

Annex 1: documents, data tables and figures referred to from the text

Annex 1.1: Documents

2023 Update:



BEP4CAL_Final
Report.zip

Annex 1.2: Tables

Table 13 Total fluoride emissions in Belgium (2017), source: <https://prtr.eea.europa.eu/#/pollutantreleases>

Transfers per country	Facilities	Facilities (Accidental)	Air	Air (Accidental)	Water	Water (Accidental)	Soil	Soil (Accidental)
Belgium	26	26	-	-	1184670	-	-	-
Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest	1	1	-	-	18300	-	-	-
Liège	2	2	-	-	919650	-	-	-
Hainaut	5	5	-	-	18750	-	-	-
Antwerpen	12	12	-	-	165340	-	-	-

Limburg	4	4	-	-	22570	-	-	-
East Flanders	2	2	-	-	40060	-	-	-
Total	26	0	0	0	1185 t	0		0

Table 14 Total fluoride emissions in Belgium per sector (2017), source: <https://prtr.eea.europa.eu/#/pollutantreleases>

Transfer per industrial activities	Facilities	Facilities (Accidental)	Air	Air (Accidental)	Water (kg)	Water (Accidental)	Soil	Soil (Accidental)
1 Energy sector	2	2	-	-	10350	-	-	-
1.(a) Mineral oil and gas refineries	2	2	-	-	10350	-	-	-
2 Production and processing of metals	5	5	-	-	59270	-	-	-
2.(e) Production of non-ferrous crude metals from ore,	3	3	-	-	18240	-	-	-

concentrates or secondary raw materials								
2.(b) Production of pig iron or steel including continuous casting	2	2	-	-	41030	-	-	-
4 Chemical industry	12	12	-	-	1068580	-	-	-
4.(b) Industrial scale production of basic inorganic chemicals	3	3	-	-	931350	-	-	-
4.(b) Industrial scale production of basic inorganic chemicals	2	2	-	-	19350	-	-	-
4.(b) Industrial scale production of basic inorganic chemicals	1	1	-	-	912000	-	-	-
4.(a) Industrial scale production of basic organic chemicals	8	8	-	-	134520	-	-	-

4.(a) Industrial scale production of basic organic chemicals	7	7	-	-	130690	-	-	-
4.(a) Industrial scale production of basic organic chemicals	1	1	-	-	3830	-	-	-
4.(c) Industrial scale production of phosphorous, nitrogen or potassium based fertilizers	1	1	-	-	2710	-	-	-
5 Waste and waste water management	6	6	-	-	40980	-	-	-
5.(f) Urban waste-water treatment plants	5	5	-	-	38160	-	-	-
5.(a) Disposal or recovery of hazardous waste	1	1	-	-	2820	-	-	-
6 Paper and wood production processing	1	1	-	-	5490	-	-	-

6.(b) Production of paper and board and other primary wood products	1	1	-	-	5490	-	-	-
Total (ton)	26	0	0	0	1185 t	0	0	0

Table 15: Range, median and mean for each analyte in pg g⁻¹ ww: detection frequency (%) for the food categories and total, for the individual countries. Median and means are calculated using the positive detects only. Source: D'Hollander et al. (2015).

Table 2

Range, median, and mean for each analyte in pg g⁻¹ ww; detection frequencies (%) for the food categories (fruit, other food groups (other FG i.e. cereals, sweets and salt) and total; and the detection frequencies (%) for the individual countries (the Czech Republic, Italy, Norway and Belgium). Median and means are calculated using the positive detects only.

Analyte	PFAA concentration (pg g ⁻¹ ww)			Detection frequency (%)						
	Min-max	Median	Mean	Fruit	Other FG	Total	Czech Republic	Italy	Norway	Belgium
PFHxA	<LOQ-171	18.4	44.5	33	5	20	15	15	30	23
PFHpA	<LOQ-183	/	/	0	5	2	0	0	0	0
PFOA	<LOQ-149	7	16.3	63	32	49	38	38	50	69
PFNA	<LOQ-205	8.44	28.3	37	0	20	15	31	20	15
PFDA	<LOQ-24.2	8.19	11.4	4	27	14	23	0	20	15
PFUnDA	<LOQ			0	0	0	0	0	0	0
PFDoDA	<LOQ-2	/	/	4	0	2	0	0	0	8
PFTTrDA	<LOQ			0	0	0	0		0	0
PFTeDA	<LOQ-7	/	/	4	0	2	0	0	0	8
PFBS	<LOQ-67	4	19.7	19	9	14	8	23	10	15
PFHxS	<LOQ-197	16	54.5	26	0	14	0	23	20	15
Lin-PFOS	<LOQ-482	16.5	91.4	48	5	29	23	23	30	38
br-PFOS	<LOQ-56	3	15	22	0	12	15	0	10	23
Tot-PFOS	<LOQ-539	16.5	97.9	48	5	29	23	23	30	38
PFDS	<LOQ-15.7	/	/	0	5	2	0	0	0	8
∑PFCAs	<LOQ-517	10.6	43.5	74	55	65	62	62	60	70
∑PFSAAs	<LOQ-573	27.5	112	48	18	35	31	31	30	46
∑PFAAs	<LOQ-1090	12.6	99.9	78	55	67	69	62	60	77

/: The compound was only detected in one sample so no median or mean could be calculated.

Table 16: (please see the excel file “List_substances_ShortChainPFASs.xlsx” below) The first sheet gives an overview of recently available information on short-chain PFASs from all over the world, regarding human biomonitoring (concentrations in blood, urine, tissues, ...) and ecological monitoring (concentrations in air, groundwater, drinking water, soil, ...). Information in the table is preceded by a number which refers to the scientific paper in which the information can be found. The numbers corresponding to the scientific papers can be seen in the second sheet. This table is updated each year with the most recent scientific papers, and is thus constantly adapted and following the newest information.

Please save this ‘scPFAS_CCIEP_report’ first on your computer in order to be able to open the link below.



List_substances_Short
ChainPFASs.xlsx

Table 17: List of fluorinated compounds from the EU regulation 10/2011 from 14 January 2014 regarding materials and products in plastic

Substance name (Dutch)	CAS number
1,1-difluorethaan	0000075-37-6
Vinylideenfluoride	0000075-38-7
Chloordifluormethaan	0000075-45-6
Chloortrifluorethyleen	0000079-38-9
Tetrafluoretheen	0000116-14-3
Hexafluorpropeen	0000116-15-4
4,4'-difluorbenzofenon	0000345-92-6
perfluormethyl-perfluorvinylether	0001187-93-5
perfluorpropyl-perfluorvinylether	0001623-05-8
ammoniumperfluorooctanoaat	0003825-26-1
magnesiumnatriumfluoridesilicaat	0037296-97-2
2,2'-ethylideenbis(4,6-di-tertbutylfenyl) fluorfosfoniet	0118337-09-0
9,9-bis(methoxymethyl)fluoreen	0182121-12-6
perfluorazijnzuur, α -gesubstitueerd met het copolymeer van perfluor-1,2- propyleenglycol en perfluoro-1,1- ethyleenglycol, getermineerd met chloorhexafluorpropyloxygroepen	0329238-24-6
perfluor[2-(poly(npropoxy))propaanzuur]	0051798-33-5
perfluor[2-(n-propoxy)propaanzuur]	0013252-13-6
3H-perfluor-3-[(3-methoxypropoxy) propaanzuur], ammoniumzout	0958445-44-8
2H-perfluoro- [(5,8,11,14-tetramethyl)-tetraethyleenglycol ethyl propyl ether]	37486-69-4
perfluor[2-ethyloxy-ethoxy]azijnzuur], ammoniumzout	0908020-52-0
(perfluorbutyl)ethyleen	0019430-93-4

Table 18: Non-exhaustive list of active substances following current PFAS definition authorized as plant protection products at ECHA

Substance name	EC / List no	CAS no	CLH status	Classification proposed	adopted or	Submitter	Regulatory Program
Triflumoron/ tritosulfuron (ISO) (containing ≤ 0,02 % 2-amino-4-methoxy-6-(trifluormethyl)-1,3,5-triazine); 1-[4-methoxy-6-(trifluoromethyl)-1,3,5-triazin-2-yl]-3-[2-(trifluoromethyl)benzenesulfonyl]urea (containing ≤ 0,02 % 2-amino-4-methoxy-6-(trifluormethyl)-1,3,5-triazine)	604-291-0	142469-14-5	Withdrawn	Skin Sens. 1B, H317 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10		Slovenia	Active substance in biocidal and plant protection products
indoxacarb (ISO); methyl (4aS)-7-chloro-2-{{(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]carbamoyl}-2,5-dihydroindeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylate	605-683-4	173584-44-6	Adopted	Acute tox 3 H301 Acute tox 4 H332 Skin Sens 1 H317 STOT RE 1 H372 Aquatic Acute 1 H400 Aquatic Chronic 1 H410 M-factor: 1		United Kingdom	Active substance in biocidal and plant protection products
isoxaflutole (ISO); 5-cyclopropyl-1,2-oxazol-4-yl α,α,α- trifluoro-2-mesyl-p-tolyl ketone	604-222-4	141112-29-0	Adopted	Repr. 2, H361d Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100		Netherlands	Active substance in plant protection products
			Submitted	Repr. 2, H361d*** STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100		Italy	
triflusulfuron-methyl; methyl 2-({[4-(dimethylamino)-6-(2,2,2- trifluoroethoxy)-1,3,5-triazin-2- yl]carbamoyl}sulfamoyl)-3-methylbenzoate	603-146-9	126535-15-7	Adopted	Carc. 2, H351 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=100 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10		France	Active substance in plant protection products
trifloxystrobin(ISO); methyl (E)-methoxyimino-{{(E)-α-[1-(α,α,α-trifluoro-m-tolyl)ethylideneaminoxy]-o-tolyl}acetate	604-237-6	141517-21-7	Adopted	Lact. Skin Sens. 1 Aquatic Acute 1 Aquatic Chronic		United Kingdom	Active substance in plant protection products

tefluthrin (ISO); 2,3,5,6-tetrafluoro-4-methylbenzyl (1RS,3RS)-3-[(Z)-2-chloro-3,3,3-trifluoroprop-1-enyl]-2,2-dimethylcyclopropanecarboxylate	616-699-6	79538-32-2	Adopted	Acute Tox. 2, H300 Acute Tox. 2, H310 Acute Tox. 1, H330 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10000 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10000	Germany	Active substance in plant protection products
Sedaxane	688-331-2	874967-67-6	Adopted	Carc. 2, H351 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1 Aquatic Chronic 2, H411	France	Active substance in plant protection products
Reaction mass of 3-(difluoromethyl)-1-methyl-N-[(1RS,4SR,9RS)-1,2,3,4-tetrahydro-9-isopropyl-1,4-methanonaphthalen-5-yl]pyrazole-4-carboxamide and of 3-(difluoromethyl)-1-methyl-N-[(1RS,4SR,9SR)-1,2,3,4-tetrahydro-9-isopropyl-1,4-methanonaphthalen-5-yl]pyrazole-4-carboxamide; isopyrazam	632-619-2	881685-58-1	Opinion Development	Skin Sens. 1B, H317 Repr. 1B, H360D Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10	United Kingdom	Active substance in plant protection products
pyroxsulam (ISO); N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl) pyridine-3-sulfonamide	610-007-6	422556-08-9	Opinion adapted	Skin Sens. 1, H317 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=100 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	United Kingdom	Active substance in plant protection products
pyridalyl (ISO); 2,6-dichloro-4-(3,3-dichloroallyloxy)phenyl 3-[5-(trifluoromethyl)-2-pyridyloxy]propyl ether	605-845-4	179101-81-6	Opinion development	Skin Sens. 1, H317 Repr. 2, H361d Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1000 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	Netherlands	Active substance in plant protection products
picolinafen (ISO); N-(4-fluorophenyl)-6-[3-(trifluoromethyl)phenoxy]pyridine-2-carboxamide; 4'-fluoro-6-[(α,α,α-trifluoro-m-tolyl)oxy]picolinanilide	604-030-0	137641-05-5	Submitted	STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1000 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	Germany	Active substance in plant protection products
penthiopyrad (ISO); (RS)-N-[2-(1,3-dimethylbutyl)-3-thienyl]-1-methyl-3-(trifluoromethyl)pyrazole-4-carboxamide	606-001-8	183675-82-3	Adopted	Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1	United Kingdom	Active substance in plant

						protection products
N-{2-[3-chloro-5-(trifluoromethyl)pyridin-2-yl]ethyl}-2-(trifluoromethyl)benzamide; fluopyram (ISO)	619-797-7	658066-35-4	Adopted	Aquatic Chronic 2, H411	Germany	Active substance in plant protection products
N-methoxy-N-[1-methyl-2-(2,4,6-trichlorophenyl)-ethyl]-3-(difluoromethyl)-1-methylpyrazole-4-carboxamide; pydiflumetofen*	817-852-1	1228284-64-7	Pending	Carc2 Repro 2 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1	France	Active substance in plant protection products
N-(cyanomethyl)-4-(trifluoromethyl)pyridine-3-carboxamide; flonicamid (ISO)	605-127-0	158062-67-0	Adopted	Acute Tox. 4, H302	France	Active substance in plant protection products
N-(5-chloro-2-isopropylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide; isoflucypram*	-	1255734-28-1	Pending	Acute Tox. 4, H332 Skin Sens. 1B, H317 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1	United Kingdom	Active substance in plant protection products
Fluxapyroxad	620-041-3	907204-31-3	Adopted	Lact. Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1	United Kingdom	Active substance in plant protection products
flutolanil (ISO); N-[3-(propan-2-yloxy)phenyl]-2-(trifluoromethyl)benzamide; α,α,α-trifluoro-3'-isopropoxy-o-toluanilide	613-921-3	66332-96-5	Intention	Aquatic Acute 1, M-factor=1 Aquatic Chronic 1, M-factor=10	Netherlands	Active substance in plant protection products
flutianil (ISO); (2Z)-{[2-fluoro-5-(trifluoromethyl)phenyl]thio}[3-(2-methoxyphenyl)-1,3-thiazolidin-2-ylidene]acetonitrile	812-888-4	958647-10-4	Adopted	Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	United Kingdom	Active substance in plant protection products
flurochloridone (ISO); 3-chloro-4-(chloromethyl)-1-[3-(trifluoromethyl)phenyl]pyrrolidin-2-one	262-661-3	61213-25-0	Adopted	Acute Tox. 4, H302 Skin Sens. 1, H317 Repr. 1B, H360Df Aquatic Acute 1, H400 Aquatic Chronic 1, H410	Spain	Active substance in plant protection products

fluopicolide (ISO); 2,6-dichloro-N-[3-chloro-5-(trifluoromethyl)-2-pyridylmethyl]benzamide	607-285-6	239110-15-7	Adopted		Austria	Active substance in plant protection products
flzasulfuron (ISO): 1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-trifluoromethyl-2-pyridylsulfonyl)urea	600-514-0	104040-78-0	Intention	Aquatic Acute 1, M-factor=1000 Aquatic Chronic 1, M-factor=100	Spain	Active substance in plant protection products
diflufenican (ISO); N-(2,4-difluorophenyl)-2-[3-(trifluoromethyl)phenoxy]-3-pyridinecarboxamide	617-446-2	83164-33-4	Adopted	Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1000 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	United Kingdom	Active substance in plant protection products
cyflumetofen (ISO); 2-methoxyethyl (RS)-2-(4-tert-butylphenyl)-2-cyano-3-oxo-3-(α,α,α-trifluoro-o-tolyl)propionate	642-974-5	400882-07-7	Adopted	Skin Sens. 1A, H317 Carc. 2, H351	Netherlands	Active substance in plant protection products
carfentrazone-ethyl (ISO); ethyl (RS)-2-chloro-3-[2-chloro-4-fluoro-5-[4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl]phenyl]propionate	603-291-8	128639-02-1	Intention	Carc. 2, H351 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410	Belgium	Active substance in plant protection products
benzovindiflupyr (ISO); N-[9-(dichloromethylene)-1,2,3,4-tetrahydro-1,4-methanonaphthalen-5-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide	691-719-4	1072957-71-1	Adopted	Acute Tox. 3, H301 Acute Tox. 3, H331 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=100 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=100	France	Active substance in plant protection products
Benfluralin	217-465-2	1861-40-1	Opinion development	Skin Irrit. 2, H315 Eye Irrit. 2, H319 Skin Sens. 1, H317 Carc. 2, H351 Repr. 2, H361d Lact., H362 STOT SE 2, H371 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10	Norway	Active substance in plant protection products
[methyl(oxo){1-[6-(trifluoromethyl)-3-pyridyl]ethyl}-λ6-sulfanylidene]cyanamide; sulfoxaflor (ISO)	807-366-8	946578-00-3	Adopted	Acute Tox. 4, H302 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1	Ireland	Active substance in plant

				Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1		protection products
4-[[(6-chloropyridin-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-one; flupyradifurone	804-373-8	951659-40-8	Adopted	Acute Tox. 4, H302 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10	Netherlands	Active substance in plant protection products
3-chloro-N-[3-chloro-2,6-dinitro-4-(trifluoromethyl)phenyl]-5-(trifluoromethyl)pyridin-2-amine; fluazinam (ISO)	616-712-5	79622-59-6	Adopted	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Dam. 1, H318 Skin Sens. 1, H317 Repr. 2, H361 STOT SE 3, H335 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=10 Aquatic Chronic 1, H410	Austria	Active substance in plant protection products
2-{2-chloro-4-(methylsulfonyl)-3-[(2,2,2-trifluoroethoxy)methyl]benzoyl}cyclohexane-1,3-dione; tembotrione (ISO)	608-879-8	335104-84-2	Adopted	Skin Sens. 1B, H317 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=100 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=10	Austria	Active substance in plant protection products
1-[[[(Z)-[[2-(4-cyanophenyl)-1-[[3-(trifluoromethyl)phenyl]ethylidene]amino]-1-[[4-(trifluoromethoxy)phenyl]urea Metaflumizone (ISO)	604-167-6	139968-49-3	Adopted	Repr. 2, H361d Lact., H362 STOT RE 2, H373	United Kingdom	Active substance in plant protection products
1-(4-{4-[[5-(2,6-difluorophenyl)-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)-2-[[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1-yl]ethan-1-one Oxathiapiprolin (ISO)	801-263-1	1003318-67-9	Adopted	Aquatic Chronic 1, H410	Ireland	Active substance in plant protection products
(2RS)-2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol; mefentrifluconazole	-	1417782-03-6	Adopted	Skin Sens. 1, H317 Aquatic Acute 1, H400 Aquatic Acute 1, M-factor=1 Aquatic Chronic 1, H410 Aquatic Chronic 1, M-factor=1	United Kingdom	Active substance in plant protection products

*The approval of these substances is pending.

Table 19: Non- exhaustive list of active substances following current PFAS definition authorised as biocides at ECHA

Substance name	EC/List no.	CAS no.	BAS number	Product-type	Approval start date
1-(3,5-dichloro-4-(1,1,2,2-tetrafluoroethoxy)phenyl)-3-(2,6-difluorobenzoyl) urea (Hexaflumuron)	-; 401-400-1	86479-06-3	1314	PT18-Insecticides, acaricides and products to control other arthropods	01/04/2017
4-bromo-2-(4-chlorophenyl)-1-ethoxy methyl-5-trifluoromethylpyrrole-3-carbonitrile (Chlorfenapyr)	-	122453-73-0	66	PT08-Wood preservatives, PT18-Insecticides, acaricides and products to control other arthropods	01/05/2015
Bifenthrin	-	82657-04-3	8	PT08-Wood preservatives	01/02/2013
Fipronil	-; 424-610-5	120068-37-3	33	PT18-Insecticides, acaricides and products to control other arthropods	01/10/2013
Flocoumafen	-; 421-960-0	90035-08-8	34	PT14-Rodenticides	01/10/2011
Fludioxonil	-; 603-476-3	131341-86-1	1416	PT07-Film preservatives, PT09-Fibre, leather, rubber and polymerised materials preservatives, PT10-Construction material preservatives	01/04/2018
Indoxacarb (enantiomeric reaction mass S:R 75:25)	-	-	64	PT18-Insecticides, acaricides and products to control other arthropods	01/01/2010
lambda-cyhalothrin	-; 415-130-7	91465-08-6	41	PT18-Insecticides, acaricides and products to control other arthropods	01/10/2013
Tralopyril	-	122454-29-9	1403	PT21-Antifouling products	01/04/2015

Table 20 RMOA list of PFAS for which an RMOA either is under development or has been completed since the start of the implementation of the SVHC Roadmap in 2013

Substance	EC/list no	CAS no	Concern	Follow up
Tetrafluoroethylene	204-126-9	116-14-3	CMR (reprotox)	CLH
C9-C14 perfluoroalkyl carboxylic acids including their salts and precursors (PFNA/PFDA/PFUnDA/PFDoDA/PFTrDA/PFTDA)	206-203-2	307-55-1	PBT/vPvB(reprotox) widespread use	restriction

Undecafluorohexanoic acid (PFHxA), its salts and related substances	-	-	CMR (reprotox) ELoC (PMT)	SVHC (withdrawn) CLH restriction
Perfluorobutane sulfonic acid (PFBS) and its salts	-	-	ELoC (PMT)	SVHC restriction
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]diphenol; bisphenol AF	216-036-7	1478-61-1	ELoC (ED)	CLH
4-chloro-α,α,α-trifluorotoluene	202-681-1	98-56-6	CMR (carcinogenic)	No suggestion yet
(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)silanetriol and any of its mono-, di- or tri-O-(alkyl) derivatives	-	-	Risks of acute lung injury from spray	restriction
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acylhalides covering any of their individual isomers and combinations thereof (GenX)	-	-	ELoC (PMT)	SVHC
2,4,6-trimethyl-2,4,6-tris(3,3,3-trifluoropropyl)cyclotrisiloxane (F-D3)	219-154-7	2374-14-3	PBT (human tox)	CLH

Notes: reprotox = reproductive toxicant; PMT = persistence, mobility, and toxicity; CMR = carcinogenic, mutagenic, or toxic to reproduction; ED = endocrine disruption; ELoC = equivalent level of concern

Table 21 PFAS identified as SVHC and on the Candidate list for REACH Authorisation

Substance	ECno	CASno	Concern
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (HFPO-DA) covering any of their individual isomers and combinations thereof (GenX)	-	-	ELoC having probable serious effects to human health and environment (Article 57(f) - human health)
Perfluorobutane sulfonic acid and its salts (PFBS)	-	-	ELoC having probable serious effects to human health and environment (Article 57(f) - human health)

PFHxS	-	-	vPvB (Article 57e)
Perfluorononan-1-oic-acid and its sodium and ammonium salts (PFNA)	-	-	Toxic for reproduction (Article 57c) PBT (Article 57d)
Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	206-400-3	335-76-2	Toxic for reproduction (Article 57c) PBT (Article 57d)
Henicosafuoroundecanoic acid (PFUnDA);	218-165-4	2058-94-8	vPvB (Article 57e)
Tricosafuorododecanoic acid (PFDoDA);	206-203-2	307-55-1	vPvB (Article 57e)
Pentacosafuorotridecanoic acid (PFTrDA);	276-745-2	72629-94-8	vPvB (Article 57e)

Table 22: PFAS substances on the CoRAP list as of August 2020

Substance	EC/list no	CAS no	Authority	Year	Concern	Status
3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl) phosphates, ammonium salt (HGC-TLF)	700-161-3	-	NL	2013	Suspected PBT/vPvB	ongoing
reaction mass of 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)morpholine	473-390-7	-	BE	2016	Suspected PBT/vPvB, Exposure of environment, Wide dispersive use	follow-up
HFE 7000 (Trade name: 3M(TM) NOVEC(TM) ENGINEERED FLUID HFE-7000)	484-450-7	-	ES	2019	Suspected PBT/vPvB	suspended
HFE 7100 (Reaction mass of 1,1,2,3,3,3-hexafluoro-1-methoxy-2-(trifluoromethyl)propane and 1,1,2,2,3,3,4,4,4-nonafluoro-1-methoxybutane), Process related name: HFE-7100 3M BRAND SPECIALITY LIQUID	422-270-2	-	ES	2019	Suspected PBT/vPvB	suspended
Potassium 2-(3-trifluoromethoxy-1,1,2,2,3,3-hexafluoropropoxy)-2,3,3,3-tetrafluoropropionate (MV31-Potassium salt)	444-340-1	-	DE	2017	Suspected PBT/vPvB, Exposure of environment	concluded
Polyhaloalkene	468-710-7	754-12-1	DE	2012	Other hazard based concern, exposure of environment, high (aggregated) tonnage, wide dispersive use	information requested
Perfluamine	206-420-2	338-83-0	BE	2020	Suspected PBT/vPvB, Exposure of environment	ongoing

Hexafluoropropene	204-127-4	116-15-4	IT	2015	Suspected CMR, High (aggregated) tonnage	conclusion under preparation
Bis(nonafluorobutyl)phosphinic acid	700-183-3	52299-25-9	DE	2018	Suspected PBT/vPvB, other hazard based concern, exposure of environment	concluded
Amphoteric Fluorinated Surfactant	-	-	BE	2018	Suspected PBT/vPvB, Exposure of environment, Wide dispersive use	ongoing
Ammonium salts of mono- and bis[3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl and/or poly (substituted alkene)] phosphate	700-403-8	-	BE	2013	Suspected PBT/vPvB, consumer use, wide dispersive use	ongoing
ammonium difluoro[1,1,2,2-tetrafluoro-2-(pentafluoroethoxy)ethoxy]acetate	700-323-3	908020-52-0	DE	2017	Suspected PBT/vPvB, Exposure of environment	ongoing
ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoate (GenX/ C3 dimer salt)	700-242-3	62037-80-3	DE/NL	2017	Suspected PBT/vPvB, Exposure of environment	information requested
Ammonium 2,2,3 trifluor-3-(1,1,2,2,3,3-hexafluoro-3-trifluoromethoxypropoxy), propionate (Adona)	480-310-4		DE	2017	Suspected PBT/vPvB, Exposure of environment, Wide dispersive use	ongoing
HFE 7500 (3-ethoxy-1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl)-hexane), processed fluid	435-790-1	297730-93-9	ES	2018	Suspected PBT/vPvB, Exposure of environment, Wide dispersive use	ongoing
3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate (6:2 FTMA)	218-407-9	2144-53-8	DE	2016	Potential endocrine disruptor, Suspected PBT/vPvB, Other hazard based concern, Exposure of environment, Wide dispersive use	information requested
3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl acrylate (6:2 FTA)	241-527-8	17527-29-6	DE	2016	Potential endocrine disruptor, Suspected PBT/vPvB, Other hazard based concern. Exposure of environment, wide dispersive use	information requested
2H-Tricosafluoro-5,8,11,14-tetrakis(trifluoromethyl)-3,6,9,12,15-pentaaoctadecane (TFEE-5)	-	37486-69-4	DE	2017	Suspected PBT/vPvB, Exposure of environment	conclusion under preparation
	484-410-9	-	ES	2019	Suspected PBT/vPvB	ongoing

HFE 7800 (2-Ethoxy-3,3,4,4,5-pentafluoro-2,5-bis[(1,2,2,2-tetrafluoro-1-trifluoromethyl)ethyl] tetrahydrofuran), Trade name: 3M(TM) NOVEC(TM) ENGINEERED FLUID 2-bromo-3,3,3-trifluoroprop-1-ene (2-BTP)	627-872-0	1514-82-5	ES	2019	Suspected reprotoxic, potential endocrine disruptor	concluded
2-[methyl[(nonafluorobutyl) sulpho-nyl]amino]ethyl acrylate (N-Me FBSEA)	266-733-5	67584-55-8	DE	2018	Suspected PBT/vPvB, other hazard based concern, exposure of environment, wide dispersive use	concluded

Table 23: CLH processes on PFAS substances that are developed or under development

Substance name*	EC / List no	CAS no	CLH status	Classification proposed	adopted or	Submitter	Regulatory Programme
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecan-1-ol	211-648-0	678-39-7	Opinion adopted	Proposal: Repr. 1B, H360D Opinion concluded no harmonised class. for this endpoint		Norway	Chemical REACH
Reaction mass of 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]diphenol and benzyltriphenylphosphonium, salt with 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (1:1)	947-368-7	-	Opinion Development	Repr. 1B, H360F		Sweden	Chemical REACH
Reaction mass of 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]diphenol and benzyl(diethylamino)diphenylphosphonium 4-[1,1,1,3,3,3-hexafluoro-2-(4-hydroxyphenyl)propan-2-yl]phenolate (1:1)	943-265-6	-	Opinion Development	Repr. 1B, H360F		Sweden	Chemical REACH
Perfluoroheptanoic acid	206-798-9	375-85-9	Opinion Development	Repr. 1B, H360D STOT RE 1, H372		Belgium	Chemical REACH
Benzyltriphenylphosphonium, salt with 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (1:1)	278-305-5	75768-65-9	Opinion development	Repr. 1B, H360F		Sweden	Chemical REACH
benzyl(diethylamino)diphenylphosphonium 4-[1,1,1,3,3,3-hexafluoro-2-(4-hydroxyphenyl)propan-2-yl]phenolate	479-100-5	577705-90-9	Opinion development	Repr. 1B, H360F		Sweden	Chemical REACH

Ammonium pentadecafluorooctanoate	223-320-4	3825-26-1	Adopted	Adopted (5. ATP); Carc 2; H351 Repr 1B; H360D Lact; H362 Acute Tox. 4; H332 Acute Tox. 4; H302 STOT RE1; H372 (liver) Eye Dam 1; H318	Norway	Chemical REACH
Pentadecafluorooctanoic acid	206-397-9	335-67-1	Adopted	Adopted (5. ATP); Carc 2; H351 Repr 1B; H360D Lact; H362 Acute Tox. 4; H332 Acute Tox. 4; H302 STOT RE1; H372 (liver) Eye Dam 1; H318	Norway	Chemical REACH

* Listed are only CLH intentions for substances under REACH for which no RMOA has been established or is ongoing (CLH intentions for substances used in biocide and plant protection products are excluded).

Annex 1.3: Figures

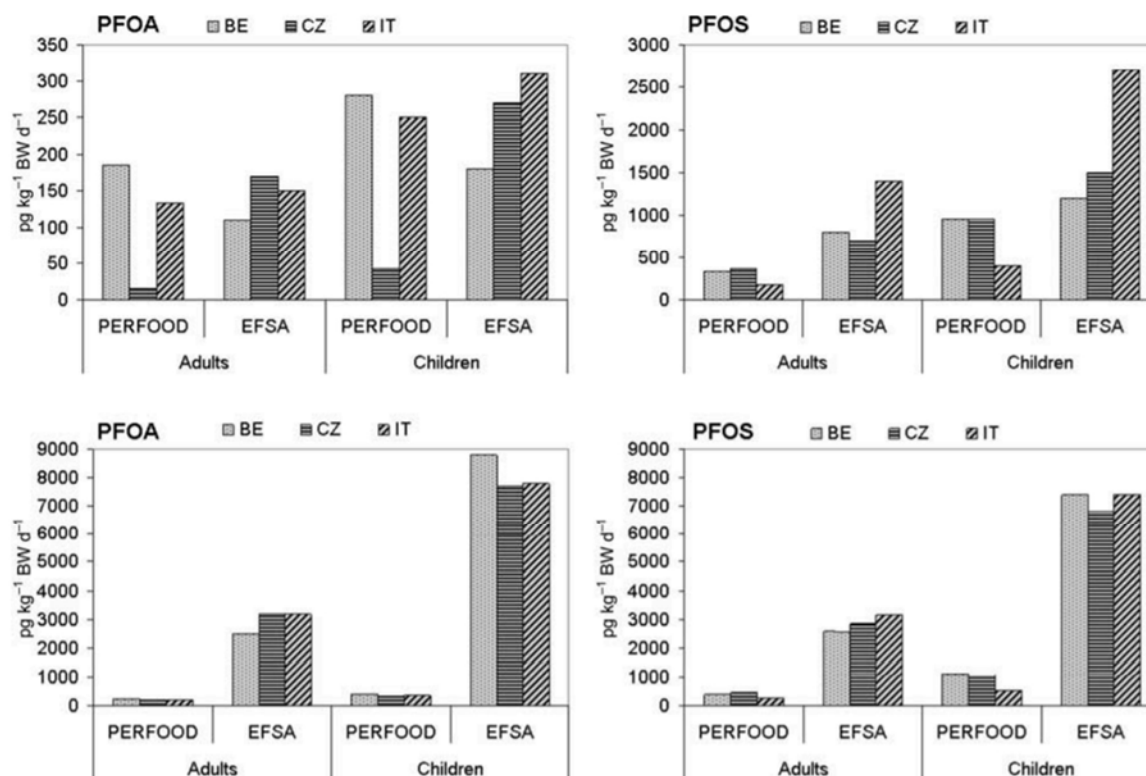


Figure 3: Comparison of dietary exposure to PFIA (left) and PFOS (right) estimated by PERFOOD and EFSA (2012) for adults and children based on lower-bound (LB) estimates (upper figures) and upper-bound (UB) estimates (lower figures). Source: Kenlow et al. (2013).

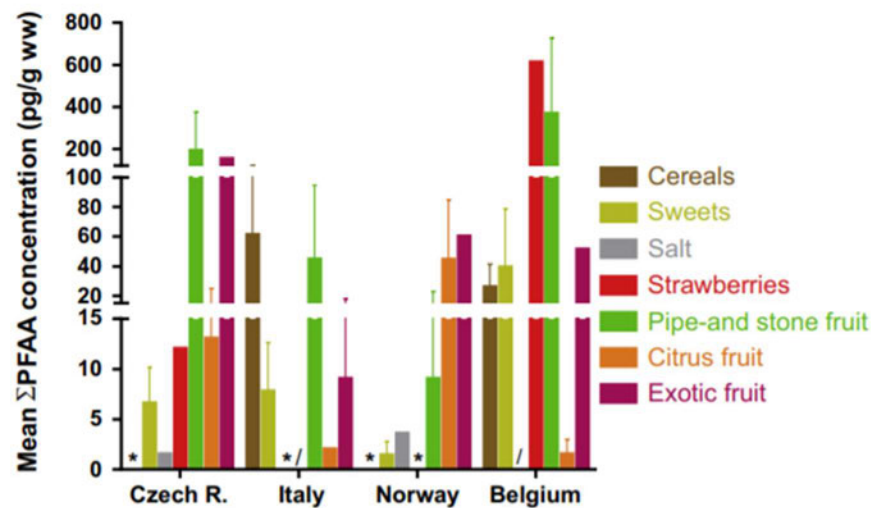


Figure 4: Comparison of mean concentrations of PFAAs ($\text{pg g}^{-1} \text{ ww}$) in 7 different food groups sampled in the Czech Republic, Italy, Norway and Belgium. Error bars represent the standard errors of the mean. *: levels < LOQ; /: not sampled. Note: the respective food groups can differ in composition between the regions. Source: D'Hollander 2015.

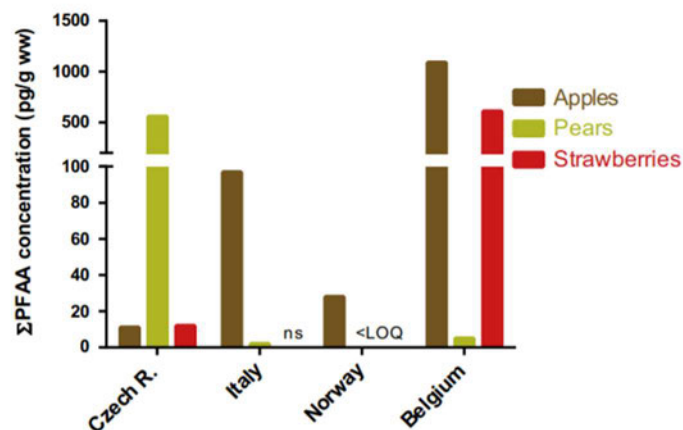


Figure 5: Comparison of the sum of PFAA concentrations ($\text{pg g}^{-1} \text{ ww}$) between the Czech Republic, Italy, Norway and Belgium in apples, pears and strawberries (ns: not sampled; < LOQ: levels in apples and pears from Norway were below LOQ). Source: D'Hollander et al. (2015).

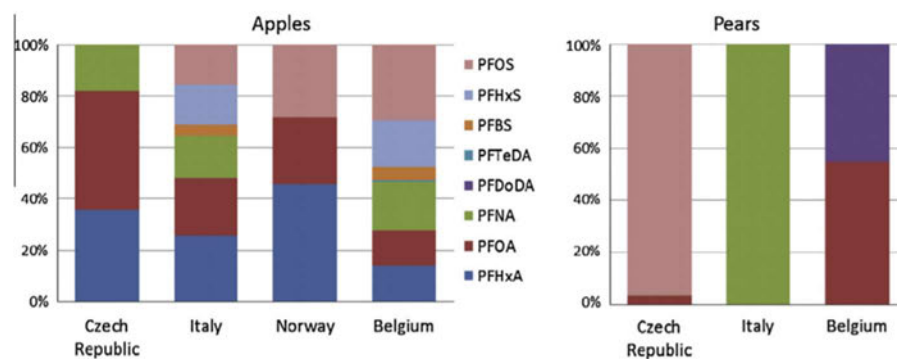


Figure 6: Contribution of the individual PFAAs (>LOQ) to the total sum of PFAAs that were detected in apples (left side) and pears (right side) sampled in the Czech Republic, Italy, Norway and Belgium. Pears sampled in Norway are not shown as all the analysed PFAAs-levels were <LOQ. Source: D'Hollander et al. (2015).