

ENTSO-E

Electricity Balancing Cost Report 2024

28 June 2024



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 **40 member TSOs**, representing 36 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 interconnected 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 using 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.

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1. Introduction

All transmission system operators (TSOs) report to the regulatory authorities on the costs of establishing, amending and operating the European balancing energy platforms for the exchange of balancing energy from frequency restoration reserves and replacement reserves and for the imbalance netting process ('EB Cost Report'), in accordance with Article 23(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing ('EB Regulation'). These European balancing energy platforms are the RR-Platform, the mFRR-Platform, the aFRR-Platform and the IN-Platform, in accordance with Articles 19 – 22 of the EB Regulation.

This report will cover the detailed reporting of the respective year 2023 while keeping an overview of cumulative costs since the previous reports (i. e., 2018 – 2022).

Costs directly related to each European balancing energy platform shall be clearly and separately identified and auditable.

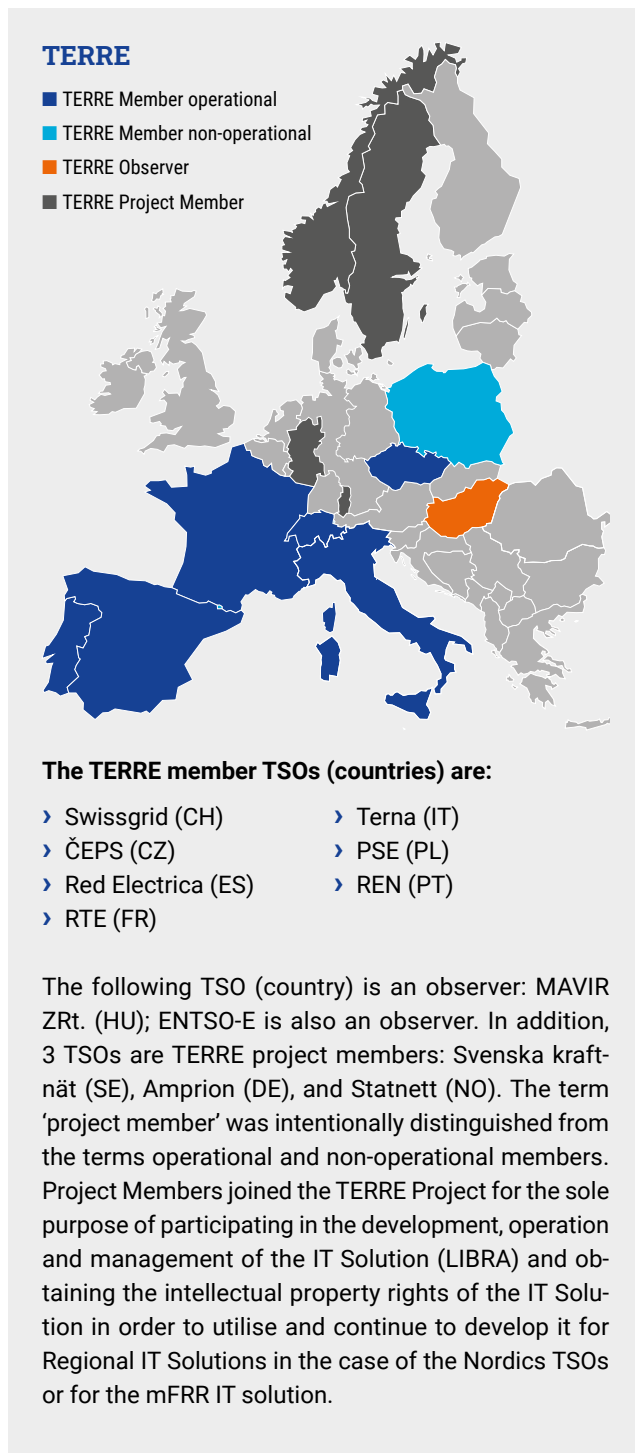
All TSOs has endorsed four implementation projects to establish the European balancing energy platforms pursuant to the EB Regulation.

The main targets of the projects are:

- › To design, implement and operate the European balancing energy platforms in compliance with the relevant regulation, including the Electricity Regulation, the EB, SO and CACM Regulations, and methodologies pursuant to those regulations, including the implementation frameworks for the European balancing energy platforms;
- › To enhance the efficiency of balancing in Europe and integrate balancing markets, promoting the possibilities for exchanging replacement reserves (RR), frequency restoration reserves with manual activation (mFRR) and frequency restoration reserves with automatic activation (aFRR) balancing energy, or for performing the imbalance netting process, while contributing to operational security.

1.1 Description of the RR-Platform: the TERRE project

The Trans-European Replacement Reserves Exchange ('TERRE') is the implementation project endorsed by all TSOs on 27 October 2016 to establish the European platform for the exchange of balancing energy from replacement reserves, i.e. the 'RR-Platform' pursuant to Article 19 of the EB Regulation.



Other relevant TERRE information

The TERRE Cooperation Agreement is the agreement between all TERRE member TSOs and entered into force on 18 October 2019. In terms of costs, as specified in the implementation framework for the RR-Platform ('RRIF'), the costs associated with the establishing, amending and operation of the RR-Platform are broken down into:

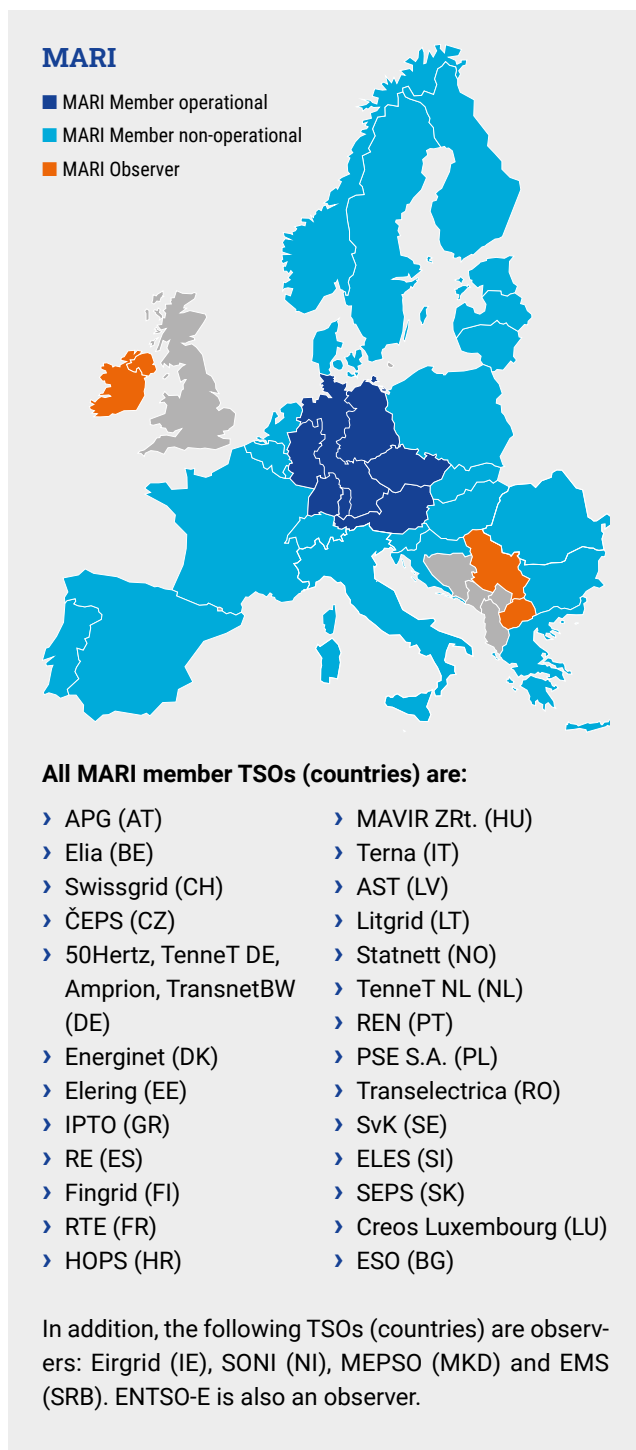
- › Common costs resulting from RR-Platform development, costs required for external support to the project and the Project Management Office (PMO) costs. These costs are required for establishing, amending and operating the RR-platform.
- › The historical costs will include all the common costs incurred from January 2017, excluding the PMO costs.

The most important events involving TERRE during 2023 were:

- › Platform evolutions and algorithm optimisation:
 - The year 2023 marks the third year of operations with five TSOs exchanging RR products in Region 1 and one TSO (CEPS) still in isolated mode in Region 2 until the connection of PSE. Based on the historic market data available since the launch of the platform of the RR-platform, the TERRE project has been able to assess, design and implement needed evolutions to improve the optimisation of the algorithm and operational processes.
 - Important discussions about the future RR process were conducted by TERRE TSOs in 2023 with RR NRAs and stakeholders (through the organisation of a public survey). Conclusions will be communicated in Q2 2024.
 - TERRE TSOs performed all needed tests to ensure the well connection of the platform to CMM. The TERRE platform was connected on the 4 October 2023 to CMM, since this date data are exchanged with this new capacity management module.
- › RRIF amendment and Public Consultation: In order to reflect the evolutions of the platform, the TERRE project submitted a 2nd amendment to the RR Implementation Framework during the year 2022, this amendment was officially approved by all RR NRAs in August 2023.
- › Transparency and Reporting: TERRE TSOs worked on improving the reporting of operational data to be compliant with the 2nd amendment of the RRIF. MSM reports are now published publicly on ENTSO-E website to report on a monthly basis about all activities in the platform.

1.2 Description of the mFRR-Platform: the MARI project

The Manually Activated Reserves Initiative ('MARI') is the implementation project endorsed by all TSOs on 7 September 2017 to establish the European platform for the exchange of balancing energy from frequency restoration reserves with manual activation, i.e. the 'mFRR-Platform' pursuant to Article 20 of the EB Regulation. MARI went in operation in 2022 by starting a dry-run (connection of ČEPS only) on 18 July 2022 and achieving market go-live on 5 October 2022 (connection of ČEPS and German TSOs). On 20 June 2023, APG successfully accessed MARI.



Other relevant information of MARI

As MARI started before entry into force of the EB Regulation, the project initially applied a Memorandum of Understanding (MoU) on a contractual basis. MARI's second MoU replaced the first MoU signed 5 April 2017 and was applicable from 11 September 2018 (the last signature date of the Parties) until the MoU was replaced by the platform's cooperation agreements, which came into force on 1 July 2020.

In terms of costs, as specified in the implementation framework for the mFRR-Platform ('mFRRIF'):

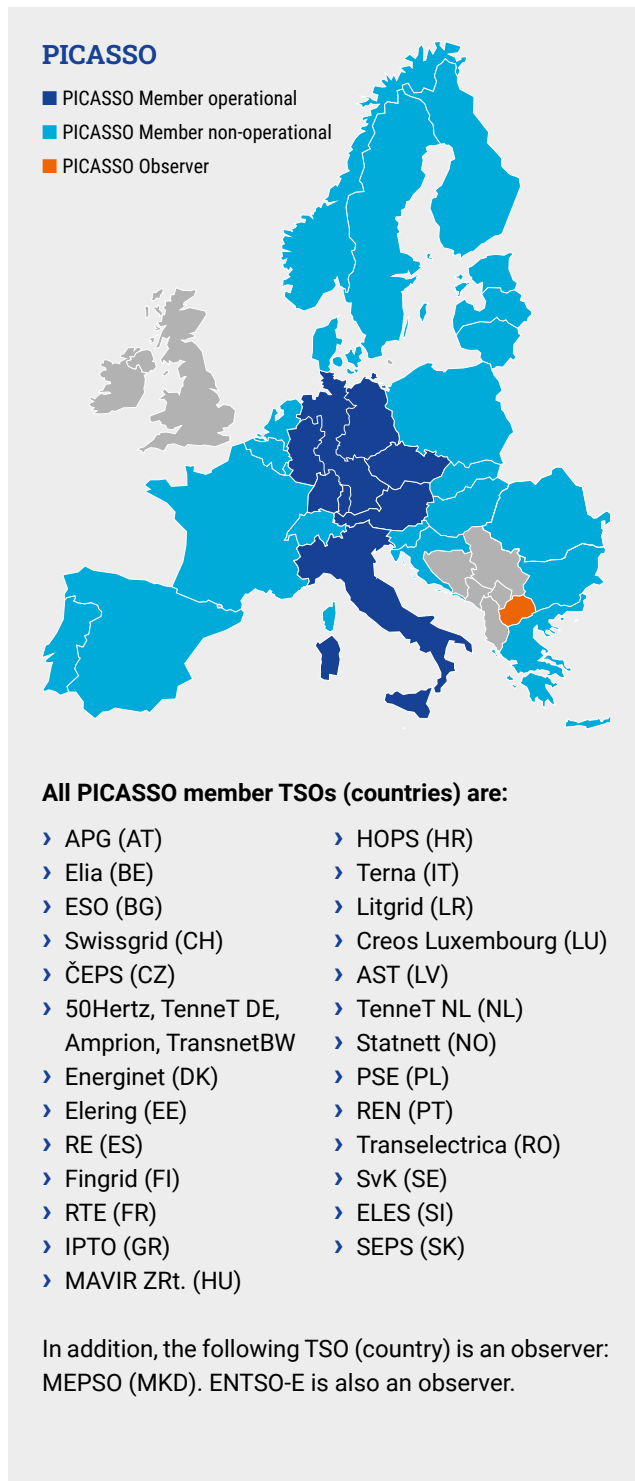
- › Each member TSO shall bear its own national costs and is solely responsible (i.e., no joint and several liability) for the due payment of all the costs related to the technical infrastructure necessary for the successful usage of the mFRR-Platform.
- › The cost sharing principle may apply to costs incurred since 1 January 2018 and shall apply to costs incurred after the approval of the mFRRIF. Any costs incurred before 1 January 2018 shall not be considered as historical costs.
- › The cost sharing key is for 1/8th attributed to membership, 5/8th to consumption and 2/8th to participation in the project.
- › In the event that several TSOs are operating in a Member State (as is the case in Germany), the Member State's share of the costs shall be distributed among those TSOs proportionally to the consumption in the TSOs control areas.
- › Per January 2023, the Cost Sharing Key for MARI common costs for establishment and amendment was adjusted to reflect the latest available consumption data.
- › The 2023 Cost Sharing Division for recurring costs was determined following the approval of the October 2023 Accession Roadmap, in line with the Agreements. The recurring cost sharing keys are calculated in line with the Agreements and EBGL. TSOs start sharing recurring costs from 6 months prior to their (planned) accession date.

The most important events involving MARI during 2023 were:

- › Design, development, testing and deployment of two mFRR platform releases with improved and new functionalities (versions 5&6).
- › The Austrian TSO APG joined the mFRR platform on 20 June 2023.
- › Running an EU tender identifying the suppliers to support the further development, maintenance, and support of the mFRR platform from 2024 onwards.
- › Go-live of the CM IT Solution.
- › Balancing platforms stakeholder's workshop, held on the 30 November 2023, informing stakeholders of the evolution of the platform, and gathering feedback for future developments.

1.3 Description of the aFRR-Platform: the PICASSO project

The Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation ('PICASSO') is the implementation project endorsed by all TSOs on 9 November 2017 to establish the European platform for the exchange of balancing energy from aFRR, i.e. the 'aFRR-Platform' pursuant to Article 21 of the EB Regulation. PICASSO went in operation in 2022 with the first connection of ČEPS on 1 June 2022. German and Austrian TSOs connected on 22 June 2022 resulting in first energy exchanged.



Other relevant information of PICASSO

As PICASSO started before entry into force of the EB Regulation, the project initially applied a Memorandum of Understanding (MoU) on a contractual basis. Anticipating the entry into force of the EB Regulation, PICASSO's first MoU was signed on 24 July 2017. On 1 October 2018, a second MoU was signed, which was applicable until it was replaced by the platform's framework for cooperation agreements, which came into force on the 1 July 2020 and consists of a principle agreement common to all European balancing energy platforms, an operational agreement and common service provider agreements.

In terms of costs, as specified in the implementation framework for the aFRR-Platform ('aFRRIF'):

- › Each member TSO shall bear its own national costs and is solely responsible (i.e., no joint and several liability) for the due payment of all the costs related to the technical infrastructure necessary for the successful usage of the aFRR-Platform.
- › The cost sharing principle may apply to costs incurred since 1 January 2018, and shall apply to costs incurred after the approval of the aFRRIF. Any costs incurred before 1 January 2018 shall not be considered as historical costs.
- › The cost sharing key is for 1/8th attributed to membership, 5/8th to consumption and 2/8th to participation in the project.
- › In the event that several TSOs are operating in a Member State (as is the case in Germany), the Member State's share of the costs shall be distributed among those TSOs proportionally to the consumption in the TSOs control areas.
- › Per January 2023, the Cost Sharing Key for PICASSO common costs for establishment and amendment was adjusted to reflect the latest consumption data.
- › The 2023 Cost Sharing Division for recurring costs was determined following the approval of the October 2023 Accession Roadmap, in line with the Agreements. The recurring cost sharing keys are calculated in line with the Agreements and EBGL. TSOs start sharing recurring costs from 6 months prior to their (planned) accession date.

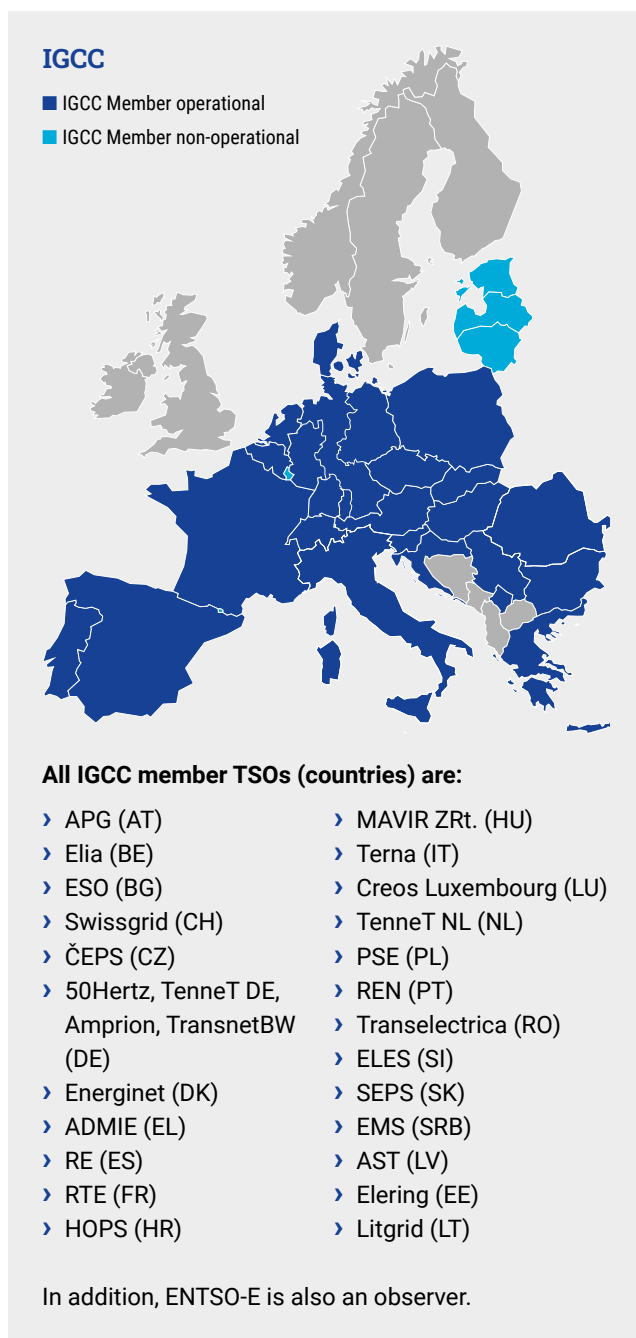
The most important events for PICASSO during 2023 were as follows:

- › The Italian TSO (Terna) accessed the PICASSO platform on 19 July 2023 and successfully exchanged aFRR via PICASSO.
- › The seventh and eighth versions of the accession roadmap have been published on the ENTSO-E website.
- › The first annual IF report (operational year from July 2022 to June 2023) has been published on the ENTSO-E website.

- › The mathematical description of PICASSO has been updated.
- › Stakeholder workshop together with MARI and IGCC has been organised on 30 November 2023, informing stakeholders of project planning and progress, as well as giving detailed explanations of the business process.
- › From October to December 2023, ENTSO-E conducted a public consultation on aFRR IF and Pricing Methodology.
- › The budget 2023 has been closed and the planned budget 2024 has been approved.

1.4 Description of the IN-Platform: the IGCC project

The International Grid Control Cooperation ('IGCC') is the implementation project endorsed by all TSOs on 11 February 2016 to establish the European platform for the imbalance netting process, i.e. the 'IN-Platform' pursuant to Article 22 of the EB Regulation.



Other relevant information of IGCC

- › The IGCC Cooperation Agreement is the agreement between all IGCC member TSOs and entered into force on 19 January 2016. A fifth amendment of the IGCC Cooperation Agreement was made on 11 December 2019, aiming to align the agreement with existing EU Regulation.
- › In terms of costs, as specified in the implementation framework for the IN-Platform ('INIF'):
 - Each member TSO shall bear its own national costs and is solely responsible (i.e.: no joint and several liability) for the due payment of all the costs related to the technical infrastructure necessary for the successful usage of the IN-Platform.
 - The cost sharing principle shall apply to costs incurred after the approval of the INIF. All TSOs agree not to share any costs incurred before the approval of the INIF.

The most important events involving IGCC during 2023 were:

- › With the accession of ESO (TSO of Bulgaria), the IGCC has a total number of 23 operational TSO. All TSO that are obliged by EB Regulation are now connected to the IGCC.
- › The growing number of participating TSOs enabled to reach a record of more than 13.9 TWh of avoided aFRR activation in 2023. The financial savings reached more than 621 Mio € in 2023.

1.5 Summary of the costs

	Category		RR-Platform (All TSOs)	mFRR-Platform (All TSOs)	aFRR-Platform (All TSOs)	IN-Platform (All TSOs)	CM IT Solution (All TSOs)	Total [K €]
2018	Establishing & amending	[K €]	2,790	315	166	0	0	3,271
	Operating	[K €]	0	0	0	0	0	0
2019	Establishing & amending	[K €]	5,178	565	317	0	0	6,060
	Operating	[K €]	0	0	0	0	0	0
2020	Establishing & amending	[K €]	1,737	1,958	480	35	0	4,210
	Operating	[K €]	1,710	0	0	0	0	1,710
2021	Establishing & amending	[K €]	900	8,347	653	45	30	9,975
	Operating	[K €]	1,586	0	0	0	0	1,586
2022	Establishing & amending	[K €]	748	6,729*	4,234*	123	8	11,842
	Operating	[K €]	1,586	115*	491*	41	0	2,233
2023	Establishing & amending	[K €]	864	5,722*	855*	0	2,496*	9,937
	Operating	[K €]	1,549	1,427*	1,082*	61	25*	4,144
2024 forecast	Establishing & amending	[K €]	875	6,698	629	50	1,899	10,151
	Operating	[K €]	1,607	2,226**	1,925**	126	696**	6,580

* The 2022 – 2023 numbers for MARI and PICASSO and the 2023 numbers for CM IT Solution cover both, common and regional costs and are thus reported in respectively chapter 2 and 3.

** These are regional costs only. The exact split between establishment and amendment and operating will be only known end of 2024.





2. Chapter A: Common costs resulting from the coordinated activities of all TSOs participating in the European balancing energy platforms

All the common costs indicated below are to be shared between TSOs in accordance with the rules specified in the respective implementation frameworks.

2.1 Actual costs of 2023

The following table provides an overview of actual common costs in 2023:

Actual costs 2023			Costs of establishing [€]		Costs of operating [€]	
RR-Platform	All TERRE TSOs' costs	1.a	863,913.84	1.b	1,548,654.96	
mFRR-Platform	All MARI TSOs' costs	2.a	5,367,156.55	2.b	0.00	
aFRR-Platform	All PICASSO TSOs' costs	3.a	524,720.83	3.b	0.00	
IN-Platform	All IGCC TSOs' costs	4.a	none	4.b	60,872.00	
CM IT Solution	All MARI TSOs' costs	5.a	2,389,283.45	5.b	0.00	

2.2 Costs of establishing and amending the European balancing energy platforms in 2023

2.2.1 RR-Platform

The actual costs for establishing and amending the RR-Platform in 2023 were:

TERRE	2023 [€]
Costs for establishing	863,913.84
IT Development	607,227.80
Optimisation module	19,049.80
Data management	359,178.00
Hosting	0.00
IT Monitoring	0.00
Finance service	0.00
Testing	229,000.00
Central project team	256,686.04
PMO	161,914.89
Business analyst	55,781.00
IT adviser	38,990.15
Other consultancy	0.00

Clarifications:

- › The 'Optimisation module' covers the support from the external provider for the design and the development of the AOF of the RR Platform.
- › The 'Data Management' covers the support from the external provider for the design and the development of the data management module of the RR Platform.
- › The 'Testing' covers the support from PSE for the UAT of the RR platform.
- › The 'PMO' considers all PMO support for all groups.
- › The 'Business analyst' is an external business analyst engaged to collect the RR requirements and support functional design of the RR IT solution.
- › The 'IT adviser' is an external IT project manager engaged to coordinate the different providers and TSOs for the design, development, amendment and testing of the RR IT solution.

TERRE actual costs 2023 per TSO					
Country	Participants	Member State	Consumption (Nrg_105 a) [GWh]	Amount per TSO Costs for establishing and amending [€]	Amount per TSO Costs for operating [€]
Czech Republic	ČEPS	1	57,997	80,148.00	146,595.00
France	RTE	1	440,971	252,849.84	475,466.96
Italy	Terna	1	286,027	182,978.00	342,412.00
Poland	PSE	1	132,839	113,898.00	0
Portugal	REN	1	46,353	74,987.00	136,596.00
Spain	REE	1	233,172	159,143.00	297,023.00
Switzerland	Swissgrid	1	62,617	73,115.00*	150,562.00
Hungary	MAVIR ZRt.	0	0	0	0
TOTAL		7	1,259,976	863,914.84	1,548,654.96

* The CAPEX share of Swissgrid is blocked in a bank account, to reflect the status on Swissgrid participation as provided for in EB Regulation Art. 1(6) and 1(7). If Swissgrid is not allowed by the European Commission, in accordance with article 1 of EB Regulation, to permanently participate, then Swissgrid's financial contribution deposited in a blocked bank account will be released to the benefit of Swissgrid.

2.2.2 mFRR-Platform

The actual costs for establishing the mFRR-Platform in 2023 were:

MARI	2023 [€]
Total costs for establishment and amending	5,367,156.55
General project costs (i. e., external PMO, conveners, experts, legal counsel)	1,217,515.07
mFRR platform IT development	1,504,627.82
mFRR platform hosting and monitoring (amendment & establishment part like test environments)	1,840,566.67
Third party services (i. e., testing support)	804,447.00

Clarifications:

- › The PMO support considers also PMO support for the joint MARI-PICASSO Legal WG, the joint Project Management Team, ad-hoc cross-platform TFs, and the PICASSO Budget Management.

MARI actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	161,014.70
Belgium	Elia	1	83,069	181,409.89
Bulgaria	ESO	1	32,089	117,004.01
Croatia	HOPS	1	16,854	97,682.25
Czech Republic	ČEPS	1	61,304	154,037.39
Denmark	Energinet	1	33,602	119,150.88
Estonia	Elering	1	8,135	86,947.94
Finland	Fingrid	1	83,301	181,946.61
France	RTE	1	442,322	635,471.34
Germany	Amprion	0.36311	183,434	290,899.89
	TenneT DE	0.30506	154,109	252,793.07
	TransnetBW	0.13055	65,951	136,325.78
	50Hertz	0.20128	101,682	183,556.75
Greece	ADMIE	1	50,554	140,619.50
Hungary	MAVIR ZRt.	1	43,387	131,495.34
Italy	Terna	1	300,887	456,745.02
Latvia	AST	1	6,930	85,337.79
Lithuania	Litgrid	1	11,954	91,778.38
Luxembourg	Creos Luxembourg	1	6,393	34,886.52
Netherlands	TenneT NL	1	112,349	218,443.27
Norway	Statnett	1	128,443	238,838.47
Poland	PSE	1	157,314	275,335.13
Portugal	REN	1	48,117	137,399.21
Romania	Transelectrica	1	49,623	139,009.35
Slovak Republic	SEPS	1	26,457	110,026.71
Slovenia	ELES	1	13,550	93,388.52
Spain	REE	1	235,025	373,554.10
Sweden	Svenska kraftnät	1	131,028	242,058.76
Switzerland	Swissgrid	1	(62,483)	(150,817.10)
TOTAL		26	2,654,723 (2,717,206*)	5,367,156.55

* Amount including Swissgrid

- › The share of common costs for Swissgrid is transferred to the blocked bank account for costs occurring from July 2020. Transnet BW maintains Power of Attorney over this blocked bank account. If Swissgrid is not allowed by

the European Commission to participate, in accordance with article 1 of EB Regulation, then Swissgrid's financial contribution deposited in the blocked bank account will be released to the benefit of Swissgrid.

2.2.3 aFRR-Platform

The actual costs for establishing the aFRR-Platform in 2023 were:

PICASSO	2023 [€]
Total cost for establishment and amending	524,720.83
General project costs (i. e., external PMO, senior project lead, external convenors)	524,720.83
aFRR platform IT development	0

PICASSO actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	16,608.82
Belgium	Elia	1	83,069	18,646.12
Bulgaria	ESO	1	32,089	12,262.758
Croatia	HOPS	1	16,854	10,373.75
Czech Republic	ČEPS	1	61,304	15,926.68
Denmark	Energinet	1	33,602	12,472.64
Estonia	Elering	1	8,135	1,476.21
Finland	Fingrid	1	83,301	18,655.23
France	RTE	1	442,322	63,384.38
Germany	Amprion	0.36311	183,434	29,263.70
	TenneT DE	0.30506	154,109	25,451.46
	TransnetBW	0.13055	65,951	13,934.94
	50Hertz	0.20128	101,682	18,639.21
Greece	ADMIE	1	50,554	14,571.52
Hungary	MAVIR ZRt.	1	43,387	13,679.49
Italy	Terna	1	300,887	45,781.09
Latvia	AST	1	6,930	1,448.88
Lithuania	Litgrid	1	11,954	1,558.23
Luxembourg	Creos Luxembourg	1	6,393	3,714.20
Netherlands	TenneT NL	1	112,349	22,266.69
Norway	Statnett	1	128,443	24,303.99
Poland	PSE	1	157,314	27,872.09
Portugal	REN	1	48,117	14,256.69
Romania	Transelectrica	1	49,623	14,457.46
Slovak Republic	SEPS	1	26,457	11,580.61
Slovenia	ELES	1	13,550	9,953.98
Spain	REE	1	235,025	37,561.20
Sweden	Svenska Kraftnät	1	131,028	24,618.82
Switzerland	Swissgrid	1	(62,483)	(15,568.49)
TOTAL		26	2,654,723 (2,717,206*)	524,720.83

* Amount including Swissgrid

› The share of common costs for Swissgrid is transferred to the blocked bank account for costs occurring from July 2020. Transnet BW maintains Power of Attorney over this blocked bank account. If Swissgrid is not allowed by the

European Commission, in accordance with article 1 of EB Regulation, to participate then Swissgrid's financial contribution, deposited in the blocked bank account, will be released to the benefit of Swissgrid.

2.2.4 IN-Platform

The costs for establishing in 2023 only relate to the costs for PMO support.

IGCC	2023 [€]
Costs for establishing	0
PMO support	none

Clarifications:

- › The 'PMO support' for the IGCC only bodies was taken over by a TSO. For common groups with the PICASSO bodies, the PMO services are provided by the PICASSO PMO. It is performed by external consultants.

2.2.5 CM IT Solution

The actual costs for establishing and amending the CM IT Solution in 2023 were:

CM IT Solution	2023 [€]
Total costs for establishment and amending	2,389,283.45
General project costs (i. e., external experts, coordinators)	40,286.25
CM IT solution IT development	1,992,246.00
CM IT solution hosting and monitoring (establishment part)	356,751.20

CM IT Solution actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	69,528.15
Belgium	Elia	1	83,069	78,368.50
Bulgaria	ESO	1	32,089	50,413.88
Croatia	HOPS	1	16,854	42,051.39
Czech Republic	ČEPS	1	61,304	66,422.08
Denmark	Energinet	1	33,602	51,369.59
Estonia	Elering	1	8,135	37,272.82
Finland	Fingrid	1	83,301	78,607.43
France	RTE	1	442,322	275,962.24
Germany	Amprion	0.36311	183,434	126,393.09
	TenneT DE	0.30506	154,109	109,429.18
	TransnetBW	0.13055	65,951	59,015.30
	50Hertz	0.20128	101,682	79,563.14
Greece	ADMIE	1	50,554	60,687.80
Hungary	MAVIR ZRt.	1	43,387	56,626.02
Italy	Terna	1	300,887	198,071.60
Latvia	AST	1	6,930	36,556.04
Lithuania	Litgrid	1	11,954	39,423.18
Luxembourg	Creos Luxembourg	1	6,393	15,052.49
Netherlands	TenneT NL	1	112,349	94,615.62
Norway	Statnett	1	128,443	103,455.97
Poland	PSE	1	157,314	119,225.24
Portugal	REN	1	48,117	59,254.23
Romania	Transelectrica	1	49,623	60,209.94
Slovak Republic	SEPS	1	26,457	47,307.81
Slovenia	ELES	1	13,550	40,378.89
Spain	REE	1	235,025	161,993.42
Sweden	Svenska kraftnät	1	131,028	104,889.54
Switzerland	Swissgrid	1	62,483	67,138.86
TOTAL		26	2,717,206	2,389,283.45

2.3 Costs of operating the European balancing energy platforms in 2023

2.3.1 RR-Platform

The RR-Platform entered in operation on 6 January 2020. Costs of operating the TERRE platform in 2023 were €1,548,654.96.

TERRE	2023 [€]
Operational costs	1,548,654.96
Optimisation module	326,761.00
Data management	274,189.00
Hosting	615,244.00
IT Monitoring	281,226.00
Financial service	51,234.96
Testing	0.00

2.3.2 mFRR-Platform

Operational costs will only become common costs for operations once all TSOs have accessed the platform. For that reason, there were no common costs for operations in 2023.

2.3.3 aFRR-Platform

Operational costs will only become common costs for operations once all TSOs have accessed the platform. For that reason, there were no common costs for operations in 2023.

2.3.4 IN-Platform

The operation of the IN-Platform is covered by the normal operations of the Host TSO (TransnetBW) for operating their system, maximising the efficiencies of using the infrastructure and personnel of an existing TSO and thus minimising costs for all TSOs, including the Host TSO. Thus, no operational costs were incurred in 2023, except JAO invoicing services fees which reflect the invoicing performed by JAO since June 2023.

IGCC	2023 [€]
Operational costs	60,872.00
JAO invoicing – Service fees	60,872.00

2.3.5 CM IT solution

Operational costs will only become common costs for operations once all TSOs have accessed the CM IT solution. For that reason, there were no common costs for operations in 2023.

2.4 Cost forecast for 2024

The following table provides an overview of total cost forecasts for 2024:

Cost forecast 2024		Costs of amending [€]		Costs of operating [€]	
			Amending		
RR-Platform	All TERRE TSOs' costs	1.e	875,490.00	1.f	1,606,942.00
mFRR-Platform	All MARI TSOs' costs	2.e	6,697,754.17**	2.f	0.00*
aFRR-Platform	All PICASSO TSOs' costs	3.e	628,500.00**	3.f	0.00*
IN-Platform	All IGCC TSOs' costs	4.e	50,000.00	4.f	125,744.00
CM IT Solution	All MARI TSOs' costs	5.e	1,898,826.20**	5.f	0.00*

* Operational Costs are expected to remain regional costs for operations until at least end 2024.

** This only concerns common costs for establishment and amendment. Regional costs for establishment and amendment are reported in the next chapter.

2.5 Cost forecast for establishing and amending the European balancing energy platforms in 2024

2.5.1 RR-Platform

The RR-Platform became operational on 6 January 2020. The project approved a budget of € 875,490.00 to amend the platform: € 592,750.00 for IT Development and € 282,740.00 for project management.

The cost forecast for establishing and amending the RR-Platform in 2024 is:

TERRE	2024 [€]
Costs for amending	875,490.00
IT Development	592,750.00
Optimisation module	85,000.00
Data management	267,750.00
Hosting	0.00
IT Monitoring	0.00
Finance service	0.00
Testing	240,000.00
Central project team	282,740.00
PMO support	134,840.00
Business analyst	72,000.00
Senior IT adviser	51,900.00
Other consultancy	24,000.00
Publication in ENTSO-E's Transparency Platform	0.00

Clarifications:

- › The 'Optimisation module' covers the support from the external provider for the additional developments of the AOF of the RR-Platform.
- › The 'Data Management' covers the support from the external provider for additional developments of the data management module of the RR-Platform.
- › The 'Testing' covers the support from PSE for the UAT of the RR platform.
- › The 'PMO support' considers all PMO support for all groups.
- › The 'Business analyst' is an external business analyst engaged to collect the RR requirements and support the functional design of the RR IT solution.
- › The 'Senior IT adviser' is an external IT consultant engaged to coordinate the different providers and TSOs for the development and testing of the RR IT solution.

2.5.2 mFRR-Platform

As the mFRR-Platform became operational in 2022, the common costs for establishment are solely cost for amending the platform.

The cost forecast for common costs for establishing and amending the mFRR-Platform in 2024 is:

MARI	2024 [€]
Total costs for amending [€]	6,697,754.17
General project costs (i. e., external PMO, conveners, experts, legal counsel)	1,187,187.50
mFRR platform IT development	2,650,000.00
mFRR platform hosting and monitoring (amendment & establishment part like test environments)	1,840,566.67
Third party services (i. e., testing support, simulations)	1,020,000.00

Clarifications:

- › The 'PMO support' considers all PMO support for the joint MARI-PICASSO Legal WG, the joint Project Management Team, ad-hoc cross-platform TFs, and the PICASSO Budget Management.

2.5.3 aFRR-Platform

As the aFRR-Platform became operational in 2022, the common costs for establishment are solely cost for amending the platform.

The cost forecast for common costs establishing and amending the aFRR-Platform in 2024 is:

PICASSO	2024 [€]
Total cost for amending	628,500.00
General project costs (i. e., external PMO, senior project lead, external conveners)	428,500.00
aFRR platform IT development	200,000.00

2.5.4 IN-Platform

The cost forecast for establishing and amending the IN-Platform in 2024 is:

IGCC	2024 [€]
Costs for amending	50,000
PMO support	0
PICASSO/IGCC Change Requests	50,000

Clarifications:

- › The 'PMO support' is planned to be done by TSO, for joined groups with PICASSO the PICASSO PMO takes over the role.
- › An estimated expense of €50,000 in 2024 for possible Change Requests is taken into consideration.

2.5.5 CM IT Solution

The cost forecast for common costs establishing and amending the CM IT solution in 2024 is:

CM IT Solution	2024 [€]
Total costs for amending	1,898,826.20
General project costs (i. e., external experts, coordinators)	234,575.00
CM IT solution IT development	1,237,500.00
CM IT solution hosting and monitoring (establishment part)	356,751.20
Third party services (i. e., external audit)	70,000.00



2.6 Cost forecast for operating the European balancing energy platforms in 2024

2.6.1 RR-Platform

The cost forecast for operating the RR-Platform in 2024 is:

TERRE	2024 [€]
Operational costs	1,606,942.00
Optimisation module	366,772.00
Data management	274,813.00
Hosting	615,252.00
IT Monitoring	282,000.00
Financial service	68,105.00
Testing	0.00

Clarifications:

- › 'Optimisation module' covers the support from external provider for the maintenance and support of the AOF of the RR-Platform.
- › 'Data Management' covers the support from the external provider for the maintenance and support of the data management module of the RR-Platform.
- › 'Hosting' covers the support from the external provider for the hosting of the RR IT solution (testing and production environments);
- › 'IT monitoring' covers the support from external provider for the IT monitoring service of the RR IT solution;
- › 'Financial service' covers the support from the external provider for the Finance service (invoicing process based on TSO – TSO settlement).

2.6.2 mFRR-Platform

Operational costs will only become common costs for operations once all TSOs have accessed the platform. As this is not expected to happen before 2026, there are no common costs for operations expected in 2024. The regional costs for operations are reported in the next chapter.

2.6.3 aFRR-Platform

Operational costs will only become common costs for operations once all TSOs have accessed the platform. As this is not expected to happen before 2026, there are no common costs for operations expected in 2024. The regional cost for operations are reported in the next chapter.

2.6.4 IN-Platform

In 2024, the settlement services for the IN-Platform will be performed JAO and will amount to circa 125,744 € for the full year 2024. No other operational costs are borne by the IGCC project given that the operation of the IN-Platform is covered by the normal operations of the Host TSO (TransnetBW) for operating their system, maximising the efficiencies of using the infrastructure and personnel of an existing TSO and thus minimising costs for all TSOs, including the Host TSO.

IGCC	2024 [€]
Operational costs	125,744.00
Financial service	125,744.00

2.6.5 CM IT Solution

Operational costs will only become common costs for operations once all TSOs have accessed the CM IT solution. As this is not expected to happen before 2025, there are no common costs for operations expected in 2024. The regional costs for operations are reported in the next chapter.

3. Chapter B: Regional costs resulting from the coordinated activities of all TSOs participating in a certain region

3.1 Actual costs of 2023

The following table provides an overview of total regional costs in 2023:

Actual costs 2023		Costs of amending [€]		Costs of operating [€]	
mFRR-Platform	MARI TSOs' costs	1.a	354,761.58	1.b	1,426,665.42
aFRR-Platform	PICASSO TSOs' costs	2.a	330,473.35	2.b	1,082,309.01
CM IT Solution	MARI TSOs' costs	3.a	107,188.46	3.b	25,306.55

3.2 Costs of establishing in 2023

3.2.1 mFRR-Platform

The actual costs for establishing the mFRR-Platform in 2023 were:

MARI	2023 [€]
Total costs for establishment	354,761.58
IT Hosting & IT monitoring	92,953.57
IT support & maintenance	212,146.15
ECP network	49,661.86

MARI actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	95,016.20
Belgium	Elia	1	83,069	53,532.68
Bulgaria	ESO	1	32,089	11,532.76
Estonia	Elering	1	8,135	8,606.54
Latvia	AST	1	6,930	8,606.54
Lithuania	Litgrid	1	11,954	9,122.93
Portugal	REN	1	48,117	40,622.87
Romania	Transelectrica	1	49,623	54,909.73
Spain	REE	1	235,025	72,811.33
TOTAL		9	1,108,281	354,761.58

3.2.2 aFRR-Platform

The actual costs for establishing the aFRR-Platform in 2023 were:

PICASSO	2023 [€]
Total costs for establishment	330,473.35
Hosting & IT monitoring	291,052.65
ECP network	39,420.70

PICASSO actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Belgium	Elia	1	83,069	11,096.98
Bulgaria	ESO	1	32,089	22,599.94
Denmark	Energinet	1	33,602	15,292.17
Finland	Fingrid	1	83,301	22,058.62
France	RTE	1	442,322	35,591.52
Italy	Terna	1	300,887	181,611.48
Romania	Transelectrica	1	49,623	35,050.20
Slovak Republic	SEPS	1	26,457	7,172.44
TOTAL		8	1,051,351	330,473.35

3.2.3 CM IT Solution

The actual costs for establishing the CM IT Solution in 2023 were:

CM IT Solution	2023 [€]
Total costs for establishment	107,188.46
Support and maintenance	92,226.00
ECP SLA	14,962.46

CM IT Solution actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Czech Republic	ČEPS	1.000	61,304	19,503.26
Germany	Amprion	0.363	183,434	18,549.30
	TenneT GmbH	0.305	154,109	16,058.39
	TransnetBW	0.131	65,951	8,585.68
	50Hertz	0.201	101,682	11,619.81
Luxembourg	CREOS	1.000	6,393	2,292.16
Romania	Transelectrica	1.000	49,623	2,928.14
Spain	REE	1.000	235,025	7,962.95
Switzerland	Swissgrid	1.000	62,483	19,688.76
TOTAL		6	920,002	107,188.46

3.3 Costs of operating in 2023

3.3.1 mFRR-Platform

The actual costs for operating the mFRR-Platform in 2023 were:

MARI	2023 [€]
Total costs for operating	1,426,665.42
IT Hosting & IT monitoring	358,058.43
IT support & maintenance	817,189.85
ECP network	191,298.14
TSO – TSO invoicing	60,119.00

MARI actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	112,993.25
Czech Republic	ČEPS	1	61,304	216,933.45
Germany	Amprion	0.36311	183,434	372,321.33
	TenneT DE	0.30506	154,109	317,454.74
	TransnetBW	0.13055	65,951	172,414.76
	50Hertz	0.20128	101,682	234,547.89
TOTAL		3	633,340	1,426,665

3.3.2 aFRR-Platform

The actual costs for operating the aFRR-Platform in 2023 were:

PICASSO	2023 [€]
Total costs for operating	1,082,309.01
Hosting & IT monitoring	900,809.14
ECP network	122,007.24
TSO – TSO invoicing	59,492.63

PICASSO actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Austria	APG	1	66,861	140,765.40
Czech Republic	ČEPS	1	61,304	135,890.55
Germany	Amprion	0.36311	183,434	223,608.12
	TenneT DE	0.30506	154,109	190,473.11
	TransnetBW	0.13055	65,951	107,164.91
	50Hertz	0.20128	101,682	141,003.33
Italy	Terna	1	300,887	143,403.59
TOTAL		4	934,227	1,082,309.01

3.3.3 CM IT Solution

The actual costs for operating the CM IT Solution in 2023 were:

CM IT Solution	2023 [€]
Total costs for operating	25,306.55
Support and maintenance	21,774.00
ECP SLA	3,532.55

CM IT Solution actual costs 2023 per TSO				
Country	Participants	Member State	Consumption 2021 [GWh]	Amount per TSO [€]
Czech Republic	ČEPS	1.000	61,304	12,587.03
Switzerland	Swissgrid	1.000	62,483	12,719.52
TOTAL		2	123,877	25,306.55



3.4 Cost forecast 2024

According to the CSP Agreements for respectively PICASSO, MARI, and the CM IT Solution there are certain costs that are only paid by TSOs 6 months prior to their go-live onwards, meaning costs are not shared by all TSOs and are instead deemed to be regional costs. The exact split depends on

when TSOs exactly access and the share of costs for establishment and amendment and the share for operating can be only determined after the Accession Roadmaps of October 2024 have been established. Hence, only summary values for forecasted regional costs for 2024 are provided.

The following table provides an overview of total cost forecasts for 2024:

Cost forecast 2024			Total forecast [€]
mFRR-Platform	All MARI TSOs' costs	1.c	2,226,305.00
aFRR-Platform	All PICASSO TSOs' costs	2.c	1,925,463.00
CM IT Solution	All MARI TSOs' costs	3.c	741,840.00

3.4.1 mFRR Platform

MARI	2024 [€]
Total cost forecast	2,226,305.00
Hosting & IT monitoring	451,012.00
IT support & maintenance	1,355,000.00
ECP network	240,960.00
TSO – TSO invoicing	179,333.00

3.4.2 aFRR Platforms

PICASSO	2024 [€]
Total cost forecast	1,925,463.00
Hosting & IT monitoring	1,420,873.00
ECP network	418,707.00
TSO – TSO invoicing	85,883.00

3.4.3 CM IT Solution

CM IT Solution	2024 [€]
Total cost forecast	741,840.00
Support & maintenance	501,900.00
ECP network	209,940.00
Hosting service	30,000.00

4. Chapter C: National costs resulting from the activities of TSO(s) in a Member State

4.1 Actual costs of 2023

Category A: Representation in meetings

- i. Time spent in the identified meetings including time for preparation, reported in euro at the rate of each TSOs
- ii. Travel expenses related to the meetings considered in Ai

Category B: National IT implementation IT costs linked to developments and systems for market coupling/interface between TSO and each platform solely

- i. Men/hour spent for development and testing
- ii. External costs of development and testing (including directly buying IT tools that are needed for market coupling/for balancing platform matters only)

Country	TSO
Austria	APG – Austrian Power Grid AG
	VÜEN-Vorarlberger Übertragungsnetz GmbH
Belgium	Elia – Elia Transmission Belgium S.A.
Bulgaria	ESO – Electroenergien Sistemen Operator EAD
Croatia	HOPS – Croatian Transmission System Operator Ltd
Czech Republic	ČEPS – ČEPS, a.s.
Denmark	Energinet – Energinet
Estonia	Elering – Elering AS
Finland	Fingrid – Fingrid OyJ (Representing also Kraftnät Åland Ab in physical meetings)
	Kraftnät Åland Ab
France	RTE – Réseau de Transport d'Electricité, S.A
Germany	Amprion – Amprion GmbH
	TransnetBW – TransnetBW GmbH
	TenneT GER – TenneT TSO GmbH
	50Hertz – 50Hertz Transmission GmbH
Greece	IPTO – Independent Power Transmission Operator S.A.
Hungary	MAVIR ZRt. – MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság ZRt.
Ireland	EirGrid – EirGrid plc
Italy	Terna – Terna SpA
Latvia	Augstsprieguma tīkls – AS Augstsprieguma tīkls
Lithuania	LITGRID – LITGRID AB
Luxembourg	CREOS Luxembourg – CREOS Luxembourg S.A.
(The) Netherlands	TenneT TSO – TenneT TSO B.V.
	Britned Netherlands
Norway	Statnett – Statnett SF
Poland	PSE – PSE S.A.
Portugal	REN – Rede Eléctrica Nacional, S.A.
Romania	Transelectrica – C.N. Transelectrica S.A.
Serbia	EMS – Akcionarsko društvo Elektromreža Srbije
Slovak Republic	SEPS – Slovenská elektrizačná prenosová sústava, a.s.
Slovenia	ELES – ELES,d.o.o
Spain	REE – Red Eléctrica de España S.A.U
Sweden	Svenska Kraftnät – Affärsverket Svenska Kraftnät
Switzerland	Swissgrid – Swissgrid AG
Northern Ireland	SONI System Operator for Northern Ireland Ltd

National costs, Category A [€]				National costs, Category B [€]			
TERRE	MARI	PICASSO	IGCC	TERRE	MARI	PICASSO	IGCC
N/A	35,807	6,735	2,415	N/A	67,792	0	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	60,775	63,337	See PICASSO	N/A	401,805	43,558	See PICASSO
N/A	16,133	12,288	0	N/A	0	0	0
N/A	17,550	12,420	1,814	N/A	87,793	46,309	0
18,282	50,012	27,194	6,997	0	367,394	277,777	51,103
N/A	46,430	71,500	5,940	N/A	0	3,659,974	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	30,934	83,761	N/A	N/A	0	50,910	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
53,495	150,668	44,387	0	13979	1,405,714	253,167	0
N/A	217,579	29,509	1,261	N/A	607,426	735,649	32,013
N/A	48,059	171,869	56,115	N/A	462,193	581,414	89,755
N/A	58,800	58,800	1,100	N/A	452,786	447,386	0
N/A	18,500	34,500	1,000	N/A	455,000	475,000	0
N/A	13,225	12,810	5,522	N/A	N/A	414,850	3,063
-	12,844	10,508	-	-	1,162,729	951,324	-
-	0	N/A	N/A	0	0	N/A	N/A
50,725	48,434	66,832	8,456	119,412	1,053,019	1,336,341	5,168
N/A	1,682	0	0	N/A	0	0	0
N/A	3,850	N/A	N/A	N/A	456,060	N/A	N/A
N/A	11,305	6,848	1,768	N/A	0	0	0
N/A	25,000	200,000	50,000	N/A	0	0	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	109,176	161,550	N/A	N/A	0	0	N/A
22,120	30,395	29,215	13,045	0	0	0	0
5,318	4,237	6,124	2,875	10,300	113,483	15,520	8,654
N/A	5,810	7,250	1,355	N/A	78,345	46,320	1,170
N/A	540	N/A	1,680	N/A	0	N/A	430
N/A	45,836	49,816	7,450	N/A	886,132	842,576	0
N/A	30,642	4,521	90	N/A	22,977	57,225	0
217,417	187,474	89,231	33,768	1,573	0	1,284,719	10,380
N/A	161,000	293,000	N/A	N/A	0	0	N/A
62,400	104,414	93,600	31,200	0	0	0	0
0	0	N/A	N/A	0	0	N/A	N/A

Glossary

50Hertz	50Hertz Transmission GmbH
ACER	EU Agency for the Cooperation of Energy Regulators
ADMIE	Independent Power Transmission Operator S.A.
aFRR	Frequency restoration reserves with automatic activation
aFRRIF	Implementation framework for the aFRR-Platform
Amprion	Amprion GmbH
AOF	activation optimisation function
APG	Austrian Power Grid AG
AST	AS Augstsprieguma tīkls
AT	Austria
BiH	Bosnia and Herzegovina
BE	Belgium
BG	Bulgaria
EB Regulation	Guideline on electricity balancing
CACM Reg.	Guideline on capacity allocation and congestion management
CEPS	ČEPS, a.s.
CGES	Crnogorski elektroprenosni sistem AD
CH	Switzerland
CMM	Capacity Management Module
Creos Luxembourg	Creos Luxembourg S.A.
CZ	Czech Republic
DE	Germany
DK	Denmark
EBSG	European Balancing Stakeholder Group
EE	Estonia
Eirgrid	EirGrid plc
Elering	Elering AS
Eles	Eles, d.o.o.

Elia	Elia Transmission Belgium SA
EMS	Akcionarsko društvo Elektromreža Srbije
Energinet	Energinet Elsystemansvar A/S
ESO	Electroenergien Systemen Operator EAD
ES	Spain
EU	European Union
FAT	factory acceptance testing
FI	Finland
Fingrid	Fingrid Oyj
FR	France
GB	Great Britain
GR	Greece
HOPS	Croatian Transmission System Operator Ltd.
HR	Croatia
HU	Hungary
IE	Ireland
IGCC	International Grid Control Cooperation
INIF	Implementation framework for the IN-Platform
IT	Italy
Litgrid	Litgrid AB
LU	Luxembourg
MARI	Manually Activated Reserves Initiative
MAVIR Zrt.	Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság
mFRR	Frequency restoration reserves with manual activation
mFRRIF	Implementation framework for the mFRR-Platform
MNE	Montenegro
MEPSO	Macedonian Transmission System Operator AD
MKD	Macedonia

MoU	Memorandum of Understanding
National Grid	National Grid ESO
NL	Netherlands
NO	Norway
NOSBiH	Nezavisni operator sustava u Bosni i Hercegovini
NRA	National regulatory authority
OST	OST sh.a – Albanian Transmission System Operator
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
PL	Poland
PMO	Project Management Officer
PSE	Polskie Sieci Elektroenergetyczne
PT	Portugal
RE	Red Eléctrica de España S.A.U.
REN	Rede Eléctrica Nacional, S.A.
RO	Romania
RR	Replacement reserves
RRIF	Implementation framework for the RR-Platform
SRB	Serbia
RTE	Réseau de Transport d'Electricité
SE	Sweden
SEPS	Slovenská elektrizačná prenosová sústava, a.s.
SI	Slovenia
SK	Slovakia
SLA	Service level agreement
SO Regulation	Guideline on electricity transmission system operation
SONI	System Operator for Northern Ireland Ltd
Statnett	Statnett SF
SVK	Svenska Kraftnät

Swissgrid	Swissgrid AG
TenneT DE	TenneT TSO GmbH
TenneT NL	TenneT TSO B.V.
Terna	Terna - Rete Elettrica Nazionale SpA
TERRE	Trans-European Replacement Reserves Exchange
Transelectrica	National Power Grid Company Transelectrica S.A.
TransnetBW	TransnetBW GmbH
TSO	Transmission System Operator
UAT	User acceptance testing

The terms used in this document have the meaning of the definitions included in Article 2 of the EB Regulation and in the respective EB methodologies.

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