

ICS 2025 ANNUAL REPORT

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From: Working Group Incident Classification Scale

ENTSO-E Mission Statement

Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the association for the cooperation of the European transmission system operators (TSOs). The 42 member TSOs, representing 35 countries, are responsible for the secure and coordinated operation of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E brings together the unique expertise of TSOs for the benefit of European citizens by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the security of the inter-connected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

Our vision

ENTSO-E plays a central role in enabling Europe to become the first climate-neutral continent by 2050 by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires sector integration and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources. ENTSO-E acts to ensure that this energy system keeps consumers at its centre and is operated and developed with climate objectives and social welfare in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

Our values

ENTSO-E acts in solidarity as a community of TSOs united by a shared responsibility.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by optimising social welfare in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and innovative responses to prepare for the future and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with transparency and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

Our contributions

ENTSO-E supports the cooperation among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its legally mandated tasks, ENTSO-E's key responsibilities include the following:

- › Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy; › Assessment of the adequacy of the system in different timeframes;
- › Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- › Coordination of research, development and innovation activities of TSOs;
- › Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the implementation and monitoring of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

Table of contents

Table of contents	i	5.2.1 Evolution of operational security indicators relevant for operational planning and scheduling, 2021–2025	30
List of Figures	iii		
List of Tables	iv		
Glossary	vii		
1 Introduction	1		
2 Incident Classification Scale	2		
2.1 Changes in the Incident Classification Scale Methodology	3		
3 Pan-European Overview	4		
3.1 Number of classified violations and incidents	4		
3.2 ICS violations per circuit length and energy consumption	9		
3.3 Evolution 2021–2025	10		
3.3.1 Detailed view of incidents leading to frequency degradation (F)	14		
3.3.2 Detailed view of incidents on transmission system elements (T)	15		
3.3.3 Detailed view of incidents on power generating facilities (G)	16		
3.3.4 Detailed view of violations of standards on voltage (OV)	17		
3.3.5 Detailed view of incidents involving a reduction of reserve capacity (RRC)	18		
3.3.6 Detailed view of incidents involving loss of tools, means or facilities (LT)	18		
3.3.7 Detailed view of N- and N-1 violations (ON)	19		
4 Detailed view of scale 2 and scale 3 incidents	20		
4.1 The scale 2/scale 3 incidents in Continental Europe	20		
4.1.1 Grid incident in Czech Republic on 4 July 2025	20		
4.1.2 Grid Incident in North Macedonia on 18 May 2025	20		
4.1.3 Grid Incident in Spain and Portugal on 28 April 2025	21		
5 Operational Security Indicators	22		
5.1 Operational security indicators relevant to operational security	22		
5.1.1 Evolution of operational security indicators relevant for operational security, 2021–2025	25		
5.2 Operational security indicators relevant to operational planning and scheduling	28		
		6 ICS violations in Continental Europe	31
		6.1 Overview of 2025	31
		6.2 Evolution 2021–2025	33
		6.3 Analysis of significant changes in trends	34
		7 ICS violations in Nordic	35
		7.1 Overview of 2025	35
		7.2 Evolution 2021–2025	37
		7.3 Analysis of significant changes in trends	38
		8 ICS violations in Ireland and Northern Ireland	39
		8.1 Overview of 2025	39
		8.2 Evolution 2021–2025	41
		8.3 Analysis of significant changes in trends	42
		9 ICS violations in Isolated system	43
		9.1 Overview of 2025	43
		9.2 Evolution 2021–2025	45
		9.3 Analysis of significant changes in trends	46
		10 Overview of ICS violations per TSO	47
		10.1 Overview of ICS violations by TSOs in Continental Europe	48
		10.1.1 ICS violations reported by 50Hertz	48
		10.1.2 ICS violations reported by Amprion	49
		10.1.3 ICS violations reported by APG	50
		10.1.4 ICS violations reported by AST	51
		10.1.5 ICS violations reported by CEPS	52
		10.1.6 ICS violations reported by CGES	53
		10.1.7 ICS violations reported by Elering	54
		10.1.8 ICS violations reported by ELES	55
		10.1.9 ICS violations reported by Elia	56
		10.1.10 ICS violations reported by EMS	57
		10.1.11 ICS violations reported by En- erginet (CE)	58
		10.1.12 ICS violations reported by ESO	59
		10.1.13 ICS violations reported by Freq (CE)	60
		10.1.14 ICS violations reported by HOPS	61
		10.1.15 ICS violations reported by IPTO	62
		10.1.16 ICS violations reported by Litgrid	63
		10.1.17 ICS violations reported by MAVIR	64
		10.1.18 ICS violations reported by Mold- electrica	65
		10.1.19 ICS violations reported by NOS BiH	66
		10.1.20 ICS violations reported by OST	67
		10.1.21 ICS violations reported by PSE	68
		10.1.22 ICS violations reported by Red Eléc- trica	69
		10.1.23 ICS violations reported by REN	70

10.1.24 ICS violations reported by RTE . . .	71	10.2.3 ICS violations reported by Freq (Nordic)	83
10.1.25 ICS violations reported by SEPS . .	72	10.2.4 ICS violations reported by Statnett .	84
10.1.26 ICS violations reported by Swissgrid	73	10.2.5 ICS violations reported by Svenska kraftnät	85
10.1.27 ICS violations reported by TEIAS . .	74	10.3 Overview of ICS violations by TSOs in Ire- land and Northern Ireland	86
10.1.28 ICS violations reported by TenneT DE	75	10.3.1 ICS violations reported by EirGrid .	86
10.1.29 ICS violations reported by TenneT NL	76	10.3.2 ICS violations reported by SONI . .	87
10.1.30 ICS violations reported by Terna . .	77	10.4 Overview of ICS violations by TSOs in Iso- lated system	88
10.1.31 ICS violations reported by Transe- lectrica	78	10.4.1 ICS violations reported by Landsnet	88
10.1.32 ICS violations reported by TransnetBW	79	11 Conclusion	89
10.1.33 ICS violations reported by Ukrenerg	80	References	90
10.2 Overview of ICS violations by TSOs in Nordic	81	Contact	91
10.2.1 ICS violations reported by En- erginet (Nordic)	81		
10.2.2 ICS violations reported by Fingrid .	82		

List of Figures

3.1	Number of violations per 1 TWh of energy consumption	9	5.7	Operational security indicator OS-E2 from 2021–2025	26
3.2	Number of violations per 100 km of circuit length	9	5.8	Operational security indicator OS-F1 from 2021–2025	27
3.3	Number of violations on transmission network elements (T0 and T1) per 100 km of circuit length	9	5.9	Operational security indicator OS-F2 from 2021–2025	27
3.4	Annual number of ICS violations by scale from 2021–2025	10	5.10	Operational security indicator OS-G1 from 2021–2025	27
3.5	Annual percentage allocation of ICS violations by scale from 2021–2025	11	5.11	Operational security indicator OS-G2 from 2021–2025	27
3.6	Annual number of scale 0 ICS violations per 1 TWh of energy consumption from 2021–2025	11	5.12	Operational security indicator OS-H from 2021–2025	27
3.7	Annual number of scale 0 ICS violations per 100 km of circuit length from 2021–2025	11	5.13	Operational security indicator OPS-A annually from 2021–2025	30
3.8	Annual number of scale 1 ICS violations per 1 TWh of energy consumption from 2021–2025	11	5.14	Operational security indicator OPS-B annually from 2021–2025	30
3.9	Annual number of scale 1 ICS violations by 100 km of circuit length from 2021–2025	11	5.15	Operational security indicator OPS-C annually from 2021–2025	30
3.10	The annual number of F-violations per 1 TWh of consumption in each synchronous area	14	5.16	Operational security indicator OPS-D annually from 2021–2025	30
3.11	Annual number of T-violations per 100 km of circuit length	15	10.1	Number of ICS violations grouped by duration in 2025 for 50Hertz	48
3.12	Annual number of T0-violations per 100 km of circuit length	15	10.2	Number of ICS violations grouped by duration in 2025 for Amprion	49
3.13	Annual number of T1-violations per 100 km of circuit length	15	10.3	Number of ICS violations grouped by duration in 2025 for APG	50
3.14	Annual number of G-violations per 1 TWh of consumption	16	10.4	Number of ICS violations grouped by duration in 2025 for AST	51
3.15	Annual number of OV-violations per 100 km of circuit length	17	10.5	Number of ICS violations grouped by duration in 2025 for CEPS	52
3.16	Annual number of RRC-violations per 100 km of circuit length	18	10.6	Number of ICS violations grouped by duration in 2025 for CGES	53
3.17	Annual number of ON-violations per 100 km of circuit length	19	10.7	Number of ICS violations grouped by duration in 2025 for Elering	54
5.1	Operational security indicator OS-A from 2021–2025	25	10.8	Number of ICS violations grouped by duration in 2025 for ELES	55
5.2	Operational security indicator OS-B from 2021–2025	26	10.9	Number of ICS violations grouped by duration in 2025 for Elia	56
5.3	Operational security indicator OS-C from 2021–2025	26	10.10	Number of ICS violations grouped by duration in 2025 for EMS	57
5.4	Operational security indicator OS-D1 from 2021–2025	26	10.11	Number of ICS violations grouped by duration in 2025 for Energinet (CE)	58
5.5	Operational security indicator OS-D2 from 2021–2025	26	10.12	Number of ICS violations grouped by duration in 2025 for ESO	59
5.6	Operational security indicator OS-E1 from 2021–2025	26	10.13	Number of ICS violations grouped by duration in 2025 for Freq (CE)	60
			10.14	Number of ICS violations grouped by duration in 2025 for HOPS	61
			10.15	Number of ICS violations grouped by duration in 2025 for IPTO	62

10.16	Number of ICS violations grouped by duration in 2025 for Litgrid	63	10.29	Number of ICS violations grouped by duration in 2025 for TenneT NL	76
10.17	Number of ICS violations grouped by duration in 2025 for MAVIR	64	10.30	Number of ICS violations grouped by duration in 2025 for Terna	77
10.18	Number of ICS violations grouped by duration in 2025 for Moldelectrica	65	10.31	Number of ICS violations grouped by duration in 2025 for Transeletrica	78
10.19	Number of ICS violations grouped by duration in 2025 for NOS BiH	66	10.32	Number of ICS violations grouped by duration in 2025 for TransnetBW	79
10.20	Number of ICS violations grouped by duration in 2025 for OST	67	10.33	Number of ICS violations grouped by duration in 2025 for Ukrenergo	80
10.21	Number of ICS violations grouped by duration in 2025 for PSE	68	10.34	Number of ICS violations grouped by duration in 2025 for Energinet (Nordic)	81
10.22	Number of ICS violations grouped by duration in 2025 for Red Eléctrica	69	10.35	Number of ICS violations grouped by duration in 2025 for Fingrid	82
10.23	Number of ICS violations grouped by duration in 2025 for REN	70	10.36	Number of ICS violations grouped by duration in 2025 for Freq (Nordic)	83
10.24	Number of ICS violations grouped by duration in 2025 for RTE	71	10.37	Number of ICS violations grouped by duration in 2025 for Statnett	84
10.25	Number of ICS violations grouped by duration in 2025 for SEPS	72	10.38	Number of ICS violations grouped by duration in 2025 for Svenska kraftnät	85
10.26	Number of ICS violations grouped by duration in 2025 for Swissgrid	73	10.39	Number of ICS violations grouped by duration in 2025 for EirGrid	86
10.27	Number of ICS violations grouped by duration in 2025 for TEIAS	74	10.40	Number of ICS violations grouped by duration in 2025 for SONI	87
10.28	Number of ICS violations grouped by duration in 2025 for TenneT DE	75	10.41	Number of ICS violations grouped by duration in 2025 for Landsnet	88

List of Tables

2.1	The Incident Classification Scale	2	3.14	Annual number of T-violations	15
3.1	Number of incidents and violations by scale and their percentage allocation for 2025	4	3.15	Annual number of T-violations by cause	15
3.2	Incidents by scale and synchronous area for 2025	5	3.16	Annual number of G-violations	16
3.3	ICS violations by scale and synchronous area for 2025	5	3.17	Annual number of G-violations by cause	16
3.4	Percentage distribution of incidents by scale and synchronous area for 2025	5	3.18	Annual number of OV-violations	17
3.5	Percentage distribution of violations by scale and synchronous area for 2025	5	3.19	Annual number of OV-violations by cause	17
3.6	Incidents by scale and TSO for 2025	6	3.20	Annual number of RRC-violations	18
3.7	ICS violations by scale by TSO for 2025	6	3.21	Annual number of RRC-violations by cause	18
3.8	Incidents by dominating criterion for each synchronous area for 2025	7	3.22	Annual number of LT-violations	19
3.9	ICS violations by dominating criterion for each synchronous area for 2025	8	3.23	Annual number of LT-violations by cause	19
3.10	Annual number of ICS incidents by dominating criterion	12	3.24	Annual number of ON-violations	19
3.11	Annual number of ICS violations by ICS criterion	13	3.25	Annual number of ON-violations by cause	19
3.12	Annual number of F-violations	14	5.1	The operational security indicators relevant to operational security	23
3.13	Annual number of F-violations by cause	14	5.2	Operational security indicators relevant to operational security by synchronous area in 2025	24
			5.3	The operational security indicators relevant to operational planning and scheduling	28
			5.4	Operational security indicators relevant to operational planning and scheduling in 2025	29

6.1	Monthly number of ICS violations by ICS criterion in 2025 in Continental Europe.	32	10.13	Monthly distribution of ICS violations by ICS criterion in 2025 for Elering	54
6.2	Cumulative number of ICS violations by ICS criterion and duration in 2025 in Continental Europe	33	10.14	Annual number of ICS violations by ICS criterion from 2021–2025 for Elering	54
6.3	Annual number of ICS violations by ICS criterion from 2021–2025	34	10.15	Monthly distribution of ICS violations by ICS criterion in 2025 for ELES	55
7.1	Monthly number of ICS violations by ICS criterion in 2025 in Nordic.	36	10.16	Annual number of ICS violations by ICS criterion from 2021–2025 for ELES	55
7.2	Cumulative number of ICS violations by ICS criterion and duration in 2025 in Nordic	37	10.17	Monthly distribution of ICS violations by ICS criterion in 2025 for Elia	56
7.3	Annual number of ICS violations by ICS criterion from 2021–2025	38	10.18	Annual number of ICS violations by ICS criterion from 2021–2025 for Elia	56
8.1	Monthly number of ICS violations by ICS criterion in 2025 in Ireland and Northern Ireland.	40	10.19	Monthly distribution of ICS violations by ICS criterion in 2025 for EMS	57
8.2	Cumulative number of ICS violations by ICS criterion and duration in 2025 in Ireland and Northern Ireland	41	10.20	Annual number of ICS violations by ICS criterion from 2021–2025 for EMS	57
8.3	Annual number of ICS violations by ICS criterion from 2021–2025	42	10.21	Monthly distribution of ICS violations by ICS criterion in 2025 for Energinet (CE)	58
9.1	Monthly number of ICS violations by ICS criterion in 2025 in Isolated system.	44	10.22	Annual number of ICS violations by ICS criterion from 2021–2025 for Energinet (CE)	58
9.2	Cumulative number of ICS violations by ICS criterion and duration in 2025 in Isolated system	45	10.23	Monthly distribution of ICS violations by ICS criterion in 2025 for ESO	59
9.3	Annual number of ICS violations by ICS criterion from 2021–2025	46	10.24	Annual number of ICS violations by ICS criterion from 2021–2025 for ESO	59
10.1	Monthly distribution of ICS violations by ICS criterion in 2025 for 50Hertz	48	10.25	Monthly distribution of ICS violations by ICS criterion in 2025 for Freq (CE)	60
10.2	Annual number of ICS violations by ICS criterion from 2021–2025 for 50Hertz	48	10.26	Annual number of ICS violations by ICS criterion from 2021–2025 for Freq (CE)	60
10.3	Monthly distribution of ICS violations by ICS criterion in 2025 for Amprion	49	10.27	Monthly distribution of ICS violations by ICS criterion in 2025 for HOPS	61
10.4	Annual number of ICS violations by ICS criterion from 2021–2025 for Amprion	49	10.28	Annual number of ICS violations by ICS criterion from 2021–2025 for HOPS	61
10.5	Monthly distribution of ICS violations by ICS criterion in 2025 for APG	50	10.29	Monthly distribution of ICS violations by ICS criterion in 2025 for IPTO	62
10.6	Annual number of ICS violations by ICS criterion from 2021–2025 for APG	50	10.30	Annual number of ICS violations by ICS criterion from 2021–2025 for IPTO	62
10.7	Monthly distribution of ICS violations by ICS criterion in 2025 for AST	51	10.31	Monthly distribution of ICS violations by ICS criterion in 2025 for Litgrid	63
10.8	Annual number of ICS violations by ICS criterion from 2021–2025 for AST	51	10.32	Annual number of ICS violations by ICS criterion from 2021–2025 for Litgrid	63
10.9	Monthly distribution of ICS violations by ICS criterion in 2025 for CEPS	52	10.33	Monthly distribution of ICS violations by ICS criterion in 2025 for MAVIR	64
10.10	Annual number of ICS violations by ICS criterion from 2021–2025 for CEPS	52	10.34	Annual number of ICS violations by ICS criterion from 2021–2025 for MAVIR	64
10.11	Monthly distribution of ICS violations by ICS criterion in 2025 for CGES	53	10.35	Monthly distribution of ICS violations by ICS criterion in 2025 for Moldelectrica	65
10.12	Annual number of ICS violations by ICS criterion from 2021–2025 for CGES	53	10.36	Annual number of ICS violations by ICS criterion from 2021–2025 for Moldelectrica	65
			10.37	Monthly distribution of ICS violations by ICS criterion in 2025 for NOS BiH	66
			10.38	Annual number of ICS violations by ICS criterion from 2021–2025 for NOS BiH	66
			10.39	Monthly distribution of ICS violations by ICS criterion in 2025 for OST	67
			10.40	Annual number of ICS violations by ICS criterion from 2021–2025 for OST	67

10.41Monthly distribution of ICS violations by ICS criterion in 2025 for PSE	68	10.62Annual number of ICS violations by ICS criterion from 2021–2025 for Transelectrica	78
10.42Annual number of ICS violations by ICS criterion from 2021–2025 for PSE	68	10.63Monthly distribution of ICS violations by ICS criterion in 2025 for TransnetBW	79
10.43Monthly distribution of ICS violations by ICS criterion in 2025 for Red Eléctrica	69	10.64Annual number of ICS violations by ICS criterion from 2021–2025 for TransnetBW	79
10.44Annual number of ICS violations by ICS criterion from 2021–2025 for Red Eléctrica	69	10.65Monthly distribution of ICS violations by ICS criterion in 2025 for Ukrenergo	80
10.45Monthly distribution of ICS violations by ICS criterion in 2025 for REN	70	10.66Annual number of ICS violations by ICS criterion from 2021–2025 for Ukrenergo	80
10.46Annual number of ICS violations by ICS criterion from 2021–2025 for REN	70	10.67Monthly distribution of ICS violations by ICS criterion in 2025 for Energinet (Nordic)	81
10.47Monthly distribution of ICS violations by ICS criterion in 2025 for RTE	71	10.68Annual number of ICS violations by ICS criterion from 2021–2025 for Energinet (Nordic)	81
10.48Annual number of ICS violations by ICS criterion from 2021–2025 for RTE	71	10.69Monthly distribution of ICS violations by ICS criterion in 2025 for Fingrid	82
10.49Monthly distribution of ICS violations by ICS criterion in 2025 for SEPS	72	10.70Annual number of ICS violations by ICS criterion from 2021–2025 for Fingrid	82
10.50Annual number of ICS violations by ICS criterion from 2021–2025 for SEPS	72	10.71Monthly distribution of ICS violations by ICS criterion in 2025 for Freq (Nordic)	83
10.51Monthly distribution of ICS violations by ICS criterion in 2025 for Swissgrid	73	10.72Annual number of ICS violations by ICS criterion from 2021–2025 for Freq (Nordic)	83
10.52Annual number of ICS violations by ICS criterion from 2021–2025 for Swissgrid	73	10.73Monthly distribution of ICS violations by ICS criterion in 2025 for Statnett	84
10.53Monthly distribution of ICS violations by ICS criterion in 2025 for TEIAS	74	10.74Annual number of ICS violations by ICS criterion from 2021–2025 for Statnett	84
10.54Annual number of ICS violations by ICS criterion from 2021–2025 for TEIAS	74	10.75Monthly distribution of ICS violations by ICS criterion in 2025 for Svenska kraftnät	85
10.55Monthly distribution of ICS violations by ICS criterion in 2025 for TenneT DE	75	10.76Annual number of ICS violations by ICS criterion from 2021–2025 for Svenska kraftnät	85
10.56Annual number of ICS violations by ICS criterion from 2021–2025 for TenneT DE	75	10.77Monthly distribution of ICS violations by ICS criterion in 2025 for EirGrid	86
10.57Monthly distribution of ICS violations by ICS criterion in 2025 for TenneT NL	76	10.78Annual number of ICS violations by ICS criterion from 2021–2025 for EirGrid	86
10.58Annual number of ICS violations by ICS criterion from 2021–2025 for TenneT NL	76	10.79Monthly distribution of ICS violations by ICS criterion in 2025 for SONI	87
10.59Monthly distribution of ICS violations by ICS criterion in 2025 for Terna	77	10.80Annual number of ICS violations by ICS criterion from 2021–2025 for SONI	87
10.60Annual number of ICS violations by ICS criterion from 2021–2025 for Terna	77	10.81Monthly distribution of ICS violations by ICS criterion in 2025 for Landsnet	88
10.61Monthly distribution of ICS violations by ICS criterion in 2025 for Transelectrica	78	10.82Annual number of ICS violations by ICS criterion from 2021–2025 for Landsnet	88

Glossary

ALFC Annual Load-Frequency Control

CE Continental Europe

CEST Central European Summer Time

CET Central European Time

Contingency list “the list of contingencies to be simulated in order to test the compliance with the operational security limits” [2]

ENS Energy Not Supplied

ENTSO-E European Network of Transmission System Operators for Electricity

Energy not supplied “the estimated energy which would have been supplied to end-users if no interruption and no transmission restrictions had occurred”

Exceptional contingency “the simultaneous occurrence of multiple contingencies with a common cause” [2]

FCR Frequency Containment Reserves

FRR Frequency Restoration Reserves

ICS Incident Classification Scale

ICS criterion The threshold(s) that define the scale and type of an incident

ICS incident A situation where one or multiple ICS criteria have been violated

IE/Nl Ireland / Northern Ireland

LFC area Load-frequency control area

MTU Market Time Unit

OPS Operational security indicator relevant to operational planning and scheduling

OS Operational security indicator relevant to operational security

Out-of-range contingency “the simultaneous occurrence of multiple contingencies without a common cause, or a loss of power generating modules with a total loss of generation capacity exceeding the reference incident” [2]

PGF Power Generating Facility

RR Replacement Reserves

SA Synchronous area

SOGL System Operation Guideline, i.e., Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation [2]

TSO Transmission System Operator

WG ICS Working Group Incident Classification Scale, that is, the group formed by ENTSO-E for the purposes of the ICS Methodology, and responsible to perform the tasks specified for the group as described in Chapters 7 and 8 of that methodology.

1 Introduction

The 2025 Incident Classification Scale Annual Report has been prepared according to the Incident Classification Scale (ICS) Methodology developed by ENTSO-E according to Article 15(1) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SOGL) .

The ICS Methodology adhered to in this report was approved on 4 December 2019 [1] and was used for the first time in the 2020 ICS Annual Report. The ICS aims to:

1. Provide an overview of operational security indicators as specified in Article 15 of the SOGL;
2. Identify any improvements necessary to support sustainable and long-term operational security;
3. Identify any appropriate improvements to the network operation tools required to maintain operational security and that are related to real-time operation and operational planning to support Transmission System Operators (TSOs) in their task identified in Article 55(e) of the SOGL; and
4. Provide "explanations for the reasons for incidents

at the operational security ranking scales 2 and 3 as per the ICS adopted by ENTSO for Electricity. Those explanations are based on an investigation of the incidents by the TSOs" as specified in Article 15(5) of the SOGL. The process of this investigation is set out in the ICS Methodology.

The Annual Report aggregates the data prepared by each TSO and provides a high-level summary of scale 0–3 ICS incidents, and a detailed review of scale 2 and scale 3 incidents.

The 2025 ICS Annual Report includes incident reports from 38 TSOs in Europe (full list in Chapter 10). Amprion provided information regarding incidents leading to frequency degradation in continental Europe (CE) for odd months, and Swissgrid provided information for even months. The frequency violations in the Nordics were provided by Svenska kraftnät.

Data for two of the operational security indicators relevant for operational security (OS-G1 and OS-G2) have been collected by Working Group Annual Load-Frequency Control (ALFC).

2 Incident Classification Scale

The Incident Classification Scale (ICS) consists of five scales (below scale, scale 0, 1, 2 and 3) ranging from minor incidents to major incidents. The scales are defined within the meaning of the system states in Article 18 of the SOGL [2]. The scales and criteria are described in detail in Chapter 5. In general, the scales and corresponding system states are:

- Below Scale for minor incidents; the system remains in a normal state;
- Scale 0 for noteworthy minor incidents; the system remains in a normal state;
- Scale 1 for significant incidents; contingency from the contingency list has been detected; the system is in an alert state;
- Scale 2 for extensive incidents; violation of operational security limit, probability of simultaneous impact on multiple TSOs; the system is in an emergency state; and
- Scale 3 for major incidents in the control area of one or multiple TSOs; the system is in a blackout state.

Each scale has a set of ICS criteria that define operational thresholds on, for example, frequency and voltage, that must be met or the ICS criteria is violated and the system state changed accordingly. Furthermore, each ICS criterion has a priority as shown in Table 2.1 with a number from 1 to 30, where 1 denotes the highest priority and 30 the lowest priority. When an ICS incident meets several criteria, the incident is classified according to the criterion that has the highest priority. All criteria violations shall be reported by TSOs to allow for the factual evaluation of the ICS incident.

It should be noted that the 'below scale' violations were added to the ICS methodology for completeness to record incidents that are needed to calculate the operational security indicators relevant to operational security pursuant to Article 15 of the SOGL [1]. These incidents are considered minor local incidents. The 'Below Scale' classification is used for reporting of violations of standards of voltage, incidents on power generating facilities and incidents leading to frequency degradation. For all other criteria the ICS scales 0, 1, 2 and 3 are sufficient for calculating the operational security indicators.

Table 2.1: The Incident Classification Scale used to categorise incidents in the pan-European power system.

Below scale Anomaly		Scale 0 Noteworthy		Scale 1 Significant incident		Scale 2 Extensive incident		Scale 3 Major incident	
Priority	Short definition (Criterion short code)	Priority	Short definition (Criterion short code)	Priority	Short definition (Criterion short code)	Priority	Short definition (Criterion short code)	Priority	Short definition (Criterion short code)
		#20	Incidents on load (L0)	#11	Incidents on load (L1)	#2	Incidents on load (L2)	#1	Blackout (OB3)
#28	Incidents leading to frequency degradation (FBS)	#21	Incidents leading to frequency degradation (F0)	#12	Incidents leading to frequency degradation (F1)	#3	Incidents leading to frequency degradation (F2)		
		#22	Incidents on network elements (T0)	#13	Incidents on network elements (T1)	#4	Incidents on network elements (T2)		
#29	Incidents on power generating facilities (GBS)	#23	Incidents on power generating facilities (G0)	#14	Incidents on power generating facilities (G1)	#5	Incidents on power generating facilities (G2)		
				#15	N-1 violation (ON1)	#6	N violation (ON2)		
		#24	Separation from the grid (RS0)	#16	Separation from the grid (RS1)	#7	Separation from the grid (RS2)		
#30	Violation of standards on voltage (OVBS)	#25	Violation of standards on voltage (OV0)	#17	Violation of standards on voltage (OV1)	#8	Violation of standards on voltage (OV2)		
		#26	Reduction of reserve capacity (RRC0)	#18	Reduction of reserve capacity (RRC1)	#9	Reduction of reserve capacity (RRC2)		
		#27	Loss of tools, means and facilities (LT0)	#19	Loss of tools, means and facilities (LT1)	#10	Loss of tools, means and facilities (LT2)		

2.1 Changes in the Incident Classification Scale Methodology

The ICS Methodology has been updated several times since its introduction. The ICS Methodology adhered to in this report was updated in 2019 to implement input received from ACER. This included an update of several thresholds and the addition of the new 'below scale' level. In addition, some adjustments were made to improve the quality of the ICS data. The first ICS Annual Report to use the 2019 update was the 2021 ICS Annual Report. The changes introduced in 2019 are presented in more detail in the 2023 ICS Annual Report [3].

All data presented in this report are based on the ICS

Methodology approved in 2019. As of 2018, annual workshops are organised to ensure high-quality and consistent reporting for all TSOs.

In December 2025, a new ICS Methodology [4] was approved for use and to be applied as of 1 January 2026. Therefore, the incidents reported for 2025 are still reported in accordance of the ICS Methodology from 2019. The 2026 ICS Annual report will use the definitions and methods as defined in the new ICS Methodology from December 2025.

3 Pan-European Overview

This chapter provides a pan-European overview of the violations and incidents in 2025 reported by the TSOs. The general overview per synchronous area and TSO is pro-

vided in Section 3.1. Section 3.2 analyses violations per circuit length and consumption, and Section 3.3 illustrates the evolution of violations between 2021–2025.

3.1 Number of classified violations and incidents

This section presents the number of ICS incidents and ICS violations that meet the ICS criteria. The numbers are shown per synchronous area and TSO and their distribution by scale or ICS criterion.

As shown in Table 3.1, TSOs reported 10144 ICS incidents in 2025, out of which 6270 were of scale 0, 3847 of scale 1, 26 were scale 2 and one scale 3. The percentage distribution of scale 0, 1 and 2 ICS violations were 62%, 38% and 0.3%, respectively. There were 186 more ICS violations than ICS incidents. The similar number of ICS violations and ICS incidents indicates that most ICS incidents only violated one ICS criteria. As expected, scale 0 incidents were most common in all synchronous areas as the power system is designed to cope with one contingency without degrading the system state.

Table 3.2 presents the total number of ICS incidents per synchronous area and scale in 2025. Table 3.3 presents the same information but for ICS violations. Table 3.4 shows the percentage allocation of reported ICS incidents by scale and synchronous area. Table 3.5 presents the same information but for ICS violations. Approximately 22% of all violations, as well as incidents, occurred in Nordic synchronous area. It should be noted that in smaller synchronous areas, single incidents can have a disproportionate effect on the percentage distributions as the total number of incidents within them is small. Section 3.2 presents these numbers normalised by consumption and circuit length in each region.

Table 3.6 shows the number of ICS incidents per TSO and scale and Table 3.7 shows the number of ICS violations per TSO and ICS scale. Incidents classified as scale 0 and scale 1 are widely distributed across most TSOs. The responsible TSO for violations leading to frequency degradation is marked in most cases as 'Freq (CE)' in CE and 'Freq (Nordic)' in the Nordic synchronous area because it is rarely possible to determine which TSO is responsible for a particular frequency violation. Usually, frequency violations are caused by a combination of different reasons. A substantial share of frequency violations that are attributed to un-

known causes is likely driven by deterministic frequency deviations (DFDs), arising from systematic changes in generation and balancing schedules between MTUs. The increase in renewable generation which by its nature is difficult to forecast also contributes to frequency violations and described as Load and Generation Forecasts.

Table 3.8 and Table 3.9 show the number of ICS incidents and ICS violations by ICS criteria and synchronous area, respectively. The most frequent violations in 2025 were violations of standards on voltage (OV0 and OV1) with 6922 violations, 2040 violations on network elements (T0 and T1), and violations leading to frequency degradation (F0) with 551 violations. Scale 2 and scale 3 violations are reported by Ukrenergo, Red Eléctrica, REN, ČEPS and Landsnet. Chapter 4 describes the scale 2 and 3 incidents in detail. However, it should be noted that while the incident on 18 May 2025 in North Macedonia was classified based on the ICS Methodology during the investigation, no reporting of the incident to the 2025 ICS Annual Report has been received.

In total, 38 TSOs reported incidents to the ICS annual report. Three incidents on scale 2 or 3 were identified in 2025 and are summarised in Chapter 4. The scale 2 or 3 incidents and their ICS violations are presented in this report except for the incident on 18 May 2025 in North Macedonia, which was inconclusively reported in the ICS annual report due to absence of all MEPSO data for 2025. For full details, WG ICS advises to read the final reports of the specific investigations.

Table 3.1: Number of incidents and violations by scale for 2025 and their percentage allocation.

	Number of incidents	Percentage of total	Number of violations	Percentage of total
Scale 0	6270	61.8%	6429	62.2%
Scale 1	3847	37.9%	3866	37.4%
Scale 2	26	0.3%	33	0.3%
Scale 3	1	0.0%	2	0.0%
Grand total	10144	100.0%	10330	100.0%

Table 3.2: Number of incidents by scale and synchronous area for 2025.

	Scale 0	Scale 1	Scale 2	Scale 3	Grand total
Continental Europe	3201	2974	25	1	6201
Ireland	33	-	-	-	33
Isolated systems	19	8	1	-	28
Nordic	3017	865	-	-	3882
Grand total	6270	3847	26	1	10144

Table 3.4: Percentage distribution of incidents by scale and synchronous area for 2025.

	Scale 0	Scale 1	Scale 2	Scale 3
Continental Europe	51.6%	48.0%	0.4%	0.0%
Ireland	100.0%	-	-	-
Isolated systems	67.9%	28.6%	3.6%	-
Nordic	77.7%	22.3%	-	-
Grand total	61.8%	37.9%	0.3%	0.0%

Table 3.3: Number of violations by scale and synchronous area for 2025.

	Scale 0	Scale 1	Scale 2	Scale 3	Grand total
Continental Europe	3340	2989	32	2	6363
Ireland	33	-	-	-	33
Isolated systems	24	11	1	-	36
Nordic	3032	866	-	-	3898
Grand total	6429	3866	33	2	10330

Table 3.5: Percentage distribution of violations by scale and synchronous area for 2025.

	Scale 0	Scale 1	Scale 2	Scale 3
Continental Europe	52.5%	47.0%	0.5%	0.0%
Ireland	100.0%	-	-	-
Isolated systems	66.7%	30.6%	2.8%	-
Nordic	77.8%	22.2%	-	-
Grand total	62.2%	37.4%	0.3%	0.0%

Table 3.6: Number of ICS incidents by scale and TSO for 2025.

Synchronous area	TSO	Scale 0	Scale 1	Scale 2	Scale 3	Grand Total
Continental Europe	50Hertz	74	2	-	-	76
	Amprion	161	2	-	-	163
	APG	12	3	-	-	15
	AST	11	2	-	-	13
	CEPS	49	16	1	-	66
	CGES	39	-	-	-	39
	Elering	7	-	-	-	7
	ELES	130	161	-	-	291
	Elia	18	6	-	-	24
	EMS	46	127	-	-	173
	Energinet (CE)	29	2	-	-	31
	ESO	64	-	-	-	64
	Freq (CE)	391	46	-	-	437
	HOPS	26	11	-	-	37
	IPTO	52	12	-	-	64
	Litgrid	15	-	-	-	15
	MAVIR	181	96	-	-	277
	Moldelectrica	15	1990	-	-	2005
	NOS BiH	37	-	-	-	37
	OST	57	1	1	-	59
	PSE	93	-	-	-	93
	Red Eléctrica	272	1	-	1	274
	REN	32	-	-	-	32
	RTE	449	27	-	-	476
	SEPS	5	2	-	-	7
	Swissgrid	78	12	-	-	90
	TEIAS	36	-	-	-	36
	TenneT DE	57	6	-	-	63
	TenneT NL	26	3	-	-	29
	Terna	68	-	-	-	68
	Transelectrica	407	320	-	-	727
	TransnetBW	63	8	-	-	71
	Ukrenergo	201	118	23	-	342
	Total	3201	2974	25	1	6201
Ireland and Northern Ireland	EirGrid	29	-	-	-	29
	SONI	4	-	-	-	4
	Total	33	-	-	-	33
Isolated system	Landsnet	19	8	1	-	28
	Total	19	8	1	-	28
Nordic	Energinet (Nordic)	12	4	-	-	16
	Fingrid	21	-	-	-	21
	Freq (Nordic)	102	2	-	-	104
	Statnett	59	2	-	-	61
	Svenska kraftnät	2823	857	-	-	3680
	Total	3017	865	-	-	3882
Grand total		6270	3847	26	1	10144

Table 3.7: Number of ICS violations by scale and TSO for 2025.

Synchronous area	TSO	Scale 0	Scale 1	Scale 2	Scale 3	Grand Total
Continental Europe	50Hertz	74	7	-	-	81
	Amprion	168	7	-	-	175
	APG	12	3	-	-	15
	AST	12	2	-	-	14
	CEPS	50	21	1	-	72
	CGES	39	-	-	-	39
	Elering	7	-	-	-	7
	ELES	130	161	-	-	291
	Elia	19	6	-	-	25
	EMS	46	128	-	-	174
	Energinet (CE)	29	2	-	-	31
	ESO	83	-	-	-	83
	Freq (CE)	401	46	-	-	447
	HOPS	28	11	-	-	39
	IPTO	52	12	-	-	64
	Litgrid	15	-	-	-	15
	MAVIR	181	96	-	-	277
	Moldelectrica	16	1990	-	-	2006
	NOS BiH	37	-	-	-	37
	OST	66	2	1	-	69
	PSE	93	-	-	-	93
	Red Eléctrica	298	1	4	1	304
	REN	35	-	3	1	39
	RTE	454	27	-	-	481
	SEPS	6	2	-	-	8
	Swissgrid	79	12	-	-	91
	TEIAS	36	-	-	-	36
	TenneT DE	63	9	-	-	72
	TenneT NL	26	3	-	-	29
	Terna	70	-	-	-	70
	Transelectrica	414	320	-	-	734
	TransnetBW	68	3	-	-	71
	Ukrenergo	233	118	23	-	374
	Total	3340	2989	32	2	6363
Ireland and Northern Ireland	EirGrid	29	-	-	-	29
	SONI	4	-	-	-	4
	Total	33	-	-	-	33
Isolated system	Landsnet	24	11	1	-	36
	Total	24	11	1	-	36
Nordic	Energinet (Nordic)	12	4	-	-	16
	Fingrid	21	-	-	-	21
	Freq (Nordic)	102	2	-	-	104
	Statnett	73	2	-	-	75
	Svenska kraftnät	2824	858	-	-	3682
	Total	3032	866	-	-	3898
Grand total		6429	3866	33	2	10330

Table 3.8: Incidents by dominating criterion for each synchronous area for 2025.

Scale	ICS criterion	Continental Europe	Ireland	Isolated systems	Nordic	Grand Total
Scale0	Incidents on load (L0)	15	-	-	1	16
	Incidents leading to frequency degradation (F0)	391	-	-	102	493
	Incidents on network elements (T0)	1746	18	17	127	1908
	Incidents on power generating facilities (G0)	190	10	2	4	206
	Separation from the grid (RS0)	-	-	-	-	-
	Violation of standards on voltage (OV0)	622	-	-	2755	3377
	Reduction of reserve capacity (RRC0)	30	-	-	2	32
	Loss of tools, means and facilities (LT0)	207	5	-	26	238
	Total	3201	33	19	3017	6270
Scale1	Incidents on load (L1)	115	-	5	-	120
	Incidents leading to frequency degradation (F1)	46	-	-	2	48
	Incidents on network elements (T1)	16	-	2	2	20
	Incidents on power generating facilities (G1)	3	-	1	-	4
	N-1 violation (ON1)	48	-	-	19	67
	Separation from the grid (RS1)	-	-	-	-	-
	Violation of standards on voltage (OV1)	2703	-	-	837	3540
	Reduction of reserve capacity (RRC1)	21	-	-	3	24
	Loss of tools, means and facilities (LT1)	22	-	-	2	24
	Total	2974	-	8	865	3847
Scale2	Incidents on load (L2)	24	-	1	-	25
	Incidents leading to frequency degradation (F2)	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	1	-	-	-	1
	Loss of tools, means and facilities (LT2)	-	-	-	-	-
	Total	25	-	1	-	26
Scale3	Blackout (OB3)	1	-	-	-	1
	Total	1	-	-	-	1
Grand Total		6201	33	28	3882	10144

Table 3.9: ICS violations by dominating criterion for each synchronous area for 2025.

Scale	ICS criterion	Continental Europe	Ireland	Isolated systems	Nordic	Grand Total
Scale0	Incidents on load (L0)	24	-	-	2	26
	Incidents leading to frequency degradation (F0)	401	-	-	102	503
	Incidents on network elements (T0)	1848	18	21	130	2017
	Incidents on power generating facilities (G0)	196	10	3	5	214
	Separation from the grid (RS0)	-	-	-	10	10
	Violation of standards on voltage (OV0)	627	-	-	2755	3382
	Reduction of reserve capacity (RRC0)	30	-	-	2	32
	Loss of tools, means and facilities (LT0)	214	5	-	26	245
	Total	3340	33	24	3032	6429
Scale1	Incidents on load (L1)	119	-	6	-	125
	Incidents leading to frequency degradation (F1)	46	-	-	2	48
	Incidents on network elements (T1)	18	-	3	2	23
	Incidents on power generating facilities (G1)	3	-	2	-	5
	N-1 violation (ON1)	49	-	-	20	69
	Separation from the grid (RS1)	-	-	-	-	-
	Violation of standards on voltage (OV1)	2703	-	-	837	3540
	Reduction of reserve capacity (RRC1)	21	-	-	3	24
	Loss of tools, means and facilities (LT1)	30	-	-	2	32
	Total	2989	-	11	866	3866
Scale2	Incidents on load (L2)	26	-	1	-	27
	Incidents leading to frequency degradation (F2)	-	-	-	-	-
	Incidents on network elements (T2)	1	-	-	-	1
	Incidents on power generating facilities (G2)	2	-	-	-	2
	N violation (ON2)	-	-	-	-	-
	Separation from the grid (RS2)	2	-	-	-	2
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	1	-	-	-	1
	Loss of tools, means and facilities (LT2)	-	-	-	-	-
	Total	32	-	1	-	33
Scale3	Blackout (OB3)	2	-	-	-	2
	Total	2	-	-	-	2
Grand Total		6363	33	36	3898	10330

3.2 ICS violations per circuit length and energy consumption

The figures in this section present the number of ICS violations in proportion to consumption or circuit length that occurred in the European synchronous areas in 2025. The reason to normalise the number of ICS violations by consumption or circuit length is to make the numbers comparable between synchronous areas different sizes. The Sections 3.3.1–3.3.7 also include a figure where the respective ICS criteria numbers are normalised by circuit length or consumption, except for LT-violations because every TSO need to have the same tools, means and facilities to operate the grid.

The circuit length is calculated according to the method described in the ENTSO-E Grid Disturbance Definitions for the Power System above 100 kV [5]. The data concerning circuit length and energy consumption have been gathered directly from the TSOs. Whenever a TSO has not reported the latest consumption and circuit length values, the value for the previous year has been used.

Figure 3.1 shows the number of violations per TWh of energy consumption, and Figure 3.2 presents the number of violations per 100 km of circuit length. Figure 3.3 presents the number of violations on transmission network elements (T0 and T1) per 100 km of circuit length.

When normalising the number of scale 0 violations in 2025 per consumption, the Nordic area has the highest value, at 7.7 ICS violations per TWh of consumption, whereas the Ireland/Northern Ireland has the lowest value at 1.0 violations per TWh of consumption. For scale 1, the minimum value is 0.0 violations per TWh in IE/Ni, and the maximum value is 2.2 violations per TWh in the Nordics. When the number of scale 0–3 violations in 2025 is normalised by circuit length, the Nordics also showed the highest values and the same remarks apply as for the values normalised by consumption.

When comparing only the number of T0- and T1-violations normalised by circuit length, the synchronous areas move closer together and all synchronous areas have less than 0.5 T0- or T1-violations per 100 km of circuit length, except for the isolated systems which have 1.0.

Incidents on transmission network elements (T) were a considerable part of all ICS violations in the transmission grid in 2025, as seen in the similarities between Figure 3.2 and Figure 3.3. Still, T-violations played a smaller role than in previous years. The largest deviation is found in Nordic area, where OV1-violations contributed significantly to the difference, and in IE/Ni, where G0-violations constitute the majority of reported ICS incidents.

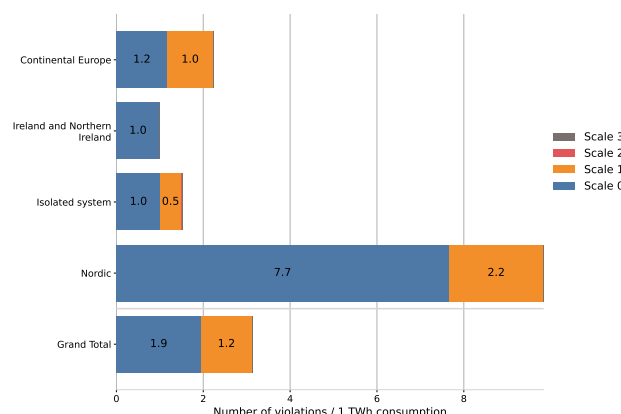


Figure 3.1: Number of violations per 1 TWh of energy consumption for 2025.

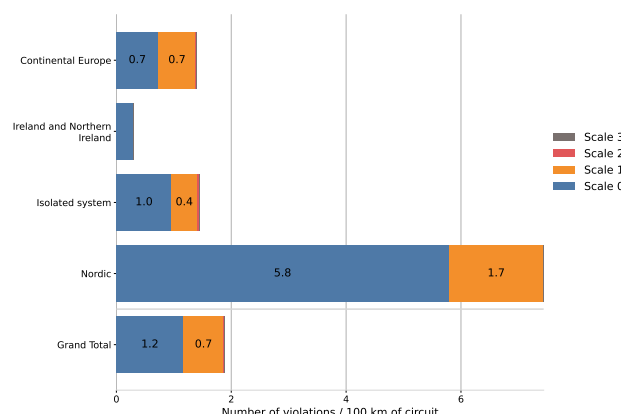


Figure 3.2: Number of violations per 100 km of circuit length for 2025.

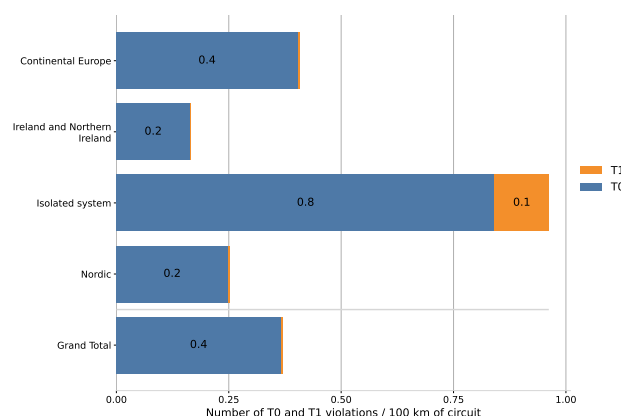


Figure 3.3: Number of violations on transmission network elements (T0 and T1) per 100 km of circuit length for 2025.

3.3 Evolution 2021–2025

This section presents classified violations according to the ICS Methodology [1] as it developed between 2021–2025. In addition, a detailed view of the ICS criteria F, T, G, OV, RRC, LT and ON is presented in Sections 3.3.1–3.3.7.

It should be noted that trends and impacts on the system must be interpreted according to specific considerations due to inherent differences in the manner in which networks have been designed and are operated across separate synchronous areas.

Figure 3.4 presents the annual number of ICS violations by scale and Figure 3.5 shows the annual percentage allocation of the violations by scale. As illustrated by the graphs, the total number of violations has decreased in 2025 compared to 2024. There has been an increase in Scale 1 events but a decrease on Scale 2 events.

There were 3866 scale 1 ICS violations in 2025, which is higher than the 2024 which showed a large increase compared to 2021–2023. This shift was mainly driven by the increased number of reported OV1-violations.

Figure 3.6 and Figure 3.7 present the annual number of scale 0 violations by consumption and circuit length ratios. The number of violations per TWh of energy consumption is stable around 1.0 or below in all synchronous areas except the Nordic. For the Nordic area, this figure decreased in 2025 but is still high with over 6 violations per terawatt-hour.

Figure 3.8 and Figure 3.9 present the ratios of the number of scale 1 violations to consumption and the number of scale 1 violations to length of circuit, respectively. The ratio of scale 1 violations per consumption and per 100 km circuit length in 2025 increased in Continental Europe and Isolated systems. The number of Scale 1 violations per consumption and circuit length increased slightly in Continental Europe even though it is less visible in the graph due to the trend observed in Nordic area. A detailed view of the annual number of ICS incidents and violations, grouped by ICS criterion, is shown in Table 3.10 and Table 3.11, respectively.

The number of OV-violations in 2025 was high, yet lower than in 2024 as a result of measures implemented by TSOs. At Svenska kraftnät and ČEPS, new compensation devices and remedial actions were successful to decrease the number of voltage violations. Measures have been put in place to negate voltage issues, but it should also be noted that the voltage standards in the Nordics are stricter than in Continental Europe, with the exception of 'below scale' and scale 0 where there is no undervoltage threshold for the Nordics. The voltage thresholds are presented in detail in the ICS methodology [1].

The most significant increase in the number of reported vi-

olations was by Moldelectrica, where enhanced data processing and reporting practices enabled the reporting of data that was not previously easily accessible for systematic analysis. This continues a trend from the previous year of TSOs increasingly using more automated data collection processes.

The number of incidents leading to frequency degradations (F) in 2025 was 36% higher than in 2024. There was a noteworthy increase in the number of F-violations in CE by approximately 60%. In 2025, the main reasons of the F-violations were in general the same as in 2024 – deviations in load and generation forecast (LGF) and unknown. The increasing use of battery technology is expected to reduce variations.

The decrease of reported ON-violations was mainly due to the decreased number of ON-violations reported by ČEPS and RTE. The number of ON-violations for ČEPS decreased because ČEPS verified neighbouring TSO impact for scaling the violations (more details in Section 10.1.5).

WG ICS notes that there were more ICS Expert Panel investigations in 2025 than during previous years. Furthermore, the investigations resulted in various recommendations to prevent similar incidents in the future. See Chapter 4 for more details on the incidents and the investigation results.

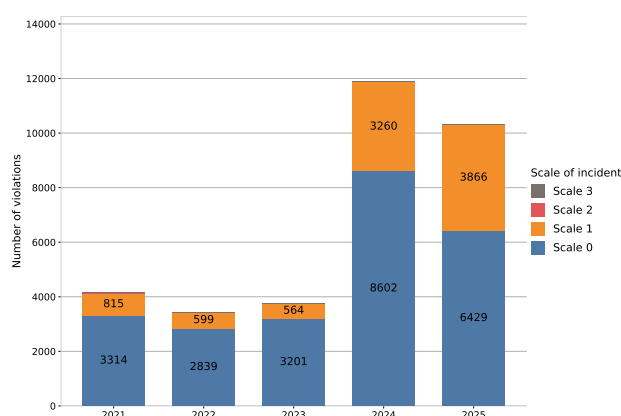


Figure 3.4: The annual number of ICS violations by scale from 2021–2025.

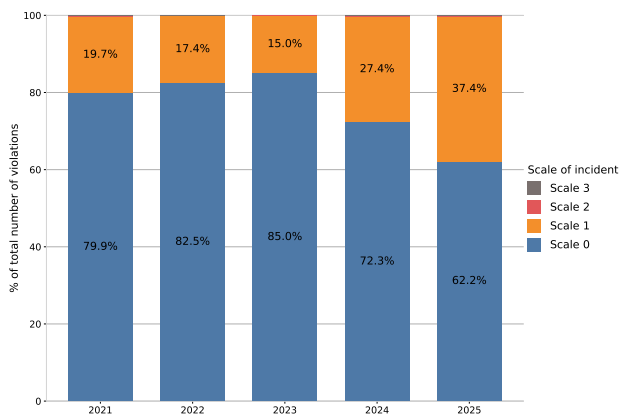


Figure 3.5: The annual percentage allocation of ICS violations by scale from 2021–2025.

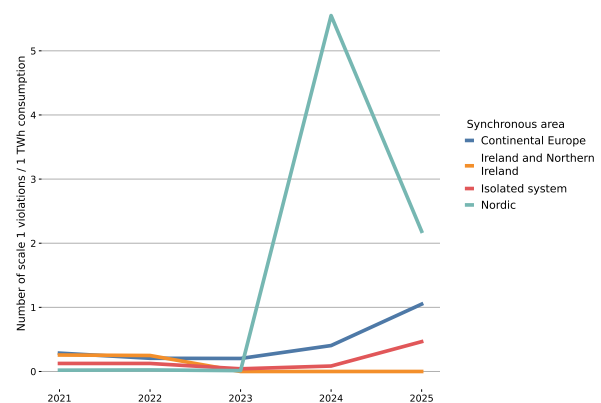


Figure 3.8: The annual number of scale 1 ICS violations per 1 TWh of energy consumption from 2021–2025.

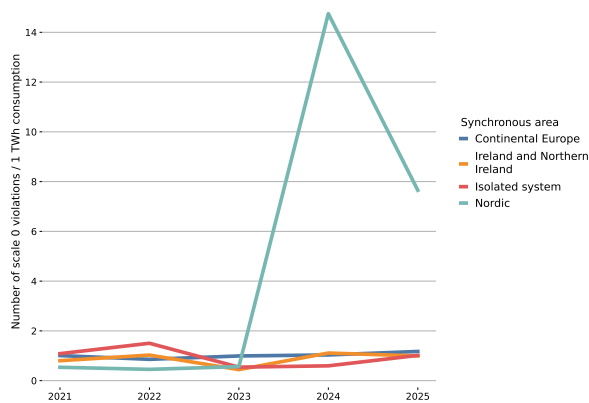


Figure 3.6: The annual number of scale 0 ICS violations per 1 TWh of energy consumption from 2021–2025.

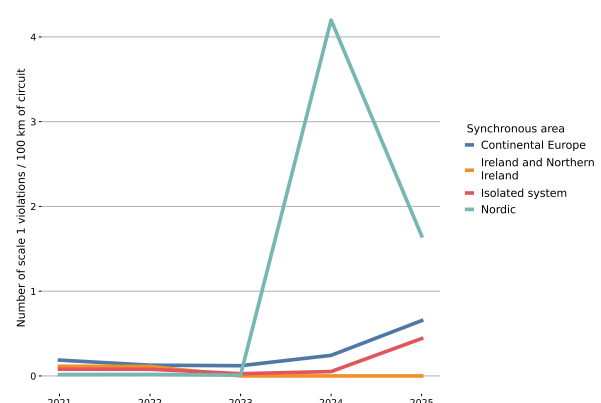


Figure 3.9: The annual number of scale 1 ICS violations by 100 km of circuit length from 2021–2025.

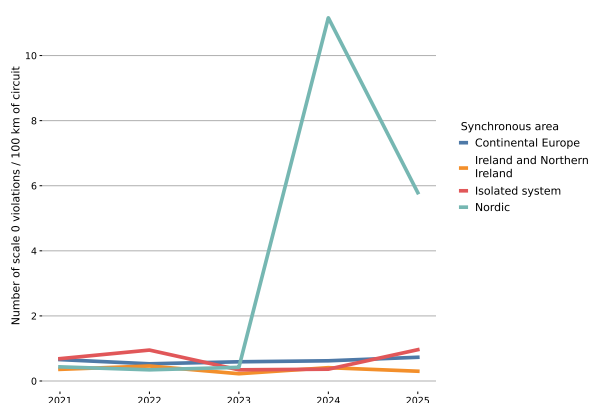


Figure 3.7: The annual number of scale 0 ICS violations per 100 km of circuit length from 2021–2025.

Table 3.10: The annual number of ICS incidents by dominating criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	3	11	8	7	25
	Incidents leading to frequency degradation (F0)	809	268	291	383	493
	Incidents on network elements (T0)	1344	1355	1786	1701	1900
	Incidents on power generating facilities (G0)	174	165	129	150	206
	Separation from the grid (RS0)	-	-	2	1	-
	Violation of standards on voltage (OV0)	471	479	436	5949	3377
	Reduction of reserve capacity (RRC0)	26	185	91	99	32
	Loss of tools, means and facilities (LT0)	89	90	121	206	237
	Total	2916	2553	2864	8496	6270
Scale1	Incidents on load (L1)	1	4	27	157	124
	Incidents leading to frequency degradation (F1)	95	7	13	16	48
	Incidents on network elements (T1)	30	28	17	24	16
	Incidents on power generating facilities (G1)	5	-	2	5	4
	N-1 violation (ON1)	67	68	58	163	67
	Separation from the grid (RS1)	1	-	-	1	-
	Violation of standards on voltage (OV1)	500	391	359	2692	3540
	Reduction of reserve capacity (RRC1)	61	74	60	110	24
	Loss of tools, means and facilities (LT1)	31	21	19	86	24
	Total	791	593	555	3254	3847
Scale2	Incidents on load (L2)	2	2	1	-	25
	Incidents leading to frequency degradation (F2)	1	-	-	-	-
	Incidents on network elements (T2)	3	1	1	-	-
	Incidents on power generating facilities (G2)	1	-	-	-	-
	N violation (ON2)	1	-	-	-	-
	Separation from the grid (RS2)	2	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	1
	Loss of tools, means and facilities (LT2)	1	-	-	-	-
	Total	11	3	2	-	26
Scale3	Blackout (OB3)	-	-	-	1	1
	Total	-	-	-	1	1
Grand Total		3718	3149	3421	11751	10144

Table 3.11: The annual number of ICS violations by ICS criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	4	11	14	7	26
	Incidents leading to frequency degradation (F0)	816	273	298	388	503
	Incidents on network elements (T0)	1446	1439	1872	1786	2017
	Incidents on power generating facilities (G0)	183	170	134	158	214
	Separation from the grid (RS0)	2	3	3	8	10
	Violation of standards on voltage (OV0)	495	480	437	5949	3382
	Reduction of reserve capacity (RRC0)	26	185	91	99	32
	Loss of tools, means and facilities (LT0)	91	90	121	207	245
	Total	3063	2651	2970	8602	6429
Scale1	Incidents on load (L1)	2	5	27	157	125
	Incidents leading to frequency degradation (F1)	95	7	13	16	48
	Incidents on network elements (T1)	35	29	24	25	23
	Incidents on power generating facilities (G1)	6	-	2	5	5
	N-1 violation (ON1)	68	69	59	164	69
	Separation from the grid (RS1)	1	1	-	1	-
	Violation of standards on voltage (OV1)	513	392	359	2694	3540
	Reduction of reserve capacity (RRC1)	63	74	60	110	24
	Loss of tools, means and facilities (LT1)	31	22	19	88	32
	Total	814	599	563	3260	3866
Scale2	Incidents on load (L2)	2	2	2	1	27
	Incidents leading to frequency degradation (F2)	1	-	-	-	-
	Incidents on network elements (T2)	4	1	1	20	1
	Incidents on power generating facilities (G2)	1	-	-	-	2
	N violation (ON2)	1	-	-	4	-
	Separation from the grid (RS2)	6	-	-	-	2
	Violation of standards on voltage (OV2)	-	-	-	2	-
	Reduction of reserve capacity (RRC2)	1	-	-	-	1
	Loss of tools, means and facilities (LT2)	1	-	-	-	-
	Total	17	3	3	27	33
Scale3	Blackout (OB3)	-	-	-	3	2
	Total	-	-	-	3	2
Grand Total		3894	3253	3536	11892	10330

3.3.1 Detailed view of incidents leading to frequency degradation (F)

This section presents a detailed view of scale 0–2 violations leading to frequency degradation; that is, F0, F1 and F2-violations. 'Unknown' is used for violations caused where it was not possible to identify the cause of the violation. Table 3.12 presents the annual number of violations leading to frequency degradation for each synchronous area, and Table 3.13 shows the same distributed by cause for all synchronous areas combined. Figure 3.10 presents the annual number of F-violations normalised by the consumption in each synchronous area.

The number of incidents leading to frequency degradations (F) in 2025 was 26% higher than in 2024. The positive observation is a reduced number of F-violations in the Nordic synchronous area. The number decreased by 17% and breaks the two-year trend of increasing F-violations in the Nordics. However, there was a noteworthy increase in the number of F-violations in CE by approximately 60%. In 2025, the main reasons of the F-violations were in general the same as in 2024 – deviations in load and generation forecast (LGF) and unknown. LGF deviations are the second most commonly reported reason of F-violations (15%) with unknown being the most commonly reported (81%). The LGF deviations are caused by an increasing amount of variable generation sources in the system which was to be expected. The increasing use of battery technology is expected to reduce variations.

For the reported unknown causes, the expectation is that they are caused by a combination of different factors but mainly due to deterministic frequency deviations (DFDs) caused by changes in generation schedules and real-time balancing between the market time units (MTUs).

Table 3.12: The annual number of F-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	839	226	223	279	447
IE-NI	-	-	-	-	-
Isolated system	-	-	-	-	-
Nordic	73	54	88	125	104
Grand total	912	280	311	404	551

Table 3.13: The annual number of F-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Loss of generation	-	-	-	1	-
Loss of load	-	-	-	3	1
Previous event	1	-	5	-	-
LGF deviations	-	-	-	115	84
Other	-	-	-	5	18
Unknown	911	280	306	280	448
Grand total	912	280	311	404	551

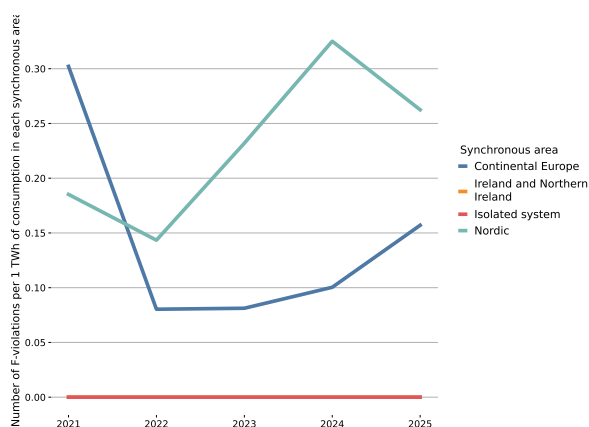


Figure 3.10: The annual number of F-violations per 1 TWh of consumption in each synchronous area from 2021–2025.

3.3.2 Detailed view of incidents on transmission system elements (T)

This section presents a detailed view of scale 0–2 violations on transmission system elements; that is, T0, T1 and T2-violations.

Table 3.14 presents the annual number of violations on transmission network elements for each synchronous area, and Table 3.15 shows the same distributed by cause for all synchronous areas combined. Figure 3.11, Figure 3.12 and Figure 3.13 present the ratio of T, T0, and T1-violations to circuit length for each synchronous area for 2021–2025, respectively.

The number of T-violations increased in 2025 by 11% from 2024, as seen in Table 3.14. The majority of them occurred in CE (92%) and can be explained by the larger grid size compared to other synchronous areas. The T-violations were mostly caused by technical equipment (33%) in 2025, as shown in Table 3.15. This is similar to the past three years, yet it has decreased by 10% compared to 2024. Environmental and unknown causes are once again representing two of the main causes behind this kind of violations with ~18% of all T-violations, respectively.

The normalised values by circuit length show a slight increase in 2025 for CE and the Nordics and a significant increase for isolated systems.

Table 3.14: The annual number of T-violations from 2021–2025 per synchronous area.

Synchronous area	2021	2022	2023	2024	2025
CE	1343	1321	1787	1709	1867
IE-NI	11	18	5	20	18
Isolated system	27	32	14	12	24
Nordic	104	98	91	90	132
Grand total	1485	1469	1897	1831	2041

Table 3.15: The annual number of T-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Other, please specify	-	-	-	-	1
Environmental causes	333	371	419	317	357
External influences	127	150	166	192	306
Operation and maintenance	142	69	98	95	152
Technical equipment	442	499	755	739	671
Tripped network element	2	1	2	2	-
Previous event	50	48	47	74	65
LGF deviations	-	-	4	-	-
Other	92	80	89	103	119
Unknown	297	251	317	309	370
Grand total	1485	1469	1897	1831	2041

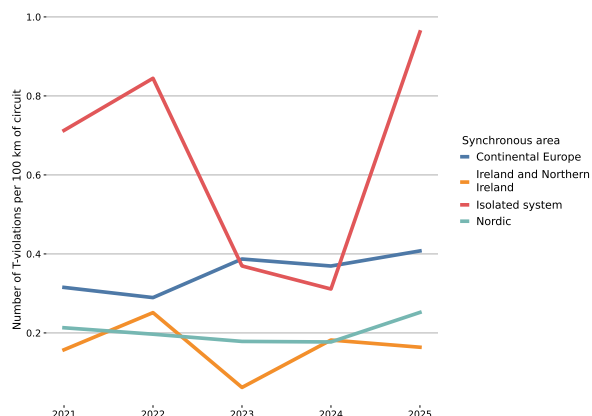


Figure 3.11: The annual number of T-violations per 100 km installed circuit length in each synchronous area from 2021–2025.

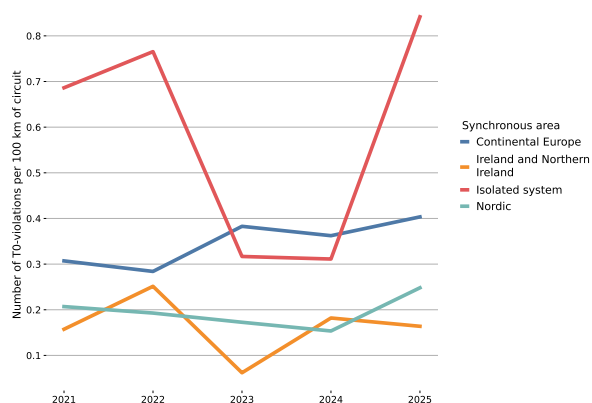


Figure 3.12: The annual number of T0-violations per 100 km installed circuit length in each synchronous area from 2021–2025.

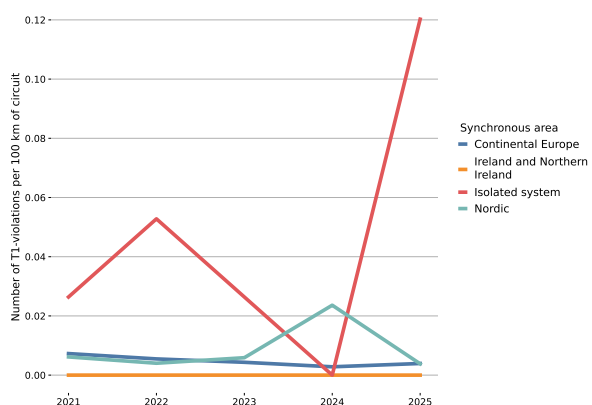


Figure 3.13: The annual number of T1-violations per 100 km installed circuit length in each synchronous area from 2021–2025.

3.3.3 Detailed view of incidents on power generating facilities (G)

This section presents a detailed view of violations on power generating facilities; that is, G0, G1 and G2-violations.

Table 3.16 presents the annual number of violations on power generating facilities for each synchronous area, and Table 3.17 shows the same distributed per cause for all synchronous areas combined. Figure 3.14 presents the annual number of G-violations normalised by the consumption in each synchronous area.

As shown in Table 3.16, the annual number of G-violations increased in 2025 compared with previous years. The same trend is observed for CE whereas IE-NI reported only half as many violations as last year. Nordics have reported a slightly lower number compared to 2024. In particular, CE synchronous area has reported more than 60 additional G-violations relative to the prior year, which contributes to an overall increase in the total number.

From Table 3.17, it can be seen that most G-violations are due to technical equipment reasons, a pattern that has remained consistent for more than 5 years. Although the number of T-violations has increased in 2025, the total number of G-violations caused by tripped network elements has remained stable over the last three years.

The number of G-violations per TWh of consumption has decreased in Ireland and Northern Ireland (IE/Ni) and Nordics during the last year, with IE/Ni's showing the largest decrease, since, as mentioned above, it has reported only half as many violations this year as in the previous one. On the other hand, in the CE synchronous area, the increase in the number of G-violations, together with a slight rise in total consumption in 2025 relative to 2024, has resulted in a moderate increase in the corresponding ratio.

Table 3.16: The annual number of G-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	159	141	105	133	201
IE-NI	14	15	13	19	10
Isolated system	2	-	-	4	5
Nordic	15	14	18	7	5
Grand total	190	170	136	163	221

Table 3.17: The annual number of G-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Environmental causes	-	-	3	-	2
External influences	-	-	-	2	1
Operation and maintenance	1	-	-	-	-
Technical equipment	111	112	85	117	133
Tripped network element	43	16	7	7	5
Previous event	9	4	4	3	9
LGF deviations	-	-	1	-	-
Other	3	9	20	16	33
Unknown	23	29	16	18	38
Grand total	190	170	136	163	221

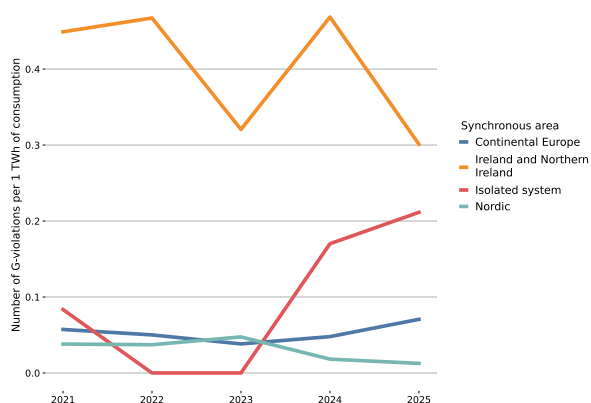


Figure 3.14: The annual number of G-violations per 1 TWh of consumption for each synchronous area from 2021–2025.

3.3.4 Detailed view of violations of standards on voltage (OV)

This section presents a detailed view of violations of standards on voltage; that is, OV0, OV1 and OV2-violations.

Table 3.18 presents the annual number of OV-violations from 2021 to 2025 for each synchronous area. Table 3.19 shows the same violations distributed by cause for all synchronous areas combined. Figure 3.15 presents the annual number of OV-violations normalised by the installed circuit length in each synchronous area.

In 2025, the total number of reported OV reduced from 8,645 to 6,922. Despite this decrease of 20% compared to the previous year, OV remains the most reported category in 2025. The distribution of scales shifted back towards OV0 from the previous year with OV0-violations making up 51% and OV1-violations 49% compared with the 31/69 split of 2024. This is the result of 43% decrease in OV0-violations, mainly in the 220kV to 300kV Voltage range, and a 31% increase in OV1-violations. While the number of reported OV1-violations increased, the cumulative duration of reported OV1-violations reduced by 14%, indicating the presence of more frequent violations of shorter duration.

Some of the largest decreases in the number of reported OV-violations were due to measures implemented by TSOs. At Svenska kraftnät, the installation of compensation devices was beneficial for voltage control. Similarly, the installation of new reactors and effective implementation of remedial actions by ČEPS helped to reduce the number of OV-violations while in the control area of EMS topological measures on transmission lines that had previously been the source of high voltages helped to reduce the number of OV-violations. For more details, please refer to the individual TSO sections in Chapter 10.

The most significant increase in the number of reported violations was by Moldelectrica, where enhanced data processing and reporting practices enabled the reporting of data that was not previously easily accessible for systematic analysis. This continues a trend from the previous year of TSOs increasingly using more automated data collection processes.

Table 3.18: The annual number of OV-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	1008	872	795	1135	3330
IE-NI	-	-	-	-	-
Isolated system	-	-	-	-	-
Nordic	-	-	1	7510	3592
Grand total	1008	872	796	8645	6922

Table 3.19: The annual number of OV-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Loss of generation	-	3	-	-	5
Operation and maintenance	-	-	-	1	-
Technical equipment	1	-	-	-	-
Previous event	22	-	4	2	1
LGF deviations	1	7	9	15	-
Other	770	249	287	8285	6570
Unknown	214	613	496	342	346
Grand total	1008	872	796	8645	6922

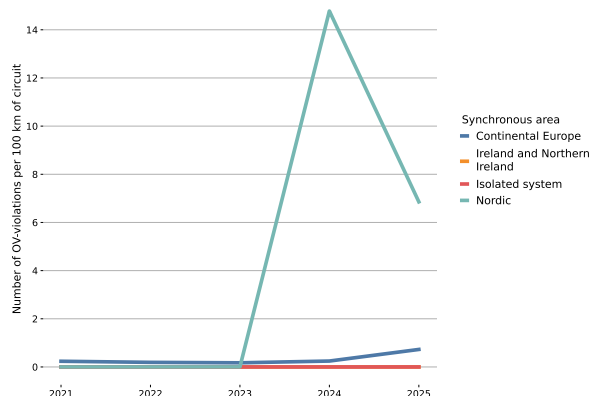


Figure 3.15: The annual number of OV-violations per 100 km of installed circuit length in each synchronous area from 2021–2025.

3.3.5 Detailed view of incidents involving a reduction of reserve capacity (RRC)

This section presents a detailed view of scale 0–2 violations involving a reduction of reserve capacity; that is, RRC0, RRC1 and RRC2 violations.

Table 3.20 presents the annual number of RRC-violations for each synchronous area, and Table 3.21 show the same distributed per cause for all synchronous areas combined. Figure 3.16 presents the annual number of RRC-violations per 100 km of installed length in each synchronous area from 2021 to 2025.

In 2025, the great reduction in number of RRC incidents can be observed. In comparison to 2024, the general reduction of RRC in MAVIR and Ukrenergo is the main factor of this improvement, because the majority of all reported RRC in 2024 were done by these two TSOs. MAVIR informed that their better situation is because of market expansion and better weather condition. Ukrenergo informed that the improvement in their grid is due to more distributed generation and the reduction of average output power of the single generation units. Furthermore, the fewer number of incidents in Ukrenergo were significantly longer than in previous years.

From the 57 incidents reported, 32 were scale 0 (RRC0), 24 scale 1 (RRC1) and 1 scale 2 (RRC2). Similarly to previous years, most of the RRC-violations were caused by unexpected discrepancies from load or generation forecasts, as seen in Table 3.21.

Table 3.20: The annual number of RRC-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	90	259	151	202	52
IE-NI	-	-	-	-	-
Isolated system	-	-	-	-	-
Nordic	-	-	-	7	5
Grand total	90	259	151	209	57

Table 3.21: The annual number of RRC-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Loss of generation	4	7	9	3	2
External influences	-	-	1	1	-
Technical equipment	-	-	1	-	-
Limitation on network element	-	-	-	-	1
Previous event	2	-	1	-	-
LGF deviations	62	242	131	119	40
Other	10	10	8	79	12
Unknown	12	-	-	7	2
Grand total	90	259	151	209	57

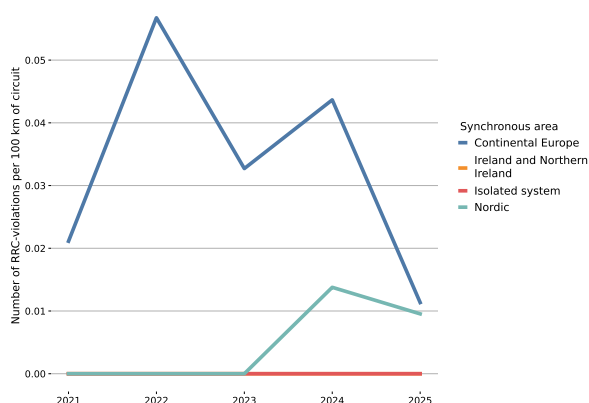


Figure 3.16: The annual number of RRC-violations per 100 km of installed circuit length in each synchronous area from 2021–2025.

3.3.6 Detailed view of incidents involving loss of tools, means or facilities (LT)

This section presents a detailed view of violations involving loss of tools or facilities, that is, LT0, LT1 and LT2-violations.

Table 3.22 presents the annual number of LT-violations for each synchronous area, and Table 3.23 shows the same distributed by cause for all synchronous areas combined.

Compared to 2024, the number of LT-violations is similar yet the number is higher than in 2023 (277 versus 140). The increase in 2024 was mainly due to the 86 LT-violations reported by Ukrenergo, who did not report ICS incidents prior to 2023. For the other TSOs, the difference is within

the bounds of the expected standard deviation with the outliers being Red Eléctrica with 20 more LT-violations in 2024 than in 2023 and TenneT NL with 18 fewer. In 2025, Ukrenergo reported approximately half the number of LT-violations than in 2024 (47). For the other TSOs, 50Hertz reported 25 more LT-violations than in 2024 (39 in total in 2025) and TenneT DE reported 17 more LT-violations (25 in total in 2025). TenneT NL continued to report a decreasing number of LT-violations with 13 fewer in 2025 (14 in total).

Most of the LT incidents were caused by other or unknown

causes or by technical equipment, as shown in Table 3.23.

Table 3.22: The annual number of LT-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	99	105	125	250	244
IE-NI	-	-	-	6	5
Isolated system	1	2	-	-	-
Nordic	23	5	15	39	28
Grand total	123	112	140	295	277

Table 3.23: The annual number of LT-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Loss of tools or facilities	1	-	-	-	-
External influences	-	-	-	23	-
Operation and maintenance	7	5	7	25	15
Technical equipment	49	35	33	97	69
Previous event	-	-	-	1	1
Other	38	44	59	118	91
Unknown	28	28	41	31	101
Grand total	123	112	140	295	277

3.3.7 Detailed view of N- and N-1 violations (ON)

This section presents a detailed view of incidents involving N and N-1 violations, that is, ON1 and ON2-violations.

Table 3.24 presents the annual number of ON1 and ON2-violation violations for each synchronous area. Table 3.25 shows the same distributed by cause for all synchronous areas combined. Figure 3.17 presents the annual number of ON-violations per 100 km of circuit length in each synchronous area.

In 2025, the number of ON-violations decreased by around 100 compared to 2024 (69 vs 168). Like in previous years, many ON-violations were caused by unexpected discrepancies from load or generation forecasts. The decrease of reported ON-violations was mainly due to the decreased number of ON-violations reported by ČEPS and RTE. The number of ON-violations for ČEPS decreased because ČEPS verified neighbouring TSO impact for scaling the violations (more details in Section 10.1.5). For RTE, the increase in 2024 occurred during the summer months and was mainly due to capacity calculation limits and the cross-effects between the Italy-North and CORE regions, that did not continue to be an issue in 2025.

Table 3.24: The annual number of ON-violations from 2021–2025.

Synchronous area	2021	2022	2023	2024	2025
CE	61	57	58	149	49
IE-NI	8	8	-	-	-
Isolated system	-	-	-	-	-
Nordic	-	4	1	19	20
Grand total	69	69	59	168	69

Table 3.25: The annual number of ON-violations by cause from 2021–2025.

Cause of event	2021	2022	2023	2024	2025
Loss of generation	-	-	2	-	-
Operation and maintenance	-	-	-	-	1
Technical equipment	1	-	-	-	2
Previous event	9	10	1	8	4
LGF deviations	44	37	37	82	34
Other	10	21	9	68	22
Unknown	5	1	10	10	6
Grand total	69	69	59	168	69

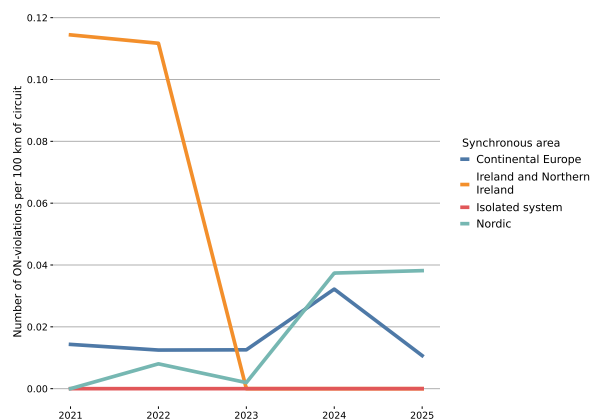


Figure 3.17: The annual number of ON-violations per 100 km of installed circuit length in each synchronous area from 2021–2025.

4 Detailed view of scale 2 and scale 3 incidents

In 2025, there were two reported scale 3 incident and one scale 2 incident that initiated an ICS Expert Panel investigation. The first was the Iberian blackout on 28 April 2025, the second was the blackout in North Macedonia on 18 May 2025 and the third one was the scale 2 loss of load in Czech Republic on 4 July 2025. A summary of the incidents can be read in the sections below. The final reports and resulting recommendations to prevent similar incidents in the future can be found at the ENTSO-E webpage [6], [7], [8]. Whether the incident met the RCC Invest-

igation Threshold, as defined in Article 5(1) of the RIAR Methodology [9], is also mentioned below.

In addition, there was one scale 2 incident in the isolated systems in 2025. The incident occurred in Iceland on 27 October due to a fault on a surge arrester that disconnected two power plants and subsequently disconnected industrial load.

No scale 2 or scale 3 ICS incidents were reported in the synchronous areas of Baltic, Nordic or IE/Nl in 2025.

4.1 The scale 2/scale 3 incidents in Continental Europe

4.1.1 Grid incident in Czech Republic on 4 July 2025

On 4 July 2025, the power system in the Czech Republic experienced an incident – a loss of around 28% of load in the ČEPS control area. The incident was caused by a conductor failure on the Hradec-Výškov 400kV transmission line and was compounded by unexpected reductions in generation, including the loss of thermal and distributed generation, which led to severe network overloads, and the isolation and subsequent collapse of part of the Czech system. The lost consumption was restored by 17:35. The operation of the interconnected European grid continued as usual, and no other country was affected by the incident.

The final report of the incident investigation, including a comprehensive account of the explanation of the incident, was published by the Expert Panel on 26 June 2026 [8]. The incident was classified as a scale 2 incident as 2300 MW of load was lost, which was 28% of the load before the incident (8200 MW) in the ČEPS control area. Furthermore, the RCC Investigation Threshold, as defined in Article 5(1) of the RIAR Methodology [9], was not met during the incident and thus no RCC Investigation Subgroup to investigate the incident was established.

4.1.2 Grid Incident in North Macedonia on 18 May 2025

On 18 May 2025 at 04:59 Central European Summer Time (CEST), the power system of North Macedonia experienced an overvoltage episode that led to a separation of the 400kV and 110kV voltage levels. The incident was caused by sustained overvoltage conditions that triggered the successive disconnection of 400/110 kV transformers, with the underlying causes including operation above defined voltage limits, insufficient consideration of overvoltage risks in operational planning, insufficient reactive power reserves and support, and limited availability of effective voltage control assets. The separation led to a blackout across the entire 110 kV system (to which all the demand is connected). Throughout the incident, the 400 kV transmission network remained operational. The remainder of the Continental Europe (CE) power system experienced no significant disturbances.

The final report of the incident investigation, including a comprehensive account of the explanation of the incident, was published by the Expert Panel on 20 April 2026 [7]. The incident was classified as a scale 3 incident as the OB3 threshold was met when almost all load in the MEPSO control area (around 485 MW) was lost. Furthermore, the RCC Investigation Threshold, as defined in Article 5(1) of the RIAR Methodology [9], was not met during the incident and thus no RCC Investigation Subgroup to investigate the incident was established.

It should be noted that while the incident was classified based on the ICS during the investigation, no reporting of the incident to the 2025 ICS Annual Report has been received.

4.1.3 Grid Incident in Spain and Portugal on 28 April 2025

On 28 April 2025, at 12:33 Central European Summer Time (CEST), the power systems of Spain and Portugal experienced the most severe and unprecedented blackout that had occurred in Europe in the past 20 years, with a major impact on citizens and society as a whole in both countries. The blackout was the result of multiple interacting factors. The incident evolved through a sequence involving a combination of voltage fluctuations and oscillatory phenomena, leading to widespread generation disconnections in Spain, particularly inverter-based resources, followed by a cascade of overvoltage disconnections and culminating in the loss of synchronism of the Iberian system with the

Continental Europe Synchronous Area.

The final report of the incident investigation, including a comprehensive account of the explanation of the incident, was published by the Expert Panel on 20 March 2026 [6]. The incident was classified as a scale 3 incident as the OB3 threshold was met in Spain and Portugal when all load in both control areas were lost. Furthermore, the RCC Investigation Threshold, as defined in Article 5(1) of the RIAR Methodology [9], was met during the incident and the conclusions of the RCC investigation were added as a dedicated chapter in the final report.

5 Operational Security Indicators

This chapter presents the operational security indicators relevant to operational security (OS) and planning and scheduling (OPS), as required by the SOGL Articles 15(3) and 15(4).

5.1 Operational security indicators relevant to operational security

This section presents the operational security indicators relevant to operational security (OS). For convenience, each security indicator, along with its abbreviation, description and calculation method, is presented in Table 5.1. Table 5.2 shows the calculated values for each security indicator for the year 2025.

Most security indicators are calculated with scale 0–3 ICS

incidents. However, the OS-indicators OS-B, OS-F1 and OS-F2 also use the reported 'Below Scale' ICS violations. OS-F1 and OS-F2 use OVBS reported by TSOs, and OS-B uses GBS-violations processed from the ENTSO-E Transparency Platform. The used data sources from the Transparency Platform were 'Unavailability of Production and Generation Units 15.1' and 'Actual Generation Output per Generation Unit 16.1'.

Table 5.1: The operational security indicators relevant to operational security

Abbr.	Description of the operational security indicator	Calculation method
OS-A	Number of tripped transmission system elements per year per TSO – SOGL Article 15(3)(a) [10].	Add up the number of transmission system elements tripped reported for all the incidents on scale 0, 1, 2 and 3.
OS-B	Number of tripped power generation facilities per year per TSO – SOGL Article 15(3)(b) [10].	Add up the number of power generation facilities tripped reported for all the incidents on 'Below Scale' and Scale 0, 1, 2 and 3. The number of tripped generation facilities collected for the 'Below Scale' category will be taken from the transparency platform.
OS-C	Energy not supplied due to unscheduled disconnection of demand facilities per year per TSO – SOGL Article 15(3)(c) [10].	Add up the energy not supplied reported for all incidents on scale 0, 1, 2 and 3 due to unscheduled disconnection of demand facilities.
OS-D1	Time duration of being in alert and emergency states per year per TSO – SOGL Article 15(3)(d) [10].	Add up the time being in alert and emergency states reported for all incidents on scale 0, 1, 2 and 3.
OS-D2	Number of instances of being in alert and emergency states per year per TSO – SOGL Article 15(3)(d) [10].	Add up the number of incidents on scale 0, 1, 2 and 3 in case alert or emergency state was reported.
OS-E1	Time duration within which there was a lack of reserve identified per year per TSO – SOGL Article 15(3)(e) [10].	Add up the duration of incidents reported under the criteria RRC0, RRC1 and RRC2; and the duration of all other incidents on scale 0, 1, 2 and 3 in case the reduction of reserve capacity is reported.
OS-E2	Number of events within which there was a lack of reserve identified per year per TSO – SOGL Article 15(3)(e) [10].	Add up the number of incidents reported under the criteria RRC0, RRC1 and RRC2; and the number of all other incidents on scale 0, 1, 2 and 3 in case the reduction of reserve capacity is reported.
OS-F1	Time duration of voltage deviations exceeding the ranges from Tables 1 and 2 of SOGL Annex II per year per TSO – SOGL Article 15(3)(f) [10].	Add up the duration of incidents reported under the criteria OV 'Below Scale' and Scale OV1 and OV2; and add up the duration of all other incidents on the 'Below Scale', Scale 0, 1, 2 and 3 in case voltage deviations are reported which exceed the ranges from SOGL Annex II [10].
OS-F2	Number of voltage deviations exceeding the ranges from Tables 1 and 2 of SOGL [10] Annex II per year per TSO – SOGL Article 15(3)(f) [10].	Add up the number of incidents reported under the criteria OV 'Below Scale' and Scale OV0, OV1 and OV2; and add up the number of incidents of all other incidents on the 'Below Scale', Scale 0, 1, 2 and 3 in case voltage deviations are reported which exceed the ranges from SOGL Annex II [10].
OS-G1	Number of minutes outside the standard frequency range per year per synchronous area – SOGL Article 15(3)(g) [10].	Annual Load-Frequency Control Reporting will provide data for number of minutes outside the standard frequency range.
OS-G2	Number of minutes outside the 50 % of maximum steady-state frequency range per year per synchronous area – SOGL Article 15(3)(g) [10].	Annual Load-Frequency Control reporting will provide data for number of minutes outside the 50 % of maximum steady state frequency deviation.
OS-H	Number of system-split separations or local blackout states per year – SOGL Article 15(3)(h) [10].	Add up the number number of incidents reported under the criteria RS1 and RS2.
OS-I	Number of blackouts involving two or more TSOs per year – SOGL Article 15(3)(i) [10].	Add up the number of incidents reported under the criteria OB3, in case two or more TSOs are involved.

Table 5.2: Operational security indicators relevant to operational security by synchronous area in 2025.

Synchronous Area	TSO	OS-A	OS-B	OS-C	OS-D1	OS-D2	OS-E1	OS-E2	OS-F1	OS-F2	OS-G1	OS-G2	OS-H	OS-I
Continental Europe	50Hertz	43	40	-	723	7	-	-	31	5	-	-	-	-
	Amprion	111	583	-	836	7	-	-	-	-	-	-	-	-
	APG	10	88	-	521	3	-	-	-	-	-	-	-	-
	AST	11	5	-	33	1	-	-	8	1	-	-	-	-
	CEPS	49	35	6309	1076	4	-	-	471	20	-	-	-	-
	CGES	39	-	-	-	-	-	-	-	-	-	-	-	-
	Elering	7	-	-	-	-	-	-	-	-	-	-	-	-
	ELES	11	-	-	20943	158	-	-	36375	410	-	-	-	-
	Elia	13	14	-	490	6	-	-	-	-	-	-	-	-
	EMS	34	109	29	395	5	438	5	100360	113	-	-	-	-
	Energinet (CE)	27	23	-	190	2	-	-	-	-	-	-	-	-
	ESO	83	2	48	-	-	-	-	-	-	-	-	-	-
	Freq (CE)	-	-	-	429	46	-	-	-	-	13921.67	289.30	-	-
	HOPS	28	9	-	3255	11	2522	7	-	-	-	-	-	-
	IPTO	9	6	-	-	-	-	-	3003	99	-	-	-	-
	Litgrid	20	4	-	-	-	-	-	-	-	-	-	-	-
	MAVIR	8	-	-	-	-	960	35	30827	776	-	-	-	-
	Moldelectrica	19	-	-	30123	1990	-	-	30123	1990	-	-	-	-
	NOS BiH	52	-	-	-	-	-	-	-	-	-	-	-	-
	OST	95	-	357	-	-	-	-	-	-	-	-	-	-
	PSE	99	13	-	595	4	-	-	-	-	-	-	-	-
	Red Eléctrica	328	120	261035	12120	6	-	-	2	1	-	-	-	1
	REN	50	41	110978	1383	2	-	-	-	-	-	-	-	1
	RTE	490	26	1630	1465	22	1029	3	81	1	-	-	-	-
	SEPS	6	-	45	115	1	115	1	-	-	-	-	-	-
	Swissgrid	44	29	-	208	1	-	-	2170	102	-	-	-	-
	TEIAS	27	15	-	-	-	-	-	-	-	-	-	-	-
	TenneT DE	42	58	-	-	-	-	-	-	-	-	-	-	-
	TenneT NL	18	14	-	606	3	-	-	-	-	-	-	-	-
	Terna	62	15	-	-	-	-	-	40	2	-	-	-	-
	Transelectrica	128	38	-	228	2	-	-	101502	911	-	-	-	-
	TransnetBW	52	28	-	2185	13	-	-	-	-	-	-	-	-
	Ukrenergo	309	17	4264567	94407	143	75693	1	-	-	-	-	-	-
	Total	2324	1332	4644998	172326	2437	80757	52	304993	4431	13921.67	289.30	-	2
Ireland and Northern Ireland	EirGrid	14	16	-	-	-	-	-	-	-	14.47	0.23	-	-
	SONI	4	1	-	-	-	-	-	-	-	-	-	-	-
	Total	18	17	-	-	-	-	-	-	-	14.47	0.23	-	-
Isolated system	Landsnet	28	15	536	472	24	-	-	-	-	-	-	-	-
	Total	28	15	536	472	24	-	-	-	-	-	-	-	-
Nordic	Energinet (Nordic)	12	26	-	190	2	-	-	-	-	-	-	-	-
	Fingrid	21	4	5	-	-	-	-	-	-	-	-	-	-
	Freq (Nordic)	-	-	-	-	-	-	-	-	-	5115.45	1.07	-	-
	Statnett	62	4	-	77	2	-	-	-	-	-	-	-	-
	Svenska kraftnät	62	83	-	356	17	395	5	438998	9330	-	-	-	-
	Total	157	117	5	623	21	395	5	438998	9330	5115.45	1.07	-	-
Grand Total		2527	1481	4645539	173421	2482	81152	57	743991	13761	19051.58	290.60	-	2

5.1.1 Evolution of operational security indicators relevant for operational security, 2021–2025

Figure 5.1–Figure 5.12 show the annual calculated values for the OS indicators OS-A to OS-H for 2021–2025.

The security indicator OS-A, that is, the number of tripped transmission network elements, shows no significant increase or decrease for synchronous area. The indicator OS-B (number of tripped power generating facilities) increased in Continental Europe (CE) and the Nordics due to a higher number of identified GBS-violations retrieved from the ENTSO-E Transparency Platform.

The indicator OS-C, which tracks energy not supplied due to unscheduled disconnection of demand facilities, was high in CE (yet lower than in 2024) due to the war in Ukraine with Russia and due the scale 2 and 3 incidents. It should be noted that both OS-B and OS-C will fluctuate depending on the occurrence of noteworthy incidents.

Regarding the ENS value reported by Red Eléctrica under the OS-C indicator in Table 5.2 for the incident of 28 April 2025, it should be noted that the reported figure represents the best estimate available to the TSO at the time of reporting. This estimate has not been subject to a specific audit process and does not include detailed information on restoration actions carried out within distribution networks or possible supply reductions managed by other entities, which may affect the final ENS figure associated with the incident. The inclusion of the ENS value in the ICS Annual Report is not intended to assign liability or responsibility to any party and should not be interpreted as doing so in any way. The ENS estimation was performed up to the point at which the TSO became aware that approximately 99% of the interrupted supply had been restored, reached by 08:00 h on 29 April 2025. Beyond that point, the remaining restoration process, mainly affecting certain distribution networks, was not known with sufficient granularity until full restoration was achieved. In addition, both demand forecasts and actual demand behaviour were significantly affected by the exceptional nature of the event, limiting the use of normal demand patterns as a reliable reference during the restoration period.

The indicators OS-D1 and OS-D2 (number of minutes and incidents with alert or emergency state, respectively) was high in 2025 in Continental Europe as it was in 2024. Some of the TSOs that were high in 2024 improved in 2025, however, 2025 was still exceptional mainly due to the scale 2 and 3 that occurred.

The security indicators OS-E1 and OS-E2 measure reductions in reserve capacity and are mostly reported by a few TSOs in CE. In 2025, the duration of these incidents stayed approximately the same as in 2024 while the number of incidents was significantly lower. The main reason is that Ukrenergo reported fewer incidents with longer durations.

The number and duration of voltage violations is measured by the security indicators OS-F1 and OS-F2. Compared to 2024, reported voltage issues decreased in the Nordics and increased in CE. In the Nordics, OS-F1 and OS-F2 mainly reported by Svenska kraftnät and details on their mitigation measures are presented in Section 10.2.5. Further details on voltage violations are presented in Section 3.3.4.

The reported OS-G1 minutes in 2025 decreased compared to 2024 and did not exceed the frequency quality target parameter of 15000 minutes in CE defined in Annex III, Table 2 of the SOGL [2]. More details can be seen in the Annual Load-Frequency Control (ALFC) Report of 2025 [11].

OS-H, which calculates the number of grid separation incidents (RS1 and RS2), is rarely recorded in the pan-European power systems. OS-H was registered once in 2021 (RS1), three times in 2021 (two RS2-violations in CE and one RS1-violation in Nordics) and once in 2024 (TEIAS).

The security indicator OS-I reached the value 2 in 2025 due the scale 3 incident in Spain and Portugal on 28 April 2025. More details on the blackout incident is presented in Chapter 4.



Figure 5.1: Operational security indicator OS-A from 2021–2025. It is calculated by adding up the number of tripped transmission system elements reported for all scale 0–3 incidents, and dividing by the number of TSOs in the synchronous area.

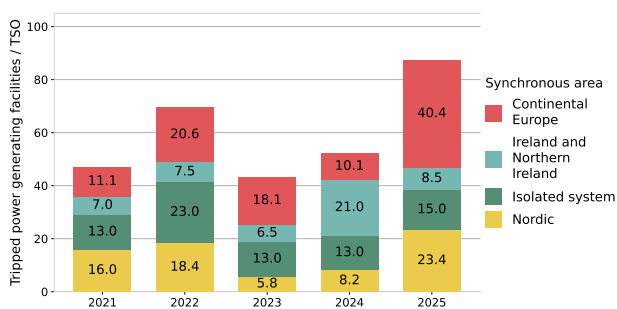


Figure 5.2: Operational security indicator OS-B from 2021–2025. It is calculated by adding up the number of tripped power generation facilities reported for scale 0–3 and below scale incidents and dividing by the number of TSOs in the synchronous area.

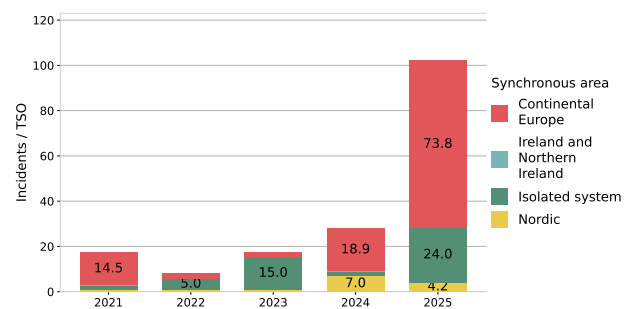


Figure 5.5: Operational security indicator OS-D2 from 2021–2025. It is calculated by counting the number of scale 0–3 incidents in which an alert or emergency state was reported, and dividing by the number of TSOs in the synchronous area.

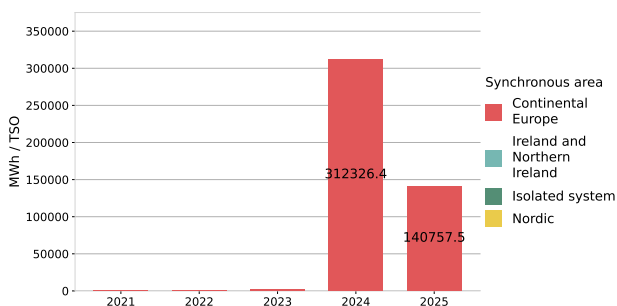


Figure 5.3: Operational security indicator OS-C from 2021–2025. It is calculated by adding up the reported energy not supplied due to unscheduled disconnection of demand facilities for all scale 0–3 incidents, and dividing by the number of TSOs in the synchronous area.

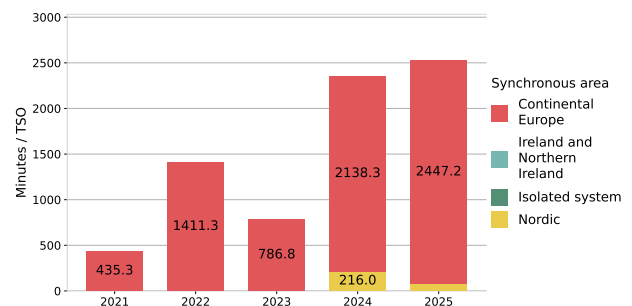


Figure 5.6: Operational security indicator OS-E1 from 2021–2025. It is calculated by adding up the duration of RRC0-, RRC1- and RRC2-incidents and the duration of all other scale 0–3 incidents if a reduction of reserve capacity is reported, and dividing by the number of TSOs in the synchronous area.

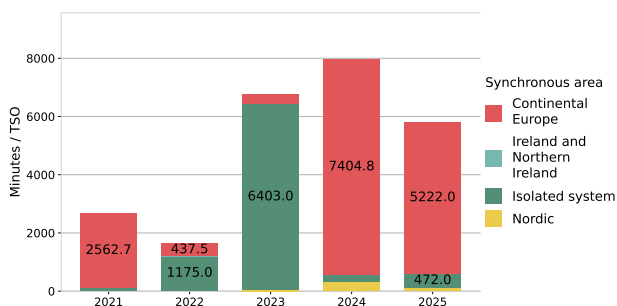


Figure 5.4: Operational security indicator OS-D1 from 2021–2025. It is calculated by adding up the number of minutes in alert and emergency states of all reported scale 0–3 incidents, and dividing by the number of TSOs in the synchronous area.



Figure 5.7: Operational security indicator OS-E2 from 2021–2025. It is calculated by counting the number RRC0-, RRC1- and RRC2-incidents and the number of all other scale 0–3 incidents if a reduction of reserve capacity is reported, and dividing by the number of TSOs in the synchronous area.

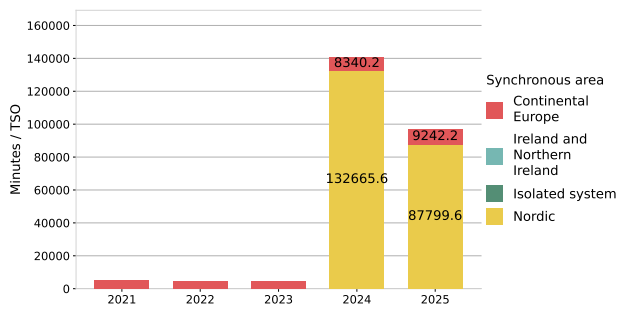


Figure 5.8: Operational security indicator OS-F1 from 2021–2025. It is calculated by adding up the duration of OVBS-, OV0-, OV1- and OV2-incidents and the duration of all other incidents on below scale and scale 0–3 where voltage deviations exceed the ranges from SOGL Annex II [10] are reported, and dividing by the number of TSOs in the synchronous area.

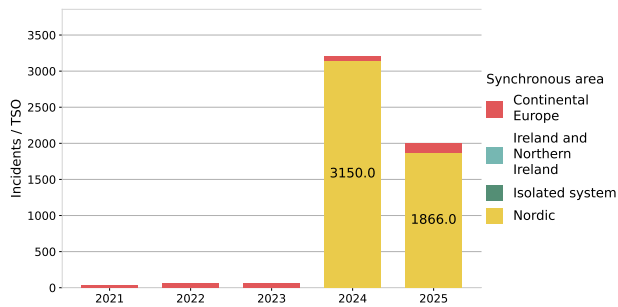


Figure 5.9: Operational security indicator OS-F2 from 2021–2025. It is calculated by counting the number of violation of standards of voltage incidents (OVBS, OV0, OV1 and OV2) and the number of all other below scale and scale 0–3 incidents in which the voltage standards are violated, and dividing by the number of TSOs in the synchronous area.

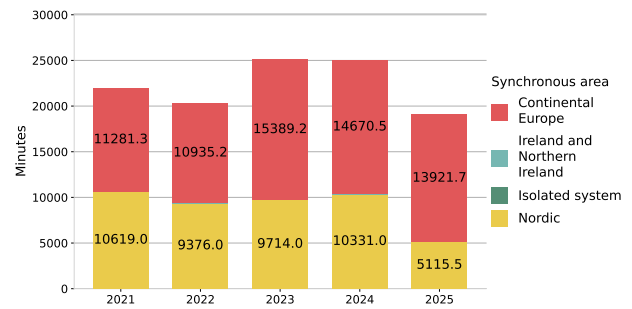


Figure 5.10: Operational security indicator OS-G1 from 2021–2025. It is calculated by adding up the number of minutes outside the standard frequency range for all scale 0–3 incidents.

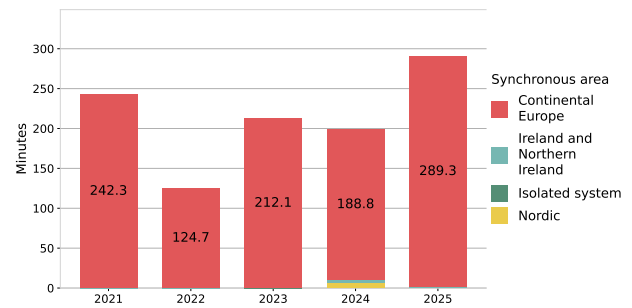


Figure 5.11: Operational security indicator OS-G2 from 2021–2025. It is calculated by adding up the number of minutes outside the 50 % of maximum steady-state frequency deviation for all scale 0–3 incidents.

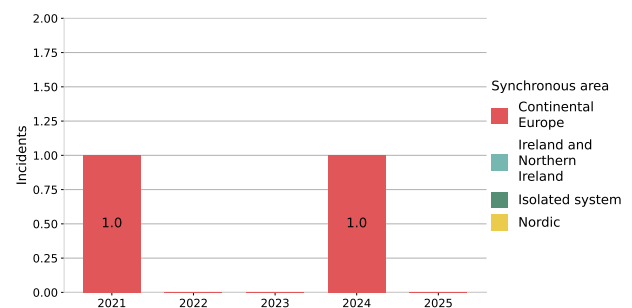


Figure 5.12: Operational security indicator OS-H from 2021–2025. It is calculated by counting the number of grid separation incidents (RS1 and RS2).

5.2 Operational security indicators relevant to operational planning and scheduling

This chapter presents the operational security indicators relevant to operational security (OS) and planning and scheduling (OPS), as required by the SOGL Articles 15(3) and 15(4) .

Table 5.3: The operational security indicators relevant to operational planning and scheduling

Abbr.	Description of the operational security indicator	Calculation method
OPS-A	Number of events in which an incident contained in the contingency list led to a degradation of the system operation state – SOGL Article 15(4)(a) [10].	Add up the number of incidents on scale 0, 1, 2 and 3 in case degradation of system operation state is reported and in case the cause of the incident is a contingency from contingency list.
OPS-B	Number of the events counted by indicator OPS-A (events in which an incident contained in the contingency list led to a degradation of the system operation state), in which a degradation of system operation conditions occurred as a result of unexpected discrepancies from load or generation forecasts – SOGL Article 15(4)(b) [10].	Add up the number of incidents counted by indicator OPS-A in case unexpected discrepancies from load and generation forecasts were reported as the cause of the incident.
OPS-C	Number of events in which there was a degradation in system operation conditions due to an exceptional contingency – SOGL Article 15(4)(c) [10].	Add up the number of incidents on scale 0, 1, 2 and 3 in case degradation of system operation state is reported and in case the cause of the incident is an exceptional contingency.
OPS-D	Number of the events counted by indicator OPS-C (events in which there was a degradation in system operation conditions due to an exceptional contingency), in which a degradation of system operation conditions occurred as a result of unexpected discrepancies from load or generation forecasts – SOGL Article 15(4)(d) [10].	Add up the number of incidents counted by indicator OPS-C in case unexpected discrepancies from load and generation forecasts were reported as the cause of the incident.
OPS-E	Number of events leading to a degradation in system operation conditions due to lack of active power reserves – SOGL Article 15(4)(e) [10].	Add up the number of incidents on scale 0, 1, 2 and 3 in case lack of active power reserves was reported as the cause of the incident.

Table 5.4: Operational security indicators relevant to operational planning and scheduling for each synchronous area in 2025.

Synchronous Area	TSO	OPS-A	OPS-B	OPS-C	OPS-D	OPS-E
Continental Europe	50Hertz	2	-	1	-	-
	Amprion	2	2	-	-	-
	APG	1	1	-	-	-
	AST	2	-	1	-	-
	CEPS	4	-	-	-	-
	CGES	-	-	-	-	-
	Elering	-	-	-	-	-
	ELES	162	3	-	-	-
	Elia	5	-	-	-	-
	EMS	122	-	-	-	-
	Energinet (CE)	-	-	-	-	-
	ESO	-	-	-	-	-
	Freq (CE)	-	-	-	-	-
	HOPS	2	-	-	-	-
	IPTO	12	-	-	-	-
	Litgrid	-	-	-	-	-
	MAVIR	-	-	-	-	-
	Moldelectrica	-	-	-	-	-
	NOS BiH	-	-	-	-	-
	OST	2	-	2	-	-
	PSE	-	-	-	-	-
	Red Eléctrica	2	-	1	-	-
	REN	-	-	-	-	-
	RTE	28	13	8	5	-
	SEPS	1	-	-	-	-
	Swissgrid	-	-	-	-	-
	TEIAS	-	-	-	-	-
	TenneT DE	4	-	-	-	-
	TenneT NL	3	3	-	-	-
	Terna	-	-	-	-	-
	Transelectrica	2	-	-	-	-
	TransnetBW	2	-	-	-	-
	Ukrenergo	140	78	105	78	-
	Total	498	100	118	83	-
Ireland and Northern Ireland	EirGrid	-	-	-	-	-
	SONI	-	-	-	-	-
	Total	-	-	-	-	-
Isolated system	Landsnet	21	4	9	4	-
	Total	21	4	9	4	-
Nordic	Energinet (Nordic)	2	-	-	-	-
	Fingrid	-	-	-	-	-
	Freq (Nordic)	-	-	-	-	-
	Statnett	2	-	-	-	-
	Svenska kraftnät	17	11	-	-	-
	Total	21	11	-	-	-
Grand Total		540	115	127	87	-

5.2.1 Evolution of operational security indicators relevant for operational planning and scheduling, 2021–2025

This section presents the operational security indicators relevant to operational planning and scheduling (OPS) for 2021–2025. Figure 5.13 through Figure 5.16 show the annual calculated values for the OPS indicators OPS-A, OPS-B, OPS-C and OPS-D, respectively. The figure for indicator OPS-E is omitted because it has been zero during the observation period.

The OPS-A indicator, which tracks the number of incidents due to a contingency from the contingency list, decreased in 2025 compared to 2024. One TSO did still report a higher number in 2025 compared to 2024, namely ELES, where the number of voltage violations due to a contingency in the contingency list was 162 in 2025 when it was 116 in 2024.

The OPS-B indicator shows similar values in 2025 and 2024, showing that unexpected discrepancies from load and generation forecasts continue to degrade the system state.

The increased number of system state degradations is also visible in the indicator OPS-C, which shows that 118 incidents in 2025 in CE were due to exceptional contingencies. The high value is reported by UkrenergO due to the ongoing war with Russia. Out of the 118 exceptional contingencies in 2025, 83 were due to load and generation forecasts errors, as shown by the OPS-D indicator.

The indicator OPS-E remained zero because no violations, not even RRC-violations, were caused by lack of active power reserves.

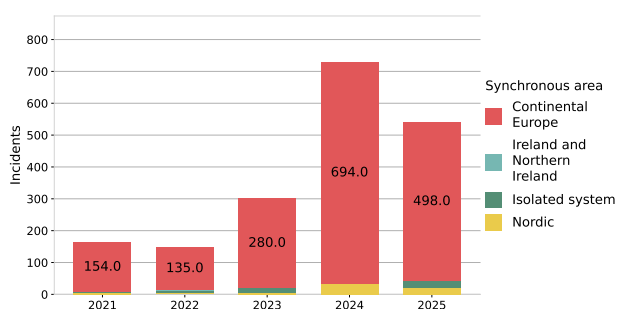


Figure 5.13: Operational security indicator OPS-A annually from 2021–2025. It is calculated by counting the number of scale 0–3 incidents where a contingency from the contingency list degraded the system operation state.

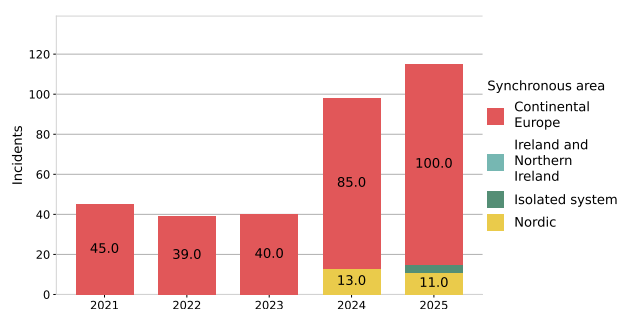


Figure 5.14: Operational security indicator OPS-B annually from 2021–2025. It is calculated by counting the number of OPS-A indicators where the cause was unexpected discrepancies from load and generation forecasts.

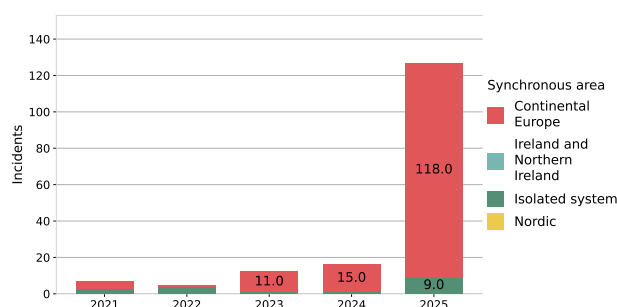


Figure 5.15: Operational security indicator OPS-C annually from 2021–2025. It is calculated by counting the number of scale 0–3 incidents where an exceptional contingency degraded the system operation state.

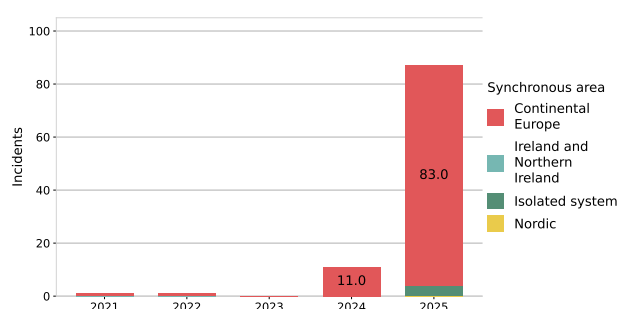


Figure 5.16: Operational security indicator OPS-D annually from 2021–2025. It is calculated by counting the number of OPS-C indicators caused by unexpected discrepancies from load and generation forecasts.

6 ICS violations in Continental Europe

6.1 Overview of 2025

This section presents an overview of scale 0–3 ICS violations in CE in 2025. The scale 0–3 ICS violations are shown by ICS criterion and further grouped by month and duration in Table 6.1 and Table 6.2, respectively.

As Table 6.1 shows, a total of 6363 ICS violations were reported by TSOs in CE in 2025. Together, these violations formed 6201 ICS incidents, meaning that most violations only involved one ICS criteria violation. Approximately 52% of all scale 0–3 violations were scale 0 violations, 47% were scale 1 violations and 0.5% were scale 2 violations.

Violations on transmission network elements (T0) accounted for 29% of all violations, and violations on standards of voltage (OV0+OV1) for 52% of all violations. Combined, these ICS criteria accounted for 81% of all violations. The number of T0-violations was higher during June–August. The number of OV0- and OV1-violations were higher during March–June. ON1-violations were mostly reported in August.

As shown in Table 6.2, approximately 48% of all scale 0 violations and 66% of all scale 1 were resolved within less than an hour. All frequency deviations in scale 0 (F0), almost all reduction of reserve capacity in scale 0 (RRC0) and almost all violations of standards on voltage (OV0) violations were cleared in less than an hour. However, 52% of G-violations were resolved in less than 10 hours. The duration of T and G-violations depended mainly on the underlying cause of the trip. 75% of LT-violations were resolved within less than five hours.

For many TSOs, 30 minutes is the minimum scheduling resolution of power generation. As such, in the 2019 ICS Methodology, RRC incidents that last for more than 30 minutes are automatically classified as scale 1 violations. Therefore, RRC0 violations are not reported by these TSOs. The other TSOs have a minimum scheduling time of 5–15 minutes and are not affected by this.

Table 6.1: Monthly number of ICS violations by ICS criterion in 2025 in Continental Europe.

Scale	ICS criterion	2025												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Scale0	Incidents on load (L0)	-	1	-	-	2	-	1	1	-	3	10	6	24
	Incidents leading to frequency degradation (F0)	10	18	111	58	94	29	29	16	26	5	4	1	401
	Incidents on network elements (T0)	148	102	137	161	122	181	235	194	136	127	173	132	1848
	Incidents on power generating facilities (G0)	24	20	19	18	13	18	19	11	10	11	16	17	196
	Separation from the grid (RS0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	25	40	54	79	88	64	31	58	65	50	33	40	627
	Reduction of reserve capacity (RRC0)	1	4	5	3	7	4	1	1	2	2	-	-	30
	Loss of tools, means and facilities (LT0)	16	19	14	11	11	16	26	24	11	27	23	16	214
	Total	224	204	340	330	337	312	342	305	250	225	259	212	3340
Scale1	Incidents on load (L1)	2	23	5	1	1	3	-	-	1	35	34	14	119
	Incidents leading to frequency degradation (F1)	1	-	28	2	11	-	2	-	2	-	-	-	46
	Incidents on network elements (T1)	1	-	3	-	1	5	3	2	2	-	-	1	18
	Incidents on power generating facilities (G1)	1	-	-	-	-	-	-	-	-	1	-	1	3
	N-1 violation (ON1)	1	2	8	4	5	7	5	11	2	-	3	1	49
	Separation from the grid (RS1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	251	230	245	254	299	296	151	249	228	205	187	108	2703
	Reduction of reserve capacity (RRC1)	-	2	2	3	6	5	1	1	-	1	-	-	21
	Loss of tools, means and facilities (LT1)	2	6	3	-	3	2	5	1	2	1	1	4	30
	Total	259	263	294	264	326	318	167	264	237	243	225	129	2989
Scale2	Incidents on load (L2)	1	-	-	2	-	-	1	-	-	-	14	8	26
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Incidents on power generating facilities (G2)	-	-	-	2	-	-	-	-	-	-	-	-	2
	N violation (ON2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	2	-	-	-	-	-	-	-	-	2
	Violation of standards on voltage (OV2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-	-	-	-	-	1	-	1
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	1	-	-	7	-	-	1	-	-	-	15	8	32
Scale3	Blackout (OB3)	-	-	-	2	-	-	-	-	-	-	-	-	2
	Total	-	-	-	2	-	-	-	-	-	-	-	-	2
Grand Total		484	467	634	603	663	630	510	569	487	468	499	349	6363

Table 6.2: Cumulative number of ICS violations by ICS criterion and duration in 2025 in Continental Europe.

2025		<1h	<2h	<5h	<10h	<24h	Total
Scale	ICS criterion						
Scale0	Incidents on load (L0)	1	5	8	15	20	24
	Incidents leading to frequency degradation (F0)	401	401	401	401	401	401
	Incidents on network elements (T0)	498	705	1021	1215	1430	1848
	Incidents on power generating facilities (G0)	26	46	84	102	120	196
	Separation from the grid (RS0)	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	602	627	627	627	627	627
	Reduction of reserve capacity (RRC0)	30	30	30	30	30	30
	Loss of tools, means and facilities (LT0)	58	101	160	200	211	214
	Total	1616	1915	2331	2590	2839	3340
Scale1	Incidents on load (L1)	5	15	37	58	102	119
	Incidents leading to frequency degradation (F1)	46	46	46	46	46	46
	Incidents on network elements (T1)	3	4	5	8	11	18
	Incidents on power generating facilities (G1)	-	-	-	-	2	3
	N-1 violation (ON1)	18	23	46	48	48	49
	Separation from the grid (RS1)	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	1905	2108	2397	2648	2685	2703
	Reduction of reserve capacity (RRC1)	2	10	15	21	21	21
	Loss of tools, means and facilities (LT1)	8	19	22	24	25	30
	Total	1987	2225	2568	2853	2940	2989
Scale2	Incidents on load (L2)	-	-	1	2	7	26
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	1	1
	Incidents on power generating facilities (G2)	-	-	-	-	2	2
	N violation (ON2)	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	2	2
	Violation of standards on voltage (OV2)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	1
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-
	Total	-	-	1	2	12	32
Scale3	Blackout (OB3)	-	-	-	-	2	2
	Total	-	-	-	-	2	2
Grand Total		3603	4140	4900	5445	5793	6363

6.2 Evolution 2021–2025

This section presents the annual number of ICS violations in CE from 2021 to 2025, distributed by scale and ICS criterion.

As shown in Table 6.3, scale 0 violations in 2025 increased by 466 (+16.2%) compared to 2024 and increased by 613 (+22.5%) compared to 2023. The number of scale 1 violations increased by 1 865 (+166%) compared to 2024 and increased by 2 432 (+437%) compared to 2023. The largest

changes in the numbers of scale 1 violations are seen in Violation of standards on voltage (OV1). OV1-violations increased from 359 violations in 2023 to 2 703 violations in 2025. There were decrease in N-1 Violation (ON1) from 145 violations in 2024 to 49 violations in 2025.

The number of reported scale 2 violations increased slightly from 27 in 2024 to 32 in 2025. The number of scale 3 violations decreased by 1 compared to 2024.

Table 6.3: The annual number of ICS violations by ICS criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	2	4	10	6	24
	Incidents leading to frequency degradation (F0)	746	220	210	274	401
	Incidents on network elements (T0)	1308	1296	1767	1676	1848
	Incidents on power generating facilities (G0)	154	141	103	130	196
	Separation from the grid (RS0)	-	1	1	1	-
	Violation of standards on voltage (OV0)	495	480	436	514	627
	Reduction of reserve capacity (RRC0)	26	185	91	99	30
	Loss of tools, means and facilities (LT0)	69	84	107	172	214
	Total	2800	2411	2725	2872	3340
Scale1	Incidents on load (L1)	2	4	27	157	119
	Incidents leading to frequency degradation (F1)	92	6	13	5	46
	Incidents on network elements (T1)	31	25	20	13	18
	Incidents on power generating facilities (G1)	4	-	2	3	3
	N-1 violation (ON1)	60	57	58	145	49
	Separation from the grid (RS1)	-	-	-	1	-
	Violation of standards on voltage (OV1)	513	392	359	619	2703
	Reduction of reserve capacity (RRC1)	63	74	60	103	21
	Loss of tools, means and facilities (LT1)	30	21	18	78	30
	Total	795	579	557	1124	2989
Scale2	Incidents on load (L2)	2	-	2	1	26
	Incidents leading to frequency degradation (F2)	1	-	-	-	-
	Incidents on network elements (T2)	4	-	-	20	1
	Incidents on power generating facilities (G2)	1	-	-	-	2
	N violation (ON2)	1	-	-	4	-
	Separation from the grid (RS2)	6	-	-	-	2
	Violation of standards on voltage (OV2)	-	-	-	2	-
	Reduction of reserve capacity (RRC2)	1	-	-	-	1
	Loss of tools, means and facilities (LT2)	-	-	-	-	-
	Total	16	-	2	27	32
Scale3	Blackout (OB3)	-	-	-	3	2
	Total	-	-	-	3	2
Grand Total		3611	2990	3284	4026	6363

6.3 Analysis of significant changes in trends

In 2025, 6363 violations were reported in CE; an increase of 58% compared to 2024 and in increase of 94% compared to 2023. This increase appears to be significant, and is mainly due to the increase in the number of reported Scale 1 violations.

The number of F1-violations increased by 820% (from 5 to 46 violations) relative to 2024. The number of OV1-violations increased by 336% (from 619 to 2703 violations) relative to 2024. On the other hand the number of ON1-violations decreased by 66% (from 145 to 49 violations) and the number of RRC1 violations decreased by 80% (from 103 to 21 violations) relative to 2024.

The trend of scale 0 violations between year 2023 and 2025 moderately changed but the trend of scale 1 violations between year 2023 and 2025 changed significantly because of significant increase of OV1 criterion. It is mostly caused by significant increase in (OV1) violations due to Moldova.

The trend in reporting of scale 2 violations shows a continued increase in the years since 2021. For the trend of scale 3 violations, there has now been two consecutive years with registered OB3 violations which is unusual as none have been registered in any year since the start of ICS reporting in 2013 until 2023.

7 ICS violations in Nordic

7.1 Overview of 2025

This section presents an overview of ICS violations in the Nordic synchronous area in 2025. The violations are presented by ICS criterion and grouped by month and duration in Table 7.1 and Table 7.2, respectively.

In 2025, 3898 scale 0–3 ICS violations were reported in the Nordic synchronous area, of which 3032 were scale 0 violations and 866 scale 1 violations. As can be seen in Table 7.1, violations are distributed moderately evenly throughout the year. Fewer violations can be seen during February–March and November–December.

As shown in Table 7.2, 76% of the violations were resolved in less than an hour, and 97% of all violations were resolved in less than 24 hours. Some T0, G0, LT1 and OV1-violations lasted longer than 24 h.

As shown in Table 7.3, a major difference was the significant decrease in of voltage violations (OV) compared to 2024. Additionally, the number of frequency violations, especially F1-violations, decreased. The number of T0-violations have clearly increased and, in turn, T1 clearly decreased.

The large number of reported violations on standards of voltage (OV) during 2024–2025 is due to improved IT tools in Sweden to track and report these. Most voltage deviations occurred in individual stations when there was insufficient reactive power for voltage control during planned outages or low network loading.

In Nordic area, there has never been a scale 2 or scale 3 violation.

Table 7.1: Monthly number of ICS violations by ICS criterion in 2025 in Nordic.

Scale	ICS criterion	2025												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Scale0	Incidents on load (L0)	-	-	1	1	-	-	-	-	-	-	-	-	2
	Incidents leading to frequency degradation (F0)	20	5	3	11	15	14	1	16	3	5	6	3	102
	Incidents on network elements (T0)	16	4	15	12	8	4	18	7	13	17	8	8	130
	Incidents on power generating facilities (G0)	1	-	-	2	1	-	-	-	-	-	-	1	5
	Separation from the grid (RS0)	-	-	1	1	-	1	3	-	1	2	1	-	10
	Violation of standards on voltage (OV0)	311	151	302	302	364	274	234	241	259	161	114	42	2755
	Reduction of reserve capacity (RRC0)	-	-	-	-	2	-	-	-	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	3	5	3	3	1	1	2	2	-	2	4	-	26
	Total	351	165	325	332	391	294	258	266	276	187	133	54	3032
Scale1	Incidents on load (L1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F1)	1	-	-	1	-	-	-	-	-	-	-	-	2
	Incidents on network elements (T1)	-	-	1	-	-	1	-	-	-	-	-	-	2
	Incidents on power generating facilities (G1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	N-1 violation (ON1)	3	1	2	3	4	-	-	-	3	1	1	2	20
	Separation from the grid (RS1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	114	26	91	107	83	90	77	66	69	46	52	16	837
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-	-	2	-	-	1	-	3
	Loss of tools, means and facilities (LT1)	-	-	1	-	-	-	-	-	1	-	-	-	2
	Total	118	27	95	111	87	91	77	68	73	47	54	18	866
Scale2	Incidents on load (L2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total		469	192	420	443	478	385	335	334	349	234	187	72	3898

Table 7.2: Cumulative number of ICS violations by ICS criterion and duration in 2025 in Nordic.

2025		<1h	<2h	<5h	<10h	<24h	Total
Scale	ICS criterion						
Scale0	Incidents on load (L0)	2	2	2	2	2	2
	Incidents leading to frequency degradation (F0)	102	102	102	102	102	102
	Incidents on network elements (T0)	43	65	81	91	104	130
	Incidents on power generating facilities (G0)	1	1	1	1	1	5
	Separation from the grid (RS0)	10	10	10	10	10	10
	Violation of standards on voltage (OV0)	2755	2755	2755	2755	2755	2755
	Reduction of reserve capacity (RRC0)	2	2	2	2	2	2
	Loss of tools, means and facilities (LT0)	3	20	24	25	26	26
	Total	2918	2957	2977	2988	3002	3032
Scale1	Incidents on load (L1)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F1)	2	2	2	2	2	2
	Incidents on network elements (T1)	1	2	2	2	2	2
	Incidents on power generating facilities (G1)	-	-	-	-	-	-
	N-1 violation (ON1)	20	20	20	20	20	20
	Separation from the grid (RS1)	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	35	429	670	761	805	837
	Reduction of reserve capacity (RRC1)	1	2	3	3	3	3
	Loss of tools, means and facilities (LT1)	-	1	1	1	1	2
	Total	59	456	698	789	833	866
Scale2	Incidents on load (L2)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		2977	3413	3675	3777	3835	3898

7.2 Evolution 2021–2025

This section presents the annual number of ICS violations in the Nordic synchronous area during 2021–2025, distributed by scale and ICS criterion.

As seen in Table 7.3, the total number of violations ranged from 180 to 7805 during 2021–2025.

The most apparent development is in the number of voltage violations (OV). During the years 2021–2023 there was reported only one in total, but in 2024 there were 5435 scale 0 voltage violations and 2075 scale 1 voltage viola-

tions. In 2025 scale 0 voltage violations decreased to 2755 and scale 1 voltage violations to 837.

The large increase of the number of reported OV-violations is due to improved IT tools to track and report voltage violations. From 2024 to 2025, there was clear increase in T0-violations and clear decrease in F1, T1, RRC1 and LT1-violations.

No-violations were classified as scale 2 or 3.

Table 7.3: The annual number of ICS violations by ICS criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	2	1	3	1	2
	Incidents leading to frequency degradation (F0)	70	53	88	114	102
	Incidents on network elements (T0)	101	96	88	78	130
	Incidents on power generating facilities (G0)	15	14	18	7	5
	Separation from the grid (RS0)	2	2	2	7	10
	Violation of standards on voltage (OV0)	-	-	1	5435	2755
	Reduction of reserve capacity (RRC0)	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	22	5	14	29	26
	Total	212	171	214	5671	3032
Scale1	Incidents on load (L1)	-	1	-	-	-
	Incidents leading to frequency degradation (F1)	3	1	-	11	2
	Incidents on network elements (T1)	3	2	3	12	2
	Incidents on power generating facilities (G1)	-	-	-	-	-
	N-1 violation (ON1)	-	4	1	19	20
	Separation from the grid (RS1)	1	1	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	2075	837
	Reduction of reserve capacity (RRC1)	-	-	-	7	3
	Loss of tools, means and facilities (LT1)	1	-	1	10	2
	Total	8	9	5	2134	866
Scale2	Incidents on load (L2)	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-
	Total	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-
	Total	-	-	-	-	-
Grand Total		220	180	219	7805	3898

7.3 Analysis of significant changes in trends

The number of reported voltage violations (OV0 and OV1) has increased from year 2023. This comes from improved IT tools to track and report voltage violations.

During last years a growing trend can be seen in the number of N-1 violations (ON1).

The positive observation is a reduced number of (F)-violations in the Nordic synchronous area from 2024 to 2025. The number decreased by 17% and breaks the two-year trend of increasing F-violations in the Nordics.

8 ICS violations in Ireland and Northern Ireland

8.1 Overview of 2025

This section presents an overview of ICS violations in Ireland in 2025. The violations are presented by ICS criterion and further grouped by month and duration in Table 8.1 and Table 8.2, respectively.

In 2025, 33 ICS violations were reported in Ireland/Northern Ireland, and all of them were scale 0, 54.5% were incidents on transmission network elements (T0), 30.3% were incidents on power generating facilities (G0), and the remainder was loss of tools (LT0) Table 8.1. Technical issues caused majority of the G0-violations, and there was a variety of reasons for the T0-violations including testing maloperations, technical issues and lightning/wind and vegetation.

The transmission network in Ireland is predominantly operated at 110 kV. While transmission incidents on the 220kV

and 400kV systems do occur, they typically do not result in N-1 security violations or widespread operational impacts that would meet the criteria for higher ICS classifications.

Ireland and Northern Ireland also benefits from a significant amount of battery energy storage connected to the system. These resources provide a very fast frequency response capability, helping to arrest frequency deviations and reduce the operational impact of generation or network disturbances.

With respect to generation-related events, the largest single generating unit connected to the Ireland and Northern Ireland system is below 500 MW. Consequently, the loss of the largest generation unit would generally not exceed the thresholds required to trigger a Scale 1 G-violation.

Table 8.1: Monthly number of ICS violations by ICS criterion in 2025 in Ireland and Northern Ireland.

Scale	ICS criterion	2025												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Scale0	Incidents on load (L0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T0)	7	-	-	-	2	1	-	1	2	2	1	2	18
	Incidents on power generating facilities (G0)	-	1	-	2	-	-	1	-	1	-	-	5	10
	Separation from the grid (RS0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	1	1	-	1	-	1	-	-	-	1	-	-	5
	Total	8	2	-	3	2	2	1	1	3	3	1	7	33
Scale1	Incidents on load (L1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on power generating facilities (G1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	N-1 violation (ON1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Scale2	Incidents on load (L2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total		8	2	-	3	2	2	1	1	3	3	1	7	33

Table 8.2: Cumulative number of ICS violations by ICS criterion and duration in 2025 in Ireland and Northern Ireland.

Scale	ICS criterion	<1h	<2h	<5h	<10h	<24h	Total
Scale0	Incidents on load (L0)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-	-
	Incidents on network elements (T0)	1	2	3	3	4	18
	Incidents on power generating facilities (G0)	-	1	2	4	5	10
	Separation from the grid (RS0)	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	1	1	2	4	4	5
	Total	2	4	7	11	13	33
Scale1	Incidents on load (L1)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F1)	-	-	-	-	-	-
	Incidents on network elements (T1)	-	-	-	-	-	-
	Incidents on power generating facilities (G1)	-	-	-	-	-	-
	N-1 violation (ON1)	-	-	-	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Scale2	Incidents on load (L2)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		2	4	7	11	13	33

8.2 Evolution 2021–2025

This section presents the annual number of ICS violations in Ireland from 2021 to 2025, distributed by scale and ICS criteria. It should be noted that the recorded values for 2019 aggregate all related ICS violations into ICS incidents, with the ICS criteria set to the violation with the highest priority according to Table 2.1.

The number of scale 0 ICS violations reported in 2025 decreased from 45 to 33 from 2024, as seen in Table 9.3 .

No scale 2 or scale 3 incidents were reported in Ireland in 2025.

Table 8.3: The annual number of ICS violations by ICS criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	-	-	-	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-
	Incidents on network elements (T0)	11	18	5	20	18
	Incidents on power generating facilities (G0)	14	15	13	19	10
	Separation from the grid (RS0)	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	-	-	-	6	5
	Total	25	33	18	45	33
Scale1	Incidents on load (L1)	-	-	-	-	-
	Incidents leading to frequency degradation (F1)	-	-	-	-	-
	Incidents on network elements (T1)	-	-	-	-	-
	Incidents on power generating facilities (G1)	-	-	-	-	-
	N-1 violation (ON1)	8	8	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	-	-	-	-
	Total	8	8	-	-	-
Scale2	Incidents on load (L2)	-	-	-	-	-
	Incidents leading to frequency degradation (F2)	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-
	Total	-	-	-	-	-
Scale3	Blackout (OB3)	-	-	-	-	-
	Total	-	-	-	-	-
Grand Total		33	41	18	45	33

8.3 Analysis of significant changes in trends

In 2025, a total of 33 ICS violations were reported in IE/Nl. The dominant criteria in 2025 were violations on network elements (T0) and violations involving power generating facilities (G0).

The continuing trend of G0 and T0-violations can still be

seen in IE/Nl. There has been no Scale 1 violations in IE/Nl since 2022.

No scale 2 or scale 3 violations were reported in 2025, which means that the reported ICS violations were low impact and did not affect normal operating conditions.

9 ICS violations in Isolated system

9.1 Overview of 2025

This section presents an overview of ICS violations in isolated systems in 2025. The violations are presented by ICS criterion and further grouped by month and duration in Table 9.1 and Table 9.2, respectively.

In 2025, a total of 36 ICS violations were reported for the isolated systems of Iceland and Cyprus. All the violations occurred in Iceland. One of the violations was of scale 2 (L2), 11 of the violations were of scale 1 and the other violations were of scale 0. The scale 2 violation (L2) was due to a fault on a surge arrester, which resulted in the tripping of a 132kV transmission line. The line connects two power plants, which were disconnected followed by automatic load shedding. Of the scale 1 violations, six were classified as L1, three as T1 and two as G1. The L1-violations mainly involved load disconnections following system dis-

turbances. The T1-violations were caused by 132kV transmission line trips that resulted in wider system impacts, including load disconnections.

Most of the reported scale 0 ICS violations were violations on transmission network elements (T0), as shown in Table 9.1. T0-violations were primarily due to environmental causes, operation and maintenance, and previous incidents according to the ICS methodology. The most common cause of the scale 1 violations was unexpected discrepancies from load or generation forecasts. The cause of the scale 2 violation was reported as a previous incident according to the ICS methodology, where the cause of the initiating event was reported as technical issues. Only one violation took longer than 24 hours to resolve, as seen in Table 9.2.

Table 9.1: Monthly number of ICS violations by ICS criterion in 2025 in Isolated system.

Scale	ICS criterion	2025												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Scale0	Incidents on load (L0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T0)	-	3	2	4	-	1	2	2	3	-	1	3	21
	Incidents on power generating facilities (G0)	-	-	1	-	-	-	-	-	-	-	2	-	3
	Separation from the grid (RS0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	3	3	4	-	1	2	2	3	-	3	3	24
Scale1	Incidents on load (L1)	1	-	1	1	1	-	-	1	1	-	-	-	6
	Incidents leading to frequency degradation (F1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T1)	1	-	1	-	-	-	-	-	-	1	-	-	3
	Incidents on power generating facilities (G1)	-	-	-	-	-	-	-	-	-	1	1	-	2
	N-1 violation (ON1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	2	-	2	1	1	-	-	1	1	2	1	-	11
Scale2	Incidents on load (L2)	-	-	-	-	-	-	-	-	-	1	-	-	1
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	1	-	-	1
Scale3	Blackout (OB3)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total		2	3	5	5	1	1	2	3	4	3	4	3	36

Table 9.2: Cumulative number of ICS violations by ICS criterion and duration in 2025 in Isolated system.

2025		<1h	<2h	<5h	<10h	<24h	Total
Scale	ICS criterion						
Scale0	Incidents on load (L0)	-	-	-	-	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-	-
	Incidents on network elements (T0)	6	12	17	19	20	21
	Incidents on power generating facilities (G0)	1	2	3	3	3	3
	Separation from the grid (RS0)	-	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-
	Total	7	14	20	22	23	24
Scale1	Incidents on load (L1)	4	6	6	6	6	6
	Incidents leading to frequency degradation (F1)	-	-	-	-	-	-
	Incidents on network elements (T1)	1	1	3	3	3	3
	Incidents on power generating facilities (G1)	-	-	2	2	2	2
	N-1 violation (ON1)	-	-	-	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-
	Total	5	7	11	11	11	11
Scale2	Incidents on load (L2)	-	-	1	1	1	1
	Incidents leading to frequency degradation (F2)	-	-	-	-	-	-
	Incidents on network elements (T2)	-	-	-	-	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	-	-	-	-	-	-
	Total	-	-	1	1	1	1
Scale3	Blackout (OB3)	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		12	21	32	34	35	36

9.2 Evolution 2021–2025

This section presents the annual number of incidents in the isolated systems from 2021 to 2025, distributed by scale and ICS criterion. The ICS criteria used in this report are presented in Table 2.1.

The number of reported scale 1 violations increased from

2 in 2024 to 11 in 2025, mainly driven by incidents on load (L1). One scale 2 violation and 11 scale 1 violations were reported in 2025. No scale 3 violations were reported during 2021–2025. All ICS incidents in the isolated systems during 2021–2025 were reported by Landsnet in Iceland.

Table 9.3: The annual number of ICS violations by ICS criterion from 2021–2025.

Scale	ICS criterion	2021	2022	2023	2024	2025
Scale0	Incidents on load (L0)	-	6	1	-	-
	Incidents leading to frequency degradation (F0)	-	-	-	-	-
	Incidents on network elements (T0)	26	29	12	12	21
	Incidents on power generating facilities (G0)	-	-	-	2	3
	Separation from the grid (RS0)	-	-	-	-	-
	Violation of standards on voltage (OV0)	-	-	-	-	-
	Reduction of reserve capacity (RRC0)	-	-	-	-	-
	Loss of tools, means and facilities (LT0)	-	1	-	-	-
	Total	26	36	13	14	24
Scale1	Incidents on load (L1)	-	-	-	-	6
	Incidents leading to frequency degradation (F1)	-	-	-	-	-
	Incidents on network elements (T1)	1	2	1	-	3
	Incidents on power generating facilities (G1)	2	-	-	2	2
	N-1 violation (ON1)	-	-	-	-	-
	Separation from the grid (RS1)	-	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	-	-	-	-
	Loss of tools, means and facilities (LT1)	-	1	-	-	-
	Total	3	3	1	2	11
Scale2	Incidents on load (L2)	-	2	-	-	1
	Incidents leading to frequency degradation (F2)	-	-	-	-	-
	Incidents on network elements (T2)	-	1	1	-	-
	Incidents on power generating facilities (G2)	-	-	-	-	-
	N violation (ON2)	-	-	-	-	-
	Separation from the grid (RS2)	-	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	-	-
	Reduction of reserve capacity (RRC2)	-	-	-	-	-
	Loss of tools, means and facilities (LT2)	1	-	-	-	-
	Total	1	3	1	-	1
Scale3	Blackout (OB3)	-	-	-	-	-
	Total	-	-	-	-	-
Grand Total		30	42	15	16	36

9.3 Analysis of significant changes in trends

In 2025, a total of 36 ICS violations were reported in isolated systems by Landsnet in Iceland and is the second highest number of violations during the reporting period 2021–2025. The incidents were mainly violations on trans-

mission network elements (T). The increase in reported violations is also partly explained by greater consideration of violations within the Icelandic transmission system resulting from disturbances originating in adjoining systems.

10 Overview of ICS violations per TSO

This chapter presents detailed information about each TSO that reported data according to the ICS Methodology. In total, 38 TSOs contributed data to the ICS report. The TSO in each synchronous area are listed below. TSOs were asked to comment on trends and out of average values. Received comments are presented in this report.

Continental Europe:

- 50Hertz
- Amprion
- APG
- AST
- ČEPS
- CGES
- CREOS
- Elering
- ELES
- Elia
- EMS
- Energinet (CE)
- ESO
- HOPS
- IPTO
- Litgrid
- MAVIR
- Moldelectrica
- NOS BiH
- OST
- PSE
- Red Eléctrica
- REN
- RTE
- SEPS
- Swissgrid
- TEIAS
- TenneT DE
- TenneT NL
- Terna
- Transelectrica
- TransnetBW
- Ukrenerg

Isolated systems:

- Landsnet
- TSO Cyprus

Ireland/Northern Ireland:

- EirGrid
- SONI

Nordic:

- Energinet (Nordic)
- Fingrid
- Statnett
- Svenska kraftnät

10.1 Overview of ICS violations by TSOs in Continental Europe

10.1.1 ICS violations reported by 50Hertz

This section presents violations for 50Hertz, one of the TSOs in Germany. Table 10.1 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.2 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.1 presents the number of violations grouped by duration in 2025.

Table 10.1: Monthly distribution of ICS violations by ICS criterion in 2025 for 50Hertz.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	2	3	4	3	1	2	3	2	5	1	1	3	30
	Incidents on power generating facilities (G0)	1	1	1	-	2	-	-	1	-	2	1	1	10
	Loss of tools, means and facilities (LT0)	-	8	2	2	1	5	2	5	1	3	4	1	34
Scale 1	N-1 violation (ON1)	-	-	-	-	-	1	-	-	-	-	1	-	2
	Loss of tools, means and facilities (LT1)	-	1	-	-	1	-	2	-	-	-	-	1	5
Grand total		3	13	7	5	5	8	7	8	6	6	7	6	81

Table 10.2: The annual number of ICS violations by ICS criterion from 2021–2025 for 50Hertz.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	1	-	-	-	-
	Incidents on network elements (T0)	40	36	66	31	30
	Incidents on power generating facilities (G0)	8	6	3	3	10
	Loss of tools, means and facilities (LT0)	1	4	5	13	34
Scale 1	Incidents on load (L1)	-	2	2	-	-
	N-1 violation (ON1)	9	8	1	1	2
	Loss of tools, means and facilities (LT1)	8	4	2	1	5
Grand total		67	60	79	49	81

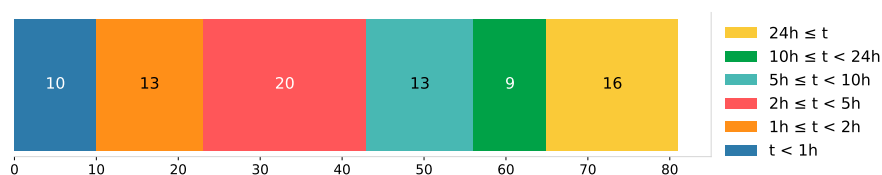


Figure 10.1: Number of ICS violations grouped by duration in 2025 for 50Hertz.

10.1.2 ICS violations reported by Amprion

This section presents violations for Amprion GmbH, one of the TSOs in Germany. Table 10.3 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.4 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.2 presents the number of violations grouped by duration in 2025.

Table 10.3: Monthly distribution of ICS violations by ICS criterion in 2025 for Amprion.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	7	-	5	8	13	13	10	8	7	5	9	10	95
	Incidents on power generating facilities (G0)	10	8	8	4	3	5	2	3	3	5	9	6	66
	Loss of tools, means and facilities (LT0)	1	-	1	-	1	-	2	-	-	-	2	-	7
Scale 1	N-1 violation (ON1)	-	-	-	-	-	-	1	1	-	-	-	-	2
	Loss of tools, means and facilities (LT1)	-	1	-	-	1	-	2	-	-	-	-	1	5
Grand total		18	9	14	12	18	18	17	12	10	10	20	17	175

Table 10.4: The annual number of ICS violations by ICS criterion from 2021–2025 for Amprion.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	79	94	76	54	95
	Incidents on power generating facilities (G0)	19	18	10	20	66
	Violation of standards on voltage (OV0)	-	3	-	4	-
	Loss of tools, means and facilities (LT0)	4	14	4	15	7
Scale 1	Incidents on network elements (T1)	-	-	1	-	-
	N-1 violation (ON1)	3	12	9	5	2
	Violation of standards on voltage (OV1)	-	3	-	11	-
	Loss of tools, means and facilities (LT1)	-	-	1	1	5
Grand total		105	144	101	110	175

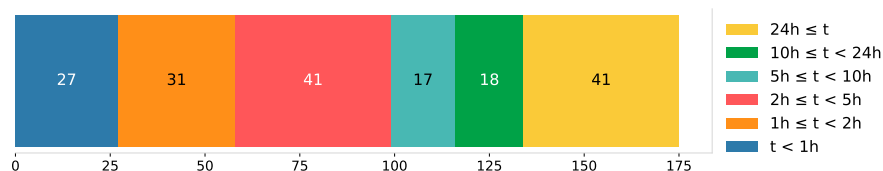


Figure 10.2: Number of ICS violations grouped by duration in 2025 for Amprion.

10.1.3 ICS violations reported by APG

This section presents violations for Austrian Power Grid AG (APG), the TSO in Austria. Table 10.5 presents the monthly distribution of ICS violations by ICS criterion in 2025, and

Table 10.6 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.3 presents the number of violations grouped by duration in 2025.

Table 10.5: Monthly distribution of ICS violations by ICS criterion in 2025 for APG.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	2	-	1	1	1	1	-	1	1	2	-	-	10
	Incidents on power generating facilities (G0)	-	-	-	-	-	-	-	-	-	-	-	2	2
Scale 1	N-1 violation (ON1)	-	-	-	-	-	-	-	-	-	-	-	1	1
	Loss of tools, means and facilities (LT1)	1	1	-	-	-	-	-	-	-	-	-	-	2
Grand total		3	1	1	1	1	1	-	1	1	2	-	3	15

Table 10.6: The annual number of ICS violations by ICS criterion from 2021–2025 for APG.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	17	13	16	7	10
	Incidents on power generating facilities (G0)	-	-	-	2	2
	Loss of tools, means and facilities (LT0)	1	-	3	-	-
Scale 1	Incidents on network elements (T1)	-	1	-	-	-
	N-1 violation (ON1)	4	3	8	12	1
	Loss of tools, means and facilities (LT1)	-	1	-	8	2
Grand total		22	18	27	29	15

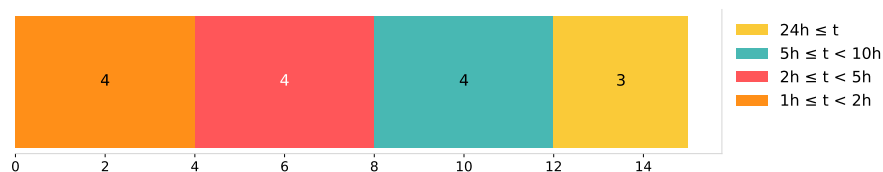


Figure 10.3: Number of ICS violations grouped by duration in 2025 for APG.

10.1.4 ICS violations reported by AST

This section presents violations for AS Augstsprieguma tīkls (AST), the TSO in Latvia. Table 10.7 presents the monthly distribution of ICS violations by ICS criterion in 2025, and

Table 10.8 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.4 presents the number of violations grouped by duration in 2025.

Table 10.7: Monthly distribution of ICS violations by ICS criterion in 2025 for AST.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	-	2	1	1	2	1	2	-	-	-	1	10
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	-	-	-	-	2	-	2
Scale 1	Violation of standards on voltage (OV1)	-	-	1	-	-	-	-	-	-	-	-	-	1
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-	-	-	-	1	-	-	1
Grand total		-	-	3	1	1	2	1	2	-	1	2	1	14

Table 10.8: The annual number of ICS violations by ICS criterion from 2021–2025 for AST.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	6	5	6	6	10
	Incidents on power generating facilities (G0)	1	1	-	1	-
	Loss of tools, means and facilities (LT0)	-	-	-	-	2
Scale 1	N-1 violation (ON1)	-	-	-	1	-
	Violation of standards on voltage (OV1)	-	-	-	-	1
	Loss of tools, means and facilities (LT1)	-	-	-	1	1
Grand total		7	6	6	9	14

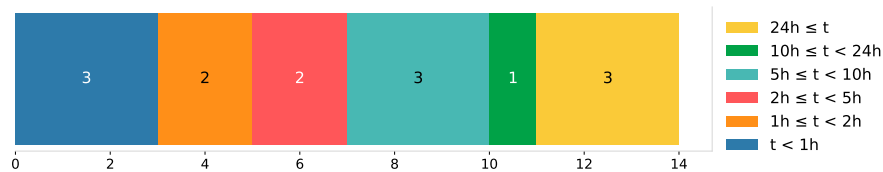


Figure 10.4: Number of ICS violations grouped by duration in 2025 for AST.

10.1.5 ICS violations reported by CEPS

This section presents violations for ČEPS, the TSO in the Czech Republic. Table 10.9 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.10 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.5 presents the number of violations grouped by duration in 2025.

In the year 2024, the ON1 incidents included only verified results of contingency analysis (i.e., potential outages

of all ČEPS lines, including tie-lines, but only with impact on tie-lines). The results of contingency analysis have not been coordinated between neighbouring TSOs and therefore, the reported values were different to what neighbouring TSOs have reported. In 2025, ČEPS coordinated with neighbouring TSOs and in most cases they confirmed that they were not impacted. Because the ON criteria excludes N-1 violations with only local consequences, the number of ON-violations decreased in 2025.

Table 10.9: Monthly distribution of ICS violations by ICS criterion in 2025 for CEPS.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	3	-	2	4	3	4	2	5	6	1	7	2	39
	Incidents on power generating facilities (G0)	1	-	1	1	-	-	1	-	-	-	-	2	6
	Violation of standards on voltage (OV0)	-	-	-	-	-	-	1	1	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	-	-	1	-	-	-	1	1	-	-	-	-	3
Scale 1	Incidents on load (L1)	-	-	-	-	1	-	-	-	1	-	-	-	2
	Incidents on network elements (T1)	-	-	-	-	1	-	2	-	1	-	-	-	4
	N-1 violation (ON1)	-	-	-	-	-	2	1	-	-	-	-	-	3
	Violation of standards on voltage (OV1)	-	-	-	-	-	-	5	-	-	4	2	-	11
	Loss of tools, means and facilities (LT1)	-	-	1	-	-	-	-	-	-	-	-	-	1
Scale 2	Incidents on load (L2)	-	-	-	-	-	-	1	-	-	-	-	-	1
Grand total		4	-	5	5	5	6	14	7	8	5	9	4	72

Table 10.10: The annual number of ICS violations by ICS criterion from 2021–2025 for CEPS.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	29	30	41	45	39
	Incidents on power generating facilities (G0)	6	2	3	9	6
	Separation from the grid (RS0)	-	1	-	-	-
	Violation of standards on voltage (OV0)	3	8	32	19	2
	Loss of tools, means and facilities (LT0)	1	1	11	8	3
Scale 1	Incidents on load (L1)	1	1	7	-	2
	Incidents on network elements (T1)	-	8	7	1	4
	N-1 violation (ON1)	-	1	-	48	3
	Violation of standards on voltage (OV1)	3	6	36	54	11
	Loss of tools, means and facilities (LT1)	1	3	2	1	1
Scale 2	Incidents on load (L2)	-	-	-	-	1
Grand total		44	61	139	185	72

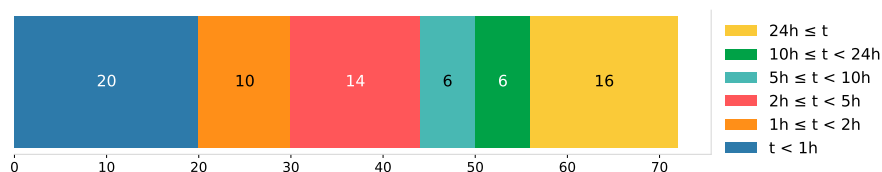


Figure 10.5: Number of ICS violations grouped by duration in 2025 for CEPS.

10.1.6 ICS violations reported by CGES

This section presents violations for CGES, the TSO in Montenegro. Table 10.11 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.12 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.6 presents the number of violations grouped by duration in 2025.

Table 10.11: Monthly distribution of ICS violations by ICS criterion in 2025 for CGES.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	6	3	6	2	1	5	6	5	2	2	1	-	39
Grand total		6	3	6	2	1	5	6	5	2	2	1	-	39

Table 10.12: The annual number of ICS violations by ICS criterion from 2021–2025 for CGES.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	-	22	19	50	39
Scale 1	Incidents on network elements (T1)	-	-	3	1	-
	N-1 violation (ON1)	-	-	-	1	-
Scale 2	Incidents on network elements (T2)	-	-	-	2	-
	N violation (ON2)	-	-	-	1	-
	Violation of standards on voltage (OV2)	-	-	-	1	-
Scale 3	Blackout (OB3)	-	-	-	1	-
Grand total		-	22	22	57	39

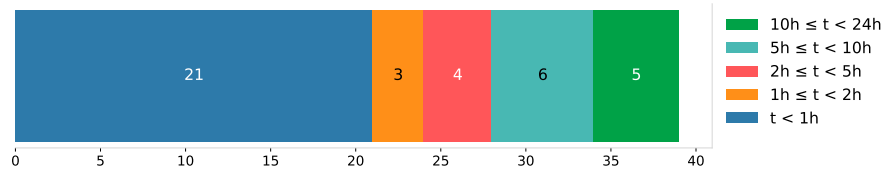


Figure 10.6: Number of ICS violations grouped by duration in 2025 for CGES.

10.1.7 ICS violations reported by Elering

This section presents violations for Elering, the TSO in Estonia. Table 10.13 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.14 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.7 presents the number of violations grouped by duration in 2025.

Table 10.13: Monthly distribution of ICS violations by ICS criterion in 2025 for Elering.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	2	-	-	-	1	2	-	-	-	1	-	7
Grand total		1	2	-	-	-	1	2	-	-	-	1	-	7

Table 10.14: The annual number of ICS violations by ICS criterion from 2021–2025 for Elering.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	8	16	11	11	7
	Incidents on power generating facilities (G0)	15	16	9	10	-
Scale 1	Loss of tools, means and facilities (LT1)	-	-	-	1	-
Grand total		23	32	20	22	7



Figure 10.7: Number of ICS violations grouped by duration in 2025 for Elering.

10.1.8 ICS violations reported by ELES

This section presents violations for ELES, the TSO in Slovenia. Table 10.15 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.16 presents

the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.8 presents the number of violations grouped by duration in 2025.

Table 10.15: Monthly distribution of ICS violations by ICS criterion in 2025 for ELES.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	-	1	-	-	-	2	6	-	-	1	-	11
	Violation of standards on voltage (OV0)	6	2	4	17	13	9	8	20	16	21	2	-	118
	Loss of tools, means and facilities (LT0)	1	-	-	-	-	-	-	-	-	-	-	-	1
Scale 1	N-1 violation (ON1)	-	-	2	-	-	-	1	-	-	-	-	-	3
	Violation of standards on voltage (OV1)	5	1	10	14	24	15	11	36	18	16	3	5	158
Grand total		13	3	17	31	37	24	22	62	34	37	6	5	291

Table 10.16: The annual number of ICS violations by ICS criterion from 2021–2025 for ELES.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	5	7	7	18	11
	Violation of standards on voltage (OV0)	-	-	-	103	118
	Loss of tools, means and facilities (LT0)	-	3	3	-	1
Scale 1	N-1 violation (ON1)	1	1	8	10	3
	Violation of standards on voltage (OV1)	-	-	-	106	158
	Loss of tools, means and facilities (LT1)	1	-	2	-	-
Grand total		7	11	20	237	291

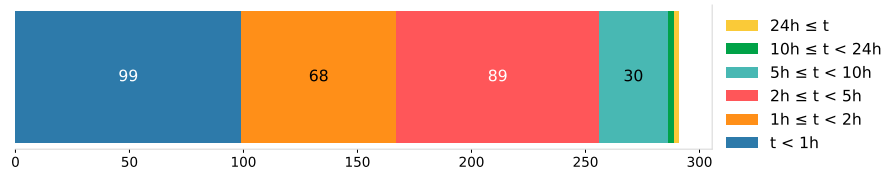


Figure 10.8: Number of ICS violations grouped by duration in 2025 for ELES.

10.1.9 ICS violations reported by Elia

This section presents violations for Elia, the TSO in Belgium. Table 10.17 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.18 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.9 presents the number of violations grouped by duration in 2025.

Table 10.17: Monthly distribution of ICS violations by ICS criterion in 2025 for Elia.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	3	1	1	-	2	2	2	-	-	2	-	-	13
	Incidents on power generating facilities (G0)	2	-	-	-	-	-	-	-	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	-	-	1	1	-	-	-	-	-	-	1	1	4
Scale 1	N-1 violation (ON1)	1	1	-	-	1	-	-	1	-	-	-	-	4
	Loss of tools, means and facilities (LT1)	-	-	-	-	-	-	-	1	1	-	-	-	2
Grand total		6	2	2	1	3	2	2	2	1	2	1	1	25

Table 10.18: The annual number of ICS violations by ICS criterion from 2021–2025 for Elia.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	9	6	8	14	13
	Incidents on power generating facilities (G0)	1	1	-	2	2
	Violation of standards on voltage (OV0)	1	-	-	2	-
	Loss of tools, means and facilities (LT0)	-	-	3	-	4
Scale 1	Incidents on network elements (T1)	3	-	-	-	-
	N-1 violation (ON1)	2	-	1	-	4
	Violation of standards on voltage (OV1)	-	-	-	2	-
	Loss of tools, means and facilities (LT1)	4	-	-	2	2
Grand total		20	7	12	22	25

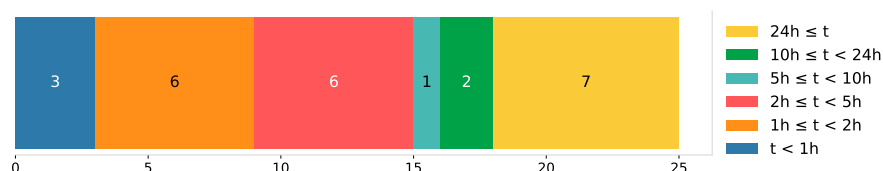


Figure 10.9: Number of ICS violations grouped by duration in 2025 for Elia.

10.1.10 ICS violations reported by EMS

This section presents violations for EMS JSC, the TSO of Serbia. Table 10.19 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.20 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.10 presents the number of violations grouped by duration in 2025.

Table 10.19: Monthly distribution of ICS violations by ICS criterion in 2025 for EMS.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	5	1	1	3	1	4	4	5	2	-	3	4	33
	Incidents on power generating facilities (G0)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Loss of tools, means and facilities (LT0)	-	-	-	1	1	1	1	-	-	3	1	4	12
Scale 1	Incidents on load (L1)	-	-	-	-	-	1	-	-	-	-	-	-	1
	Incidents on network elements (T1)	-	-	-	-	-	1	-	-	-	-	-	-	1
	N-1 violation (ON1)	-	-	-	-	-	3	-	5	-	-	-	-	8
	Violation of standards on voltage (OV1)	7	6	7	6	15	10	6	10	7	14	14	11	113
	Reduction of reserve capacity (RRC1)	-	-	1	1	3	-	-	-	-	-	-	-	5
Grand total		12	7	9	12	20	20	11	20	9	17	18	19	174

Table 10.20: The annual number of ICS violations by ICS criterion from 2021–2025 for EMS.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	31	16	33	28	33
	Incidents on power generating facilities (G0)	2	-	-	-	1
	Violation of standards on voltage (OV0)	4	4	-	-	-
	Loss of tools, means and facilities (LT0)	-	-	-	1	12
Scale 1	Incidents on load (L1)	-	-	1	2	1
	Incidents on network elements (T1)	4	1	1	2	1
	N-1 violation (ON1)	-	-	-	-	8
	Violation of standards on voltage (OV1)	109	119	132	137	113
	Reduction of reserve capacity (RRC1)	4	2	4	7	5
	Loss of tools, means and facilities (LT1)	2	-	-	-	-
Scale 2	Separation from the grid (RS2)	1	-	-	-	-
Grand total		157	142	171	177	174

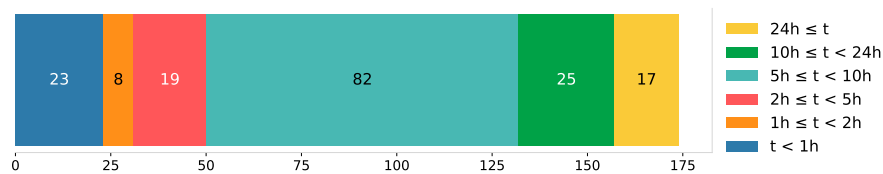


Figure 10.10: Number of ICS violations grouped by duration in 2025 for EMS.

10.1.11 ICS violations reported by Energinet (CE)

This section presents violations for Energinet (CE), the TSO in Denmark. Table 10.21 presents the monthly distribution of ICS violations by ICS criterion in 2022, and Table 10.22 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.11 presents the number of violations grouped by duration in 2025.

Table 10.21: Monthly distribution of ICS violations by ICS criterion in 2025 for Energinet (CE).

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	2	1	2	1	2	1	2	2	1	3	3	21
	Loss of tools, means and facilities (LT0)	1	3	1	1	-	-	1	-	-	1	-	-	8
Scale 1	Loss of tools, means and facilities (LT1)	-	-	1	-	-	-	-	-	1	-	-	-	2
Grand total		2	5	3	3	1	2	2	2	3	2	3	3	31

Table 10.22: The annual number of ICS violations by ICS criterion from 2021–2025 for Energinet (CE).

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	35	15	18	29	21
	Violation of standards on voltage (OV0)	1	-	-	-	-
	Loss of tools, means and facilities (LT0)	2	1	-	10	8
Scale 1	Loss of tools, means and facilities (LT1)	-	3	4	2	2
Grand total		38	19	22	41	31

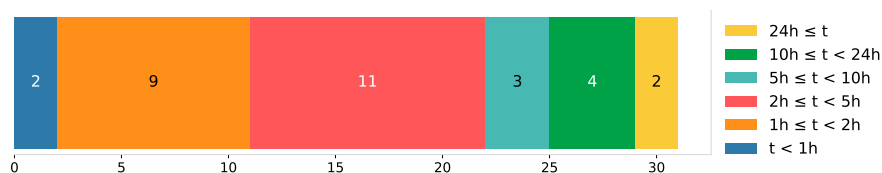


Figure 10.11: Number of ICS violations grouped by duration in 2025 for Energinet (CE).

10.1.12 ICS violations reported by ESO

This section presents violations for ESO EAD, the TSO in Bulgaria. Table 10.23 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.24 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.12 presents the number of violations grouped by duration in 2025.

Table 10.23: Monthly distribution of ICS violations by ICS criterion in 2025 for ESO.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	5	1	5	10	8	11	17	13	5	3	3	2	83
Grand total		5	1	5	10	8	11	17	13	5	3	3	2	83

Table 10.24: The annual number of ICS violations by ICS criterion from 2021–2025 for ESO.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	38	91	142	73	83
	Loss of tools, means and facilities (LT0)	-	-	-	1	-
Grand total		38	91	142	74	83

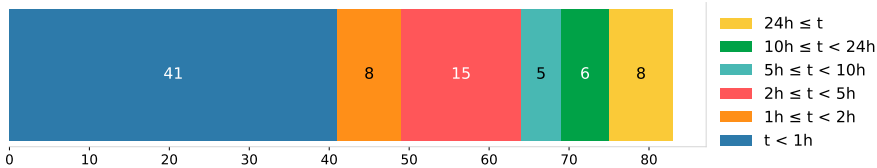


Figure 10.12: Number of ICS violations grouped by duration in 2025 for ESO.

10.1.13 ICS violations reported by Freq (CE)

This section presents frequency violations in Continental Europe in 2025. Table 10.25 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.26 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.13 presents the number of violations grouped by duration in 2025. Amprion provided information regarding incidents leading to frequency degradation in continental Europe (CE) for

odd months and Swissgrid provided information for even months.

There is a noticeable increase in F-violations in the spring months. A probable explanation is the difficulty of LGF after winter – especially PV. In winter, PV develops approximately the same as in the other months but they are less effective. As a result, the generation capabilities of PV are very difficult to determine during the spring.

Table 10.25: Monthly distribution of ICS violations by ICS criterion in 2025 for Freq (CE).

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents leading to frequency degradation (F0)	10	18	111	58	94	29	29	16	26	5	4	1	401
Scale 1	Incidents leading to frequency degradation (F1)	1	-	28	2	11	-	2	-	2	-	-	-	46
Grand total		11	18	139	60	105	29	31	16	28	5	4	1	447

Table 10.26: The annual number of ICS violations by ICS criterion from 2021–2025 for Freq (CE).

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents leading to frequency degradation (F0)	746	220	210	274	401
Scale 1	Incidents leading to frequency degradation (F1)	92	6	13	5	46
Grand total		838	226	223	279	447

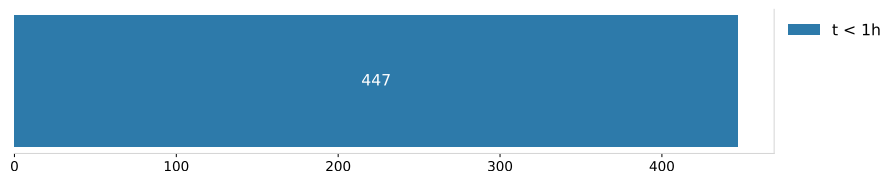


Figure 10.13: Number of ICS violations grouped by duration in 2025 for Freq (CE).

10.1.14 ICS violations reported by HOPS

This section presents violations for HOPS, the TSO in Croatia. Table 10.27 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.28 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.14 presents the number of violations grouped by duration in 2025.

Table 10.27: Monthly distribution of ICS violations by ICS criterion in 2025 for HOPS.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	2	3	1	3	1	6	2	7	-	3	-	-	28
Scale 1	N-1 violation (ON1)	-	-	2	-	-	-	-	-	-	-	-	-	2
	Reduction of reserve capacity (RRC1)	-	-	-	-	2	5	-	-	-	-	-	-	7
	Loss of tools, means and facilities (LT1)	-	1	-	-	-	-	-	-	-	-	1	-	2
Grand total		2	4	3	3	3	11	2	7	-	3	1	-	39

Table 10.28: The annual number of ICS violations by ICS criterion from 2021–2025 for HOPS.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	49	39	52	9	28
	Loss of tools, means and facilities (LT0)	11	-	-	-	-
Scale 1	Incidents on network elements (T1)	2	-	-	3	-
	N-1 violation (ON1)	-	-	1	4	2
	Reduction of reserve capacity (RRC1)	12	-	-	-	7
	Loss of tools, means and facilities (LT1)	2	1	1	1	2
Scale 2	Incidents on load (L2)	-	-	-	1	-
	Incidents on network elements (T2)	1	-	-	4	-
	N violation (ON2)	-	-	-	1	-
	Separation from the grid (RS2)	2	-	-	-	-
	Violation of standards on voltage (OV2)	-	-	-	1	-
Grand total		79	40	54	24	39

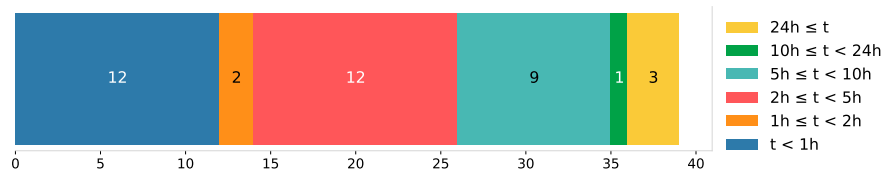


Figure 10.14: Number of ICS violations grouped by duration in 2025 for HOPS.

10.1.15 ICS violations reported by IPTO

This section presents violations for IPTO, the TSO in Greece. Table 10.29 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.30 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.15 presents the number of violations grouped by duration in 2025.

Table 10.29: Monthly distribution of ICS violations by ICS criterion in 2025 for IPTO.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	-	-	1	-	3	2	-	1	-	-	1	9
	Violation of standards on voltage (OV0)	-	-	3	14	15	5	-	-	1	-	1	-	39
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	-	-	1	1	2	-	4
Scale 1	Violation of standards on voltage (OV1)	-	-	1	6	5	-	-	-	-	-	-	-	12
Grand total		1	-	4	21	20	8	2	-	3	1	3	1	64

Table 10.30: The annual number of ICS violations by ICS criterion from 2021–2025 for IPTO.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	35	35	58	10	9
	Incidents on power generating facilities (G0)	1	-	-	1	-
	Separation from the grid (RS0)	-	-	-	1	-
	Violation of standards on voltage (OV0)	14	22	25	77	39
	Loss of tools, means and facilities (LT0)	10	10	10	5	4
Scale 1	Incidents on load (L1)	-	-	1	-	-
	Violation of standards on voltage (OV1)	34	28	18	2	12
	Loss of tools, means and facilities (LT1)	-	-	1	-	-
Grand total		94	95	113	96	64

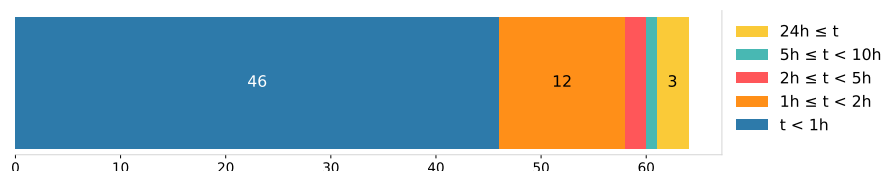


Figure 10.15: Number of ICS violations grouped by duration in 2025 for IPTO.

10.1.16 ICS violations reported by Litgrid

This section presents violations for Litgrid AB, the TSO in Lithuania. Table 10.31 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.32 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.16 presents the number of violations grouped by duration in 2025.

Table 10.31: Monthly distribution of ICS violations by ICS criterion in 2025 for Litgrid.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	-	3	1	-	1	3	-	3	3	-	1	15
Grand total		-	-	3	1	-	1	3	-	3	3	-	1	15

Table 10.32: The annual number of ICS violations by ICS criterion from 2021–2025 for Litgrid.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	7	6	9	19	15
	Incidents on power generating facilities (G0)	-	1	-	1	-
	Loss of tools, means and facilities (LT0)	1	-	-	-	-
Scale 1	Incidents on network elements (T1)	4	6	1	-	-
Grand total		12	13	10	20	15

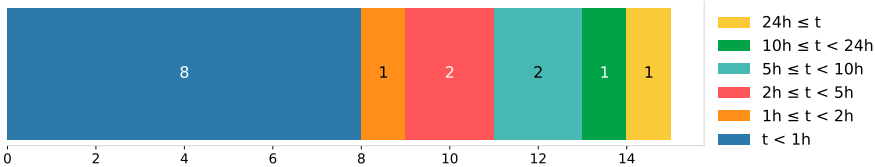


Figure 10.16: Number of ICS violations grouped by duration in 2025 for Litgrid.

10.1.17 ICS violations reported by MAVIR

This section presents violations for MAVIR ZRt, the TSO in Hungary. Table 10.33 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.34

presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.17 presents the number of violations grouped by duration in 2025.

Table 10.33: Monthly distribution of ICS violations by ICS criterion in 2025 for MAVIR.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	-	-	2	-	-	-	3	1	-	1	-	8
	Violation of standards on voltage (OV0)	9	15	7	9	8	20	5	11	17	9	11	20	141
	Reduction of reserve capacity (RRC0)	1	4	5	3	7	4	1	1	2	2	-	-	30
	Loss of tools, means and facilities (LT0)	-	-	2	-	-	-	-	-	-	-	-	-	2
Scale 1	Violation of standards on voltage (OV1)	10	7	4	10	12	6	1	5	16	7	7	6	91
	Reduction of reserve capacity (RRC1)	-	1	1	2	-	-	-	-	-	1	-	-	5
Grand total		21	27	19	26	27	30	7	20	36	19	19	26	277

Table 10.34: The annual number of ICS violations by ICS criterion from 2021–2025 for MAVIR.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	-	12	9	11	8
	Violation of standards on voltage (OV0)	249	329	232	136	141
	Reduction of reserve capacity (RRC0)	25	185	89	91	30
	Loss of tools, means and facilities (LT0)	-	-	-	-	2
Scale 1	Incidents on network elements (T1)	15	-	-	-	-
	Violation of standards on voltage (OV1)	287	154	92	69	91
	Reduction of reserve capacity (RRC1)	35	53	40	23	5
Grand total		611	733	462	330	277

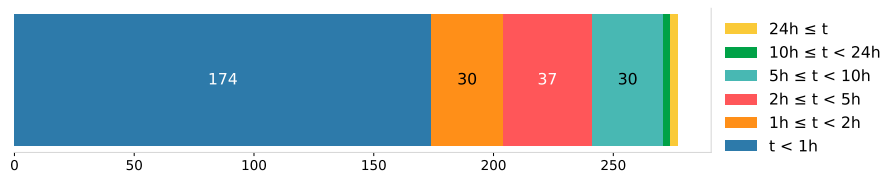


Figure 10.17: Number of ICS violations grouped by duration in 2025 for MAVIR.

10.1.18 ICS violations reported by Moldelectrica

This section presents violations for Moldelectrica, the TSO in Moldova. Table 10.35 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.36 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.18 presents the number of violations grouped by duration in 2025.

Table 10.35: Monthly distribution of ICS violations by ICS criterion in 2025 for Moldelectrica.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	1	1	1	1	1	1	6	1	-	-	3	-	16
Scale 1	Violation of standards on voltage (OV1)	212	187	190	189	206	239	108	165	155	134	137	68	1990
Grand total		213	188	191	190	207	240	114	166	155	134	140	68	2006

Table 10.36: The annual number of ICS violations by ICS criterion from 2021–2025 for Moldelectrica.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	-	-	15	4	16
Scale 1	Violation of standards on voltage (OV1)	-	-	-	150	1990
Scale 2	Incidents on load (L2)	-	-	1	-	-
Grand total		-	-	16	154	2006

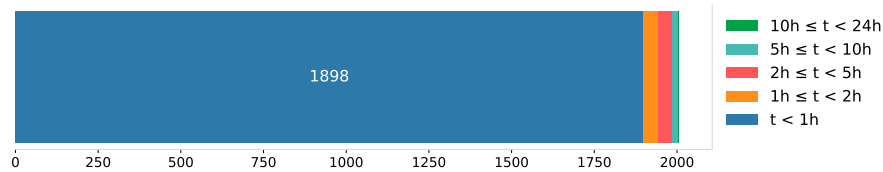


Figure 10.18: Number of ICS violations grouped by duration in 2025 for Moldelectrica.

10.1.19 ICS violations reported by NOS BiH

This section presents violations for NOS BiH, the TSO in Bosnia and Herzegovina. Table 10.37 presents the monthly distribution of ICS violations by ICS criterion in 2025, and

Table 10.38 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.19 presents the number of violations grouped by duration in 2025.

Table 10.37: Monthly distribution of ICS violations by ICS criterion in 2025 for NOS BiH.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	2	5	2	7	2	4	1	3	5	4	1	1	37
Grand total		2	5	2	7	2	4	1	3	5	4	1	1	37

Table 10.38: The annual number of ICS violations by ICS criterion from 2021–2025 for NOS BiH.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	28	26	8	28	37
	Incidents on power generating facilities (G0)	1	-	-	1	-
	Violation of standards on voltage (OV0)	-	-	-	1	-
Scale 1	Incidents on network elements (T1)	2	-	3	-	-
Scale 2	Incidents leading to frequency degradation (F2)	1	-	-	-	-
	Incidents on network elements (T2)	-	-	-	8	-
	N violation (ON2)	-	-	-	1	-
Scale 3	Blackout (OB3)	-	-	-	1	-
Grand total		32	26	11	40	37

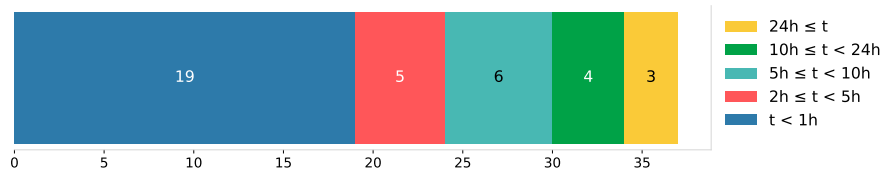


Figure 10.19: Number of ICS violations grouped by duration in 2025 for NOS BiH.

10.1.20 ICS violations reported by OST

This section presents events for OST, the TSO in Albania. Table 10.39 presents the monthly distribution of ICS events by ICS criterion in 2025, and Table 10.40 presents the annual number of ICS events by ICS criterion from 2021–2025. Figure 10.17 presents the number of events grouped by duration in 2025.

Table 10.39: Monthly distribution of ICS violations by ICS criterion in 2025 for OST.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on load (L0)	-	-	-	-	-	-	1	-	-	-	-	-	1
	Incidents on network elements (T0)	4	4	1	2	1	7	13	7	7	13	5	1	65
Scale 1	Incidents on load (L1)	1	-	-	1	-	-	-	-	-	-	-	-	2
Scale 2	Incidents on load (L2)	1	-	-	-	-	-	-	-	-	-	-	-	1
Grand total		6	4	1	3	1	7	14	7	7	13	5	1	69

Table 10.40: The annual number of ICS violations by ICS criterion from 2021–2025 for OST.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	-	-	-	-	1
	Incidents on network elements (T0)	61	32	41	61	65
	Incidents on power generating facilities (G0)	-	-	-	4	-
Scale 1	Incidents on load (L1)	-	-	-	-	2
	Incidents on network elements (T1)	-	-	-	4	-
	Incidents on power generating facilities (G1)	-	-	-	1	-
	N-1 violation (ON1)	-	-	-	1	-
Scale 2	Incidents on load (L2)	-	-	-	-	1
	Incidents on network elements (T2)	-	-	-	6	-
	N violation (ON2)	-	-	-	1	-
Scale 3	Blackout (OB3)	-	-	-	1	-
Grand total		61	32	41	79	69

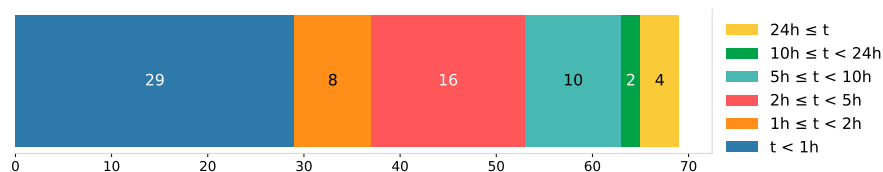


Figure 10.20: Number of ICS violations grouped by duration in 2025 for OST.

10.1.21 ICS violations reported by PSE

This section presents violations for PSE, the TSO in Poland. Table 10.41 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.42 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.21 presents the number of violations grouped by duration in 2025.

Table 10.41: Monthly distribution of ICS violations by ICS criterion in 2025 for PSE.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	6	2	7	6	3	17	6	6	9	7	3	1	73
	Incidents on power generating facilities (G0)	3	2	1	-	3	1	1	-	-	-	1	1	13
	Loss of tools, means and facilities (LT0)	2	1	-	-	-	-	1	-	1	-	1	1	7
Grand total		11	5	8	6	6	18	8	6	10	7	5	3	93

Table 10.42: The annual number of ICS violations by ICS criterion from 2021–2025 for PSE.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	100	138	78	77	73
	Incidents on power generating facilities (G0)	14	12	9	8	13
	Loss of tools, means and facilities (LT0)	-	1	-	2	7
Scale 1	Reduction of reserve capacity (RRC1)	1	6	1	-	-
	Loss of tools, means and facilities (LT1)	2	-	-	-	-
Scale 2	Incidents on power generating facilities (G2)	1	-	-	-	-
	Reduction of reserve capacity (RRC2)	1	-	-	-	-
Grand total		119	157	88	87	93

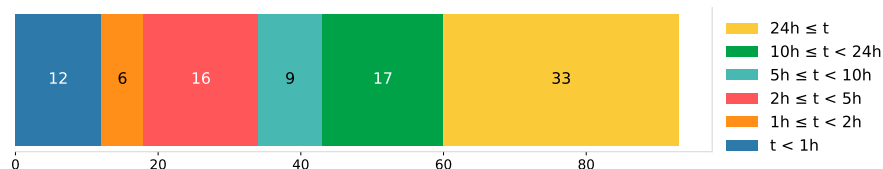


Figure 10.21: Number of ICS violations grouped by duration in 2025 for PSE.

10.1.22 ICS violations reported by Red Eléctrica

This section presents violations for Red Eléctrica, the TSO in Spain. Table 10.43 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.44 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.22 presents the number of violations grouped by duration in 2025.

Table 10.43: Monthly distribution of ICS violations by ICS criterion in 2025 for Red Eléctrica.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	35	13	25	18	20	21	30	27	14	19	30	22	274
	Incidents on power generating facilities (G0)	3	1	-	-	-	1	-	-	-	-	1	-	6
	Loss of tools, means and facilities (LT0)	-	1	3	2	1	1	2	1	1	4	1	1	18
Scale 1	Violation of standards on voltage (OV1)	-	-	-	1	-	-	-	-	-	-	-	-	1
Scale 2	Incidents on load (L2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Incidents on network elements (T2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Incidents on power generating facilities (G2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Separation from the grid (RS2)	-	-	-	1	-	-	-	-	-	-	-	-	1
Scale 3	Blackout (OB3)	-	-	-	1	-	-	-	-	-	-	-	-	1
Grand total		38	15	28	26	21	23	32	28	15	23	32	23	304

Table 10.44: The annual number of ICS violations by ICS criterion from 2021–2025 for Red Eléctrica.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	274	214	240	233	274
	Incidents on power generating facilities (G0)	-	3	8	10	6
	Violation of standards on voltage (OV0)	-	1	13	-	-
	Loss of tools, means and facilities (LT0)	-	5	6	26	18
Scale 1	Incidents on power generating facilities (G1)	1	-	-	-	-
	Violation of standards on voltage (OV1)	-	-	13	-	1
Scale 2	Incidents on load (L2)	1	-	-	-	1
	Incidents on network elements (T2)	1	-	-	-	1
	Incidents on power generating facilities (G2)	-	-	-	-	1
	Separation from the grid (RS2)	1	-	-	-	1
Scale 3	Blackout (OB3)	-	-	-	-	1
Grand total		278	223	280	269	304

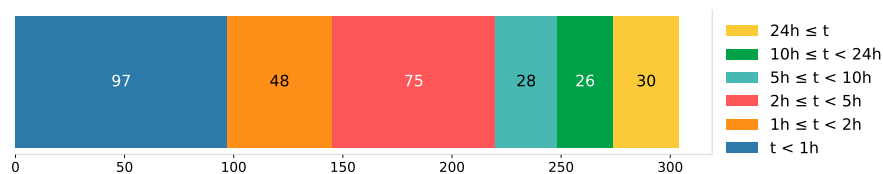


Figure 10.22: Number of ICS violations grouped by duration in 2025 for Red Eléctrica.

10.1.23 ICS violations reported by REN

This section presents violations for REN, the TSO in Portugal. Table 10.45 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.46 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.23 presents the number of violations grouped by duration in 2025.

Table 10.45: Monthly distribution of ICS violations by ICS criterion in 2025 for REN.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	6	-	4	3	-	1	4	8	-	6	1	-	33
	Incidents on power generating facilities (G0)	1	-	-	-	-	-	-	-	-	-	-	-	1
	Loss of tools, means and facilities (LT0)	1	-	-	-	-	-	-	-	-	-	-	-	1
Scale 2	Incidents on load (L2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Incidents on power generating facilities (G2)	-	-	-	1	-	-	-	-	-	-	-	-	1
	Separation from the grid (RS2)	-	-	-	1	-	-	-	-	-	-	-	-	1
Scale 3	Blackout (OB3)	-	-	-	1	-	-	-	-	-	-	-	-	1
Grand total		8	-	4	7	-	1	4	8	-	6	1	-	39

Table 10.46: The annual number of ICS violations by ICS criterion from 2021–2025 for REN.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	17	9	25	23	33
	Incidents on power generating facilities (G0)	1	1	1	1	1
	Loss of tools, means and facilities (LT0)	-	2	1	-	1
Scale 1	Loss of tools, means and facilities (LT1)	-	-	2	-	-
Scale 2	Incidents on load (L2)	1	-	-	-	1
	Incidents on power generating facilities (G2)	-	-	-	-	1
	Separation from the grid (RS2)	1	-	-	-	1
Scale 3	Blackout (OB3)	-	-	-	-	1
Grand total		20	12	29	24	39

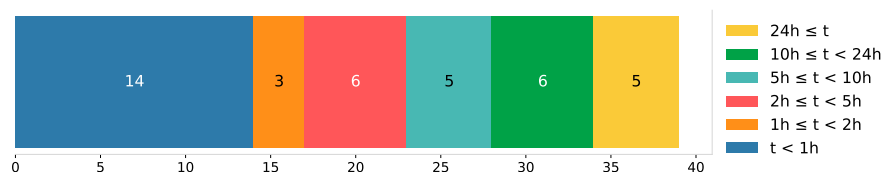


Figure 10.23: Number of ICS violations grouped by duration in 2025 for REN.

10.1.24 ICS violations reported by RTE

This section presents violations for RTE, the TSO in France. Table 10.47 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.48 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.24 presents the number of violations grouped by duration in 2025.

Table 10.47: Monthly distribution of ICS violations by ICS criterion in 2025 for RTE.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on load (L0)	-	-	-	-	2	-	-	1	-	-	-	-	3
	Incidents on network elements (T0)	12	26	33	43	29	34	49	38	27	27	57	32	407
	Incidents on power generating facilities (G0)	1	-	3	7	1	2	4	-	2	1	2	-	23
	Violation of standards on voltage (OV0)	-	-	-	5	-	-	-	-	-	-	-	-	5
	Loss of tools, means and facilities (LT0)	-	-	-	-	3	2	3	8	-	-	-	-	16
Scale 1	Incidents on network elements (T1)	-	-	2	-	-	4	1	2	1	-	-	-	10
	Incidents on power generating facilities (G1)	1	-	-	-	-	-	-	-	-	-	-	-	1
	N-1 violation (ON1)	-	-	1	2	3	-	1	4	1	-	1	-	13
	Reduction of reserve capacity (RRC1)	-	-	-	-	1	-	1	1	-	-	-	-	3
Grand total		14	26	39	57	39	42	59	54	31	28	60	32	481

Table 10.48: The annual number of ICS violations by ICS criterion from 2021–2025 for RTE.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	1	3	2	5	3
	Incidents on network elements (T0)	159	190	276	325	407
	Incidents on power generating facilities (G0)	30	27	19	19	23
	Violation of standards on voltage (OV0)	39	13	8	-	5
	Loss of tools, means and facilities (LT0)	1	-	4	7	16
Scale 1	Incidents on network elements (T1)	-	-	2	1	10
	Incidents on power generating facilities (G1)	2	-	2	-	1
	N-1 violation (ON1)	31	12	15	41	13
	Violation of standards on voltage (OV1)	18	5	1	-	-
	Reduction of reserve capacity (RRC1)	2	4	2	5	3
	Loss of tools, means and facilities (LT1)	1	2	-	1	-
Scale 2	Incidents on network elements (T2)	1	-	-	-	-
Grand total		285	256	331	404	481

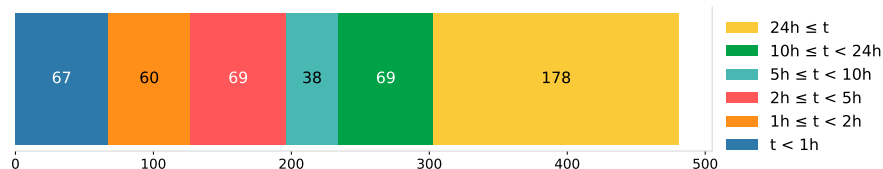


Figure 10.24: Number of ICS violations grouped by duration in 2025 for RTE.

10.1.25 ICS violations reported by SEPS

This section presents violations for SEPS, the TSO in Slovakia. Table 10.49 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.50 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.25 presents the number of violations grouped by duration in 2025.

Table 10.49: Monthly distribution of ICS violations by ICS criterion in 2025 for SEPS.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	-	-	1	-	1	-	-	-	2	-	1	5
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	1	-	-	-	-	-	1
Scale 1	Incidents on load (L1)	-	-	-	-	-	1	-	-	-	-	-	-	1
	Reduction of reserve capacity (RRC1)	-	1	-	-	-	-	-	-	-	-	-	-	1
Grand total		-	1	-	1	-	2	1	-	-	2	-	1	8

Table 10.50: The annual number of ICS violations by ICS criterion from 2021–2025 for SEPS.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	8	8	8	15	5
	Violation of standards on voltage (OV0)	23	-	-	-	-
	Loss of tools, means and facilities (LT0)	-	-	-	2	1
Scale 1	Incidents on load (L1)	-	-	-	-	1
	Incidents on network elements (T1)	-	-	1	-	-
	Violation of standards on voltage (OV1)	12	-	-	-	-
	Reduction of reserve capacity (RRC1)	-	8	5	5	1
Grand total		43	16	14	22	8

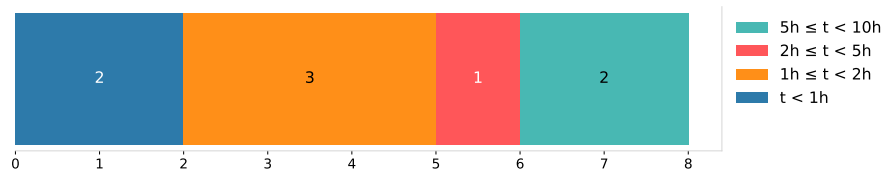


Figure 10.25: Number of ICS violations grouped by duration in 2025 for SEPS.

10.1.26 ICS violations reported by Swissgrid

This section presents violations for Swissgrid, the TSO in Switzerland. Table 10.51 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.52 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.26 presents the number of violations grouped by duration in 2025.

Table 10.51: Monthly distribution of ICS violations by ICS criterion in 2025 for Swissgrid.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	4	1	-	9	2	4	10	3	3	1	1	1	39
	Incidents on power generating facilities (G0)	-	1	-	-	1	-	-	-	-	-	-	-	2
	Violation of standards on voltage (OV0)	-	-	11	8	4	3	4	1	1	-	2	-	34
	Loss of tools, means and facilities (LT0)	-	-	-	1	-	2	-	-	-	-	-	1	4
Scale 1	Violation of standards on voltage (OV1)	-	-	-	2	-	-	1	3	2	-	-	-	8
	Loss of tools, means and facilities (LT1)	1	-	1	-	-	2	-	-	-	-	-	-	4
Grand total		5	2	12	20	7	11	15	7	6	1	3	2	91

Table 10.52: The annual number of ICS violations by ICS criterion from 2021–2025 for Swissgrid.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	33	34	25	36	39
	Incidents on power generating facilities (G0)	2	2	2	4	2
	Violation of standards on voltage (OV0)	78	53	35	46	34
	Loss of tools, means and facilities (LT0)	13	13	7	9	4
Scale 1	Incidents on load (L1)	-	-	1	-	-
	N-1 violation (ON1)	-	1	1	6	-
	Violation of standards on voltage (OV1)	12	5	7	3	8
	Loss of tools, means and facilities (LT1)	3	-	-	3	4
Grand total		141	108	78	107	91

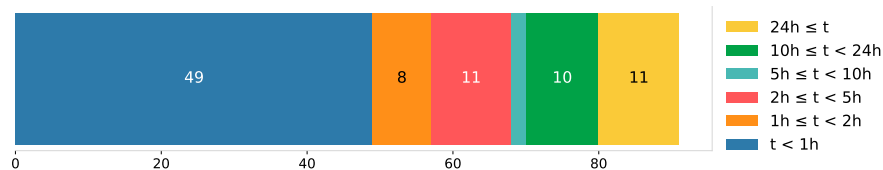


Figure 10.26: Number of ICS violations grouped by duration in 2025 for Swissgrid.

10.1.27 ICS violations reported by TEIAS

This section presents violations for TEIAS, the TSO in Turkey. Table 10.53 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.54 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.27 presents the number of violations grouped by duration in 2025.

Table 10.53: Monthly distribution of ICS violations by ICS criterion in 2025 for TEIAS.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	1	-	1	1	-	11	5	4	2	2	-	27
	Incidents on power generating facilities (G0)	-	1	-	-	1	3	-	1	-	2	1	-	9
Grand total		-	2	-	1	2	3	11	6	4	4	3	-	36

Table 10.54: The annual number of ICS violations by ICS criterion from 2021–2025 for TEIAS.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	-	1	6	-	-
	Incidents on network elements (T0)	18	18	10	13	27
	Incidents on power generating facilities (G0)	23	8	17	19	9
Scale 1	Separation from the grid (RS1)	-	-	-	1	-
	Violation of standards on voltage (OV1)	-	-	1	-	-
Grand total		41	27	34	33	36

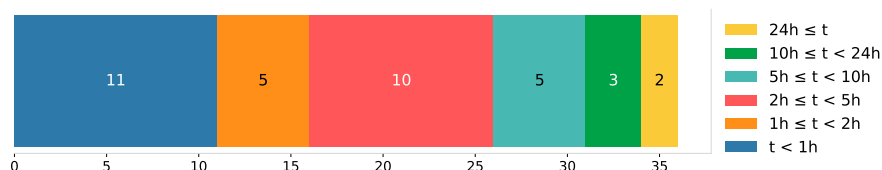


Figure 10.27: Number of ICS violations grouped by duration in 2025 for TEIAS.

10.1.28 ICS violations reported by TenneT DE

This section presents violations for TenneT TSO GmbH, one of the TSOs in Germany. Table 10.55 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.56 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.28 presents the number of violations grouped by duration in 2025.

The year-on-year figures remain largely stable under consistent ICS methodologies. For TenneT Germany, T0 events continue to represent the majority of occurrences in 2025, accounting for more than 50% of all events. This proportion has remained stable in recent years, and the absolute number of T0 events has also followed a steady trend over the past five years.

In contrast, the number of T1 events has decreased to zero, while ON1 events show a slight decline compared to previous years. LT0 and LT1 incidents, however, have both increased in 2025.

Overall, the monthly variance observed in 2025 is negligible and consistent with the stability seen in prior years.

While overall grid security continues to be maintained at a high level, a potential increase in the number of events is anticipated in the future. This outlook is primarily driven by ongoing grid expansion, the increasing frequency of severe weather conditions, and the growing complexity of the IT infrastructure.

Table 10.55: Monthly distribution of ICS violations by ICS criterion in 2025 for TenneT DE.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	4	4	4	4	4	3	3	6	2	1	3	4	42
	Incidents on power generating facilities (G0)	-	-	-	-	-	-	-	1	-	-	-	-	1
	Loss of tools, means and facilities (LT0)	1	1	1	1	1	-	2	3	1	5	3	1	20
Scale 1	N-1 violation (ON1)	-	-	1	2	-	1	-	-	-	-	-	-	4
	Loss of tools, means and facilities (LT1)	-	1	-	-	1	-	1	-	-	-	-	2	5
Grand total		5	6	6	7	6	4	6	10	3	6	6	7	72

Table 10.56: The annual number of ICS violations by ICS criterion from 2021–2025 for TenneT DE.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	64	43	57	54	42
	Incidents on power generating facilities (G0)	-	2	-	-	1
	Loss of tools, means and facilities (LT0)	3	3	3	8	20
Scale 1	Incidents on network elements (T1)	1	9	1	-	-
	N-1 violation (ON1)	3	9	9	8	4
	Loss of tools, means and facilities (LT1)	2	-	1	-	5
Grand total		73	66	71	70	72

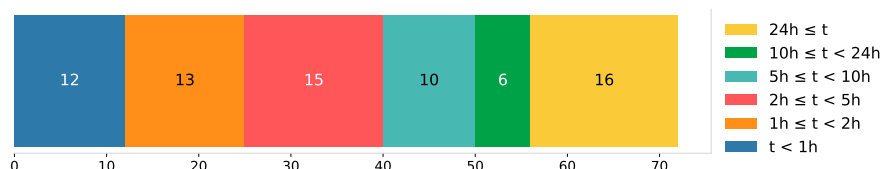


Figure 10.28: Number of ICS violations grouped by duration in 2025 for TenneT DE.

10.1.29 ICS violations reported by TenneT NL

This section presents events for TenneT TSO B.V., the TSO in the Netherlands. Table 10.57 presents the monthly distribution of ICS events by ICS criterion in 2025, and Table 10.58 presents the annual number of ICS events by ICS criterion from 2021–2025. Figure 10.29 presents the number of events grouped by duration in 2025.

Table 10.57: Monthly distribution of ICS violations by ICS criterion in 2025 for TenneT NL.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	2	-	-	1	-	-	1	-	-	2	-	-	6
	Incidents on power generating facilities (G0)	1	-	2	-	1	-	1	-	-	1	-	-	6
	Loss of tools, means and facilities (LT0)	3	-	1	-	-	1	1	2	1	3	2	-	14
Scale 1	N-1 violation (ON1)	-	1	-	-	1	-	-	-	1	-	-	-	3
Grand total		6	1	3	1	2	1	3	2	2	6	2	-	29

Table 10.58: The annual number of ICS violations by ICS criterion from 2021–2025 for TenneT NL.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	16	15	16	28	6
	Incidents on power generating facilities (G0)	11	22	7	4	6
	Violation of standards on voltage (OV0)	-	-	6	-	-
	Loss of tools, means and facilities (LT0)	21	26	45	27	14
Scale 1	Incidents on load (L1)	-	1	-	-	-
	Incidents on power generating facilities (G1)	1	-	-	-	-
	N-1 violation (ON1)	4	7	4	3	3
	Violation of standards on voltage (OV1)	-	1	6	-	-
Grand total		53	72	84	62	29

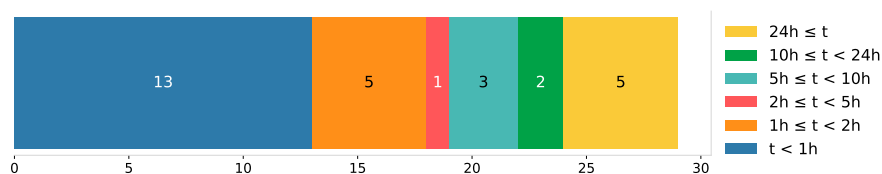


Figure 10.29: Number of ICS violations grouped by duration in 2025 for TenneT NL.

10.1.30 ICS violations reported by Terna

This section presents events for Terna, the TSO in Italy. Table 10.59 presents the monthly distribution of ICS events by ICS criterion in 2025, and Table 10.60 presents the annual number of ICS events by ICS criterion from 2021–2025. Figure 10.30 presents the number of events grouped by duration in 2025.

Table 10.59: Monthly distribution of ICS violations by ICS criterion in 2025 for Terna.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	10	8	7	7	4	1	2	3	2	2	2	-	48
	Incidents on power generating facilities (G0)	-	1	1	1	-	3	5	1	2	-	-	-	14
	Violation of standards on voltage (OV0)	-	-	-	1	-	-	-	-	-	-	1	-	2
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	2	-	-	2	1	1	6
Grand total		10	9	8	9	4	4	9	4	4	4	4	1	70

Table 10.60: The annual number of ICS violations by ICS criterion from 2021–2025 for Terna.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	-	-	-	1	-
	Incidents on network elements (T0)	75	57	64	49	48
	Incidents on power generating facilities (G0)	-	-	-	-	14
	Separation from the grid (RS0)	-	-	1	-	-
	Violation of standards on voltage (OV0)	12	-	2	2	2
	Reduction of reserve capacity (RRC0)	1	-	-	3	-
	Loss of tools, means and facilities (LT0)	-	-	1	2	6
Scale 1	N-1 violation (ON1)	-	-	1	-	-
	Reduction of reserve capacity (RRC1)	9	1	1	-	-
Grand total		97	58	70	57	70

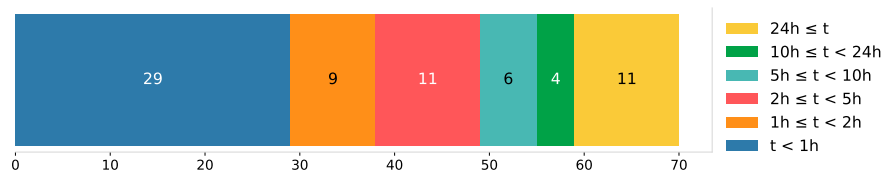


Figure 10.30: Number of ICS violations grouped by duration in 2025 for Terna.

10.1.31 ICS violations reported by Transelectrica

This section presents violations for Transelectrica, the TSO in Romania. Table 10.61 presents the monthly distribution of ICS violations by ICS criterion in 2022, and Table 10.62 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.31 presents the number of violations grouped by duration in 2025.

Table 10.61: Monthly distribution of ICS violations by ICS criterion in 2025 for Transelectrica.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	3	5	6	6	5	20	30	20	16	5	9	3	128
	Violation of standards on voltage (OV0)	10	23	29	25	48	27	13	25	30	20	16	20	286
Scale 1	N-1 violation (ON1)	-	-	2	-	-	-	-	-	-	-	-	-	2
	Violation of standards on voltage (OV1)	17	29	32	26	37	26	19	30	30	30	24	18	318
Grand total		30	57	69	57	90	73	62	75	76	55	49	41	734

Table 10.62: The annual number of ICS violations by ICS criterion from 2021–2025 for Transelectrica.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	56	59	116	137	128
	Incidents on power generating facilities (G0)	3	1	4	1	-
	Violation of standards on voltage (OV0)	71	47	83	124	286
	Loss of tools, means and facilities (LT0)	-	1	-	1	-
Scale 1	Incidents on load (L1)	1	-	-	2	-
	N-1 violation (ON1)	-	-	-	-	2
	Violation of standards on voltage (OV1)	38	71	53	85	318
Scale 2	Incidents on network elements (T2)	1	-	-	-	-
	N violation (ON2)	1	-	-	-	-
	Separation from the grid (RS2)	1	-	-	-	-
Grand total		172	179	256	350	734

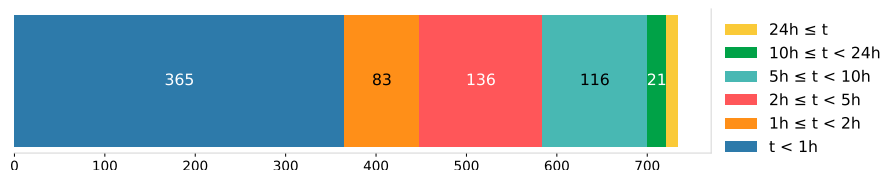


Figure 10.31: Number of ICS violations grouped by duration in 2025 for Transelectrica.

10.1.32 ICS violations reported by TransnetBW

This section presents violations for TransnetBW GmbH, one of the TSOs in Germany. Table 10.63 presents the monthly distribution of ICS violations by ICS criterion in 2025, and

Table 10.64 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.32 presents the number of violations grouped by duration in 2025.

Table 10.63: Monthly distribution of ICS violations by ICS criterion in 2025 for TransnetBW.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	4	1	3	5	4	1	2	-	-	5	5	30
	Incidents on power generating facilities (G0)	1	5	2	3	1	2	5	4	2	-	-	2	27
	Loss of tools, means and facilities (LT0)	-	2	-	-	1	1	3	2	-	1	-	1	11
Scale 1	Incidents on network elements (T1)	-	-	-	-	-	-	-	-	-	-	-	1	1
	N-1 violation (ON1)	-	-	-	-	-	-	1	-	-	-	-	-	1
	Loss of tools, means and facilities (LT1)	-	1	-	-	-	-	-	-	-	-	-	-	1
Grand total		1	12	3	6	7	7	10	8	2	1	5	9	71

Table 10.64: The annual number of ICS violations by ICS criterion from 2021–2025 for TransnetBW.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	11	10	10	21	30
	Incidents on power generating facilities (G0)	16	18	9	9	27
	Loss of tools, means and facilities (LT0)	-	-	1	3	11
Scale 1	Incidents on network elements (T1)	-	-	-	-	1
	N-1 violation (ON1)	3	3	-	4	1
	Loss of tools, means and facilities (LT1)	4	7	2	2	1
Grand total		34	38	22	39	71

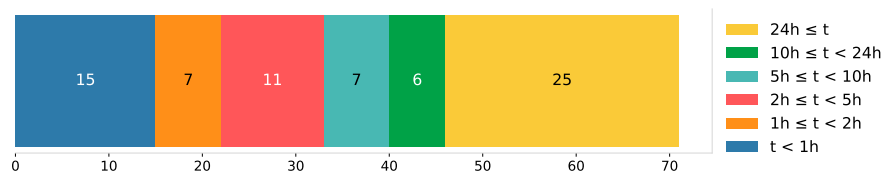


Figure 10.32: Number of ICS violations grouped by duration in 2025 for TransnetBW.

10.1.33 ICS violations reported by Ukrenergo

This section presents violations for Ukrenergo, the TSO in Ukraine. Table 10.65 presents the monthly distribution of ICS violations by ICS criterion in 2022, and Table 10.66 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.33 presents the number of violations grouped by duration in 2025.

Table 10.65: Monthly distribution of ICS violations by ICS criterion in 2025 for Ukrenergo.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on load (L0)	-	1	-	-	-	-	-	-	-	3	10	6	20
	Incidents on network elements (T0)	19	12	13	8	12	6	11	6	12	13	21	34	167
	Incidents on power generating facilities (G0)	-	-	-	1	-	1	-	-	1	-	1	3	7
	Loss of tools, means and facilities (LT0)	6	3	1	2	2	3	4	2	5	4	3	4	39
Scale 1	Incidents on load (L1)	1	23	5	-	-	1	-	-	-	35	34	14	113
	Incidents on network elements (T1)	1	-	1	-	-	-	-	-	-	-	-	-	2
	Incidents on power generating facilities (G1)	-	-	-	-	-	-	-	-	-	1	-	1	2
	N-1 violation (ON1)	-	-	-	-	-	-	-	-	-	-	1	-	1
Scale 2	Incidents on load (L2)	-	-	-	-	-	-	-	-	-	-	14	8	22
	Reduction of reserve capacity (RRC2)	-	-	-	-	-	-	-	-	-	-	1	-	1
Grand total		27	39	20	11	14	11	15	8	18	56	85	70	374

Table 10.66: The annual number of ICS violations by ICS criterion from 2021–2025 for Ukrenergo.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	-	-	2	-	20
	Incidents on network elements (T0)	-	-	207	157	167
	Incidents on power generating facilities (G0)	-	-	2	1	7
	Reduction of reserve capacity (RRC0)	-	-	2	5	-
	Loss of tools, means and facilities (LT0)	-	-	-	32	39
Scale 1	Incidents on load (L1)	-	-	15	153	113
	Incidents on network elements (T1)	-	-	-	1	2
	Incidents on power generating facilities (G1)	-	-	-	2	2
	N-1 violation (ON1)	-	-	-	-	1
	Reduction of reserve capacity (RRC1)	-	-	7	63	-
	Loss of tools, means and facilities (LT1)	-	-	-	54	-
Scale 2	Incidents on load (L2)	-	-	1	-	22
	Reduction of reserve capacity (RRC2)	-	-	-	-	1
Grand total		-	-	236	468	374



Figure 10.33: Number of ICS violations grouped by duration in 2025 for Ukrenergo.

10.2 Overview of ICS violations by TSOs in Nordic

10.2.1 ICS violations reported by Energinet (Nordic)

This section presents violations for Energinet (Nordic), the TSO in Denmark. Table 10.67 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.68 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.34 presents the number of violations grouped by duration in 2025.

Table 10.68 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.34 presents the number of violations grouped by duration in 2025.

Table 10.67: Monthly distribution of ICS violations by ICS criterion in 2025 for Energinet (Nordic).

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	1	1	-	-	-	2	-	-	-	-	-	4
	Loss of tools, means and facilities (LT0)	1	3	1	1	-	-	1	-	-	1	-	-	8
Scale 1	N-1 violation (ON1)	-	-	-	2	-	-	-	-	-	-	-	-	2
	Loss of tools, means and facilities (LT1)	-	-	1	-	-	-	-	-	1	-	-	-	2
Grand total		1	4	3	3	-	-	3	-	1	1	-	-	16

Table 10.68: The annual number of ICS violations by ICS criterion from 2021–2025 for Energinet (Nordic).

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	13	5	5	3	4
	Loss of tools, means and facilities (LT0)	-	-	-	10	8
Scale 1	N-1 violation (ON1)	-	3	1	1	2
	Loss of tools, means and facilities (LT1)	-	-	-	2	2
Grand total		13	8	6	16	16

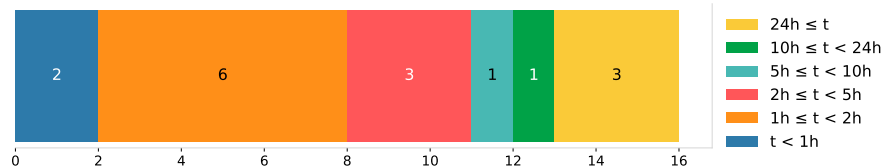


Figure 10.34: Number of ICS violations grouped by duration in 2025 for Energinet (Nordic).

10.2.2 ICS violations reported by Fingrid

This section presents violations for Fingrid Oyj, the TSO in Finland. Table 10.69 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.70 presents the annual number of ICS violations by dominant-

ing ICS criterion from 2021–2025. There is no clear trend in number of violations. Figure 10.35 presents the number of violations grouped by duration in 2025.

Table 10.69: Monthly distribution of ICS violations by ICS criterion in 2025 for Fingrid.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	3	-	-	4	1	-	4	1	3	-	1	2	19
	Incidents on power generating facilities (G0)	-	-	-	1	1	-	-	-	-	-	-	-	2
Grand total		3	-	-	5	2	-	4	1	3	-	1	2	21

Table 10.70: The annual number of ICS violations by ICS criterion from 2021–2025 for Fingrid.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	13	3	4	11	19
	Incidents on power generating facilities (G0)	-	2	3	4	2
	Loss of tools, means and facilities (LT0)	1	2	-	-	-
Scale 1	Violation of standards on voltage (OV1)	-	-	-	1	-
Grand total		14	7	7	16	21

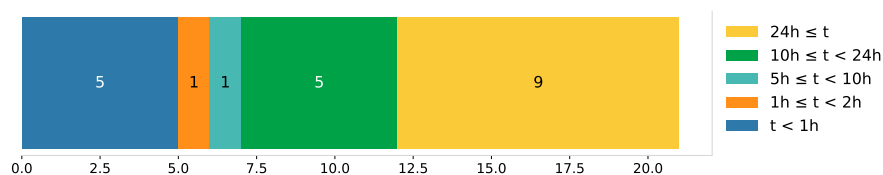


Figure 10.35: Number of ICS violations grouped by duration in 2025 for Fingrid.

10.2.3 ICS violations reported by Freq (Nordic)

This section presents frequency violations in the Nordics. Table 10.71 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.72 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.36 presents the number of violations grouped by duration in 2025.

Table 10.71: Monthly distribution of ICS violations by ICS criterion in 2025 for Freq (Nordic).

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents leading to frequency degradation (F0)	20	5	3	11	15	14	1	16	3	5	6	3	102
Scale 1	Incidents leading to frequency degradation (F1)	1	-	-	1	-	-	-	-	-	-	-	-	2
Grand total		21	5	3	12	15	14	1	16	3	5	6	3	104

Table 10.72: The annual number of ICS violations by ICS criterion from 2021–2025 for Freq (Nordic).

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents leading to frequency degradation (F0)	70	53	88	114	102
Scale 1	Incidents leading to frequency degradation (F1)	3	1	-	11	2
Grand total		73	54	88	125	104

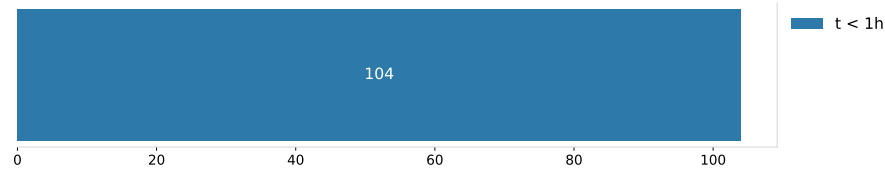


Figure 10.36: Number of ICS violations grouped by duration in 2025 for Freq (Nordic).

10.2.4 ICS violations reported by Statnett

This section presents violations for Statnett, the TSO in Norway. Table 10.73 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.74 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.37 presents the number of violations grouped by duration in 2025.

Table 10.73: Monthly distribution of ICS violations by ICS criterion in 2025 for Statnett.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on load (L0)	-	-	1	1	-	-	-	-	-	-	-	-	2
	Incidents on network elements (T0)	8	-	8	3	3	1	7	-	1	15	5	6	57
	Incidents on power generating facilities (G0)	1	-	-	-	-	-	-	-	-	-	-	-	1
	Separation from the grid (RS0)	-	-	1	1	-	1	3	-	1	2	1	-	10
	Loss of tools, means and facilities (LT0)	-	-	-	-	-	-	1	1	-	-	1	-	3
Scale 1	Incidents on network elements (T1)	-	-	1	-	-	1	-	-	-	-	-	-	2
Grand total		9	-	11	5	3	3	11	1	2	17	7	6	75

Table 10.74: The annual number of ICS violations by ICS criterion from 2021–2025 for Statnett.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	2	1	3	1	2
	Incidents on network elements (T0)	19	34	26	21	57
	Incidents on power generating facilities (G0)	2	3	2	-	1
	Separation from the grid (RS0)	2	2	2	7	10
	Violation of standards on voltage (OV0)	-	-	1	-	-
	Loss of tools, means and facilities (LT0)	-	-	2	-	3
Scale 1	Incidents on load (L1)	-	1	-	-	-
	Incidents on network elements (T1)	2	1	3	12	2
	N-1 violation (ON1)	-	1	-	-	-
	Separation from the grid (RS1)	1	1	-	-	-
	Violation of standards on voltage (OV1)	-	-	-	1	-
	Loss of tools, means and facilities (LT1)	-	-	1	-	-
Grand total		28	44	40	42	75

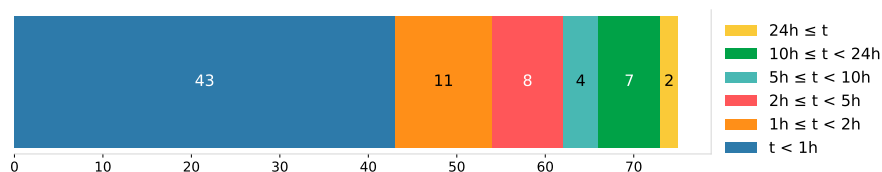


Figure 10.37: Number of ICS violations grouped by duration in 2025 for Statnett.

10.2.5 ICS violations reported by Svenska kraftnät

This section presents violations for Svenska Kraftnät, the TSO in Sweden. Table 10.75 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.76 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.38 presents the number of violations grouped by duration in 2025.

The number of voltage violations reported by Svenska kraftnät decreased significantly compared to 2024. The number decreased because:

1. three shunt reactors and one shunt capacitor were installed to reduce voltage variations and improve system stability; and
2. one reactor was installed at a station located at the end of a long radial line.

Furthermore, two STATCOM units are scheduled to enter service in 2026 and additional reactive power compensation projects are planned for the coming years.

Table 10.75: Monthly distribution of ICS violations by ICS criterion in 2025 for Svenska kraftnät.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	5	3	6	5	4	3	5	6	9	2	2	-	50
	Incidents on power generating facilities (G0)	-	-	-	1	-	-	-	-	-	-	-	1	2
	Violation of standards on voltage (OV0)	311	151	302	302	364	274	234	241	259	161	114	42	2755
	Reduction of reserve capacity (RRC0)	-	-	-	-	2	-	-	-	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	2	2	2	2	1	1	-	1	-	1	3	-	15
Scale 1	N-1 violation (ON1)	3	1	2	1	4	-	-	-	3	1	1	2	18
	Violation of standards on voltage (OV1)	114	26	91	107	83	90	77	66	69	46	52	16	837
	Reduction of reserve capacity (RRC1)	-	-	-	-	-	-	-	2	-	-	1	-	3
Grand total		435	183	403	418	458	368	316	316	340	211	173	61	3682

Table 10.76: The annual number of ICS violations by ICS criterion from 2021–2025 for Svenska kraftnät.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	56	54	53	43	50
	Incidents on power generating facilities (G0)	13	9	13	3	2
	Violation of standards on voltage (OV0)	-	-	-	5435	2755
	Reduction of reserve capacity (RRC0)	-	-	-	-	2
	Loss of tools, means and facilities (LT0)	21	3	12	19	15
Scale 1	Incidents on network elements (T1)	1	1	-	-	-
	N-1 violation (ON1)	-	-	-	18	18
	Violation of standards on voltage (OV1)	-	-	-	2073	837
	Reduction of reserve capacity (RRC1)	-	-	-	7	3
	Loss of tools, means and facilities (LT1)	1	-	-	8	-
Grand total		92	67	78	7606	3682

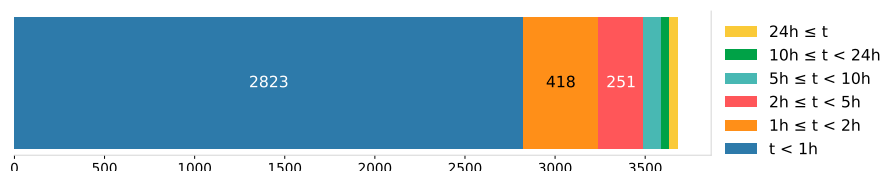


Figure 10.38: Number of ICS violations grouped by duration in 2025 for Svenska kraftnät.

10.3 Overview of ICS violations by TSOs in Ireland and Northern Ireland

10.3.1 ICS violations reported by EirGrid

This section presents violations for EirGrid, the TSO in Ireland. Table 10.77 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.78 presents the annual number of ICS violations by ICS criterion from 2021–2025. Table 10.39 presents the number of violations grouped by duration in 2025.

Table 10.77: Monthly distribution of ICS violations by ICS criterion in 2025 for EirGrid.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	4	-	-	-	2	1	-	1	1	2	1	2	14
	Incidents on power generating facilities (G0)	-	1	-	2	-	-	1	-	1	-	-	5	10
	Loss of tools, means and facilities (LT0)	1	1	-	1	-	1	-	-	-	1	-	-	5
Grand total		5	2	-	3	2	2	1	1	2	3	1	7	29

Table 10.78: The annual number of ICS violations by ICS criterion from 2021–2025 for EirGrid.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	8	16	4	14	14
	Incidents on power generating facilities (G0)	14	12	13	12	10
	Loss of tools, means and facilities (LT0)	-	-	-	6	5
Scale 1	N-1 violation (ON1)	7	8	-	-	-
Grand total		29	36	17	32	29

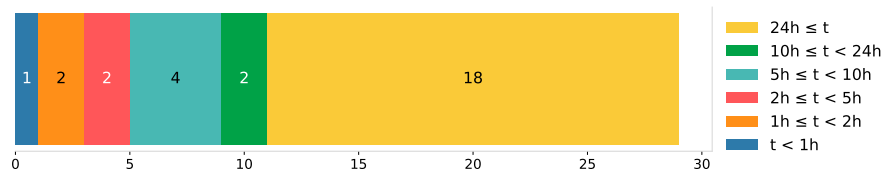


Figure 10.39: Number of ICS violations grouped by duration in 2025 for EirGrid.

10.3.2 ICS violations reported by SONI

This section presents violations for SONI, the TSO in Northern Ireland. Table 10.79 presents the monthly distribution of ICS violations by ICS criterion in 2025, and Table 10.80 presents the annual number of ICS violations by ICS criterion from 2021–2025. Figure 10.40 presents the number of violations grouped by duration in 2025.

Table 10.79: Monthly distribution of ICS violations by ICS criterion in 2025 for SONI.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	3	-	-	-	-	-	-	-	1	-	-	-	4
Grand total		3	-	-	-	-	-	-	-	1	-	-	-	4

Table 10.80: The annual number of ICS violations by ICS criterion from 2021–2025 for SONI.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on network elements (T0)	3	2	1	6	4
	Incidents on power generating facilities (G0)	-	3	-	7	-
Scale 1	N-1 violation (ON1)	1	-	-	-	-
Grand total		4	5	1	13	4

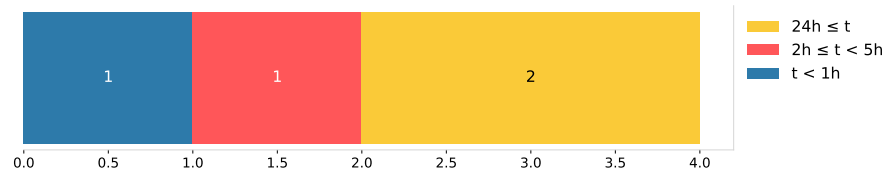


Figure 10.40: Number of ICS violations grouped by duration in 2025 for SONI.

10.4 Overview of ICS violations by TSOs in Isolated system

10.4.1 ICS violations reported by Landsnet

This section presents events for Landsnet, the TSO in Iceland. Table 10.81 presents the monthly distribution of ICS events by ICS criterion in 2025, and Table 10.82 presents the annual number of ICS events by ICS criterion from 2021–2025. Figure 10.41 presents the number of events grouped by duration in 2025.

Table 10.81: Monthly distribution of ICS violations by ICS criterion in 2025 for Landsnet.

Scale	Main event ICS criterion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Scale 0	Incidents on network elements (T0)	-	3	2	4	-	1	2	2	3	-	1	3	21
	Incidents on power generating facilities (G0)	-	-	1	-	-	-	-	-	-	-	2	-	3
Scale 1	Incidents on load (L1)	1	-	1	1	1	-	-	1	1	-	-	-	6
	Incidents on network elements (T1)	1	-	1	-	-	-	-	-	-	1	-	-	3
	Incidents on power generating facilities (G1)	-	-	-	-	-	-	-	-	-	1	1	-	2
Scale 2	Incidents on load (L2)	-	-	-	-	-	-	-	-	-	1	-	-	1
Grand total		2	3	5	5	1	1	2	3	4	3	4	3	36

Table 10.82: The annual number of ICS violations by ICS criterion from 2021–2025 for Landsnet.

Scale	Main event ICS criterion	2021	2022	2023	2024	2025
Scale 0	Incidents on load (L0)	-	6	1	-	-
	Incidents on network elements (T0)	26	29	12	12	21
	Incidents on power generating facilities (G0)	-	-	-	2	3
	Loss of tools, means and facilities (LT0)	-	1	-	-	-
Scale 1	Incidents on load (L1)	-	-	-	-	6
	Incidents on network elements (T1)	1	2	1	-	3
	Incidents on power generating facilities (G1)	2	-	-	2	2
	Loss of tools, means and facilities (LT1)	-	1	-	-	-
Scale 2	Incidents on load (L2)	-	2	-	-	1
	Incidents on network elements (T2)	-	1	1	-	-
	Loss of tools, means and facilities (LT2)	1	-	-	-	-
Grand total		30	42	15	16	36

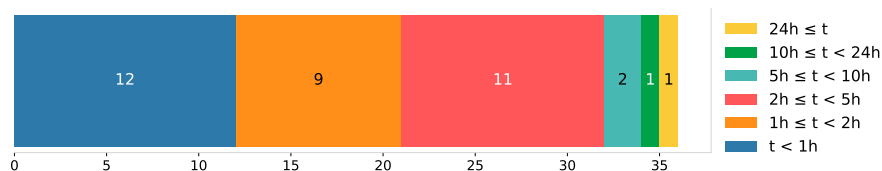


Figure 10.41: Number of ICS violations grouped by duration in 2025 for Landsnet.

11 Conclusion

The 2025 ICS Annual Report follows the 2019 version ICS Methodology [1]. The included ENTSO-E Members and Observer Members reported a total of 10,144 ICS incidents in 2025, of which 6270 were scale 0, 3,847 were scale 1, 26 were scale 2, and one was a scale 3 incident. There were 186 more violations than incidents. The similar number of ICS violations and ICS incidents indicates that most ICS incidents only had one ICS violation. The term ICS violation describes one occurrence of an ICS criteria violation, while ICS incident groups all related criteria violations into one incident.

In total, 38 TSOs reported incidents to the ICS annual report. Three incidents on scale 2 or 3 were identified in 2025 and are summarised in Chapter 4. The scale 2 or 3 incidents and their ICS violations are presented in this report except for the incident on 18 May 2025 in North Macedonia, which was inconclusively reported in the ICS annual report due to absence of all MEPSO data for 2025. For full details, WG ICS advises to read the final reports of the specific investigations.

The number of registered OV-violations in 2025 was high, yet lower than in 2024 as a result of measures implemented by TSOs. At Svenska kraftnät and ČEPS, new compensation devices and remedial actions were successful to decrease the number of voltage violations. Measures have been put in place to negate voltage issues, but it should also be noted that the voltage standards in the Nordics are stricter than in Continental Europe. The voltage thresholds are presented in detail in the ICS methodology on pages 20 to 22.

The most significant increase in the number of reported vi-

olations was by Moldelectrica, where enhanced data processing and reporting practices enabled the reporting of data that was not previously easily accessible for systematic analysis. This continues a trend from the previous year of TSOs increasingly using more automated data collection processes.

Identification of improvements necessary to support sustainable and long-term operational security

The ICS Methodology sets forth that the ICS Annual Report should identify improvements to "[...] to support sustainable and long-term operational security" and "[...] to network operation tools required to maintain operational security and related to real-time operation and operational planning to support TSOs in their task provided in Article 55(e) of the SOGL".

WG ICS has identified a continuously high number of ICS violations due to violations of standards on voltage (OV). A significant part of the latest progress is a result of improved reporting tools and processes. WG ICS will continue to improve and harmonise available tools and processes to register ICS incidents for the European TSOs. Reporting of ICS incidents by all TSOs is fundamental for monitoring the performance of the electricity system and to highlight potential risks.

WG ICS notes that there were more ICS Expert Panel investigations in 2025 than during previous years. Furthermore, the investigations resulted in various recommendations to prevent similar incidents in the future. WG ICS has commenced the implementation of the recommendations that are assigned to the group.

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