# CEER TSO Cost Efficiency Benchmark TCB21

## Cover note

Version V1.0
9 September 2024

# 1. Introduction

1. The TSO Cost efficiency Benchmark project TCB21 succeeds the electricity benchmark projects E3GRID of 2008/2009 and 2012/2013, the gas benchmark project E2GAS of 2015/2016, and the combined benchmark project TCB18 2018/2019. Like TCB18, TCB21 combines a cost efficiency benchmark of gas TSOs and electricity TSOs in a single project.

2. TCB21 is owned and initiated in 2021 for regulatory purposes by CEER, the Counsil of European Energy Regulators, and ran until 2024. CEER has hired Sumicsid for advice and to perform parts of the benchmark study, notably data analysis, modelling, and reporting.

**Objective of TCB21**

3. The main objective of TCB21 is to produce a robust and methodologically sound platform for deriving cost efficiency estimates for transmission system operators, under process and data quality requirements allowing use of the results to inform regulatory oversight of the operators. In the project, best practice TSOs (forming the so-called frontier) are identified and related to other TSOs in a pan-European and regulatory context. Ultimately this is the purpose of TCB21.

**Participants**

4. The following 18 NRAs took part in TCB21 on behalf of CEER (names abbreviated and as they were known in 2021):
   - E-Control (Austria)
   - EWRC (Bulgaria)
   - CERA (Cyprus)
   - DUR (Denmark)
   - ECA (Estonia)
   - EV (Finland)
   - BNetzA (Germany)
   - RAE (Greece)
   - CRU (Ireland)
   - ARERA (Italy)
   - PUC (Latvia)
   - VERT (Lithuania)
   - ACM (Netherlands)
   - ENV-RME (Norway)
   - ERSE (Portugal)
   - ANRE (Romania)
   - CNMC (Spain)
   - EI (Sweden)

5. The following 16 electricity TSOs took part in TCB21 (names abbreviated and as they were known in 2021) :
   - APG (Austria)
   - ESO (Bulgaria)
   - TSO-C (Cyprus)
   - Energinet (Denmark)
   - Elering (Estonia)
   - FinGrid (Finland)
   - IPTO (Greece)
   - Eirgrid (Ireland)
   - AST (Latvia)
   - LitGrid (Lithuania)
   - TenneT (Netherlands)
   - Statnett (Norway)
   - REN (Portugal)
   - Transelectrica (Romania)
   - REE (Spain)
   - Kraftnät (Sweden)

6. The following 16 gas TSOs took part in TCB21 (names abbreviated and as they were known in 2021) :
   - GasConnect, TAG (Austria)
   - Bulgartransgaz (Bulgaria)
   - Energinet (Denmark)
   - Elering (Estonia)
   - GasGrid (Finland)
   - DESFA (Greece)
   - SNAM, SGI (Italy)
   - Conexus (Latvia)
   - AmberGrid (Lithuania)
   - GTS (Netherlands)
   - REN (Portugal)
   - Transgaz (Romania)
   - Reganosa, Enagás (Spain)

7. Also, the German NRA, BNetzA, delivered benchmark data of all 16 German gas TSOs to TCB21. These TSOs were part of the gas TSO sample in TCB21, but did not participate themselves. Hence, the gas TSO sample consisted of a total of 32 TSOs.

## 2. Project set-up and timeline

### Organisation

8. Daily management of TCB21 was done by a project steering group (PSG) that consisted of representatives from ACM (Dutch NRA), BNetzA (German NRA), CNMC (Spanish NRA), DUR (Danish NRA), NVE-RME (Norwegian NRA), PUC (Latvian NRA), and Sumicsid (consultant). The PSG held (bi-)weekly meetings.

9. About monthly, the PSG reported to the IRB Workstream, the Electricity Working Group, the Gas Working Group, and the General Assembly of CEER.

### Communication

10. To communicate with the participating NRAs and TSOs (back and forth), a web-based, secured project platform, called Worksmart, was installed. This platform was used to inform parties about the project, distribute project documentation, for Q&A purposes, and to facilitate discussions. The platform was divided into several parts, each having its own read and write permissions, to ensure confidentiality of information exchange where needed.

### Project phases and timing

11. TCB21 ran through four phases:

*Phase A. Data definitions*
Jan-Oct 2021.
Defining what data to request from TSOs and in what format.
See the TCB21 data definition guides.

*Phase B. Data collection and validation*
Oct 2021 – Oct 2022.
Requesting the data from TSOs and validating it.
See below more about data collection and validation.

*Phase C. Data analysis and model development*
Feb 2022 – Nov 2023.
Analysing the data and searching for the best models that fit the data.
See the TCB21 reporting.

*Phase D. Results and reporting*
Nov 2023 – Aug 2024.
Running the final models and reporting about the outcome.
See the TCB21 reporting.

**Written consultations**

12. Throughout TCB21, TSOs were consulted in writing several times about various topics. Consultation started with a consultation document and ended with a response note by CEER based on the responses from TSOs. These documents were published on Worksmart to all participants.

    *Environmental factors and cost impact*
    Started Dec 2021.

    *Comparability issues*
    Started Feb 2022.

    *Transparency (data sharing)*
    Started Apr 2022.
    See also below.

    *Benchmark method(s)*
    Started Aug 2022.

    *Normgrid*
    Started Nov 2022.

    *Model specification*
    Started Feb 2023.

    *Special conditions*
    Started May 2023.
    See also below.

    *Several data reviews by TSOs and NRAs*
    During Phase B of the project.

13. Apart from those consultations, the project platform was used for ad hoc consultations about smaller topics or issues and comments and suggestions from TSOs or NRAs anytime. Several TSOs used those opportunities to ask questions and make helpful suggestions.

**Workshops**

14. Since for an important part the project is focused at TSO-NRA interaction, a number of workshops were organized. All project participants, TSOs and NRAs, were invited to the workshops, from which all documentation and minutes were published on the project platform to all participants.

    *Workshop 1: Data collection*
    8 Oct 2021, online.

*Workshop 2: Data analysis*
7 Jul 2022, online.

*Workshop 3: Benchmark model*
12&13 Apr 2023, Brussels and online.

*Workshop 4: Benchmark model (cont.)*
26&27 Jun 2023, Brussels and online.

*Workshop 5: Final analysis and results*
23 Nov 2023, Brussels and online.

**External audit**

15. Like in TCB18, CEER requested KPMG to validate that the TCB21 results result are indeed the outcome of the benchmarking methods and parameters stated in the documentation. The audit report by KPMG is part of the TCB21 reporting structure, and will be made available on request when finished (expected November of December 2024).

**Phase A: Data collection**

16. For TCB21 data definition guides, one for asset data and one for financial data, were developed in Phase A of TCB21.

17. TSOs received the final data definition guides in October 2021 and were asked to deliver data in February 2022. This process was kicked-off with a workshop early October 2021, meant to further explain the purpose and expectations of the data collection.

18. After the TSO data was collected, NRAs validated the data of their TSO(s) and then handed over the data to the Sumicsid (consultant) for further data validation and analysis at sample level.

19. All together, like in TCB18, the data collection and validation process starts with the principal that TSOs have a proper asset system and audited financial statements. Data quality is then assured by the following steps:
    - In Phase A of the project reporting guides and templates were developed to assure clear data definitions to translate the asset system and audited financial statements into benchmark data. Reporting guides and templates were essentially copied from TCB18 and corrected and further developed based in lessons learned from TCB18.
    - After the data collection, national validation at NRA level was done. The goal of the national validation was to assure that data is complete, consistent, correct and plausible.

- After the national validation, cross validation was done by the consultant. The goal of cross validation is that remaining misinterpretation of definitions amongst countries are detected and corrected for.
- Data analysis was done to develop a benchmark model. This is seen as part of the data quality strategy as data analysis may reveal errors in the data that were not picked up by national or cross validation. So actually, the validations in previous steps did not per se have a well-defined ending, feedback loops continued during the early stage of the analysis and modelling phase.
- In parallel with the previous step, full and validated data sets have been checked with TSOs. All TSOs and NRAs received a dump of asset and financial files that they could check on missing or incorrect data. For many TSOs a few corrections have indeed been made.

20. TSOs were not asked by CEER to audit their data formally by an independent auditor. A first reason for that is that the data definitions take the audited annual accounts as starting point. Furthermore, NRAs also checked data against sources like regulatory data, which are often audited and validated before. Also, an audit often focuses on just a part of the data, mostly the financial accounts. So, an explicit audit on the benchmark data for each TSO was not seen as a necessary part of the data quality strategy. Nevertheless, some NRAs required their TSOs to audit their data for reassurance in their national validation.

**Consultation: Transparency**

21. Like in previous CEER benchmarking projects, on request/demand of TSOs, TSO data have to be treated confidential. To ensure confidentiality data exchanges were organised through private and secured parts of the project platform. Sumicsid was the only party the project having access to all TSO data, without any constraints.

22. During the project participating TSOs and NRAs have been consulted to see if there is any way to make TSO data transparent to all parties in the project. The consultation led to the development of a so-called Non Disclosure Statement (NDS) that could be signed by any TSO that was willing to give up its data confidentiality in return for receiving the data of other TSOs that signed the NDS. Also NRAs could sign the NDS and receive the data of signing TSOs.

23. The procedure led to the following 6 TSOs and 5 NRAs signing the NDS and, hence, forming a “data sharing community” within TCB21:
    - Electricity TSOs: TSO-C (CYP), TenneT (NL), LitGrid (LT), Elering (EE).
    - Gas TSOs: Conexus (LV), AmberGrid (LT), Elering (EE).
    - NRAs: DUR (DK), ECA (EE), EI (SE), NVE-RME (NOR), ACM (NL).

Note that the data shared among these TSOs and NRAs were at a higher level that the original data as was agreed between TSOs and NRAs dring the consultation.

**Consultation: Special conditions**

24. During the project TSOs were given an opportunity to signal conditions that are not addressed by the benchmark model, but they think should have been. Such conditions are referred to as special conditions and may call for correction of benchmarked scope or data, or the benchmark model. Defining and implementing special conditions is meant to get closer to the purpose of the benchmark, i.e. to define best practices. The concept of special conditions evolves from the concept of so-called Z-factors in previous CEER benchmarks.

## 3. Documentation and reporting

25. TCB21 produced a wide range of documentation and reports. In the context of the TCB21 project, all notes, reports, and sheets were distributed using the project platform.

26. The TCB21 documentation can be divided in two sets: (1) a self-contained set of main reports, covering the whole project and results, (2) supporting notes, data sheets, parameter sheets, calculation sheets, presentations, and workshop minutes. Below we list these in an aggregated format and per set of documents.

**TCB21 main reports about the modelling and results**

27. The TCB21 project reports about all aspects of TCB21, including approach and results, in a set of reports. These reports constitute the main part of the TCB21 documentation. All other documentation, like notes and sheets, see below, were instrumental to these main reports.

*Cover note*
(This note)
Combined for electricity and gas.

*Method note*
(TCB21 Method and Calculations, version V1.2, 30 June 2024)
For electricity and gas combined, explaining the benchmark method used in TCB21. The report is public and does not contain information that can be traced to individual TSOs.

*Model specification notes*
(TCB21 Model Specification Gas, version V1.0, 30 June 2024, and TCB21 Model Specification Electricity, version V1.0, 31 July 2024)
Separately for electricity and gas, these two notes explain how the method transformed TSO data and public parameters into the TCB21 results. These reports are also public and do not contain information that can be traced to individual TSOs.

*Comparability note*
(TCB21 Note on comparability, version V1.1, 8 September 2022)
For electricity and gas combined, explaining considerations and measures to ensure the comparability of TSOs in TCB21.

*Environmental note*
(TCB21 Note on Environmental Modelling, version V1.4, 13 January 2023)
For electricity and gas combined, explaining how environmental parameters are considered in TCB21 and how routing of lines, cables and pipes is estimated.

*Environmental analysis matrixes*
(TCB21 Environmental Analysis Matrix Electricity, and TCB21 Environmental Analysis Matrix Gas, versions V1.1, 15 March 2023)
Separately for electricity and gas, these two documents explain the quantification of environmental factors in TCB21.

*Normgrid note*
(TCB21 Normgrid Weights, version V1.2, 16 April 2024)
For electricity and gas combined, this note focusses specifically on the normgrid output parameter and the weights assigned to the different kinds of assets considered in TCB21.

*Special conditions note*
(TCB21 Special Conditions Response Note, version V1.0, 30 June 2024)
This note, combined for electricity and gas, reports about the special conditions that were submitted by several TSOs and the analysis of those submissions by CEER. This note is public and refers to specific (and named) TSOs, however without revealing confidential TSO data.

*Individual reports*
(Confidential reports)
Separately for each TSO (and separate for electricity and gas) a report was drafted to explain the TCB21 results for the specific TSO. These reports are confidential and one by one only delivered to the relevant NRA and TSO, together with Excel sheets showing the final data used in TCB21.

*Audit report*
Audit report by KPMG, see above. This report is public.

**TCB21 documentation leading to the main reports**

28. Several notes were developed and consulted during the TCB21 project, each note covering specific aspects of the project:

    *Data guides*
    (Financial Reporting Guide, Electricity Asset Reporting Guide, and Gas Asset Reporting Guide, 15 Oct 2021)
    Containing data definitions used for the collection of TSO data.

    *Workshop presentations and minutes*
    Workshop material for each workshop, see above.

    *Consultation notes*
    Consultation notes, responses by TSOs and NRAs, and the analysis of that by CEER. See above.

29. Excel sheets with data from public sources used for indexations, cost normalisation, and environmental impact:

*Data sheets*
Per TSO, sheets with asset and financial TSO data. Also per TSO sheets with processed and/or aggregated TSO data derived from the original sheets.

*Parameter sheets*
Sheets with environmental parameters and economic indices, used to analyse TSO data and turn it into comparable benchmark data.

*Calculation sheets*
Sheets that show the exact derivation of benchmark data, e.g. the calculation of the Normgrid output parameter.

**Other project information**

30. Apart from such notes, presentations and sheets, many suggestions were done, and comments made, on the project platform by TSOs and NRAs and many responses by CEER to that were given on that platform. This kind of information was important to inform the project about specific issues and concerns raised by TSOs or NRAs.