NORDIC AND BALTIC GRID DISTURBANCE AND FAULT STATISTICS 2014

Utdrag ur rapport utarbetad av DISTAC-gruppen under RGN inom ENTSO-E

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entsoe

Reliable Sustainable Connected

- Arbetsgruppen DISTAC är placerad under System Operations Committee / Regional Group Nordic (inom ENTSO-E)
- Representanter från Sverige, Norge, Danmark, Finland, Island, Estland, Lettland och Litauen.

- DISTAC (tidigare Nordel felstatistik) har skapat årlig störningsstatistik sedan år 1999.
- Störningsstatistiken inkluderar spänningsnivåerna **100-400kV**

<u>Normalt arbetsflöde</u>

- **Januari-februari** – förfrågan om årlig data skickas från Svenska kraftnät till regionnätsägarna
- **April-maj** - “Sverige-data” är sammanställt och skickat till konsult som redigerar rapporten
- **September-oktober** – Rapporten presenteras och publiceras

The content of DISTAC's work

- Driftstörningar – antal, orsaker, fördelning över tid
- Störningar med ILE
- Felfrekvens för kraftsystemkomponenter
  - → Luftledningar
  - → Kablar
  - → Transformatorer
  - → Brytare
- Avbrott – antal, tidsutsträckning, per komponent
- Utnyttjandegrad för HVDC-förbindelser

FIGURE 3.1.1 NUMBER OF GRID DISTURBANCES IN EACH NORDIC COUNTRY DURING THE PERIOD 2005–2014

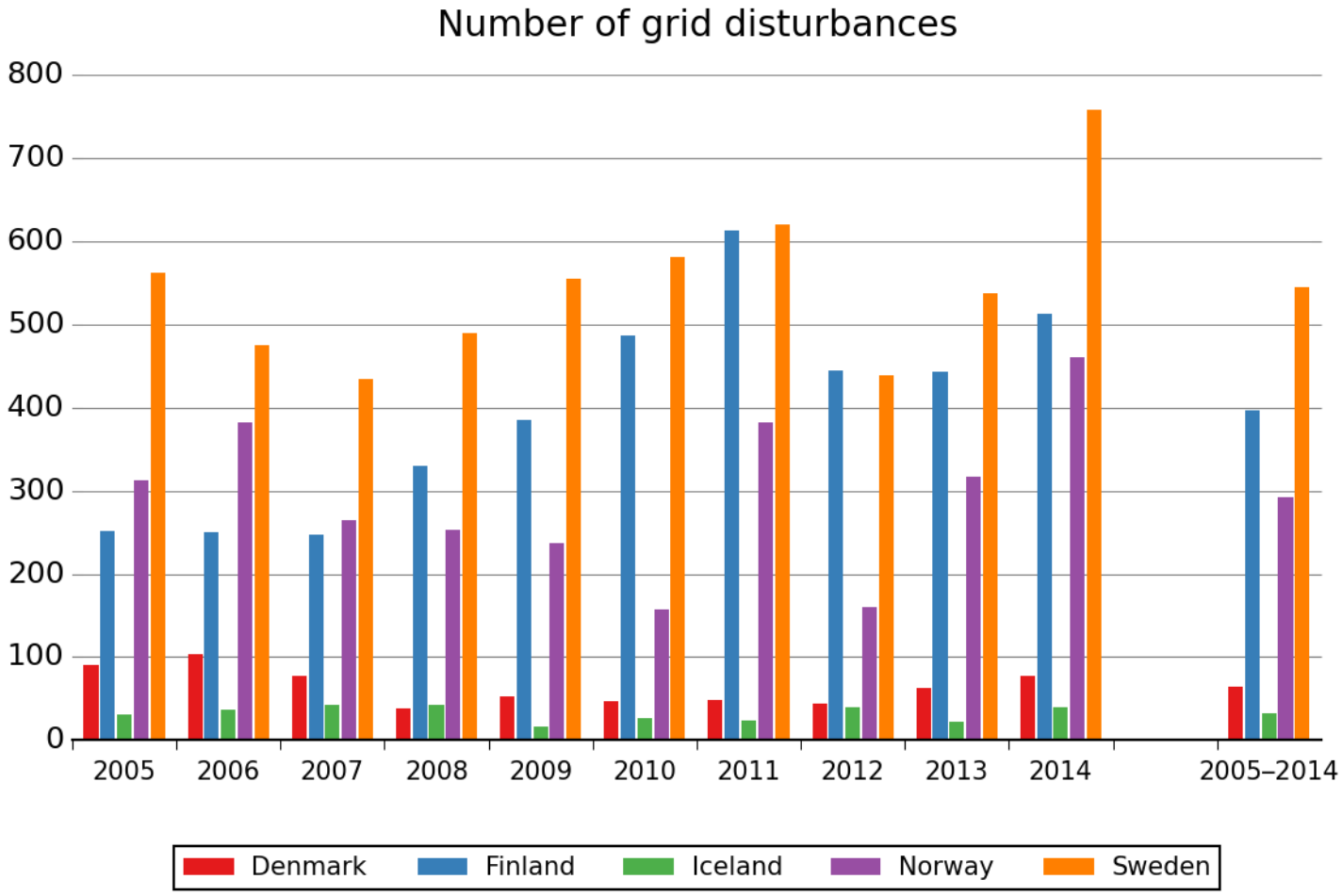


FIGURE 3.3.1 PERCENTAGE DISTRIBUTION OF GRID DISTURBANCES ACCORDING TO CAUSE IN EACH NORDIC COUNTRY IN 2014

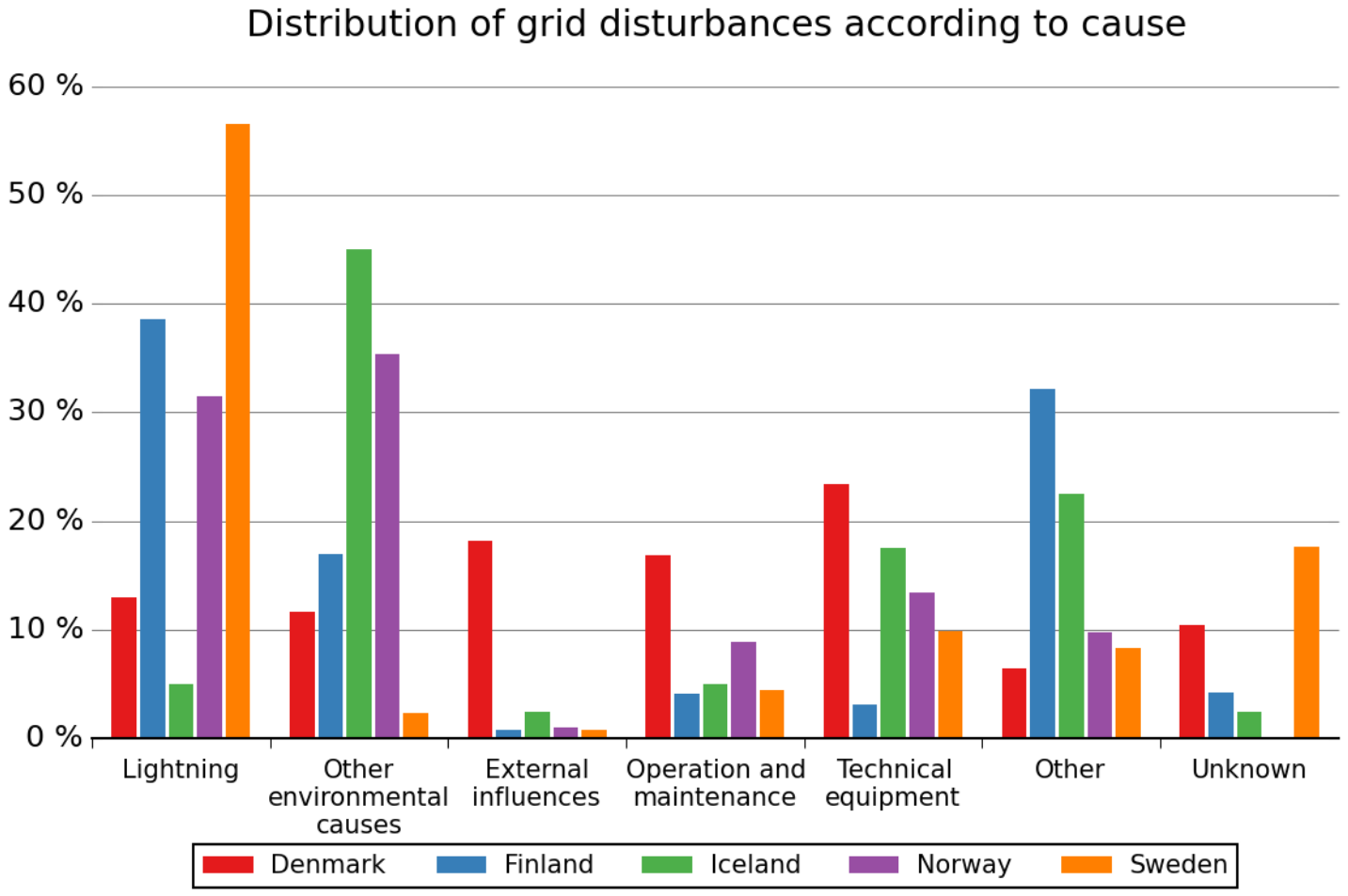


FIGURE 3.3.2 PERCENTAGE DISTRIBUTION OF GRID DISTURBANCES ACCORDING TO CAUSE IN EACH BALTIC COUNTRY IN 2014

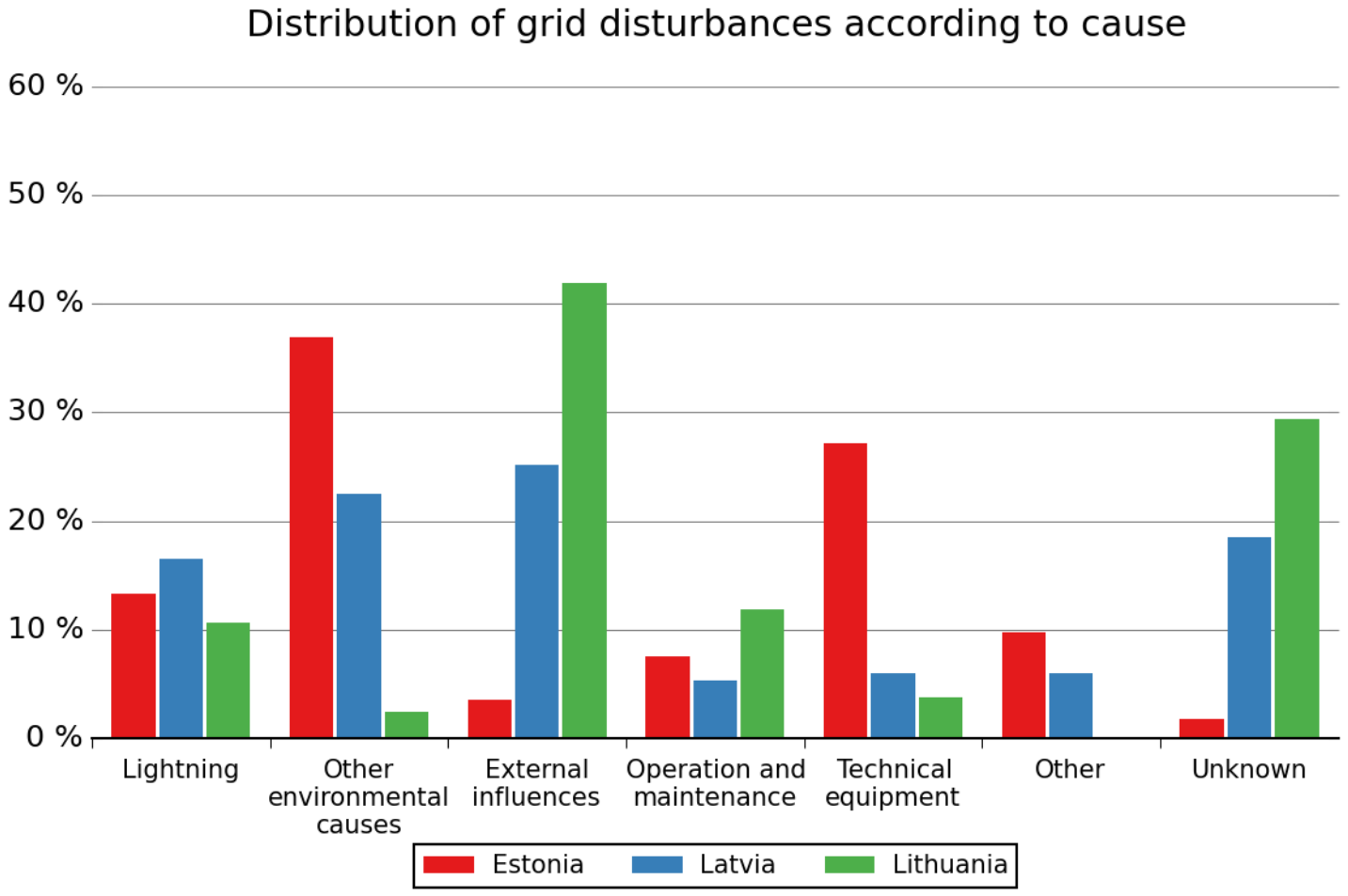


FIGURE 4.4.1 PERCENTAGE DISTRIBUTION OF ENERGY NOT SUPPLIED (ENS) ACCORDING TO THE CAUSE OF THE PRIMARY FAULT IN EACH NORDIC COUNTRY IN 2014

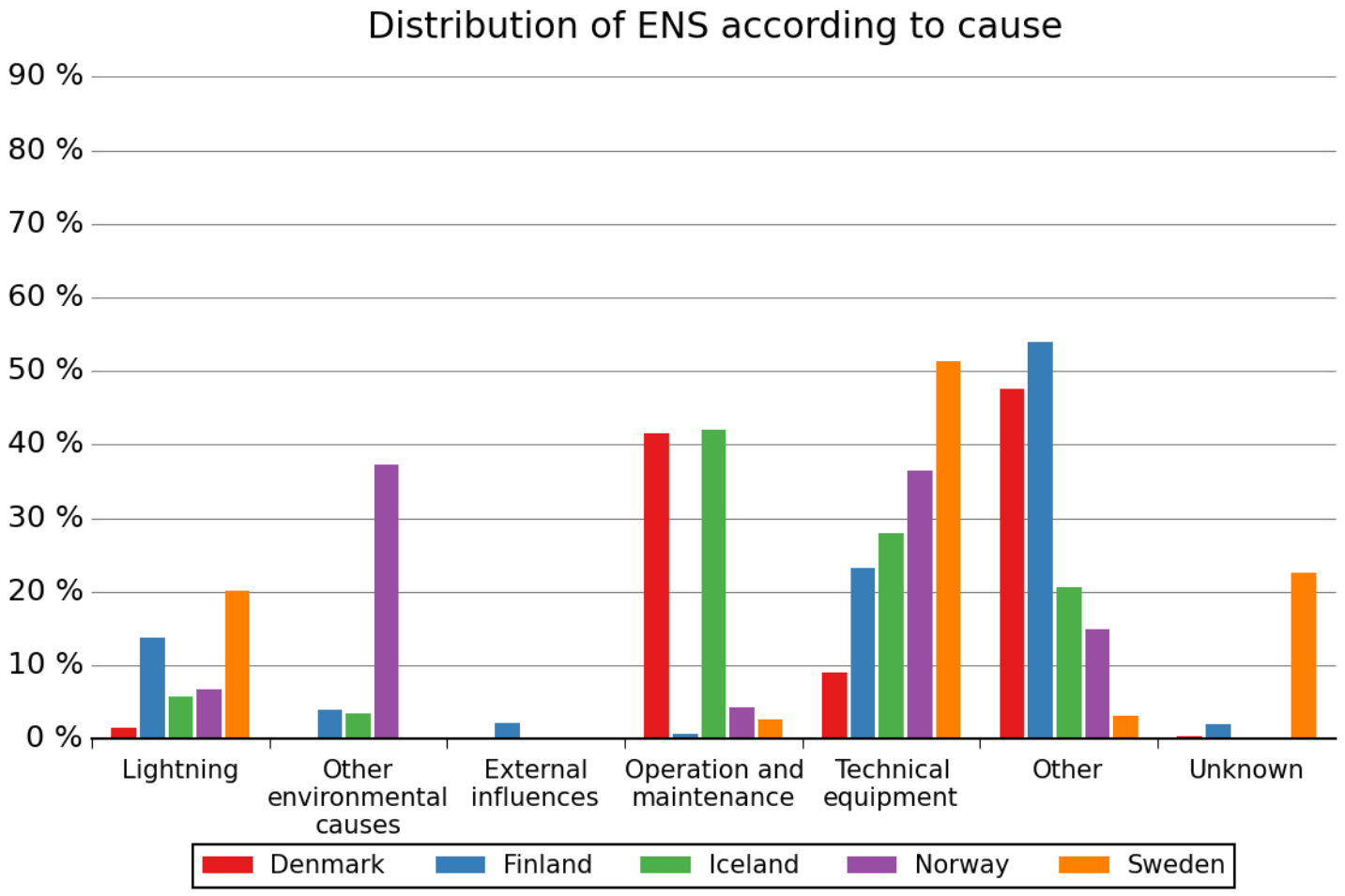
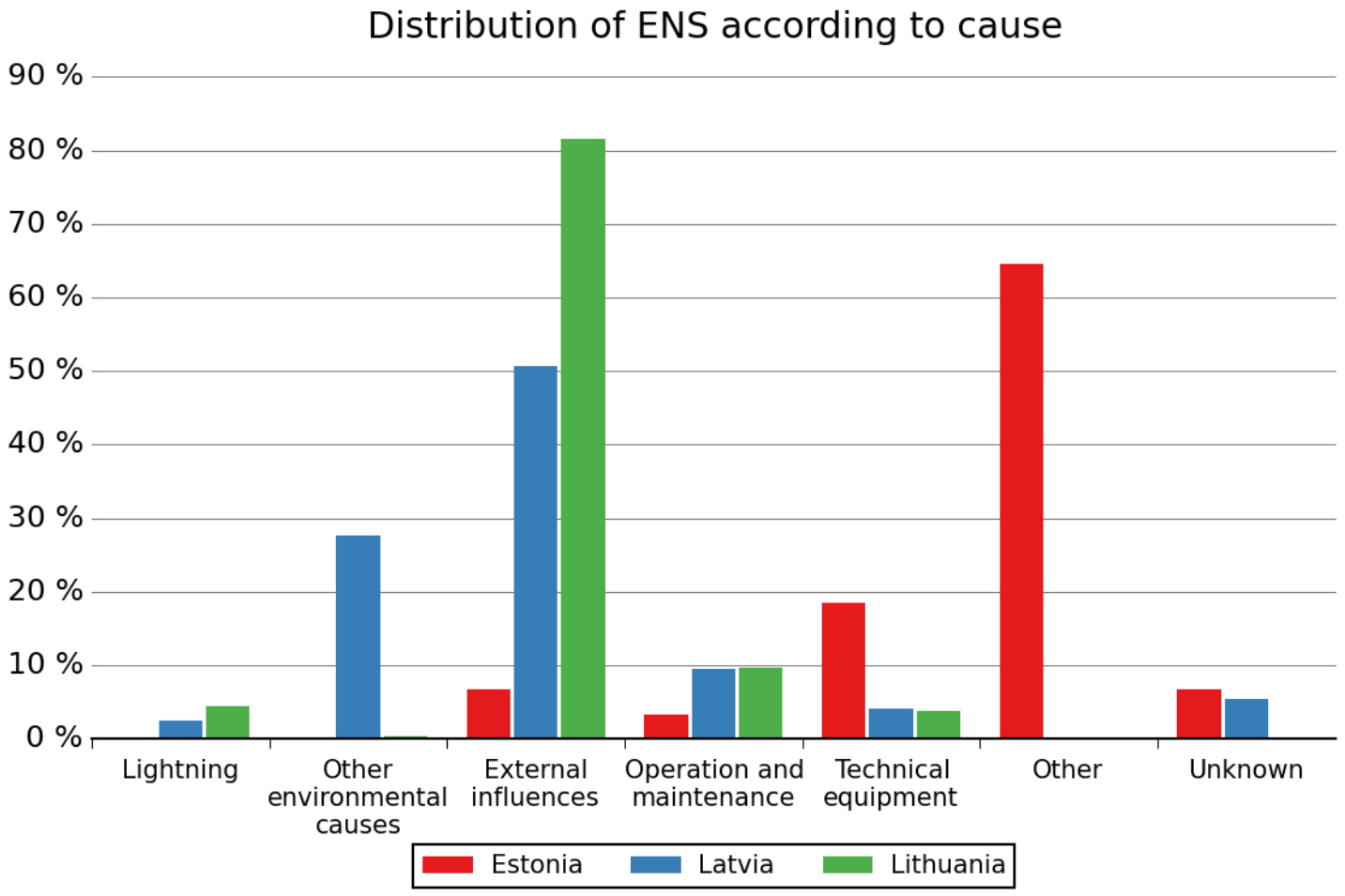


FIGURE 4.4.2 PERCENTAGE DISTRIBUTION OF ENERGY NOT SUPPLIED (ENS) ACCORDING TO THE CAUSE OF THE PRIMARY FAULT IN EACH BALTIC COUNTRY IN 2014



Energy not supplied

TABLE 4.1.1 ENERGY NOT SUPPLIED (ENS) ACCORDING TO THE VOLTAGE LEVEL OF THE INITIATING FAULT IN EACH NORDIC AND BALTIC COUNTRY

Country	Energy not supplied (MWh) 2014	Average ENS 2005–2014 (MWh)	ENS divided into different voltage levels, 2005–2014 (%)			
			100–150 kV	220–330 kV	380–420 kV	Other[1)]
Denmark	24	19	93.4	0.0	0.0	6.6
Finland	499	356	93.8	2.7	3.5	0.0
Iceland	835	1137	34.2	65.8	0.0	0.0
Norway	2165	3316	27.5	7.5	63.8	1.1
Sweden	1235	1832	82.0	15.2	1.9	0.8
			ENS (%) divided into different voltage levels, 2014			
Estonia	30	-	100.0	0.0	0.0	0.0
Latvia	36	-	96.7	3.3	0.0	0.0
Lithuania	39	-	100.0	0.0	0.0	0.0
Total	4758	6659	66.2	18.3	13.8	1.7

1) **The category other contains energy not supplied from system faults, auxiliary equipment, lower voltage level networks and the connections to foreign countries, etc.**

FIGURE 4.1.1 ENERGY NOT SUPPLIED (ENS) IN TERMS OF THE VOLTAGE LEVEL OF THE INITIATING FAULT IN EACH NORDIC AND BALTIC COUNTRY IN 2014

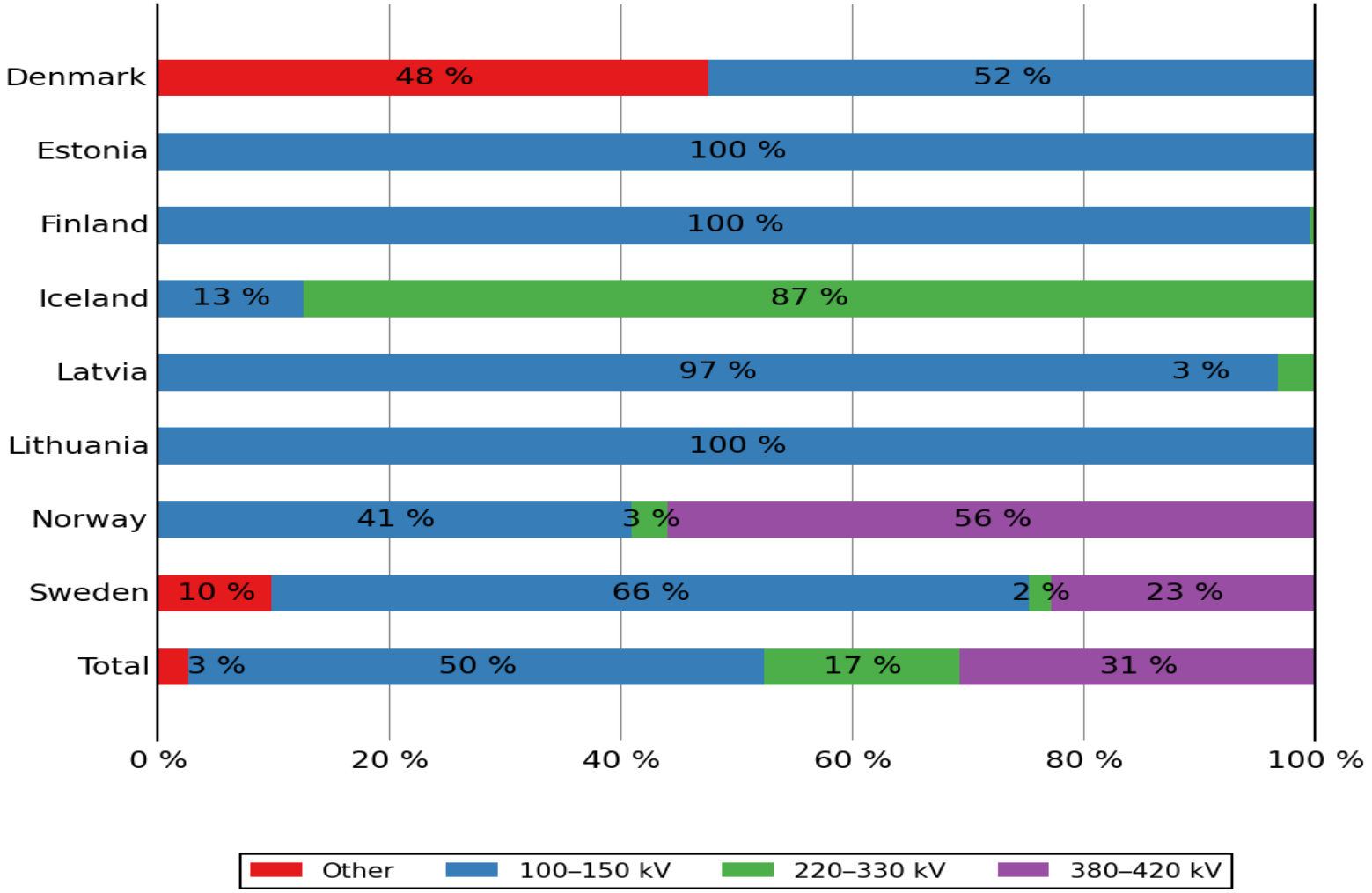


Figure 5.3.9 Fault trends for overhead lines in each Nordic country at voltage level 100–150 kV

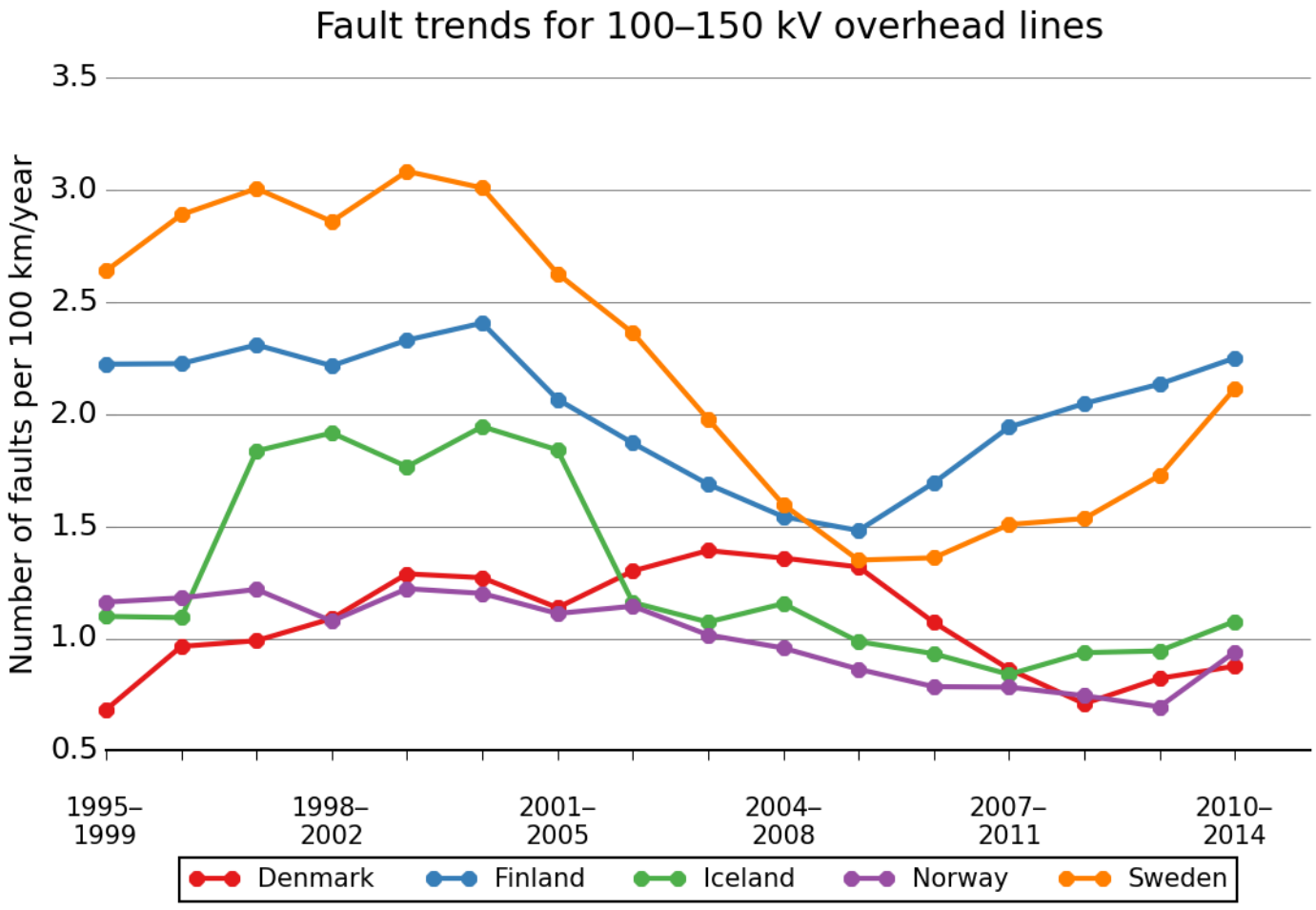


Figure 5.3.8 Fault trends for overhead lines in each Nordic country at voltage level 220–330 kV

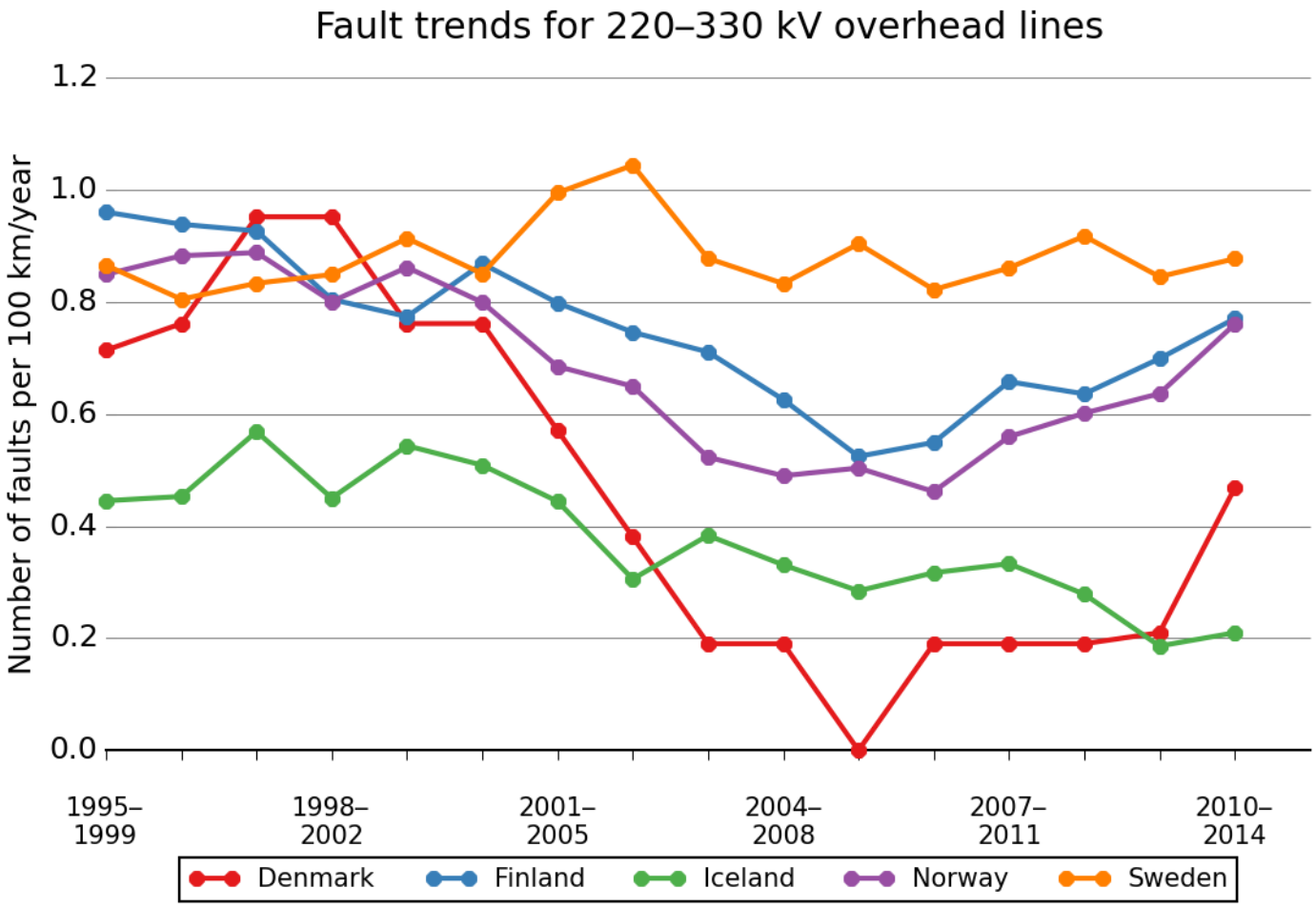


Figure 5.3.7 Fault trends for overhead lines in Nordic countries at voltage level 380–420 kV

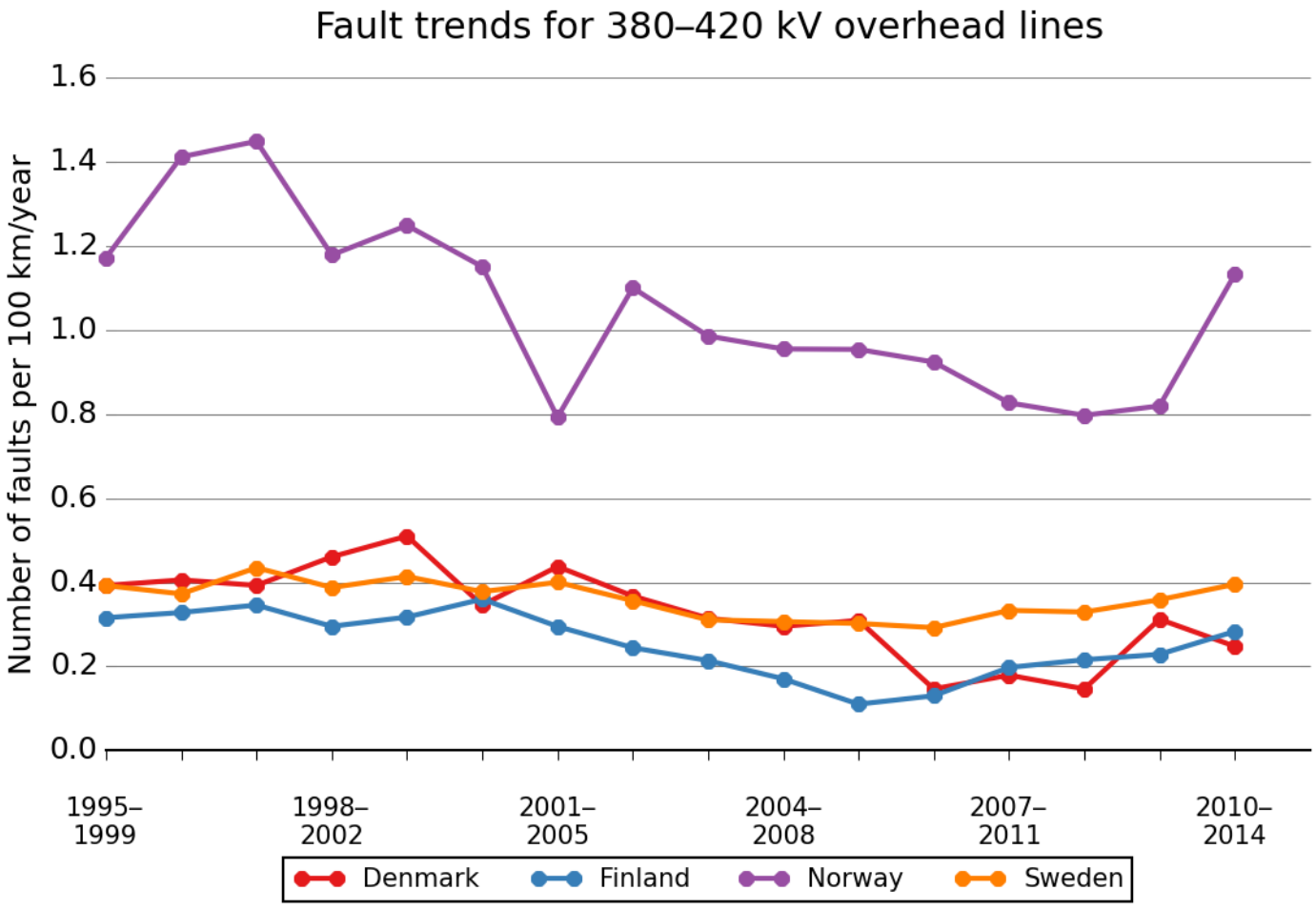
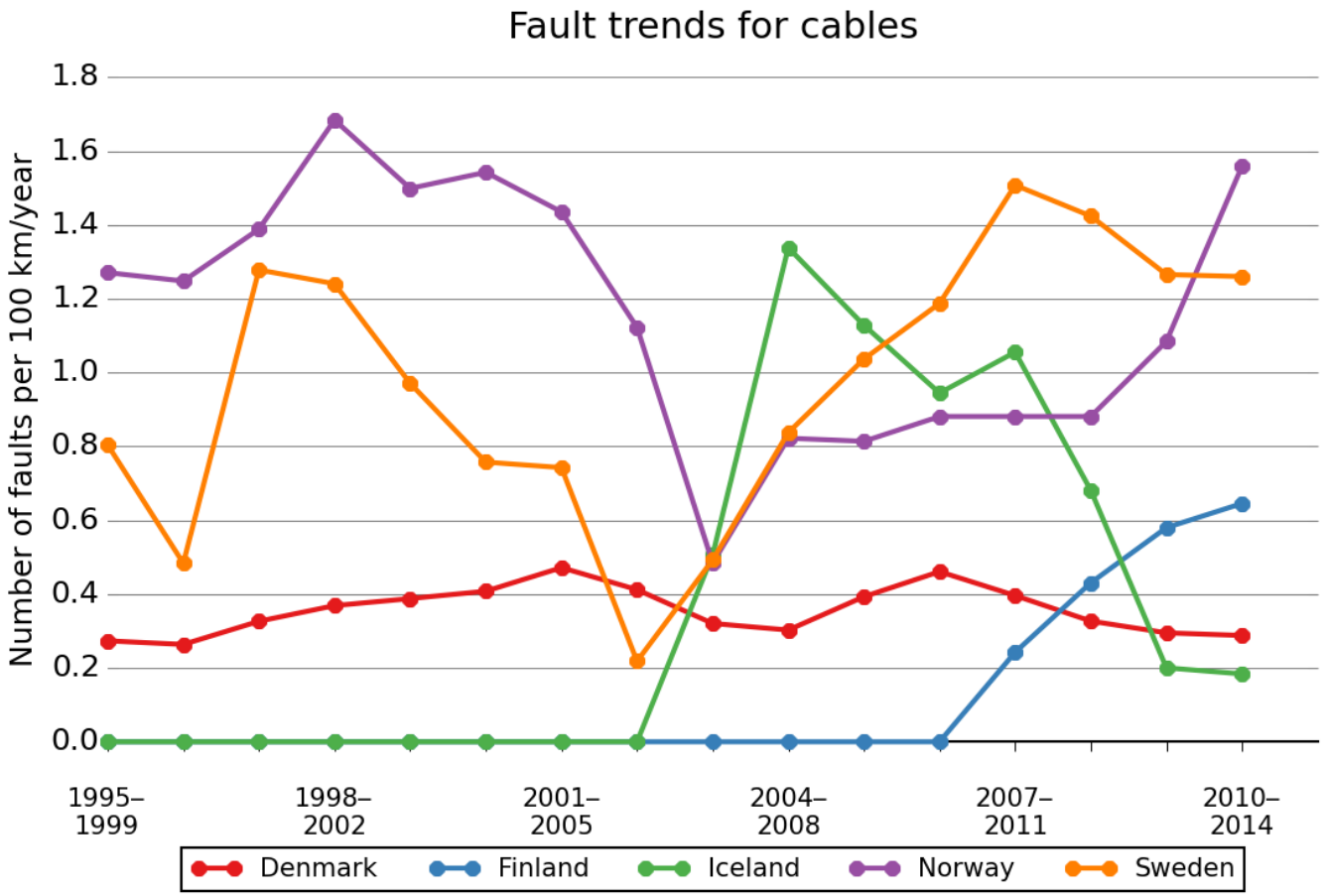


FIGURE 5.4.3 FAULT TRENDS FOR AC-CABLES AT ALL VOLTAGE LEVELS IN EACH NORDIC COUNTRY



The main explanation for the high values in the fault trend for Sweden during the years 2008–2012 is that there were several cable faults in 2008, as seen in Figure 5.4.2.

FIGURE 5.4.2 ANNUAL DISTRIBUTION OF CABLE FAULTS DURING THE PERIOD 2005–2014 AND THE AVERAGE FOR THE PERIOD 1995–2014 IN EACH NORDIC COUNTRY FOR 100–150 KV CABLES

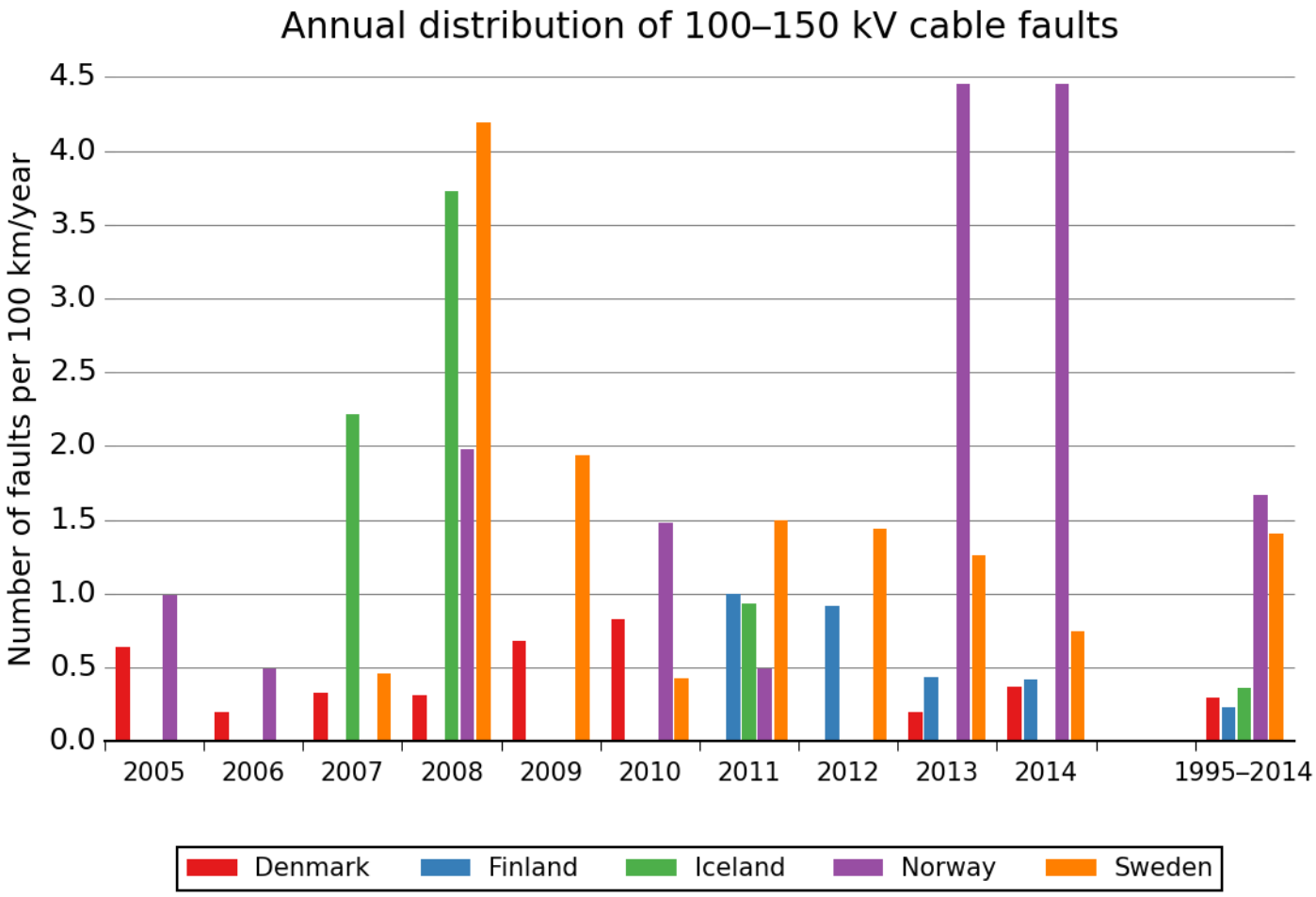


Figure 5.5.6 Fault trends for power transformers in each Nordic country at voltage level 100–150 kV

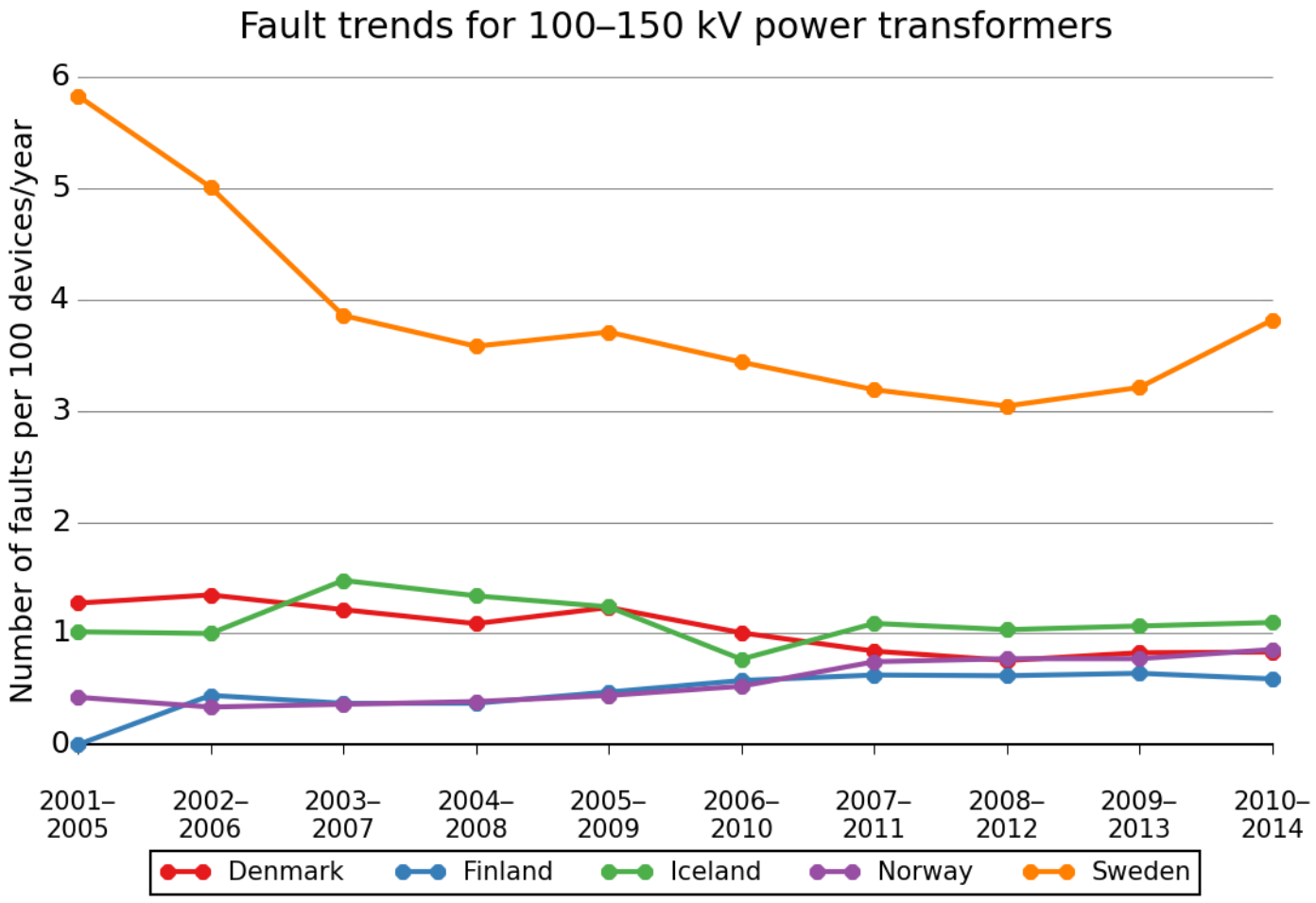


FIGURE 5.5.5 FAULT TRENDS FOR POWER TRANSFORMERS IN EACH NORDIC COUNTRY AT VOLTAGE LEVEL 220–330 KV

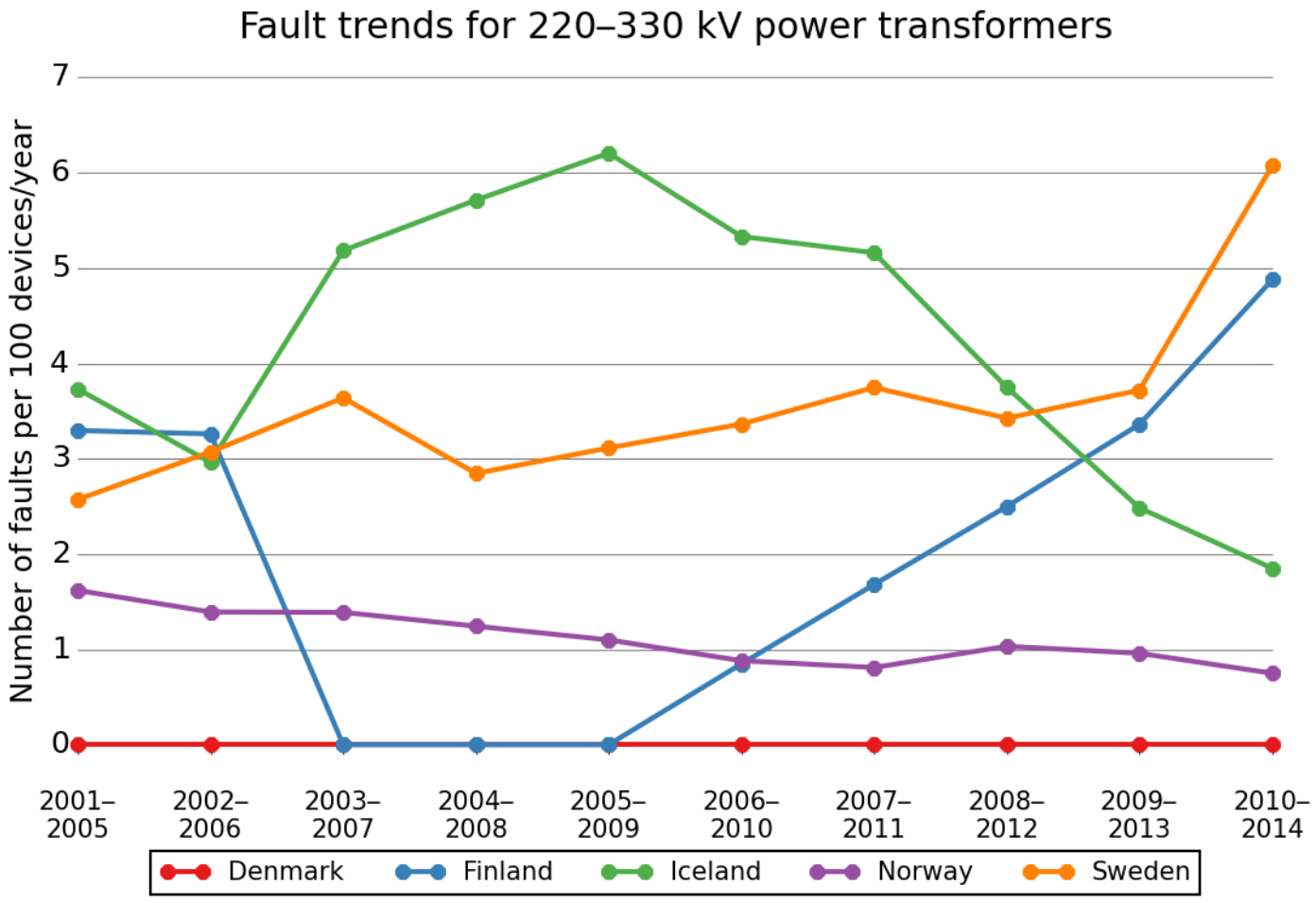


Figure 5.5.4 Fault trends for power transformers in Nordic countries at voltage level 380–420 kV

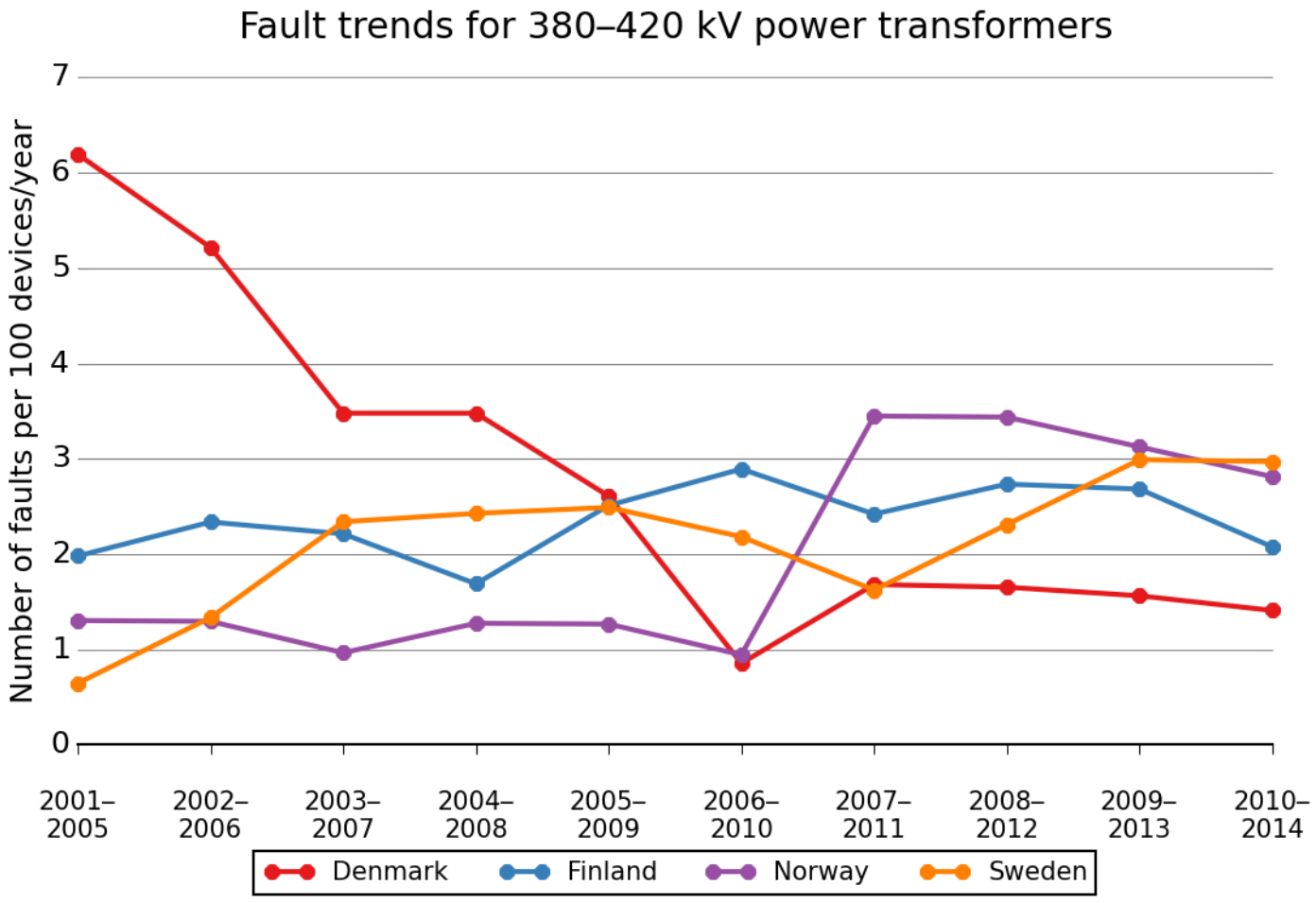


FIGURE 5.6.3 FAULT TRENDS FOR INSTRUMENT TRANSFORMERS IN EACH NORDIC COUNTRY AT VOLTAGE LEVEL 100–150 V

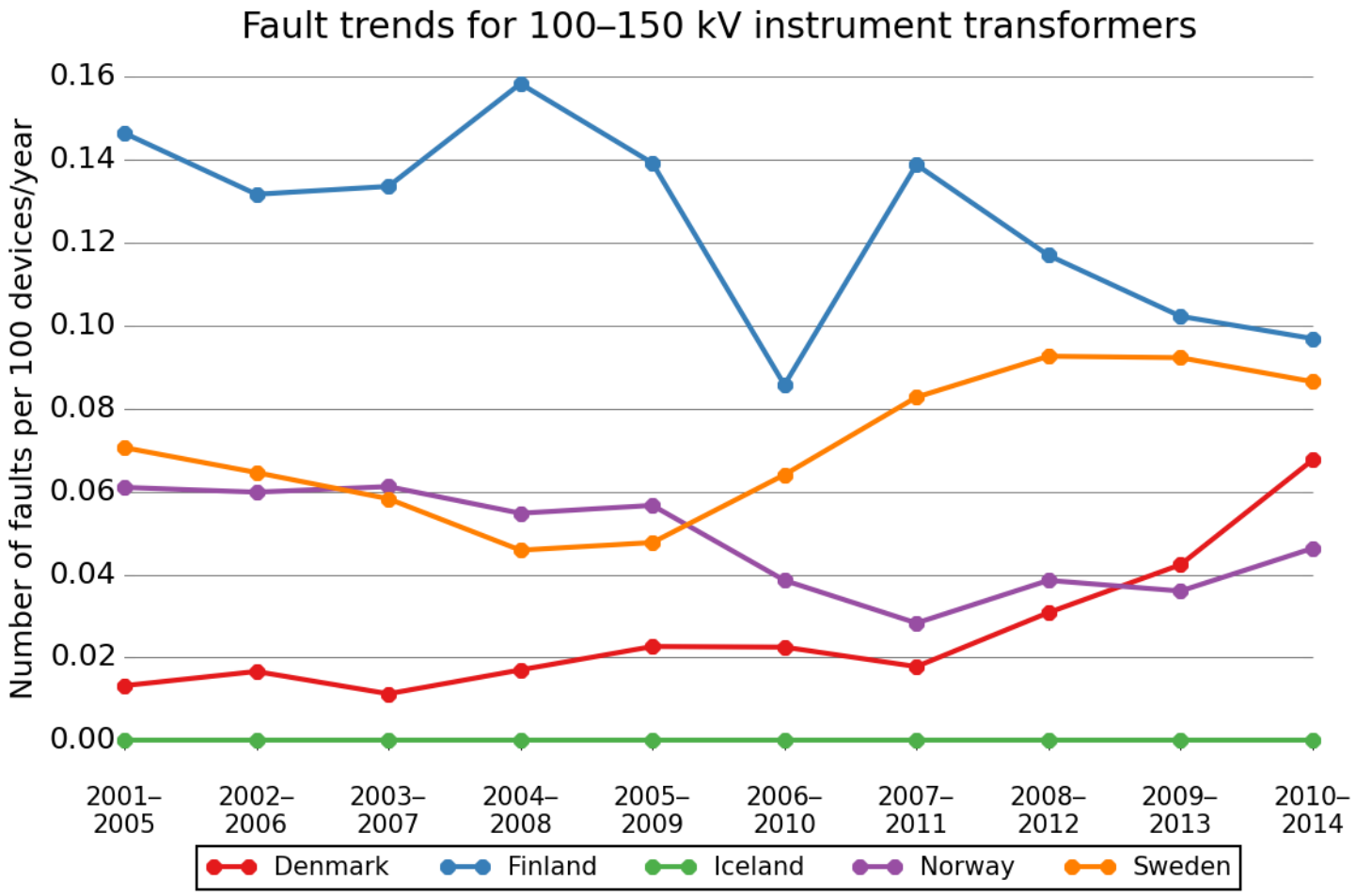


FIGURE 5.6.2 FAULT TRENDS FOR INSTRUMENT TRANSFORMERS IN EACH NORDIC COUNTRY AT VOLTAGE LEVEL 220–330 KV

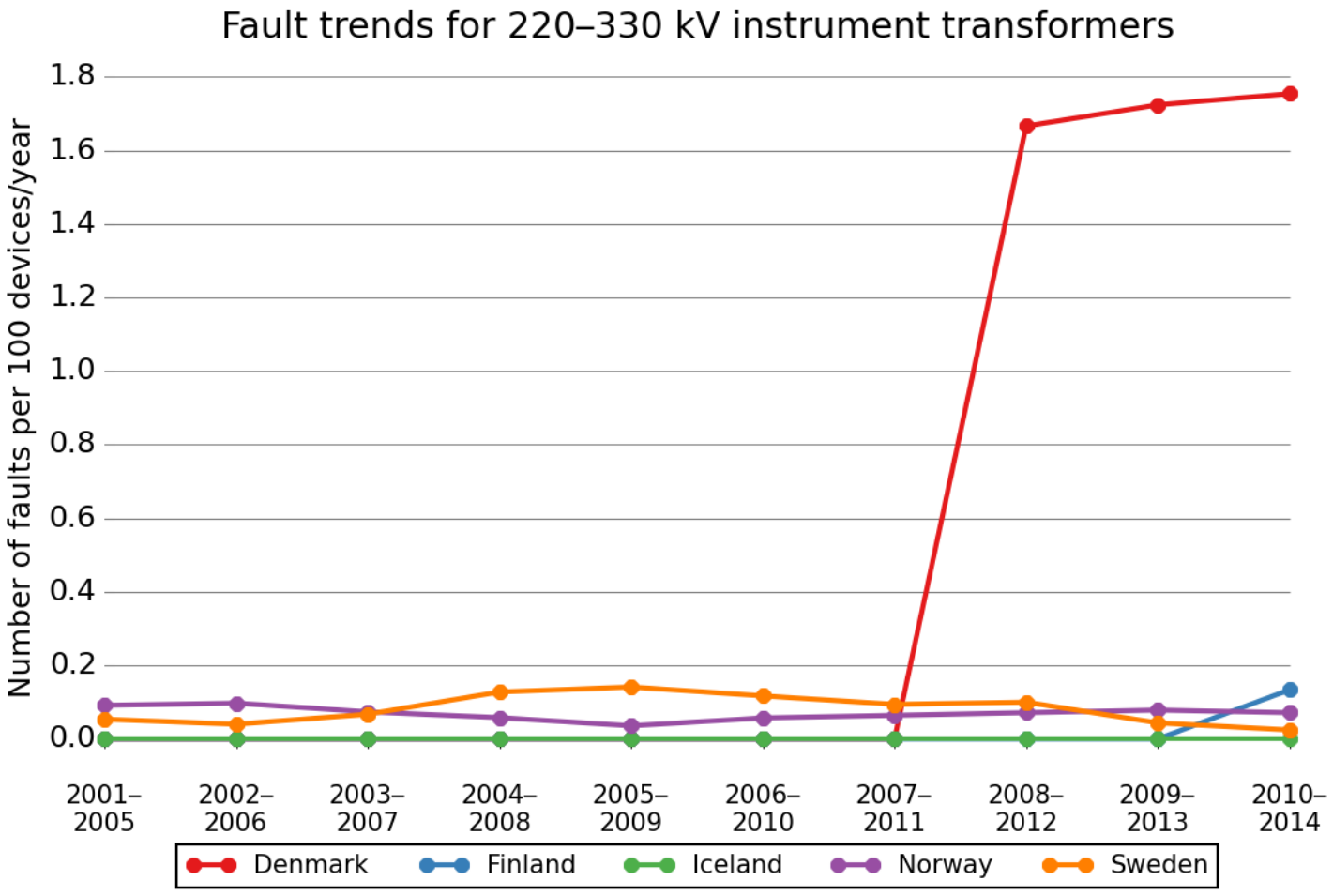


Figure 5.6.1 Fault trends for instrument transformers in Nordic countries at voltage level 380–420 kV