



General Distribution
October 2015

ISOE INFORMATION SHEET

EUROPEAN DOSIMETRIC RESULTS FOR 2013

ISOE European Technical Centre - Information Sheet No. 58

This ISOE Information Sheet presents the average annual collective doses per reactor (PWRs, VVERs, BWRs) for the period 2011-2013 in the European countries participating in ISOE.

Main changes in 2013:

- Russian Federation became a member of the European Technical Centre (17 operating VVERs and 2 shutdown VVERs). The dosimetric results of the operating plants are now integrated in this information sheet.
- The reactor of Santa Maria de Garona (BWR, Spain) was shutdown. There is now only 1 operating BWR in Spain.

In 2013 the average annual collective dose per reactor for all PWRs increased from 0.58 to 0.66 man·Sv, mainly due to an increase of Slovenian result (the plant faced an outage with large maintenance work) (see Table 1)

Regarding VVER reactors, a slight decrease is observed in terms of average collective dose per reactor (0.38 man·Sv in 2013 compared to 0.47 man·Sv in 2012), mainly due to Finnish results (lowest outage doses in Loviisa plant history).

Regarding BWRs, the average annual collective dose per reactor has increased in 2013 with a value at 0.88 man·Sv compared to 0.74 man·Sv in 2012, mainly due to Spain results (no outage in 2012 for both plants, 1 outage in 2013) (see Table 2).

The evolution of the 3-year rolling average annual collective dose, which provides a better representation of the general trend in dose, shows a small increase of PWR average, a decrease for VVERs and a stability for BWRs (see Tables 3 and 4).

Regarding VVERs, the Czech Republic presents the lowest 3-year rolling average annual collective dose per reactor in 2010-2013 with 0.12 man·Sv per reactor, followed by the Slovak Republic (0.15 man·Sv per reactor), Finland (0.49 man·Sv per reactor), Hungary (0.51 man·Sv per reactor) and Russian Federation (0.60 man·Sv per reactor) (see Figure 1).

For European PWRs, the data per country show that with respect to the 3-year rolling average annual collective dose for 2011-2013, five main groups can be distinguished (see Figure 2):

Belgium, Germany, United Kingdom:
around 0.3 man·Sv per reactor,
Switzerland:
around 0.4 man·Sv per reactor,
Spain, The Netherlands :
around 0.5 man·Sv per reactor,
France:
around 0.7 man·Sv per reactor,
Slovenia, Sweden:
around 0.8 man·Sv per reactor.

The 3-year rolling average annual collective dose per reactor for BWRs are quite similar in Germany, Sweden and Switzerland around 1 man·Sv per reactor. Finland is presenting the lowest value with 0.39 man·Sv per reactor and Spain the highest value with 1.52 man·Sv per reactor (see Figure 3).

For further information on the evolution of collective doses in different countries, please refer to the Country reports in ISOE Annual Report published on the ISOE website (www.isoe-network.net).

Table 1. PWRs average annual collective dose per reactor by country from 2011 to 2013

Country (Number of reactors)	Average annual coll. dose per reactor (man-Sv)		
	2011	2012	2013
PWR Group:			
Belgium (7)	0.37	0.33	0.19
France (58)	0.72	0.68	0.79
Germany (7*)	0.43	0.23	0.32
Netherlands (1)	0.28	0.33	0.83
Slovenia (1)	0.07	0.88	1.35
Spain (6)	0.50	0.47	0.38
Sweden (3)	1.43	0.54	0.52
Switzerland (3)	0.36	0.43	0.35
United Kingdom (1)	0.54	0.04	0.39
PWR Sub-Total (87*)	0.64	0.58	0.66
Czech Republic (6)	0.12	0.12	0.12
Finland (2)	0.36	0.84	0.27
Hungary (4)	0.59	0.45	0.50
Russian Federation (17*)	0.66	0.62	0.52
Slovak Republic (4)	0.14	0.17	0.13
VVER Sub-Total (33*)	0.47	0.47	0.38
All PWR Group (120*)	0.59	0.55	0.58

* Germany: 11 reactors in 2011; 7 reactors in 2012 and 2013;

* PWRs: 91 reactors in 2011; 87 reactors in 2012 and 2013;

* Russian Federation: 16 reactors in 2011, 17 reactors in 2012 and 2013

* All PWRs Group: 123 reactors in 2011; 120 reactors in 2012 and 2013.

Table 2. BWRs average annual collective dose per reactor by country from 2011 to 2013

Country (Number of reactors)	Average annual coll. dose per reactor (man-Sv)		
	2011	2012	2013
BWR Group:			
Finland (2)	0.48	0.36	0.32
Germany (6*)	0.58	1.07	1.09
Spain (1*)	2.05	0.25	2.25
Sweden (7)	1.07	0.67	0.71
Switzerland (2)	1.07	1.49	1.11
All BWR Group (14*)	0.96	0.74	0.88

* Germany: 6 reactors in 2011; 2 reactors in 2012 and 2013

* Spain: 2 reactors in 2011 and 2012; 1 reactor in 2013

* All BWR Group: 19 reactors in 2011; 15 reactors in 2012; 14 reactors in 2013

Table 3. PWRs 3-year rolling average annual collective dose per reactor by country

Country	Average annual coll. dose per reactor (man-Sv)		
	2009-11	2010-12	2011-13
PWR Group:			
Belgium	0.34	0.33	0.30
France	0.68	0.67	0.73
Germany	0.69	0.42	0.32
Netherlands	0.38	0.41	0.48
Slovenia	0.52	0.60	0.77
Spain	0.52	0.43	0.45
Sweden	0.94	0.81	0.83
Switzerland	0.42	0.44	0.38
United Kingdom	0.38	0.28	0.32
PWR Sub-Total	0.64	0.59	0.62
Czech Republic	0.13	0.12	0.12
Finland	0.51	0.67	0.49
Hungary	0.47	0.47	0.51
Russian Federation	0.70	0.64	0.60
Slovak Republic	0.17	0.16	0.15
VVER Sub-Total	0.48	0.46	0.44
All PWR Group	0.60	0.56	0.57

Table 4. BWRs 3-year rolling average annual collective dose per reactor by country

Country	Average annual coll. dose per reactor (man-Sv)		
	2009-11	2010-12	2011-13
BWR Group:			
Finland	0.51	0.43	0.39
Germany	0.82	0.85	0.92
Spain	1.63	0.94	1.52
Sweden	1.14	0.89	0.82
Switzerland	1.16	1.27	1.23
All BWR Group	1.03	0.86	0.87

Figure 1. Evolution of the VVERs 3-Year Rolling Average Collective Dose per Reactor by Country

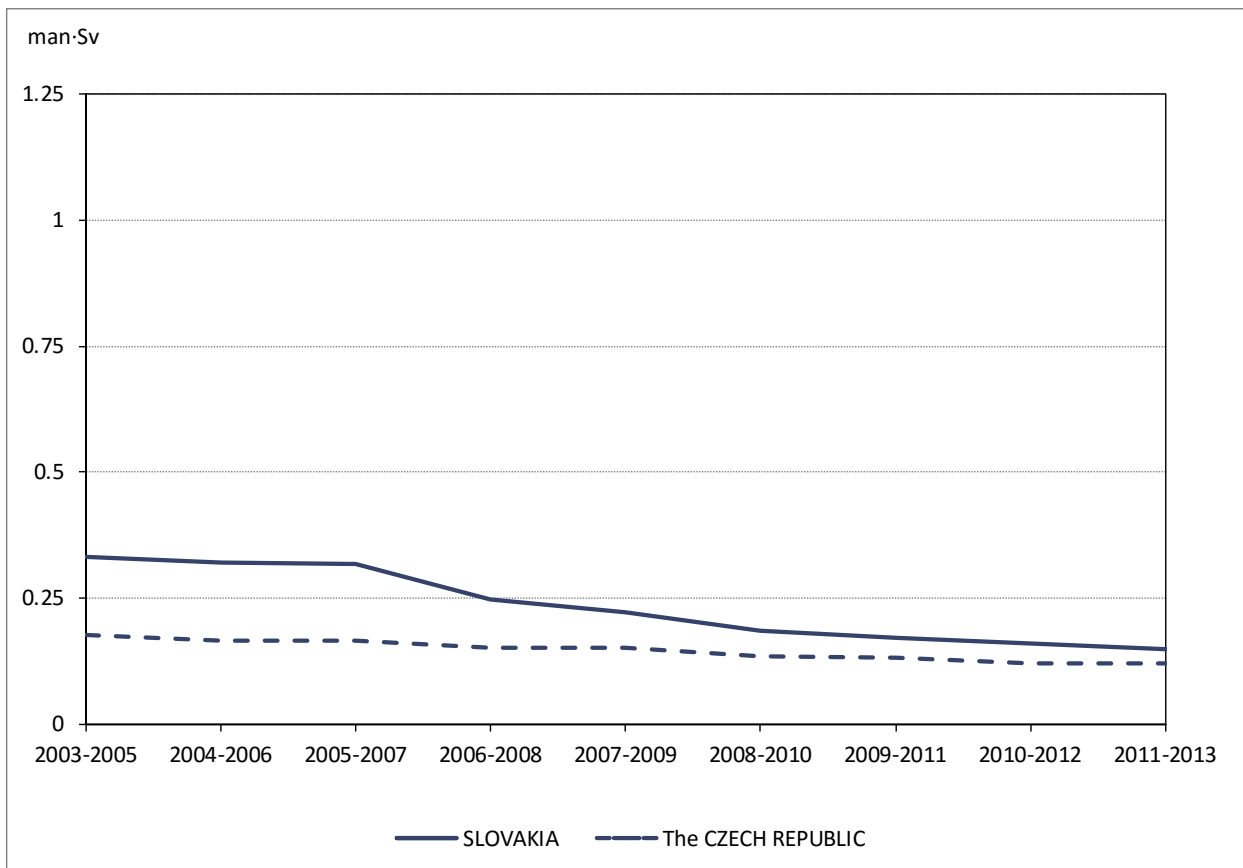
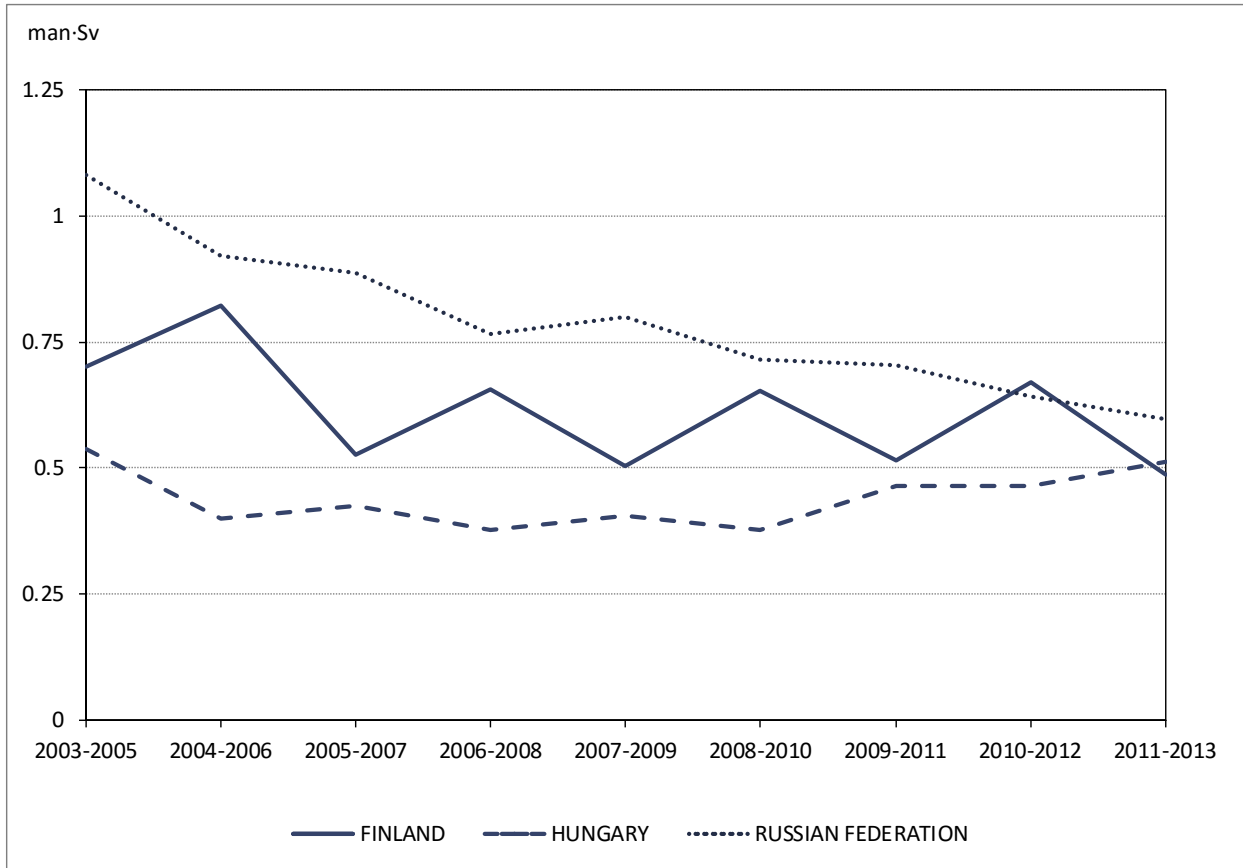


Figure 2. Evolution of the PWRs 3-Year Rolling Average Collective Dose per Reactor by Country

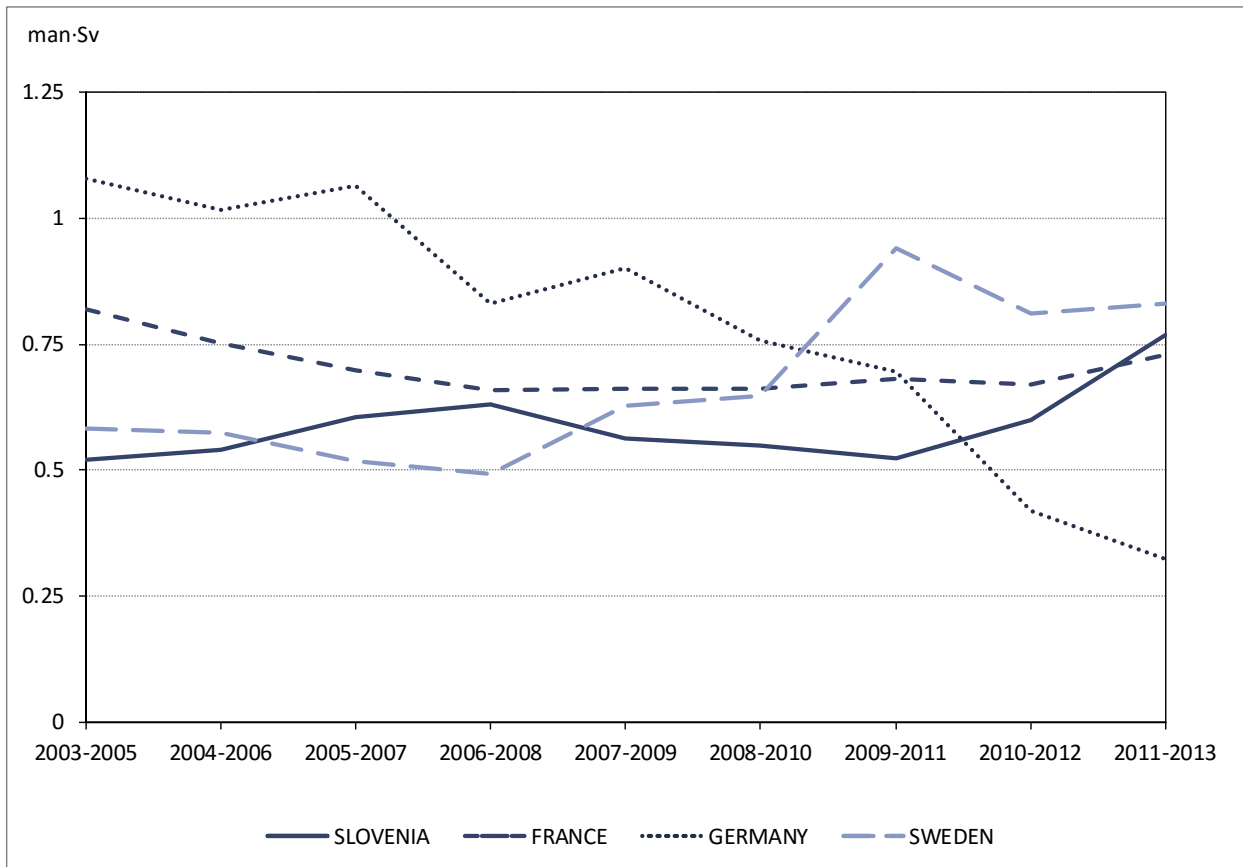
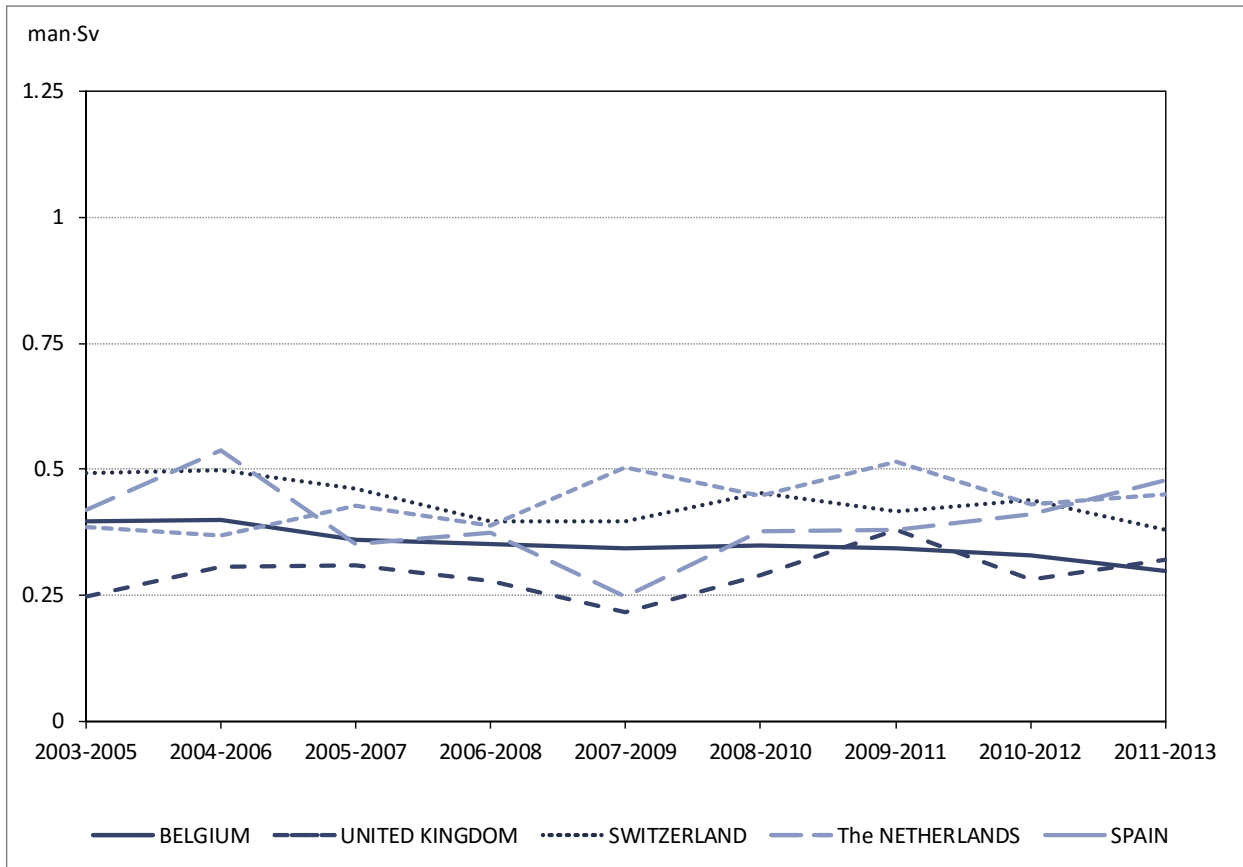


Figure 3. Evolution of the BWRs 3-Year Rolling Average Collective Dose per Reactor by Country

