

		100 years GWP	σ_g^2	Total E DALYs(0,0)/t	Total H DALYs(0,0)/t	Total I DALYs(0,1)/t	Total σ_g^2
Carbon Dioxide	CO2	1	1.7	0.00021	0.00021	0.0002	2.4
Methane (ii)	CH4	n.u.	2.9	0.0044	0.0044	0.0044	3.6
Nitrous Oxide	N2O	n.u.	1.7	0.069	0.069	0.067	2.4
HFC-23	CHF3	11700	1.7	2.6	2.6	2.5	2.4
HFC-32	CH2F2	650	2.9	0.14	0.14	0.13	3.6
HFC-41	CH3F	150	2.9	0.031	0.031	0.031	3.6
HFC-43-10mee	C5H2F10	1300	2.9	0.27	0.27	0.27	3.6
HFC-125	C2HF5	2800	1.7	0.58	0.57	0.057	2.4
HFC-134	C2H2F4	1000	2.9	0.21	0.21	0.21	3.6
HFC-134a	CH2FCF3	1300	2.9	0.27	0.27	0.27	3.6
HFC-152a	CH2FCF3	140	2.9	0.029	0.029	0.029	3.6
HFC-143	C2H3F3	300	2.9	0.063	0.063	0.062	3.6
HFC-143a	C2H3F3	3800	1.7	0.78	0.78	0.77	2.4
HFC-227ea	C3HF7	2900	1.7	0.6	0.59	0.59	2.4
HFC-236fa	C3H2F6	6300	1.7	1.4	1.4	1.4	2.4
HFC-245ca	C3H3F5	560	2.9	0.12	0.12	0.12	3.6
Chloroform	CHCl3	4	10.0	0.00083	0.00084	0.00083	11.1
Methylene chloride	CH2Cl2	9	10.0	0.0019	0.0019	0.0019	11.1
Sulphur hexafluoride	SF6	23900	1.7	5.3	5.3	5.2	2.4
Perfluormethane	CF4	6500	1.7	1.4	1.4	1.4	2.4
Perfluoroethane	C2F6	9200	1.7	2	2	2	2.4
Perfluoropropane	C3F8	7000	1.7	1.5	1.6	1.5	2.4
Perfluorbutane	C4F10	7000	1.7	1.5	1.6	1.5	2.4
Perfluoropentane	C5F12	7500	1.7	1.7	1.7	1.6	2.4
Perfluorhexane	C6F14	7400	1.7	1.6	1.6	1.6	2.4
Perfluorocyclobutane	c-C4F8	8700	1.7	1.9	1.9	1.9	2.4
Trifluoroiodomethane	CF3I	1	10.0	0.00021	0.00021	0.00021	11.1
CFC-11 (i)	CFCl3	1065	2.9	0.22	0.22	0.22	3.6
CFC-12 (i)	CF2Cl2	6635	1.7	1.4	1.4	1.3	2.4
CFC-113 (i)	CF3Cl	3059	1.7	0.63	0.63	0.63	2.4
HCFC-22 (i)	CF2HCl	1349	1.7	0.28	0.28	0.28	2.4
HCFC-142b (i)	C2F2H3Cl	1649	1.7	0.34	0.34	0.34	2.4
H1301 (i)	CF3Br	-34701	10.0	-7.1	-7.1	-7	11.1
HCFC-141b (i)	CFH3Cl2	251	10.0	0.052	0.052	0.052	11.1
Methyl chloroform (i)	CH3CCl3	-204	10.0	-0.043	-0.043	-0.042	11.1
Carbon Tetrachloride (i)	CCl4	-1249	10.0	-0.26	-0.26	-0.25	11.1
HCFC-123 (i)	C2F3HCl2	32	10.0	0.0066	0.0066	0.0066	11.1
HCFC-124 (i)	C2F4HCl	410	2.9	0.085	0.085	0.085	3.6

Table 4.9: Positive human health damages due to global warming for the three cultural perspectives hierarchists (H), egalitarians (E), and individualists (I) initially extrapolated from table 4.7a with the GWP's from table 4.8

(i) includes direct and indirect effects from stratospheric ozone depletion

4.7. Damage to Human Health caused by ionising radiation

The data used in this section can all be found in [FRISHKNECHT ET AL 1999]

4.7.1. Fate and exposure factors

The exposure and fate modelling is different for regional and globally dispersed substances. Table 4.10 presents the regional dispersed substances.

Damage analysis: Hierarchist DALYs per kg emission in Europe					
Substance	Emissions to: Air		Water	Ind. soil	Agri soil
	total		total	total	total
	DALYs		DALYs	DALYs	DALYs
Arsenic (long term)	2.46E-02		6.57E-02	1.32E-02	2.50E-01
Arsenic (short term)					
Benzene	2.50E-06		4.12E-06	1.33E-05	2.04E-05
Bis(chloromethyl)ether	7.48E-03		1.54E-02	1.68E-02	1.12E+00
Cadmium (long term)	1.35E-01		7.12E-02	3.98E-03	2.17E+00
Cadmium (short term)					
Chromium VI (long term)	1.75E+00		3.43E-01	2.71E-01	1.61E+01
Chromium VI (short term)					
Nickel (long term)	2.35E-02		3.11E-02	3.94E-03	1.96E-01
Nickel-refinery-dust (long term)	4.74E-02		5.02E-03	6.37E-03	8.19E-02
Nickel-subsulfide (long term)	9.48E-02		1.00E-02	1.27E-02	1.64E-01
Nickel (short term)					
Nickel-refinery-dust (short term)					
Nickel-subsulfide (short term)					
Vinylchloride	2.09E-07		2.84E-07	7.67E-07	7.89E-07
1,2-dibromoethane	2.60E-04		1.24E-03	3.81E-03	6.22E-02
1,3-butadiene	1.58E-05		3.37E-04	1.20E-05	1.74E-03
Acrylonitril	1.69E-05		4.16E-05	7.01E-05	5.43E-04
Benzo(a)pyrene	3.98E-03		2.99E+00	2.06E-03	1.29E-01
Benzo(a)anthracene	5.86E-02		6.58E-01	1.60E-01	1.45E+00
Dibenz(a)anthracene	3.10E+01		4.07E+01	2.44E+01	8.14E+01
Diesel soot particles	9.78E-06		0.00E+00	0.00E+00	0.00E+00
Epichlorohydrin	3.02E-07		9.90E-07	1.30E-06	6.86E-06
Ethylene oxide	1.83E-04		1.39E-04	2.38E-03	2.27E-03
Formaldehyde	9.91E-07		4.97E-06	1.83E-06	2.75E-05
Polychlorobiphenyls	1.97E-03		3.91E-02	2.04E-02	1.44E-01
Propylene oxide	1.17E-05		1.74E-05	1.40E-04	1.50E-03
1,2-dichloroethane	2.98E-05		2.98E-05	4.58E-04	4.81E-04
1,4-dioxane	1.39E-07		9.21E-07	3.10E-07	6.67E-06
2,3,7,8,-TCDD-dioxin	1.79E+02		2.02E+03	7.06E+00	2.06E+02
2,4,6-trichlorophenol	2.05E-06		1.05E-05	2.76E-06	1.29E-05
Acetaldehyde	2.16E-07		9.23E-07	4.77E-07	4.81E-06
alpha-hexachlorocyclohexan	3.00E-04		6.85E-03	7.25E-04	2.32E-02
Benzotrichloride	6.60E-03		9.46E-03	1.32E-01	1.32E-01
Benzylchloride	1.04E-05		1.98E-05	4.16E-05	1.27E-04
beta-hexachlorocyclohexan	9.99E-05		5.75E-03	2.22E-04	7.36E-03
Bromodichloromethane	8.76E-06		9.36E-06	7.82E-05	1.18E-04
Carbontetrachloride	8.38E-04		8.29E-04	3.99E-02	3.94E-02
Chloroform	2.63E-05		2.60E-05	4.12E-06	3.96E-04
Diethylhexylphthalate	3.38E-05		6.64E-04	3.18E-07	5.81E-05
Dichloromethane	4.36E-07		4.79E-07	5.99E-06	8.19E-06
Dichlorvos	3.15E-05		1.17E-05	2.91E-07	2.25E-05
Lindane (gamma HCH)	3.49E-04		4.16E-03	8.46E-04	8.64E-03
Hexachlorobenzene	8.25E-02		1.25E-01	1.47E-01	1.28E-01
Pentachlorophenol	7.21E-03		2.29E-02	1.26E-05	2.67E-04
Perchloroethylene	4.82E-07		4.72E-07	6.00E-06	6.00E-06
Styrene	2.44E-08		1.22E-06	2.09E-08	9.65E-07

Table 4.1(continued): Damage to Human Health (carcinogenics)

4.7.3. Results

Table 4.15 summarises the damage factors per pollutant (expressed as kBq)

	Damage factor per pollutant					
	Egalitarian DALYs(0,0)/kBq	σ_g^2	Hierarchist DALYs(0,0)/Kbq	σ_g^2	Individualist DALYs(0,1)/kBq	σ_g^2
Emitted to air:						
C-14	2.10E-07	15	2.10E-07	15	1.60E-08	15
Co-58	4.30E-10	15	4.30E-10	15	3.60E-10	15
Co-60	1.60E-08	15	1.60E-08	15	1.40E-08	15
Cs-134	1.20E-08	15	1.20E-08	15	1.00E-08	15
Cs-137	1.30E-08	15	1.30E-08	15	1.10E-08	15
H-3	1.40E-11	28	1.40E-11	28	1.20E-11	28
I-129	9.40E-07	65	9.40E-07	28	2.50E-07	28
I-131	1.60E-10	15	1.60E-10	15	1.30E-10	15
I-133	9.40E-12	15	9.40E-12	15	7.90E-12	15
Kr-85	1.40E-13	28	1.40E-13	28	1.20E-13	28
Pb-210	1.50E-09	15	1.50E-09	15	1.30E-09	15
Po-210	1.50E-09	15	1.50E-09	15	1.30E-09	15
Pu alpha	8.30E-08	15	8.30E-08	15	7.00E-08	15
Pu-238	6.70E-08	15	6.70E-08	15	5.70E-08	15
Ra-226	9.10E-10	15	9.10E-10	15	7.60E-10	15
Rn-222	2.40E-11	15	2.40E-11	15	2.00E-11	15
Th-230	4.50E-08	15	4.50E-08	15	3.80E-08	15
U-234	9.70E-08	15	9.70E-08	15	8.20E-08	15
U-235	2.10E-08	15	2.10E-08	15	1.70E-08	15
U-238	8.20E-09	15	8.20E-09	15	6.90E-09	15
Xe-133	1.40E-13	15	1.40E-13	15	1.20E-13	15
Emitted to rivers and lakes:						
Ag-110m	5.10E-10	15	5.10E-10	15	4.20E-10	15
Co-58	4.10E-11	15	4.10E-11	15	3.40E-11	15
Co-60	4.40E-08	15	4.40E-08	15	3.70E-08	15
Cs-134	1.40E-07	15	1.40E-07	15	1.20E-07	15
Cs-137	1.70E-07	15	1.70E-07	15	1.40E-07	15
H-3	4.50E-13	28	4.50E-13	28	3.80E-13	28
I-131	5.00E-10	15	5.00E-10	15	4.20E-10	15
Mn-54	3.10E-10	15	3.10E-10	15	2.60E-10	15
Ra-226	1.30E-10	15	1.30E-10	15	1.10E-10	15
Sb-124	8.20E-10	15	8.20E-10	15	6.90E-10	15
U-234	2.40E-09	15	2.40E-09	15	2.00E-09	15
U-235	2.30E-09	15	2.30E-09	15	2.00E-09	15
U-238	2.30E-09	15	2.30E-09	15	1.90E-09	15
Emitted to the Ocean:						
Am-241	3.10E-08	15	3.10E-08	15	2.60E-08	15
C-14	1.20E-09	15	1.20E-09	15	9.90E-10	15
Cm alpha	5.70E-08	15	5.70E-08	15	4.80E-08	15
Co-60	3.90E-10	15	3.90E-10	15	3.30E-10	15
Cs-134	7.90E-11	15	7.90E-11	15	6.60E-11	15
Cs-137	7.90E-11	15	7.90E-11	15	6.70E-11	15
H-3	6.90E-14	28	6.90E-14	28	5.80E-14	28
I-129	1.00E-07	65	1.00E-07	28	1.90E-08	28
Pu alpha	7.40E-09	15	7.40E-09	15	6.20E-09	15
Ru-106	1.40E-10	15	1.40E-10	15	1.20E-10	15
Sb-125	1.50E-11	15	1.50E-11	15	1.20E-11	15
Sr-90	4.00E-12	15	4.00E-12	15	3.40E-12	15
U-234	2.30E-11	15	2.30E-11	15	1.90E-11	15
U-235	2.50E-11	15	2.50E-11	15	2.10E-11	15
U-238	2.30E-11	15	2.30E-11	15	2.00E-11	15

Table 4.15: Damage factors and characterisation factors for three scenarios following three world views combining the data given in Tables 3 to 7. The σ_g^2 stands for the geometric standard deviation. Dividing and multiplying the best estimate by σ_g^2 spans the 95% confidence interval.

4.8. Damage to Human Health caused by ozone layer depletion

In the main report sufficient data for the calculation of the fate factor and the estimation of DALYs per % ozone layer depletion is shown. These figures are repeated at the top of the table. The damage per kg CFC-11 is calculated by multiplying the fate factor and the DALYs per % depletion.

The equivalency factors are taken from [HAUSSCHILD 1998] They are based on a time frame of 100 years.

7.2.3. Normalisation values for respiratory effects

In the tables 7.3 and 7.4 the normalisation values for respiratory effects are calculated for inorganic substances and organic substances respectively. The contribution of PM10 is very important in all three perspectives. The total DALYs for inorganic substances are a lot higher for all three perspectives.

Emissions to air	Damage factors			Emission kg/yr	Normalisation values		
	Egalitarian Dalys/kg	Hierarchist Dalys/kg	Individualist Dalys/kg		Egalitarian DALYs/yr	Hierarchist DALYs/yr	Individualist DALYs/yr
Inorganic substances							
CO	7.31E-07			4.65E+10	3.40E+04	0.00E+00	0.00E+00
PM10	3.75E-04	3.75E-04	2.74E-04	5.17E+09*	1.94E+06	1.94E+06	1.42E+06
SOx (as SO2)	1.09E-06	1.09E-06		1.21E+10	1.32E+04	1.32E+04	0.00E+00
SOx (as SO2)	5.35E-05	5.35E-05	3.90E-05	1.21E+10	6.47E+05	6.47E+05	4.72E+05
NH3	7.00E-05	7.00E-05	5.10E-05	3.62E+09	2.53E+05	2.53E+05	1.85E+05
NH3	1.50E-05	1.50E-05		3.62E+09	5.42E+04	5.42E+04	0.00E+00
NOx (as NO2)	4.31E-07			1.29E+10	5.57E+03	0.00E+00	0.00E+00
NOx (as NO2)	8.74E-05	8.74E-05		1.29E+10	1.13E+06	1.13E+06	0.00E+00
NOx (as NO2)	1.28E-06	1.28E-06	1.19E-06	1.29E+10	1.65E+04	1.65E+04	1.53E+04
totals					4.09E+06	4.05E+06	2.09E+06

Table 7.3: Normalisation values for respiratory effects (inorganic substances to air)

*) Emission data for 1995 taken from [HOFSTETTER 1998]

Emissions to air	Damage factors			Emission kg/yr	Normalisation values		
	Egalitarian Dalys/kg	Hierarchist Dalys/kg	Individualist Dalys/kg		Egalitarian DALYs/yr	Hierarchist DALYs/yr	Individualist DALYs/yr
Organic substances							
NMVOG	1.28E-06	1.28E-06	1.19E-06	1.32E+10	1.69E+04	1.69E+04	1.57E+04
VOCs (average)	6.46E-07	6.46E-07	6.40E-07	1.19E+10	7.69E+03	7.69E+03	7.62E+03
methane	1.28E-08	1.28E-08	1.19E-08	2.32E+10	2.96E+02	2.96E+02	2.75E+02
benzene	4.68E-07	4.68E-07	4.35E-07	1.28E+08	5.99E+01	5.99E+01	5.57E+01
o-xylene	2.30E-06	2.30E-06	2.14E-06	8.53E+07	1.96E+02	1.96E+02	1.82E+02
m-xylene	2.38E-06	2.38E-06	2.22E-06	8.53E+07	2.03E+02	2.03E+02	1.89E+02
p-xylene	2.21E-06	2.21E-06	2.06E-06	8.53E+07	1.89E+02	1.89E+02	1.75E+02
trichloroethene	6.98E-07	6.98E-07	6.49E-07	6.82E+07	4.76E+01	4.76E+01	4.42E+01
tetrachloroethene	6.21E-08	6.21E-08	5.78E-08	5.46E+07	3.39E+00	3.39E+00	3.15E+00
totals					2.60E+04	2.60E+04	2.42E+04

Table 7.4: Normalisation values for respiratory effects (organic substances to air)

7.2.4. Normalisation values for climate change

In the table below the damage factors are multiplied with the emissions from [BLONK ET AL 1997]. The figures for CO₂, CH₄ and N₂O have been replaced by the more recent data from [EEA 1997]. The emission of ozone depleting substances is taken from the calculation in section 7.2.6. The last table shows the relative contribution from the different substances for the hierarchical perspectives. Clearly CO₂ is dominating.

Substance	Damage factors			Emission t/yr	Normalisation values			
	Egalitarian DALYs(0,0)/t	Hierarchist DALYs(0,0)/t	Individualist DALYs(0,1)/t		Egalitarian Dalys/yr	Hierarchist Dalys/yr	Individualist Dalys/yr	Hierarchist Contribution
Carbon Dioxide	2.10E-04	2.10E-04	2.00E-04	3.30E+09	6.93E+05	6.93E+05	6.60E+05	76%
Methane	4.40E-03	4.40E-03	4.40E-03	2.32E+07	1.02E+05	1.02E+05	1.02E+05	11%
Nitrous Oxide	6.90E-02	6.90E-02	6.70E-02	9.83E+05	6.78E+04	6.78E+04	6.59E+04	7%
Methylene chloride	1.90E-03	1.90E-03	1.90E-03	5.59E+02	1.06E+00	1.06E+00	1.06E+00	0%
CFC-11	2.20E-01	2.20E-01	2.20E-01	7.70E+03	1.69E+03	1.69E+03	1.69E+03	0%
CFC-12	1.40E+00	1.40E+00	1.30E+00	3.90E+03	5.46E+03	5.46E+03	5.07E+03	1%
CFC-113	6.30E-01	6.30E-01	6.20E-01	4.90E+01	3.09E+01	3.09E+01	3.04E+01	0%
HCFC-22	2.80E-01	2.80E-01	2.80E-01	4.73E+04	1.32E+04	1.32E+04	1.32E+04	1%
HCFC-142b	3.40E-01	3.40E-01	3.40E-01	6.90E+04	2.35E+04	2.35E+04	2.35E+04	3%
H1301 (i)	-7.10E+00	-7.10E+00	-7.00E+00	8.42E+02	-5.98E+03	-5.98E+03	-5.89E+03	-1%
HCFC-141b	5.20E-02	5.20E-02	5.20E-02	2.01E+05	1.05E+04	1.05E+04	1.05E+04	1%
Tetrachloromethane	-2.60E-01	-2.60E-01	-2.50E-01	1.40E+04	-3.64E+03	-3.64E+03	-3.50E+03	0%
Totals					9.08E+05	9.08E+05	8.72E+05	

Table 7.5: Calculation of normalisation values for greenhouse effect, based on the data of [BLONK ET AL 1997], the update 1999 in section 7.2.1 and calculation of emissions for ozone depleting substances in section 7.2.6.

7.2.5. Normalisation values for ionising radiation

The normalisation for ionising radiation is based on the emissions per TWh electricity, as it is produced in France. The resulting damage is then multiplied with the nuclear power consumption in Europe. This procedure does not give a complete picture, as other nuclear industrial activities are excluded.

Specific emissions Unit	Emission MBq/TWh	Damage factor per kBq			Damage in DALYs per TWh		
		Egalitarian DALYs(0,0)/ kBq	Hierarchist DALYs(0,0)/ KBq	Individualist DALYs(0,1)/ kBq	Egalitarian DALYs(0,0)/yr	Hierarchist DALYs(0,0)/yr	Individualist DALYs(0,1)/yr
Airborne							
Radio. C14 p 1)	84300	2.10E-07	2.10E-07	1.60E-08	1.77E+01	1.77E+01	1.35E+00
Radio. Co58 p	0.496	4.30E-10	4.30E-10	3.60E-10	2.13E-07	2.13E-07	1.79E-07
Radio. Co60 p	0.496	1.60E-08	1.60E-08	1.40E-08	7.94E-06	7.94E-06	6.94E-06
Radio. Cs134 p	0.496	1.20E-08	1.20E-08	1.00E-08	5.95E-06	5.95E-06	4.96E-06
Radio. Cs137 p	0.496	1.30E-08	1.30E-08	1.10E-08	6.45E-06	6.45E-06	5.46E-06
Radio. H3 p	195800	1.40E-11	1.40E-11	1.20E-11	2.74E-03	2.74E-03	2.35E-03
Radio. I129 p	51.1	9.40E-07	9.40E-07	2.50E-07	4.80E-02	4.80E-02	1.28E-02
Radio. I131 p	3.648	1.60E-10	1.60E-10	1.30E-10	5.84E-07	5.84E-07	4.74E-07
Radio. I133 p	6.233	9.40E-12	9.40E-12	7.90E-12	5.86E-08	5.86E-08	4.92E-08
Radio. Kr85 p	7.21E+08	1.40E-13	1.40E-13	1.20E-13	1.01E-01	1.01E-01	8.65E-02
Radio. Pb210 p	0	1.50E-09	1.50E-09	1.30E-09	0.00E+00	0.00E+00	0.00E+00
Radio. Po210 p	0	1.50E-09	1.50E-09	1.30E-09	0.00E+00	0.00E+00	0.00E+00
Radio. Pu alpha p	2.33E-05	8.30E-08	8.30E-08	7.00E-08	1.93E-09	1.93E-09	1.63E-09
Radio. Pu238 p	1.02E-05	6.70E-08	6.70E-08	5.70E-08	6.83E-10	6.83E-10	5.81E-10
Radio. Ra226 p	0	9.10E-10	9.10E-10	7.60E-10	0.00E+00	0.00E+00	0.00E+00
Radio. Rn222 p	11000000	2.40E-11	2.40E-11	2.00E-11	2.64E-01	2.64E-01	2.20E-01
LT Radio. Rn222 p	0				0.00E+00	0.00E+00	0.00E+00
Radio. Th230 p	0	4.50E-08	4.50E-08	3.80E-08	0.00E+00	0.00E+00	0.00E+00
Radio. U234 p	45.596	9.70E-08	9.70E-08	8.20E-08	4.42E-03	4.42E-03	3.74E-03
Radio. U235 p	1.92735	2.10E-08	2.10E-08	1.70E-08	4.05E-05	4.05E-05	3.28E-05
Radio. U238 p	45.48174	8.20E-09	8.20E-09	6.90E-09	3.73E-04	3.73E-04	3.14E-04
Radio. Xe133 p	1070000	1.40E-13	1.40E-13	1.20E-13	1.50E-04	1.50E-04	1.28E-04
Waterborne							
Rad. Ag110m f	480	5.10E-10	5.10E-10	4.20E-10	2.45E-04	2.45E-04	2.02E-04
Rad. Am241 s	92.1	3.10E-08	3.10E-08	2.60E-08	2.86E-03	2.86E-03	2.39E-03
Rad. C14 s	45500	1.20E-09	1.20E-09	9.90E-10	5.46E-02	5.46E-02	4.50E-02
Rad. Cm alpha s	44.2	5.70E-08	5.70E-08	4.80E-08	2.52E-03	2.52E-03	2.12E-03
Rad. Co58 f	700	4.10E-11	4.10E-11	3.40E-11	2.87E-05	2.87E-05	2.38E-05
Rad. Co60 f	250	4.40E-08	4.40E-08	3.70E-08	1.10E-02	1.10E-02	9.25E-03
Rad. Co60 s	9100	3.90E-10	3.90E-10	3.30E-10	3.55E-03	3.55E-03	3.00E-03
Rad. Cs134 f	31	1.40E-07	1.40E-07	1.20E-07	4.34E-03	4.34E-03	3.72E-03
Rad. Cs134 s	1500	7.90E-11	7.90E-11	6.60E-11	1.19E-04	1.19E-04	9.90E-05
Rad. Cs137 f	53	1.70E-07	1.70E-07	1.40E-07	9.01E-03	9.01E-03	7.42E-03
Rad. Cs137 s	13800	7.90E-11	7.90E-11	6.70E-11	1.09E-03	1.09E-03	9.25E-04
Rad. H3 f	1400000	4.50E-13	4.50E-13	3.80E-13	6.30E-04	6.30E-04	5.32E-04
Rad. H3 s	28900000	6.90E-14	6.90E-14	5.80E-14	1.99E-03	1.99E-03	1.68E-03
Rad. I129 s	684	1.00E-07	1.00E-07	1.90E-08	6.84E-02	6.84E-02	1.30E-02
Rad. I131 f	13	5.00E-10	5.00E-10	4.20E-10	6.50E-06	6.50E-06	5.46E-06
Rad. Mn54 f	26	3.10E-10	3.10E-10	2.60E-10	8.06E-06	8.06E-06	6.76E-06
Rad. Pu alpha s	147.7	7.40E-09	7.40E-09	6.20E-09	1.09E-03	1.09E-03	9.16E-04
Rad. Ra 226 f	0	1.30E-10	1.30E-10	1.10E-10	0.00E+00	0.00E+00	0.00E+00
Rad. Ru106 s	87700	1.40E-10	1.40E-10	1.20E-10	1.23E-02	1.23E-02	1.05E-02
Rad. Sb124 f	110	8.20E-10	8.20E-10	6.90E-10	9.02E-05	9.02E-05	7.59E-05
Rad. Sb125 s	61700	1.50E-11	1.50E-11	1.20E-11	9.26E-04	9.26E-04	7.40E-04
Rad. Sr90 s	146000	4.00E-12	4.00E-12	3.40E-12	5.84E-04	5.84E-04	4.96E-04
Rad. U 238 f	7.83	2.30E-09	2.30E-09	1.90E-09	1.80E-05	1.80E-05	1.49E-05
Rad. U 238 s	6044.7	2.30E-11	2.30E-11	2.00E-11	1.39E-04	1.39E-04	1.21E-04
Rad. U234 f	11.57	2.40E-09	2.40E-09	2.00E-09	2.78E-05	2.78E-05	2.31E-05
Rad. U234 s	6370	2.30E-11	2.30E-11	1.90E-11	1.47E-04	1.47E-04	1.21E-04
Rad. U235 f	0.5967	2.30E-09	2.30E-09	2.00E-09	1.37E-06	1.37E-06	1.19E-06
Rad. U235 s	274	2.50E-11	2.50E-11	2.10E-11	6.85E-06	6.85E-06	5.75E-06
Total DALYs/TWh					1.83E+01	1.83E+01	1.78E+00
Nuclear energy in Europe (TWh)					560	560	560
Total damage in Europe (DALYs/yr)					1.02E+04	1.02E+04	9.95E+02

Table 7.6: Calculation of Normalisation, based on specific emissions of the French nuclear fuel cycle per TWh, according to [DREICER 1995]. ¹⁾: to air: p: process specific emission; to water: f: to fresh water; s: to sea water; LT: long term; (Radon emissions occurring during 80'000 years [ESU 1996, VII])

7.2.11. Summary of the normalisation values

Egalitarian						
	Air	Water	Industrial soil	Agricultural soil	Total	per inhabitant
Carcinogenic effects [DALY/yr]	1.99E+05	3.10E+05	1.83E+05	6.77E+04	7.60E+05	2.00E-03
Respiratory (inorganic) [DALY/yr]	4.09E+06				4.09E+06	1.08E-02
Respiratory (organic) [DALY/yr]	2.60E+04				2.60E+04	6.84E-05
Climate Change [DALY/yr]	9.08E+05				9.08E+05	2.39E-03
Radiation [DALY/yr]	1.01E+04	9.84E+01			1.02E+04	2.68E-05
Ozone depletion [DALY/yr]	8.32E+04				8.32E+04	2.19E-04
Total Human health [DALY/yr]	5.31E+06	3.10E+05	1.83E+05	6.77E+04	5.88E+06	1.55E-02
Ecotoxicity (PAFm2yr/yr)	7.02E+11	7.87E+09	2.37E+12	4.32E+08	3.08E+12	8.11E+03
Ecotoxicity (PDFm2yr/yr)	7.02E+10	7.87E+08	2.37E+11	4.32E+07	3.08E+11	8.11E+02
Acidification/nitrification (PDF m2yr/yr)	1.43E+11				1.43E+11	3.75E+02
Land-use (PDF m2yr/yr)	1.50E+12				1.50E+12	3.95E+03
Total Ecosystem Quality (PDF.m2.yr/yr.)	1.71E+12	7.87E+08	2.37E+11	4.32E+07	1.95E+12	5.13E+03
Minerals [MJ/yr]					5.69E+10	1.50E+02
Fossil [MJ/yr]					2.20E+12	5.79E+03
Total Resources [MJ/yr]					2.26E+12	5.94E+03
Hierarchist						
	Air	Water	Industrial soil	Agricultural soil	Total	
Carcinogenic effects [DALY/yr]	1.99E+05	3.10E+05	1.83E+05	6.77E+04	7.60E+05	2.00E-03
Respiratory (inorganic) [DALY/yr]	4.05E+06				4.05E+06	1.07E-02
Respiratory (organic) [DALY/yr]	2.60E+04				2.60E+04	6.84E-05
Climate Change [DALY/yr]	9.08E+05				9.08E+05	2.39E-03
Radiation [DALY/yr]	1.01E+03	9.84E+01			1.02E+04	2.68E-05
Ozone depletion [DALY/yr]	8.32E+04				8.32E+04	2.19E-04
Total Human health [DALY/yr]	5.27E+06	3.10E+05	1.83E+05	6.77E+04	5.84E+06	1.54E-02
Ecotoxicity (PAFm2yr/yr)	7.02E+11	7.87E+09	2.37E+12	4.32E+08	3.08E+12	8.11E+03
Ecotoxicity (PDFm2yr/yr)	7.02E+10	7.87E+08	2.37E+11	4.32E+07	3.08E+11	8.11E+02
Acidification/nitrification (PDF m2yr/yr)	1.43E+11				1.43E+11	3.75E+02
Land-use (PDF m2yr/yr)	1.50E+12				1.50E+12	3.95E+03
Total Ecosystem Quality (PDF.m2.yr/yr.)	1.71E+12	7.87E+08	2.37E+11	4.32E+07	1.95E+12	5.13E+03
Minerals [MJ/yr]					5.69E+10	1.50E+02
Fossil [MJ/yr]					3.14E+12	8.26E+03
Total Resources [MJ/yr]					3.20E+12	8.41E+03
Individualist						
	Air	Water	Industrial soil	Agricultural soil	Total	
Carcinogenic effects [DALY/yr]	1.40E+04	6.20E+04	3.06E+03	0.00E+00	7.91E+04	2.08E-04
Respiratory (inorganic) [DALY/yr]	2.09E+06				2.09E+06	5.50E-03
Respiratory (organic) [DALY/yr]	2.42E+04				2.42E+04	6.37E-05
Climate Change [DALY/yr]	8.72E+05				9.09E+06	2.29E-03
Radiation [DALY/yr]	9.38E+02	5.74E+01			9.95E+02	2.62E-06
Ozone depletion [DALY/yr]	6.73E+04				6.73E+04	1.77E-04
Total Human health [DALY/yr]	3.07E+06	6.21E+04	3.06E+03	0.00E+00	3.13E+06	8.25E-03
Ecotoxicity (PAFm2yr/yr)	7.37E+10	5.10E+09	6.14E+11	4.32E+08	6.93E+11	1.82E+03
Ecotoxicity (PDFm2yr/yr)	7.37E+09	5.10E+08	6.14E+10	4.32E+07	6.93E+10	1.82E+02
Acidification/nitrification (PDF m2yr/yr)	1.43E+11				1.43E+11	3.76E+02
Land-use (PDF m2yr/yr)	1.50E+12				1.50E+12	3.95E+03
Total Ecosystem Quality (PDF.m2.yr/yr.)	1.65E+12	2.62E+08	6.14E+10	4.32E+07	1.71E+12	4.51E+03
Minerals [MJ/yr]					5.69E+10	1.50E+02
Fossil [MJ/yr]					0.00E+00	0.00E+00
Total Resources [MJ/yr]					5.69E+10	1.50E+02

Table 7.16: Normalisation values for Europe (totals for Europe and per habitant)

7.3. Weighting

The relevant data is described in the methodology report.