Mid-term Adequacy Forecast Executive Summary

2020 Edition

entsoe

About ENTSO-E

ENTSO-E, the European Network of Transmission System Operators for Electricity, represents 42 electricity transmission system operators (TSOs) from 35 countries across Europe. ENTSO-E was registered in European law in 2009 and given legal mandates since then.

ENTSO-E was established in 2009 and was given legal mandates by the EU's Third Legislative Package for the Internal Energy Market, which aims to further liberalise the gas and electricity markets in the EU.

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Disclaimer

Regulation (EU) 943/2019 (hereinafter "Electricity Regulation") and Regulation (EU) 942/2019 (hereinafter "Risk Preparedness Regulation"), as part of the Clean Energy Package (CEP) in combination with the European Resource Adequacy Assessment (ERAA) methodologies as approved by ACER on 2 October 2020, have introduced significant changes to the ERAA's future role. In particular, under the CEP, the ERAA will be the key tool in the detection of adequacy concerns at a European level and the related potential introduction of capacity mechanisms.

However, the 2020 Mid-term Adequacy Forecast Report (hereinafter "the MAF 2020") and its findings should not be interpreted in light of the CEP for the following reasons:

- The MAF 2020 is not an ERAA report;
- The collection of the input data and the scenarios used do not follow the CEP requirements;
- The methodology followed does not yet comply with the important elements of the CEP/ERAA framework which are notably, but not limited to, an economic viability assessment and the implementation of the flow-based methodology.

Consequently, the MAF 2020 cannot and should not be used for the purposes meant in the CEP and ERAA, namely assessing the need for the introduction of capacity mechanisms or providing the basis for national adequacy assessments.

Thus, the MAF 2020 results can be deemed as presenting an optimistic view on the European adequacy situation given the combination of large amounts of new capacities assumed to be introduced throughout Europe for the analysed time horizons – as, for example, announced by market actors or the corresponding governments – and the fact that no economic viability or feasibility checks on those inputs have been implemented yet.

ENTSO-E and the participating TSOs have followed accepted industry practice in the collection and analysis of available data. Although all reasonable care has been taken in the preparation of this data, neither ENTSO- E nor the TSOs are responsible for any loss that may be attributed to the use of this information. Prior to taking business decisions, interested parties are advised to seek separate and independent opinions with respect to topics covered by this report and should not rely solely upon the data and information contained herein. Information in this document does not amount to a recommendation with respect to any possible investment. This document is not intended to contain all the information that a prospective investor or market participant may require.

ENTSO-E emphasises that both itself and the TSOs involved in this study are not responsible in the event that the hypotheses presented in this report or the estimations based upon these hypotheses are not realised in the future.

MAF 2020: Navigating through the report

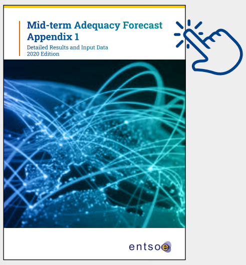
MAF 2020 is divided into five sections (Executive summary and appendices) in an effort to assist stakeholders in identifying relevant information.

Executive Summary

In the executive summary the MAF 2020 motivation is presented, followed by:

- The main adequacy results for the target years (TY) studied, namely 2025 & 2030;
- Survey results of COVID-19 expected impacts on adequacy;
- The CEP/ERAA and main methodological differences.

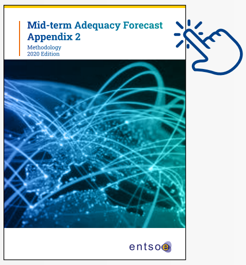
The appendices as well as the relevant data can be downloaded on MAF 2020 website



Appendix 1 – Input Data & Detailed Results

A closer look at:

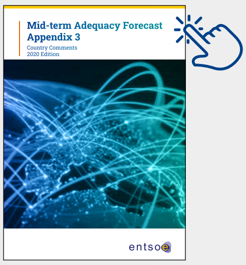
- The main input data and the changes compared to the MAF 2019;
- Detailed results per modelling tool for TYs 2025 & 2030.



Appendix 2 – Methodology

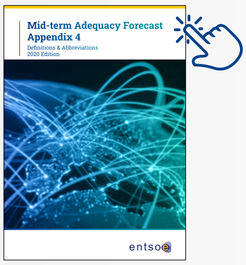
The main MAF 2020 methodology, consisting of:

- Probabilistic methodology for assessing adequacy;
- Input data and granularity;
- Introduction to methodologies used for preparing demand and hydro datasets;
- Future evolution of the methodology.



Appendix 3 – Country views on the MAF 2020

Country-specific comments and references to national and regional studies provided directly by the TSOs.



Appendix 4 – Definitions & Abbreviations

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1 Purpose and Motivation of the MAF

What is the purpose of the Mid-term Adequacy Forecast (MAF)?

The MAF is a pan-European monitoring assessment of power system resource adequacy of specific years up to 10 years ahead based upon a state-of-the-art probabilistic analysis.

The MAF provides stakeholders with the data necessary to make informed, qualified decisions and promote the development of the European power system in a reliable, sustainable and connected way. MAF assessments have contributed to the spatial harmonisation of adequacy methodologies across European Transmission System Operators (TSOs). The MAF is also coordinated and consistent with other timeframe studies as the Ten-Year Network Development Plan (TYNDP) and Seasonal Outlook. Over the past decade, the European Network of Transmission System Operators for Electricity (ENTSO-E) has been improving its adequacy assessment and forecasting methodologies continuously and will continue to ensure that further progress is made under MAF evolution into the target European Resource Adequacy Assessment (ERAA; see Section 3 for more information).

Stakeholders find the MAF and its extensive pan-European coverage particularly useful. Its realisation is an inherently complex task, only made possible as a result of the collaborative effort of European TSOs. The calibration and benchmarking of five advanced modelling tools increases consistency, robustness and fundamentally confidence in the results among the different tools.

The scope of the MAF includes ENTSO-E member countries (42 TSOs) as well as Turkey as an observer member, and all have been explicitly modelled with the exception of Iceland, due to the lack of up-to-date data. For more information regarding the countries modelled in the MAF 2020 please refer to Appendix 2. Figure 2 below illustrates the geographical scope of the MAF 2020, distinguishing between countries that have been explicitly modelled, neighbouring countries that have been modelled implicitly through fixed exchanges and non-modelled countries.

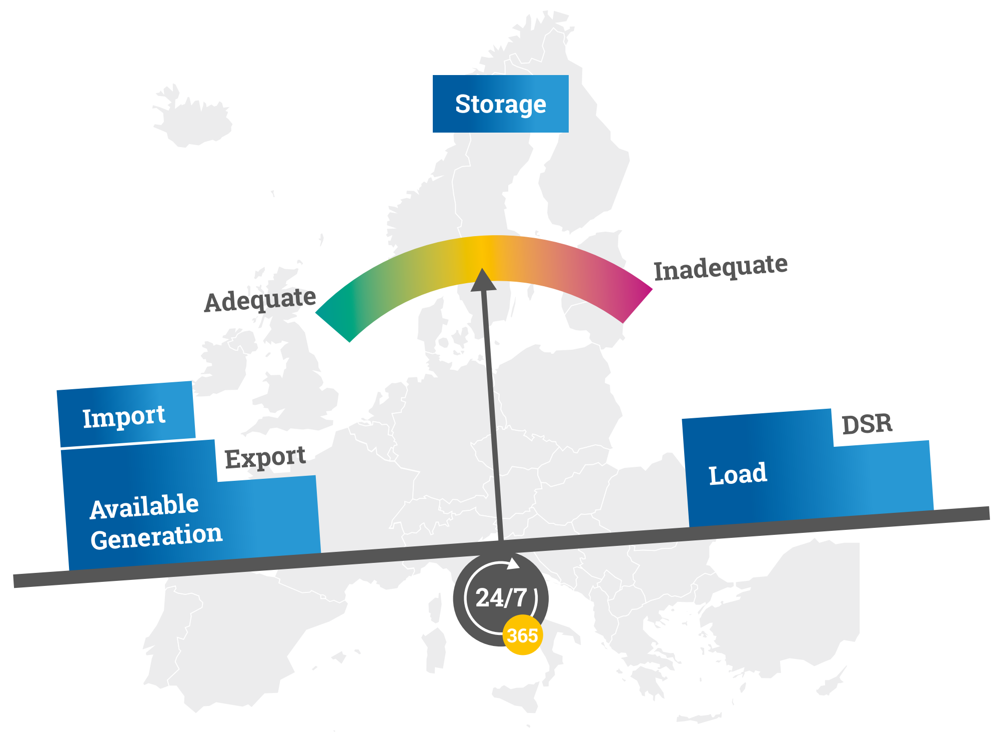

Figure 1: Resource adequacy: balance between net available generation and net load

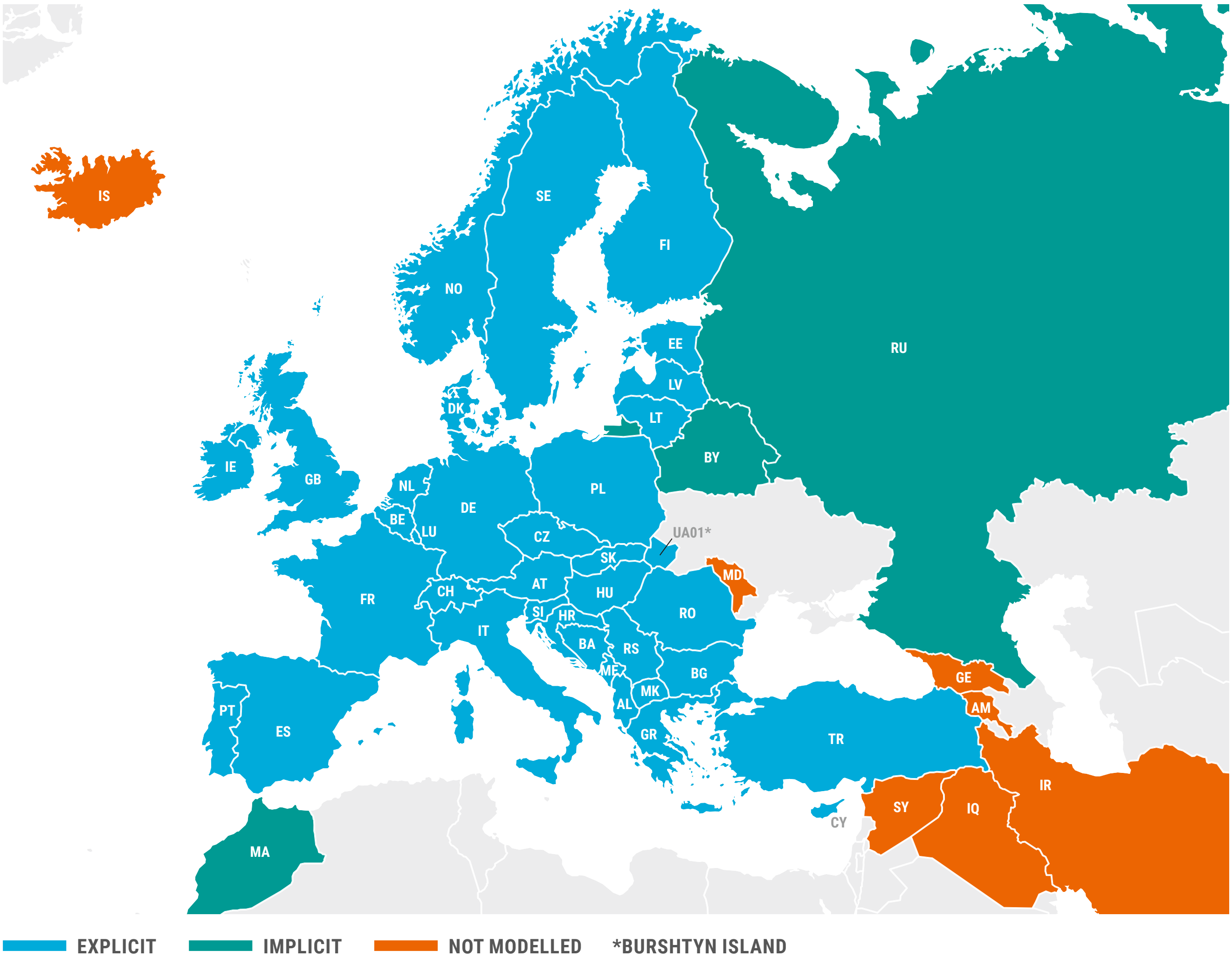

Figure 2: The MAF 2020 geographical scope

The extended geographical scope of the MAF 2020 leads to significantly complex and computationally heavy models. Thus, it is necessary for the MAF study to introduce a set of simplifying assumptions to make the respective models computationally feasible. For instance, the MAF does not consider all possible network constraints within a defined modelling zone. The regional/national adequacy analyses carried out by individual TSOs and regional groups, are complementary to the MAF and they might model the respective grids in more detail. As such, they are more suited to detecting local resource or network constraints, highlighting the complementary nature of the pan-European MAF and the regional/national adequacy studies. Although such studies may rely on the same methodology and reference scenarios, they can assess additional sensitivities[1]. National and regional studies can use tools and data granularity complementary to those used by ENTSO-E.

1 Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal market for electricity, Chapter IV, Art. 20.1. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0943

2 Main findings of MAF 2020

The MAF 2020 assessed the adequacy of the European system for two target years (TY), namely 2025 and 2030. The main findings of the assessment are presented in this section, whereas more detailed results can be found in Appendix 1. Target year 2025 was chosen as it represents a pivotal year for evaluating adequacy due to expected reductions in coal and nuclear capacity in Europe and enables a comparison with the MAF 2019, in which the same TY was studied. Target year 2030 was chosen to allow for the evaluation of the adequacy situation further ahead, at the end of the 10-year time horizon. It is the first time that a MAF assessment has evaluated the adequacy situation a decade ahead.

Although a new legal framework was created with the entry into force of the Clean Energy Package (CEP) and with the recent approval of the ERAA methodologies, it is important to reiterate that both the MAF 2020 scenarios and the MAF 2020 results should not be interpreted nor utilised under this new legal framework. For more details, please refer to the disclaimer included in the preface of this report.

It is important to note that large amounts of new capacities of different types are assumed to be installed throughout Europe for the analysed time horizons. For countries with Capacity Mechanisms (CMs) already in place, or expected to be in place, estimated volumes of capacities are added to ensure the adequacy of the concerned countries[2]. For countries without such mechanisms, those new capacities reflect future ambitions of the concerned countries, whereas no economic viability or feasibility checks on those inputs provided by the TSOs have been implemented yet. Therefore, in neither of the above cases is there any guarantee on the effective and timely realisation of those capacities.

The MAF 2020 indicates mostly low risks of inadequacy in the system for both target years with a positive evolution in some zones from TY 2025 to TY 2030. However, some countries do show high risks of inadequacy. The zones with the largest risks of inadequacy in TY 2025 are Malta, Sardinia, Turkey and Ireland, though the loss of load expectation (LOLE) for the latter is still well below the national reliability standard of Ireland, which is 8 hours. Sardinia's risk almost disappears in TY 2030, whereas Malta's risk increases severely from TY 2025 to TY 2030. Naturally, the results depend on the model input assumptions, which can be found in Appendix 1.

As the adequacy level of each country depends on the assumptions on the evolution of both its own installed capacity and that of neighbouring countries, the results cannot be separated from the underlying assumptions. In particular, the pace of development of new capacities and the evolution of the existing capacities are subject to uncertainties, in particular regarding their economic viability. This means that the absence of adequacy issues, as seen in MAF 2020, for a specific country does not necessarily mean that there is no scarcity but should instead be seen in the context of the assumptions forming the underlying input data. The complexity of the models and input data variation does not enable a single reason to be identified for the overall adequacy evolution over the years.

In addition, the MAF 2020 results for TY 2025 show lower adequacy risks compared to MAF 2019. These differences are mainly attributed to the updates of the input datasets. For example, the expected installed capacity in Germany has been updated based on the latest national scenarios leading to an increase in overall capacity in the country compared to the MAF 2019 scenario. This, together with an expected increase in gas capacity in Italy north, has increased the available capacity in the area compared to MAF 2019 expectations. Although a one-to-one comparison is difficult to perform due to the large number of interdependent assumptions and the complexity of the models, the results presented hereafter should be considered as an updated estimate of the future adequacy landscape under the condition that all assumptions taken for this analysis are effectively realised. More information on the updates in the input data and methodology can be found in Appendices 1 and 2, respectively.

2 Please note that there might be different assumptions for each country with respect to capacities stemming from a CM, i. e. these capacities for some countries come from a finalised CM auction, a future CM auction or simply an estimate of the corresponding TSO on a future CM.

To obtain robustness and confidence in the results, five different market modelling tools were used for the current adequacy assessment. In addition, the simulation inputs are aligned with bottom-up scenarios using data collected from TSOs in alignment with National Energy and Climate Plans. The corresponding scenarios are the **National Trends 2025** and **National Trends 2030**. As in all probabilistic studies, and especially Monte Carlo assessments such as the present one, the results should be interpreted considering all necessary input assumptions and the uncertainty of input variables. In the MAF 2020, the latter consist of climate variables and forced outages. Thus, results are presented in expectation of the probabilistic results, i. e. LOLE. Lastly, to better illustrate the range of results observed from the different tools, the minimum and maximum values are presented for each zone and each property.

LOLE TY 2025

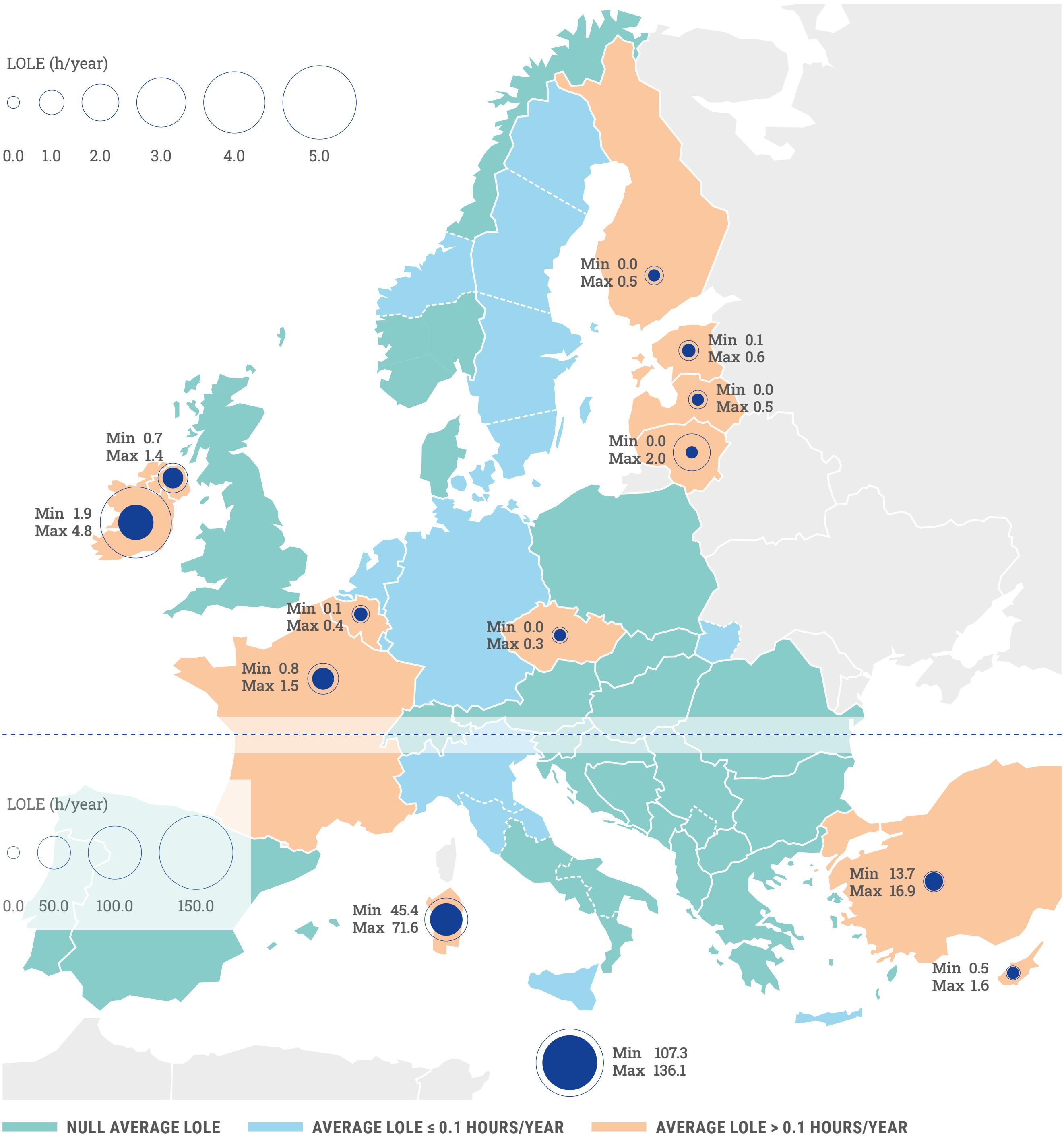

Figure 3: LOLE values for TY 2025. Min/Max circles for bidding zones with an average LOLE over the 5 tools equal or smaller than 0.1 hours/year are not represented. (Even though the same input data is used for all modelling tools, differences in LOLE results can occur due to different geographical or temporal distributions of unserved energy in the case of multiple optimisation solutions, as well as the different approaches to optimising hydro plants.)

LOLE TY 2030

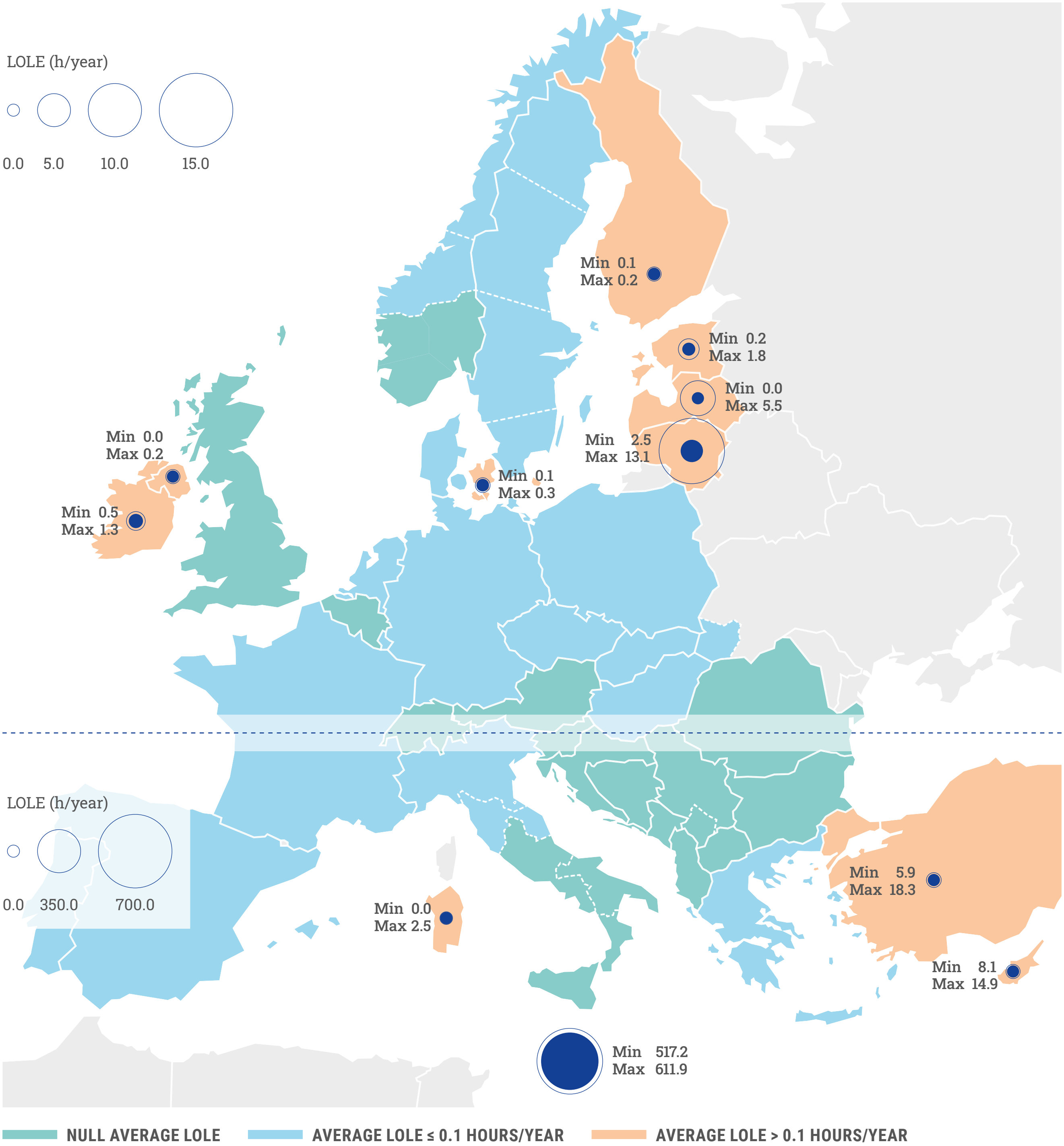

Figure 4: LOLE values for TY 2030. Min/Max circles for bidding zones with an average LOLE over the 5 tools equal or smaller than 0.1 hours/year are not represented. (Even though the same input data is used for all modelling tools, differences in LOLE results can occur due to different geographical or temporal distributions of unserved energy in the case of multiple optimisation solutions, as well as the different approaches to optimising hydro plants.)

Figure 3 and Figure 4 illustrate the minimum and maximum LOLE of the five modelling tools per region for TYs 2025 and 2030 respectively. The maximum and minimum values are represented by two circles of different sizes and colour. A region's LOLE derived from a given modelling tool is calculated by averaging the Loss of Load Duration (LLD), i. e. hours with unserved energy, resulting from all the simulated Monte Carlo Years. More detailed results, including Expected Energy Not Served (EENS) per region, can be found in Appendix 1. For the methodology and probabilistic indicators, please see Appendix 2. Moreover, there are cases in which the results depend on the specificities of each country or zone. Thus, the reader should also consult Appendix 3, which contains country-specific comments that will enable more accurate conclusions.

2.1 COVID-19 impact on mid-term adequacy: A survey among TSOs

Year 2020 is marked by the COVID-19 outbreak. In addition to the health crisis it caused and its adverse impacts on the economy, it has also impacted the energy sector. The IEA has highlighted that the clean energy transition might be at risk, as cheaper energy may lead consumers to a less efficient use thereof[3]. Both governments and the European Union are introducing support packages to lessen the adverse impacts of the outbreak.

The assumptions used in the MAF 2020 do not include the impact of COVID-19. Accurately predicting the impacts of the crisis on the Energy Sector towards 2025 and 2030 is not possible, but in an effort to assess the severity of these, ENTSO-E asked its member TSOs to fill in a qualitative survey regarding the expected impact of COVID-19 on adequacy[4]. It should be noted that TSOs are naturally not in a position to accurately predict the impact of COVID-19. The views and survey response presented below should be read as simply a reflection of the opinion of TSOs and their experts at the time that this survey took place, during the first period of this pandemic. The survey was answered by 23 TSOs out of 42 ENTSO-E members. The response rate for questions relating to the impact on adequacy was lower than for other questions, highlighting the complexity of assessing the overall impact of many drivers.

When asked about the several-year-ahead[5] impact on the **adequacy on their region**, a majority of respondents estimate a neutral to minor positive overall impact (see Figure 5). Despite some expected delays in the commissioning or decommissioning of grid projects, non-renewable and renewable generation, this slightly optimistic outlook is mainly driven by an expected demand reduction on the short term due to reduced economic activity. Only 3 of 23 respondents expect a minor negative impact on regional adequacy overall. In some cases, this opinion is driven by regional impacts, such as the postponement of the maintenance of large-scale generation units to the winter season. On a European level, the impact on adequacy is less certain but instead expected to be slightly positive. Timewise, the overall expected impact on European energy transition and demand-side efficiency targets looks neutral according to the TSOs, even if electric vehicle penetration could slow down as consumer buying power is reduced.

On the infrastructure side, 15 of 23 respondents experienced delays in the commissioning or decommissioning of **grid projects**, ranging from a couple of months to half a year (see Figure 8). The main causes are capital deployment delays of important grid reinforcement projects, equipment supply delays, difficult working conditions, and the impossibility of organising public consultations as part of a permitting process. In turn, 10 of 23 respondents expect these delays to have a minor negative impact on adequacy, which would be mitigated in the medium term as grid projects resume (see Figure 8).

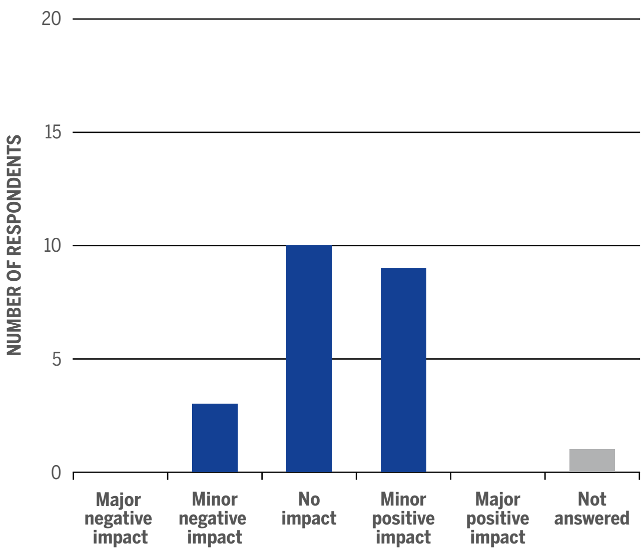

Figure 5: Expected COVID-19 impact on regional adequacy overall

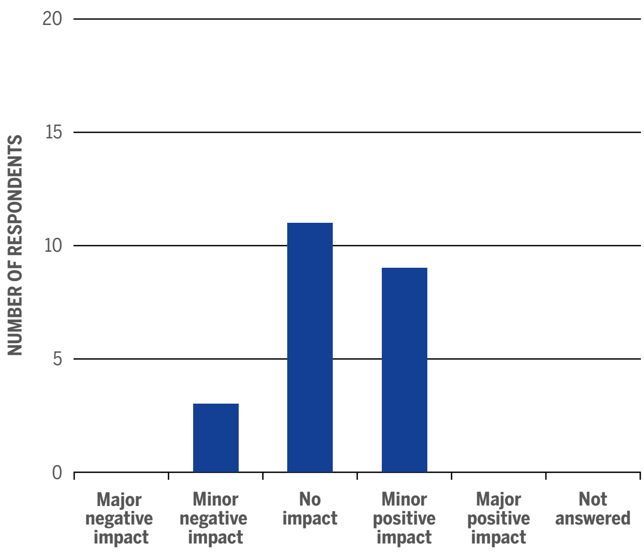

Figure 6: Expected COVID-19 impact of demand on adequacy

3 https://www.iea.org/commentaries/put-clean-energy-at-the-heart-of-stimulus-plans-to-counter-the-coronavirus-crisis
4 https://consultations.entsoe.eu/entso-e-general/69f31550
5 The short term impact is addressed in the Winter Outlook 2021/2021: https://www.entsoe.eu/outlooks/seasonal/

On the generation side, a minor negative impact on the commissioning of planned non-renewable generation capacity (postponement) or the decommissioning of existing **non-renewable generation** (preponement) is expected (see Figure 9). Although many respondents could not assess the overall impact on adequacy, the majority of those who did expect a minor negative impact on adequacy (see Figure 10).

In addition, although 10 of 23 respondents expect a minor negative impact on the commissioning of planned **renewable generation** in their region (see Figure 11), only a minority of respondents expect a negative impact on adequacy, as the contribution of renewable generation to adequacy is limited and official reports on delays are lacking (see Figure 12). Furthermore, 8 of 23 respondents expect only a minor negative impact on future renewable energy investments in the short term thanks to existing subsidy schemes (see Figure 13).

Despite the expected negative impacts on adequacy from grid and generation projects, respondents estimate a neutral to minor positive impact on regional adequacy overall due to an expected reduction in **demand** for electricity in the short term (see Figure 6). The main drivers of the latter are reduced economic activity and, for some regions, reduced tourism. Respondents do not expect new lockdowns to be imposed and, thus, no additional impact on demand. Medium and long term estimates are, however, less certain, with opposing trends potentially cancelling each other out. A few respondents expect that the impact of COVID-19 on peak consumption, and therefore on adequacy, during winter might be negligible.

The impact on **European energy transition targets** and on **European demand-side efficiency targets** is expected to be limited, as these targets will stay in place and both national and European economic recovery plans are foreseen as being increasingly oriented towards climate, environment and the energy sector (see Figure 14 and Figure 15).

Opinions on the impact of COVID-19 on national **electric vehicle** penetration diverge but are neutral overall (see Figure 16). A reduction in sales in the short term is expected, as consumer buying power has dropped and many consumers have postponed new car purchases. This reduction, however, is expected to be compensated in the medium term via support from national and European post-COVID-19 recovery plans.

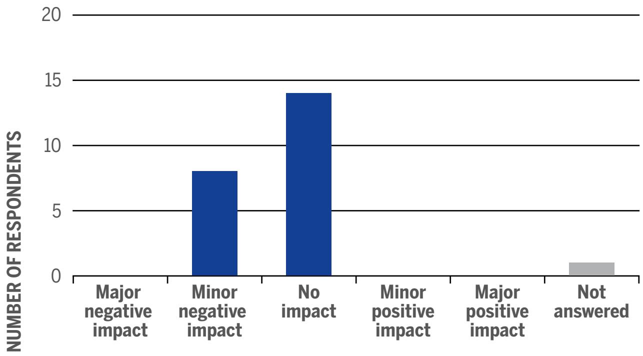

Figure 9: Expected COVID-19 impact on the commissioning of planned/existing regional non-renewable generation capacity

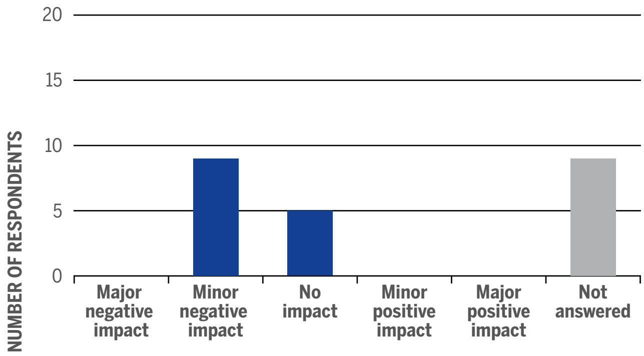

Figure 10: Expected COVID-19 impact of non-renewable generation capacity on regional adequacy

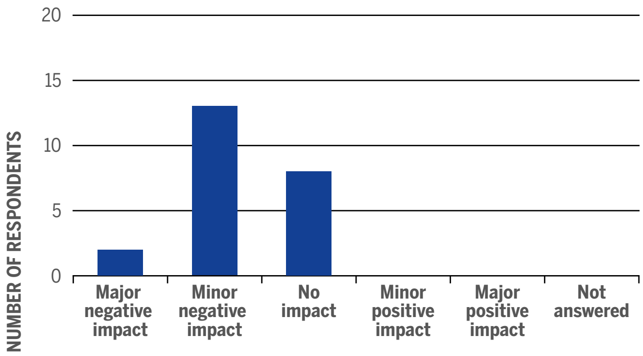

Figure 7: Expected COVID-19 impact on the commissioning/ decommissioning of existing/planned regional grid projects

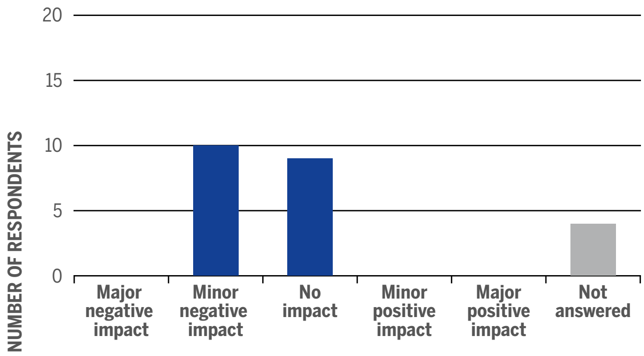

Figure 8: Expected COVID-19 impact of grid projects on regional adequacy

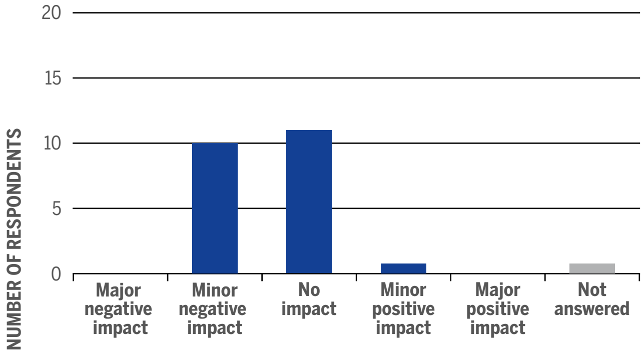

Figure 11: Expected COVID-19 impact on the commissioning of planned regional renewable generation capacity

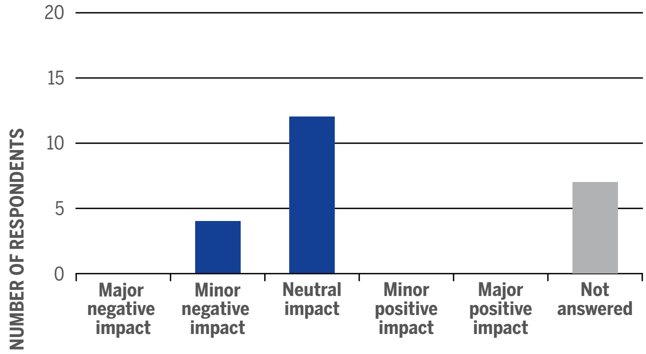

Figure 12: Expected COVID-19 impact of renewable generation capacity on regional adequacy

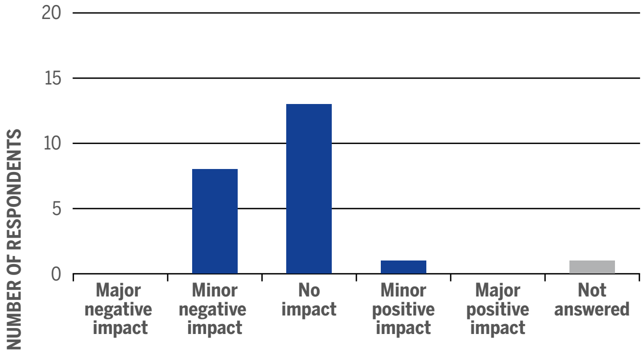

Figure 13: Expected COVID-19 impact on new regional renewable generation investments

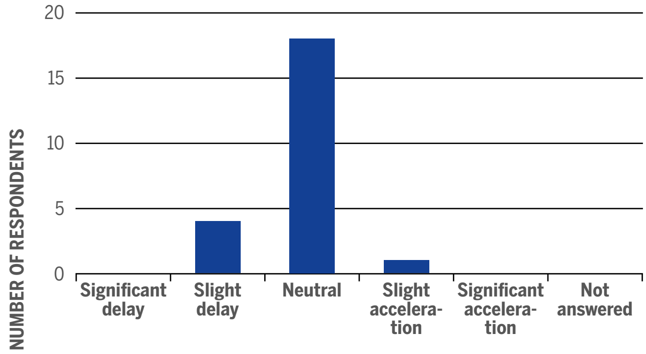

Figure 14: Expected COVID-19 impact on nationally reaching the European energy transition targets

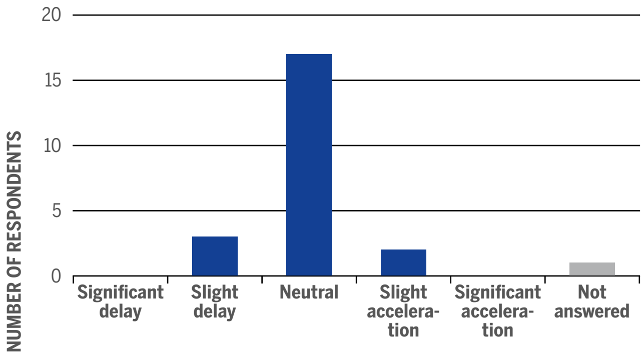

Figure 15: Expected COVID-19 impact on nationally reaching the European demand-side efficiency targets

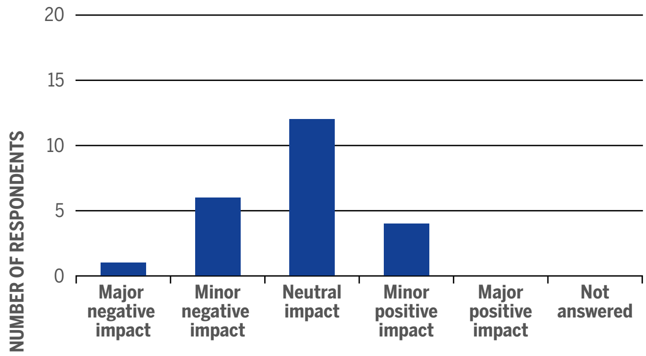

Figure 16: Expected COVID-19 impact on national electric vehicle penetration

3 The “Clean Energy for all Europeans” package and evolution from the MAF to ERAA

With the coupling of European energy markets, the integration of renewable energy sources and efforts to decarbonise energy systems, adequacy monitoring needs to be intensified. In the current fast-paced landscape, the European resource adequacy assessment, i. e. the annual screening of adequacy in Europe for the upcoming decade, must provide input for strategic decisions regarding, for instance, the introduction of CMs. To address these needs, the methodology for assessing adequacy in Europe shall undergo significant improvements and scope extensions. The target methodology, the ERAA, was approved by ACER on 2 October 2020[6][7] and its stepwise implementation will begin in 2021. The MAF 2020 is thus the last MAF report anterior to the ERAA implementation.

What are the upcoming challenges and future steps for resource adequacy assessments as required under the CEP?

The CEP will require the introduction of additional methodologies and features, such as an economic viability assessment, scenarios with capacity mechanisms, the impact of climate change on input data, and flow-based representation of the grid, thus introducing significant challenges and improvements for future pan-European and regional adequacy assessments.

The recent legislative package on Clean Energy for all Europeans, specifically Regulation 2019/943 of the 5 June 2019 on the internal market for electricity, has placed resource adequacy in a central position in European energy policy. Under this regulation (Article 23), the ERAA, which will be implemented stepwise from 2021, is required to consider, among others, the following aspects:

- An Economic Viability Assessment (EVA) of resource capacities;
- Flow-Based (FB) modelling of the power network (when applicable);
- Impact of climate change on adequacy;
- Analysis of additional scenarios, including the presence or absence of CMs;
- Consideration of energy sectoral integration;
- Time horizons of 10 years with annual resolution.

6 https://www.acer.europa.eu/Media/News/Pages/ACER-sets-the-methodologies-to-assess-electricity-resource-adequacy-in-the-EU.aspx

7 Methodology for the European resource adequacy assessment: https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions%20Annexes/ACER%20Decision%20No%2024-2020_Annexes/ACER%20Decision%2024-2020%20on%20ERAA%20-%20Annex%20I.pdf

Two of the most significant improvements in the future ERAA are the assessment of the economic viability of existing and new capacities and the implementation of FB (for more information on the rest of the changes, see Appendix 2). The former will provide a better insight into the adequacy situation considering the market impact on the withdrawal or expansion of generation, whereas the latter will come to replace the Net Transfer Capacity (NTC) approach that is currently used, aiming to provide a better representation of the grid elements in the model. ENTSO-E and its members are already actively preparing for the evolution to ERAA. Dedicated working groups are working to provide a robust and tested methodology for each of the aforementioned elements. The current methodologies and results will set the basis for the future implementation of these methodological improvements in the ERAA.

3.1 Economic viability assessment

The EVA is a methodological element in the target ERAA methodology that aims to identify changes in the capacity mix, stemming from economic reasons that could affect the likelihood of retirement, mothballing and new investments in capacities. In the current MAF state of play, TSOs provide their best estimates of available units for each of the simulated target years, based on national plans and/or ambitions and to the best of their knowledge at the time of the data collection. The economic rationale that would ensure that these capacities would indeed materialise is, however, not verified, rendering such assumptions intrinsically uncertain. In addition, even if these estimates could be realised, they may represent a non-optimal asset mix with regards to profitability. The EVA aims to identify assets which, under perfect competition, would likely be decommissioned or mothballed and simultaneously identify new generation investments. In addition, under the ERAA, the impact of existing CMs in improving adequacy for a given TY is considered by assessing the results in two separate scenarios, including and excluding CM respectively.

The general guidelines for the implementation of the EVA in the future ERAA assessments are set in the ERAA methodology, approved by ACER on 2 October 2020[8], and its implementation is a complex task that will need time and careful investigations. ENTSO-E has already started on building and testing the methodology for the EVA through a dedicated working group of experts, in an effort to initiate the development of a proof of concept that will ensure the robustness of the methodology and its applicability within the context of the ERAA.

ENTSO-E investigated a two-step approach to perform the EVA. In the 1st step, the economic viability of capacities for a given target year is assessed and potential investments are evaluated. The 2nd step is a validation step in which the models are re-run considering the results of the 1st step and ensuring the remaining assets are profitable as expected. The 1st step is modelled as a Monte Carlo probabilistic assessment of the system cost minimisation problem. Compared to MAF methodology, the generation assets viability is an additional optimisation variable which, in combination with the stochasticity of climate variables and random outages, further complexifies the model. Below is a list of the main assumptions, some of which were introduced to bring computational time within acceptable levels:

- The scenario with CM will include approved CMs for the concerned target year and in accordance with the Union State aid rules pursuant to Articles 107, 108 and 109 of the TFEU, whereas the scenario without CM will only consider already awarded contracts under existing CMs;
- Regulatory constraints regarding phase-out or restrictions of specific technologies (e. g. coal or nuclear) are considered;
- Input data temporal granularity is decreased;
- Hourly input data are aggregated in time steps larger than an hour.

The abovementioned statements reflect the first findings on the EVA established during the preliminary investigations. Further assessments and analyses on the implementation of the EVA will be performed in the framework of the next adequacy assessment by ENTSO-E, ultimately leading to the decision on a final approach on the application of the EVA.

8 https://www.acer.europa.eu/en/Electricity/Pages/European-resource-adequacy-assessment.aspx

3.2 Flow-based implementation

Flow-based Market Coupling (FBMC) describes a method for the capacity calculation between bidding zones in the energy market for electricity. By monitoring linearised load flow, FBMC defines the available trading capacity between zones. In Europe, FBMC has been operational in the day-ahead market for the capacity calculation region (CCR) of Central-West Europe (CWE) since 2015, and the method will be extended to the CCR of CWE and Central-East Europe (CEE), i. e. the Core region, by mid-2021. The remaining CCRs in Europe apply another approach using values for NTC between bidding zones. Unlike FBMC, the NTC methodology assumes that bilateral trade between bidding zones does not affect the exchanges on other borders. For the main simulations in the MAF 2020, seasonal NTC values were applied in the whole pan-European market model.

In preparation of the ERAA, FBMC for adequacy studies is implemented as a proof of concept at ENTSO-E. In principle, FBMC is derived from a linearised load flow model. Based on power transfer distribution factors, the individual net positions of bidding zones, and setpoints of relevant HVDC interconnectors, the active power flow can be calculated for monitored network elements. The resulting power flow must not exceed the available transmission margin, which depends on the individual physical transmission capacity, flow reliability margins and effective legal requirements. Further developed methodological advancements enable the calculations of FB domains for probabilistic studies. As the calculations are based on planning data sets for market data and grid models, these domains are applicable to mid- and long-term studies. For its implementation in the ERAA, the plan is to capture all of the Core region as a CCR. As another outcome of the proof of concept, the preliminary simulation results highlight the importance of considering the effect of curtailment minimisation and curtailment sharing. For more details regarding the FBMC methodology, please refer to Appendix 2.

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