Methods used for the Dutch Emission Inventory

Product usage by consumers, construction and services

Emissions calculated by the task force WESP
Working group for emissions from services and product use
Netherlands' Pollutant Release and Transfer Register

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Authors:
B.I. Jansen, TNO, Utrecht
M.M. Nijkamp, RIVM, Bilthoven
J.D. te Biesebeek, RIVM, Bilthoven
C.J. Peek, RIVM, Bilthoven
S.N.C. Dellaert, TNO, Utrecht
R. Dröge, TNO, Utrecht

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1. Introduction

In this document the calculation methods for the emissions caused by consumers and some small trade and service companies within the taskforce WESP is reported. This document is only available online and is updated periodically or when needed. The emissions described in this document are part of the total Dutch emission inventory. For more information, check the website http://www.emissieregistratie.nl/ERPUBLIEK/bumper.en.aspx.

The emissions calculated by the taskforce WESP are mainly emissions caused by product use and are mainly emitted to air. The emissions to the compartment water are calculated by the taskforce MEWAT. The emissions caused by industrial production, waste management and energy production are reported by the taskforce ENINA.

Within this document the background of the process causing the emissions is described, but also the method of data collection, the source of the emission factors and some other important information. It’s important to give a description of the method, because in some cases, for example, the calculation is based on a single measurement or data of a single year. The base year needs to be corrected or interpreted to get an estimation method for all years.

One of the purposes of this document is to give information on the estimation of the emissions. Only the direct emissions caused by the process or product use are calculated within WESP and therefore here described. The environmental effects such as acidification, greenhouse gas effect or ozone layer depletion are not considered. The waste produced, the amount of energy used and the resources needed for production or the described process are not included. Waste management and energy used are calculated on country scale within taskforce ENINA. The emissions caused by the production of the products used are calculated in other parts of the Dutch emission inventory, but only if the production occurs in the Netherlands.

In the method description it is also explained how the spatial allocation occurs. The spatial allocation describes how the emissions are geographically distributed throughout the Netherlands. This is based on the location were the emissions are assumed to take place. For example, if a product is mainly used by consumers, the distribution is based on the amount of people living in a certain area. The spatially distributed emissions are used as input for the (air quality) models calculating the concentrations of the substances in the environment. This is used to get an estimation of the environmental quality in the Netherlands.

Appendix A gives an explanation on the quality indicators. The indicators are A till E, with A being the highest and E the lowest.
In Appendix B the methods which are not translated yet are displayed.

2. General assurance and quality control (QA/QC)

In accordance with the basic work agreements within the Dutch emission registration, the responsable work package leader checks that:
1. the basic data are well documented and adopted (check for typing errors, use of the correct units and correct conversion factors);
2. the calculations have been implemented correctly;
3. assumptions are consistent and specific parameters (e.g. activity data) are used consistently;
4. complete and consistent data sets have been supplied.

Any actions that result from these checks are noted on an ‘action list’ by the ER secretary. The work package leaders carry out these actions and they communicate by e-mail regarding these QC checks, actions and results with the ER secretary. While adding a new emission year the task forces perform a trend analysis, in which data from the new year are compared with data from the previous year. The workpackage leader provides an explanation if the increase or decrease of emissions exceeds the minimum level of 5% at target group level or 0.5% at national level. These explanations are also sent by e-mail to the ER secretary by the workpackage leaders The ER secretary keeps a logbook of all these QC checks and trend explanations and archives all concerned e-mails. This shows explicitly that the required checks and corrections have been carried out. Based on the results of the trend analysis and the feedback on the control and correction process (‘action list’) the Working Group on Emissions Monitoring (WEM) gives advice to the institute representatives (Deltares on behalf of Rijkswaterstaat, Statistics Netherlands (CBS) and Netherlands Environmental Assessment Agency (PBL)) to approve the dataset. The ER project leader at RIVM defines the dataset, on receipt of an e-mail by the institute representatives, in which they give their approval. Furthermore, all changes of emissions in the whole timeseries as a result of recalculations are documented in CRF table 8(b).

3. Emissions of greenhouse gases

This report also provides the methodology descriptions of the greenhouse gas emissions, which are reported in the national greenhouse gas inventory. The relevant emission sources are presented in the following table, including a reference to the chapter and the CRF code.

CRF	Chapter	ES code	Emission source (English)	Emission source (Dutch)
1.A.4.b	15	0801801	Charcoal use for barbecuing	Houtskoolverbruik door consumenten: barbecuen
	19	T012200	Residential combustion, wood stoves and fire places	Vuurhaarden consumenten, sfeerverwarming woning
2.D.2	6	0801000	Burning of candles	Branden van kaarsen
2.G.3.a	5	9310100	Solvent and other product use: anaesthesia	Oplosmiddel- en ander productgebruik: anesthesie, narcosegas
2.G.3.b	4	0811301	Solvent and other product use: sprays	Oplosmiddel- en ander productgebruik: spuitbussen, drijfgas/oplosmiddel, consumenten
2.G.4	11	0801700	Fireworks at new year	Afsteken vuurwerk
	11	0850000	Degassing of groundwater, production of drinking water	Ontgassen drinkwater

Emissions from the use of compost by consumers is described in the methodology report for agriculture (Vonk et al, 2015: Methodology for estimating emissions from agriculture in the Netherlands)

In the next table an overview is provided on the tier used to calculate the emissions and the source of the emissionfactor.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O	
	Method applied	**Emission factor**	**Method applied**	**Emission factor**	**Method applied**	**Emission factor**
1. Energy						
A. Fuel combustion						
4. Other sectors	T1	D	T1	D	T1	D
2. Industrial processes						
D. Non-energy products from fuels and solvent use	T1	D				
G. Other product manufacture and use	T1	CS	T1	CS	T1	CS, D

4. Aerosol cans (CRF 2.G.3.b)

In this paragraph the emission of nitrous oxide from aerosol cans is described.

Process description	Emk_code	CRF_code	Sector
Aerosol cans	811301	2.G.3b	Consumers

4.1 Description emission source

Nitrous oxide (N_2O) is used as a propelling agent in aerosol cans (for example, cans of cream).
Contribution to the national emission
The contribution of this source to the total national N_2O emission was 0.82 % in 2013.

4.2 Calculation

For the complete time series, the emissions are calculated as follows
Emission = Activity data x Emission factor

Activity data = Number of N_2O containing aerosol cans sold
Emission factor = N_2O emission per aerosol can

a) Activity data
The Dutch Association of Aerosol Producers (NAV) reports data on the annual sales of N_2O-containing spray cans. Since the 2014 submission the annual sales are based on real sales figures instead of estimated sales. As a result of these improved activity data the N_2O emissions have been recalculated for the whole time series.

b) Emission factor
The EF for N_2O from aerosol cans is estimated to be 7.6 g/can (based on data provided by one producer) and is assumed to be constant over time.

4.3 Uncertainty and Quality checks

For N_2O emissions, the uncertainty is estimated to be approximately 50 per cent based on the judgement of experts. Uncertainty in the activity data of N_2O use is estimated to be 50 per cent and that of the EF to be less than 1 per cent (the assumption is that all gas is released).

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

4.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on population density.

Emission source/process	Allocation-parameter
Aerosol cans	population density.

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

4.5 References

The Dutch Association of Aerosol Producers (NAV)

4.6 Version, dates and sources

Version: 1.3
Date: September 2015
Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
C.J. Peek	RIVM/ER	kees.peek@rivm.nl

5. Anaesthesia (CRF 2.G.3.a)

In this paragraph the emissions of N_2O used as an anaesthesia is described.

Process description	Emk_code	CRF_code	Sector
Anaesthesia	9310100	2.G.3.a	Trade and services

5.1 Description emission source

Nitrous oxide (N_2O), commonly known as laughing gas, is still used sometimes as an anaesthesia. Besides N_2O, other ansesthesia are in use in the Netherlands, most commonly halothane, desflurane, enflurane and sevoflurane. It’s not known how much of those anaesthesia are used and, because of the decomposition of those gases, how much is exhaled again.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

The contribution of this source to the total national N_2O emission was <0.5% in 2009.

5.2 Calculation

For the complete time series, the emissions are calculated as follows
Emission = Activity data x Emission factor

Activity data = Amount of N_2O sold for anaesthesia
Emission factor = N_2O emission from anaesthesia

This is a tier 1 methodology. The methodology is consistent with the IPCC 2006 Guidelines.

a) Activity data
The amount of nitrous oxide sold in the Netherlands would be the best measure for the activity data. Therefore, since 2011, all companies known to sell nitrous oxide as anaesthesia to the Dutch market are asked annually for their sales to the Dutch market. Those sales combined result in the total amount of nitrous oxide used as anaesthesia in the Netherlands.
In the years before reporting year 2010, an estimate was made based on the sales of the biggest seller. In years in which not all companies report their sales, the total is estimated based on the sales of the other companies. This is based on the estimated market share of the biggest company, selling nitrous oxide as anaesthesia.
If nitrous oxide is sold as a mixture with oxygen, only the nitrous oxide is calculated as sales.

b) Emission factor
The emission factor for nitrous oxide is 1kg per kg nitrous oxide sold in the Netherlands. All nitrous oxide sold in a certain year is considered to be emitted after use in the same year. This emission factor is consistent with the 2006 IPCC guidelines.

5.3 Uncertainty and Quality checks

In case all companies report their sales, the uncertainty in the activity data is caused by stock changes at the consumer side (mainly hospitals). Those differences are considered negligible. If, on the other hand, not all companies provide their sales, the uncertainty can be as much as 25%. The uncertainty in emission factor is 0%, because all N_2O will be exhaled over time. Both the uncertainty in activity data and in emission factor are based on expert judgement.

Quality codes

Substance	Activity data	Emission factor	Emission
N_2O	B	A	B

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

5.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on the number of beds per hospital.

Emission source/process	Allocation-parameter
Anaesthesia	Number of beds per hospital

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

5.5 References

Written (or in early years oral) data on sales from companies selling anaesthesia.

5.6 Version, dates and sources

Version: 1.2
Date: May 2015
Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I. Jansen	TNO	bart.jansen@tno.nl

6. Burning of Candles (CRF 2.D.2)

In this paragraph the emissions as a result of the burning of candles are described.

Process description	Emk_code	CRF_code	Sector
Burning of candles	0801000	2D2	CON

6.1 Description emission source

Within households and in some catering industries, candles are burned to create a more cozy atmosphere. The burning of candles causes the emission of several substances, for example particulate matter and PAHs.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

The contribution of this source to the national emissions of benzo(ghi)pyrene is <10%. For benzo(a)pyrene the contribution is about 1%.

6.2 Calculation

For the complete time series, the emissions are calculated as follows
Emission = Activity data x Emission factor

Activity data = Amount of candles burned in kg
Emission factor = Emission per kg candle

This is a tier 1 methodology. The methodology is consistent with the IPCC 2006 Guidelines.

a) Activity data
The activity data consist of two parts, national statistics on the number of inhabitants of the Netherlands (Dutch bureau for statistics) and the amount of candles burned per person in the Netherlands.
The amount of candles burned per person is retrieved from a company selling candles in the Netherlands. Up until 2009 the amount of candles burned per inhabitant is retrieved from www.bolsius.nl. From 2010 it is based on expert judgement by representative from a company selling candles.

b) Emission factor
The emission factors for burning candles are dependent on the type of candle burned. Both tea lights as regular (gothic) candles are taken into account, both estimated at 50% usage. Less used candle types, e.g. beeswax candles, are not considered to be relevant for this calculation. The CO_2 emission factor, given in g/MJ candle, is multiplied with a heating value of 42,7 MJ/kg. Both the CO_2 emission factor and the heating value for candles are derived from the Dutch fuel list 2015 (Zijlema, 2015).
All other emission factors are mainly calculated based on EPA 2001.

Substance	EF	Unit
Benzo(ghi)pyrene	0.278	mg/kg candle
Benzo(a)pyrene	0.150	mg/kg candle
VOC	928	mg/kg candle
CO_2	73.3	g/MJ candle
PM_{10}	0.872	mg/kg candle
$PM_{2.5}$	0.872	mg/kg candle
Pb	1.56	mg/kg candle
Zn	0.127	mg/kg candle

6.3 Uncertainty and Quality checks

The uncertainty of both the activity data and for the emission factor of CO_2 are determined in the report on uncertainties in greenhouse gas emissions Olivier 2009. The uncertainty in activity data is estimated to be 100%. The uncertainty in the emission factor for CO_2 is estimated at 20%.

For the other substances (not greenhouse gases), the uncertainty was not determined. Instead, the reliability of the data is qualitatively indicated in the table below with codes A-E (see Appendix A).
The number of inhabitants in the Netherlands is accurately known, but the amount of candle burned per inhabitant is a rough estimate based on one manufacturer. Therefore the activity data is not very sure, rated with a D.
The emission factors are retrieved by combining different sources, improving the reliability. However, since these sources did not taken different candle types into account, the emission factors are rated with a C.

Quality codes

Substance	Activity data	Emission factor	Emission
Benzo(ghi)pyrene	D	C	D
Benzo(a)pyrene	D	C	D
VOC	D	C	D
CO_2	D	C	D
PM_{10}	D	C	D
$PM_{2.5}$	D	C	D
Pb	D	C	D
Zn	D	C	D

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

6.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on the population density, following the assumption that most candles are burned in residential areas/households.

Emission source/process	Allocation-parameter
Burning of candles	Population density

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

6.5 References

EPA; January 2001, Candles and incense as potential sources of indoor air pollution: Market analysis and Literature review; EPA-600/R-01-001.

Fine M. Philip, Glen R. Cass, Bernd R.T. Simoneit; Characterization of fine particle emissions from burning church candles; Environmental Science & Technology vol. 33, NO. 14, 1999.

Gruijter H.J. de, A.J.G. van Rossum; De Kaars; Lesbrief KNCV/NVON; first edition1983.

Vebeka BV; Information on sizes and burning times:, http://vebeka.nl.

Dutch Bureau of Statistics, Statline, annual data on the number of inhabitants

Information on the amount of candles burned, http://bolsius.nl.

Te Molder, R. Metadata gegevensbeheer emissieregistratie: beschrijving gegevens t.b.v ruimtelijke verdeling van emissies, PBL, Bilthoven, jaarlijks, intern document.

Zijlema, P.J., 2015; Nederlandse lijst van energiedragers en standaard CO2 emissiefactoren.

Olivier, J.G.J., Brandes, L.J. and te Molder, R.A.B., 2009, Uncertainty in the Netherlands' greenhouse gas emissions inventory, PBL publication 500080013

6.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

7. Car Products

This paragraph describes the NMVOC emission from car products.

Process description	Emkcode	NFR code	Sector
Car products	0802300	3D2	Consumers
Car products	0802301	3D3	Trade and services

7.1 Description emission source

Car products (products maintaining cars) contain NMVOC which emit to the air during and after use. We are dealing here with products meant for company and private cars. The car products are split up into two target groups: trade and services and consumers.
In the different categories we deal with the following products:

Car products:
- Car wax
- Plastic cleaners and care products (for example cockpit sprays)
- Aerosol paint (car paint).

NB: Car shampoos are not included because they contain negligible amounts of NMVOC (Chemiewinkel, 1999).

Car products mobile:
- Screen washer solutions
- De-ice products.

Screen washer solutions contribute with ≈ 70% the most to the total NMVOC emission from car products.

Contribution to the national emission
The contribution of NMVOC by car products to the total national NMVOC emission is 2.6%. The contribution of car product can be split up into ≈ 2.3% for consumers and ≈ 0.3 % for trade and services (ER, 2009).

7.2 Calculation

Emissions are calculated as follows:
Emission = Activity data x Emission factor

Activity data = amount of NMVOC in car products sold in the Netherlands
Emission factor = emission per kg NMVOC in car products

a) Activity data
In 1997 bureau CREM conducted a research using car product monitoring data over the years 1994 and 1996 (CREM, 1997). The monitoring data originated from questionnaires filled in producers and suppliers of car products. In 1998 a recall survey by telephone was conducted in which the data for 1997 was established. The recall contained the information of 26 companies (18 companies conducted in the 1997 survey and 8 new companies). It's estimated that these 26 companies cover 80% of the marked.
The companies provided sales data of car products and the average amount of NMVOC theses products contained. This information is used to determine the NMVOC emissions from car products.
The monitoring data from 1997 (CREM 1998) is still used for calculation of the NMVOC. The data from CREM (1998) is the most recent information available.

The emission of screen washer solutions and de-ice products strongly depends on the hardness of winter. However no correlation was found for the monitored data and number of days of frost. An explanation for not finding a correlation may be the time of buying is in the beginning of the winter period (December) and the using (frost days) may be at later period of winter (January). So sales and frost days are not reported in the same year.

b) Emission factor
The emissions from car products are split up into the target groups consumers (≈ 60%) and trade and services (mostly garages ≈ 40%). In the past the use of car products was split up in a third target group: traffic and transportation (screen washer solutions and de-ice products), but in 2005 this third group is no longer used and was retrospectively assigned to consumers.
The emission factor for car products is set to "1".

De NMVOC totals are recalculated to individual substances by using an average car product profile. The profiles were established for car products by TNO (1992) in cooperation with the car products branch.

Substance in car product profile	factor
Propane	0.12
Isobutane	0.12
Monohydroxyverbindingen	0.54
Dimethyl ether	0.03
Hydrocarbon. mixture. c2-c10 <25% aromatic.	0.18

7.3 Uncertainty

The uncertainties of the emission calculation are not quantified.

Quality codes

Substance	Activity data	Emission factor	Emission
NMVOC	E	C	D

7.4 Spatial allocation

The emissions of consumers and trade and services are allocated in the Netherlands based on population density. Details are available at http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

7.5 References

- ER, 2009. Netherlands Emission Registry. Data on 2009 available from www.emissieregistratie.nl
- CBS, (1998 en latere jaren) Statistiek Motorvoertuigen, CBS, Heerlen.
- CREM, 1997, NMVOS-emissies auto-onderhoudsproducten, CREM, Amsterdam (niet openbaar).
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- CREM, december1998, VOS-emissies auto-onderhoudsproducten, herhaalmeting 1997, CREM, Amsterdam (niet openbaar).
- Chemiewinkel UvA,1999, Herziening Milieukeur Autoreinigingsmiddelen, Conceptrapportage, augustus 1999, Amsterdam.

7.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

Note: Since 1999 no new data is available on emission variables and emission factors. Therefore, the used data might be outdated.

8. CFCs from refrigerators and freezers

In this paragraph the emissions of chlorofluorocarbons (CFCs) as a result of the leakages in the refrigerant system and the processing of discarded refrigerators and freezers are described.

Process description	Emk_code	CRF_code	Sector
Discarding refrigerators and freezers	0890209		Consumers

8.1 Description emission source

Since 1995, the production and sale of refrigerators and freezers (R/F) using chlorofluorocarbons as refrigerant is prohibited in the European Union. However, given an average lifetime of at least 15 years, R/F equipment that uses CFCs is still in use and significant numbers are discarded annually. In the Netherlands, discarded R/F equipment is collected and processed by specialized companies which remove and destroy the CFCs still present in the equipment. Still, in some cases the CFCs have leaked to the environment before the equipment is discarded and processed. This emission source represents these leakage emissions of CFCs and possible processing inefficiencies which lead to the emission of CFCs to the environment.

Before the year 2000, a share of the discarded R/F units were exported to Eastern Europe and Africa. However, from 1999, the export of old R/F equipment has been prohibited.

Contribution to the national total emission
For trichloorfluormethane (CFC-12) the contribution of the discarded refrigerators and freezers is <25%.

8.2 Calculation

Emissions are calculated as follows:
Emission = Activity data x Emission factor

Activity data = Number of refrigerators and freezers that use CFCs as refrigerant that are discarded annually and are not exported abroad.
Emission factor = CFC emission per unit of CFC R/F equipment

a) Activity data
To estimate the number of CFC R/F equipment that is discarded annually from 1990 to 2030, a combination of multiple data is needed. First, the number of R/F units put on the market between 1960 and 1994 in the Netherlands is extracted from CBS data. These R/Fs are assumed to all use CFC-12 as refrigerant. The average amount of CFC refrigerant present per unit is estimated at 165 grams (Brouwer & Hulskotte, 1995).

To estimate the number of CFC R/F units that are discarded annually, the Weibull distribution is used. Based on data from CBS, the average lifetime of a refrigerator is estimated at 16.4 years and of a freezer at 18.6 years. Furthermore, the shape of the Weibull function is 2.2 for refrigerators and 1.3 for freezers (Magalini et al., 2014).

These steps result in an annual number of discarded CFC R/F units from 1990 to 2030. However, since from 1990 to 1999 a share of the discarded units were exported (and therefore did not cause emissions in the Netherlands). From 1990 to 1998 the share of discarded units was assumed to be 20%, in 1999 the share was assumed to be 10%. This ratio is applied to the number of discarded CFC R/F units from 1990 to 1999 to estimate the number of CFC R/F units that were annually processed in the Netherlands. From 2000 onwards, the number of discarded CFC R/F units is assumed to be equal to the number of CFC R/F units that is processed.

b) Emission factor
The emission factor is estimated by subtracting the average amount of CFC refrigerant that is recovered from processed R/F units, from the average amount of CFC refrigerant that was used in CFC R/F units (Brouwer & Hulskotte, 1994).
165 gram – 60 gram = 105 gram/unit.

This calculation was verified by dividing the amount of recovered CFCs by the number of units processed according to CFK aktieprogramma (1994) and subtracting this from the present amount of CFCs, which resulted in an emission factor of 103 grams/unit. Furthermore, the Flanders Environment Agency (MIRA, 2010) reports an average CFC recovery percentage of 33%, which results in an EF of 101 grams per unit.

Substance	EF	Unit
CFC-12	0.105	kg/RF unit

8.3 Uncertainty

The uncertainty of both the activity data and the emission factors are not determined.
Only rough estimates are available of the number of CFC R/F units present, discarded or exported in the Netherlands. Therefore the activity data has a significant level of uncertainty, rated D.
The emission factor is verified by combining different sources, improving the reliability. It is therefore rated C.

Quality codes

Substance	Activity data	Emission factor	Emission
CFC-12	D	C	D

8.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on the population density.

Emission source/process	Allocation-parameter
Discarding refrigerators and freezers	Population density

Details available from:
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

8.5 References

Brouwer, J.G.H & Hulskotte, J.H.J. (1995). Verwerking afgedankte koelapparatuur. RIVM rapprtnr. 772414004

Magalini, F., F. Wang, J. Huisman, R. Kuehr, C.P. Baldé, V. v. Straalen, M. Hestin, L. Lecerf, U. Sayman and O. Akpulat (2014). Study on collection rates of waste electrical and electronic equipment (WEEE). Preliminary version, subject to final verification

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MIRA (2010). Achtergronddocument 2010 Aantasting van de ozonlaag.

8.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

9. Cosmetics for personal care

This paragraph describes the emissions of NMVOC resulting from cosmetics and personal care products. The paragraph does not describe the emission of NMVOC.

Process description	Emk_code	NFR_code	Target group
Cosmetics for personal care	0801100	3D2	Consumers
Cosmetics for personal care	0801101	3D3	Trade and services

9.1 Description emission source

Cosmetics products for personal care contain NMVOC which emit to the air during and after use. Here, we are dealing with products used by consumers and hairdressing salon, barbershops and beauty parlours. The cosmetics for personal consist of a very wide range of products: hairsprays, deodorants, eau de toilette/perfumes, nail polish/remover, aftershave and miscellaneous. In 2012 the emission were ascribe to consumers for 96% and to trades and services for 4%. The distribution consumers and trades/services shifted from 90 versus 10 in 2004 to 96 versus 4 in 2012 and is based on a communication of the NCV (Dutch Cosmetics Association; 2004 2012). In 2004 hairspray was with ~65% the main NMVOC contributor of the cosmetics group, followed by deodorants ~29%. However in 2012 the two main contributors switched places. Now deodorants contribute with ~54% (6.41 kton) and hairstyling products with ~35% (4.14 kton). According to the NCV there are no major changes of NMVOC concentration in products since 1996. Only within the group deodorant there is an increase of the use of NMVOC rich deodorant sprays. The increase of NMVOC emission is ascribed to the increased use of hairspray (flexible hairspray) and deodorant spray (roller sticks replaced by aerosol cans). Ultimately this leads to an increase of NMVOC from cosmetics.

Contribution to the national emission
The contribution of NMVOC by cosmetics for personal care is ~33.6% of consumers NMVOC total and 4.6% of trades and services NMVOC total (ER 2011). The contribution of cosmetics to the Dutch total NMVOC emission is ~7.7% (ER 2011).

9.2 Calculation

The calculation of NMVOC emission cosmetics and personal care products is based on market shares surveillance of these products, annually published by the NCV. In the past the NCV themselves estimated the emission of NMVOC for the years 1997, 2002 and 2003 (NCV 1998, 2003 and 2004). Since 2004 the market shares corrected with the annual Dutch central price index were used to estimate the emission.

In 2013 the NVC, on request of the ER, again estimated NMVOC emissions from cosmetics and personal care products for both consumers and trades and services (NVC 2013). Based on this latest NVC estimation it's concluded that the annual published NVC report contains sufficient information to estimate the NMVOC emission. The ER estimated 11.5 kton for consumers while NVC estimated 11.7 kton. The 11.7 kton in 2012 will be used to index the emissions for the next 5 years. The members of the NCV represent the bulk of the market shares in the Netherlands. The NMVOC total is in its turn split up into the individual substances, using an average profile, established by TNO and the Dutch Cosmetics Association in 1992.

9.3 Uncertainty

The uncertainties of the emission calculation are not quantified.

Quality codes

Substance	Activity data	Emission factors	Emission
NMVOC	B	C	C

9.4 Spatial allocation

The emissions of consumers and trade and services are allocated in the Netherlands based on population density. Details are available at http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

9.5 References

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9.6 Version, dates and sources

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Date: November 2013
Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

10. Crematorium

This paragraph describes the emissions of dioxin, mercury and PM_{10} resulting from cremation of human remains. The paragraph does not describe the emission of NO_x, SO_x or CO_2.

Procesomschrijving	Emk_code	NFR_code	Target group
Crematoria	8922001	6Cd	Trade and services

10.1 Description emission source

In the Netherlands there are 71 crematoria for human remains (LEV 2012). In 2011 59% of the deceased were cremated.

Contribution to the national emission

- Crematorium were responsible for the emission of 2.8% of the national mercury emission (ER 2012)
- Crematorium were responsible for the emission of <<1% of the national dioxin emission (ER 2009)
- Crematorium were responsible for the emission of <<1% of the national PM_{10} emission (ER 2009)

10.2 Calculation

Emissions are calculated as follows:
Emission = Activity data (-NeR) x Emission factor (-NeR) + Activity data (+ NeR) x Emission factor (+NeR)
Activity data (-NeR) = amount of cremations (in crematoria not yet in compliance with NeR)
Emission factor (-NeR) = emission per cremation (in crematoria not yet in compliance with NeR)
Activity data (+NeR) = amount of cremations (in crematoria in compliance with NeR)
Emission factor (+NeR) = emission per cremation (in crematoria in compliance with NeR)

a) Activity data
During cremation of human remains substances are emitted. From these substances NO_x, SO_x, CO_2, mercury, dioxin and fly ash (PM_{10}) the most relevant ones.

Emission of NO_x, SO_x, CO_2
The emissions are based on emission factors per cremated human. The emission of the three substances are been added to the other burning emissions of the target group trade and services. The task group ENINA is responsible for the calculation and reporting of the burning emission from trade and services.

Other emissions:
The emissions are determined by multiplying the number of cremations in the Netherlands with emission factors. The number of cremations in the Netherlands is provided on by the LVC (National Association Crematoria). On the home page of LVC the data can be downloaded.

Year	Deceased	Cremations		
	absolute	absolute	% total	% with NeR
1950	75,580	1,520	2	0
1980	114,279	39,947	35	0
1990	128,790	57,130	44	0
2000	140,527	68,700	49	5
2005	136,402	70,766	52	18
2010	135,895	77,465	57	75*
2011	135,516	78,599	58	86**

* interpolation using year 2011
** calculation based on accurate list crematoria with NeR (LVC 2012)

b) Emission factor

Mercury

The calculations of mercury are based on a study of Tauw Milieu (1997). Tauw made a list of amalgam sales in the past and combined it with the KUB model (1992). The KUB calculated an emission factor for mercury per age category. The emission factors are 1.15 in 1995, 1.37 in 2000 and 1.73 in 2010. In 2011 a factor of 1.73 g mercury per cremation was used. It's assumed that all the mercury in the amalgam is emitted to the air during cremation.

Implementation of the NeR measures

According to report "cremanties" (WESP 1996) 2150 m^3 fume is generated per cremation resulting in 0.43 g Hg/cremation. However measurements resulted in concentration far below 0.43 g Hg/cremation (between 0.001 and 0.004 mg/m^3).
Assumption: emission of mercury with NeR = 0.05 mg/m3 ≈ **0.1 g Hg/cremation.**

Emission Hg (-NeR) (kg) = cremation (-NeR) x Hg emission factor (-NeR)
Emission Hg (+NeR) (kg) = cremation (+NeR) x Hg emission factor (+NeR)
Emission Hg total (kg) = Emission Hg (-NeR) (kg) + Emission Hg (+NeR) (kg)

PM_{10} (fly ash)

The emission factor for fly ash is **100g/cremation** (WESP 1996).

Implementation of the NeR measures

The NeR measure require the use of special filter (cloth or electrostatic filters). Due to these filter the emission of fly ash decreases. According to WESP (1996) the emission for fly ash using cloth filters is 25 g/cremation. Measurements in Geleen showed concentrations of <6 mg/m^3, or 13 g per cremation. Measured data from Bilthoven showed even lower values, <0.7 mg/m^3.
Assumption: emission fly ash with NeR = **10 g/cremation**.

Emission fly as (-NeR) (kg) = cremation (-NeR) x fly ash emission factor (-NeR)
Emission fly as (+NeR) (kg) = cremation (+NeR) x fly ash emission factor (+NeR)
Emission fly as total (kg) = Emission fly as (-NeR) (kg) + Emission fly ash (+NeR) (kg)

Dioxins
The emission factor for dioxins is 4 ug I-TEQ per cremation. The 4 ug I-TEQ/cremation is based on measurements in 1991 in fumes from three crematoria (Bremmer et al, 1993).

Implementation of the NeR measures
For dioxins the emission with NeR measures are also lower. Measurements performed by TNO showed 0.024 ng/m^3 = 0.052 ug I-TEQ/cremation at Geleen and 0.013 ng/m^3 = 0.028 ug I-TEQ/cremation at Bilthoven.
According to measurements of the EEFS (Europese branche-organisatione) lower values are possible. 0.1 ng/m^3 (or 0.2 ug I-TEQ/cremation) is the modern German limit (27e BlmSchV) for installation with filters.
Assumption: emission dioxins with NeR = **0.2 ug I-TEQ/cremation.**

Emission Dioxins (-NeR) (kg) = cremation (-NeR) x Dioxine emissie factor (-NeR)
Emission Dioxins (+NeR) (kg) = cremation (+NeR) x Dioxine emissie factor (+NeR)
E. Dioxins total (kg) = Emission dioxins (-NeR) (kg) + Emission Dioxine (+NeR) (kg)

Measures influencing the calculation
Since July 1998, new crematoria or new ovens in exciting crematoria must comply to the NeR with respect to mercury (0.2 mg/m^3). Therefore the emissions of dioxins and fly ash are lower. According to the LVC information (2012) 57 of the 71 crematoria are now in compliance with the NeR. In the 57 crematoria (with NeR) 86% of the cremations occurred. At the end of 2012 all the crematoria must be incompliance with the NeR. From this date only the lower emission factors are used.

10.3 Uncertainty

Quality codes

Substance	Activity data	Emission factors	Emission
Dioxins	A	B	B
Fly as	A	B	B
Mercury	A	B	B

10.4 Spatial allocation

The emissions of the crematoria are assigned to the locations of the crematoria (SBI 96.032) in the Netherlands according the ratio of employees at the crematoria.

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

10.5 References

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10.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

11. Degassing of groundwater (CRF 2.G.4)

In this paragraph the emissions from the degassing of groundwater are described.

Process description	Emk_code	CRF_code	Sector
Degassing groundwater	0850000	2.G.4	Drinkwater companies

11.1 Description emission source

A part of the Dutch drink water is obtained through the production of ground water. Gasses which are dissolved in the water are released during processing. One of those gasses is methane. Shallow ground water extraction for usage in agriculture or on construction sites is not included in this document, since this water contains no methane.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

The contribution of this process to the national methane emission was <0.3% in 2009.

11.2 Calculation

For the complete time series, the emissions are calculated as follows
Emission = Activity data x Emission factor

Activity data = Amount of groundwater produced
Emission factor = Emission per m^3 groundwater

This is a tier 1 methodology. The methodology is not provided within the IPCC 2006 Guidelines.

a) Activity data
The amount of ground water extracted for drink water purposes is used as activity data. This data is retrieved from VeWin, the Dutch society for (drink) water producing companies. Only the amount of ground water is taken into account.
For the year 2009 this results in 676 million m^3.

b) Emission factor
The emission factor for degassing groundwater has been calculated for the year 1990 by dividing the estimated methane emissions (2000 tons) by the amount of extracted groundwater (810 million m^3), as reported by van den Born (1990).

Substance	EF	Unit
CH_4	2469	kg/ million m^3 groundwater

11.3 Uncertainty and Quality checks

The activity data for the degassing of drink water from ground water is derived from the statistics of VeWin (Dutch association for water win companies). It's estimated that the uncertainty is at most 10%, based on expert judgement.
The uncertainty of the emission factor for methane is derived from '*Olivier, 2009*' and is reported as 50%.

Quality codes

Substance	Activity data	Emission factor	Emission
CH_4	A	D	C

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

11.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on population density. Although this might not be completely correct, it's probably the best assumption.

Emission source/process	Allocation-parameter
Degassing of groundwater	Population density

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

11.5 References

Born, G.J. van den, A.F. Bouwman, J.G.J. Olivier, R.J. Swart, 1991, The emission of greenhouse gases in the Netherlands, RIVM-rapport 222901003.

VeWin, vereniging voor waterwinbedrijven. http://www.vewin.nl/

11.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

12. Fireworks (CRF 2.G.4)

In this paragraph the emissions from fireworks are described. This refers only to consumer fireworks lighted on new years eve, since only professional fireworks is allowed on other occasions.Other amounts are considered negligible.

Process description	Emk_code	CRF_code	Sector
Fireworks	0801700	2.G.4	CON

12.1 Description emission source

On new years eve, inhabitants of the Netherlands are allowed to light up fireworks. These fireworks consist of both ‘banger’ and ‘coloured’ types of firework, with an estimated 15% / 85% ratio. When lighting fireworks, various gasses and metal substances are emitted, dependent on the type of fireworks.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

The contribution of fireworks to the total national emission of particulate matter was <5% in 2009.
However, the emission of some metal components contribute considerably to the national total. Fireworks may contain, among other substances, antimony, barium and strontium. For these metals, fireworks are the main source of process emissions, emissions to the soil and emissions to the sewer system.

12.2 Calculation

The emissions are calculated as follows
Emission = Activity data x Emission factor

Activity data = Amount of fireworks lighted in kg
Emission factor = Average emission per kg fireworks

This is a tier 1 methodology. The methodology is not provided within the IPCC 2006 Guidelines.

a) Activity data
In 2009, an estimated 17.3 million kg of fireworks was lighted at new year.
In order to calculate the amount of fireworks, the difference between import and export each year is taken into account. These statistics are derived from the national statistics agency (CBS). As the difference of imported and exported fireworks doesn’t need to be lighted up the same year, consecutive years are averaged. This is done according to the following rule:
Year2 = (Year1 + 2 * Year2 + Year3) / 4
There is a bias in the statistics since smaller companies are not included in the statistics and the import of illegal fireworks is not accounted. To compensate for this bias, the amount calculated from the statistics is multiplied by a factor 1.7. This factor is based on expert judgement (estimated total fire works divided by the CBS reported amount). Prior to 1996 the CBS provided also information on the smaller companies, therefore the statistics where only multiplied by 1.316 to correct for illegal fireworks only.

b) Emission factor

The emission factors for all gaseous substances caused by fireworks are based on the report of Brouwer et al. (1995). This includes; CO_2, CO, CH_4, H_2S, SO_2 en N_2O.

For the emissions of heavy metals, the studies of Brouwer et al. (1995), Plinke et al. (2001), both for Germany and Sweden, and Croteau et al. (2010) are combined, giving an average emission factor. Plinke et al. (2001) assume that fireworks consist of 20% pyrotechnic ingredients and 80% packaging material (comparable with Brouwer et al.).

The emission of particulate matter is calculated by the sum of the emitted metals and the other particulate matter forming components as reported by Brouwer et al. (1995). According to Noordijk (1994) only 10% of particulate matter (and likewise the heavy metals) is emitted to air. This is in line with Croteau et al. (2010), where both the composition of the fireworks and the emissions to air are reported, giving around 10% of the ingredients as emissions to air.
The distribution of the heavy metals to the compartments air, sewer and soil are 10%, 54% and 36. The distribution of the compartments sewer and soil are equal to the distribution used for road wear inside the residential areas.

There is a difference between the ‘bangers’ and the rest of the fireworks in emissions. The uncolored ‘bangers’ don’t contain the reported heavy metals and have a different emission profile. Therefore the emission factors are weighted for the contribution of the different types of fireworks, with a ratio of 15% ‘bangers’ and 85% of the colored fireworks.

This results in the following emission factors.

Substance	**EF**	**Unit**
CO_2	43250	kg/ million kg fireworks
CO	6900	kg/ million kg fireworks
CH_4	825	kg/ million kg fireworks
H_2S	1195	kg/ million kg fireworks
SO_2	1935	kg/ million kg fireworks
N_2O	1935	kg/ million kg fireworks
Strontium*	3681	kg/ million kg fireworks
Barium*	11424	kg/ million kg fireworks
Copper*	5772	kg/ million kg fireworks
Antimony*	927	kg/ million kg fireworks
Zinc*	578	kg/ million kg fireworks
PM_{10}	14244	kg/ million kg fireworks
$PM_{2.5}$	14244	kg/ million kg fireworks

*total emission, not distributed to air, soil and sewer system

12.3 Uncertainty and Quality checks

Within the Netherlands the emissions of fireworks and candles are reported on a aggregated level under CRF 2G. For this aggregated level, Olivier (2009) reported uncertainties for CO_2 (20%), CH_4 (50%) and N_2O (50%). The uncertainty in activity data for fireworks is estimated to be 50% (Olivier, 2009).

The uncertainty of the emissions of other substances have not been studied. Instead, the reliability of the data is qualitatively indicated in the table below with codes A-E (see Appendix A). The codes are based on expert judgement.

Quality codes

Substance	Activity data	Emission factor	Emission
CO_2	D	D	D
CO	D	D	D
CH_4	D	D	D
H_2S	D	D	D
SO_2	D	D	D
N_2O	D	D	D
Strontium	D	C	D
Barium	D	C	D
Copper	D	C	D
Antimony	D	C	D
Zinc	D	C	D
PM_{10}	D	D	D
$PM_{2.5}$	D	D	D

Quality checks

There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

12.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on population density.

Emission source/process	Allocation-parameter
Fireworks	Population density

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

12.5 References

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Croteau, G., Dills, R., Beaudreau, M. en Davis, M., 2010. Emission factors and exposures from ground-level pyrotechnics. Atmospheric Environment 44, 3295-3303.

National Bureau of Statistics, www.statline.CBS.nl

Olivier, J.G.J., Brandes, L.J. and te Molder, R.A.B., 2009, Uncertainty in the Netherlands' greenhouse gas emissions inventory, PBL publication 500080013

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

13. Human ammonia emissions from transpiration and breathing

In this paragraph the emissions of NH_3 from human transpiration and breathing are described.

Process description	Emk_code	NFR_code	Sector
Human transpiration and breathing	0801600	6.A	Consumers

13.1 Description emission source

This emission source describes the ammonia emissions from humans by sweating and breathing. Through the consumption of food, nitrogen (N) is introduced in our system and afterwards is disposed again. Most nitrogen is released into the sewer system, the ammonia released through sweating and breathing is calculated within this emission source.
Contribution to the national emission
The contribution of this source to the total national NH_3 emission is around 1% (based on 2014).

13.2 Calculation

For the complete time series, the emissions are calculated as follows.
Emission = Activity data x Emission factor

Activity data = the amount of Dutch inhabitants
Emission factor = kg emission per inhabitant

a) Activity data
The amount of inhabitants in the Netherlands is derived from CBS Statline on annual basis. The amount of people living in the Netherlands at the end of June in a specific year is taken as activity data for that year.
b) Emission factor
With the food humans consume, also nitrogen (N) is consumed. It is estimated that a human excretes though different ways (urine, sweat, faeces etc.) 5 kg N (NH_3) per year (Battye et al 1994). Most N or NH_3 is released with the urine (and faeces) and is supposed to go through the sewer system.
The first emission factor used by the Dutch emission inventory was based on van der Hoek 1994. This report mentioned a total emission factor of 0.7 kg NH_3 per inhabitant per year, combining 0.3 kg NH3 from sweating and breathing, use of ammonia as cleaning product (1 litre of ammonia solution per household) and the ammonia emissions of cats and dogs.
Another report (Bouwman et al 1997) mentions an emission factor of the same magnitude for human emission of NH_3. In this study the emissions calculated are used for a global emission inventory. The author mentions that it's difficult to come to a well estimated emission factor, but describes that this source should not be neglected. Therefore he assumes 0.5 kg NH_3 per person per year, independent of sanitary arrangements and including domestic pets (cats/dogs). Since the Dutch standard includes a good sewer system and the Netherlands reports the emissions of domestic pets separately, this emission factor is considered to too high for the Netherlands.
In Joshua Fu et al 2010 is mentioned that, perspiration, respiration, untreated waste, cigarettes, household ammonia use, diapers and homeless people are sources of ammonia emissions

directly caused by humans. Joshua Fu et al 2010 reports an emission factor of 0.44 kg NH3 per person per year for all these emission sources combined. No separate emission factors are presented, though de distribution of the emission on the different sources is reported. Both perspiration and respiration are reported to contribute about 40% each. The emissions of untreated waste, household ammonia use and homeless people contribute about 4-6% each. Cigarettes, (untreated) waste and household ammonia are sources that are included as separate sources in the Dutch emission inventory. Also other studies report that the emissions of breathing are less than the emissions of sweating. Therefore the emissions in this document could be too high for the Netherlands.
In Battye et al 1994 different references are considered, varying from 0.25-1.3 kg NH_3/human/year from breathing and sweating. Although it's mentioned that further research is needed, it's recommended to use the emission factor of 0.25 kg NH_3 p.p.p.y. and that this emission factor is retrieved from a NAPAP report. Most interesting aspect is the reference to a measurement of NH_3 in a home. It is mentioned that an emission factor of 1 kg NH_3 should result in a concentration of about 431 µg/m^3, while the concentrations measured are between 32 and 39 µg/m^3. It might be concluded, although this is not done within this study, that the emission factor should be around 0.1 kg NH_3 per person and per year.
One of the most comprehensive studies on the emissions of ammonia from non-agricultural sources, is conducted by Sutton et al 2000. In this report the emissions of sweating are calculated with a range of emission factors from 2.08 g NH_3 till 74.88 g NH_3 per person and year. For breathing the range is 1.0-7.7 g NH3 per person per year. Sutton et al 2000 references to a number of other reports and explains his assumptions. One of the most important assumptions made is the amount of NH_3 that volatilizes from sweat (10-30%). If no volatilisation is assumed the high end emission factor is about 0.25 kg NH_3 per person and per year. This is equal to Battye et al 1994 and a reference used by Sutton et al 2000.
Furthermore some studies (Chang 2014, Zheng et al 2012 and Klimont&Brink 2004) found on ammonia emissions, all use the emission factors presented by Sutton et al 2000.
Some countries other than the Netherlands also report the emissions of human sweating and breathing, for example Switzerland, Canada and the UK (in the past). The three countries mentioned used the 'best' emission factors provided by Sutton et al 2000 of 0.017 kg NH_3 p.p.p. This is less than the ammonia emission factor in the guidebook 2013 of 0.05 kg NH_3 per person and year.
Only one study found (Sutton et al 2000) reports an emission factor for the ammonia emissions from diapers. Depending on the age and some assumptions made, the emission factor ranges from 2.4-68 g NH_3 per infant and per year. A first estimate for children (age 0-3 year) in the Netherlands gives an emission of 2 till 50 tonnes NH_3 a year. Since this is only one reference and a relative low contribution to the national total, the decision is made not to include this emission (separately) in the Dutch emission inventory.

Emission factor used in the Netherlands emissions inventory:
The high end emission factors of Sutton et al 2000 are used, resulting in a total emission factor of 0.0826 kg NH_3 per person per year (sum of 74.88 and 7.7 gram p.p.p.y. for sweating and respiration respectively). Because the emission factors in other reports are higher, it is decided to choose the high end emission factors of Sutton et al 2000, instead of the 'best' emission factors. This way the risk of underestimating the human ammonia emissions is reduced and emission sources not calculated (homeless people and diapers) can be neglected.

13.3 Uncertainty and Quality checks

The uncertainty in the number of inhabitants in the Netherlands is considered to be very small, therefore the uncertainty is qualified as A.

The uncertainty in the emission factor is estimated to be relative high, since emission factors vary between different sources and the amount of ammonia volatilized is based on an assumption. Hence the uncertainty is qualified as D.

Quality codes

Substance	Activity data	Emission factor	Emission
NH_3	A	D	C

Quality checks

There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

13.4 Spatial allocation

The ammonia emissions of humans are spatially allocated in the Netherlands based on the inhabitants.

Emission source/process	Allocation-parameter
Human ammonia emission; sweating and breathing	inhabitants

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

13.5 References

- Dutch Bureau of Statistics, Statline, annual data on the number of inhabitants
- Sutton M.A. et al, 1999, Ammonia emissions from non-agricultural sources in the UK, Atmospheric Environment 34 (2000) 855-869
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14. Leather maintenance products and office supplies

This paragraph describes the emissions of NMVOC from office supplies and leather maintenance products.

Process description	Emk_code	NFR_code	Target group
Leather maintenance products	0802800	3D3	Consumers
Office supplies	0820600	3D2	Consumers
Office supplies	0820601	3D3	Trade and services

14.1 Description emission source

All emissions from leather maintenance products are ascribed to consumers. The emissions from office supplies are ascribed to consumers (50%) and trade and surfaces (50%). Leather maintenance products consist of polishing wax, furniture polish, furniture cleaners, shoe polish, etc. Office supplies consist of tip-ex, ballpoints, fibre- tip pens, text markers, etc. All these products contain NMVOC which emits after use to the air.

Contribution to the national emission
The contribution to the national total is less than 1% for both the consumers and trade and services groups.

14.2 Calculation

The market share of VOC containing products was monitored on a regular basis monitored in the project KWS2000 by InfoMil. They performed producer and supplier surveys. The surveys however, were performed a long time ago: leather maintenance products in 2000 and for office supplies in 1997 and surveys.
The NMVOC total is split up into the individual substances, using an average profile, established by TNO and Association in 1992.

14.3 Uncertainty

Quality codes

Substance	Activity data	Emission factors	Emission
NMVOC	D	Not relevant	D

14.4 Spatial allocation

Details are available at:
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

The emissions NMVOC are allocated in the Netherlands based on:

Emissiesource/proces	Allocation-parameter	Source data
Office supplies	Floor area commercial and industrial buildings	LISA
Office supplies	Population desity	Bridgris (ACN)
Leather maintenance products	Population density	Bridgris (ACN)

14.5 References

- *KWS2000/InfoMil, 1999,* Jaarverslagen 1996-2000, InfoMil, Den Haag.

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

15. Meat preparation and charcoal use (CRF 1.A.4.b)

In this paragraph the emissions of charcoal use on the barbecue and meat preparation are described.

Process description	Emk_code	CRF_code	Sector
Meat preparation	0801800	1A4bi	CON
Charcoal use	0801801	1A4bi	CON

15.1 Description emission source

During meat preparation, NMVOC are produced as result of the heating and burning of grease. During the burning of charcoal on the barbecue, various compounds are emitted, for example particulate matter, CH_4 and NMVOC.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

The contribution of NMVOC emissions from meat preparation to the total national NMVOC emission was 0.5% in 2009.

The emission of CO_2 is booked as memo item under the Kyoto protocol, since charcoal is considered as biomass. The amount of CO_2 emissions caused by charcoal burning is negligible in relation to the national total CO_2 emissions from biomass burning.
The contribution to national emissions of PM_{10}, $PM_{2.5}$, CO, CH_4, NO_X, N_2O, SO_2 and NMVOC as a result of charcoal burning are negligible.

15.2 Calculation

Emissions are calculated as follows:
Emission = Activity data x Emission factor

This is a tier 1 methodology. The methodology is consistent with the IPCC 2006 Guidelines.

a) Activity data
Since no actual data is available for the use of charcoal in Dutch households, all emissions are calculated based on the amount of meat used. Data on the number of inhabitants and the amount of meat consumed annually per inhabitant were gathered from the national statistics bureau. Combined, these result in a total amount of meat consumed in the Netherlands. Estimated is that 0.3% of the meat is prepared on the barbeque and about 80% is fried, roasted or grilled.

Charcoal use is estimated by multiplying the amount of meat consumed by 0.194 TJ charcoal/kton meat. This is based on 1.5 kg charcoal per 1 kg meat prepared on the barbeque.

For the year 2009 this results in 1,430 kton meat consumed and 278 TJ charcoal used on the barbecue

b) Emission factor

The emission factors for NMVOC, particulate matter, SO_2, NO_X and CO are derived from Brouwer et al. (1994). The emission factor for CO_2 (memo item), CH_4 and N_2O are derived from the 2006 IPCC guidelines, the default emission factors are used.

Substance	EF	Unit
Meat preparation		
NMVOC	0.5	g/kg meat
Barbecueing		
NMVOC	250	kg/TJ charcoal
SO_2	10	kg/TJ charcoal
N_2O	1	kg/TJ charcoal
NO_X	50	kg/TJ charcoal
CO	6000	kg/TJ charcoal
CH_4	200	kg/TJ charcoal
PM_{10}	150	kg/TJ charcoal
$PM_{2.5}$	75	kg/TJ charcoal
CO_2 (memo item)	112	ton/TJ charcoal

15.3 Uncertainty and Quality checks

The activity data for the burning of charcoal in households is estimated on the amount of meat consumed yearly. This is based on the assumption that only barbecuing is responsible for charcoal usage in households. Since the amount of charcoal used in the Dutch households is based on meat consumption combined with estimated charcoal sales, the uncertainty is estimated at 50%, based on expert judgement.
The emission factors (and corresponding uncertainties) used for charcoal burning are derived from '*IPCC guidelines 2006*'. Therefore the uncertainty bandwidth is for N_2O -62.5% till 275%. For CH_4 the uncertainty bandwidth is -66.6% till 200%. The corresponding uncertainty of CO_2 (memo-item) is reported as 20%.

The other emission factors are estimated based on a single report from the US. Therefore those emission factors are not very reliable;
The reliability of the data is qualitatively indicated in the table below with codes A-E (see Appendix A). The valuations are based on expert judgement.

Quality codes

Substance	Activity data	Emission factor	Emission
NMVOC (meat)	B	C	C
NMVOC (BBQ)	B	C	C
SO_2	B	C	C
N_2O	B	B	B
NO_X	B	C	C
CO	B	C	C
CH_4	B	B	B
PM	B	C	C
CO_2	B	B	B

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

15.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on population density.

Emission source/process	Allocation-parameter
Meat preparation	Population density
Charcoal use in barbecue	Population density

Details available via:
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

15.5 References

- ER, 2009. Netherlands Emission Registry. Data on 2009 available from www.emissieregistratie.nl
- *Brouwer J.G.H., J.H.J. Hulskotte, C.H.A. Quarles van Ufford, 1994*, Vleesbereiding, inclusief gebruik barbecue, WESP-rapport C-2, RIVM-rapportnr 773009003.
- CBS statline
- IPCC 2006 guidelines. http://www.ipcc-nggip.iges.or.jp/public/index.html

15.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

16. Paint

This paragraph describes the non-methane volatile organic compounds (NMVOC) emission from paint.

Process description	Emkcode	NFR code	Sector
Car paint – use of paint and lacquer	8920800		Trade and services
Paint - construction	0802200		Construction
Paint - consumers	0802201		Consumers
Road paint	0119800/ 0129800		Construction

16.1 Description emission source

Paint may contain NMVOC which evaporates to the air during and after use. Paint includes products like coating, (wall) paint, lacquer, varnish, plaster, glue, stripper and filler and thinner. Annually the Netherlands Association of Paint Producers (Vereniging Van Verf en drukinkt Fabrikanten (VVVF)) provides sales data for the calculation of NMVOC emission.

Contribution to the national emission and sector totals
An overview of the contribution of NMVOC by paints to the target group and the national total can be found in the next table.

Sub market VVVF	Target group	Contribution to Target group (%)	Contribution to national total (%)
Car repair lacquer	Trade and services	10	1.3
Construction	Construction	94	3.7
Consumers	Consumers	7	1.5

16.2 Calculation

The annual national paint sales, including information on NMVOC content, are provided by the annual paint sales statistics of the VVVF, representing about 95% of the Dutch total market. The remaining 5% consists of directly imported paint. The VVVF divides different sub markets as seen in the table below. The task force ENINA covers the target group industry and therefore will not be addressed in this report.

Sub market VVVF	Target group
Car repair lacquer	Trade and services
Construction (including steel preservation and road marking)	Construction
Consumers	Consumers
Industry and carpentry factories	Industry
Ship building	Industry

Car repair lacquer
The total NMVOC emission from this source is calculated as follows:

$EM_{totalcrl}$ = EmN + EmI
EmN = NMVOC content national paint sales
EmI = NMVOC content directly imported paint

It is assumed that:
- all paint sold will be used the same year and that the NMVOC emitted is 100% and the imported paint has the same NMVOC percentage as the paint sold by VVVF,
- 5% is directly imported paint.

Construction (including steel preservation and road marking)
The total NMVOC emission from this source is calculated as follows:

$Em_{totalconstruction}$ = EmN-C + EmI-C + EmN-SP + EmI-SP
EmN-C = NMVOC content national paint sales of construction
EmI-C = NMVOC content directly imported paint of construction.
EmN-SP = NMVOC content national paint sales of steel preservation
EmI-SP = NMVOC content directly imported paint of steel preservation

It is assumed that:
- all paint sold will be used the same year and that the NMVOC emitted is 100%,
- the NMVOC percentage of the imported construction paint is 2%,
- the imported paint of steel preservation has the same NMVOC percentage as the paint sold by VVVF,
- for construction 35% is directly imported paint is and for steel perservation 10% is directly imported paint.

The total NMVOC emission from the construction sector must be split up into road markings and others based on the amount of road markings.

Consumers
The total NMVOC emission from this source is calculated as follows:

$EM_{totalconsumers}$ = EmN + EmI
EmN = NMVOC content of national paint sales
EmI = NMVOC content of directly imported paint

It is assumed that:
- all paint sold will be used the same year and that the NMVOC emitted is 100% and the imported paint contains the same amount of NMVOCs as the paint sold by VVVF,
- 0% is directly imported paint.

a) Activity data
Total NMVOC emission is subdivided into individual substances based on paint profile statistics as provided by the VVVF (VVVF 1997).

Substance in paint profile	Factor*
Additional Nonhalogenated volatile hydrocarbons	0,119
Additional Alif nonhalogenated hydrocarbons	0,264
Additional Aromatic nonhalogenated hydrocarbons	0,045
Methylenechloride	0,004
Ethanol	0,015
Esters boiling point <150◦C	0,224
Ketone	0,075
Propyleneglycomethylether	0,045
Propyleneglycomethylether acet	0,045
Toluene	0,030
Xylene	0,134

*Based on VVVF statistics 1997

16.3 Uncertainty

The uncertainties of the emission calculation are quantified by the Utrecht University (J. vd Sluys) in 2002.

Quality codes

Substance	Activity data	Emission factor	Emission
NMVOC			C

16.4 Spatial allocation

The emissions of consumers and trade and services are allocated in the Netherlands based on population density. The emission of road paint is allocated based on road density.

16.5 References

- Annually reports VVVF on www.vvvf.nl
- Ministerie van VROM 2005. Nationaal Reductieplan NMVOS industrie, HDO en bouw, bijdrage van de sectoren aan het realiseren van het NEC-plafond in 2010.
- Staatsblad 2005/632. Besluit organische oplosmiddelen in verven en vernissen (BOOVV).
- Sluijs vd J., et al., 2002. Uncertainty assessment of VOC emissions from paint in the Netherlands. Utrecht University, NW&S E-2002-13.
- Instituut voor toegepaste milieu-economie (TME) 2003.Kosteneffectiviteit VOS maatregelen 2010. eindrapportage.
- Instituut voor toegepaste milieu-economie (TME) 2003. Kosteneffectiviteit VOS maatregelen 2010. achtergronddocument verf, bouw en doe het zelf.
- Vereniging Van Verf en drukinktFabrikanten (VVVF) 1999. Grondstoffenverbruik in 1997 in de Nederlandse verfindustrie.
- Vereniging Van Verf en drukinktFabrikanten (VVVF) 2002.VOS-reductieplan 2010 voor de verf-en drukinktindustrie.

16.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

17. PCP pressure treated wood

This paragraph describes the emissions of PCP and dioxins from resident façade boarding treated with PCP. The paragraph does not describe the emission NMVOC.

Process description	Emk_code	NFR_code	Target group
PCP pressure treated wood	0010300	3D3	Consumers

17.1 Description emission source

In the past wooden façade boarding of residences were treated with PCP (pentachlorophenol). Overtime PCP and dioxins emit from the wood to the air. The dioxin emissions occur because the wood was treated with contaminated paint.

Contribution to the national emission
PCP from façade boarding is within the ER the only source.
The contribution of dioxin is ~46% of the national total.

17.2 Calculation

Dioxin
In 1990 Bremmer at al. estimated the dioxin emission from façade boarding in the RIVM report 'emissies van dioxines in Nederland' (Bremmer et al 1993). The use of PCP is prohibited in 1989 and therefore, it's assumed that there is linear decrease of the emission. Bremmer et al. estimated emission of ~25 g I-TEQ (1990), ~20 g I-TEQ (2000) and ~10 g I-TEQ in 2020.

Pentachlorophenol
Slooff et al. (1990) calculated in a PCP base document an emission of 35 tons in 1987. For the year 1990 the PCP emission was set to 34 tons. According to Slooff et al and Bremmer et al. in both these documents it is stated that within 15 years the emission will be reduced to 50%. Therefore, an emission of 3.3% per year is assumed.

The emission of PCP and dioxin is also reduced because façade boarding are been replaced. The total amount of façade boarding is assumed to be reduced with 1% each year between the years 10 to 20, 2% for each year between 20 to 30 years, 3% for each year between 30 to 40 years and 4% for each year after 40 years.

The emission values for PCP and dioxin presented by Slooff et al and Bremmer et al are including the reduction of the amount façade boarding reduction after 10 years.

Measures influencing the calculation
The use of PCP was prohibited in 1989.

17.3 Uncertainty

The uncertainties of the emission calculation are quantified within the reports of Bremmer et al and Slooff et al.

Bremmer calculated an average of 16 g I-TEQ dioxine in 1990 and stated in the report that the maximum could not exceed 25 g I-TEQ dioxin. For 1990 the ER assumed an emission of 25 g I-TEQ. This would mean that there is only uncertainty in the low tail of the value. The 95% confidence interval is skewed. Within the ER, as a rule, the highest uncertainty value is used and also that the 95% confidence interval is normally distributed around the 25 g I-TEQ.

For PCP Slooff et al reported the average PCP emission. The 95% confidence interval is normally distributed around the average.

Quality codes

Substance	Activity data	Emission factors	Emission
Dioxins	D	Not relevant	D
PCP	D	Not relevant	E

17.4 Spatial allocation

The emissions dioxin and PCP are allocated in the Netherlands based on population density. Details are available at:
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

17.5 References

- Bremmer, H.J., L.M. Troost, G. Kuipers, J. de Koning, A.A. Sein, 1993, Emissies van dioxinen in Nederland, RIVM rapportnummer 770501003.
- Slooff et.al, Basisdocument PCP, RIVM, november 1990.

17.6 Version, dates and sources

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

18. Petrol stations

This paragraph describes the NMVOC emissions from petrol stations.

Process description	Emk_code	NFR_code	Target group
NACE 47.3: gas stations, spills tank refill	8920900	1B2aiv	Trade and service
NACE 47.3: gas stations, vapour expel - tank refill	8920901	1B2aiv	Trade and services
NACE 47.3: gas stations, vapour expel - storage tanks	8920902	1B2aiv	Trade and services

18.1 Description emission source

Petrol stations not only include the distributions points for road traffic, but also include petrol stations on company grounds (meant for company cars). The NMVOC emissions of petrol and LPG are reported. LPG is reported as butane and propane (50/50). Emission occurs during the filling of tanks and result from two sources. The first is the loss due to leakages of the fuel (petrol) and the second is due to expulsion while filling car tanks and storage tanks (petrol and LPG). In the Netherlands there are between 40 and 45 filling stations for car using natural gas as fuel. However it is assumed that the losses occurring during filling of natural gas are negligible. Before disconnecting the filling pistol, the natural gas in the dead space between pistol and tank, is recovered, no gas is emitted into the air.

Contribution to the national emission
The contribution of NMVOC from petrol station is around 5.5% of the national total NMVOC emission and circa 18% of the target group trade and services (ER, 2009).

18.2 Calculation

Emissions are calculated as follows:
Emission = Activity data x Emission factor

Activity data = amount of fuel used in the Netherlands for road transportation
Emission factor = emission per litre fuel used

a) Activity data

<u>Leakage losses</u>

During filling of car tanks spilling of petrol drops can occur.

On average it’s assumed that the minimal spillage is at least 1-2 ml and the average tank amount per filling is 40 litres. The density of petrol is 0.72 kg/litre. It’s assumed that a million litres petrol produces 720 tons of VOC.
The last decade the Netherlands used 5.5 billion litres petrol for transportation by road (statline.CBS.nl). Based on these assumption and official data we calculated a VOC emission of around 300,000 kg. Since the amount of petrol is constant over the years, the VOC emission due petrol spillage has not changed.

After disconnecting the LPG filling pistol, LPG (a mixture of butane and propane 50/50) will be-emitted into the air. The average dead volume of the pistol and connection nipple of the tank is 12.5 ml (personal communication LPG installation branch).
It’s assumed that on average the tank is filled with 40 litres LPG. CBS (statline.CBS.nl) in the Netherlands provides data for amounts LPG used for transportation by road. Based on these assumptions and the official data we calculated LPG spillage of 97 tons.

Expulsion losses car tanks
At the start of refuelling with petrol the tank is filled with petrol vapour. When petrol flows in the tank, the petrol vapour comes out (Bernouille-principal). Therefore, during refuelling petrol is emitted into the air. In the Netherlands measures were implemented to reduce the emission of petrol. These measures called stage 1 and stage 2 have been implemented since 2000 and 2005 respectively. Since 2005 the expulsion losses have been settled to 1.27 kt. Because the amount of petrol for transportation has not changed (5.5 billion litres according to statline.CBS.nl) the expulsion losses have been constant for years now.

Measures influencing the calculation
Although both the stage 1 and the stage 2 measures are implemented since 2005, a rest emission of 25% of pre-implementation emission will remain. No further emission reduction measures are foreseen. Although the mobility increases, the sale of petrol remains constant. The sale of diesel however did increase.

b) Emission factors
The factors for the emission by petrol leakage are unknown.

NMVOC (kT)	**Amount Petrol**	**Expulsion losses**		**Spillage**	**Total**	**Realization**
year	(billion litre)	storage	car's	refueling car's	losses	Stage I and II
1980	?	5.1	4.9	0.6	10.6	
1990	?	4.9	4.9	0.6	10.4	
2001	5.5	0.0	1.9	0.4	2.5	Stage 1
2005	5.5	0.0	1.3	0.3	1.6	Stage II
2011	5.7	0.0	1.3	0.3	1.6	
2012	5.4	0.0	1.3	0.3	1.6	

Substance in LPG	**Emission factor**
propane	0.5
butane	0.5

Butane/propane (kT)	Amount Petrol	Losses	Spillage refueling car's (kT)		
year	(billion litres)	storage	LPG total	wv butane	wv propane
1985	1.5	0.0	0.26	0.13	0.13
1990	1.5	0.0	0.24	0.12	0.12
2001	1.0	0.0	0.16	0.08	0.08
2005	0.7	0.0	0.11	0.06	0.06
2011	0.5	0.0	0.09	0.045	0.045

18.3 Uncertainty

The uncertainties of the emission calculation are not quantified.

Quality codes

Substance	Activity data	Emission factor	Emission
NMVOC	B	C	C

18.4 Spatial allocation

The emissions of the petrol stations are assigned to the locations of the petrol stations (SBI 47.3) in the Netherlands according the ratio of employees at the petrol stations point. Details are available at:
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation).

18.5 References

- ER, 2009. Netherlands Emission Registry. Data on 2009 available www.emissieregistratie.nl
- VROM, Besluit 'tankstations en milieubeheer' en 'herstelinrichtingen voor motorvoertuigen en milieubeheer' en het wijzigingsbesluit daarop (Stb 1996, 228).
- Comprimo (briefrapport 18 november1994) over schattingen voor lekverliezen van benzine.
- www.statline.CBS.nl

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

19. Residential combustion, Wood stoves and Fire places (CRF 1.A.4.b)

In this paragraph the emissions from wood combustion by consumers are described.

Process description	Emk_code	CRF_code	Sector
Residential wood combustion	T012200	1.A.4b	CON

19.1 Description emission source

In the Netherlands residential combustion of wood is mainly done to create a cosy atmosphere. Although wood combustion in stoves is sometimes considered more environmentally friendly, there are hardly any houses in the Netherlands that use wood combustion as their main heat source.
The wood combustion in stoves and fire places leads to various emissions. The emissions of CO_2 are the result of biomass burning and therefore reported as such. Besides CO_2, also CH_4, N_2O, NO_X, particulate matter, VOC's and other compounds are emitted.

Contribution to the national emission
For the greenhouse gases this emission source is not a key source.

Wood stoves and fire places contribute relatively the most to the emissions of particulate matter. The contribution to particulate matter is about 6% of the national total. Although this is the particulate matter without condensables. If the condensables are included in the particulate matter emissions, the contribution increases to about 14% of the national total.

All contributions to the national emissions are related to the emissions in the year 2009.

19.2 Calculation

The emissions of fire places and different types of woodstoves are calculated with a model. This model is described in Jansen (2010) and Jansen (2014).

The emissions are calculated as follows for each type of stove;
Emission = Activity data x Emission factor

For the greenhouse gases this is a tier 1 methodology, since there is no differences in the emission factors for the greenhouse gases. The methodology is consistent with the IPCC 2006 Guidelines.

a) Activity data
For the year 2009 this results in a total wood use of about 1200 million kilograms in all stoves and the fire places. This is the equivalent of 17000 TJ wood burned in the stoves and fire places. The amount of wood is based on Segers (2013) (and earlier studies on wood burning in stoves for the Netherlands) and modelled in the emission model (for more details see Jansen 2010).

b) Emission factor
All emission factors are reported in the 2010 and 2014 reports about the emission model for woodstoves (Jansen 2010; 2016).
The emission factors for some substances are listed in the next table.

Substance	EF (type of stove)				unit
	Fire place	conventional	approved	DINplus	
CO_2	112	112	112	112	kg/GJ
CH_4	0,3	0,3	0,3	0,3	kg/GJ
N_2O	4	4	4	4	g/GJ
PM_{10}	161	194	97	52	g/GJ
Condensables	484	323	129	80	g/GJ

For the greenhouse gas emissionfactors, the default emission factors from the IPCC 2006 guidelines are used.

19.3 Uncertainty and Quality checks

The activity data for wood burning is calculated yearly, based on 5-yearly questionnaires. The uncertainty might therefore fluctuate over time and is estimated on 35% (ND) based on expert judgement in combination with the data in *Segers, 2010*.
The emission factors for the greenhouse gases are based on the '*IPCC guidelines 2006*', the corresponding uncertainties are reported as; 20% for CO_2 (reported as memo-item), -62.5% till 275% for N_2O and -66.6% till 200% for CH_4.

For the other substances the uncertainty in the emission factors has not been specifically determined. Based on expert judgment the uncertainty is estimated to be rated as C (see Appendix A).

Quality checks
There are no sector specific quality checks performed. For the general QA/QC, see chapter 2.

19.4 Spatial allocation

The emissions of consumers are spatially allocated in the Netherlands based on the inhabitant distribution.

Emission source/process	Allocation-parameter
Burning wood in Stoves	Population density

Details available via
http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation)

19.5 References

- Segers R., 2010, Houtverbruik huishoudens, CBS, The Netherlands
- Segers R., 2013, Houtverbruik huishoudens WoOn 2012, CBS, The Netherlands
- Jansen B.I., 2010, Emissiemodel houtkachels, TNO, The Netherlands
- Jansen B.I., 2016, Emissiemodel houtkachels update, TNO, The Netherlands
- Oldenburger et al., 2012, Houtstromenstudie, Probos, The Netherlands

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
B.I.Jansen	TNO	bart.jansen@tno.nl

20. Shooting

This paragraph describes the emissions of lead to the soil by shooting.

Process description	Emk_code	NFR_code	Target group
Shooting	E800200		Trade and services

20.1 Description emission source

The emission source involves clay-pigeon shooting. Hunting and traditional (folklor(ist)ic) shooting is not included. Since 2008, the use of lead is in both disciplines prohibited. Lead has been replaced by steel. The emission of steel (iron) is reported by the agriculture group. Only official clay-pigeon shooters (match) have an exemption from the minister until 2016 to shoot with lead, but will probably be continued because in the international competition the shooters still use lead. Clay-pigeon shooting is only performed at one location in the Netherlands, in Emmen. Currently the number off match shooters is very small.

Contribution to the national emission
The lead emission contribution from clay-pigeon shooting to the national total is ~3%.(ER 2012).

20.2 Calculation

Since December 2004, lead shots aren't allowed anymore. According to the information from the KNSA (Koninklijke Nederlandse Schutters Associatie) there are presently only 3 clay-pigeon match shooters. Only official clay-pigeon shooters (match) have exemption release from the minister until 2016 to shoot with lead. A match shooter trains on a regular basis and shoots 14000 times per year. A shell contains 24 grams lead. Thus, a shooter uses 336 kg lead. In 2012 there were 3match shooters in the Netherlands, thus, the emission of lead due to clay-pigeon shooting was ~1 ton. According to the KNSA the lead is, afterwards, not removed from the shooting range. In 2013 the Minister of State signed an exemption until end 2016, granting the Olympic competitive shooters another four years. However, the KNSA is invited to come up with proposal, at latest date of 1 January 2014, to avoid emission of to the environment (soil and groundwater).

20.3 Uncertainty

Quality codes

Substance	Activity data	Emission factors	Emission
Lead	B	A	C

20.4 Spatial allocation

There is only one location in the Netherlands, Schietsportcentrum Emmen Emmer-Compascuum.

20.5 References

Reference	Titel
Staatscourant 2004/ 237	*Besluit kleiduivenschieten WMS, 19 mei 2004*
De straat, 1996	*De Straat Milieu-adviseurs, 1996*, Beperking van de milieubelasting bij kleiduivenschieten, Projectnummer B2112, De Straat Milieu-adviseurs, Delft.
Bon, 1988	*Bon, J. van en J.J. Boersema, feb 1988,* Metallisch lood bij de jacht, de schietsport en de sportvisserij, IVEM rapport nr 24, Groningen.
VROM, 1995	*VROM/DGM, dir. Stoffen, Veiligheid, Straling, afd. Stoffen, 1995,* Circulaire Beperking loodbelasting van de bodem bij traditioneel schieten, VROM/DGM, Den Haag.
Booij, 1993	*Booij, H ,et al, sept 1993*, Alternatieven onder schot, RIVM rapport nr 710401026, RIVM, Bilthoven.
VROM, 1999	*Traditioneel Schieten, Circulaire, VROM/DGM/SVS, 1 november 1999*
KNSA, 2011/2013	*Telefonisch onderhoud met Dhr. Duisterhof van de KNSA. http://www.knsa.nl*
Staatscourant 2013	*Beschikking van 11 juni 2013, Ontheffing verbod op gebruik van loodhagel bij het kleiduivenschieten voor topsporters. Staatscourant nr 17795*

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Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

21. Wholesale Business in fuel and remaining mineral oil products

This paragraph describes NMVOC emissions from Wholesale business in fuel and remaining mineral oil products. Before 2010 this emission source was addressed with the terms "petrol distribution points" or petrol distribution chain".

Process description	Emk_code	NFR code	Sector
Wholesale business in fuel and remaining mineral oil products.	8921100	1B2aiv	Trade and services

21.1 Description emission source

The petrol distribution points are looked upon as the link between petrol stations and refinery. In the KWS2000 project it was called "petrol distribution chain". The emissions resulting from the loading of tank Lorries at refineries and filling of large storage tanks are incorporated within the emission trend of the distribution chain. Since 2001 the expulsions losses during filling of Lorries and storage tanks are no longer reported individually, but reported summed up and imply the emission resulting from petrol only.

Contribution to the national emission
The NMVOC emissions from petrol distribution chain decreased after a light increase in 1996. The decrease is mainly due to decreased NMVOC emission from storage tanks.

The contribution of NMVOC from the wholesale business and remaining mineral oil products is <1% of the total national NMVOC emission and circa 7% from the NMVOC emission from HDO (ER, 2009).

21.2 Calculation

Until 1999, emission data is based on data for 1997 and overall estimates of branch developments in the years after. In 2001 the petrol storage facilities have been interviewed through questionnaires in order to provide information about the implementation of measures and the residual emissions in 2000. Since the response to this questionnaire was limited, it was not possible to use this questionnaire in order to obtain a good picture of the VOC emissions and the implementation degree. The individual companies have not gained insight in their VOC emissions. With regard to the implementation degree of measures the questionnaire data show that in any case the major petrol storage facilities have implemented these measures, but the situation of the smaller storage facilities remains unclear (KWS 2000, 2002).

In 2004 the VPNI (Vereniging Nederlandse Petroleum Industrie: Association Dutch Petrol Indusrty) developed a reduction plan VOC emissions for the years 2000-2010. The VPNI produced emission calculations based on measures mentioned in KWS 2000.

Measure affecting the calculation

Due to the KWS2000 the following precautions were undertaken for the distribution chain:
- storage tanks with internal floating deck
- treatment of expulsion air

These measures were established in the departmental regulation "Storage, transfer and distribution of petrol environmental management" December 1995. There were no further reductions presented in the reduction plan VOS 2000-2010 for petrol distribution (VPNI). Since 2003 the emissions from distribution points are kept constant.

21.3 Uncertainty

The uncertainties of the emission calculation are not quantified.
There were two general measures enforced (labelling and environmental car). The effect of these measures are unknown.

Quality codes

Substance	Activity data	Emission factor	Emission
NMVOC	C	C	C

21.4 Spatial allocation

The emissions of the Wholesale Business in fuel and remaining mineral oil products are assigned to the locations of the petrol distribution points (SBI 46.71) in the Netherlands according ratio of employees at the distribution point. Details are available at: http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx?ROOT=Algemeen (General)\Ruimtelijke toedeling (Spatial allocation).

21.5 References

- ER, 2009. Netherlands Emission Registry. Data on 2009 available from www.emissieregistratie.nl
- VROM Ministeriele regeling Op-, overslag en distributie benzine milieubeheer, 27 december 1995.
- VNPI, P.Houtman, mrt 2004 Reductieplan VOS 2000-2010 voor de aardolieketen.

21.6 Version, dates and sources

Version: 1.1
Date: November 2013
Responsibility manager task group WESP:

Administrator	Organisation	E-mail address
J. Meesters	RIVM	Joris.Meesters@rivm.nl

Note: Since 1999 no new data is available on emission variables and emission factors. Therefore, the used data might be outdated.

A Quality indication

The quality and reliability of the emission data is expressed in a coding system using A, B, C, D and E scores. This corresponds to the method used in EPA emission inventories in the light of EMEP/CORINAIR. The quality scores are defined as follows:

A: The data are gathered from very accurate (high precision) measurements.
B: The data are gathered from accurate measurements.
C: The data are gathered from a published source such as government statistics or industrial trade figures.
D: The data are derived from extrapolation of other measured activities.
E: The data are derived from extrapolation of foreign data.
N: Not applicable or no data available.

The reliability of the emission factors can vary substantially over years and between substances. Therefore, no confidence interval can be linked to the quality indications used. However, it can be assumed that, for a specific substance, the relative confindence decreases along the data quality classifications (A to E).

B Methodology descriptions to be updated

Part of the methodology descriptions need to be updated and translated to English. These methodologies are collected in this appendix.

These methodologies are:

nr.	Dutch	English
B1	Antiroestbehandelingsbedrijven	Service stations, anti-corrosive treatment
B2	Bestrijdingsmiddelengebruik door huishoudens	Domestic pesticides
B3	Bestrijdingsmiddelengebruik niet landbouwkundig	Pesticides (not agricultural usage)
B4	Chemisch reinigen van kleding en textiel	Washing, dry-cleaning and dye-works (<10 employees)
B5	Industrieel reinigen van kleding en textiel	Washing, dry-cleaning and dye-works (>10 employees)
B6	Ontsmetten van transporten	Fumigation of transports
B7	Roken van rookwaren	Smoking of cigarettes and cigars
B8	Schoonmaakmiddelen	Detergents
B9	Tankautoreiniging	Industrial cleaning of road tankers
B10	Transpiratie	Human transpiration and breathing
B11	Huisdieren Mest	Manure of domestic animals
B12	Diffusie uit isolatieschuim koelkasten en vriezers	Refrigerator foam
B13	Dewaxen van nieuwe auto’s	Degreasing new vehicles

B.1 Antiroestbehandelingsbedrijven

Omschrijving	Doelgroep	EO Code:	NFR Code:
Antiroestbehandelingsbedrijven	HDO	8920700	3A

Bijdrage aan de totale nationale emissies

De bijdrage aan de NMVOS emissie van antiroestbehandeling door garagebedrijven is <1% in het nationale totaal en ca. 1% van de doelgroep HDO (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

Dit hoofdstuk beschrijft de monitoring van de emissies van vluchtige organische stoffen (NMVOS) die vrijkomen bij de behandeling van auto's met antiroestmiddelen (ook wel tectyleren genoemd). De emissies door antiroestbehandelingsbedrijven worden volledig toegerekend aan de doelgroep Handel, Diensten en Overheid (HDO).

Bij de behandeling van auto's met antiroestmiddelen (ook wel tectyleren genoemd) komen direct na gebruik de in deze middelen toegepaste oplosmiddelen (NMVOS) vrij. In tegenstelling tot de jaren daarvoor, worden nieuwe auto's sinds halverwege de jaren 80 door de fabrikant standaard voorzien van een antiroestlaag. Daarnaast zijn de constructiematerialen veranderd door de toepassing van bijvoorbeeld kunststof- en verzinkte carrosseriedelen. Slechts een fractie van de auto's krijgt na verloop van jaren nog een nabehandeling. Om deze reden is het aantal bedrijven in Nederland waar auto's een antiroestbehandeling kunnen krijgen sinds medio de jaren 80 sterk afgenomen. Voor de komende jaren wordt verwacht dat er uiteindelijk een bepaalde stabilisatie intreedt. Dit als gevolg van de antiroestbehandelingen die uitgevoerd worden bij klassieke auto's.

Berekeningsmethode

De totale NMVOS-emissie wordt vastgesteld op basis van afzetgegevens van de antiroestmiddelen. Het betreft een globale schatting van de marktleider in antiroestmiddelen (KWS2000, diverse jaren). De meest recente opgave dateert van 1999, in de jaren daarna is de emissie constant verondersteld.

Kwaliteitsindicatie

Onderstaand schema toont de kwaliteitscodes voor de emissies door antiroestbedrijven. In bijlage 1 wordt de betekenis van deze codes verder toegelicht.

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS	n.v.t.	n.v.t.	E

Stofprofielen

De NMVOS emissie wordt opgesplitst naar individuele stoffen op basis van een emissieprofiel opgesteld door TNO in 1992.

Regionalisering

Regionalisatie van de berekende NMVOS emissies vindt plaats door verdeling van deze emissies over de antiroestbehandelingsbedrijven (SBI 501, Garagebedrijven) .

Emissiebron/proces	Allocatie-parameter	Bronhouder
Antiroestbehandelings-bedrijven	Arbeidsplaatsen binnen SBI 501	- LISA (MKB gegevens)

Bron: Te Molder, PBL.

Referenties en aanvullende documenten

KWS2000, diverse jaren. Jaarverslagen van verschillende jaren t/m 2002. InfoMil, Den Haag.

Te Molder, R. Metadata gegevensbeheer emissieregistratie: beschrijving gegevens t.b.v ruimtelijke verdeling van emissies, PBL, Bilthoven, jaarlijks, intern document.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

B.2 Bestrijdingsmiddelengebruik door huishoudens

Omschrijving	Doelgroep	EO Code:	NFR Code:
NMVOS huishoudelijke bestrijdingsmiddelen	Consumenten	0802400	3D

Bijdrage aan de totale nationale emissies

De bijdrage van de emissies van NMVOS uit het gebruik van huishoudelijke bestrijdingsmiddelen is <1% van het nationale totaal van de NMVOS emissies en <1% van de doelgroep consumenten (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

Emissies uit huishoudelijke bestrijdingsmiddelen worden toegedeeld aan de doelgroep Consumenten. Het gaat hier om emissies naar lucht ten gevolge van gebruik van oplosmiddelen als hulpstof in huishoudelijke bestrijdingsmiddelen, zoals middelen tegen vliegende en kruipende insecten en bladglansmiddelen. Bij de toepassing van bestrijdingsmiddelen worden hulpstoffen gebruikt om de actieve stof in de juiste dosering te kunnen verspreiden. De hulpstoffen bestaan voor deze toepassingen voornamelijk uit drijfgassen voor spuitbussen, welke tijdens het gebruik naar lucht worden geëmitteerd.

Berekeningsmethode

Voor de monitoring van NMVOS-emissies in het KWS2000 project werden jaarlijks vier bedrijven geënquêteerd, waarmee naar verwachting het overgrote deel van de markt is gedekt (KWS2000, diverse jaren). De meest recente monotoring is van 2000. Met ingang van 2001 is deze monitoring niet meer uitgevoerd en worden de gegevens van de monitoring uit 2000 gebruikt voor de daarop volgende jaren.
De gegevens over bladglansmiddelen zijn van 1990 en 1993 en worden sindsdien constant verondersteld.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS	C	C	C

Stofprofielen

Het emissieprofiel is opgesteld door TNO gebaseerd op de samenstelling van drijfgas in spuitbussen.

Regionalisering

Regionalisatie van emissies vanuit huishoudelijke bestrijdingmiddelen geschiedt op basis van de inwonerdichtheid.

Emissiebron/proces	Allocatie-parameter	Bronhouder
NMVOS huishoudelijke bestrijdingsmiddelen	Inwonerdichtheid	Bridgris (ACN)

Bron: Te Molder, PBL

Referenties

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

KWS2000, diverse jaren. Jaarverslagen van verschillende jaren t/m 2002. InfoMil, Den Haag.

Te Molder, R. Metadata gegevensbeheer emissieregistratie: beschrijving gegevens t.b.v ruimtelijke verdeling van emissies, PBL, Bilthoven, jaarlijks, intern document.

B.3 Bestrijdingsmiddelengebruik niet landbouwkundig

Omschrijving	Doelgroep	EO Code:	NFR Code:
NMVOS niet landbouw bestrijdingsmiddelen	HDO	0812400	3D

Bijdrage aan de totale nationale emissies

De bijdrage van de emissies van NMVOS uit het gebruik van bestrijdingsmiddelen voor niet landbouwkundige toepassingen is <1% van het nationale totaal van de NMVOS emissies en <1% van de doelgroep HDO (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

In dit proces gaat het om emissies naar lucht ten gevolge van de toepassing van hulpstoffen in bestrijdingsmiddelen anders dan voor landbouwkundig gebruik. Het gaat hier voornamelijk om de professionele bestrijding van houtworm. Bij de toepassing van bestrijdingsmiddelen worden hulpstoffen bijgemengd om de actieve stof in de juiste dosering te kunnen verspreiden. Deze hulpstoffen bevatten dikwijls vluchtige stoffen (NMVOS) welke tijdens en na het gebruik naar de lucht worden geëmitteerd.

Berekeningsmethode

De NMVOS-emissie is gebaseerd op een opgave van een grote leverancier en eerdere ramingen door de Maatregelgroep Bestrijdingsmiddelen van het KWS2000 project. Met ingang van 2001 is deze grote leverancier niet meer benaderd en worden de gegevens van de monitoring uit 2000 gebruikt voor de daar opvolgende jaren.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS	C	C	C

Stofprofielen

Het emissieprofiel is gebaseerd op gegevens van de Toelatingsregistratie Bestrijdingsmiddelen (Klein, 1996).

Regionalisering

Regionalisatie van emissies vanuit huishoudelijke bestrijdingmiddelen geschiedt op basis van de inwonerdichtheid.

Emissiebron/proces	Allocatie-parameter	Bronhouder
NMVOS niet landbouw bestrijdingsmiddelen	Inwonerdichtheid	Bridgris (ACN)

Bron: Te Molder, PBL

Verbeterpunten
De meest recente monitoring dateert van 1999, het gaat echter om een zeer kleine bron.

Referenties

Klein A.E. 1996, Risico-evaluatie van hulpstoffen in niet-landbouwbestrijdingsmiddelen, TNO-rapport R 96/319.

InfoMil, KWS2000 Jaarverslagen van verschillende jaren, Den Haag.

InfoMil, oktober 1997 Herziening maatregelen Bestrijdingsstrategie Huishoudelijke, Institutionele en Industriële producten (HIIP), Den Haag.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

Te Molder, R. Metadata gegevensbeheer emissieregistratie: beschrijving gegevens t.b.v ruimtelijke verdeling van emissies, PBL, Bilthoven, jaarlijks, intern document.

B.4 Chemisch reinigen kleding en textiel

Omschrijving	Doelgroep	EO Code:	NFR Code:
Chemisch reinigen kleding/textiel	HDO	8922200	3B

Bijdrage aan de totale nationale emissies
De bijdrage van de emissie is <1% van het nationale totaal van de NMVOS emissies en ca. 2% van de doelgroep HDO (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen
Het chemisch reinigen van kleding leidt tot emissies van de gebruikte oplosmiddelen. Circa 750 kleinere bedrijven (<10 werknemers) houden zich bezig met het reinigen van kledingstukken van consumenten (stomerijen).
Bij het chemisch reinigen van kleding en textiel wordt in hoofdzaak gebruikt gemaakt van Perchloorethyleen (PER). PER wordt in de wasmachine opgewarmd tot het kookpunt waarna de PER dampen samen met zeep en eventuele aanvullende hulpmiddelen op de te reinigen kledingstukken en overig textiel wordt gebracht. Het schone deel van het dampvormige PER wordt na condensatie weer gebruikt voor de volgende wascyclus. Het residu dat resten zeep en vuil bevat wordt opgevangen in een gesloten container. Een deel van het PER verdampt gedurende de wascyclus naar de lucht en een deel komt in het afvalwater terecht.

Berekeningsmethode
De emissie werd in het verleden berekend uit het volume aan kleding (welke werd ingeschat door het instituut TNO Reinigingstechnieken) en een basis-emissiefactor van het gemiddeld PER-verlies (tetrachlooretheen) per kg gereinigde kleding. Deze factor is afkomstig uit (Verhagen, 1990).

Sinds de invoering van gesloten machines in 1980 is het PER-verlies geleidelijk afgenomen van gemiddeld 10% tot 4% in 1994. In een optimale situatie is een verlies van 2% haalbaar, maar in de praktijk zal door ouderdom van machines en de toegepaste werkwijze gemiddeld 4,2 % haalbaar zijn. Dit verlies zal gehandhaafd worden tot de invoering van nieuwe machines of alternatieve reinigingsmiddelen (bijv. oplosmiddelen op basis van paraffineachtige stoffen, iso-paraffines, n-paraffines of gedearomatiseerde paraffines).

Actualisatie vond jaarlijks plaats op basis van mededelingen over ontwikkelingen in de branche, bijgehouden door het instituut TNO Reinigingstechnieken.

Daarnaast wordt tevens een zeer geringe hoeveelheid PER naar het water geëmitteerd. Deze emissie is afkomstig van het zogenaamde contactwater. Tijdens normaal gebruik is het percentage PER dat in het contactwater terecht komt ongeveer 0,02 % van het totale gebruik aan PER. Bij de meeste chemische wasserijen wordt het contactwater opgevangen en via een actief-kool filter op de riolering geloosd. De daadwerkelijke emissie naar water is vastgesteld op 100 kg PER per jaar (in 1990) en wordt jaarlijks aangepast naar rato van de luchtemissie.

Aangezien nadien er door de NETEX geen actuele informatie is verstrekt over de hoeveelheid gereinigde kleding is door TNO-Industriële reiniging (IR) een schatting gemaakt van de jaarlijkse toe/afname.

Voor het jaar 1999 en 2000 heeft TNO-IR geen inschatting kunnen maken van het aantal kledingstukken, welke zijn gereinigd, aangezien zij zich niet meer rechtstreeks bezighouden met het particulier reinigen van kledingstukken. Met behulp van de gegevens van TNO-IR over 1998 en de omzetcijfers en de verdeling van de gebruikte reinigingsmethoden (met of zonder PER) uit het jaarverslag van 2000 van de NETEX is een koppeling gemaakt tussen deze twee informatiebronnen.
Op basis van de verhoudingen van omzet, gebruikte reinigingstechniek enerzijds en de door TNO-IR geschatte PER-emissie in 1998 anderzijds zijn de emissies voor 1999 en 2000 berekend.
Deze methode laat ondanks een stijgende omzet een daling in de PER-emissies zien, die verklaard kunnen worden door de toepassing van alternatieve reinigingstechnieken in de branche. Het is de algemene verwachting dat op termijn een verdere daling van het verbruik van PER zal plaatsvinden.

Tabel 4.2.1 Basiscijfers en berekeningsmethode Chemisch reinigen (voor het basisjaar 1994)

Verdeling PER-verlies

Compartiment	Verdeling
Lucht	80 %
Afval	20 %

Berekening PER-emissie lucht

Code	Beschrijving factoren	Factoren	Bron
A	Aantal inwoners	15.341.553	CBS
B	Artikelen per inwoner	1,6	NETEX
C	Gemiddeld artikel gewicht	0,65 kg	TNO-IR
D	PER-verlies lucht	4,2 %	TNO-IR

Emissies

Code	Compartiment	Berekening	Hoeveelheid (ton)
E	PER-lucht	A*B*C*D	670
F	PER-afval	(100/80)*20%*E	167

Maatregelen van invloed op de berekening

KWS 2000 heeft zich gericht op het terugdringen van het gebruik van oplosmiddelen. Dit heeft ertoe geleid, dat men ertoe is overgestapt om gebruik te maken van andere reinigingsmiddelen en/of technieken. Deze veranderingen komen tot uiting in de berekening. In de basisgegevens wordt een onderscheid gemaakt tussen technieken die gebruik maken van PER en andere reinigingstechnieken.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
PER	E	D	D

Regionalisering

Regionalisatie van emissies van geschiedt op basis van de locatie van de bedrijven uit de betreffende SBI <10 werknemers.

Emissiebron/proces	Allocatie-parameter	Bron gegevens
Chemisch reinigen kleding	Bedrijven < 10 werknemers SBI 93.01	LISA

Bron: Bron: Metadata gegevensbeheer Emissieregistratie 2004

Referenties

CFK-projectbureau, 1991-1995, CFK-Aktieprogramma, Jaarrapportages 1990, 1991, 1992, 1993 en 1994., Tilburg.

Verhagen, 1990, Informatiedocument halogeenkoolwaterstofhoudende afvalstoffen, VROM/DGM/A, rapportnr 738902010, november 1990, Den Haag

Berg H., van den, Mondelinge mededelingen H.van den Berg, TNO Reinigingstechnieken, Delft.

NETEX, Jaarverslagen van verschillende jaren, Ophemert.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

B.5 Industrieel reinigen van kleding en textiel

Dit document beschrijft de emissies oplosmiddelen (NMVOS: PER en TRI) die vrijkomen bij het reinigen van kleding en textiel op industriële schaal.

Omschrijving	Doelgroep	EO Code:	NFR Code:
Industrieel reinigen kleding/textiel	HDO	8922100	3B

Bijdrage aan de totale nationale emissies

De bijdrage van de emissie van NMVOS naar de lucht zijn <1% van het nationale totaal van de NMVOS emissies en ca. 3% van de doelgroep HDO (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

Het chemisch reinigen van kleding en textiel (bedrijfskleding, poetsdoeken en dergelijke) leidt tot emissies van de gebruikte oplosmiddelen (PER). Het gaat hierbij vooral om de wat grotere bedrijven (> 10 werknemers).
Bij het chemisch reinigen van kleding en textiel wordt in hoofdzaak gebruikt gemaakt van Perchloorethyleen (PER). PER wordt in de wasmachine opgewarmd tot het kookpunt waarna de PER dampen samen met zeep en eventuele aanvullende hulpmiddelen op de te reinigen kledingstukken en overig textiel wordt gebracht. Het schone deel van het dampvormige PER wordt na condensatie weer gebruikt voor de volgende wascyclus. Het residu dat resten zeep en vuil bevat wordt opgevangen in een gesloten container. Verder verdampt een deel van het PER gedurende de wascyclus naar de lucht en komt een deel in het afvalwater terecht.

Berekeningsmethode

De totale PER-emissie (van zowel particulieren als industrieel) wordt berekend op basis van de balans tussen de totale aflevering van halogeenkoolwaterstoffen aan chemische wasserijen en de totale hoeveelheid PER in het vrijkomende PER-slib dat aangeboden is als chemisch afval (Bureau melding chemische afvalstoffen) in 1991. Het verschil is geëmitteerd naar de lucht (en voor een zeer klein deel naar het water). De berekeningsmethode voor de emissie die vrijkomt bij de particuliere markt (bedrijven < 10 werknemers) is beschreven in een ander proces. Er is aangenomen dat de emissies voor de industriële markt de totale emissie is minus de emissie van de particuliere markt.

<u>PER emissie 1991:</u>
Levering van HKW’s aan chemische wasserijen: 1690 ton (VHCP).
600 ton PER-slib is aangeboden als chemisch afval (Bureau meldingen chemische afvalstoffen).
De hoeveelheid PER in het slib is ca 225 ton.

De totale emissie naar lucht is: 1690 - 225 = 1465 ton PER, waarvan 965 ton voor de particuliere markt (volgens berekening kledinggewicht en PER-gebruik, zie vorige paragraaf).
Voor 1991 is de emissie door industriële reiniging 1465 - 965 = 500 ton. Op basis van een inschatting door TNO-IR is de emissie voor 1995 op 400 ton geraamd. Voor de jaren na 1995 is de emissie constant verondersteld.

TRI emissie
De emissie van trichlooretheen is geschat door H v/d Berg van TNO-IR, waarbij is aangenomen dat de emissie sinds 1995 constant is.

Emissie naar water
Het aandeel van de stoffen dat naar water emitteert bedraagt ca 0,015 % van de luchtemissie (bron TNO-IR).

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS (PER/TRI)	E	E	E

Regionalisering

Regionalisatie van emissies van geschiedt op basis van locaties van bedrijven met meer dan 10 werknemers in de betreffende SBI, waarbij rekening wordt gehouden met de bedrijfsgrootte a.d.h.v. het aantal werknemers.

Emissiebron/proces	Allocatie-parameter	Bron gegevens
Industrieel reinigen kleding en textiel	Locatie bedrijven SBI 93.01 > 10 werknemers	LISA

Bron: Metadata gegevensbeheer Emissieregistratie 2004

Verbeterpunten

De gegevens waarop de emissies gebaseerd zijn, zijn gedateerd. Nieuwe monitoringgegevens van het gebruik van oplosmiddelen (o.a. PER en TRI) in de chemische wasserijen en/of andere basisgegevens in deze sector zouden de huidige emissieschatting kunnen verbeteren.

Referenties

CFK-projectbureau, 1991-1995, CFK-Aktieprogramma, Jaarrapportages 1990, 1991, 1992, 1993 en 1994., Tilburg.

Berg H., van den, Mondelinge mededelingen H.van den Berg, TNO Reinigingstechnieken, Delft.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

B.6 Ontsmetten transporten

Omschrijving	Doelgroep	EO Code:	NFR Code:
Ontsmetten transporten	HDO	E800000	3D

Bijdrage aan de totale nationale emissies

De bijdrage van de emissie is ca 50% van het nationale totaal en 100% van de doelgroep HDO (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

Containers en bulkladingen in schepen worden in het buitenland vaak behandeld tegen schadelijke insecten in verband met importbepalingen die eisen stellen aan het ontsmetten van handelswaren. Voor de Nederlandse markt gaat het hierbij vooral om de ladingen met cacao, rijst, granen, diervoeders, grondnoten en boekweit. Voor het ontsmetten van de waren wordt in de meeste gevallen gebruik gemaakt van bestrijdingsmiddelen die behoren tot de groep van middelen die fosforwaterstoffen ontwikkelen, zoals methylbromide of formaldehyde. Deze middelen worden in vorm van tabletten of plates in de lading aangebracht en onder invloed van de luchtvochtigheid en zuurstof wordt dan het zeer giftige gas waterstoffosfide dan wel methylbromide gevormd. De vrijgekomen gassen worden naar het compartiment lucht geëmitteerd.

Berekeningsmethode

Er zijn drie vormen van gassingen te onderscheiden, ten eerste import gassingen waarbij buitenlandse gegaste goederen Nederlandse havens inkomen, export gassingen waarbij goederen die Nederlandse havens verlaten gegast moeten worden volgens de importbepalingen van het onvangende land en als laatste de voorraad gassingen waarbij gebouwen of silo's met voorraden worden gegast.

<u>Import gassingen</u>
Bulkladingen in schepen die in het buitenland gegast zijn (behandeld met een chemisch bestrijdingsmiddel) en een Nederlandse haven aan doen, dienen dit te melden op grond van diverse havenverordeningen. De havenautoriteiten melden dit vervolgens aan de Inspectie Milieuhygiëne (IMH) die toeziet op de veilige ontgassing van de lading. Voor containers geldt deze verplichting niet. De Inspectie Milieuhygiëne heeft derhalve met betrekking tot bulkladingen een vrij compleet beeld van de aard en de hoeveelheid gassen die via import gassingen in Nederland naar de lucht emitteren (vrij compleet omdat niet te controleren is of alle import gassingen ook netjes aangemeld worden). Voor containers is dit beeld niet duidelijk aangezien hiervoor geen meldingsplicht bestaat, de IMH vermoed op basis van tot nu bekende gegevens dat het om enkele duizenden container op jaarbasis gaat.

<u>Export gassingen</u>
Op grond van deRegeling melding fosforwaterstof en methylbromide moeten uit te voeren gassingen worden gemeld aan de Arbeidsinspectie binnen wiens regio het middel wordt toegepast, die de melding vervolgens doorgeeft aan de IMH waar de betreffende gegevens worden geregistreerd. De IMH voert daarop controles uit op onder andere de gasdichtheid van te gassen ladingen, de noodzaak van gassing en mogelijke alternatieve wijze(n) van gassen.

Voorraad gassingen
Op grond van deRegeling melding fosforwaterstof en methylbromide moeten uit te voeren gassingen worden gemeld aan de Arbeidsinspectie binnen wiens regio het middel wordt toegepast. De betreffende Arbeidsinspectie geeft de melding vervolgens door aan de IMH waar de betreffende gegevens worden geregistreerd. De IMH voert daarop controles uit op onder andere de gasdichtheid van te gassen ladingen, de noodzaak van gassing en mogelijke alternatieve wijze(n) van gassen. De meeste gassingen vinden plaats ter bestrijding van insekten. De gassingen met methylbromide vinden in ongeveer 30 gemeenten op verschillende locaties plaats.
Samenvattend kan worden vermeld dat de emissies gelijk worden gesteld aan de jaarlijkse gebruikscijfers afkomstig van de VROM inspectie.

Daarnaast worden door KPMG cijfers vergaard in het kader van het CFK actieprogramma. Deze cijfers zijn gebaseerd op de boekhouding van bedrijven. Deze cijfers liggen hoger dan de cijfers van de inspectie. De verklaring van dit verschil tussen het opgegeven jaargebruik van methylbromide door KPMG en het geregistreerde gebruik bij de VROM inspectie is gelegen in de wijze waarop de VROM Inspectie te werk gaat en de gebruikte hoeveelheden die worden geregistreerd. Bij de VROM Inspectie moet namelijk vooraf worden opgegeven wanneer en hoeveel methylbromide het betreffende bedrijf voor het gassen denkt te gebruiken (afhankelijk van onder andere de goederen en het soort opslag). Bij de daadwerkelijke gassing kan het voorgenomen gebruik afwijken van het verwachte gebruik door bijvoorbeeld afwijkende weersomstandigheden. Het werkelijke gebruik moet dan eveneens worden opgeven aan de VROM Inspectie. Regelmatig gebeurd dit onvolledig of helemaal niet, daarnaast worden ook regelmatig gassingen niet aangemeld of op een dergelijk laat tijdstip dat het voor de VROM Inspectie vrijwel onmogelijk is om controle uit te oefenen (98% van de gevallen in het jaar 2000). KPMG voert enquêtes uit en controleert steekproefsgewijs de boekhouding (inkoop) van de betreffende bedrijven en bepaalt aan de hand van deze gegevens het gebruik.

Het gebruik volgens de jaarreeks van KPMG is absoluut gezien beduidend hoger en het verschil neemt de laatste jaren procentueel toe.Oorzaken zijn eerder genoemde oorzaken als illegaal gebruik, geen correctie opgave achteraf, maar ook verminderde controle door Handhaving, voorraadvorming enz. In de ER wordt vooralsnog uitgegaan van de cijfers van de VROM inspectie.

De afgelopen jaren is het steeds lastiger gebleken nieuwe cijfers van de VROM inspectie te ontvangen, hierdoor heeft de afgelopen jaren geen update van de emissies plaatsgevonden.

Maatregelen van invloed op de berekening

De productie en de consumptie van Methylbromide wordt onder het Montreal protocol uitgefaseerd. Ontgassingen van lading zijn op dit moment nog uitgezonderd van het beleid, omdat er nog geen geschikte alternatieven beschikbaar zijn.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
Methylbromide	E	B	C

Regionalisering

Regionalisatie van emissies van geschiedt op basis van de exacte locaties waar de gassingen plaatsvinden (op basis van de meldingen).

Emissiebron/proces	Allocatie-parameter	Bron gegevens
Ontsmetten transporten	Locatie begassingen	VROM Inspectie

Bron: Te Molder, PBL

Referenties

Inspectie Milieuhygiëne, afdeling Bestrijding van Dierplagen, Schriftelijke mededelingen, Wageningen.

Gasvrij, Handhaving van de bestrijdingsmiddelenwet door de Inspectie Milieuhygiëne ten aanzien van het gassen met methylbromide en fosforwaterstof in 1999 en 2000;

Ministerie van VROM, Inspectie Milieuhygiëne; februari 2001.
Mondelinge mededelingen door VROM-inspectie regio zuid-west.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

B.7 Roken van rookwaren

Omschrijving	Doelgroep	EO Code:	NFR Code:
Roken van sigaren	Consumenten	0801001	3D
Roken van sigaretten	Consumenten	0801002	3D

Bijdrage aan de totale nationale emissies

De bijdrage van de emissies rookwaren zijn ca 3% van het nationale totaal aan fijn stof en ca. 43 % van de doelgroep Consumenten (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen

Bij het roken ontstaan emissies naar de lucht. Het gaat om de emissies van fijn stof, koolstofmono en dioxide en koolwaterstoffen.

Berekeningsmethode

Op basis van onderzoek dat voornamelijk is uitgevoerd met het oog op de volksgezondheid is een berekening gemaakt van de emissies die vrijkomen als gevolg van het roken.
De emissiefactoren zijn gebaseerd op WESP-rapport “Roken van tabaksproducten” (Brouwer et al, 1994). Voor sigaren is tevens gebruik gemaakt van een Amerikaans onderzoeksrapport uitgebracht door het “National Cancer Institute”. De emissiefactoren worden vermenigvuldigd met de consumptie van rookwaar.

De emissies worden jaarlijks geactualiseerd met behulp van het aantal verkochte sigaretten en shag en sigaren van het CBS. De gegevens worden door de Stichting Volksgezondheid en Roken (Defacto Rookvrij, voor 1 augustus STIVORO) omgerekend naar het aantal gerookte sigaretten per inwoner. De CBS gegevens worden berekend uit de opbrengsten van accijnzen ontleend aan de door het ministerie van Financiën aan de fabrikanten en importeurs van tabaksproducten afgeleverde bandenrollen. De uitkomsten kunnen door deze werkwijze enigszins afwijken van de werkelijke consumptie als gevolg van voorraadvorming en taxfree leveringen. Daarnaast kan illegale import een vertekening geven.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS	A	C	C

Regionalisering

Regionalisatie van emissies van geschiedt op basis van bevolkingsdichtheid.

Emissiebron/proces	Allocatie-parameter	Bronhouder
Roken	Inwonerdichtheid	Bridgris (ACN)

Bron: Te Molder, PBL

Referenties

Brouwer J.G.H., J.H.J. Hulskotte, H. Booij, 1994, Roken van tabaksproducten, WESP Rapportnr. C4, RIVM-rapportnr. 773009006.

CBS Statistisch jaarboek verschillende jaren, Centraal Bureau voor de Statistiek, Voorburg/Heerlen.

Defacto/stivoro ,Stichting Volksgezondheid en Roken, Jaarverslagen verschillende jaren.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

B.8 Schoonmaakmiddelen

Dit document beschrijft de emissies van.

Procesomschrijving	RAP	Doelgroep	SBI	SNAP	NOSE
Schoonmaakmiddelen	0803000	CON			
Schoonmaakmiddelen	0803001	HDO			

Bijdrage aan de totale nationale emissies
De bijdrage van de emissies zijn ca 3% van het nationale totaal van de NMVOS emissie (MNP, 2005).

Algemeen
In schoonmaakmiddelen worden VOS toegepast, met name vanwege de vetoplossende capaciteiten ervan. Het grootste deel van deze VOS komt tijdens of na gebruik vrij in de lucht.

Relevante productgroepen zijn Spiritus,Vlekkenmiddel, Ruitenreiniger, Handenreiniger, Luchtverfrisser, Tapijtreiniger en Wasbenzine.
Een deel van de spiritus (26%) wordt als brandstof gebruikt (bijvoorbeeld bij barbecue en fondue). Aangenomen is dat hierbij geen VOS emissies optreden.
Ook medische handdesinfectanten zijn onder schoonmaakmiddelen verdisconteerd (doelgroep HDO).
Daarnaast valt ammonium onder de schoonmaakmiddelen (in de regel geëtiketteerd als ammonia). Tijdens gebruik kan de hierin opgeloste ammoniak emitteren naar de lucht.

Terpentine wordt ook wel als reinigingsmiddel ingezet. De emissie door dit product is echter reeds onder het proces ‘gebruik van verfproducten’ verdisconteerd.

Het betreft middelen die worden gebruikt door consumenten, institutionele gebruikers en schoonmaakbedrijven. Industriele reinigingsmiddelen vallen onder de werkingssfeer van de taakgroep ENINA.
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Berekeningsmethode
De VOS-emissies zijn berekend aan de hand van monitoringgegevens afkomstig van Motivaction . In dit onderzoek zijn tevens emissiefactoren bepaald voor VOS in reinigingsmiddelen die in water worden opgelost, en ten dele na gebruik via het riool worden afgevoerd, alwaar er afbraak plaatsvindt van de VOS. Voor spiritus is berekend dat in totaal 38% van de VOS in het product in de lucht terecht komt. De rest wordt afgebroken in de RWZI of verbrand (barbecue en fondue). Voor handenreinigers is het aandeel dat in de lucht tercht komt op 50% geschat. Voor de overige producten is uitgegaan van 100% emissie van de VOS naar de lucht. De emissies voor 1995 zijn berekend met behulp van de CBS index voor de groei van de woningvoorraad t.o.v 1994 (1994=1).
Over 1996 t/m nu heeft jaarlijks marktmonitoring plaatsgevonden door de branchevereniging NVZ (Nederlandse Vereniging van Zeepfabrikanten) m.b.v. een enquete onder hun leden.

Vanuit de totale VOS-emissies zijn, via een VOS-profiel, de emissies van de individuele stoffen bepaald. Dit profiel is in 1992 opgesteld door TNO in overleg met. de branche-organisatie NVZ.

Binnen de productgroep schoonmaakmiddelen vormt wasbenzine een probleem: dit product wordt ook via andere kanalen verkocht (bijvoorbeeld bouwmarkten), waardoor de geschatte dekking in het door Motivaction uitgevoerde monitoringonderzoek uit 1996 zeer laag is, en de geschatte emissie een zeer grote bandbreedte bezit. De emissie uit wasbenzine is door InfoMil geraamd op 1,5 kton. In 1999 is uit onderzoek door ACNielsen iov Infomil gebleken dat de emissie uit wasbenzine 0,65 kt bedraagt. Dit cijfers is van 1998 tot heden gehanteerd.

Ammonia wordt ook tot de schoonmaakmiddelen gerekend. Op basis van de aanname dat elk huishouden jaarlijks 1 liter ammonia gebruikt is de emissie van ammoniak voor 1990 op 1000 ton geschat (RIVM, 1994). Voor de jaren daarna is dit getal steeds gecorrigeerd m.b.v. de CBS woninggroei-index.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS			C

Regionalisering

Regionalisatie van emissies van geschiedt op basis van bevolkingsdichtheid.

Referenties

Ref.	Titel
Motivaction, 1996	Emissies van VOS door het gebruik van reinigingsmiddelen – Nulmetingsonderzoek i.o.v. het Ministerie van VROM,
RIVM, 1994	Berekeningsmethodiek ammoniakemissie in Nederland voor de jaren 1990, 1991 en 1992, RIVM rapport nr 773004003

B.9 Tankautoreiniging

Dit document beschrijft de emissies van.

Procesomschrijving	RAP	Doelgroep	SBI
Reinigen van tankauto's	0811212	HDO	

Bijdrage aan de totale nationale emissies
De bijdrage van de emissie is < 1% van het nationale totaal van de NMVOS emissie (MNP, 2005).

Algemeen
Onder dit proces wordt verstaan het reinigen van tankauto's bij speciale reinigingsbedrijven (een 20-tal bedrijven, aangesloten bij de ATCN). De te reinigen tankauto's hebben sterk varierende ladingen gehad, zoals sinaasappelsap, krijtpoeder, formaldehyde, glycol, fosforzuur, natronloog, kerosine, wijn, etc. In veel gevallen bevat de tank nog damp of restlading met vluchtige stoffen. Deze komen vrij tijdens het schoonmaken. In 1999 was dit bij 41.000 tankauto's het geval.

Berekeningsmethode
De emissies zijn in 1999 gemeten door TNO en gerapporteerd in 2000.
De emissies voor de alle jaren na 1995 zijn hieraan gelijkgesteld.
Voor vroegere jaren is uitgegaan van eerdere (hogere) schattingen door de branche en het projectbureau KWS-2000.
Er is in 2000 overleg geweest met de branche over te nemen maatregelen. Dit heeft er toe geleid dat een aantal maatregelen in 2001 in de NeR zijn opgenomen.
Onbekend is in hoeverre deze maatregelen zijn geïmplementeerd. In 2005 is hierover een brief naar de ATCN gestuurd, zonder reactie. Vooralsnog zijn de emissies constant verondersteld.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS			C

Regionalisering
Regionalisatie van emissies van geschiedt op basis van bevolkingsdichtheid

Referenties

- KWS 2000 eindrapportage, Infomil, Den Haag
- Vervolgonderzoek naar emissies van VOS bij tankautoreiniging in Nederland, sept 2000, TNO-MEP r2000/280, Apeldoorn

B.10 Transpiratie en ademen

Dit document beschrijft de emissies van.

Omschrijving	Doelgroep	EO Code:	NFR Code:
Transpiratie en ademen	Consumenten	0801600	7

Bijdrage aan de totale nationale emissies
De bijdrage van de emissies zijn <1% van het nationale totaal van de ammoniak emissies (ER, 2007). Emissiecijfers zijn beschikbaar via www.emissieregistratie.nl.

Algemeen
Via transpiratie en ademhaling van mensen komen er beperkte hoeveelheden ammoniak vrij.

Berekeningsmethode
Ammoniakemissies uit huishoudens staan vermeld in het rapport "Berekeningsmethodiek ammoniakemissie in Nederland voor de jaren 1990, 1991, 1992" (van der Hoek, 1994). Hierin zijn de ammoniakemissies vermeld die vrijkomen via transpiratie en ademen door mensen (0,3 kg NH_3 per inwoner per jaar) . De emissies worden jaarlijks geactualiseerd met het aantal inwoners (CBS). De gegevens in het RIVM-rapport zijn gebaseerd op 1992.

Emissies door transpiratie en ademen worden berekend door het aantal inwoners te vermenigvuldigen met een emissiefactor van 0.3 kg NH_3/persoon (van der Hoek e.a., 1994). Er zijn later nog diverse onderzoeken uitgevoerd naar emissiefactoren door transpiratie en ademen:
Sutton e.a. (2000) refereert aan enkele literatuurbronnen waar een emissiefactor van 0.26 kg NH_3/ persoon voor zweten wordt genoemd. Emissies door ademen zijn lager. Samen is dit vergelijkbaar met de emissiefactor van 0.3 kg NH_3/persoon. Sutton e.a. (2000) verwacht echter dat niet alle ammoniak zal verdampen. Uiteindelijk wordt hierin een emissiefactor van 0.014 kg NH_3/persoon door transpiratie en een emissiefactor van 0.003 kg NH_3/persoon voor ademen berekend. Samen levert dit een emissiefactor van 0.017 kg NH_3/persoon op.
Sarwar, e.a. (2005) heeft onderzoek gedaan naar ammoniak emissies in Texas. Hij komt uit op een emissiefactor van 0.44 kg NH_3/persoon. Deze emissiefactor is gebaseerd op literatuuronderzoek.
De huidige emissiefactor van 0.3 kg NH_3/persoon ligt hier tussen en wordt gebruikt voor de schatting van deze emissies.

Kwaliteitsindicatie

Stof	Activiteitendata	Emissiefactoren	Emissie
NMVOS	A	C	C

Regionalisering
Regionalisatie van emissies geschiedt op basis van bevolkingsdichtheid.

Referenties
Hoek, K.W. van der, 1994, Berekeningsmethodiek ammoniakemissie in Nederland voor de jaren 1990, 1991 en 1992, RIVM-rapportnr. 773004003.
CBS, Bevolking der gemeenten van Nederland op 1 januari van verschillende jaren, Centraal Bureau voor de Statistiek, Voorburg/Heerlen.

ER, 2007. Emissieregistratie, cijfers 2007. Beschikbaar via www.emissieregistratie.nl

Sutton, M.A., Dragosits, U., Tang, Y.S. en Fowler, D., 2000. Ammonia emission from non-agricultural sources in the UK. Atmospheric Environment 34, 855-869

Sarwar, G., Corsi, R.L., Kinney, K.A., Banks, J.A., Torres, V.M. en Schmidt, C., 2005. Measurements of ammonia emissions from oak and pine forests and development of a non-industrial ammonia emissions inventory in texas. Atmospheric Environment 39, 7137-7153.

B.11 Huisdieren Mest

Procesomschrijving	Rapcode	Doelgroep	SNAP
Huisdieren mest	0802007	Consumenten	110702

Nadere omschrijving emissieoorzaak(en)
Het gaat hierbij om de uitwerpselen van gezelschapsdieren, waaruit ammoniak vervluchtigt. Gezelschapsdieren zijn gedefinieerd als huisdieren die niet voor productiedoeleinden worden gehouden. Het betreft alle soorten huisdieren met uitzondering van paarden, pony's en geiten.

Toelichting doelgroepindeling
De emissies als gevolg van gezelschapsdieren worden volledig toegerekend aan de doelgroep Consumenten.

Beschrijving emissie-model (berekeningswijze)
De ammoniak emissies zijn gebaseerd op het WESP-rapport "Gezelschapsdieren" (Booij, 1995). Om de emissies jaarlijks te kunnen actualiseren zijn de in dit rapport berekende emissies voor het basisjaar 1991 gedeeld door het aantal woningen in dat jaar (5.965.850, op basis van CBS statistieken). Op deze wijze is er een emissiefactor per woning ontstaan, die voor actualisering van de emissies te gebruiken is.

De aantallen gezelschapsdieren in 1991 zijn geschat op basis van enquêtes van de brancheorganisatie Dieren Benodigdheden Voerders (DIBEVO). De hoeveelheden geproduceerde mest door gezelschapsdieren zijn niet bekend en zijn berekend op basis van gegevens uit de landbouw.

Soort	**Aantal (1991)**	**NH_3 emissie (1991) [miljoen kg]**
Honden	1.350.000	0,48
Katten	2.000.000	0,36
Vogels	9.350.000	0,17
- Post- en sierduiven	5.000.000	0,18
Konijnen	750.000	0,03
Overige knaagdieren	250.000	?
Vissen	5.600.000	?
Reptielen/amfibieën	200.000	?

Referenties bij emissieberekening

- Booij H., 1995, Gezelschapsdieren, WESP-rapport C6, RIVM-rapport 772414003.
- CBS, Statistisch jaarboek van verschillende jaren, Centraal Bureau voor de Statistiek, Voorburg/Heerlen.

Methodiek van regionalisatie
Regionalisatie van de emissies als gevolg van gezelschapsdieren geschiedt aan de hand van de bevolkingsdichtheid.

B.12 Diffusie uit isolatieschuim van koelkasten en diepvriezers

Procesomschrijving	Rapcode	Doelgroep	SBI	SNAP
Diffusie isolatieschuim Koelkast/diepvriezer	0890407	Consumenten		060504
Diffusie isolatieschuim Koelkast/diepvriezer	0890409	Afvalverwijderingsbedrijven		060504

Nadere omschrijving emissieoorzaak(en)
Tijdens de gebruikfase en bij de verwerking van koelkasten die in het afvalstadium terechtkomen, kunnen er CFK's uit zowel het koelsysteem, als uit het isolatieschuim vrijkomen en naar lucht worden geëmitteerd. In onderhavige Meta-datasheet wordt de emissie van CFK11 naar lucht uit het isolatieschuim tijdens het gebruik en bij de verwerking in het afvalstadium beschreven.

Toelichting doelgroepindeling
De emissies als gevolg van diffusie vanuit isolatieschuim van koelapparatuur tijdens de gebruiksfase en de verwerkingsfase in het afvalstadium worden in de verhouding 50/50 toegedeeld aan de doelgroepen Consumenten respectievelijk Afvalverwijdering.

Beschrijving emissie-model (berekeningswijze)
Om de emissies jaarlijks te kunnen actualiseren is de in het WESP rapport "Verwerking afgedankte koelapparatuur"(Brouwer et al., 1995) berekende emissie voor het basisjaar 1992 gedeeld door het aantal koelkasten dat in dat jaar in het afvalstadium terecht is gekomen. Op deze wijze is een emissiefactor per afgedankte koelkast ontstaan, die voor de jaarlijkse actualisering van de emissies gebruikt wordt. Sinds 1995 is de situatie bij de afvalverwerkers geoptimaliseerd. Het aantal koelkasten waarvan jaarlijks het koelsysteem (CFK12) wordt afgetapt is constant verondersteld. Voor het verwerken van isolatieschuim (met CFK11) is die situatie pas later ontstaan. Vanaf 1994 worden jaarlijks circa 35.000 koelkasten vervangen door CFK-vrije koelkasten, waardoor de diffuse emissie van CFK11 uit schuim van koelapparatuur vermindert. Door de combinatie van de toename van de hoeveelheid isolatiemateriaal waaruit het blaasmiddel wordt teruggewonnen en de vervanging van oude koelkasten door nieuwe koelkasten met CFK vrij isolatieschuim wordt er ieder jaar minder CFK11 naar lucht geëmitteerd. De oorspronkelijke gegevens in het WESP-H2-rapport zijn gebaseerd op het jaar 1992.

Referenties bij emissieberekening

- Brouwer J.G.H., J.H.J. Hulskotte, A.H.H. Hanemaayer, 1995, Verwerking afgedankte koelapparatuur, WESP-rapport H-2, RIVM-rapport 772414004, Bilthoven.
- CFK-projectbureau. 1991-1995, CFK-Aktieprogramma, Jaarrapportage 1990, 1991, 1992, 1993 en 1994., Tilburg.

Methodiek van regionalisatie
Regionalisatie van de emissies als diffusie vanuit isolatieschuim van koelapparatuur geschiedt door middel van de inwonerdichtheid.

B.13 Dewaxen van nieuwe auto's

Procesomschrijving	Rapcode	Doelgroep	SBI	SNAP
Reinigen van nieuwe auto 's - processen	1800112	HDO		060409
Reinigen van nieuwe auto 's - water	1800112	HDO		
Reinigen van nieuwe auto 's - water	1800112	HDO		

Nadere omschrijving emissieoorzaak(en)
Het gaat hier om emissies naar water en lucht als gevolg van het verwijderen van een beschermende paraffinelaag van nieuwe auto's. Het aantal nieuwe auto's dat voor het transport vanaf de fabrikant naar de garage van een paraffine beschermlaag (waslaag) wordt voorzien is de afgelopen jaren sterk gedaald, doordat steeds meer gebruik wordt gemaakt van wateroplosbare copolymeer beschermlagen of van plastic folie . De auto's die nog wel voorzien zijn van een paraffine beschermlaag worden meestal centraal gereinigd ("gedeconserveerd"). Hierbij komen volgens TNO-MEP geen noemenswaardige emissies naar de lucht vrij, vanwege de nageschakelde zuiveringen. Van één automobielmerk worden de auto's nog decentraal gedeconserveerd (bij de dealer). Hierbij treden VOS emissies naar de lucht op. De verwachting is dat door steeds strengere vergunningseisen deze emissies bij dealers in de toekomst verder zullen afnemen (CREM, 1998).
Sinds 1999 is het bewuste automobielmerk gestopt met het decentraal deconserveren van nieuwe auto's. Dit betekent dat alle nieuwe auto's met een paraffine beschermlaag alleen nog maar centraal worden gedeconserveerd en dat er geen noemenswaardige emissies naar lucht vrijkomen tengevolge van deconserveer activiteiten. Deze Meta-data informatie sheet is derhalve met ingang van 1999 overbodig, maar is nog wel opgenomen in het bestand in verband met de verantwoording van de data van voor 1999.

Toelichting doelgroepindeling
De emissies als gevolg van reiniging van nieuwe auto's wordt volledig toegerekend aan de doelgroep Handel, Diensten en Overheid (HDO).
Beschrijving emissie-model (berekeningswijze)
De totale VOS-emissie wordt jaarlijks door InfoMil vastgesteld op basis van het aantal geimporteerde auto's van het betreffende merk dat decentraal gedeconserveerd wordt. Berekening van VOS-emissies vindt plaats op basis van dit aantal auto's en de hoeveelheid oplosmiddel die per auto benodigd is. Deze hoeveelheid (emissiefactor) is door TNO opgesteld en heeft als basisjaar 1992. Het emissieprofiel is opgesteld door TNO. Er is aangenomen dat de oplosmiddelen bestaan uit aromaatvrije koolwaterstoffen . Wateremissies zijn berekend door TNO op basis van opgaven van een grote importeur.
De emissies worden toegedeeld aan het compartimenten lucht en water.

Referenties bij emissieberekening

- InfoMil, KWS2000 Jaarverslagen verschillende jaren, Den Haag.
- CREM, november 1998, (i.o.v. InfoMil), Monitoring VOS-emissie van 9 sectoren 1997, Amsterdam (niet openbaar).

Methodiek van regionalisatie
Regionalisatie van emissies als gevolg van het (decentraal) reinigen van nieuwe auto's geschiedt op basis van de bevolkingsdichtheid.