	0.001319	An emission factor of 0.049 gHg/cremation was used according to measurements by the crematoria
	26 998 (2004)	0.001333347	
	28128 (2005)	0.001389154	
	28905 (2006)	0.001427528	
	29877 (2007)	0.001475532	
	31690 (2008)	0.001565071	
	32667 (2009)	0.001613322	
	33619 (2010)	0.001660338	
	34203 (2011)	0.001673241	
	36860 (2012)	0.001820401	
	38977 (2013)	0.001924953	
	39086 (2014)	0.001930336	Installation of filtration system in progress
Walloon region	awaited		
Brussels	awaited		

An emission factor of 1gHg/cremation was used till 2002, from 2003 an emission factor of 0.049 gHg/cremation was used

Number of crematoria in the country not applying mercury removal	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
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Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

techniques		mercury)	

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

**I. Implementation Report on Compliance****Country:**

France

**Reservation applies:**

no

**Is measure applicable in your country ?**

yes

If not applicable, then state why not (e.g. no relevant plant)

**Means of Implementation:**

Regarding the existence of measures to limit mercury releases to the atmosphere:

France adopted on 28<sup>th</sup> January 2010 a legal text (arrêté) regarding the height of chimneys of crematoria and the maximum threshold of pollutants in emissions to the atmosphere. For mercury the mandatory limit is defined at 0,2 mg/normal m<sup>3</sup>. This provision is already in force for crematoria built or extended after 28<sup>th</sup> January 2010, and will have to be implemented by all crematoria before 28<sup>th</sup> January 2018.

Withdrawal of dental amalgam before cremation is not implemented nor foreseen by the regulation.

Regarding the number of crematoria equipped with system corresponding to the best available techniques to limit emissions of mercury to the environment:

In France 160 crematoria exist already and at 31<sup>st</sup> December 2013 30 others were in project. A consolidated number of those crematoria that are already equipped with filters in compliance with the provision of the above mentioned arrêté is not available for the time being. However, as previously stated it would be mandatory for all the crematoria to be equipped with these filters on 28<sup>th</sup> January 2018 at the latest.

Regarding the quantity of mercury released by crematoria, comprehensive elements are not available at the moment as reporting at national level happens every 5 years. Thus more information may be transmitted at a later stage when the information-gathering and reporting exercise will be finalised

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country ?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
no	yes	no

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

## II. Implementation Report on Effectiveness

## Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

<b>Number of crematoria in the country which apply mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
144	485714	26.5	Please refer to additional information below.

<b>Number of crematoria in the country not applying mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
	50595	12.7	Please refer to additional information below.

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

**Additional information**



## Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

Since the reporting year 2009, the total number of crematoria in Germany has increased by 4% to up to 159 in 2014. Thereof, 144 are equipped with effective flue gas cleaning techniques which are considered BAT according to the OSPAR Recommendation 2003/4 (e.g. “co-flow” techniques using different adsorbing materials or “solid-bed filters”).

The residual 15 crematoria are operated with less effective flue gas cleaning techniques regarding mercury emissions (mainly fabric filters, partially combined with oxidising catalysts for the removal of dioxins and other organic compounds) – considered not BAT (at least one of the 16 crematoria without BAT reported in 2009 is meanwhile out of operation).

As for the reporting year 2009, the number of cremations has been estimated based on 2004 figures.

Regarding the calculation of loads, the emission factors for the annual mercury load emitted from a single crematorium applied in the previous reports are still considered up-to-date and therefore have been used for the calculation of loads in 2014, as well. By applying 184 g Hg/a for crematoria using BAT and 844 g Hg/a for crematoria not being equipped with BAT, about 26.5 kg Hg and 12.7 kg Hg have been emitted in 2014, respectively. Accordingly, the total annual mercury load from German crematoria is estimated to amount to approximately 39 kg and is slightly higher than in 2009.

## Annex 4: Iceland

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country ?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
yes/no*	Yes	yes/no*

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

II. Implementation Report on Effectiveness

Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

Number of crematoria in the country which apply mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
0	629	No information	Samples have been taken from the environment / soil samples closed to crematoria and the value are low and no signs of Hg. in soil from crematoria. Results: (THg) ranging: <0.05 til 0.07 mg/kg in soil samples.

Number of crematoria in the country not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
Only one crematorium in Iceland. Situated in Reykjavik.	629 total cremations	No. inf.	

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

**For the year 2015: Of the total of 2.116 deaths in Iceland, 629 are cremations that gives 29.73% of total.**

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium). **Crematoria is small (total 629 people) and ovens are old but have been improved. In**

**the year 2012 a research was conducted on possible Hg. pollution in the area closed to crematoria but samples showed very low amount of Hg.**

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

## I. Implementation Report on Compliance

Country:

Ireland

Irish crematoria

There are three Crematoria in Ireland, Glasnevin Cemetery & Crematorium (also operates Newlands Cross Crematorium) and the Mount Jerome Crematorium in Dublin, and The Island Crematorium in Cork.

Estimates of heavy metal emissions from crematoria are based on an EPA funded study conducted by AEA Technology (UK) and Clean Technology Centre, Cork (Feb 2006).

Emission factors

Emissions factors used in estimating emissions of Mercury from Cremation are based on NAEI, UK using conversion factors from 2009-2013.

Emission factors are taken from the UK NAEI and are based on the general approach suggested by Mills (1990) and refined by Basu *et al* (1991). These UK estimates take data from the most recent adult dental health surveys in the UK (UK Department of Health, 2000) as well as detailed death statistics published by CSO, 2004.

Calculated UK emission factors increase over the period 1990 to 2003 due to improvements in adult dental health over the period. Although the need for fillings is on the decrease, the general improvement in dental health has meant that far more adults remain dentate at the time of death so the average number of mercury amalgam fillings per cadaver has actually increased over this period.

We have assumed that the population of Ireland have similar dental health to the UK population. The UK conversion factors do not take into account the few systems in operation in Ireland and the fact that they are all relatively modern.

Calculations were also undertaken using the EMEP/EEA air pollutant emission inventory guidebook – 2013 (EEA 2013). This assumes a standard conversion factor for all year of 1.49g mercury per cadaver (Figure 1).

Abatement technologies at Irish crematoria

Mount Jerome

<http://www.mountjerome.ie/?content=more-information-about-our-environmentally-friendly-crematorium>

In the summer of 2011 Mount Jerome finalised the investment of €1.3 million in new crematory buildings and the installation of a new DFW 6000 cremator and filtration system, manufactured by a Dutch company called DFW Europe. Their equipment is installed all across Europe today.

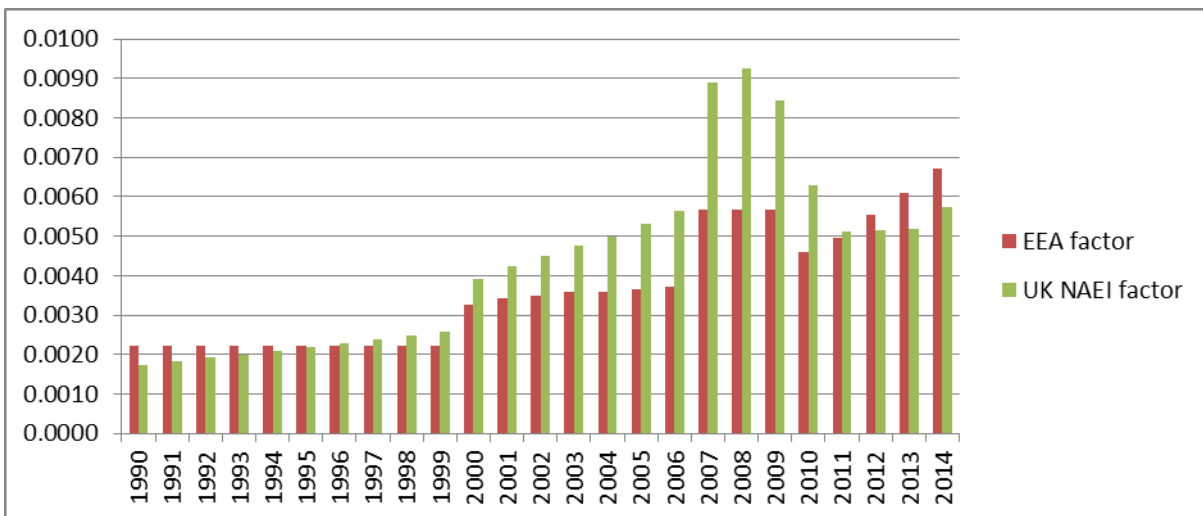
The filtration system is fully integrated with the cremator. There are 3 main stages in the filtration process. Firstly the flue gases are cooled from 800C to 165C by passing them through a large heat exchanger. It is at this stage that the waste heat resulting from the cooling of these flue gases is recycled through our (2014) heating system and used to heat our crematorium buildings. This has enabled us to reduce our carbon footprint by a further 10%.

Secondly the cooled flue gases then pass through firstly a dust bag filter. This filter collects all the dust which is produced from the cremation process and is free of any additives of any kind. The collected dust is then interred in cemetery common ground.

Thirdly the flue gases pass through a fixed bed filter unit which is comprised of activated carbon and sodium bicarbonate which captures 99% of all dioxins, mercury and acid gases (HCL). When the fixed filter bed materials are spent, they are removed to Belgium for specialised incineration and landfill.

The remaining Crematoria do not have specific mercury abatement in place due to the small number of cremations currently performed. Glasnevin Trust will open a new crematorium facility in Dardistown (Dublin) in 2016 which will have abatement technology in place.

Figure 1. Annual mercury emissions in tonnes from Irish crematoria as calculated using UK NAEI emission factors and default EEA emission factor (1.49 g Hg/cadaver). The same emission factors are applied to all facilities irrespective of the as a facility specific emission factor is not available for Mount Jerome which applies abatement technology and accounted for ~42% of all cremations in Ireland in 2014.



# Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

## Appendix 1

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Total number of cremations per year</b>	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2200	2300	2350	2400	2415	2458	2500	3800	3800	3800	3083	3334	3719	4081	4517
<b>Hg tonnes, EEA conversion</b>	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0033	0.0034	0.0035	0.0036	0.0037	0.0038	0.0039	0.0050	0.0050	0.0050	0.0040	0.0050	0.0050	0.0060	0.0060
		2	2	2	2		2	2	2	2		4	5	6	6	7		7	7	7	6	0	5	1	7
<b>Hg tonnes, UK NAEI conversion</b>	0.0017	0.0018	0.0019	0.0020	0.0021	0.0022	0.0023	0.0024	0.0025	0.0026	0.0039	0.0040	0.0041	0.0042	0.0050	0.0051	0.0052	0.0089	0.0093	0.0088	0.0063	0.0051	0.0051	0.0052	0.0053
		8	9	0	1		3	4	5	6		3	5	8	0	3		9	3	5	3	1	1	2	7

**Report covering Irish crematoria up to 2009. This supplements the above report.**

There are 3 Crematoria in Ireland, Glasnevin Cemetery & Crematorium (also operates Newlands Cross Crematorium), Mount Jerome Crematorium and The Island Crematorium in Cork.

Estimates of heavy metal emissions from crematoria are based on an EPA funded study conducted by AEA Technology (UK) and Clean Technology Centre, Cork (Feb 2006).

Emissions factors used in estimating emissions of Mercury from Cremation are based on NAEI, UK

“Emission factors are taken from the UK NAEI and are based on the general approach suggested by Mills (1990) and refined by Basu *et al* (1991). These UK estimates take data from the most recent adult dental health surveys in the UK (UK Department of Health, 2000) as well as detailed death statistics published by CSO, 2004.

Calculated UK emission factors increase over the period 1990 to 2003 due to improvements in adult dental health over the period. Although the need for fillings is on the decrease, the general improvement in dental health has meant that far more adults remain dentate at the time of death so the average number of mercury amalgam fillings per cadaver has actually increased over this period.

We have assumed that the population of Ireland have similar dental health to the UK population.”

Abatement technologies at Irish crematoria are not known. The following information is available from the Mount Jerome website.

“In early 2011 Mount Jerome will become the most environmentally friendly crematorium in Ireland. It will be the first Irish crematorium to install a full filtration system on its new energy efficient cremator. What this simply means is that the air leaving the cremator chimney will be cleaner than the air taken in! Effectively all the pollutants such as dioxins, particulates and mercury (from tooth fillings) generated by the cremation process will be captured by the installed filtration system. The new cremator will be the most energy efficient in Ireland. The carbon footprint of remains cremated at Mount Jerome will be reduced by 30%.”

<http://www.mountjerome.ie/?content=crematorium-history>



Annex 6: Luxembourg

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country ?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
yes	yes	yes

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

The Crematoria fall under the obligations of the Law of 10 June 1999 on classified establishments (*Loi du 10 juin 1999 relative aux établissements classés*). The plant operator must hold a permit issued by the Minister of environment. The operating permission includes specific conditions for reducing pollutants release in the air, water, soil (limit values for substances) and also for reducing waste.

The permit was delivered on 1<sup>st</sup> July 1999 by the Minister of environment.

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\*Delete whichever is not appropriate.

## II. Implementation Report on Effectiveness

## Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

Number of crematoria in the country which apply mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
1	2404	<b>Approximately:</b> 2.5 kg annually (maximum value)	<b>Measurements are done every three years (permission)</b>  <b>Limit value for mercury (permission):</b> ≤ 0.1 mg/Nm <sup>3</sup>  <b>Measured value of mercury in 2014:</b> ≤0.01mg/Nm <sup>3</sup>  <b>Exhaust gas volume flow measured in 2014:</b> 2000 m <sup>3</sup> /h  <b>Mass flow calculated:</b> ≤ 0.001 kg/h  <b>Operating hours per year:</b> 2032 hours

Number of crematoria in the country not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
–	–	–	

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

Number of dead in the reporting year 3840.

Approximately 40% of the dead was buried.

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).

The crematoria is managed by the SIEC, the Syndicat intercommunal aimed the construction, maintenance and operation of a crematory which joined 75 municipalities of 105. The SIEC is an inter-municipal institution, public and independent, managed by the municipalities that are members. The 75 municipalities register about 496656 inhabitants of the whole population of about 562960.

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

## Annex 7: Netherlands

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
Yes	No	No

Please provide information on:

- a. *specific measures taken to give effect to this measure;*
- b. *any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;*
- c. *any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.*

Rec 2003/4 is implemented in the Netherlands in the Environmental Management Act regulation under the activities degree art. 4.119 (regulation for crematoria).

The amendment to incorporate Rec 2003/4 has been agreed with the Dutch association of crematoria and is based on a national BAT study.

Fixed bed activated carbon filtration has been identified as BAT and results in emission levels for mercury lower than 0.01- 0.02 mg m<sup>3</sup>. The choice for activated carbon is also based on the removal efficiency for other pollutants (i.e. VOC, dioxins) and on the cost effectiveness of the measure. The investment costs are approximately 250 000 euro per installation. All crematoria fulfil the regulation set in the activities decree.

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

II. Implementation Report on Effectiveness

Loads of mercury reaching the environment from crematoria

*Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:*

In 2014 77 crematoria in the Netherlands were in operation.

The Dutch National Association of Crematoria LVC reports that in 2014 139223 people died and 86018 people were cremated. The implementation of the measures at crematoria resulted into an emission factor of 0.1 g Hg/cremation (Jimmink et al., RIVM report 680355015/2014). This resulted into an estimated emission to the atmosphere of slightly more than 8 kg Hg.

<b>Number of crematoria in the country which apply mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
77 (2014)	86018 (2014)	8	

<b>Number of crematoria in the country not applying mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
0			

*Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.*

## Annex 8: Norway

**I. Implementation Report on Compliance****Country:**

Norway

**Reservation applies:**

no

**Is measure applicable in your country ?**

yes

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
yes	no	no

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

Norway has regulation for crematoria since 1 January 2003. For units existing before this date the regulation enter into force from 1 January 2007. The regulation is aiming at reducing i.e. the mercury emissions from crematoria through emission limits (above a certain activity rate).

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

II. Implementation Report on Effectiveness

Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

<b>Number of crematoria in the country which apply mercury removal techniques</b>	<b>Number of cremations in year of reporting 2014</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
13	13591	2.2 kg Hg	Number of cremations is based on 2012-data if the crematorium did not report data for 2014.  Load of mercury: 9 crematoria have reported data for 2014. For the 4 crematoria not reporting data, it was estimated 0.5 gram Hg per cremation

<b>Number of crematoria in the country not applying mercury removal techniques</b>	<b>Number of cremations in year of reporting 2012</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
12	2084	10.42 kg Hg	Number of cremation is based on 2012-data  Load of Hg is estimated at 5g Hg per cremation

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

The emissions are estimated by an average of 5 g mercury per corps for crematories not applying mercury removal techniques. For emissions from crematories applying mercury removal techniques reported data from the crematoria are used. If no data have been reported, emissions are estimated by assuming that these techniques will reduce the emissions with 90 % (thus 0.5 g Hg per cremation).

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial? 37%

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium). 12 crematoria are small with 200 cremation per year or less, 5 crematoria have between 200-1000 cremation per year, 6 crematoria have between 1000-1200 cremation per year, and the largest one in Oslo have more than 3000 cremations per year

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.



**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country ?**

If not applicable, then state why not (e.g. no relevant plant)

**Means of Implementation:**

by legislation	by administrative action	by negotiated agreement
yes	yes	yes

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

a. There is national legislation on potentially polluting activities of the atmosphere. Spain is developing a Guide to Best Environmental Practices apply to the cremation sector. Spain has created a working group on environmental issues between the Administrations and Sector Cremation.

All cremation installations require an environmental authorisation for its operation. Each authorisation is granted by the Regional Environmental Authority.

b. Spain has many crematoriums whose operating volume can reach less than 50 bodies per year. The main problem is to implement measures in such furnaces, because they function under the circumstances, rather continuous phase, making it difficult to obtain objective measurements, since the operating time of the furnace is not sufficient to obtain realistic measurements, if only one body is burned every two or three days.

Spain will implement the measures in crematoria ovens with a volume of operation is less than 350 cremations per year. To do this, we are writing a Guide to Best Environmental Practices apply to the cremation sector, where residence times of corpses, coffins materials, best available techniques, etc. are taken into account. This guide prepared by Spain will be shared with European countries that are interested.

**II. Implementation Report on Effectiveness**

## Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables: **2014 data**

Number of crematoria in the country which apply mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
13	4.996	No information	

Number of crematoria in the country not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
345	132.592	1976 kg	Emission factor is 1.49 g/body

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

Cremations in Spain have reached 35% of deaths nationwide and it is growing every year. Most of the existing crematoria in Spain are small and the number of cremations performed is less than 350 per year.

In Spain the total number of cremations performed in **2014** was 137.588 bodies.

Format for implementation reports concerning OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria

*(Note: In accordance with paragraph 5.3 of Recommendation 2003/4, this format should be used as far as possible in implementation reports)*

**I. Implementation Report on Compliance**

Country:

Reservation applies:

Is measure applicable in your country ?

If not applicable, then state why not (e.g. no relevant plant)

**Means of Implementation:**

by legislation	by administrative action	by negotiated agreement
yes	no	no

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

**II. Implementation Report on Effectiveness**

## Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

<b>Number of crematoria in the country which apply mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
33 (2004)	49 500	7.5	Reported 2004
42 (2014)	62 800	9.4	42 crematories utilise flue gas cleaning with coal powder. It is estimated that the emission of Hg is 0.15 g/cremation.

<b>Number of crematoria in the country not applying mercury removal techniques</b>	<b>Number of cremations in year of reporting</b>	<b>Load of mercury dispersed into environment from crematoria (kilograms of mercury)</b>	<b>Comments</b>
36 (2004)	16 500	49.5	Reported 2004 (emission 3.0 g/cremation)
17 (2014)	8 500	25.5	It is estimated that the emission of Hg is 3.0 g/cremation.

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:

what is the scale of cremation compared to burial?

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).

This information should be given in the first report made after 1 July 2006, and need not be repeated thereafter unless there is known to have been a substantial change.

**I. Implementation Report on Compliance**

**Country:**

**Reservation applies:**

**Is measure applicable in your country ?**

If not applicable, then state why not (e.g. no relevant plant)

Means of Implementation:

by legislation	by administrative action	by negotiated agreement
No*	Yes	No

Please provide information on:

- a. specific measures taken to give effect to this measure;
- b. any special difficulties encountered, such as practical or legal problems, in the implementation of this measure;
- c. any reasons for not having fully implemented this measure should be spelt out clearly and plans for full implementation should be reported.

In England and Wales, statutory guidance requires abatement of mercury from 50% of all cremations from 31 December 2012. This is achieved by requiring pre-existing (prior to 1 October 2006) crematoria to either fit mercury abatement equipment or to take part in a 'burden sharing' scheme whereby a crematoria which does not have abatement equipment contributes to the costs of the abatement equipment fitted to a partner cremator. This approach ensures that across England and Wales, abatement of mercury is in place at 50% of all cremations at the same time as sharing the cost. All new crematoria (operating from 1 October 2006) have been required to fit mercury arrestment equipment since 31 December 2012.

Regulators in England and Wales must include a condition in each environmental permit for a crematorium that requires operators to submit written confirmation of any abatement equipment fitted or otherwise, provide details of burden sharing arrangements. A national scheme, CAMEO (derived from Crematoria Abatement of Mercury Emissions Organisation) was set up in 2006 to support the burden sharing arrangement. Crematoria may also make individual burden sharing agreements.

Northern Ireland: The crematoria is regulated by a district council under the Pollution Prevention and Control (Industrial Emissions) regulations (Northern Ireland) 2013 and the regulator uses the same statutory guidance [http://webarchive.nationalarchives.gov.uk/20141106091809/http://www.defra.gov.uk/industrial-emissions/files/04092012-pg-502.pdf]

Implementation of OSPAR Recommendation 2003/4 on Controlling the Dispersal of Mercury from Crematoria Second Overview assessment

II. Implementation Report on Effectiveness

Loads of mercury reaching the environment from crematoria

Please estimate the load of mercury entering the environment from crematoria in your country, if possible according to the following tables:

Number of crematoria in the country which apply mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments
>135	approx. 400 000 approx. 4000 in Northern Ireland		The data received from Local Authorities recorded in 2013 for England and Wales showed there were more than 330 000 cremations with around 75% of those recorded abated.

Number of crematoria in the country not applying mercury removal techniques	Number of cremations in year of reporting	Load of mercury dispersed into environment from crematoria (kilograms of mercury)	Comments

Note: Please provide a clear description of the calculation of the load, and emission factors used to calculate the loads exactly and in a transparent way so that approaches used by different countries can be compared.

**“If possible, please give information on the societal and cultural practices associated with cremation in your country which are relevant for the assessment of the reported data and information on the dispersal of mercury from crematoria, for example:**

**what is the scale of cremation compared to burial?**

**are crematoria small, with a low level of activity or located in local churchyards, or large installations serving a substantial area? (It may be helpful to give an indication of the average size of population served by a crematorium).**

There are around 250 crematoria in England and Wales. In England and Wales cremations account for around 70% of all funerals and this has been on an upward curve since 1945. In most Local Authority areas there are one or two crematoria carrying out between 1 000 and 2 000 cremations annually.

In Northern Ireland there is only one crematorium (Roselawn, Belfast), which is at full capacity of ~5 000 per year. There are ~14 000 deaths a year in NI so burial is more common and cremation is only ~36% of funerals. However cremation is becoming more popular and there is plan to build a second crematorium in 2017 to cater for the growing demand.





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