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ISOE INFORMATION SHEET

EUROPEAN DOSIMETRIC RESULTS FOR 2011

ISOE European Technical Centre - Information Sheet No. 56

This ISOE Information Sheet presents the average annual collective doses per reactor (PWRs, VVERs, BWRs) for the period 2009-2011 in the European countries participating in ISOE.

In 2011 the average annual collective dose per reactor for all PWRs and VVERs increased from 0.52 man·Sv to 0.58 man·Sv.

Regarding PWR reactors, the average collective dose increased going from 0.57 man·Sv per reactor in 2010 to 0.64 man·Sv per reactor in 2011. Such increase is mainly due to: many projects in progress for modernization, plant life extension, safety related measures (regulatory demands) and power upgrades in Sweden (see Table 1).

Regarding BWRs, the average collective dose has also increased in 2011 with a value at 0.96 man·Sv compared to 0.86 in 2010 (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 stability of the averages for PWRs & VVERs and for BWRs after a decrease in 2008-2010 (see Tables 3 and 4).

Regarding VVERs, the Czech Republic and Slovak Republic present the lowest 3-year rolling average annual collective dose per reactor in 2009-2011 with 0.12 man·Sv per reactor, followed by the Slovak Republic (0.14 man·Sv per reactor),

Hungary (0.36 man·Sv per reactor) and Finland (0.59 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 2009-2011, four main groups can be distinguished (see Figure 2):

Belgium, The Netherlands, Switzerland, United Kingdom:

around 0.4 man·Sv per reactor,

Slovenia, Spain :

around 0.5 man·Sv per reactor,

France, Germany:

around 0.7 man·Sv per reactor,

Sweden:

around 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 0.51 man·Sv per reactor and Spain the highest value with 1.63 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 (see ISOE Network website, Publications menu - <http://www.isoe-network.net/>).

Table 1. PWRs average annual collective dose per reactor by country from 2009 to 2011

| Country (Number of reactors) | Average annual coll. dose per reactor (man·Sv) | | |
|---------------------------------|---|-------------|-------------|
| | 2009 | 2010 | 2011 |
| PWR Group: | | | |
| Belgium (7) | 0.36 | 0.30 | 0.37 |
| France (58) | 0.70 | 0.62 | 0.72 |
| Germany (11) | 1.05 | 0.61 | 0.43 |
| Netherlands (1) | 0.24 | 0.62 | 0.28 |
| Slovenia (1) | 0.65 | 0.85 | 0.07 |
| Spain (6) | 0.72 | 0.33 | 0.50 |
| Sweden (3) | 0.92 | 0.46 | 1.43 |
| Switzerland (3) | 0.36 | 0.53 | 0.36 |
| United Kingdom (1) | 0.34 | 0.27 | 0.54 |
| PWR Sub-Total | 0.70 | 0.57 | 0.64 |
| Czech Republic (6) | 0.15 | 0.12 | 0.12 |
| Finland (2) | 0.38 | 0.81 | 0.36 |
| Hungary (4) | 0.44 | 0.37 | 0.59 |
| Slovak Republic* (6) | 0.17 | 0.11 | 0.14 |
| VVER Sub-Total | 0.25 | 0.25 | 0.27 |
| All PWR Group | 0.63 | 0.52 | 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 2. BWRs average annual collective dose per reactor by country from 2009 to 2011

| Country (Number of reactors) | Average annual coll. dose per reactor (man·Sv) | | |
|---------------------------------|---|-------------|-------------|
| | 2009 | 2010 | 2011 |
| BWR Group: | | | |
| Finland (2) | 0.59 | 0.45 | 0.48 |
| Germany (6) | 1.01 | 0.88 | 0.58 |
| Spain (2) | 2.31 | 0.52 | 2.05 |
| Sweden (7) | 1.41 | 0.93 | 1.07 |
| Switzerland (2) | 1.14 | 1.25 | 1.07 |
| All BWR Group | 1.26 | 0.84 | 0.84 |

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

| Country | Average annual coll. dose per reactor (man·Sv) | | |
|-----------------------|---|-------------|-------------|
| | 2007-09 | 2008-10 | 2009-11 |
| PWR Group: | | | |
| Belgium | 0.34 | 0.35 | 0.34 |
| France | 0.66 | 0.66 | 0.68 |
| Germany | 0.90 | 0.76 | 0.69 |
| Netherlands | 0.25 | 0.38 | 0.38 |
| Slovenia | 0.56 | 0.55 | 0.52 |
| Spain | 0.50 | 0.45 | 0.52 |
| Sweden | 0.63 | 0.65 | 0.94 |
| Switzerland | 0.40 | 0.45 | 0.42 |
| United Kingdom | 0.22 | 0.29 | 0.38 |
| PWR Sub-Total | 0.64 | 0.62 | 0.64 |
| Czech Republic | 0.15 | 0.13 | 0.13 |
| Finland | 0.50 | 0.65 | 0.51 |
| Hungary | 0.41 | 0.38 | 0.47 |
| Slovak Republic* | 0.19 | 0.15 | 0.14 |
| VVER Sub-Total | 0.26 | 0.25 | 0.26 |
| All PWR Group | 0.57 | 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) | | |
|----------------------|---|-------------|-------------|
| | 2007-09 | 2008-10 | 2009-11 |
| BWR Group: | | | |
| Finland | 0.55 | 0.50 | 0.51 |
| Germany | 1.06 | 1.03 | 0.82 |
| Spain | 2.32 | 1.11 | 1.63 |
| Sweden | 1.12 | 1.06 | 1.14 |
| Switzerland | 1.13 | 1.18 | 1.16 |
| All BWR Group | 1.17 | 1.01 | 1.03 |

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

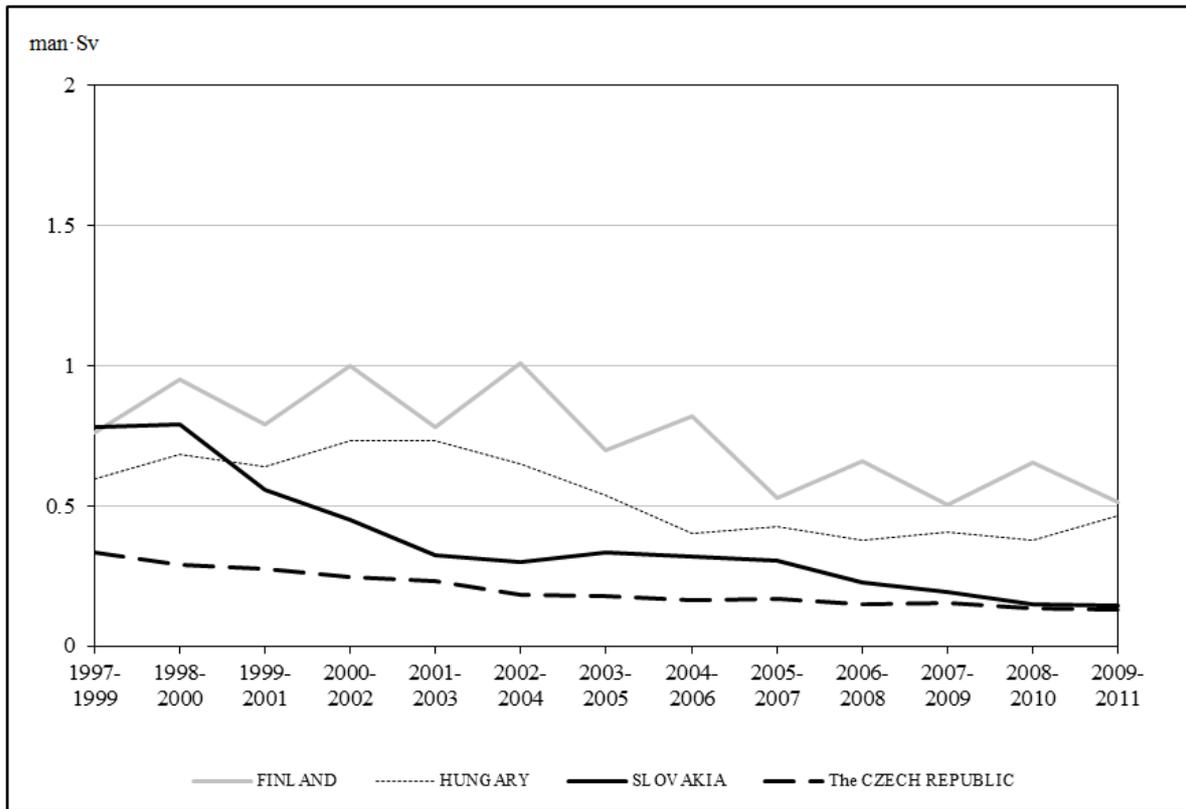


Figure 2. Evolution of the PWRs 3-Year Rolling Average Collective Dose per Reactor by Country

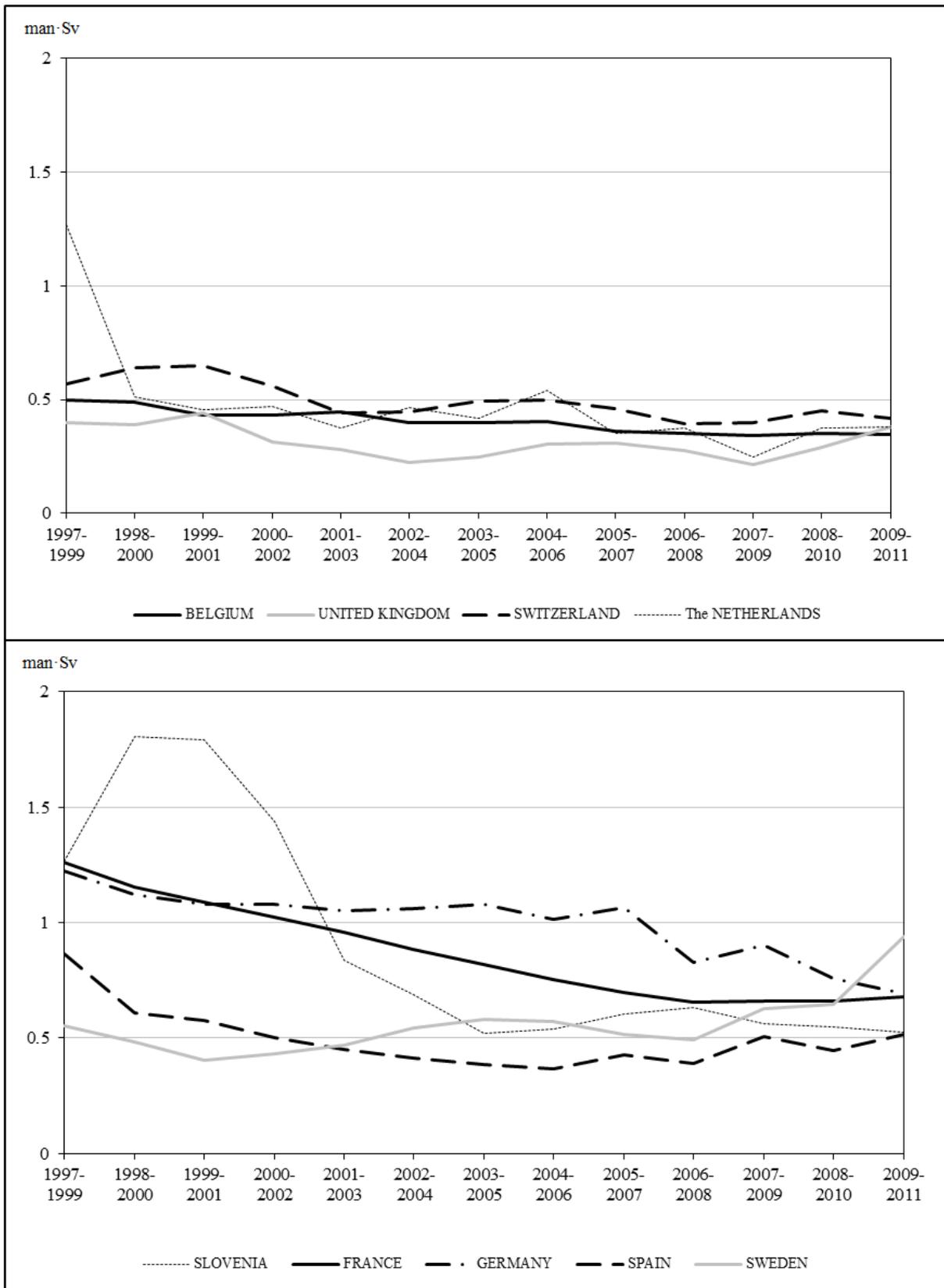


Figure 3. Evolution of the BWRs 3-Year Rolling Average Collective Dose per Reactor by Country

