

ISOE INFORMATION SHEET

EUROPEAN DOSIMETRIC RESULTS FOR 2009

ISOE European Technical Centre - Information Sheet No. 53 (2011)

This ISOE Information Sheet presents the average annual collective doses per reactor (PWRs, VVERs, BWRs) for the period 2007 - 2009 in the European countries participating in ISOE.

In 2009 the average annual collective dose per reactor for all PWRs and VVERs is increasing compared to 2008 going from 0.53 man·Sv to 0.63 man·Sv. The average collective dose for all BWRs has also increased compared to 2008, with a value at 1.26 man·Sv compared to 0.91 in 2008 (see Tables 1 and 2). Among the reasons which can explain such an increase, it can be noted that year 2009 was marked by the following situations in the main countries affected:

- Sweden: ongoing projects of modernisation,
- Germany: outages performed for all plants (4 of them with a duration exceeding 10 months),
- Spain: unscheduled BWR outages and a large refuelling PWR outage,
- France: a great number of unforeseen events (with an impact of 0.92 man·Sv), 2 reactor vessel head replacements and 1 steam generator replacement.

The evolution of the 3-year rolling average annual collective dose, which provides a better representation of the general trend in dose, shows a continuity of the decrease for VVERs. An increase of the 2007-2009 value is noticed for PWRs and BWRs compared to the previous period. For these two types of reactors, the value of 2007-2009 stills

however lower than the 2005-2007 value (see Tables 3 and 4).

Regarding VVERs, the Czech Republic presents the lowest 3-year rolling average annual collective dose per reactor in 2007-2009 with 0.15 man·Sv per reactor, followed by the Slovak Republic (0.19 man·Sv per reactor), Hungary (0.41 man·Sv per reactor) and Finland (0.50 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 2007-2009, five main groups can be distinguished (see Figure 2):

- The Netherlands, United Kingdom:
below 0.25 man·Sv per reactor,
- Belgium and Switzerland:
between 0.3 and 0.4 man·Sv per reactor,
- Spain, Slovenia :
between 0.5 and 0.6 man·Sv per reactor,
- France, Sweden:
between 0.6 and 0.7 man·Sv per reactor,
- Germany:
0.9 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 0.55 man·Sv per reactor and Spain the highest with 2.32 man·Sv per reactor (see Figure 3).

Table 1. PWRs average annual collective dose per reactor by country from 2007 to 2009

Country	Average annual coll. dose per reactor (man·Sv)		
	2007	2008	2009
PWR Group:			
Belgium	0.29	0.39	0.37
France	0.62	0.66	0.70
Germany	1.04	0.62	1.05
Netherlands	0.23	0.28	0.24
Slovenia	0.89	0.15	0.65
Spain	0.50	0.29	0.72
Sweden	0.41	0.56	0.92
Switzerland	0.37	0.46	0.36
United Kingdom	0.05	0.26	0.34
PWR Sub-Total	0.62	0.59	0.71
Czech Republic	0.17	0.13	0.15
Finland	0.36	0.78	0.38
Hungary	0.45	0.33	0.44
Slovak Republic*	0.24	0.16	0.17
VVER Sub-Total	0.28	0.26	0.25
All PWR Group	0.56	0.53	0.63

*includes JAVYS 1 and 2 reactors which are in preparation stage for decommissioning (respectively shutdown since 1st January 2007 and 1st January 2009).

Table 2. BWRs average annual collective dose per reactor by country from 2007 to 2009

Country	Average annual coll. dose per reactor (man·Sv)		
	2007	2008	2009
BWR Group:			
Finland	0.59	0.46	0.59
Germany	0.99	1.19	1.00
Spain	4.15	0.50	2.31
Sweden	1.10	0.85	1.41
Switzerland	1.10	1.16	1.14
All BWR Group	1.33	0.91	1.26

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

Country	Average annual coll. dose per reactor (man·Sv)		
	2005-07	2006-08	2007-09
PWR Group:			
Belgium	0.36	0.36	0.35
France	0.70	0.66	0.66
Germany	1.06	0.83	0.90
Netherlands	0.35	0.38	0.25
Slovenia	0.61	0.63	0.56
Spain	0.43	0.39	0.50
Sweden	0.52	0.49	0.63
Switzerland	0.46	0.40	0.40
United Kingdom	0.31	0.28	0.22
PWR Sub-Total	0.67	0.62	0.64
Czech Republic	0.17	0.15	0.15
Finland	0.53	0.66	0.50
Hungary	0.43	0.38	0.41
Slovak Republic*	0.30	0.23	0.19
VVER Sub-Total	0.31	0.28	0.26
All PWR Group	0.61	0.56	0.58

*includes JAVYS 1 and 2 reactors which are in preparation stage for decommissioning (respectively shutdown since 1st January 2007 and 1st January 2009).

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

Country	Average annual coll. dose per reactor (man·Sv)		
	2005-07	2006-08	2007-09
BWR Group:			
Finland	0.94	0.72	0.55
Germany	1.05	1.11	1.06
Spain	2.29	1.69	2.32
Sweden	1.08	1.02	1.12
Switzerland	1.02	1.08	1.13
All BWR Group	1.18	1.09	1.17

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

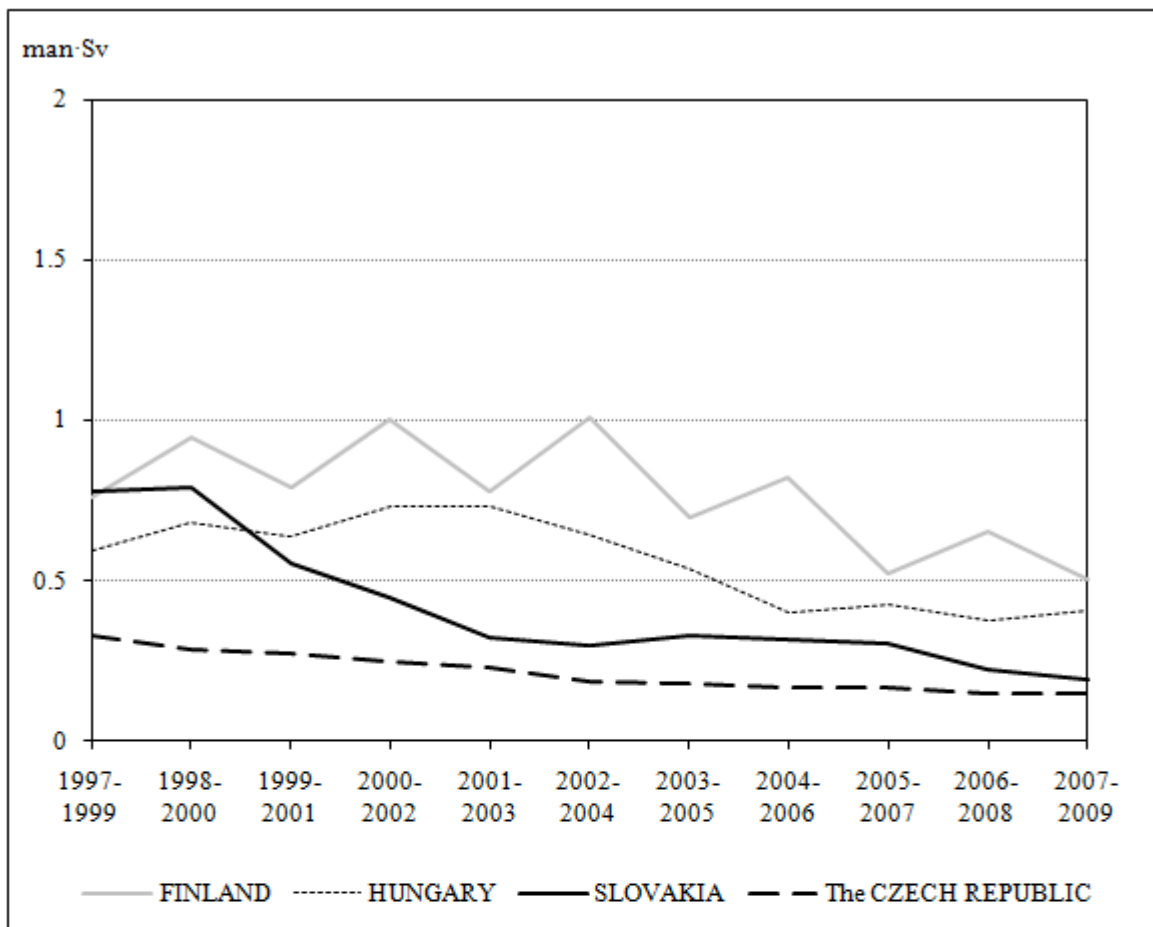


Figure 2. Evolution of the PWRs 3-Year Rolling Average Collective Dose per Reactor by Country

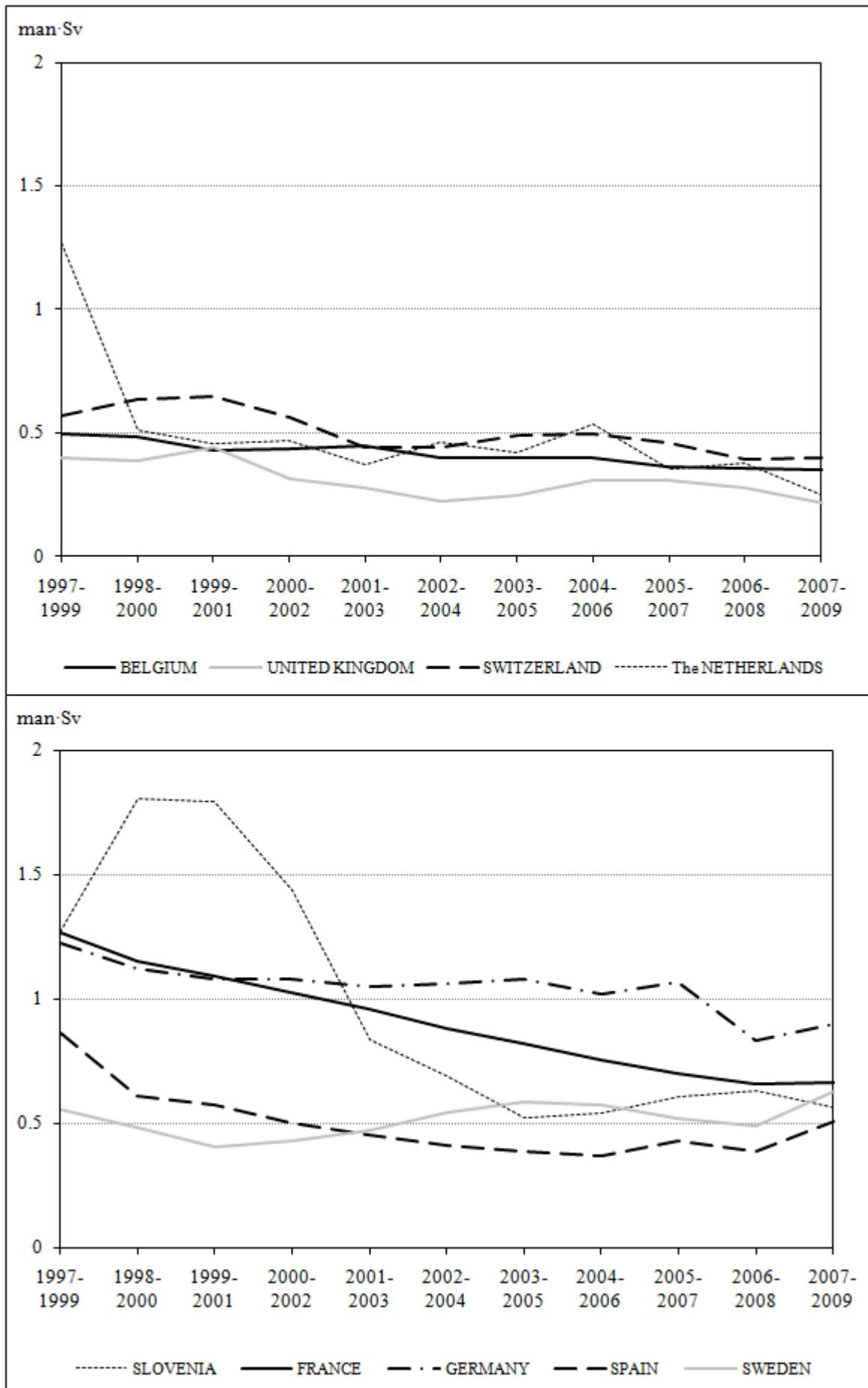


Figure 3. Evolution of the BWRs 3-Year Rolling Average Collective Dose per Reactor by Country

