

Specific tables on the situation of Switzerland

The Vulnerability of Small Countries in the Event of a Major Nuclear Accident in Their Territory
Strategic Analysis and International Comparison

International Version of
“Switzerland’s Vulnerability in the Event of a Major Nuclear Accident in Its Territory”
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Study conducted by the Institut Biosphère on behalf of the organization *Sortir du Nucléaire*

STRATEGIC WEAKNESS AND VULNERABILITY: Rank of 4 Swiss nuclear power plants based on their proximity to Switzerland's main urban areas (rank of each urban area is calculated based on Switzerland's main "metropolitan area"--taken from the results of Table 5--compared to 194 nuclear power plants)							
Tableau i: Switzerland's vulnerability	Population: Urban Area (UA) Rank 1		Population: Urban Area (UA) Rank 2		Population: Urban Area (UA) Rank 3		Switzerland's political vulnerability
	Dist. to plant (km) <=30 31 to 50		Dist. to plant (km) <=30 31 to 50		Dist. to plant (km) <=30 31 to 50		
Nuclear Power Plant Name	No. of UA Rank 1	No. of UA Rank 1	No. of UA Rank 2	No. of UA Rank 2	No. of UA Rank 3	No. of UA Rank 3	Ranking from Table 5 (out of 194 plants) Rank
Beznau	Zh		Bs		Wint		1
Gösgen	Zh		Bs		Lu		7
Leibstadt	Zh		Bs		Wint		8
Mühleberg			Be*		Fr Ne Biel	Thun	11

Table i: Swiss nuclear power plants have a sensitive strategic environment in a 30 km and 50 km radius, making them an abnormally high threat to the country when compared to other plants around the world. Zürich (Zh), Basel (Bs), Bern (Be), Fribourg (Fr), Neuchâtel (Ne), Bienne (Biel), Winterthur (Win), Luzern (Lu), Thun (Thun).

SWISS GOVERNMENT'S RESPONSIBILITY TO THE POPULATION AND COMPARISON TO THE DAMPIERRE NUCLEAR POWER PLANT (Data: Declan Butler ^a)			
Table 8: Population in a 30 km radius and a 75 km radius			
Line No.	Nuclear Power Plant Name	No. of inhabitants in a 30 km radius No. of inhabitants ^a	No. of inhabitants in a 75 km radius No. of inhabitants ^a
1	Dampierre	123'675	1'193'163
2	Beznau	1'027'780	5'866'058
3	Leibstadt	817'983	5'829'898
3	Goesgen	959'787	5'638'222
4	Mühleberg	892'419	3'432'574

a) Data from Declan Butler (*Nature*).
<http://www.nature.com/news/2011/110421/full/472400a.html>. Declan Butler analyzed these data with Kytt MacManus and Liana Razafindrazay of Columbia University's Center for International Earth Science Information Network (CIESIN) using data from the NASA Socioeconomic Data and Applications Center. Data are from 2000 and 2010. For contributors and additional information, see:
<http://www.nature.com/news/2011/110421/full/472400a/box/1.html>

Vulnerability of Switzerland's political equilibrium after a major nuclear accident									
Table 9 Political vulnerability	Population Urban Area (UA) Rank 1		Population Urban Area (UA) Rank 2		Population Urban Area (UA) Rank 3		Population: Rank 4 UA with a political role in Switzerland		Switzerland's political vulnerability
	Dist. to plant (km)		Dist. to plant (km)		Dist. to plant (km)		Dist. to plant (km)		Number of urban areas with a major political role
Nuclear Power Plant	<=30	31 to 50	<=30	31 to 50	<=30	31 to 50	<=30	31 to 50	
	No. UA Rank 1	No. UA Rank 1	No. UA Rank 2	No. UA Rank 2	No. UA Rank 3	No. UA Rank 3	No. UA Rank 4	No. UA Rank 4	
Name									
Beznau	Zh		Bs		(Wint)		Aa	Lie Sch Zug Fra	7
Gösgen	Zh		Bs		Lu		Aa Lie	So Del Zug	8
Leibstadt	Zh		Bs		(Wint)		Aa	Lie Sch	5
Mühleberg			Be*		Fr Ne (Biel)	(Thun)	So Del		5

Table 9: Switzerland is a Federal State comprised of 26 cantons and demicantons with major political roles. Urban areas in parentheses are not cantonal capitals. * Berne is the capital of the Swiss Confederation and the capital of the Bern Canton. The other cantonal capitals are: Zürich (Zh), Basel-Stadt (Bs), Fribourg (Fr), Neuchâtel (Ne), Luzern (Lu), Aarau (Aa), Schaffhausen (Sch), Zug, Frauenfeld (Fra - Thurgovie Canton), Delémont (Dél - Jura Canton), Solothurn (So), Liestal (Lie - Basel-Country Canton).

COMPARISON OF DIFFERENT ECONOMIC ASSESSMENTS OF A MAJOR NUCLEAR ACCIDENT: Belgium, France, Switzerland (in local currency)				
Nuclear Power Plant	Country	Population in 30 km	Per capita income (relative)	Estimated cost of a major nuclear accident
Name	Name	No. inhabitants*	%	(In billions; local currency)
Doel	BELGIUM	1'511'575	base	741 - 1'412**
Beznau	SWITZERLAND	1'027'780	(+)33%****	≥1000
Leibstadt	SWITZERLAND	817'983	(+)33%	≥1000
Goesgen	SWITZERLAND	959'787	(+)33%	≥1000
Mühleberg	SWITZERLAND	892'419	(+)33%	≥1000
Fessenheim	FRANCE	931'516	base	946***
median population surrounding plant	FRANCE	200'000	base	430***
Beznau	SWITZERLAND	1'027'780	(+)42%****	≥1000
Leibstadt	SWITZERLAND	817'983	(+)42%	≥1000
Goesgen	SWITZERLAND	959'787	(+)42%	≥1000
Mühleberg	SWITZERLAND	892'419	(+)42%	≥1000

Table 10: Table 10 is organized into two parts of five and six lines respectively. Part one compares the Doel nuclear power plant with four other Swiss plants; part two compares the four Swiss plants to the two French plants for which damage estimates exist. By comparing the 1,000 billion estimate from the Office of the Protection of the Population with figures proposed by Martens and Matters in Belgium, on the one hand, and by Pascucci-Cahen and Momal in France, on the other, we note the numbers are very similar. The number of people affected in the area surrounding Doel is certainly greater than the number living in proximity to Swiss nuclear power plants; however, we have to consider income is 33% higher in Switzerland than in Belgium (which influences the damage estimate). The population exposed to the French nuclear reactor has the most inhabitants in its surrounding area and it is similar in size to the population in proximity to Swiss plants. Knowing that income is 42% higher in Switzerland, 1,000 billion Swiss francs for a Level 6 major nuclear accident according to the IFSN seems to be an underestimate.

* a) Data from Declan Butler (*Nature*). <http://www.nature.com/news/2011/110421/full/472400a.html>

** Cf. Martens Bart, Matters Smart, De Economische Impact van een Kernramp in Doel, 2014, p. 30.

*** Cf. Pascucci-Cahen Ludivine & Momal Patrick, "Massive radiological releases profoundly differ from controlled releases," Institute of Radioprotection and Nuclear Safety, 2013, p. 6.

**** Cf. OECD 2014 Factbook, "Gross national income per capita," US\$ 2010

PERSPECTIVE COST OF A MAJOR NUCLEAR ACCIDENT GIVEN OTHER SIGNIFICANT AMOUNTS AT PLAY		
1 Total cost of a major nuclear accident in Switzerland	CHF	≥ 1'000'000'000'000
2013 gross domestic product (Switzerland)	CHF	635'000'000'000
Percentage of GDP taken by a major accident	%	≥157%
2 Total cost of a major nuclear accident in Switzerland	CHF	≥1'000'000'000'000
Loss of value by household (3.54 million households**)	CHF	≥ 282'000
Loss of value by inhabitant (8.23 million inhabitants***)	CHF	≥ 122'000
3 Total cost of a major nuclear accident in Switzerland	CHF	≥1'000'000'000'000
Total cost covered by operators (except in the event of a terrorist act)*	CHF	1'000'000'000
Percentage of total covered by operators in the event of a major accident	%	≤ 0.1%
Total covered by the Swiss government*	Euro*	1'200'000'000
Percentage of total covered by the Swiss government for a major accident	%	≤0.13%

Table 11: The first part of the table compares the cost of a major nuclear accident to Switzerland's 2013 GDP; the second part details the loss of value for households and inhabitants. The third part compares the cost of a major nuclear accident to the total covered by insurance carried by operators and the Swiss government.

* Cf. Swiss Confederation, "Le Conseil fédéral adopte une révision totale de l'ordonnance sur la responsabilité civile en matière nucléaire" (The Federal Council adopts a complete revision of the ordinance on civil nuclear liability), 25 March 2015, <https://www.news.admin.ch/message/index.html?lang=fr&msg-id=56671> (consulted July 2015)

** Swiss Federal Office of Statistics, "Produit intérieur brut" (Gross domestic product), 2013 data (consulted July 2015), http://www.bfs.admin.ch/bfs/portal/fr/index/themen/04/02/01/key/bip_nach_verwendungsarten.html

*** Swiss Federal Office of Statistics, "Etat de la population et évolution démographique" (Population size and population composition), 2014 data (consulted July 2015), <http://www.bfs.admin.ch/bfs/portal/fr/index/themen/01/02/blank/key/bevoelkerungsstand.html>