



ISOE INFORMATION SHEET

**PRELIMINARY EUROPEAN  
DOSIMETRIC RESULTS  
FOR 1996**

**ISOE European Technical Centre - CEPN Information Sheet No. 10**

This ISOE Information Sheet presents the last ten years trend in occupational exposure in Europe, for reactors in operation. The average collective dose per reactor in each country in 1994, 1995 and 1996 for PWRs and BWRs respectively are given in Tables 1 and 2.

Two new countries are now members of the European Region: the Czech Republic and Hungary, both operating VVER reactors. All the European PWR results have been therefore recalculated in order to take into account the Czech Republic and Hungary.

The decrease of European PWR average collective dose is mainly due to the increasing number of VVER reactors (10 reactors), included in European Region and to the fact that these reactors have doses around 0.5-0.7 personSv per unit.

In Sweden, since four years, the average collective dose per reactor is approximately 0.7-0.8 personSv a year. These results may be analysed having in mind that each of the three 3-loops Westinghouse PWR type has annually a refueling outage. In 1995 when a steam generator replacement (SGR) was performed at Ringhals 3, the average collective dose per reactor did not exceed 1 personSv.

Dosimetric results have also been lower than 1 personSv a year, several times since 1994 both in Belgium and Switzerland; particularly noticeable are the results in 1996 in Belgium when all 7 reactors have had a refueling outage and when a SGR occurred in Doel 4 with excellent dosimetric results (0.63 personSv).

Table 1. PWRs average collective dose per reactor by country from 1994 to 1996

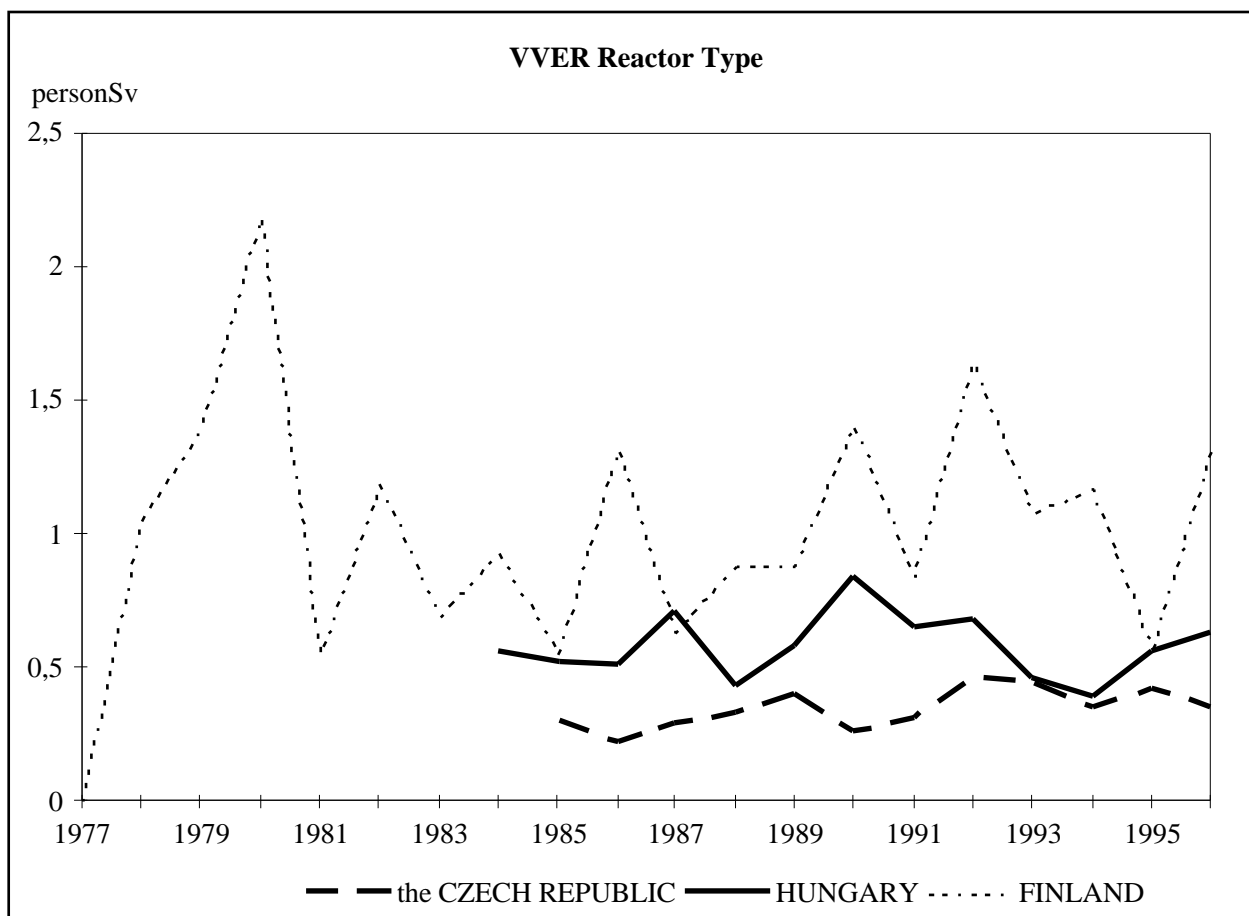
Country	Average coll. dose (personSv)		
	1994	1995	1996
Belgium	0.98	1.31	0.92
France	1.74	1.63	1.59
Germany	2.25	2.00	1.66
Netherlands	1.82	0.97	1.11
Spain	1.77	2.12	1.47
Switzerland	0.79	0.82	0.71
Sweden	0.64	0.98	0.66
United Kingdom	-	0.03	0.53
<b>Sub-Total</b>	<b>1.69</b>	<b>1.63</b>	<b>1.46</b>
Czech Republic	0.35	0.42	0.36
Finland	1.17	0.57	1.32
Hungary	0.39	0.56	0.63
<b>VVER Sub-Total</b>	<b>0.53</b>	<b>0.51</b>	<b>0.66</b>
<b>All PWRs</b>	<b>1.58</b>	<b>1.52</b>	<b>1.38</b>

The increase of European BWR average collective dose is mainly due to Spain and Sweden. The results in Spain, operating a small number of reactors, are impacted by the number of reactors which have had a refueling outage: in 1996, the 2 BWRs have had an outage (none in 1995). In Sweden, the increase is due to the increase of safety requirements (material testing) for Barsebäck 1 and 2 and modernising projects for Oskarshamn 2. It is important to note that since a few years, all Swedish BWRs are concerned by important modernising works requested by the National Authorities and that, other modernising works are at the planning stage and will be implemented in the near future.

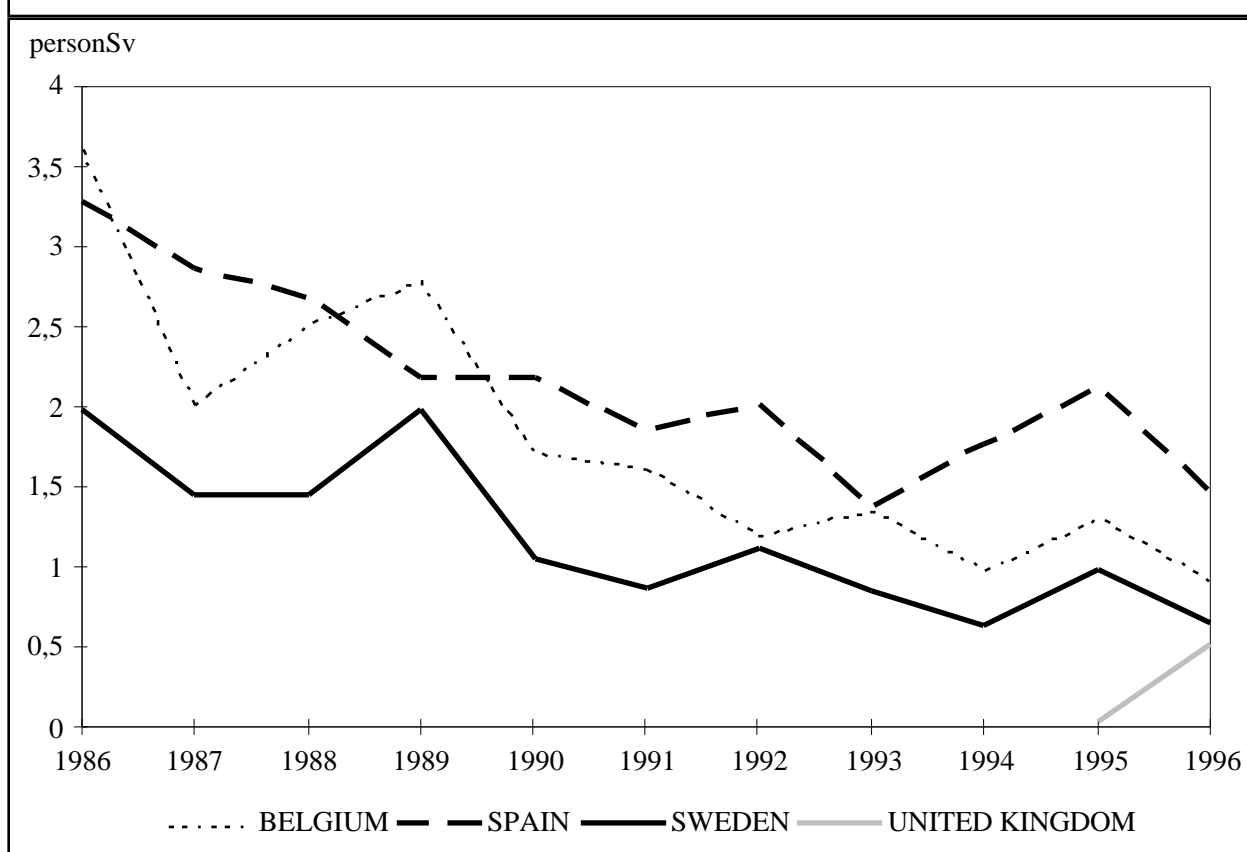
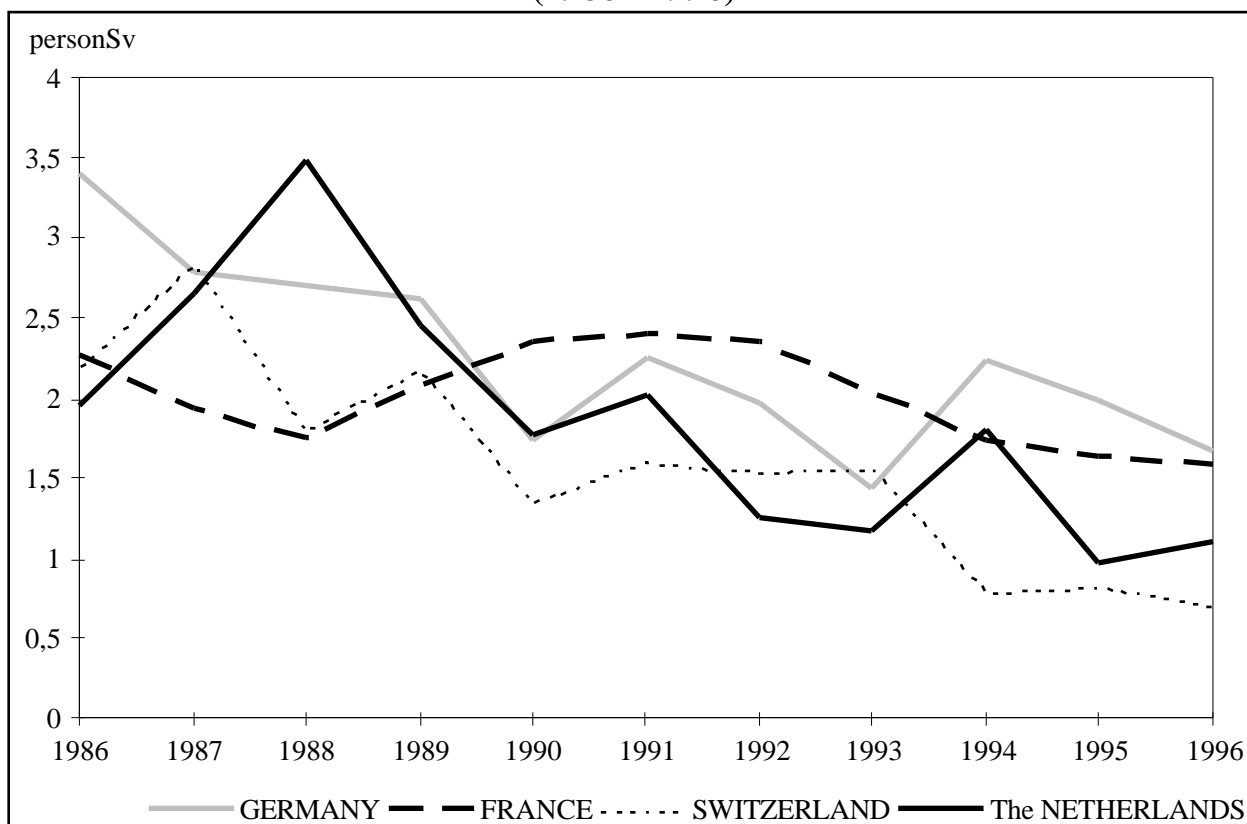
The Figures show PWR and BWR annual average collective dose per reactor by country from 1986 to 1995. For the first time, a figure presents the evolution of VVER annual average collective dose per reactor by country.

Table 2. BWRs average collective dose per reactor by country from 1994 to 1996

Country	Average coll. dose (personSv)		
	1994	1995	1996
Finland	<b>1.20</b>	<b>0.55</b>	<b>0.84</b>
Germany	<b>2.15</b>	<b>1.37</b>	<b>1.43</b>
Netherlands	<b>0.85</b>	<b>1.01</b>	<b>0.99</b>
Spain	<b>3.94</b>	<b>0.52</b>	<b>3.36</b>
Sweden	<b>1.71</b>	<b>1.67</b>	<b>2.25</b>
Switzerland	<b>2.31</b>	<b>1.57</b>	<b>1.68</b>
<b>All PWRs</b>	<b>2.01</b>	<b>1.34</b>	<b>1.89</b>



### Evolution of PWRs Average Collective Dose per Reactor by Country (1986 - 1996)



**Evolution of BWRs Average Collective Dose per Reactor  
by Country  
(1986 - 1996)**

