

ENTSO-E

Electricity Balancing Cost Report

30 June 2021



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 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 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.

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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 is the second EB Cost Report since the entry into force of the EB Regulation on 18 December 2017. For this reason, all TSOs have decided to publish all TSOs' actual costs since this date, i. e. for the years 2018 and 2019. Given that this shall be a yearly report, this report will cover the detailed reporting of the respective year only (i. e. 2020) while keeping an overview of cumulative costs since the first report (i. e. 2018 – 2019).

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

ENTSO-E 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.

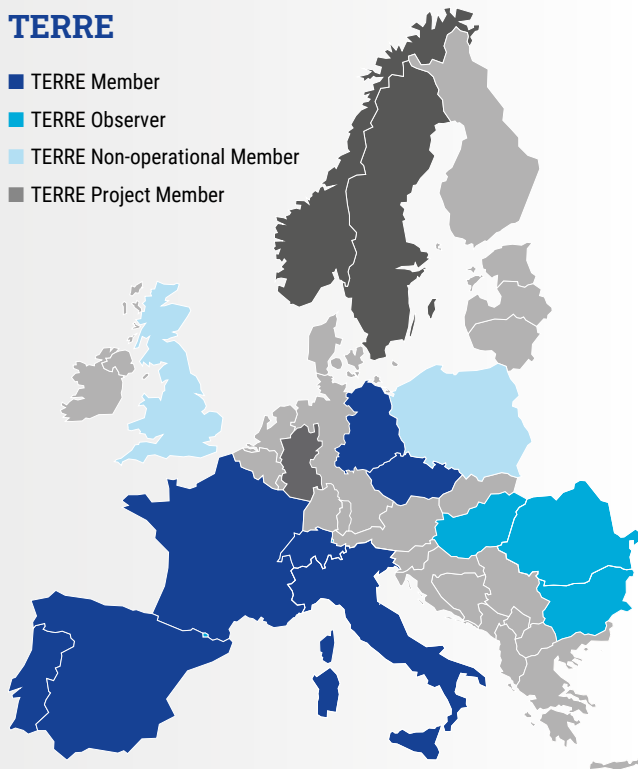


1.1 Description of the RR-Platform: the TERRE project

The Trans-European Replacement Reserves Exchange ('TERRE') is the implementation project endorsed by all TSOs through ENTSO-E's Market Committee 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.

TERRE

- TERRE Member
- TERRE Observer
- TERRE Non-operational Member
- TERRE Project Member



The TERRE member TSOs (countries) are:

- › Swissgrid (CH)
- › ČEPS (CZ)
- › REE (ES)
- › RTE (FR)
- › National Grid ESO (GB)
- › Terna (IT)
- › PSE (PL)
- › REN (PT)

The following TSOs (countries) are observers: ESO (BG), MAVIR Zrt. (HU) and Transelectrica (RO); ENTSO-E is also an observer. In addition, 3 TSOs are TERRE project members: Svenska Kraftnät (SE), AMPRION (DE), and Statnett. The term 'project member' was intentionally distinguished from the terms operational and non-operational members. Project Members join the TERRE Project for the sole purpose of participating in the development, operation and management of the IT Solution (LIBRA) and obtaining the intellectual property rights of the IT Solution in order to utilise and continue to develop it for Regional IT Solutions in the case of the Nordics TSOs or for the mFRR IT solution.

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 2020 were:

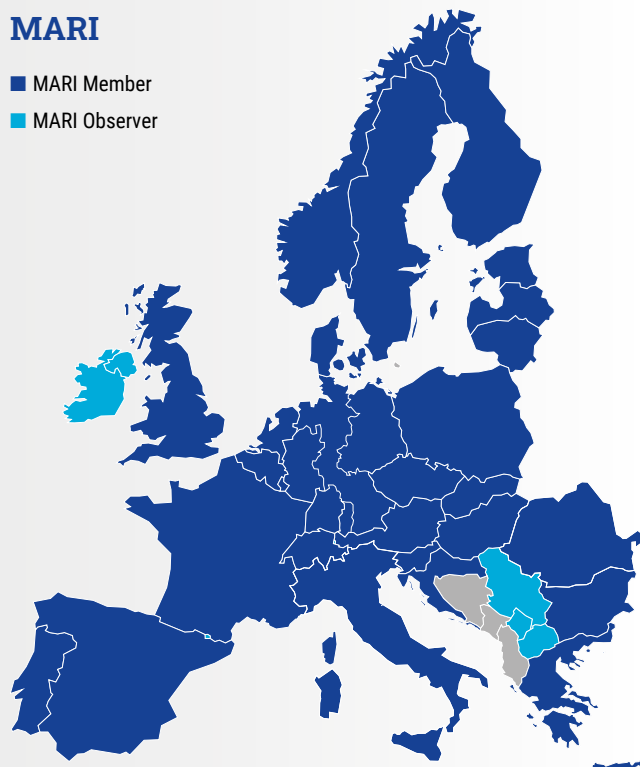
- › RR-platform is live: The operational go-live of the platform occurred in January 2020 with ČEPS connection, in Region 2. Following the connection of 4 TSOs in Region 1 (REE in March, REN in September, Swissgrid in October and RTE in December), RR cross-border exchanges are effectively enabled between countries in this region.
- › Opening TERRE for non-RR TSOs: The TERRE Cooperation Agreement has been amended and approved to include Project Members (Amprion, Statnett and Svenska Kraftnät) as signatories. The TERRE TSOs and Project Members have established the LIBRA Project Management Board (LPMB) as the forum for liaison between the representatives of TERRE, MARI and Fifty for the purpose of sharing information on the three variants of the LIBRA platform and enabling synergies and cost savings across the projects.
- › RRIF amendment and Public consultation: Following the approval of the TSO–TSO settlement proposal and the pricing proposal, the TSOs' representatives of the TERRE project carried out an amendment of the RRIF which was submitted for Public Consultation in October 2020.

1.2 Description of the mFRR-Platform: the MARI project

The Manually Activated Reserves Initiative ('MARI') is the implementation project endorsed by all TSOs through ENTSO-E's Market Committee 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

- MARI Member
- MARI Observer



All MARI member TSOs (countries) are:

- › APG (AT)
- › Elia (BE)
- › Swissgrid (CH)
- › ČEPS (CZ)
- › 50Hertz, TenneT DE, Amprion, TransnetBW (DE)
- › Energinet (DK)
- › Elering (EE)
- › IPTO (GR)
- › REE (ES)
- › Fingrid (FI)
- › RTE (FR)
- › National Grid ESO (GB)
- › HOPS (HR)
- › MAVIR ZRt. (HU)
- › Terna (IT)
- › AST (LV)
- › Litgrid (LT)
- › Statnett (NO)
- › TenneT NL (NL)
- › REN (PT)
- › PSE S.A. (PL)
- › Transelectrica (RO)
- › SvK (SE)
- › ELES (SI)
- › SEPS (SK)
- › Creos Luxembourg (LU)
- › ESO (BG)

In addition, the following TSOs (countries) are observers: Eirgrid (IE), SONI (NI), MEPSO (MKD) and EMS (SRB); ENTSO-E is also an observer.

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 $\frac{1}{8}$ attributed to membership, $\frac{5}{8}$ to consumption and $\frac{2}{8}$ 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 July 2020, the Cost Sharing Key for MARI was adjusted to reflect the following:
 - i. Creos Luxembourg joined as a 'non-participating' TSO, meaning they will not bear the $\frac{2}{8}$ of the establishment cost attributed to participation but they will bear the $\frac{1}{8}$ attributes to membership and $\frac{5}{8}$ to consumption;
 - ii. ESO joined as a participating TSO and will thus bear all costs as divided among the other participating TSOs.



The most important events involving MARI during 2020 were:

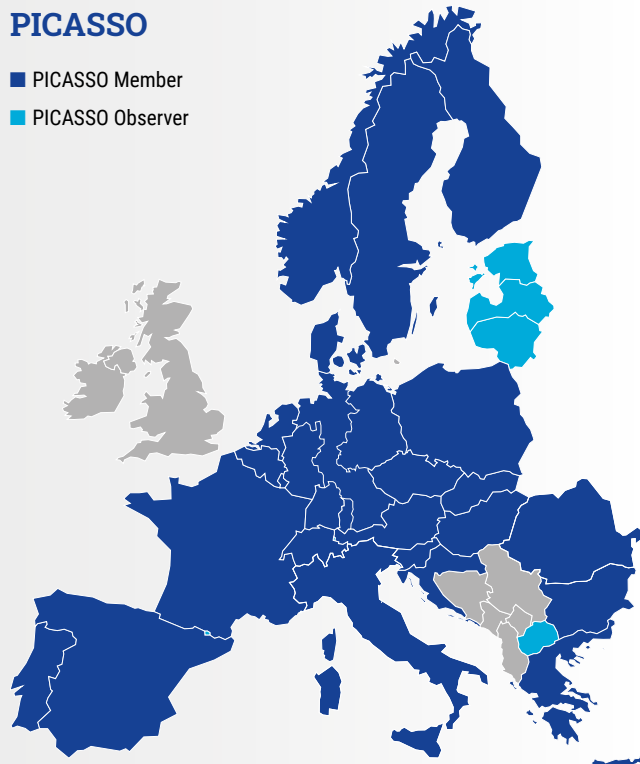
- › Stakeholder workshop on 13 July 2020 and 18 December 2020 on the market and technical design and accession roadmap of MARI.
- › European Balancing Implementation Group meetings took place online on the 18th of March, 24th of June, 17th of September, 13th of October and 17th of December.
- › The mFRRIF was approved on 24 January 2020.
- › MARI TSOs confirmed the entity designation for the MARI platform on 24 July 2020.
- › The first version of the MARI Accession roadmap was published on 24 April 2020; the first update was published on 13 November 2020.
- › The implementation Guide was published on the [ENTSO-E EDI library](#).
- › On 1 July 2020, the MARI TSOs completed the signature process on the contractual framework, encompassing all the necessary agreements for the establishment and operation of the balancing platforms, including MARI.
- › With the delivery of the requirement catalogue V 3.1 on 1 July 2020, the TSOs completed the specification of all detailed functions of the platform and underlying design concepts. The hosting requirements catalogue was approved on 30 June.
- › On 1 July, the 'Initial Study of the MARI Change Request on LIBRA' was approved, which validated the feasibility of adding the MARI required functions to the LIBRA software.
- › The activation optimisation function (AOF) will be developed in three incremental versions. The design and development for AOF V1 was begun in July 2020. Both V1 and V2 are to be finalised and approved in 2021.
- › The hosting for factory acceptance testing (FAT) and user acceptance testing (UAT) was ready in December 2020, enabling testing in 2021. Testing preparations and procurement of test support began in 2020 and are to be completed over the course of 2021.
- › The Operational Working Group was established in November 2020 and has begun work on the operational documentation, including the operational handbook. In December, the Testing Task Force was further established to work on testing activities.
- › An agreement was reached on the requirements for MARI and PICASSO for Transparency reporting and TSO–TSO invoicing in Q4 2020.
- › In March 2020, MARI SC approved the implementation of the mFRRIF on the LIBRA platform. An IPR Agreement is being drafted and is due for completion in 2021.
- › MARI SC confirmed that the Transparency platform is the target tool for publications for MARI.
- › Creos Luxembourg and ESO joined as members of MARI. Creos Luxembourg will participate as a non-participating TSO member.

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 through ENTSO-E's Market Committee 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

- PICASSO Member
- PICASSO Observer



All PICASSO member TSOs (countries) are:

- › APG (AT)
- › Elia (BE)
- › ESO (BG)
- › Swissgrid (CH)
- › ČEPS (CZ)
- › 50Hertz, TenneT DE, Amprion, TransnetBW
- › Energinet (DK)
- › IPTO (GR)
- › REE (ES)
- › Fingrid (FI)
- › RTE (FR)
- › MAVIR ZRt. (HU)
- › HOPS (HR)
- › Terna (IT)
- › TenneT NL (NL)
- › Statnett (NO)
- › PSE (PL)
- › REN (PT)
- › Transelectrica (RO)
- › SvK (SE)
- › ELES (SI)
- › SEPS (SK)
- › Creos Luxembourg (LU)

In addition, the following TSOs (countries) are observers: Elering (EE), Litgrid (LT), AST (LV), MEPSO (MKD); ENTSO-E is also an observer.

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 $\frac{1}{8}$ attributed to membership, $\frac{5}{8}$ to consumption and $\frac{2}{8}$ 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 July 2020, the Cost Sharing Key for PICASSO was adjusted to reflect the following:
 - i. Creos Luxembourg joined as a 'non-participating' TSO, meaning they will not bear the $\frac{2}{8}$ of the establishment cost attributed to participation, but they will bear the $\frac{1}{8}$ attributes to membership and $\frac{5}{8}$ to consumption.

The most important events for PICASSO during 2020 were as follows:

- › The aFRRIF was approved on 24 January 2020.
- › One stakeholder workshop together with MARI took place on 13 July 2020 focussing on the market and technical design and first version of the accession roadmap of PICASSO.
- › European Balancing Implementation Group meetings took place online on 18 March, 24 June, 17 September, 13 October and 17 December.
- › The specification phase will be completed with the approval of the Implementation Guide in February 2021.
- › AOF development was completed in July 2020. In December 2020, the first set of FATs was completed. The plan is that final corrections and retesting will be due by the second quarter of 2021.
- › The first operational procedures used for testing were completed in December 2020.
- › The second version of the PICASSO accession roadmap was published in October 2020. On 1 July 2020, the PICASSO TSOs completed the signature process on the contractual framework encompassing all the necessary agreements for the establishment and operation of the balancing platforms, including PICASSO.
- › An agreement was reached on the requirements for MARI and PICASSO for Transparency reporting and TSO–TSO invoicing in Q4 2020.
- › PICASSO SC confirmed that the Transparency platform is the target tool for publications for PICASSO.
- › Creos Luxembourg joined as a non-participating TSO member of PICASSO.

1.4 Description of the IN-Platform: the IGCC project

The International Grid Control Cooperation ('IGCC') is the implementation project endorsed by all TSOs through ENTSO-E's Market Committee 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.

IGCC

- IGCC Member
- IGCC Observer
- IGCC Non-operational Member



All IGCC member TSOs (countries) are:

- | | |
|--|-------------------------|
| › APG (AT) | › HOPS (HR) |
| › Elia (BE) | › MAVIR ZRT. (HU) |
| › ESO (BG) | › Terna (IT) |
| › Swissgrid (CH) | › Creos Luxembourg (LU) |
| › ČEPS (CZ) | › TenneT NL (NL) |
| › 50Hertz, TenneT DE, Amprion, TransnetBW (DE) | › PSE (PL) |
| › Energinet (DK) | › REN (PT) |
| › ADMIE (EL) | › Transelectrica (RO) |
| › REE (ES) | › ELES (SI) |
| › RTE (FR) | › SEPS (SK) |
| | › EMS (SRB) |

In addition, the following TSOs (countries) are observers: NOSBiH (BiH), MEPSO (MKD) and CGES (MNE); ENTSO-E is also an observer.

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 2020 were:

- › Accession: 6 TSOs became operational in 2020, leading to energy savings enabled by the imbalance netting process of up to 800 GWh on average per month.
 - Terna (Italy) on 27 January
 - PSE (Poland) on 18 February
 - MAVIR ZRt. (Hungary) on 10 March
 - SEPS (Slovakia) on 13 May
 - REE (Spain) on 21 October
 - REN (Portugal) on 16 December
- › The INIF was approved on 24 June 2020.

1.5 Summary of the costs

		2018		2019		2020		2021 forecast	
Category		Establishing & amending [K €]	Operating [K €]	Establishing & amending [K €]	Operating [K €]	Establishing & amending [K €]	Operating [K €]	Establishing & amending [K €]	Operating [K €]
RR-Platform	All TSOs	2,790	0	5,178	0	1,731	1,710	(1,086)*	1,754
mFRR-Platform	All TSOs	315	0	555	0	1,958	0	7,261	0
aFRR-Platform	All TSOs	166	0	317	0	480	0	853	0
IN-Platform	All TSOs	0	0	0	0	35	0	45	0
Total		3,271	0	6,050	0	4,204	1,710	8,159	1,754

* TERRE project expects revenues resulting from the payment of MARI project for the Software License (LIBRA) of € 2,600,000 resulting in a positive forecast (income).



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 2020

The following table provides an overview of total actual common costs in 2020:

Actual costs 2020			Costs of establishing (€)		Costs of operating (€)
RR-Platform common costs	All TERRE TSOs' costs	1.a	1,730,806.00	1.b	1,709,904.00
mFRR-Platform common costs	All MARI TSOs' costs	2.a	1,958,418.00	2.b	0.00
aFRR-Platform common costs	All PICASSO TSOs' costs	3.a	480,000.00	3.b	0.00
IN-Platform common costs	All IGCC TSOs' costs	4.a	34,562.50	4.b	0.00

2.2 Costs of establishing and amending the European balancing energy platforms in 2020

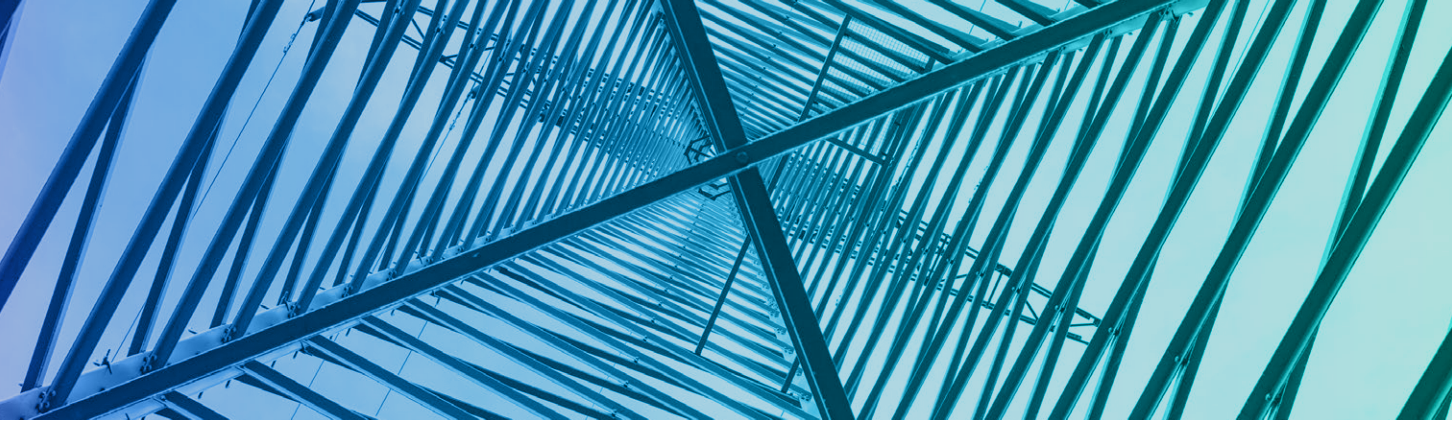
1.a RR-Platform

RR TSOs have allocated a range of € 12,993,850 for establishing and amending the RR-Platform. The actual costs for establishing the RR-Platform in 2020 were:

TERRE	2020 (€)
Costs for establishing	1,730,806.00
IT Development	1,300,852.00
AOF module	161,840.00
Data management	716,664.00
Hosting	0.00
IT Monitoring	0.00
Finance service	0.00
Testing	422,348.00
Central project team	429,954.00
PMO	182,149.00
Business analyst	98,910.00
Project manager	104,657.00
Other consultancy	44,238.00

Clarifications:

- › The 'AOF 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 the external provider 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 'Project manager' is an external IT project manager engaged to coordinate the different providers and TSOs for the design, development and testing of the RR IT solution.



TERRE actual costs 2020					
Country	Participants	Member State	Consumption (Nrg_105a) [GWh]	Amount per TSO Costs for establishing and amending [€]	Amount per TSO Costs for operating [€]
Czech Republic	ČEPS	1	57,997	123,043.00	134,913.00
France	RTE	1	440,971	376,963.00	420,916.00
Italy	Terna	1	286,027	274,232.00	305,205.00
Poland	PSE	1	132,839	172,665.00	0
Portugal	REN	1	46,353	115,322.00	126,218.00
Spain	REE	1	233,172	239,188.00	265,734.00
Switzerland	Swissgrid	1	62,617	113,957.00 *	138,364.00
United Kingdom	National Grid ESO	1	303,902	286,083.00	318,554.00
Hungary	MAVIR Zrt.	0	0	4,490.00	0
Romania	Transelectrica	0	0	4,680.00	0
TOTAL		8	1,563,878	1,596,666.00 **	1,709,904.00

* 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.

** Amprion became a Project member in 2020 and, according to membership rules, was requested to issue the payment on its share of the historical costs (€ 134,139.00) to TERRE TSOs. The amount has therefore been deducted from the amounts invoiced to TERRE TSOs. This deducted amount explains the delta with the total 2020 costs for establishing (€ 1,730,806.00), as reported in section 2.1.

2.a mFRR-Platform

The actual costs for establishing the mFRR-Platform in 2020 were:

MARI	2020 (€)
Costs for establishing	1,958,418.00
mFRR algorithm design & development*	1,107,303.00
Hosting	0.00
PMO support	534,452.00
Business analyst	200,910.70
Legal support TSO agreements	115,752.00
Publication in ENTSO-E's Transparency Platform	0.00

Clarifications:

- › All (additional) MARI development costs will be reinvoyed in 2022.
- › The estimated amount for the mFRR algorithm design & development for 2020 was initially € 2,176,747.00 (estimated in 2019). This budget has been spread over 2020 and 2021, hence the 2020 budget being lower than initially foreseen.

MARI actual costs 2020				
Country	Participants	Member State	Consumption (Nrg_105 a) [GWh]	Amount per TSO for MARI [€]
Austria	APG	1	61,852	53,336.62
Belgium	Elia	1	81,725	61,801.89
Bulgaria	ESO	1	28,939	30,052.24
Croatia	HOPS	1	15,300	33,506.97
Czech Republic	ČEPS	1	57,997	38,308.21
Denmark	Energinet	1	31,152	40,259.41
Estonia	Elering	1	7,139	30030.64
Finland	Fingrid	1	80,759	61,390.41
France	RTE	1	440,971	214,829.19
Germany	Amprion	0.36311	187,865	100,961.18
	TenneT DE	0.30506	157,831	87,616.07
	TransnetBW	0.13055	67,544	47,498.00
	50Hertz	0.20128	104,138	63,758.10
Greece	ADMIE	1	53,363	49,720.59
Hungary	MAVIR ZRt.	1	37,541	42,980.92
Italy	Terna	1	286,027	148,828.01
Latvia	AST	1	6,482	29,750.78
Lithuania	Litgrid	1	9,750	31,142.84
Luxembourg	Creos Luxembourg	1	6,367	22,675.21
Netherlands	TenneT NL	1	105,332	71,857.71
Norway	Statnett	1	113,709	75,426.05
Poland	PSE	1	132,839	83,574.82
Portugal	REN	1	46,353	46,734.55
Romania	Transelectrica	1	43,569	45,548.65
Slovak Republic	SEPS	1	24,987	37,633.32
Slovenia	ELES	1	13,026	32,538.31
Spain	REE	1	233,172	126,313.47
Sweden	Svenska Kraftnät	1	127,496	81,298.87
Switzerland	Swissgrid	1	62,617	12,603.50 (+ 39893.03*)
United Kingdom	National Grid ESO	1	303,902	156,442.18
TOTAL		27	2,929,743	1,958,418.00

› The cost sharing key for MARI was adjusted per July 2020, considering the membership changes for Creos Luxembourg and ESO. Above cost calculations are based on the actuals of Q1 and Q2, and of Q3 and Q4 with the respective cost sharing principle.

› The amount under Swissgrid between brackets will be deposited on the blocked bank account. The share of common costs for Swissgrid is transferred to a blocked bank account for costs occurring from July 2020. TSO 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 a blocked bank account will be released to the benefit of Swissgrid.

3.a aFRR-Platform

The actual costs for establishing the aFRR-Platform in 2020 were:

PICASSO	2020 (€)
Costs for establishing	480,000.00
PMO support	210,000.00
Senior Project Lead	270,000.00
Legal Support TSO agreements	0*

Clarifications

- › The 'PMO support' considers all PMO support for all groups.
- › The costs for legal support are borne by MARI.

PICASSO actual costs 2020				
Country	Participants	Member State	Consumption (Nrg_105 a) [GWh]	Amount per TSO for MARI [€]
Austria	APG	1	61,852	14,853.90
Belgium	Elia	1	81,725	17,175.81
Bulgaria	ESO	1	28,939	11,008.43
Croatia	HOPS	1	15,300	9,414.89
Czech Republic	ČEPS	1	57,997	14,403.49
Denmark	Energinet	1	31,152	11,266.99
Finland	Fingrid	1	80,759	17,062.95
France	RTE	1	440,971	59,149.20
Germany	Amprion	0.36311	187,865	27,839.94
	TenneT DE	0.30506	157,831	24,172.56
	TransnetBW	0.13055	67,544	13,147.66
	50Hertz	0.20128	104,138	17,616.12
Greece	ADMIE	1	53,463	13,862.07
Hungary	MAVIR ZRt.	1	37,541	12,013.47
Italy	Terna	1	286,027	41,045.94
Luxembourg	Creos Luxembourg	1	6,367	1,739.67
Netherlands	TenneT NL	1	105,332	19,933.99
Norway	Statnett	1	113,709	20,912.74
Poland	PSE	1	132,839	23,147.84
Portugal	REN	1	46,353	13,043.04
Romania	Transelectrica	1	43,569	12,717.76
Slovak Republic	SEPS	1	24,987	10,546.69
Slovenia	ELES	1	13,026	9,149.20
Spain	REE	1	233,172	34,870.49
Sweden	Svenska Kraftnät	1	127,496	22,523.58
Switzerland	Swissgrid	1	62,617	7381.58 (+7,313.44)*
TOTAL		22	2,602,470	480,000.00

- › The cost sharing key for MARI was adjusted per July 2020, considering the membership changes for Creos Luxembourg. The above cost calculations are based on the actuals of Q1 and Q2, and of Q3 and Q4 with the respective cost sharing principle.

- › The amount under Swissgrid between brackets will be deposited on the blocked bank account. The share of common costs for Swissgrid is transferred to a blocked bank account for costs occurring from July 2020. TSO 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 a blocked bank account, will be released to the benefit of Swissgrid.

4.a IN-Platform

The costs for establishing in 2020 only relate to the costs for PMO support.

IGCC	2020 (€)
Costs for establishing	34,562.50
PMO support	34,562.50

Clarifications:

- › The 'PMO support' considers all PMO support for all groups. It was performed by ENTSO-E until April 2020 and by external consultants since May 2020.

2.3 Costs of operating the European balancing energy platforms in 2020

1.b RR-Platform

The RR-Platform entered in operation on 6 January 2020. Costs of operating the TERRE platform in 2020 were € 1,709,904.00.

2.b mFRR-Platform

The mFRR-Platform is planned to be ready for TSO connection by end Q2 2022. Thus, no operational costs were incurred in 2020.

3.b aFRR-Platform

The aFRR-Platform is planned to be ready for TSO connection in Q3 2021. Thus, no operational costs were incurred in 2020.

4.b 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 2020.

2.4 Cost forecast for 2021

In 2021, one platform (the RR-Platform) is to be considered already as established and costs are differentiated between for 'establishing' and for 'amending' the platforms. The following table provides an overview of total cost forecasts for 2021:

Cost forecast 2021		Costs of establishing and amending (€)			Costs of operating (€)	
		Establishing	Amending			
RR-Platform common costs	All TERRE TSOs' costs	1.e	(2,600.00)*	1,513,500.00	1.f	1,754,096.00
mFRR-Platform common costs	All MARI TSOs' costs	2.e	7,596,832.96	0	2.f	0
aFRR-Platform common costs	All PICASSO TSOs' costs	3.e	853,021.33	0	3.f	0
IN-Platform common costs	All IGCC TSOs' costs	4.e	45,000.00	0	4.f	0

* The TERRE project expects revenues resulting from the payment of MARI project for the Software License (LIBRA) of € 2,600,000 to result in a positive forecast (income).

2.5 Cost forecast for establishing and amending the European balancing energy platforms in 2021

1.e RR-Platform

The cost forecast for establishing and amending the RR-Platform in 2021 is:

TERRE	2021 (€)
Costs for establishing	(2,600,000.00)*
MARI-LIBRA Software license	(2,600,000.00)*
Costs for amending	1,513,500.00
IT Development	1,099,316.00
Optimisation module	147,100.00
Data management	652,216.00
Hosting	0.00
IT Monitoring	0.00
Finance service	0.00
Testing	300,000.00
Central project team	414,184.00
PMO support	169,034.00
Business analyst	90,900.00
Senior IT adviser	104,250.00
Other consultancy	50,000.00
Publication in ENTSO-E's Transparency Platform	0.00

* The reimbursement from MARI to TERRE for the software license.

The RR-Platform became operational on 6 January 2020. The project approved a budget of € 1,513,500 for 2021 to amend the platform: € 414,184 for project management and € 1,099,316 for IT developments and testing. In 2021, the TERRE project expects revenues resulting from the payment of MARI project for the Software License (LIBRA) of € 2,600,000, resulting in a positive forecast (income) for the costs for establishing and amending in 2021 of € 1,086,500.

This leaves a reserve of € 3,416,138 out of the € 12,993,850 envelope for 2021 onwards.

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 the external provider 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.e mFRR-Platform

The cost forecast for establishing and amending the mFRR-Platform in 2021 is:

MARI	2021
Costs for establishing	7,596,832.96
mFRR design & development costs	2,625,637.33
Hosting & Communication	82,760.00
AOF Testing	804,050.00
Software Licences	2,694,500.00
Finance Service	173,021.33
Legal Support for TSO agreements	237,535.00
PMO Support	710,000.00
Business Analyst	24,929.30
Change Control Advisor & Test Owner	244,400.00
Cost for operations	0
Contingency	255,487.56

Clarifications:

- › The 'PMO support' considers all PMO support for all groups.
- › The budget for the business analyst and the TSO agreements is partly budget shifted from 2020 to 2021
- › The budget for TSO–TSO invoicing is to be confirmed. The preliminary budget is based on the current offer from the provider for the TSO–TSO invoicing agent. The budget for the AOF Testing services is a preliminary estimate, to be confirmed in the eventual agreement. The legal budget covers both legal activities for MARI and PICASSO and considers several European challenges.

3.e aFRR-Platform

The cost forecast for establishing and amending the mFRR-Platform in 2021 is:

PICASSO	2021 (€)
Costs for establishing	853,021.33
Finance Service	173,021.33
PMO support	210,000.00
Senior project lead	270,000.00
Test Coordinator	200,000.00

Clarifications:

- › The 'PMO support' considers all PMO support for all groups.
- › The 'Senior project lead' is an external support that ensures quality in the organisation of project meetings, develops a high-level project plan and prioritises tasks, performs risk management, ensures efficient communication and alignment between the different bodies of the project, supports steering discussions and identifying ways forward, and supervises the quality and progress of the PMO's work.
- › The budget for TSO–TSO invoicing is to be confirmed. The preliminary budget is based on the current offer from the provider for the TSO–TSO invoicing agent.

4.e IN-Platform

The cost forecast for establishing and amending the IN-Platform in 2021 is:

IGCC	2021 (€)
Costs for establishing	45,000.00
PMO support	45,000.00
Publication in Transparency Platform	0.00

Clarifications:

- › The 'PMO support' considers all PMO support for all groups. This role was performed by ENTSO-E until 30 April 2020. Since 1 May 2020, the IGCC member TSOs have shared common costs for PMO support, for which external PMO(s) have been engaged.
- › The costs for the implementation of the publication requirements in the Transparency Platform are undertaken by ENTSO-E and will be covered by the participation fees of the TSOs. As such, no costs for the implementation of the publication requirements will be directly covered by the IGCC project.

2.6 Cost forecast for operating the European balancing energy platforms in 2021

1.f RR-Platform

The cost forecast for operating the RR-Platform in 2021 is:

TERRE	2021 (€)
Operational costs	1,754,096.00
Optimisation module	399,996.00
Data management	254,506.00
Hosting	628,846.00
IT Monitoring	250,800.00
Financial service	219,948.00
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.f mFRR-Platform

The mFRR-Platform is planned to be in operation and ready for TSO connection by Q2 2022.

3.f aFRR-Platform

The aFRR-Platform is planned to enter in operation and be ready for TSO connection by Q1 2022.

4.d 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.

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

3.1 Actual costs of 2020 and cost forecast 2021

There are no regional costs incurred nor planned in the European balancing energy platforms.

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

4.1 Actual costs of 2020 and cost forecast 2021

TSOs reserve the right to submit directly to the relevant regulatory authority the national costs resulting from the activities of the TSOs in that Member State that are classified as sensitive commercial information.

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
ČEPS	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 Sistemen 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
REE	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	TernaRete 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.

