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CEER Benchmarking Report 5.1
on the Continuity of Electricity Supply
Data update

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INFORMATION PAGE

Abstract

This document (C13-EQS-57-03) presents the CEER Benchmarking Report 5.1.

This document seeks to update key data found in the more extensive 5th CEER Benchmarking Report published in 2012. CEER aims to provide such updates annually, in between the more detailed reports, in order to provide accurate and up to date data on a more regular basis.

Target Audience

European Commission, energy suppliers, traders, gas/electricity customers, gas/electricity industry, consumer representative groups, network operators, Member States, academics and other interested parties.

Keywords

Electricity, supply, continuity, voltage, benchmarking.

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Related Documents

CEER Benchmarking Reports:

- [5th Benchmarking Report on Quality of Electricity Supply](#) (December 2011)
- [4th Benchmarking Report on Quality of Electricity Supply](#) (December 2008)
- [3rd Benchmarking Report on Quality of Electricity Supply](#) (December 2005)
- [2nd Benchmarking Report on Quality of Electricity Supply](#) (September 2003)
- [Quality of Electricity supply: Initial Benchmarking on actual levels, standards and regulatory strategies – 1st Benchmarking Report](#) (April 2001)



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1 Introduction

This Benchmarking Report 5.1 (BR 5.1) aims to provide a partial update of the indicators related to Continuity of Supply (CoS) included in the 5th CEER Benchmarking Report, published in 2012. Where the full Benchmarking Report addresses three areas of the Quality of Supply of electricity networks (Continuity of Supply, Voltage Quality and Commercial Quality), this BR 5.1 does not include Voltage Quality and Commercial Quality. All three areas of the Quality of Supply will be addressed in detail in CEER's upcoming 6th Benchmarking Report, expected in 2015.

Therefore, the CEER Electricity Quality of Supply Task Force sought to focus on recent CoS data only for this update. This report does not include any analysis of the received data, draws no conclusions and gives no recommendations; it therefore only serves to present the most recent data on CoS.

A questionnaire was sent to CEER Member and Observer countries; 27 countries responded. Participation in this exercise has continued to increase since CEER's 1st Benchmarking Report in 2001.

It is important to emphasise that currently, indicators are not perfectly harmonised between different countries. Definitions of the indicators described in this report can be found in the 4th CEER Benchmarking Report. In particular, the following definitions might differ depending on the country:

- The voltage levels EHV, HV, MV and LV;
- Exceptional events;
- Indicators such as SAIDI, SAIFI, MAIFI, AIT, ENS can be calculated with slightly different methods depending on the country; and
- The distinction between rural, semi-urban and urban areas.

Previous Benchmarking Reports are available on the CEER website as listed on page 3 (Related Documents). In particular, the 4th CEER Benchmarking Report (2008) includes precise definitions of continuity indicators (from page 20) and detailed content about exceptional events (from page 42).

This present report has 2 key sections; section 2 – main results gives several figures, which illustrate the main indicators, and Annexes 1, 2 and 3 which show tables corresponding to figures in the main section.



2 Main results

2.1 Annual average interruption time on distribution networks: SAIDI

SAIDI (System Average Interruption Duration Index) is representative of the average interruption time on LV (low-voltage) networks and is not weighted according to the consumption. Figure 1 shows SAIDI, when all unplanned interruptions (originating from all voltage levels) are taken into account, including exceptional events.

Countries marked with an asterisk (*) use an alternative indicator instead of SAIDI, which is more representative of the average interruption time on MV (medium-voltage) networks: either because the average is weighted depending on the annual consumption (T-SAIDI, Finland) or rated capacity (ASIDI, Austria), or because interruptions originating from LV networks are not taken into account (Malta, Norway, Slovenia).

Based on (1) typical percentage of SAIDI that is caused by incidents occurring on LV, and (2) Austrian data which includes both ASIDI and SAIDI, it is likely that countries which provide such a “MV indicator” underestimate their interruption time by about 5-20%, compared to countries which use SAIDI.

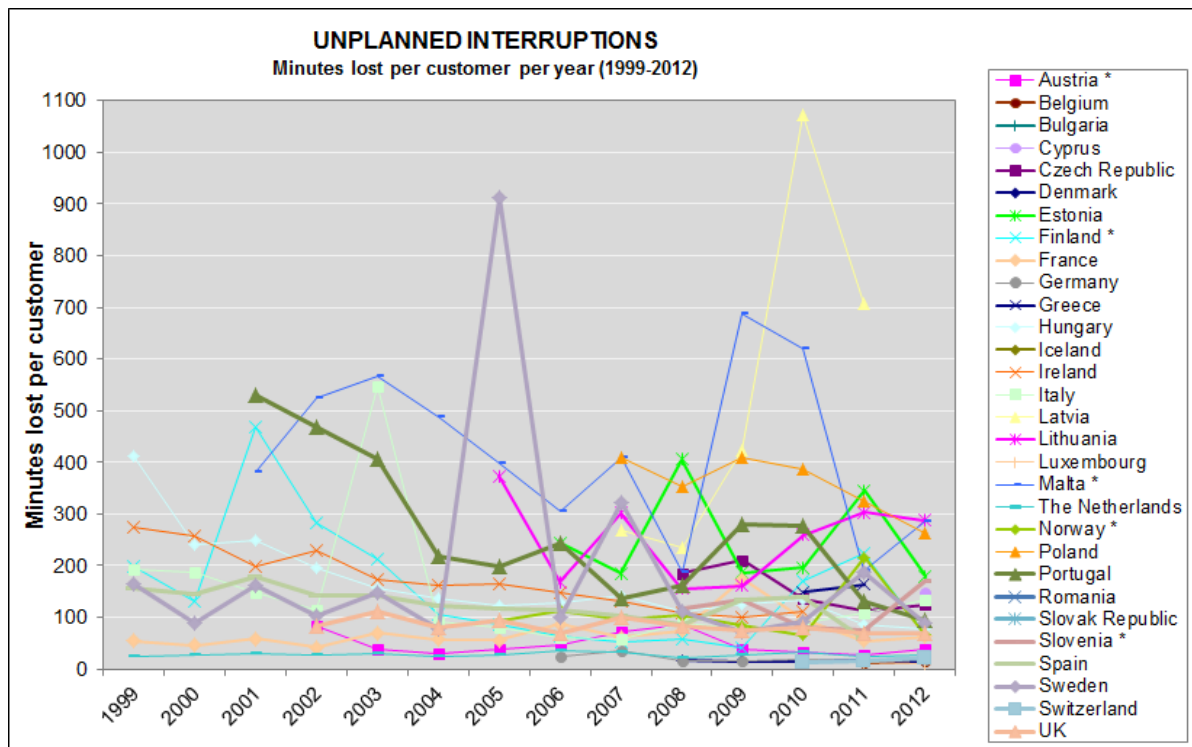


Figure 1: Unplanned SAIDI, including exceptional events

Figure 2 shows SAIDI, when unplanned interruptions (originating from all voltage levels) are taken into account, with the exception of interruptions caused by exceptional events.

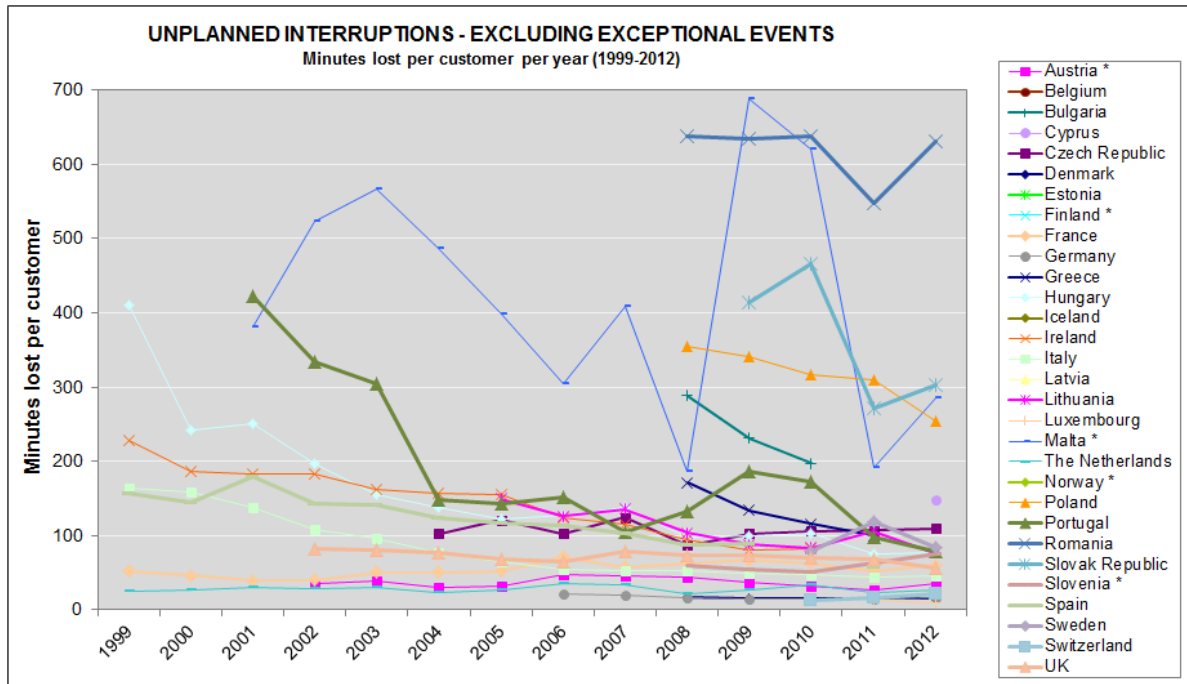


Figure 2: Unplanned SAIDI, excluding exceptional events

Figure 3 shows SAIDI, when planned interruptions (originating from all voltage levels) are taken into account.

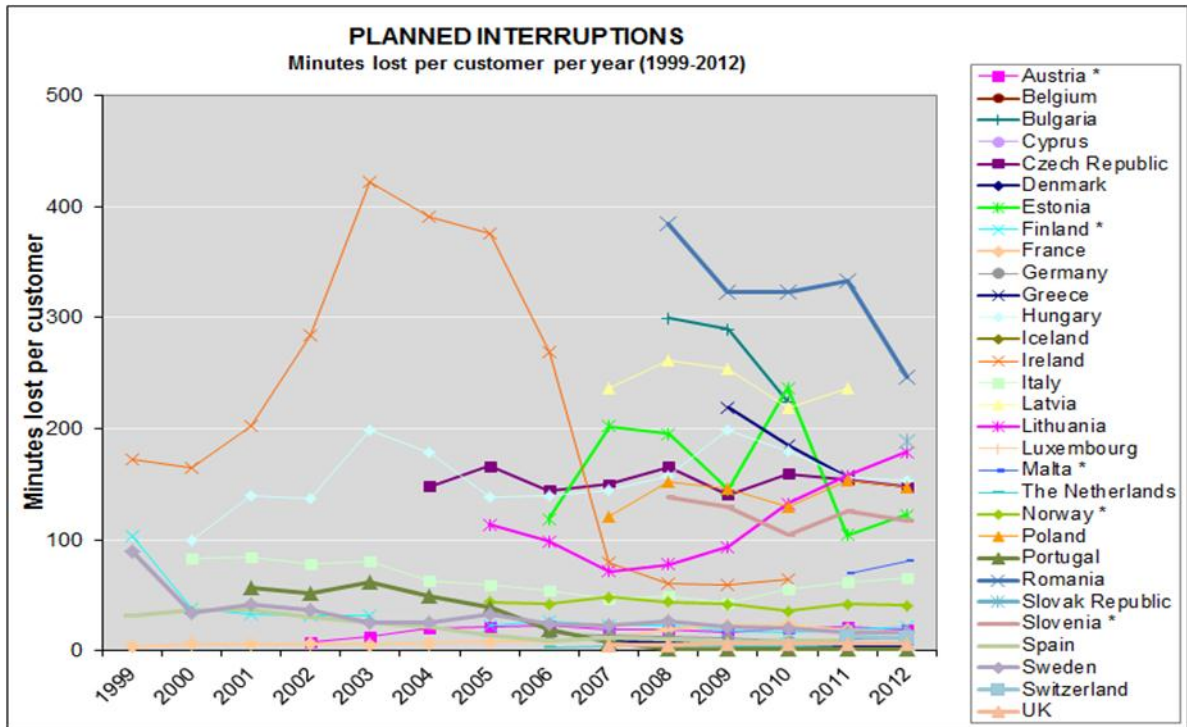


Figure 3: Planned SAIDI



Figure 4 shows the average SAIDI since 2008 and SAIDI for the last available year (often 2012), when all interruptions (originating from all voltage levels) are taken into account; including planned interruptions and unplanned interruptions with exceptional events. Countries are sorted according to the average annual interruption time since 2008.

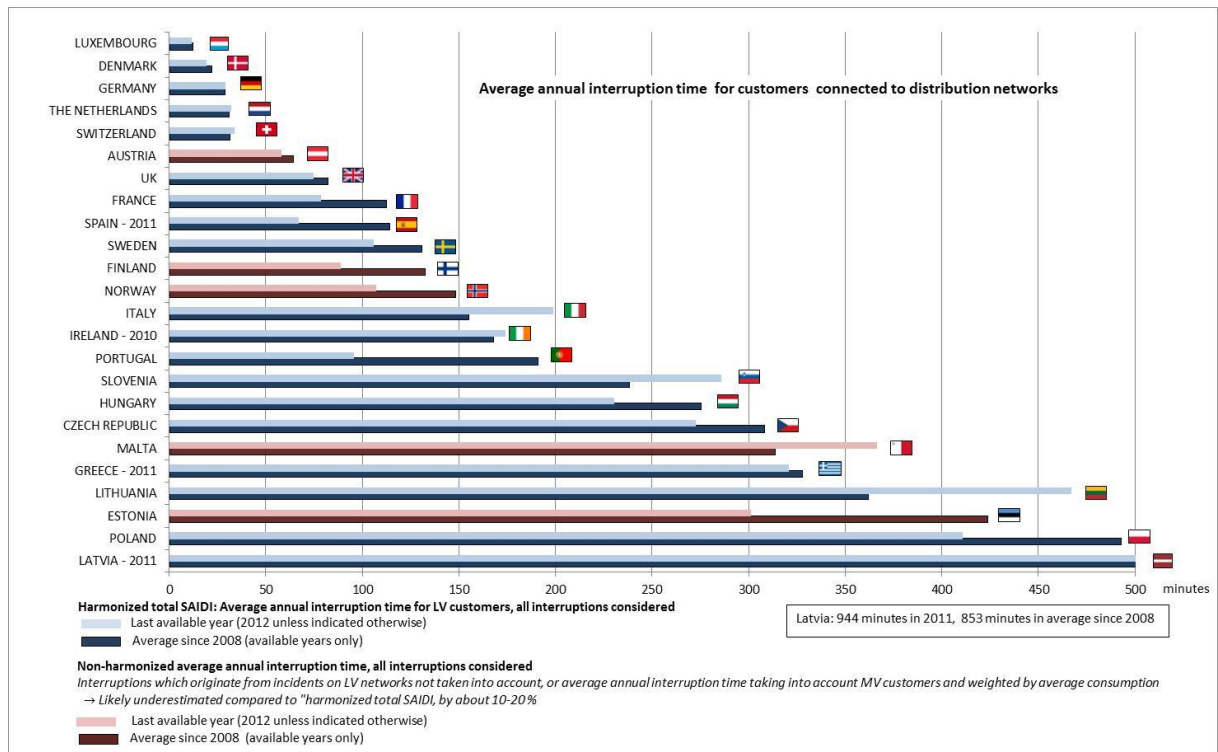


Figure 4: Total SAIDI



2.2 Annual average number of interruptions on distribution networks (SAIFI)

SAIFI (System Average Interruption Frequency Index) indicates the average number of interruptions. Like SAIDI, SAIFI is not weighted according to the consumption.

Figure 5 shows SAIFI, when all unplanned interruptions (originating from all voltage levels) are taken into account, including exceptional events.

Countries marked with an asterisk (*) use an alternative indicator instead of SAIFI, which is more representative of the average number of interruptions on MV networks; either because the average is weighted depending on the annual consumption (T-SAIFI, Finland) or rated capacity (ASIFI, Austria), or because interruptions originating from LV networks are not taken into account (Malta, Norway, Slovenia).

Based on (1) typical percentage of SAIFI that is caused by incidents occurring on LV networks and (2) Austrian data which includes both ASIFI and SAIFI, it is likely that countries which provide such a “MV indicator” underestimate their interruption time by about 5-20%, compared to countries which use SAIFI.

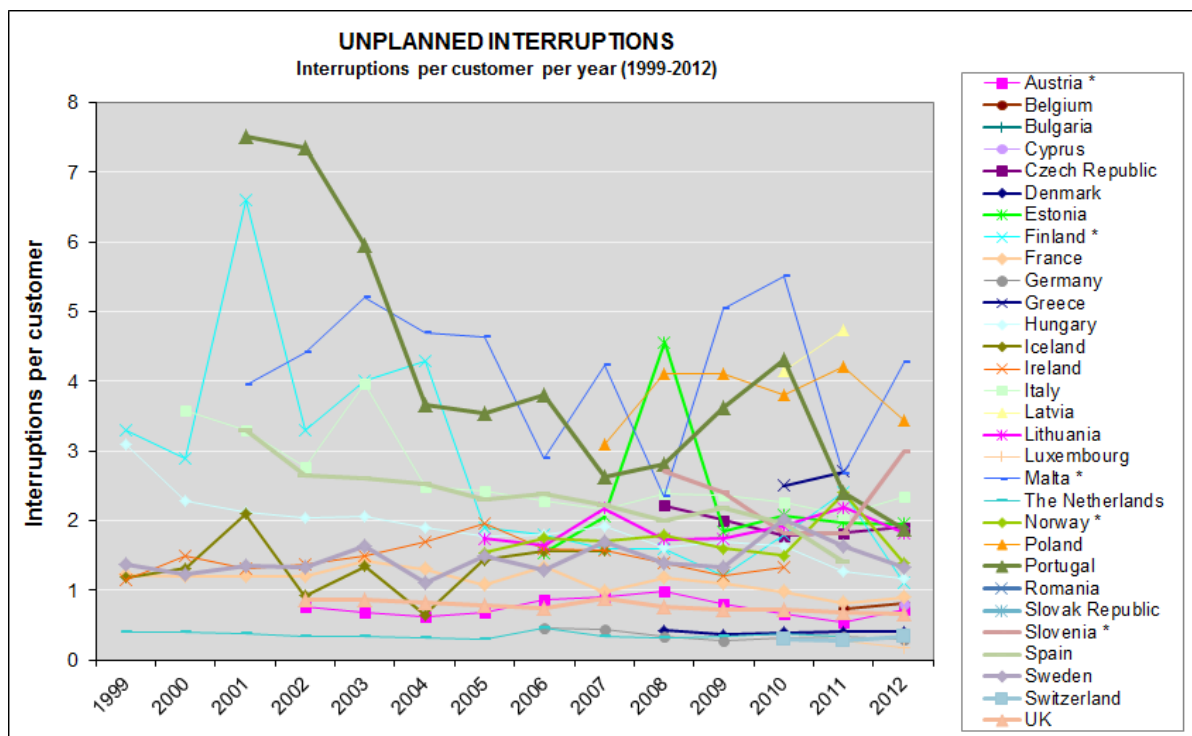


Figure 5: Unplanned SAIFI, including exceptional events



Figure 6 shows SAIFI, when unplanned interruptions (originating from all voltage levels) are taken into account, with the exception of interruptions caused by exceptional events.

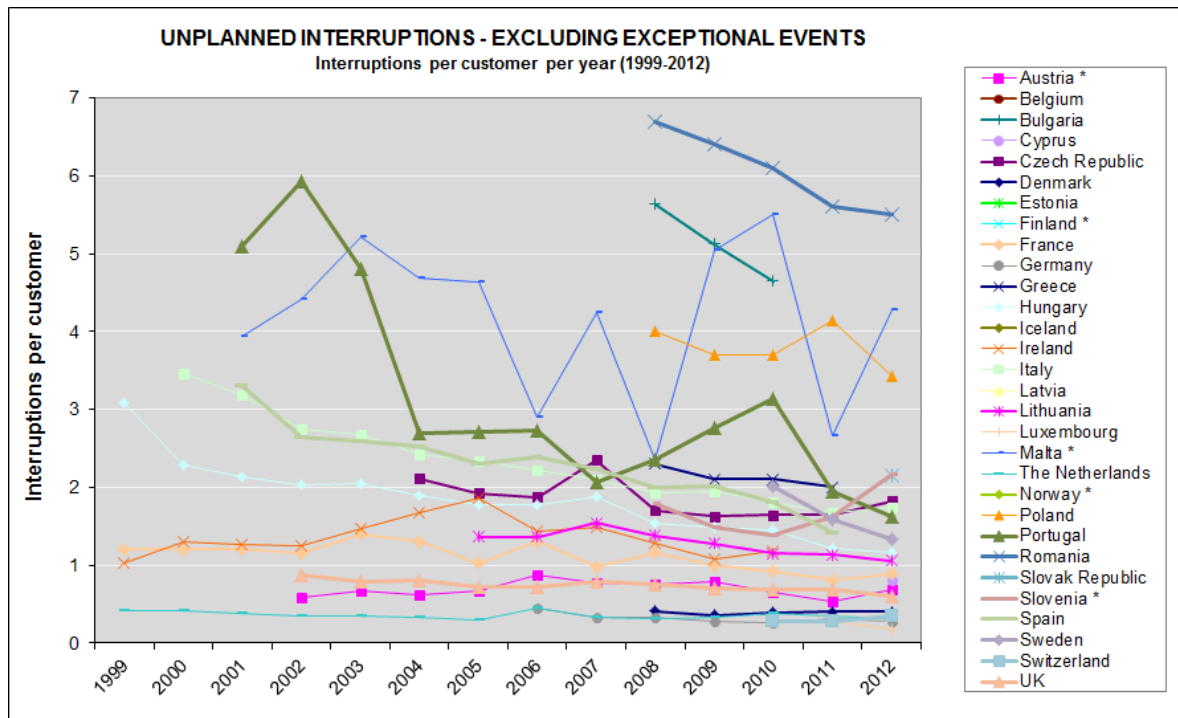


Figure 6: Unplanned SAIFI, excluding exceptional events



Figure 7 shows SAIFI, when planned interruptions (originating from all voltage levels) are taken into account.

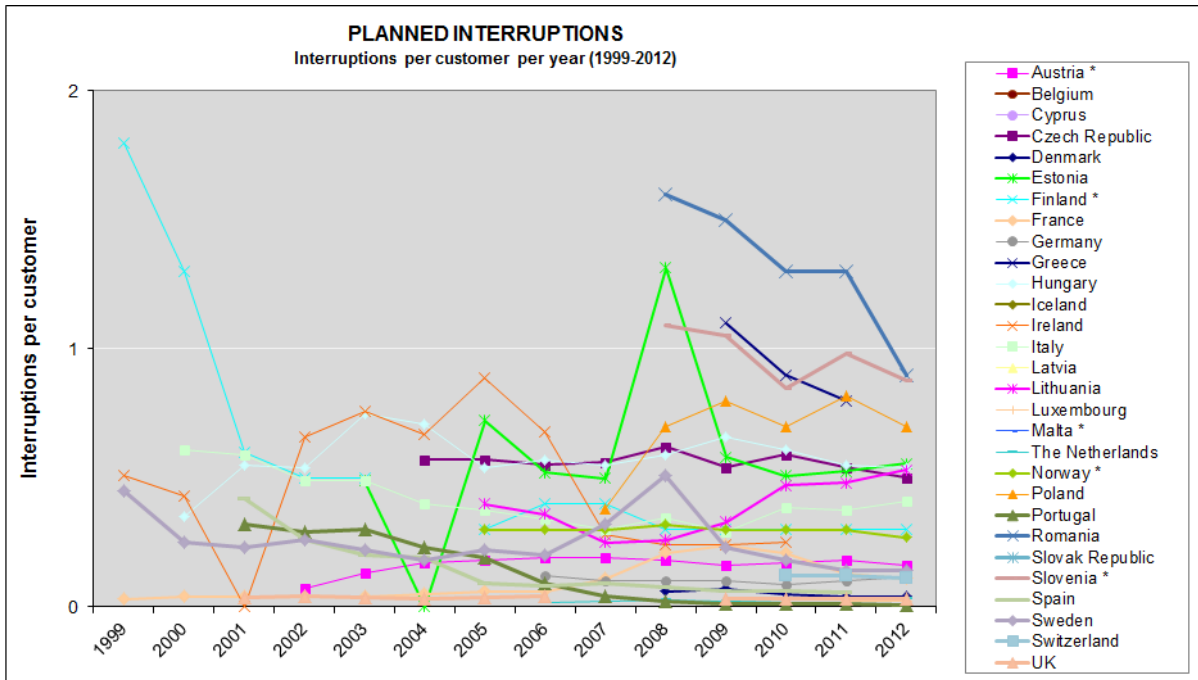


Figure 7: Planned SAIFI

2.3 Network length

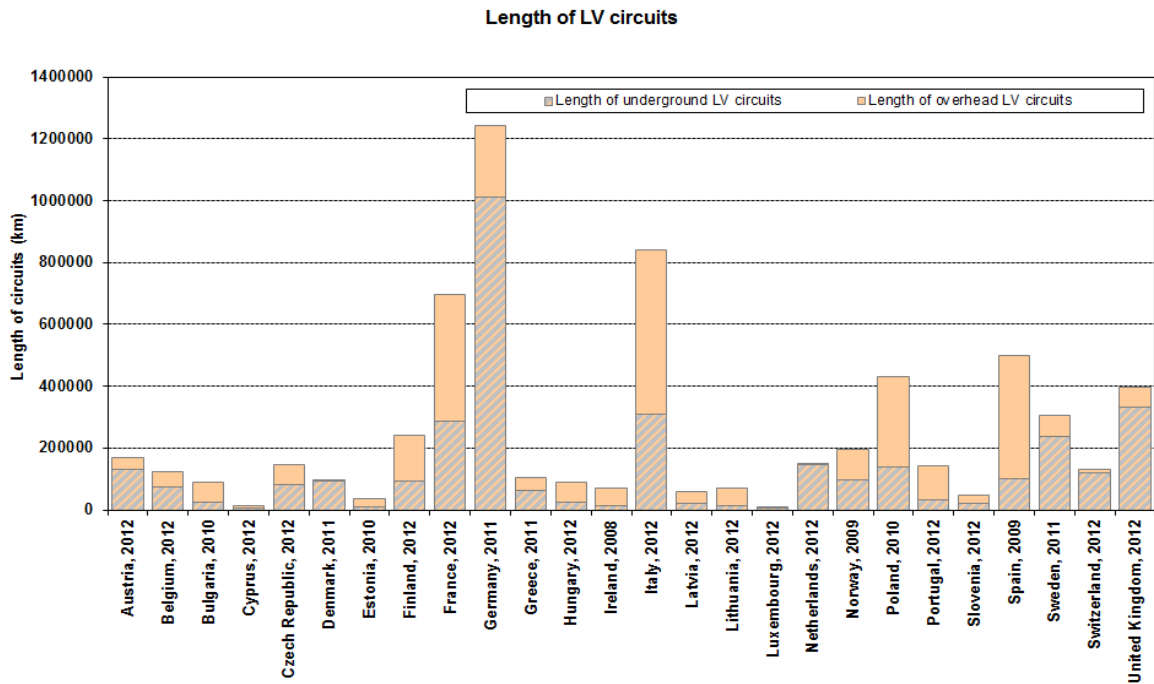


Figure 8: Length of low voltage (LV) circuits

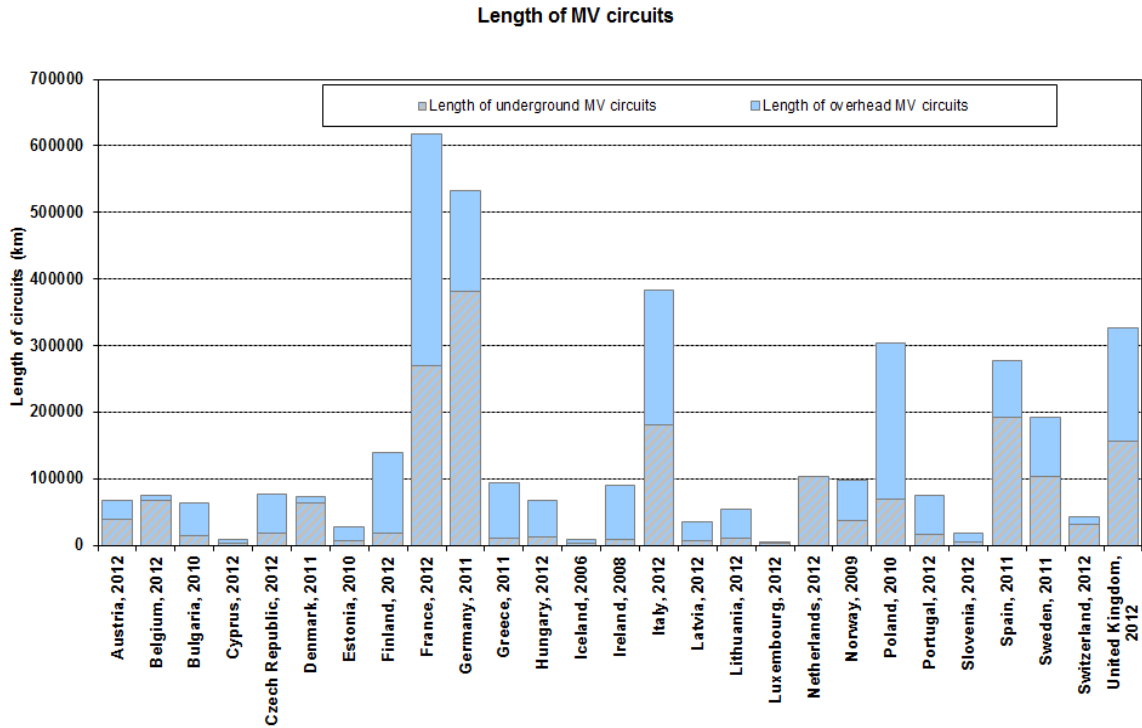


Figure 9: Length of medium voltage (MV) circuits

2.4 CEER analysis: Clustering European countries according to the technical network characteristics

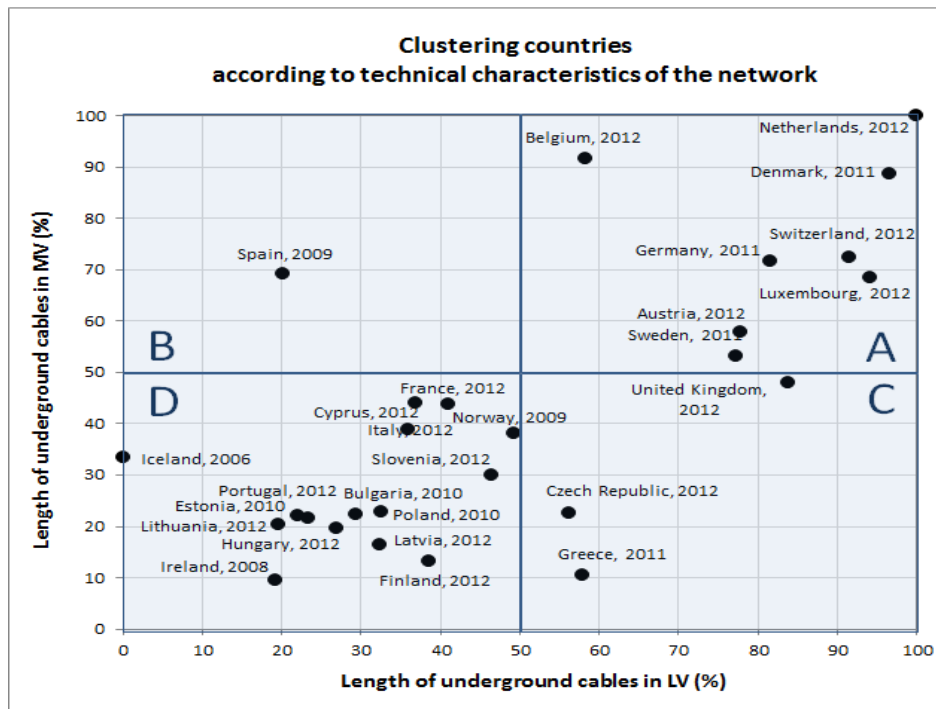


Figure 10: Clustering European countries according to the technical network characteristics



Annex 1: CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national regulators of electricity and gas at EU and international level. Through CEER, a not-for-profit association, the national regulators cooperate and exchange best practice. A key objective of CEER is to facilitate the creation of a single, competitive, efficient and sustainable EU internal energy market that works in the public interest.

CEER works closely with (and supports) the [Agency for the Cooperation of Energy Regulators \(ACER\)](#). ACER, which has its seat in Ljubljana, is an EU Agency with its own staff and resources. CEER, based in Brussels, deals with many complementary (and not overlapping) issues to ACER's work such as international issues, smart grids, sustainability and customer issues.

The work of CEER is structured according to a number of working groups and task forces, composed of staff members of the national energy regulatory authorities, and supported by the CEER Secretariat.

This report was prepared by the Electricity Quality of Supply Task Force of CEER's Electricity Working Group.

CEER wishes to thank in particular the following regulatory experts for their work in preparing this report: Werner Friedl, Veli-Pekka Saajo, Romain Castel, Sergio Faias, and Yvonne Beyer.



Annex 2: Extra continuity indicators

In addition to the indicators mentioned before, several countries use additional indicators for assessing CoS.

Austria: Both SAIDI and ASIDI (and both SAIFI and ASIFI) are now available.

Greece: Number of incidents per 100 km of network on LV and MV networks.

Hungary: Energy not supplied/Energy produced, ‰ (MWh/GWh) on distribution and transmission networks.

Italy: Number of interruptions per transmission user on transmission networks + MAIFI-transient (number of transient interruptions (< 1s)) on MV networks, by territorial density.

Norway: Energy not supplied/Energy produced, ‰ (MWh/GWh).

Portugal: TIEPI (average interruption time weighted by the installed capacity).



Annex 3: Additional information per country regarding Quality of Supply

Several countries have provided information about recent changes in their regulation on electricity quality of supply or the plans they might have for the near future. This information is reproduced below:

Czech Republic: New parameters for incentives regulation for the next regulatory period (2015-2019) are currently being set. In the on-going analysis, values for quality indicators are monitored and new values for the next period will be prepared. Technical and economic performance of individual measures will be examined. In addition, the NRA will focus on the correctness of reported data.

Germany: Germany implemented a quality regulation system starting from 2012. The system is part of the incentive based regulation which was implemented in 2009. DSOs can receive a reward or a penalty on their revenue cap depending on their overall performance concerning CoS in comparison to other DSOs. The aim of the quality regulation system is to achieve a socio-economically acceptable level of CoS by considering the costs of customers due to interruptions and a cost-benefit analysis of the DSO. The system is valid for electricity DSOs on LV ($LV \leq 1 \text{ kV}$) and MV ($1 \text{ kV} < MV \leq 72.5 \text{ kV}$). Small DSOs with less than 30,000 customers are excluded from the quality regulation system but can decide to join the efficiency benchmarking and quality regulation system prior to a new regulatory period. From 2012 onwards, the performance of DSOs is measured with SAIDI on LV and with ASIDI on MV.

The following interruptions are considered:

- Interruptions due to atmospherical influence;
- Interruptions caused by a third party; and
- Interruptions for which the network operator is responsible, or for unknown causes.

Planned interruptions are considered by 50% only. Interruptions due to the exchange of meters, force majeure and feedback effects caused in other networks/plants of customers/generating plants are not considered in the quality regulation system. Using these interruptions the DSO's SAIDI is calculated as a mean value of the past 3 years to control for stochastic influences in network reliability. Each DSO's current SAIDI (SAIDI_i) is compared to an individual reference value (SAIDI_i*). The difference between the DSO's current SAIDI value and the individual reference value is translated into a monetary value (reward or penalty). Therefore the difference between SAIDI_i* and SAIDI_i is multiplied with the price of quality and the number of customers of the DSO.

$$\text{REWARD/PENALTY} = (\text{SAIDI}_{i^*} - \text{SAIDI}_i) \times \text{CUSTOMERS}_i \times \text{PRICE OF QUALITY}$$



The price of quality is estimated by using a macroeconomic approach. For the last two years of the first regulation period (2012 and 2013), the price of quality was 0,18 € per minute of interruption per customer. Moreover, structural differences in overall reliability of DSOs must be considered when calculating the individual reference values (SAIDI_i*) for each DSO. Therefore the parameter “load density” is considered in the regression analysis to calculate the individual reference values. The “load density” is defined as the ratio of peak load and geographic area. The quality regulation system uses caps and floors to limit the impact of the quality regulation on the DSO’s revenue cap. The incentive scheme does not include a dead band. The calculated reference values do not define minimum levels of CoS. In this incentive scheme, it is up to the individual DSO to decide whether to improve its CoS or not. In 2013, new rewards and penalties are calculated for DSOs for the first three years (2014, 2015 and 2016) of the second regulation period (2014 – 2018).

Netherlands: In 2012, a survey on how much customers value having fewer interruptions was conducted to update an earlier study from 2004, which has formed the basis for our quality regulation system since 2007. This new study will be used for our quality regulation from 2017 onwards.

Norway: From 2014, some changes to the Norwegian regulation will enter into force. Regarding CoS, DSOs are obliged to register and report interruptions due to LV events from 2014 onwards.

Portugal: During 2013, ERSE is preparing a revision of the Quality of Electricity Supply code. Relating to the continuity of supply, the main changes proposed are:

- Introduction of MAIFI indicator at EHV, HV and MV levels;
- Introduction of SAIDI and SAIFI indicators at HV level; and
- Revision of the system standards and individual guaranteed standards.

Slovenia: For the regulatory period 2013-2015, new incentives (based on revised continuity Overall Standards applied separately for urban (sub-urban incorporated) and rural network types) have been introduced for distribution, as well as a new framework for individual compensations (based on revised continuity Guaranteed Standards). The penalty/reward scheme is capped at approximately 4 million EUR of eligible costs (influencing particular building blocks of CAPEX & OPEX). New methodology for determining the "Q" factor considering reliability impact factors has been introduced based on the results of internal impact analysis.

For more information, please refer to the article "Reliability impact factors analysis for distribution in Slovenia" - Mohar, Valenčič, Batič; 22nd International Conference on Electricity Distribution Stockholm, 10-13 June 2013 - Paper #1153.



Annex 4: Tables

Countries marked with an asterisk (*) use an alternative indicator instead of SAIDI (or SAIFI), which is more representative of the average number of interruptions on MV networks: either because the average is weighted depending on the annual consumption (T-SAIDI or T-SAIFI, Finland) or rated capacity (ASIDI or ASIFI, Austria), or because interruptions originating from LV networks are not taken into account (Malta, Norway, Slovenia).

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				83,08	38,44	30,33	39,41	48,07	72,33	85,68	38,18	31,77	27,85	38,78
Belgium													36,18	39,45
Bulgaria														
Cyprus														148
Czech Republic										185,5	210,9	135,9	114,1	125,2
Denmark										16,48	15,29	15,18	17,04	14,75
Estonia								243,49	185,83	405,33	186,69	195,97	346,00	178,90
Finland *	198,00	130,00	468,00	284,00	212,00	105,00	87,00	64,00	53,00	59,00	41,00	170	225,00	68,00
France	55,00	46,00	59,00	42,00	69,30	57,10	55,90	86,30	61,60	74,10	173,80	95,1	53,90	62,90
Germany								23,25	35,67	16,96	15,29	20,01	17,25	17,37
Greece												149	164	
Hungary	411,00	241,20	250,20	196,80	155,40	137,40	121,80	127,70	141,00	111,00	125,00	132,59	85,12	76,89
Iceland														
Ireland	273,60	257,90	199,30	230,20	171,90	162,80	163,60	148,30	129,70	108,90	100,40	110,00		
Italy	191,77	187,40	149,09	114,74	546,08	90,53	79,86	60,55	57,89	89,64	78,67	88,84	107,96	132,73
Latvia									269	236	424	1073	708	
Lithuania							373,57	168,70	301,70	155,65	161,30	260,03	302,59	287,73
Luxembourg													12	10
Malta *			381,5	523,8	567	486,8	398,8	304,4	409	186,6	687,9	620,6	191	286,2
The Netherlands	25,30	27,00	31,00	28,00	30,00	24,00	27,40	35,60	33,10	22,10	26,50	33,70	23,40	27,00
Norway *							93,00	113,00	96,00	104,00	84,00	66	216	66
Poland									409,99	352,50	408,60	385,50	325,76	263,19
Portugal			530,74	467,98	406,18	217,79	198,73	243,19	136,00	162,67	280,03	276,04	131,43	94,15
Romania														
Slovak Republic														
Slovenia *										116	133	81	76	169
Spain	156,37	145,41	179,69	142,56	141,91	123,60	117,00	112,80	103,80	86,82	133,86	140,9	58,20	
Sweden	165,77	89,17	162,90	101,84	148,05	78,08	912,60	100,00	321,90	110,80	73,30	92,3	186,46	89,01
Switzerland												14	16	22
UK				83,69	110,38	81,11	94,29	69,16	100,10	81,94	75,69	81,42	70,02	68,05

Table 1: Unplanned SAIDI, including exceptional events



Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				35,23	38,44	30,33	31,35	48,07	45,47	43,68	36,65	31,77	27,46	34,74
Belgium														
Bulgaria										288,50	231,20	197,24		
Cyprus														148
Czech Republic						102,54	120,50	102,50	124,23	86,70	102,65	106,24	107,08	109,93
Denmark										16,45	15,29	15,17	16,09	14,75
Estonia														
Finland *														
France	52,00	46,00	39,00	40,00	51,00	50,70	52,20	71,50	57,70	62,60	67,20	62,90	52,60	60,10
Germany								21,53	19,25	16,89	14,63	14,9	15,31	15,91
Greece										171	134	116	100	
Hungary	411,00	241,20	250,20	196,80	155,40	137,40	121,80	127,75	137,42	97,70	99,32	102,38	75,73	76,25
Iceland														
Ireland	227,26	187,00	183,00	183,00	162,00	156,50	154,90	123,90	115,40	94,10	81,30	82,00		
Italy	164,52	159,22	138,57	108,88	96,88	76,52	65,74	53,84	52,47	53,10	49,45	47,77	43,59	45,45
Latvia														
Lithuania							149,85	125,75	135,55	103,37	87,71	83,38	106,10	76,58
Luxembourg													12,00	10,00
Malta *			381,5	523,8	567	486,8	398,8	304,4	409	186,6	687,9	620,6	191	286,2
The Netherlands	25,30	27,00	31,00	28,00	30,00	24,00	27,40	35,60	33,10	22,10	26,50	33,70	23,40	27,00
Norway *														
Poland										354,5	341,6	316,1	309,1	254
Portugal			421,86	334,54	303,75	148,81	142,82	152,08	104,33	133,08	185,62	172,98	97,25	78,48
Romania										638	635	638	547	630
Slovak Republic											414,60	465,40	272,15	303,10
Slovenia *										59	54	51	64	75
Spain	156,37	145,41	179,69	142,56	141,91	123,60	117,00	112,80	103,80	86,82	88,74		58,20	
Sweden												79,3	118,34	84,02
Switzerland												13	16	21
UK				81,66	81,28	76,59	68,64	65,55	78,03	74,22	73,43	70,02	67,95	55,43

Table 2: Unplanned SAIDI, excluding exceptional events



Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				7,40	12,79	20,70	20,97	22,38	18,77	19,57	17,17	19,87	21,44	19,57
Belgium														
Bulgaria										299,50	289,70	224,21		
Cyprus														
Czech Republic						148,29	166,19	144,70	150,23	165,82	140,65	159,40	154,7	147,6
Denmark										8,76	8,37	5,37	4,94	4,76
Estonia								118,59	202,20	195,26	145,04	236,70	104,1	122,5
Finland *	103,00	38,00	33,00	32,00	32,00		23,00	26,00	23,00	23,00	18,00	17	19	21
France	4,00	6,00	6,00	6,00	5,30	6,60	8,00	7,90	10,80	19,40	23,20	24,00	18,9	15,6
Germany								15,10	13,85	13,17	11,53	9,66	10,12	11,83
Greece											219	185	157	
Hungary		100,06	139,58	137,02	199,24	178,95	138,50	139,97	145,00	156,99	198,17	179,65	156,6	153,4
Iceland														
Ireland	172,00	164,70	202,00	284,10	422,30	390,70	375,40	268,70	79,00	60,50	59,30	64,10		
Italy		82,62	84,82	77,97	80,67	62,62	58,77	53,79	46,16	49,35	43,58	55,71	61,85	65,97
Latvia									237	261	254	219	236	
Lithuania							113,62	98,27	71,23	78,07	93,29	132,72	157,9	179,2
Luxembourg													1,2	1,5
Malta *			109,11	89,38	72,84	69,28	105,63	94,74	78,88	72,73	75,10	72,60	69,08	80,32
The Netherlands								2,81	3,39	4,13	4,04	4,35	5,1	5,17
Norway *							44,00	42,00	48,00	44,00	42,00	36	42	41
Poland									121,02	152,20	145,80	129,80	153,1	147,4
Portugal			57,37	52,21	62,39	49,16	39,16	18,70	7,31	2,07	2,00	1,57	2,05	1,68
Romania										385	323	323	333	246
Slovak Republic														188,9
Slovenia *										138,00	130,00	104,00	126	117
Spain	31,36	37,05	36,57	30,66	24,79	21,60	13,80	9,60	11,40	10,80	8,34	8,82	9	
Sweden	90,07	34,53	42,28	37,12	25,41	24,83	33,42	23,81	23,14	26,40	21,30	20,1	16,7	16,94
Switzerland													13	12
UK									4,96	5,70	6,48	6,72	6,69	6,7

Table 3: Planned SAIDI



Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				0,77	0,67	0,61	0,69	0,87	0,90	0,99	0,80	0,66	0,54	0,73
Belgium													0,74	0,81
Bulgaria														
Cyprus														
Czech Republic										2,22	2,00	1,78	1,82	1,9
Denmark										0,42	0,36	0,39	0,4	0,4
Estonia								1,54	2,05	4,56	1,84	2,07	1,97	1,95
Finland *	3,30	2,90	6,60	3,30	4,00	4,30	1,90	1,80	1,60	1,60	1,20	1,8	2,4	1,1
France	1,22	1,20	1,20	1,20	1,43	1,30	1,08	1,33	0,98	1,18	1,10	0,98	0,82	0,9
Germany								0,46	0,43	0,33	0,28	0,32	0,34	0,29
Greece												2,5	2,7	
Hungary	3,09	2,29	2,13	2,03	2,05	1,90	1,77	1,79	1,92	1,62	1,69	1,63	1,26	1,17
Iceland	1,18	1,32	2,10	0,92	1,34	0,64	1,44	1,56	1,57					
Ireland	1,15	1,49	1,31	1,37	1,50	1,70	1,95	1,60	1,57	1,39	1,20	1,32		
Italy		3,59	3,29	2,76	3,96	2,48	2,42	2,29	2,16	2,38	2,36	2,27	2,08	2,33
Latvia												4,15	4,74	
Lithuania							1,74	1,65	2,18	1,73	1,74	1,92	2,19	1,82
Luxembourg													0,27	0,18
Malta *			3,94	4,41	5,21	4,69	4,63	2,89	4,24	2,35	5,04	5,50	2,66	4,28
The Netherlands	0,40	0,40	0,38	0,34	0,34	0,32	0,30	0,45	0,33	0,31	0,33	0,38	0,34	0,32
Norway *							1,54	1,75	1,70	1,79	1,60	1,5	2,4	1,4
Poland									3,09	4,10	4,10	3,8	4,22	3,44
Portugal			7,51	7,35	5,96	3,66	3,54	3,81	2,62	2,80	3,63	4,32	2,41	1,88
Romania										6,9	6,5			
Slovak Republic														
Slovenia *										2,71	2,40	1,81	1,81	2,99
Spain			3,30	2,65	2,60	2,52	2,31	2,38	2,23	1,99	2,19	1,96	1,42	
Sweden	1,38	1,23	1,35	1,32	1,64	1,10	1,49	1,28	1,70	1,38	1,32	2,02	1,63	1,33
Switzerland												0,29	0,28	0,34
UK				0,87	0,86	0,83	0,78	0,74	0,88	0,77	0,73	0,72	0,69	0,65

Table 4: Unplanned SAIFI, including exceptional events



Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				0,59	0,67	0,61	0,67	0,87	0,77	0,75	0,79	0,66	0,54	0,69
Belgium														
Bulgaria										5,63	5,12	4,65		
Cyprus														0,8
Czech Republic						2,11	1,92	1,87	2,35	1,70	1,63	1,64	1,65	1,82
Denmark										0,41	0,36	0,39	0,4	0,4
Estonia														
Finland *														
France	1,20	1,20	1,20	1,15	1,40	1,30	1,02	1,30	0,98	1,16	1,00	0,92	0,81	0,89
Germany								0,46	0,33	0,32	0,27	0,26	0,31	0,28
Greece										2,30	2,10	2,1	2	
Hungary	3,09	2,29	2,13	2,03	2,05	1,90	1,77	1,77	1,88	1,54	1,49	1,45	1,21	1,16
Iceland														
Ireland	1,03	1,30	1,26	1,24	1,47	1,68	1,86	1,43	1,49	1,28	1,08	1,18		
Italy		3,46	3,19	2,74	2,68	2,42	2,33	2,23	2,10	1,92	1,95	1,80	1,67	1,74
Latvia														
Lithuania							1,36	1,36	1,54	1,38	1,28	1,15	1,13	1,06
Luxembourg													0,27	0,18
Malta *			3,94	4,41	5,21	4,69	4,63	2,89	4,24	2,35	5,04	5,50	2,66	4,28
The Netherlands	0,41	0,41	0,38	0,34	0,34	0,32	0,30	0,45	0,33	0,31	0,33	0,384	0,341	0,316
Norway *														
Poland										4,00	3,70	3,7	4,14	3,42
Portugal			5,09	5,93	4,81	2,69	2,71	2,73	2,06	2,36	2,77	3,14	1,94	1,62
Romania										6,70	6,40	6,1	5,6	5,5
Slovak Republic														2,15
Slovenia *										1,80	1,49	1,39	1,63	2,16
Spain			3,30	2,65	2,60	2,52	2,31	2,38	2,23	1,99	2,01	1,82	1,42	
Sweden												2,02	1,59	1,33
Switzerland												0,28	0,28	0,34
UK				0,87	0,79	0,81	0,72	0,72	0,78	0,75	0,71	0,69	0,68	0,6

Table 5: Unplanned SAIFI, excluding exceptional events



Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria *				0,07	0,13	0,17	0,18	0,19	0,19	0,18	0,16	0,17	0,18	0,16
Belgium														
Bulgaria												5,25	5,29	3,61
Cyprus														
Czech Republic						0,57	0,57	0,55	0,56	0,62	0,54	0,59	0,54	0,5
Denmark										0,06	0,07	0,05	0,04	0,04
Estonia					0,49	0,00	0,72	0,52	0,50	1,31	0,58	0,51	0,53	0,56
Finland *	1,80	1,30	0,60	0,50	0,50		0,30	0,40	0,40	0,3	0,3	0,3	0,3	0,3
France	0,03	0,04	0,04	0,04	0,04	0,05	0,06	0,06	0,11	0,21	0,24	0,21	0,13	0,11
Germany								0,12	0,104	0,101	0,101	0,089	0,102	0,116
Greece											1,1	0,9	0,8	
Hungary		0,35	0,55	0,54	0,75	0,71	0,54	0,57	0,55	0,59	0,66	0,61	0,55	0,54
Iceland														
Ireland	0,51	0,43	0,49	0,66	0,76	0,67	0,89	0,68	0,28	0,24	0,24	0,25		
Italy		0,61	0,59	0,49	0,49	0,40	0,37	0,34	0,30	0,35	0,29	0,38	0,37	0,41
Latvia														
Lithuania							0,4	0,36	0,25	0,26	0,33	0,47	0,48	0,53
Luxembourg													0,02	0,02
Malta *			1,62	0,93	0,97	0,72	1,97	0,99	0,59	0,54	0,46	0,82	0,53	0,77
The Netherlands								0,02	0,02	0,027	0,024	0,027	0,031	0,031
Norway *							0,30	0,30	0,30	0,32	0,3	0,3	0,3	0,27
Poland									0,38	0,7	0,8	0,7	0,82	0,7
Portugal			0,32	0,29	0,30	0,23	0,19	0,09	0,04	0,02	0,01	0,01	0,012	0,008
Romania										1,6	1,5	1,3	1,3	0,9
Slovak Republic														
Slovenia *										1,09	1,05	0,85	0,98	0,88
Spain			0,42	0,26	0,2	0,19	0,09	0,08	0,09	0,076	0,06	0,06	0,057	
Sweden	0,45	0,25	0,23	0,26	0,22	0,18	0,22	0,2	0,32	0,51	0,23	0,18	0,14	0,14
Switzerland												0,12	0,12	0,11
UK			0,04	0,04	0,04	0,03	0,04	0,04			0,03	0,03	0,03	0,03

Table 6: Planned SAIFI



Annex 5: List of abbreviations

Term	Definition
CEER	Council of European Energy Regulators
CoS	Continuity of Supply
MV	Medium Voltage
LV	Low Voltage
HV	High Voltage
EHV	Extremely High Voltage
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
ASIDI	Average System Interruption Duration Index
ASIFI	Average System Interruption Frequency index
MAIFI	Momentary Average Interruption Frequency Index
AIT	Average Interruption Time
ENS	Energy Not Supplied
TIEPI	Equivalent interruption time related to the installed capacity (used in Spain and Portugal)
T-SAIFI	Transformer SAIFI (used in Finland)
T-SAIDI	Transformer SAIDI (used in Finland)