European Network of
Transmission System Operators
for Electricity

entsoe

Consultation on all Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL

1 October 2021

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2. Comments and Replies

Eneco Energy Trade B.V.

Rob Jansen (rob.jansen@eneco.com)

Eneco supports proposal put forward by all Nordic TSOs to propose 15 minutes as a time period for LER.

TSOs acknowledge the position.

Wouter le Rutte (wouter.lerutte@eneco.com)

"We are strongly against a Tmin of 30 minutes. In summary:

- The CBA is based on poor assumptions and is reasoned from the TSO perspective without taking into account system costs.
- The savings of TSOs do not outweigh the inefficiencies that such a measure will affect system/society-wide, in particular for market parties.

  The analyses performed during 2020 (consulted in March-April 2020) implemented a Cost Benefit Analysis where the social welfare was calculated (considering both supply and demand sides). The results presented in 2020 already showed the presence of a minimum of the total costs in correspondence with a specific LER share (which in turn depends on the TminLER). Exceeding that LER share showed to lead to increased total costs due to the need for TSOs to purchase more FCR.

  The process that TSOs have followed in the last year is presented in the section 7 of the Explanatory document currently under consultation. TSOs have considered the presence of the aforementioned minimum in the total costs with a specific LER share, but they also considered the infeasibility of a LER share limitation. Furthermore, the effect of LER share on the need of FCR increase are not reflected by proper market signals.

  The study presented with the current consultation is thus to be considered as a further development of the previous study where all these issues have been addressed.
- The necessity and proportionality of this proposal, therefore, is unclear (in the Netherlands but also in many other countries, there are also no issues with FCR).

  An issue on FCR (e.g., LER depletion) would impact the frequency of whole synchronous area, not specific areas/blocks.
- aFRR and mFRR markets are easily able to take over FCR already beyond five minutes.

  The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.

  If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need

for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

- This will create significant investment uncertainty for LER, which, looking at the asset pool of the next decaded, is very undesirable.

  TSOs acknowledge the potential uncertainty introduced by a change in the requirement. It should however be highlighted that this possibility is expressly provided by Art.156(11), which set the minimum and the maximum time period respectively to 15 and 30 minutes.

  In order to minimize the uncertainty and the impact on existing business cases, an interim period of at least 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period.

  LER prequalified before the end of the interim period are exempted from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

We support and refer to the Eurelectric and RWE responses for a more detailed explanation of our views.

In deviation from the Eurelectric reponse, we do not believe a derating factor for 15-minute LERs is appropriate as you'd be offering different prices for the same service. Instead, if TSOs would deem this necessary, they should resort to making different FCR products in different timeframes."

The adoption of Derating Factors has been ruled out by TSOs. Regardless of their TLER, the remuneration of LER will not be reduced.

The adoption of different products is impracticable since it would require a way to separately define the demands of LER and nonLER. Only a comprehensive market in which both prices and quantities of LER and non LER arise as market results could deal with it (please refer to the Explanatory note, Section 7.b). The potential introduction of such a market has been assessed by TSOs, but it resulted to be infeasible on the short-medium term. The extremely wide procurement mechanisms currently in place in CE as well as the potential effects on FRP (e.g., on k-factors) make a market-based approach not practicable.

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BORALEX

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The option D on page 41 is not acceptable because it goes against the conditions set for the existing LER installations.

The option C on page 41 will lead to a decrease of interest of investors for FCR market for which it is already difficult to reach a sufficient profitability.

The option B on page 40 will lead also to the same situation as option B, with relatively less impact.

The option A on page 40 is the most suitable, leaving flexibility for both the owner of the LER installations and the TSO allowing the market to remain sufficiently attractive.

As an improvement, it should be considered the opportunity to let participating the certified LER installations to the FCR market with steps of 0,1 MW (i.e the certified level) instead of considering steps of 1 MW as it is done currently.

TSOs acknowledge your position.

Regarding the comments on Options B, C and D, TSOs are aware that the introduction of a 30 min requirements on TLER would reduce the attractiveness of LER investment in LER, at least to a limited extent.

An increase of TminLER leads to higher CAPEX for the installation of LER.

As described in the explanatory note, the choice depends on the fact that a high share of LER would require TSOs to procure more FCR to keep the system to an adequate safety level.

In any case, to mitigate the impact of the decision on existing and underway business cases, an interim period of at least 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. LER prequalified before the end of the interim period are exempted from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

TSOs acknowledge your consideration on a reduced certified level (from 1 MW to 0.1 MW). The topic is however out of scope of the present consultation.

Axpo

Philippe Schwarcz (philippe.schwarcz@axpo.com)

"I would strongly advise to go for Option C (30 minutes but not applied to LER already prequalified) for the following reasons:

1. The analysis of LER to system safety presented in the explanatory document is not fully satisfying, as an LL is not clearly defined. We have prequalified two 15-minutes batteries for a customer of us and demonstrated to the TSO (Swissgrid) that the batteries have enough capacity to cope with the January 8, 2021 event, where the Continental Europe synchronous area was split into two separate grid regions with different frequencies. We could demonstrate that such an event would not have been a problem for 15-minutes batteries and that the batteries would not have been reached its capacity limits. According to Swissgrid, such an event occurs at most every 10 years and we would qualify it as an LL. This leads to say that there is no need to increase the 3000 MW criteria, should FCR be covered by 15-minutes batteries only.
2. As battery CAPEX decrease and possible number of cycles increase with technological developments, batteries will be more and more used for other services than FCR, e.g. aFRR or SPOT-arbitrage (day-ahead and/or intraday). For such services, batteries with higher capacity, typically 2 to 4 hours will be needed. This means that in the near futures, there is little chance that 15-minutes batteries will be built, as they cannot be used for these other services. Hence, there is no need to force existing batteries to ""upgrade"" to 15 minutes as these batteries will disappear with time."

TSOs acknowledge your position.

Regarding the presented considerations, TSOs would like to point out what follows:

1. The Long-Lasting definition has been provided during the public consultation on input data held on 17th October 2019. The definition is: a "Long lasting frequency deviation is an event with an average steady state frequency deviation larger than the standard frequency deviation over a period longer than the time to restore frequency.".

   During the years considered for the analyses (2008-2018) some events having an energetic content such as to potentially deplete LER have been detected. Furthermore, please consider that these events are just one of the inputs of the model used for the calculations, albeit the most impacting. Their effect could be combined with the effects of potential power plants outages.

   Focusing on the January 8, 2021 event, 15-minutes batteries dealt with the frequency deviation experienced by the north-west area. The frequency deviation experienced in south-east area had however a duration and an amplitude (thus an energetic content) large enough to deplete both 15-minutes and 30-minutes LER. A wide presence of LER in this area would have likely worsened the frequency deviation; 30-minutes LER would have been however less impacting than 15-minutes LER.
2. The extension of the ancillary services provided by LER is a very likely scenario for the future, thanks to technological and regulatory evolutions.

   In a scenario where a single RPG/RPU provide several different services at the same time, the BSP need to accurately allocate in advance both energy and capacity (power) to each service.

   While it's likely that LER RPG/RPU will be equipped in the future with larger battery capacity, it does not imply that such capacity will always be available for FCR. It's instead likely that, in order

to optimize its asset, a BSP will allocate the minimum required energy to FCR, exploiting the remaining energy to maximize its revenues from other services.

In TSOs opinion the correct definition of a suitable TminLER would thus be a key factor also looking at the most likely evolution scenarios of storage system integration in power systems. However, as clearly stated in the CBA methodology (approved by NRAs according to Art156(11) SO GL), if a change in the operating conditions will be observed in the future (e.g. reduction of LLs energetic content), the TminLER could be modified accordingly.

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Axpo Solutions AG

Dominique Guth (dominique.guth@axpo.com)

"We strongly support the proposal of the TSOs for a 30-min minimum activation time for LERs in alert state. However we ask the TSOs to take investment protection into account when designing the transition period.

In our opinion LER providers already have special conditions compare to nonLER providers in terms of activation time. Therefore the balance of treatment between different energy providers is in our point of view important beside to ensure system security."

TSOs acknowledge that one of the most problematic issue associated with the adoption of a 30 minutes TminLER is the risk related to retroactivity of a 30 min requirement to already installed LER which are currently prequalified for 15 minutes.
To mitigate the impact of the decision on existing and underway business cases, an interim period of at least 24 months following the entry into force of the regulation is therefore provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. LER prequalified before the end of the interim period are exempted from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

EDF

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Even though it was validated by the regulators, the methodology and the execution of the CBA has always been fundamentally flawed, and hence any outcome of the CBA is highly questionable. This can be seen quite clearly, even without going into too much details, by looking at the document "All CE and Nordic TSOs' results of CBA in accordance with Art.156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017" dated 19 February 2020.

According to the results of the study (Table 1 of the report), the methodology does not even manage to clearly distinguish TminLER = 15 and TminLER = 30 minutes. According to this table, 3 GW of 15-min LER causes FCR depletion as soon as the LER share reaches 40 %. Yet according to this same table, increasing TminLER to 30-minutes barely even helps the system because even with TminLER = 30 minutes, FCR depletion occurs as soon as the LER share reaches 50 % ! So according to this report, even a TminLER of 30 minutes is insufficient to avoid FCR depletion and the FCR prescription must be increased.

a)

The report to which the reference is made is dated back to 19 February 2020. The updated result of the work (which is currently under consultation) provides updated results in terms of requested FCR increase in presence of LER (please refers, for comparison, to the examples of safe curves presented in Figure 2 and Figure3 of the consulted document).

However, the results presented in the documents under consultation qualitatively confirm what was presented in the mentioned 2020 document. For example, according to the used model, depending on the LER share in the FCR provision, there could be the need for more FCR even if TminLER = 30 minutes, albeit at a lesser extent than if TminLER = 15 minutes.

These results derived, for the greatest part, from the simulation of real frequency deviation events which occurred in the CE power systems during the interval under observation (2008-2018). The possibility to experience a LER depletion is thus based on real observations of the potential effects that LER could have had on the system during those past events, if LER were installed at the time such events occurred.

Of course, it could be questioned whether such kind of events could occur once again in the future, given the improvements in the system which have been implemented in the last years. In this sense, the TSOs choice has been however to base the whole study on the historical frequency trends rather than on assumptions on how the system will perform in the future. This approach is indeed what lies behind the approved methodology itself, based on the use of the past frequency trends. This represents a conservative approach, since the assumptions on future are clearly characterized by a certain level of uncertainty. The event occurred on the CE system on 8th January 2021 is an example of the fact that these events - despite all the measures put in place in order to avoid them - are still possible. A rough estimation of the frequency deviation experienced by the south-east part of the system has shown that LER (even with 30') would have depleted.

It is extremely complex to correctly model the full dynamics and operation of the CE electrical network. A simplistic model such as the one used for this CBA will give simplistic results that tend to be false and unreliable. As a result, instead of being able to choose between Tmin = 15 and Tmin = 30, the CBA study in fact challenges the prescription of 3 GW of FCR, which is out of the scope of the CBA.

b)

TSOs are aware of the extreme complexity needed to model and simulate the CE electrical network. This complexity is indeed the reason why the historical-data-based approach was chosen. Instead of trying to model and simulate the whole system, the approach has been to simulate (with adequate combinations) the events actually occurred in the past. These past frequency trends implicitly contain all the information regarding aspect such as FRR activation (together with associated malfunctioning), renewable curtailment, etc. as they have been deployed in reality.

Of course, this choice is subject to considerations on whether all the characteristic of the system recorded at the moment of a specific event are still relevant today and for the future (see previous reply).

Moreover, it should be considered that all the fast dynamics (e.g. inertia and FCR deployment time) are not relevant for the energy usage of LER and could be neglected.

Moreover, analysis of the past 10 years of historical frequency data (in open loop) with precise models of LER providing 15 minutes of equivalent full FCR (responding to historical frequency data) show that these 15-minute LER are never depleted. Therefore, this highlights once again that the simplistic closed-loop model used in the CBA does not accurately reproduce the actual operation and frequency of the CE network, because it cannot even reproduce what was actually observed over the past 10 years.

c)

This statement is not in line with the results of the calculation made by TSOs. In the observed period 2008-2018 there have been frequency deviation event (with alert state trigger) having an energetic content (calculated as the integral of Δf on dt) well above the energy reservoir associated with a LER with 15-minutes full activation time (calculated as the integral of 200 mHz on dt, on 15 minutes interval).

The differences between the results calculated in the study and those mentioned are likely related to a different model of usage of the energy reservoir (e.g., associated with the energy management).

In terms of the economic impact of TminLER = 30 min compared to 15 minutes on real projects that are in the pipeline (battery energy storage systems or BESS for dedicated FCR provision), the CBA does not correctly reflect the real impact on these projects. Setting Tmin = 30 minutes rather than 15 minutes almost DOUBLES the energy capacity requirement of a battery, and it is well known that a battery's capacity represents the majority of its total cost. Therefore, we could be easily looking at a 50 % increase of the cost of a BESS for an identical service.

d)

All the assumptions on new LER installation costs (with different energy E/P ratio) have been presented in the workshop held on 17th October 2019. The dependency of the CAPEX from the E/P ratio has been derived from an analysis of a set of real projects for which data have been found in literature. The assumptions have been also reviewed by means of a sensitivity analysis to project the expected installation costs on a medium-term scenario.

On top of that, several other factors impacting the overall costs are considered. E.g.:

- The expected energy capacity degradation implies an initial battery over dimensioning to ensure to keep the E/P ratio on a 15-years lifetime of a project.
- The depth of discharge is limited in order to limit the battery degradation.
- The OPEX includes the costs related to the provision of energy at the average DAM prices to cover the energy losses associated with the batteries' round-trip efficiency.

Also, the CBA never distinguishes upper and lower reserve. Yet this is fundamental because overfrequency events can easily be solved by curtailing renewable energy sources (a function that is now integrated in

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RFG with LFSM-O). It makes no sense to oversize FCR batteries just because there is a risk of long-lasting overfrequency events that can be resolved by curtailing renewables.

e)

The model does not distinguish between overfrequency and underfrequency, in terms of severity.

In this regard, it should be highlighted that both overfrequency and underfrequency are easily solved by dispatching traditional units (i.e., mFRR). The amount of dispatchable resource at CE level is huge if compared to the power imbalance related to a long-lasting frequency event. The problem is that such an event occurs not due to a shortage of regulating capacity, but due to some kind of malfunctioning in the FRP. The time needed to identify the potential issue and to solve it has shown to be way longer than 15 minutes. Only understanding the issue, it would be possible to identify the affected area(s) and operate the proper dispatching (either by mFRR, FRR or RES curtailment).

Even if there is a depletion of LER systems in a simplified model, one must keep in mind that in reality, all these LERs will have different recharging strategies, different initial operating conditions, etc.... so in reality they will not realistically all deplete at the same time (as is the case in the simplistic model). Not to mention the energy capacity margins that LER systems must have to ensure continuous operation in Normal State (which effectively adds in 95% of cases to the capacity used in Alert State).

f)

The model is clearly a simplification, considering the real behavior of LER related different recharging strategies, different initial operating conditions, etc. The starting state of charge of LER considered in the model is however set at 50%, in this way a mean value has been assumed aiming at intercepting a "mean behavior" of LER. LER depletion would occur on a time distribution of a few minutes around the moment in which the model simulates the instantaneous full depletion. This simplification has however a limited impact on the final results, also considering that fast dynamics (inertia, FCR deployment time) is neglected.

It's true that the energy capacity margin needed for energy management could play a role also in alert state. To consider its contribution however would mean to rely on an energy margin the retention of which is not legally binding for LER.

On the other hand, the model does not consider situations where the frequency deviation remains for a very long period around 50 mHz, without triggering the alert state. In such condition the possibility for LER to keep the SOC within the acceptable band (namely to affect the energy for the alert state) is a challenging aspect.

Another aspect that has been mentioned time and time again in the consultations is the incoherence with the prescriptions for secondary control. In theory, the "time to restore frequency" is fixed at 15 minutes by SOGL. If we consider a linear return from 49.8 Hz to 50 Hz, the theoretical response required by LER is therefore only 7.5 minutes of equivalent full FCR. Many actual events of large power plant losses in the past few years confirm that this is generally what happens. So Tmin = 15 minutes is already much more than the minimum theoretical requirement. Requesting anything higher than 15 minutes effectively moves the cost of occasional secondary reserve failures onto FCR.

g)

Each frequency event which lasts more than 15 minutes is very likely related to some kind of malfunctioning of FRR. For this reason, the fact that events lasting more than 15 minutes are considered is

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not an incoherence with the FRR FAT. It reflects instead the fact that a complex mechanism such the Frequency Restoration Process could experience failure or malfunctioning.

For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Finally, in case of extreme situations (such as 2003 Italy blackout, or 2006 system split), these events cannot be considered relevant today since many improvements to system security have been brought since then, notably with RFG and the capability for renewable energy sources to reduce their power output for overfrequency events. So, taking into account the now existing LFSM-O and LFSM-U functions, as well as the possibility for load-shedding, system security is well ensured to avoid full system blackouts even in the extremely rare cases of full LER FCR depletion.

h)

This is a legitimate view.

In addition, it should be however highlighted that in the context of an extremely degraded system conditions (albeit rare, such as 2003, 2006, 2021 events) a large presence of LER (particularly having 15-minutes) represents an additional challenge for the TSOs, which cannot rely anymore on a long lasting FCR provision, but must consider this further time constraint in order to avoid a full black-out.

Furthermore, the need to consider the impact on system stability risks is expressly provided in Art.156(11)(d) of SO GL.

In conclusion, the CBA methodology was fundamentally flawed, and analysis of historical frequency data over the past 10 years shows that TminLER = 15 minutes would be sufficient to ensure proper frequency control without reservoir depletion. The 30-minute requirement would be an overprescription based on a very questionable study which will result in blocking many battery projects that are currently in the pipeline for economic reasons. Oversizing batteries will be more expensive but more importantly will result in oversized systems which indirectly will have a negative environmental impact (excessive primary materials, rare metals, CO2 emissions for building a bigger system...) which is totally contrary to the environmental targets and the aim to reduce worldwide CO2 emissions.

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Greenchoice BV

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The issue of increasing costs for TSO's (and thus the community) raised and the security of a stable grid is a very valid point. Action should be taken to ensure a cost effective and stable electricity supply to the community.

Proposing option D, all LER systems have to comply with a 30min TminLER, is not acceptable for participants with LER systems with a 15min TminLER. This change does not respect the master agreements of participants and the investments made by market participants based on these agreements.

The FCR market has great risks in itself, without regulation being changed before end of Life of a LER system. Changing the rules during the game will defer investors from new projects, slowing the energy transition.

An option where new projects comply to the TminLER of 30 minutes but current participants with a TminLER of 15 minutes can still participate seems a very valid option, given the analysis, while not changing the rules during the game.

TSOs acknowledge that one of the most problematic issue associated with the Option D) is indeed the risk related to retroactivity of a 30-minutes requirement to already installed LER having 15-minutes. The risks associated with it are the ones mentioned in the comment.

To mitigate the impact of the decision on existing and underway business cases, an interim period of at least 24 months following the entry into force of the regulation is therefore provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. LER prequalified before the end of the interim period are exempted from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

EnAlpin

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*** empty comment ***

Danish Intelligent Energy Alliance

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"We strongly oppose the proposal to change the TminLER from the existing 15 minutes to 30 minutes. This would imply that all assets shall maintain a full activation in alert state during 30 minutes instead of 15 minutes.

We oppose this for two reasons:

1. It will create a major barrier for new and most likely smaller flexible assets. In particular in a beginning market where market volumes are lower, and therefore portfolios of assets are more difficult to establish. It is important to engage new electrified assets such as EVs, stationary batteries, heat pumps etc. in the green transition. This activation will help to balance intermittent RE production with digitally manageable RE consumption, and thereby reduce the costs of the green transition, ensure highest level of security of supply and potentially share the flexibility benefits with the average size consumer. Therefore, all barriers to such assets in the balancing market is a barrier to the development of a well-functioning market in support of the green transition.

2. There are fundamental errors in the CBA because the cost of not activating newly electrified, often smaller assets are neglected. Only short-term marginal costs of supplying FCR for existing batteries and run-of-river hydro have been taken into account. The long-term marginal costs assume investments in e.g. larger batteries, with resp. 15 and 30 minute stock, where the price difference between 15 and 30 minute stock is not assumed significant.

Therefore, the result is that it pays better to change the FCR to 30 minutes. If FCR were to provide a similarly secure system for 15 minutes, the TSO's purchase of FCR would have to be increased. The cost of this is estimated to be greater than by changing the FCR to 30 min. But this is an assessment from a ""scale of economies"" perspective not taking into account the value lost when a number of new assets such as EVs, heatpumps, HVAC in larger buildings etc. faces higher barriers when accessing the market"

The study is focused mainly on FCR-dedicated large LER installation (battery, run-of-river). This is due to the fact that distributed, small, portfolio-based assets (which have the FCR provision as a minor source of revenue, e.g., EV, heat pumps) are expected to play a marginal role in the short term, in terms of offered FCR.

TSOs recognize the potential role in the future for these kinds of FCR providers. In particular, their presence could lower the FCR prices. Their FCR cost (and thus offered price) will be probably less than the one associated to FCR-dedicated large installation.

The FCR cost of dedicated large installation has indeed to consider a long-run marginal costs associated with a large initial investment. Non-FCR-dedicated LER have core businesses other than providing FCR. It means that their CAPEX is likely largely covered by their main sources of revenue. For this reason, they will probably be able to take advantage also of lower FCR prices, contributing to reducing them.

As a result of it, it's possible that – on a medium term – the presence of such providers in the FCR procurement could change the balance in favor of a larger FCR procurement with reduced minimum activation time period. In this respect, the approved calculation methodology according to Art.156(11) explicitly provides for the possibility of an update of the CBA, with a consequent review of the minimum activation time period for LER.

Nevertheless, the CBA needs to consider the current situation and what is expected in the short term. This is the reason why the non-FCR-dedicated installation are not considered. To allow a reduced minimum activation time (15 minutes) - aiming at promoting the development of smaller flexible assets - would result in a higher need for FCR to be procured by TSOs. This would translate into higher costs for TSOs and consequently for consumers. It would instead be more transparent to promote an explicit subsidy to foster the development of such kind of assets.

It should also be considered that requiring a 30-minutes full activation represents a relatively limited barrier to small flexible assets grouped in portfolios (e.g., EVs and heat-pumps). A longer activation time period reduces the FCR which can be offered under the same available energy, thus reducing the potential revenues from FCR. For these plants the provision of ancillary services represents however an additional source of revenues: their installation (and thus their bulk investment cost) is not dependent from the possibility or profitability of FCR provision. The profitability of FCR provision should thus be compared only with the actual costs to be borne in order to provide the service (control, communication, etc.) which are usually far less than the costs associated with energy storages and grid-reservoir interfaces.

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University of Southern Denmark

Nicolas Fatras (nifa@mmmi.sdu.dk)

I am opposed to the proposal, as it would increase participation barriers even further for participants aiming to provide flexibility to electricity markets.

TSOs acknowledge your position.

STEAG GmbH

Dr. Hans Wolf von Koeller (hanswolf.vonkoeller@steag.com)

"In the past, STEAG has spoken out clearly in favor of the 30 minutes taking into account our systemic experiences. Based on our operating experience, we still see the 30 minutes as necessary if the continuous/stable/sufficient charging management cannot be guaranteed even in critical grid situations.

However, in operational terms, it can be stated that 15 minutes are sufficient, because the FCR is to be replaced via the other control energy types. In its decision of 2 May 2019, the BNetzA also determined that 15 minutes is sufficient. In spite of the reduction to the 15-minute limit, there was no change in the installation of batteries in Germany.

The TSOs' cost-benefit analysis shows that both variants are possible, but the 30 minutes criteria is more efficient regarding the long run margining costs.

Our view is that a definition of 15 minutes is only acceptable if three premises are fulfilled:

1. No additional rules are introduced in contrast to the TSO approach described in the ""Explanatory document to all TSOs proposal for the definition of Time Period"".
2. The rules of participation have to be the same for all member states and participants. Individual TSOs shall not provide different regulations for the tender affecting the common market for energy.
3. there must be no discrimination of technologies in this market. A requirement to limit technical plant types in the tender or to penalize them through price reductions is, in our view, contradicting free competition and equal treatment.

STEAG is thus in favor of the TSOs' proposal (Proposal, p.6, Article 3) 30 minutes, no further change of rules and exemption for an interim period for batteries with 15 minutes. STEAG insists on a single harmonized market in Europe."

TSOs acknowledge your position.

The need for an interim period, or other solutions to cope with existing LER with an activation time period of 15 minutes, stems from the fact that some LER currently have a reservoir dimensioned on such energy criterion. While in Germany the vast majority of LER already have the possibility to physically provide 30 minutes activation (due to the recent requirement update of BNetzA), in other countries LER would have to go through equipment refurbishment.

To meet such needs the interim period has been set to be not less than 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. LER prequalified before the end of the interim period are granted for an exemption from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for

more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

As a further comment (regarding point 2, "TSOs' different regulations"), TSOs are already committed to ensure the same regulations across areas having a common procurement market (i.e., FCR Cooperation).

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Entelios AG

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"The TSOs have proposed a change from 15 minutes to 30 minutes minimum fulfilment time. This means that all storage units that are dimensioned for 15 minutes require considerable investments in order to remain operational. We at Entelios reject this application resolutely because it is discriminatory and shows inadmissible hardships for all battery storage market participants and the advantages are at best doubtful.

The amount already prequalified would drop drastically. Potential customers are already confused by the requirements that only part of the installed capacity can be marketed. With even higher requirements and lower prices for Frequency Containment Reserve (FCR), battery storage would offer their potential to the intraday market. Furthermore, FCR units can be replaced by aFRR after 5 minutes and mFRR after 15 minutes, so there is no need for a minimum fulfilment time above 15 minutes. The European PICASSO platform will make this market even more efficient.

FCR prices lowering cannot be associated with the selection of a longer TminLER. The general reduction of FCR prices experienced in the past years can be due to several factors, one of them is indeed the penetration of LER which have a very limited short-run marginal costs and can thus offer very competitive price for FCR.

In any case, the introduction of a long-lasting interim period with permanent exemption strongly mitigate (or cancel) the effects on already prequalified LER.

The fact aFRR and mFRR are designed to replace FCR within 7÷15 minutes doesn't imply that these aFRP and mFRP will always be able to restore frequency within such timeframe. Frequency events lasting more than 15 minutes are instead likely related to malfunctioning of FRP. They reflect the fact that a complex mechanism such the Frequency Restoration Process could experience failure or malfunctioning. Such events have been present in the CE system, as revealed by the frequency analyses performed for the CBA. For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR failure as a proper measure.

Entelios questions the presented results and rejects the proposed solutions formulated within the Cost Benefit Analysis (CBA). It is being attempted to formulate a far-reaching decision about the minimum activation period of FCR providers with Limited Energy Reservoir based on partly non-transparent and discriminating assumptions.

TSOs acknowledge your position. Regarding the lack of transparency of the process: prior to the current consultation TSOs have already consulted stakeholders two times: on the input data to be used (17th October 2019 Workshop) and on the first outcomes (March-April 2020). The replies received with the latter consultation have been considered by TSOs in the further developments which led to the current results. Extensive replies on the received comments can be found here:
https://eepublicdownloads.entsoe.eu/clean-documents/nc-tasks/Stakeholder_Update_and_Consultation_reply_to_All_CE_and_Nordic_TSOs_results_of_CBA_consultation_closed_30_April_2020.pdf
Furthermore, TSOs have periodically updated NRAs on the development process of the CBA.

We instead suggest striving towards a market-based solution reflecting the dynamic, complex and diverse reality of the cost structure of FCR providing assets and the potential influence on the necessary FCR power to be tendered. Instead of a constant FCR demand curve, a flexible FCR demand curve depending on, for example, the estimated Deterministic Frequency Deviations (DFD) and composition of BSPs, would be able to tackle several issues related to the operational security and would make the FCR procurement more efficient."

The potential introduction of a market-based synchronous-area-wide FCR procurement mechanism has been assessed by TSOs. Such kind of procurement would be based on a dynamic demand depending on the offer composition in terms of LER presence and LER duration.

At the moment however, such solution has to be ruled out due to the extremely wide procurement mechanisms being in place across Continental Europe. Some areas are already procuring FCR with a common platform on of few hours basis (e.g., FCR Cooperation) while others are procuring the service locally, with auctions covering longer timeframe. In a lot of areas, the FCR is even considered a mandatory service to be provided as an obliged ancillary service by all generators.

Furthermore, the implementation of a market-based approach a dynamic demand would imply a continuous update of the k-factors of each LFC Block (due to different procured FCR amount). Such continuous update would upend the current FRP, leading to the need of a wide revision of the whole Load Frequency Control scheme.

Given such situation, the potential evolution towards a flexible and dynamic market-based approach can be conceived only on a medium-long term. To define a suitable requirement is however an urgent necessity which must be addressed defining a specific TminLER valid for all the LER.

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TIWAG-Tiroler Wasserkraft AG

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"We would like to stress that the system security is difficult to assess, as there might occur complex and tricky grid situations, that may not be foreseen by simulations today. Therefore, certainty about the resources in the FCR is mandatory. The discussion on the TminLER-topic does not address the problem of the lack of inertia in the system, which is also very important.

Due to the extreme complexity needed to model and simulate the CE electrical network, TSOs decided to base the study on an historical-data-based approach. Instead of trying to model and simulate the whole system, the approach has been to simulate (with adequate combination) the events actually occurred in the past.

All the dynamic aspects regarding inertia, FCR deployment time etc. have been neglected in the performed analyses since the whole process was aimed at understanding the impact of LER in terms of energy capacity (following what provided for in Art.156(11) of SO GL).

Agreement with 30 min: We argue for a TminLER = 30 min because the benefits for the system security and the economic advantages seem to be more favorable for the TminLER = 30min. We see that, e.g. TminLER = 15min would be more difficult to handle in complex situations in which TSOs have to react quickly and need certainty in the FCR delivery. The economic benefits of TminLER = 30min are stated in the explanatory document "8. / Option D", as proposed by TSOs.

No severe impact with 30 min, since LERs should be flexible/adaptable: Furthermore, we do not see that TminLER = 30 min would have a large impact on all existing LER-business models, since in some countries, LERs usually can take part in pooling systems and make their individual contribution to the pooling system according to their capabilities.

In any case, because LER-systems are designed to offer flexibility, they are usually programmable and customizable in their behavior and can adapt to different TminLER-regimes easily. Therefore, we do not see obstacles with the introduction of TminLER = 30 min."

A survey performed amongst TSOs have revealed that the possibility to adjust the TminLER from 15 minutes to 30 minutes is a challenge for some providers (e.g., hydro resources). Some plants even need to go through technical refurbishment to fulfill a 30 min requirement. The TSOs' consensus is therefore that the choice of 30 minutes requirement would impact the LER currently prequalified for a shorter minimum activation time period. To meet such needs the interim period has been set to be not less than 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

Vattenfall Energy Trading GmbH

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"Technical consequences: An increase in minimum activation time period from 15 min to 30 min as proposed by the TSOs of the CE synchronous area will reduce the contractable FCR power of our batteries (1:1 ratio of rated-to-prequalified-power) by 30-50 %.

Economic consequences: FCR battery bidding price need to be raised to compensate loss of turnover. Considering the expected loss in contractable FCR battery power, the calculated increase in long-run marginal cost appears to be undervalued. In addition, attractiveness and profitability of FCR market will be very likely decreasing and existing as well as new installed battery flexibility will shift to alternative market channels (such as ID Continuous, aFRR and hybrid park solutions).

TSOs acknowledge that the increase of the requirement to 30 minutes would impact both the profitability of existing LER as well as the attractiveness of new LER installation. The presence of LER is however associated to the need of an increased required FCR. The 30 minutes choice is due to the need the cost associated to such FCR increase. According to the results, these additional costs would indeed not be compensated by the effect of LER presence on FCR prices. In any case, to mitigate (or even cancel) the impact of the decision on existing and underway business cases, an interim period of at least 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period, with the partial exception of the LER already prequalified for more than 15 minutes.

The increase of long-run marginal costs associated with the adoption of 30 minutes instead 15 minutes is derived from the assumptions on new LER installation costs (with different energy E/P ratio) presented in the workshop held on 17th October 2019. The dependency of the CAPEX from the E/P ratio has been derived from an analysis of a set of real projects for which data have been found in literature. The assumptions have been then also reviewed by means of a sensitivity analysis to project the expected installation costs on a medium-term scenario.

On top of that, several other factors impacting the overall costs are considered. E.g.:

- The expected energy capacity degradation implies an initial battery over dimensioning to ensure to keep the E/P ratio on a 15-years lifetime of a project.
- The depth of discharge is limited in order to limit the battery degradation.
- The OPEX includes the costs related to the provision of energy at the average DAM prices to cover the energy losses associated with the batteries' round-trip efficiency.

Before the consultation, TSOs asked SHs for a support on the definition of LER installation costs. Given the limited contribution received, TSOs have performed a study based on the literature.

Discussion: With a minimum activation time period of 30 minutes or perhaps even higher in the future the FCR product would develop more in the direction of aFRR and thereby forcing the asset owner to install oversized storages and ending up losing intended focus on the unique strengths of battery storages (ramp speed, high control accuracy and response speed). Instead compact sized battery storages shall be given the opportunity to provide fast-acting frequency response services and shall not balance persistent imbalances in the energy grid over a longer period than the last tradable quarter.

A 30 minutes requirement will not in any case be increased in the future since this is the maximum value set in Art.156(11) SO GL. It's not therefore expected that FCR provider, either LER or nonLER, will ever operate as substitute of aFRR. It's instead possible that the requirement will be reduced in the next years, if the LFC will show improved performances in terms of long-lasting frequency events.

The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.

If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

TSOs acknowledge that battery-based have high performances in terms of response speed. According to Art.156(11) however, the study is aimed at understanding the effects of LER in terms of energetic contents, regardless of all the other aspects. In this respect batteries, although able to provide a quick response, are similar to all the other LER. The CBA is in fact about LER (limited energy reservoir FCR providers), independently from the technology. A wide share of LER in CE are not batteries, namely hydro run-of-river.

Vattenfall therefore supports a FCR minimum activation time period of 15 min."

TSOs acknowledge your position.

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Safetry ApS

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"It is our belief, that the TSOs' proposal to change a well-functioning reserve in DK1 (Primary Reserve FCR) to address other structural imbalances in the balance sheet market is unfortunate.

By adopting the submitted proposal in its current form, where a forced extension of the activation time of the primary reserve FCR from 15 min to 30 min, will result in minimum three major changes for several LERs with limited capacity:

- It will reduce the potential capacity that can be offered to the primary reserve with up to 50 %
- The offered price on Primary Reserve FCR will double to meet the requirement for a longer activation time, if the commercial incentive is to remain status quo
- Several installations with limited balance reserves will be unable to participate in the balancing market to the disadvantage of the entire market and the price formation

Basically, the proposal in its current form will remove the possibility for many LERs to activating a significant part of the connected energy plants to balance imbalances in the electricity grid.

As a result, balance services will in future be mainly performed by traditional CO2 consumption units rather than LERs based on green technology.

TSOs acknowledge that the adoption of a 30 minutes minimum activation requirement impacts the existing LER as well as future new installation (in terms of higher long-run marginal costs). The adoption of a 15 minutes requirement implies however a potentially larger increase on the amount of FCR to be procured at synchronous area level, with an increased cost for TSOs. These increased costs would be a direct consequence of the LER energy performances as compared to nonLER.
Such an increased FCR requirement could be covered either by fossil fuel power plants or by renewables (LER or non LER). The actual share of FCR which would be covered by traditional - CO2 consuming – plants is depending on several different factors (DAM prices, other ancillary services prices, primary source costs, CO2 prices, fossil fuel plants phase-out, etc.). The outcomes of the analyses show that the overall costs for TSOs would be currently higher for TSOs.
In any case, to mitigate (or even cancel) the impact of the decision on existing and underway business cases, an interim period of at least 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. Such exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

The question is whether the current proposal is in contradiction to, or violation of the latest EU direction set out by the European Commission for the green transition of Europe?"

Whatever choice between 15 and 30 minutes cannot be in any case in contradiction with the EU law since this choice is explicitly provided (and requested to TSOs) by the Art.156(11) of COMMISSION REGULATION (EU) 2017/1485 of 2 August 2017.

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TU Clausthal

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"Which proposal? ""These results led all Nordic TSOs to propose 15 minutes as a time period for LER."" This one?

This sounds perfectly reasonable, as we have primary control (FCR), secondary control (aFRR) and tertiary control (mFRR). As primary control will be replaced by secondary (5 min full activation time) and tertiary (15 min full activation time) there is no need to extend the time a FCR provider needs to be active beyond the 15 min threshold. If there was a need to extend the need, we should fix the mechanism to activate aFRR and mFRR as this has obviously failed in this case.

The choice of a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience some kind of malfunctioning. TSOs are working on procedures and policies to promptly identify, counteract and resolve such situations. As of today, however these conditions cannot be identified and resolved within a suitable time frame, with the consequence of the FCR to keeping counteracting a power imbalance. It should be considered that FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs.
For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

By the way, today FRR is cheaper than FRR, so it makes economically sense to use the cheaper product if we need more balancing power and not making the more expensive product even more expensive.

The fact that the use of FCR is more expensive than the use of FRR is indeed a confirmation of the fact that the use of FCR to contain frequency for occasionally malfunctioning of FRP doesn't represent a way to substitute FRR with FCR. Instead, it comes from the need to deal with technical conditions for which FCR is an indispensable function of a power system.

BTW - cheap frequency regulation: Earlier drafts of the DCC had the idea to let temperature controlled devices react on frequency as mandatory feature. The clause was sacked because of regulatory issues: no free lunch for TSO, which could substitute this service for procurement of FCR. The idea is to offer an optional service product for system frequency control, called emulation of the self-regulation effect. See IEC project 62898-3-3 ""Self-regulation of dispatchable loads"", e.g. electric vehicles, heat pumps, air conditioners, fridges & freezers which follows the same principles. If there is a support scheme for certified grid-friendly appliances (e.g. a lump sum payment when buying one with a given label) this could bring the costs down and render the European Grid unbreakable, as the decline in self-regulation will be stopped and reversed."

The "distributed FCR" (non-FCR-dedicated LER) provided by installations such as EVs, heat pumps, air conditioning, cooling systems, etc. is not considered in the presented analyses. The choice to consider in the analyses only the plants dedicated to ancillary service provision (i.e., battery-based providers and run-of-river hydro plants) is derived from the fact that currently the non-FCR-dedicated LER are very limited in the CE system. The increased in FCR quantity provided by them on the short term is considered still marginal.

TSOs acknowledge however that their contribution could play a central role on medium-long term if supported by a proper legal framework. The available regulating capacity would be very high and the effect on FCR costs would be significative. Non-FCR-dedicated LER have indeed a core business other than providing FCR; it means that their CAPEX is likely largely covered by their main source of revenues. For this reason, they will probably be able to take advantage also of lower FCR prices, contributing to reducing them.
As a result of it, it's possible that – on a medium term – the presence of such providers in the FCR procurement could change the balance in favor of a larger FCR procurement with reduced minimum activation time period. In this respect, the approved calculation methodology according to Art.156(11) explicitly provides for the possibility of an update of the CBA, with a consequent review of the minimum activation time period for LER.

Nevertheless, the CBA needs to consider the current situation and what is expected in the short term. This is the reason why the non-FCR-dedicated installation are not considered. To allow a reduced minimum activation time (15 minutes) - aiming at promoting the development of smaller flexible assets - would result in a higher need for FCR to be procured by TSOs. This would translate into higher costs for TSOs and consequently for consumers. It would instead be more transparent to promote an explicit subsidy to foster the development of such kind of assets.

It should also be considered that requiring a 30-minutes full activation represents a relatively limited barrier to small flexible assets grouped in portfolios (e.g., EVs and heat-pumps). A longer activation time period reduces the FCR which can be offered under the same available energy, thus reducing the potential revenues from FCR. For these plants the provision of ancillary services represents however an additional source of revenues: their installation (and thus their bulk investment cost) is not dependent from the possibility or profitability of FCR provision. The profitability of FCR provision should thus be compared only with the actual costs to be borne in order to provide the service (control, communication, etc.) which are usually far less than the costs associated with energy storages and grid-reservoir interfaces.

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Sonnen GmbH

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Sonnen is a German battery manufacturer and one of the first frequency containments reserve (FCR) prequalified operators of a virtual power plant. We welcome the efforts of ENTSO-E to strive for more harmonisation among the Continental European markets. However, we disagree with the assessment that a minimum activation time exceeding 15 minutes for FCR providing units or groups with limited energy reservoirs (LER) is necessary or beneficial for the system. A minimum activation time of 30 minutes would put LER FCR providers at a significant disadvantage against non-LER FCR-providers. In addition, it would limit their potential to provide other flexibility services and optimise the uptake of renewable electricity.

ENTSO-E, based on the conducted cost-benefit analysis, concludes that LER do not offer the same amount of safety to the grid as non-LER. Therefore, a larger share of LER would lead to an increasing amount of FCR that needs to be procured, which in turn would lead to higher costs for the consumer. To limit the predicted cost-increase, ENTSO-E suggest that the minimum activation time of 30 minutes shall be implemented by all Continental European TSOs.

However, LER units or groups only differ from non-LER FCR providers in the most exceptional events. The system is designed in a way that the automatic frequency restoration reserve (aFRR) and manual Frequency Restoration Reserve (mFRR) start to gradually replace FCR already after 30 seconds. Only in case of particularly rare long-lasting frequency deviation events, FCR is ever required to remain active for longer than a few minutes. In over 20 years, in the entire Continental European zone, there have only been 3 severe events in Europe, which would qualify as a long-lasting frequency deviation. According to the analysis, those events could have been worsened if there was a large share of LER, assuming these would completely stop their activity after the minimum activation time was over. In reality, LER units and groups are usually not fully depleted after the minimum activation time is over. Consequently, the FCR provided by LER would not drop to zero as soon as the minimum activation time is over, so that the negative effects are not as drastic as modelled.

The Long-Lasting definition adopted for the analyses is that a "Long lasting frequency deviation is an event with an average steady state frequency deviation larger than the standard frequency deviation over a period longer than the time to restore frequency.". In this sense the events recorded in the 2008-2018 interval are several.

The LER reservoir energy usage is considered only if an alert state is then triggered[1].
LER are requested (by SO GL) to provide FCR for an energy equivalent to full activation for the minimum activation time-period.
A potential extra energy could come from the margin needed to implement the energy management. To consider its contribution however would mean to rely on an energy margin the retention of which is not legally binding for LER.
On the other hand, the model does not consider situations where the frequency deviation remains for a very long period around 50 mHz, without triggering the alert state. In such condition the possibility for LER to keep the SOC within the acceptable band (namely to affect the energy for the alert state) is a challenging aspect.

[1] Possibly also in combination with other contributing factors such outages.

According to the cost-benefit analysis by ENTSO-E, an increasing share of LER will require a larger share of FCR overall, which then in turn, would lead to higher costs for the system. According to the prediction made by ENTSO-E, the increase of costs will be lower, if the minimum activation time is 30 minutes instead of 15 minutes. The analysis does not show, which assumptions have been used to predict the development of costs in each scenario. It is likely that an increase of the minimum activation time to 30 minutes will significantly increase the costs of the FCR providers and therefore drive up the costs of the system. The development of the costs is very complex and does not suffice as a basis for the measures suggested. We were surprised to see that the cost-benefit-analysis assumes that after years of decreasing overall system costs, we will now see a sudden sharp increase. Without deeper insights into the assumptions regarding battery prices and overall LER-FCR market penetration we at least doubt that there will be a sudden reverse in this trend towards sinking costs due to an ever-growing number of 15-Minute-LER-FCR providers.

The long-run marginal costs assumed for the analyses are presented in Table 1 of the Explanatory note. Three different scenarios of possible LER costs evolution are presented from the most conservative Base Scenario (i.e., having higher costs) to the less conservative Scenario B (with long-run marginal costs almost halved).
Under the same scenario the LER having 30 minutes are obviously far more expensive (even if the costs are not doubled). The general assumptions behind these figures have been provided by TSOs during the workshop held on 17th October 2019.
The increased costs presented from Figure 5 refer to the potential rise of costs to be borne by TSOs as a consequence of the increased FCR requirement due to LER penetration (under the assumptions provided at pg. 14). Even if the LER would mitigate the increase of FCR marginal price, their high share would require TSOs to purchase more FCR with a potential overall increase of costs.

Consequently, the reasons put forward by ENTSO-E do not establish the need to a prescribed minimum activation time of more than 15 minutes. A longer minimum activation time would pose a disproportionate burden and significant discrimination against LER FCR providers. A restriction of the fundamental principles of the European energy market, in particular the rights of active customers (Art. 15 Electricity Market Design Directive) and the right to non-discriminatory access to balancing markets (Art. 6 Electrcity Market Regulation), thus cannot be justified. We suggest to strengthen the overall hierarchy and reliability of FCR, aFRR and mFRR, instead of burdening active customers with a service which clearly has to be provided by the aFRR and mFRR.

TSOs agree that the role of frequency restoration after 15 minutes is up to FRR and that FCP cannot be requested to play the role of FRP.
On the other hand, TSOs are requested to operate the power system and to keep it in safe condition. The real conditions experienced by the system can be different from those foreseen in the general Load Frequency Control scheme, despite all the actions deployed by TSOs (i.e., the presence of long-lasting frequency deviations).
For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure. The need to require LER to ensure their service for a period longer than the time to restore frequency stems from the fact for TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). TSOs consider therefore the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

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As a further consideration, it should be highlighted that SO GL already provide for a differentiated requirement between LER (Art.156(8)) and nonLER (Art.156(7)), with the latter required to provide the service indefinitely.

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CEZ, a.s.

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"While we understand the need to set boundary conditions for LER units providing FCR, we cannot agree with the TSO proposal due to several reasons.

Proposal does not consider that existing LER were connected to the grid based on conditions and rules applicable for them at the time of their first grid connection. Technically majority of connected LER is able to provide 15 mins minimum activation period (Tmin LER). De facto retroactive application of new rules would significantly deteriorate return on investment for these LER. Stability of investment environment would thus be deteriorated.

TSOs acknowledge that one of the most problematic issue associated with the adoption of a 30 minutes requirement is indeed the risk related to retroactivity to already installed LER having 15-minutes. To meet such needs the interim period has been set to be not less than 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period. LER prequalified before the end of the interim period are granted for an exemption from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

Introduction of 30 minutes Tmin LER for all newly prequalified LER could lead to increase of overall FCR price, as the volume of prequalified FCR providers would inevitably decrease due to stricter conditions for existing LER undergoing regular prequalification (prequalification usually takes place every 3-5 years).

This aspect has been considered in the analyses. The adoption of a 30 minutes time period would increase the long-run marginal costs of LER and at the same time reduced the FCR currently available from these plants. As shown in the explanatory document however, the adoption of 30 minutes would reduce the need for increased FCR. The latter aspect has proved to play an important role in reducing the overall costs for TSOs.

Proposal does not consider that FCR is activated only for an inevitably long period. SOGL, Article 157 and Annex III set time to restore frequency to 15 minutes. FAT for aFRR has been set to 7,5 minutes and 5 minutes after 2024. Having regard of these requirements, setting TminLER to a period longer than 15 minutes makes little sense.

The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.
If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, an high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding).

For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Impact of LER's depletion on the needed amount of FCR shall be more properly assessed. Decision on Tmin LER shall not be taken before the probabilistic analysis on FCR volume needed is elaborated. This analysis shall consider RES but also LER development, as well as phase-outs of existing power plants more precisely. It could point out that due to changing conditions, T min LER in duration of 30 minutes is not needed anymore.

Setting Tmin to 30 minutes prior to such analysis would have an unnecessary negative impact both on the existing LER's, which already have a 15 minutes requirement, and on the total costs for TSOs.

TSOs acknowledge your position regarding the coordination with the probabilistic analysis on FCR volume. The deadlines for the proposal of a time period to NRAs are however defined by the SOGL (Art.156(11), "12 months after approval of the assumptions and methodology by all regulatory authorities"). A proposal is therefore needed.

The choice to base the study on the current conditions (and on the past data, for what regards the frequency deviation statistics) has been undertaken in the definition of the CBA methodology. The limits associated with this choice (as those correctly highlighted in the comment) have been mitigated with the possibility – expressly provided for by the approved methodology – to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side, even during a radical transitional period such as the one expected in the next decade.
For these reasons the choice to foresee the possibility of an update of Time Period has been adopted in the methodology in the first place.
In any case, to eliminate the risk of retroactivity of the 30 minutes decision (and therefore to safeguard existing and underway business cases), the requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

Having regard of above-mentioned elements, we believe proposal shall be changed as following:

- Article 3, minimum activation period required for frequency containment reserve providing units or groups with limited energy reservoirs to remain available during alert state period for LER shall be set to 15 minutes for all LER, with no derating factor scheme.

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- If this is not feasible, then Tmin LER shall be set to 15 minutes for existing LER and 30 minutes for new LER.
- Existing LER shall be those connected to grid before entry into force of this methodology.

We support option A elaborated in the explanatory document on page 40, followed by option C with modification – LER shall be considered existing not based on the date of prequalification, but based on the date of their connection to the electricity grid. Alternatively, all the LER that have already applied for a network connection shall be considered as "prequalified LER".

There should also be a limited space for stricter national rules, as it would ultimately harm EU-wide competition."

TSOs acknowledge your position.

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Vestas Wind Systems A/S

Andreas Svendstrup-Bjerre (ansbr@Vestas.com)

"Vestas Wind Systems thanks the ENTSOE for the opportunity to comment on this consultation.

In the material it is stressed that the TSOs aim at fostering a level playing field for all FCR providers. At the same time the TSOs keep proposing legislation that is specifically targeted at an isolated group of FCR providing assets which does not go well together. It is not long ago that the additional properties for FCR were proposed, who's effects on FCR demand are ignored in this proposal! This repeated targeting for LER is harming the trustworthiness of the TSOs and marks them as unreliable when it comes to their ability to maintain and upkeep stable market conditions, that incentivize investment in new capacity. At present we see the Central European system as unfavorable for new projects and are forced to include a significant risk premium, in our pricing, specifically to cover the uncertainties that the TSOs keep introducing through new rapidly deployed legislation. The latter is stressed even more by the fact that the proposal aims to make the new requirements applicable to existing installations, potentially crippling the investment cases and leaving the investors with a bill that now is willing to pay for.

The need of a stable regulatory environment is definitely a value whose importance TSOs are aware of. The main challenge of a 30 minutes choice would be to deal with the impact on all existing plants by the means of proper measures.
To mitigate the impact on the stability of regulatory environment, eliminating the risk of retroactivity and safeguarding existing and underway business cases, the new 30 minutes requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

It should be highlighted that the possibility of an update of the TminLER is expressly provided by Art.156(11), which set the minimum and the maximum time period respectively to 15 and 30 minutes. The fact that part of the existing LER are currently prequalified for 15 minutes (and therefore that setting 30 minutes would be a rules' change) shall be considered as one contributing factors amongst all the other factors TSOs have to consider.

Additional properties for FCR foresee the possibility to introduce the so called "Reserve mode" for LER. LER switching to the "reserve mode" would request the regulation to counteract only minor, fast-fluctuating frequency deviation. The bulk regulation is expected to be taken over by FRR in order to avoid the full depletion of LER and to ensure a residual regulation capacity.
The "reserve mode", as explicitly defined by the approved regulation, shall be ensured "Besides ensuring that the energy reservoir is sufficient to continuously activate FCR in normal state and fully activate FCR in alert state for the time period pursuant to Article 156(9) of the SO Regulation".
It means that it cannot be considered as an extra energy/time margin in the case of a depletion, but rather as a way to ensure a limited regulating capacity from LER against small frequency fluctuations.

Furthermore, the "reserve mode" (which is applied to units prequalified for the first time after the entry into force of the regulation) relies on a process of shift of the regulating capacity from FCR to FRR. Whenever a long-lasting frequency deviation occurs, FRP is not working as expected, undermining the possibility of such a bumpless transfer of regulation.

We appreciate the amount of work that has been done and welcome the increased transparency that has been given by the explanatory document. It would however have been wishful if the specific input data had undergone more detailed work and was made readily available, as we believe some of the assumptions are flawed leading to false conclusions.
One such fundamental flaw is the insignificance of doubling the required energy amount when it comes to overall cost. The CBA only looks at the prices for large scale stand alone storage where the total project price does not suffer as much as a smaller project would do from the increase in energy storage. The future is however not a centralized one but a decentralized one, where many smaller LERs participate actively in balancing the grid. For small scale LERs a doubling of the required energy content increases the price significantly. We believe that ENTSOE is grossly underestimating the potential of smaller LERs to bring down the FCR prices which renders the conclusion that TminLER030 is the cheapest option false. There are more arguments for why FCR providing LER cannot be approximated as standalone storage, built with the sole purpose of delivering FCR. As a market actor we can disclose that this is not a viable business model in the CE-system. We see that a battery system needs multiple revenue streams to get financed and generate stable returns. We see large fleets of multipurpose battery systems being deployed being used for electric vehicle infrastructure, local peak shaving and grid support as well as retrofitting renewable energy plants. All these assets can deliver part of their capacity to the FCR market at low cost. TminLER=30min will significantly reduce these assets' ability to participate in the FCR market which is not considered in the CBA nor in the material presented. This is severe as FCR revenue typically is the "icing on the cake" that makes a project viable and if it becomes unattractive the capacity will be used for other services.

TSOs recognize the potential role in the future for these kinds of FCR providers. In particular, their presence could lower the FCR prices. Their FCR cost (and thus offered price) will be probably less than the one associated to FCR-dedicated large installation.

The FCR cost of dedicated large installation has indeed to consider a long-run marginal costs associated with a large initial investment. Non-FCR-dedicated LER have core businesses other than providing FCR. It means that their CAPEX is likely largely covered by their main sources of revenue. For this reason, they will probably be able to take advantage also of lower FCR prices, contributing to reducing them.

As a result of it, it's possible that – on a medium term – the presence of such providers in the FCR procurement could change the balance in favor of a larger FCR procurement with reduced minimum activation time period. In this respect, the approved calculation methodology according to Art.156(11) explicitly provides for the possibility of an update of the CBA, with a consequent review of the minimum activation time period for LER.

Nevertheless, the CBA needs to consider the current situation and what is expected in the short term. This is the reason why the non-FCR-dedicated installation are not considered. To allow a reduced minimum activation time (15 minutes) - aiming at promoting the development of smaller flexible assets - would result in a higher need for FCR to be procured by TSOs. This would translate into higher costs for TSOs and consequently for consumers. It would instead be more transparent to promote an explicit subsidy to foster the development of such kind of assets.

It should also be considered that requiring a 30-minutes full activation represents a relatively limited barrier to small flexible assets grouped in portfolios (e.g., EVs and heat-pumps). A longer activation time

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period reduces the FCR which can be offered under the same available energy, thus reducing the potential revenues from FCR. For these plants the provision of ancillary services represents however an additional source of revenues: their installation (and thus their bulk investment cost) is not dependent from the possibility or profitability of FCR provision. The profitability of FCR provision should thus be compared only with the actual costs to be borne in order to provide the service (control, communication, etc.) which are usually far less than the costs associated with energy storages and grid-reservoir interfaces.

It is worth noting that the requirement TminLER=30 min covers two full timeslots in the intraday markets. Considering that many existing systems are 15 min systems and increase of TminLER=30min will make participating in the Intraday market more attractive leading to the draining of valuable FCR capacity.

The requirement of 15 or 30 minutes of full activation is meant to represent an equivalent energy value. The Art.156(9), each LER shall ensure to be "able to fully activate FCR continuously for at least" the time period "or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time".
Whatever it is the minimum activation time period (15/30 minutes), the usage of a LER reservoir will likely cover several 15 minutes timeslots. The comparison between the minimum activation time period and the duration of market slots makes therefore limited sense.

The core of the TSOs concern are long lasting, single sided, frequency deviations and their subsequent consequences for LERs ability to provide the desired services. As it is mentioned in the explanatory document such a situation may only happen when the provision of FRR has failed. It seems that targeting LERs with specific and discriminatory regulation is treating the symptoms rather than the cause. Frequency Containment Reserve is meant to contain a frequency drop and not solve long lasting power deficits in the system. Ensuring a well-functioning and harmonized FRR implementation across all TSO's seems a better solution as it can ensure that the long lasting single sided frequency event cannot happen. In the proposal for TminLER all future revisions of FRR are ignored which we find alarming and discriminating.

As correctly pointed out in the comment, the need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.
If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Since the system frequency is a result of the power balance in the system all frequency measures must be assessed as a whole and cannot be treated individually. As an alternative to the presented legislation, we suggest that ENTSOE include the benefits a reduction of the activation time for a-FRR would have as this in our opinion would greatly reduce the stress on the FCR servers thus counteracting the scenarios outlined in the explanatory document, potentially solving the issue with long lasting frequency deviations all together.

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Since the occurring of a long-lasting frequency event is the consequence of a non-proper working of FRP, the further reduction of aFRR FAT (already set to far less than 15 minutes) wouldn't have a significant impact.

Based on the presented critique points Vestas Wind Systems A/S urges ENTSOE to rethink the issue in a holistic way and not by discriminating a specific group of market participants that can help achieve a stable, efficient and cheap energy system. We Recommend that TminLER be set to 15min as this in our opinion will give the best overall solution in the long run."

TSOs acknowledge your position.

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RWE Supply & Trading GmbH

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"We do not support the analysis done and consequently do not agree with the conclusions drawn by the TSOs of the Continental European region. Instead of locking out certain technologies from the FCR market, TSOs should continue using the existing 15 minutes period required for LER to remain available during alert state (TLER) until it can be proven that a system security concern arises requiring such change.

We are of the opinion that the existing level playing field based on technologic neutrality should be maintained and that no Derating Factor (DF) should be applied. Furthermore, we are concerned that with the proposed design change especially batteries will be pushed out of the market for FCR provision. In addition to the proposed change to the minimum time for TLER, this also concerns the application of a DF which should be harmonized for the CE region in order to support the level playing field in case a DF is applied. Having the phase out of conventional generation in mind, not safeguarding the level playing is potentially dangerous as it precludes market participants from investing in technologies that will be required making the energy transition possible.

TSOs acknowledge the presented position regarding DFs and their application. The adoption of Derating Factors has been in any case ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.
TSOs do not agree on the envisaged possibility of batteries to be pushed out of FCR market requiring 30 minutes. While it's true that the imposition of a longer requirement impacts the long-run marginal costs of battery-based LER, the performed analyses envisage expected costs between 5.5 €/MW(h) and 9.4 €/MW(h). Such costs are expected to be still competitive, also considering the current spot prices on FCR cooperation (which are likely already heavily impacted by LER presence).
In any case, existing and underway business cases are safeguarded by means of an exemption granted to all LER prequalified before the end of an interim period (lasting not less than 24 months) following the entry into force of the present regulation.

TSO's claim a positive cost effect of 10% which is based on many assumptions, the parameters for which have not been made publicly available and that are highly interdependent on each other. Changing those may lead to very different results in either direction. Considering that a 10% cost effect also does not include investment costs market participants will have to undertake in order to change the configurations of their assets the overall positive value attributes of the proposed change should be reconsidered.

The general assumptions on LER long-run marginal costs have been provided by TSOs during the workshop held on 17th October 2019. The figures used in the study are presented in Table 1 of the Explanatory note. Such assumptions are of course subject to a certain level of uncertainty. In order to deal with it, three different scenarios of CAPEX evolution have been considered.
The potential costs to be borne by LER to convert their asset from 15 to 30 minutes are not expressly considered in the study. It should however be considered that a lot of battery based LER (i.e. in Germany) are already able to provide 30 minutes of full activation since this was the requirement previously enforced. Several other 15 minutes LER could fulfill the longer requirement with a reduction of the provided FCR without assets' configuration changes (albeit with a profitability reduction). Only a limited

number of market participant need to go through a substantial refurbishment in order to increase the minimum activation time period.
Furthermore, the impact on the FCR market of a reduced availability of existing LER because of a longer minimum activation time period is considered in the study.

We would furthermore like to remind the TSOs that investments need a stable regulatory environment. The FCR market (which currently works and where no shortcomings could be identified in the past) should not be changed because of identified problems in other markets (namely the provision of aFRR). Instead, the establishment of the EU-wide balancing platforms PICASSO and MARI, the harmonisation and the reduction of the Full Activation Time of standard aFRR energy bids and the harmonisation of imbalance settlement periods to 15 minutes should also be considered, as well as any other measure aiming at system balancing and operational security, implemented or decided upon over the past years in light of the implementation of the European Balancing Guideline. It is now time to deliver all the related projects and see the positive (and/or negative) effects thereof. Only thereafter, should TSOs start thinking of fine tuning the system where needed.

The need of a stable regulatory environment is definitely a value whose importance TSOs are aware of. The main challenge of a 30 minutes choice would be to deal with the impact on all existing plants by the means of proper measures.
To mitigate the impact on the stability of regulatory environment, eliminating the risk of retroactivity and safeguarding existing and underway business cases, the new 30 minutes requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. Such exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

It should be highlighted that the possibility of an update of the TminLER is expressly provided by Art.156(11), which set the minimum and the maximum time period respectively to 15 and 30 minutes. The fact that part of the existing LER are currently prequalified for 15 minutes (and therefore that setting 30 minutes would be a rules' change) shall be considered as one contributing factors amongst all the other factors TSOs have to consider.

We recommend to maintain a TLER of 15 minutes and have identified several weaknesses in the TSO argumentation and in the methodology:

TSOs claim that limitations in the activation period result in higher FCR demand. But, TSOs did not consider the higher quality of batteries due to their faster reaction time and higher accuracy in operation. Instead, TSOs claim that technologies with limited activation period have a lower value to the system. That the current system design with a 15 min TLER however allows to achieve the TSOs target of security of supply finds no mentioning either.

The battery-based LER represent only a part of the currently installed LER (another important component comes from run-of-river hydro power plants). The whole study is aimed at fulfilling what requested by Art.156(11) SO GL, that is to define the minimum activation time period. The analyses are therefore focused on the energetic issue and not to other features of FCR provision (such as the reduced deployment time of batteries). The valuable features which battery can provide will be considered in the

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probabilistic recalculation of FCR dimensioning (Art.153(2) SO GL). Such features however are out of scope in a study aimed at understanding which is the most suitable duration to be requested to FCR providers.

According to the analysis provided by the TSOs, only a small cost difference of about 10% was the result for different scenarios and activation periods. Considering the number of assumptions made to derive this result and the uncertainties behind them as well as the generation of stranded costs and value destruction related to the LER units that won't be able to fulfil this new requirement, we disagree that a TLER of 30 minutes clearly supersedes the 15min TLER.

The critical assumption is that the FCR demand increases proportionally to the growth of storage capacity when a storage capacity of 900 MW is reached. As this point, the TSOs assume that additional storage capacities of 1200 MW (for TLER 15 min) or 300 MW (for TLER 30min) do not replace conventional plants but will result in an increase of FCR demand of the same size. It is unclear to us why additional storage capacity should not have an effect at all.

Furthermore, in a situation with LER installations only, the FCR demand is assumed to be 4800 MW (for TLER 15 min) and 3500 MW (for TLER 30 min), respectively. In parallel, TSOs argue that the amount of energy required is the driver for additional FCR capacities in these cases. It is unclear to us, how 1200 MWh for TLER 15 min correspond to 1750 MWh for TLER 30 min.

The reason of such a counterintuitive behavior can be explained as follows.
The simulated frequency deviation is derived from the input power imbalance assuming a certain MW/Hz curve representing the primary response behavior of the synchronous area.
Whenever a LER depletion is detected (i.e. the reservoir is completely full or completely empty), the system loses the regulation capacity of LER. The effect is a rescaling of the MW/Hz curve of the whole synchronous area since only non-LER are counteracting the power imbalance.
Comparing such condition with the normal operation (without LER depletion), this rescaling implies that - given the same power imbalance - the system will result in a wider simulated frequency deviation. An example of the comparison of simulated frequency deviation with and without LER depletion is provided in the following example (provided merely for the sake of clarity).

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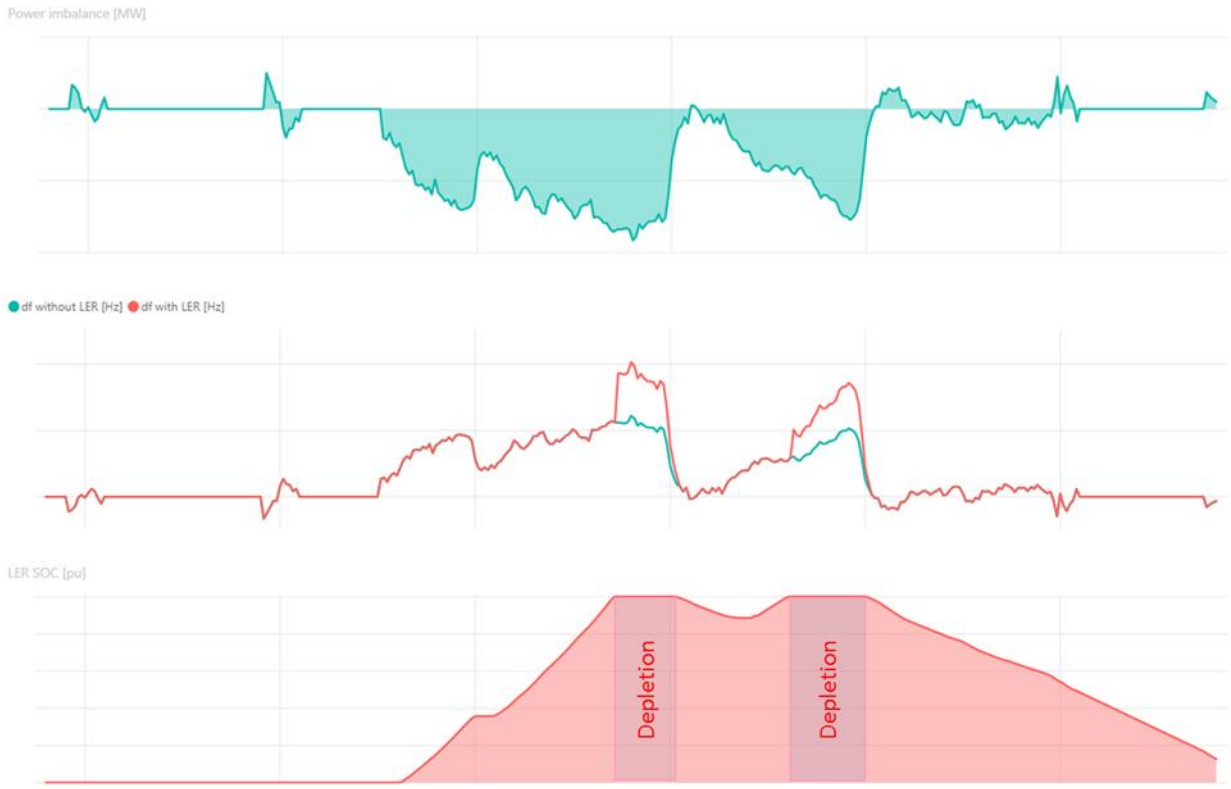

Figure 1

During the interval of LER depletion (reservoir totally full) the loss of the regulating capacity of LER leads the simulated frequency deviation to higher values.
In order to counteract the same power imbalance, only non-LER are still operating. It means that the equilibrium is reached with higher frequency: the MW/Hz curve is indeed flattened.
Furthermore, by increasing the dimensioned value of FCR procured at synchronous area level, the MW/Hz changes. Since in CE the full activation of the procured FCR occurs at ±200 mHz, increase the procured FCR above the current value of 3000 MW allow to have reduced frequency deviation under the same power imbalance.
TSOs need to define a criterion to assess whether the frequency worsening is acceptable or not. TSOs have evaluated several criteria.
Regardless of the chosen criterion, once LER are depleted, the frequency deviation is determined only by the residual nonLER. This is the reason why the introduction of more LER in the system (keeping the same share of nonLER) has no impact on the frequency deviation quality as LER deplete: after the depletion only nonLER share matters.
However, a higher LER share in the system contributes to reduce the frequency deviation *before* the depletion occurs. The more FCR is present (either from LER or nonLER), the lesser the frequency deviation. More FCR means indeed that the MW/Hz curve is steeper, and the frequency equilibrium is reached at lower frequency deviation, under the same power imbalance.
A reduced frequency deviation lead to a lesser usage of the energy reservoir of LER and, as a consequence, to a delayed depletion. Increasing delaying LER depletion end up in avoiding it altogether: the power imbalance ends before the depletion itself.
The latter condition is also the reason why, once a certain level of overall FCR is reached (e.g., 4800 MW with LER 15), even a LER share of 100% is acceptable: with that amount of FCR deployed at 200 mHz, the LER depletion are not present anymore, no matter how a power imbalance would last.

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Lastly, the analysis done by TSOs focuses on the future security of supply but is based on the generation fleet currently available. It thus disregards phase-out plans, age related dismantling, the build out of RES-E generation and additional investments in flexible capacity over the coming years. We think that in order to make the European energy transition possible, today's changes should be set as future-proof as possible so that investments do not face unnecessarily high regulatory risk. Disregarding the future will lead to further losses in confidence and add another layer of uncertainties for investors.

For what regard the nonLER provision, the analyses are based on the current fleet. The conventional generation phase out could indeed have an impact on FCR prices.
The choice to base the study on the current conditions (and on the past data, for what regards the frequency deviation statistics) has been undertaken in defining the CBA methodology, approved by NRAs. The limits associated with this choice (as those correctly highlighted in the comment) have been mitigated with the possibility – expressly provided for by the approved methodology – to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the cost benefit analysis will significantly change after entering into force of the Time Period" (Art.9 of the Methodology). TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side, even during a radical transitional period such as the one expected in the next decade.
For these reasons the choice to foresee the possibility of an update of Time Period has been adopted in the methodology in the first place.

Considering that the elements provided by TSOs contain several flaws and do not provide clear financial recommendation for a change as well as the lacking analysis of the impact of the LER on the system safety, TSOs should continue to apply a 15min TLER. In the event that further analysis and assessments demonstrate that the 15 min TLER has a negative impact on the system safety such effects may be considered, potentially resulting in the increase of the required FCR. Setting the TLER to 30 minutes prior to such conclusive analysis will have an unnecessary impact both on the existing LER, which already have a 15 minutes requirement, and the total costs for TSOs.

TSOs acknowledge the presented position.

Finally, should TSOs nonetheless go ahead with the change and adopt a 30min TLER, TSOs will have to commit to ensuring a proper interim period for already prequalified LER to deal with the regulation change, both from the technical and financial point of view. In this regard, we would like to stress that switching 15 minutes TLER units to longer periods will take several years and will unduly affect investments planned but not yet build. Therefore an exemption from the 30 min requirement should be granted to LER-units provided they have applied for a prequalification before 31 December 2022."

TSOs acknowledge the presented position.
As previously stated, to mitigate the impact on existing and underway business cases, eliminating the risk of retroactivity, the new 30 minutes requirement will apply only to LER prequalified after the end of the interim period, with the partial exception of the LER already prequalified for more than 15 minutes: these

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LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

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LEAG

Eckehard Schulze (eckehard.schulze@leag.de)

"We welcome the opportunity to comment on your proposal for the Definition of a Minimum activation time period required for LER to remain available during alert state.

The proposal disagrees the Resolution of Bundesnetzagentur BNetzA BK6-17-234 which reject the enlarging of the Minimum activation time period from 15 min to 30 min. This decision is the Basis of construction design for Investment in LER. The Change will lead to an additional risk.
Ever-changing Basics don't lead to a lot of confidence in the FCR-market.
That's why realized Investments in LER should get a conservation of Status quo and a suitable transition period for renewing.

TSOs acknowledge your position on existing investment.
TSOs is also aware of the issue associated with the potential change in the requirement in several countries (actually requiring 15 minutes). Such issue is one of the concerns for TSOs in the decision on the minimum activation time period and it is addressed with the introduction of the interim period. Existing and underway business cases are safeguarded since the new 30 minutes requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are exempted from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

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An important aspect to be considered is however that the possibility of a 30 minutes requirement is expressly provided by Art.156(11), which set the minimum and the maximum time period (15 and 30 minutes respectively). The fact that part of the existing LER are currently prequalified for 15 minutes (and therefore that setting 30 minutes would be a rules' change) shall be considered as one contributing factors to be considered amongst all the other factors TSOs have to take into account.

Nevertheless the TSO have to ensure the safety of supply. The cost-benefit-analysis shows that a Minimum activation time period of 30 min is needed. That's why the TSO should ensure this necessity by procuring such a product on the market."

The possibility to differentiate the provision of different products within the FCR procurement (i.e., LER 15 minutes, LER 30 minute, nonLER) has been ruled out by TSOs. The adoption of different products is indeed impracticable since it would require a way to separately define the demands of LER and nonLER. Only a comprehensive market in which both prices and quantities of LER and non LER arise as market results could deal with it (please refer to the Explanatory note, Section 7.b). The potential introduction of such a market has been assessed by TSOs, but it resulted to be infeasible on the short-medium term. The extremely wide procurement mechanisms currently in place in CE as well as the potential effects on FRP (e.g., on k-factors) make a market-based approach not practicable.
If deemed as needed, the presence of LER in the provision will be addressed by TSOs increasing the overall FCR provided at synchronous area level. Such aspect will be one of the factors to be considered in a FCR dimensioning review.

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EnBW Energie Baden-Württemberg AG

Dr. Bernhard Walter (b.walter@enbw.com)

"We fully support the ENTSO-E proposal of a minimum activation period of 30 minutes for LER units (option D). The illustrations in both the CBA and the Explanatory Document provide plausible arguments that this is crucial in alert states; it is also relevant as such states have occurred more frequently in the recent past.

If there is a decision to divert from the ENTSO-E proposal towards a smaller minimum activation period (e.g. 15 min), we strongly propose to actively control the LER share. As stated in the Explanatory Document and the CBA, the critical element is not only the minimum activation period but rather the share of LER units. Even a required minimum activation period of 30 minutes would not be sustainable if the LER share is too high. To this end, we would suggest to introduce the maximum LER share as an explicit parameter into the auction clearing. Accordingly, the clearing algorithm must only accept LER bids up to this maximum share. If this upper bound is not met, the auction result is identical to the current clearing. If it is met, a separate LER-CBMP is determined at the bid price of the last accepted LER unit. This LER-CBMP is then awarded to all accepted LER bids unless a lower local marginal price applies. Non-LER units receive the CBMP of the last accepted bid or the respective local marginal price. This way the current product characteristics can be maintained and the LER share can be restricted in a market-based way.

The possibility of a LER share explicit limitation has been ruled out by TSOs. Such limitation would be infeasible from the legal point of view as well for technical reasons. The introduction of a maximum LER quantity in an auction clearing algorithm would result in the procurement of two separate products (LER and nonLER) with potentially different clearing price. Only a comprehensive market in which both prices and quantities of LER and non LER arise as market results could deal with it (please refer to the Explanatory note, Section 7.b). The potential introduction of such a market has been assessed by TSOs, but it resulted to be infeasible on the short-medium term. The extremely wide procurement mechanisms currently in place in CE as well as the potential effects on FRP (e.g., on k-factors) make a market-based approach not practicable.

In general, such an approach could also be considered for the proposed minimum activation period of 30 minutes for LER units."

Bundesverband Neue Energiewirtschaft e.V. (bne)

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"The cost analysis in the "All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL" does present some interesting numbers and insights into the reasoning of the TSOs. But overall the cost analysis is disappointing.

The main parameters of the analysis are not disclosed. It is unclear, what the assumptions on the duration and the power of the Long-Lasting unidirectional frequency deviations (LL) are and it remains unclear, how often events of Long-Lasting deviations actually occur. Without this information it is difficult to assess, if the cost analysis is plausible. In particular, the amount of extra FCR calculated for increasing amounts of LER within the system seems to be depending on the magnitude of the LL. It would therefore be interesting to get more information about those assumptions.

The so-called long-lasting frequency events have been considered in the study starting from the raw frequency data of the years 2008-2018. Following the definition of long-lasting ("an event with an average steady state frequency deviation larger than the standard frequency deviation over a period longer than the time to restore frequency") there are some occurrences each year. Of course, not all of them are a problem for the system, also considering the LER presence. Most of them do not even trigger the alert state and therefore are not considered for the purpose of defining the minimum activation time period. Furthermore, the detected long-lasting frequency deviations are combined (by means of a Monte Carlo probabilistic model) with other events potentially occurring on the system (i.e., plants' outages).

But even more disappointing is the lack to consider aFRR and mFRR as substitutes for larger energy reservoirs in the cost analysis. To our understanding, the amount of FCR in the electricity system is purposefully limited, mainly for cost-reasons. Technically, a larger share of FCR would be positive for system security in any case. Because of the higher costs of FCR, the present system of a combination of FCR, aFRR and mFRR has been implemented. In this present system, FCR is optimized for fast response and not intended to deliver energy for longer durations – in those cases it is planned to activate aFRR or mFRR. The proposal of the cost analysis to enlarge the energy reservoir is fundamentally deviating from this established system – and the proposal does not even explain the reasoning for this fundamental change.

FCR and FRR play very different roles in the LFC scheme. FCR is aimed at containing frequency deviation, counteracting a power imbalance with a regulation which is fast, automatically activated, widely distributed. These features are very peculiar of FCR and justify the higher costs of FCR.
Currently, FCR is dimensioned in order to ensure that specific frequency thresholds are not exceeded (either during transient or statically) as of the reference incident occurs.

FCR is a non-integral regulation: it does not restore frequency to 50 Hz, it only limits the frequency worsening. The FRR has the purpose to restore frequency within the Time to Restore frequency (15 minutes) to replace the activated FCR.
The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.

If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

The potential need to increase FCR in presence of a large LER share is aimed at reducing the frequency deviation *before* the LER depletion (under the same power imbalance). Such amplitude reduction of frequency deviation reduces in turn the usage of the energy reservoir, delaying (or even preventing) the depletion.

It is the responsibility of the aFRR and mFRR supplier to properly backup their systems and it is the TSO responsibility to control and enforce that all suppliers meet their obligations. It should not the responsibility of the FCR provider to provide an additional backup for those other markets. If providing this additional backup is the motivation of the TSOs to expand the requirements of LER, then it has to be stressed, that in consequence this will reduce the incentive to increase aFRR and mFRR reliability, therefore this core issue will not be solved.
We would like to know, why the activation of aFRR is not possible within a time frame of 15 minutes, why the activation of aFRR fails in a notable extent, what are possible remedies to those failings and how long it will take to implement a better activation procedure for aFRR. And it would be interesting to know what the costs would be, if aFRR could be used in comparison to the costs of the enlargement of the reservoirs of the LER.

The FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs. Beyond the FRR providers activation, there are several other aspects contributing to a correct FRP implementation. These aspects are technical as well as organizational. For instance, important roles are played by real-time power exchange measurements. Also the real-time coordination of the neighboring areas for the Area Control Error is very important.
Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side.
TSOs are implementing new procedures and policies to promptly identify, counteract and resolve such conditions. As of today, however, these conditions cannot be identified and resolved within a suitable time frame, due to their inherently multiple potential causes. As a consequence, FCR can be requested to keep counteracting power imbalance for longer than 15 minutes.
Whenever LFC would show improved performances in the next years (in terms of long-lasting frequency events), the FCR requirement could be reduced.

Without clear and comprehensive answers to those questions, the cost analysis is lacking in content. Even without any calculation, it is obvious that more FCR is better for system security and it is obvious, that larger energy reservoirs for LER are more expensive than smaller reservoirs. The cost analysis can only provide substantial new information, if other alternatives than the enlargement of the reservoirs are examined as well.

From our perspective, a TLER of 15 minutes has major advantages.

- Investment costs are lower, resulting in lower costs for the provision of FCR
  The long-run marginal costs of LER (as assumed in the study, referring to large, FCR-dedicated installations) is low. Nevertheless, nonLER can always be competitive: even for fuel-based plants

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the FCR costs could be extremely low whenever their variable costs is close enough to the energy prices.
It cannot thus be assumed that LER are always more competitive than nonLER - not to mention that even nonLER could have negligible short-term marginal costs as LER (e.g., hydro power plants with large reservoir).

- Stranded investments are avoided, because a large share of LER cannot be retrofitted to a reservoir of 30 minutes due to technical and economic reasons. Technical reasons can be a lack of space (land, building volume, …) and a lack of available and suitable parts. The possible economic consequences are a decrease of liquidity, badly scaling systems, collapsing business cases, bankruptcy and long regulatory processes on all levels.
- Potential investors are not scared away by drastic regulatory changes. That enables continual investment in our power system in the future.
- The existing LER with a reservoir of 15 minutes will be able to continue to bid for FCR. More liquidity for FCR auctions resulting in lower prices

.
A large number of LER currently installed are already able to provide 30 minutes full activation, even if the requirement is currently set to 30 minutes in their area (e.g., Germany). Furthermore, the provision of 30 minutes activation could be theoretically ensured either by a larger reservoir or by a reduced FCR offer (under the same reservoir), albeit with a reduced remuneration.
The number of LER installation which need to go through a technical refurbishment is therefore only a part of the overall currently installed LER.
It should finally be considered that the possibility of a requirement between 15 and 30 minutes is expressly provided by Art.156(11) of SOGL (approved on 2/8/2017), which set these minimum and the maximum time periods. The status quo conditions (part of the existing LER prequalified for 15 minutes) is only one of the contributing factors to be considered, together with all the other aspects TSOs have to take into account.
The potential effect of a change in the regulation is nevertheless a major issue associated with the 30 minutes choice. It's especially true for existing plants. For this reason, existing and underway business cases are safeguarded by means of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

- FCR battery technology does not only fulfill the dynamic requirements of FCR but exceeds them. With a reaction time in the single second range, they have the potential to provide additional grid stability products. If one day a Fast Frequency Response market will be established, it will help to already have a significant amount of battery energy storage systems in the FCR market
The battery-based LER represent only a part of the currently installed LER (another important component comes from run-of-river hydro power plants). The whole study is aimed at fulfilling what requested by Art.156(11) SO GL, that is to define the minimum activation time period. The analyses are therefore focused on the energetic issue and not to other features of FCR provision (such as the limited deployment time of batteries). The valuable features which battery can provide will be considered in the probabilistic recalculation of FCR dimensioning (Art.153(2) SO GL). Such features however are out of scope in a study aimed at understanding which is the most suitable duration to be requested to FCR providers.

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- Faster market penetration of LER. The EU-climate change policy requires to switch from fossil fuels to renewable energy. Phasing out the fossil power plants will reduce the number of suppliers of FCR. In order to be able to source the required amounts of FCR, other technologies, like LER, will have to close the gap. Our assumption is, that this change will occur in a short period of a few years. Therefore, it is important to quickly develop the LER-technologies and integrate them into the market. Not doing so will either lead to supply-problems in the FCR-market or to fossil power plants staying in the market for a longer time, than acceptable from a climate-change perspective.
  FCR provision should continue to be a technologically neutral mechanism. TSOs are however aware of the expected phase out of fossil fuel and indeed are aiming at finding the most suitable solution for integrating LER in the FCR provision. FCR (from nonLER) has always been a source TSOs can rely indefinitely on. This feature is particularly important under stressed system conditions. The limited duration of LER (regardless of the minimum activation time period) represents an additional challenge for TSOs, which must consider this further time constraint in order to prevent further system degradation.
  FCR is an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system.
  The solution TSOs are aiming at is therefore a compromise, allowing the continuous safe system operation also in the expected rapidly evolving framework.

We therefore strongly advocate a general TLER of 15 minutes for all LER."

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EKZ

Marina Gonzalez Vaya (marina.gonzalezvaya@ekz.ch)

"Answer to All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL / Opened 3 Aug 2021 / Closes 6 Sep 2021

1.Introductory remarks

The current proposal builds on ""All CE and Nordic TSOs' results of CBA in accordance with Art.156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017"". First, we comment on the responses to the previous consultation [1], and then we focus on the new aspects of the current proposal. We have also included our responses to the CBA results below, since not all of our comments were addressed. Our response to the previous consultation also shows quantitatively the impact of some assumptions, since we reproduced the CBA methodology to replicate the results.
The current proposal can only be sustained with assumptions and design choices in the methodology that are heavily biased against LER. This is not only problematic because it leads to an unfair treatment of LER, but also – since the method to determine LER dimensioning in practice should be consistent with it – because it will lead to an overestimation of the amount of FCR procured when LER are present, and thus on FCR procurement costs.

2. Answer to response to consultation

2.1. Value destruction

According to the consultation reply, "the investment costs of existing LER have been already incurred, therefore they are considered as sunk costs" [1]. While this assumption makes sense when determining marginal costs of FCR procurement, it does not make sense from a holistic perspective considering the economic impact of the decision. The value destruction of the decision has not been quantified. In order to avoid value destruction, the interim period should be sufficiently long (see 4.3 below).

The potential effect of a change in the regulation is a major issue associated with the 30 minutes choice. It's especially true for existing plants. For this reason, existing and underway business cases are safeguarded by means of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. Such exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

As further considerations, it should however be mentioned that a large number of LER currently installed are already able to provide 30 minutes full activation, even if the requirement is currently set to 30 minutes in their area (e.g., Germany). Furthermore, the provision of 30 minutes activation could be ensured either by a larger reservoir or by a reduced FCR offer (under the same reservoir), albeit with a reduced remuneration.
The number of LER installation which need to go through a technical refurbishment is therefore only a part of the overall currently installed LER.
It should finally be considered that the possibility of a requirement between 15 and 30 minutes is expressly provided by Art.156(11) of SOGL (approved on 2/8/2017), which set these minimum and the maximum time periods. The status quo conditions (part of the existing LER prequalified for 15 minutes) is

only one of the contributing factors to be considered, together with all the other aspects TSOs have to take into account.

2.2. Disagreement on cost structure

Rather than commenting on the cost assumptions themselves, our main criticism in this respect was that the LER share in the market and LER costs were considered independently of each other, although there is an obvious causal link between the two. The LER share would only increase if new LER were cost competitive. CBA results assume LER costs higher than existing non-LER, which would actually result in new LER not entering the market. Therefore, either the scenarios with high LER will not materialize, or the welfare costs computed for these scenarios are overestimated. The scenarios that would not exist under the CBA costs assumptions should be marked accordingly and not considered for the decision.
While the new proposal currently under consultation correctly explores these dynamics, it is done so just for illustrative purposes. The CBA results upon which the current decision relies on have not been accordingly updated.

The potential LER share penetration as a result of their competitiveness against nonLER is investigated in the updated work. The FCR increase dependency from LER presence cannot be considered as definitive since the process of review of the current FCR dimensioning is still ongoing. Other aspects will play a role in such dimensioning (e.g., dynamics). In any case, the presented FCR increase dependency is considered as reasonable figures by TSOs. The potential uncertainty associated with the non-definitive FCR dimensioning is furthermore mitigated by the sensitivity analyses performed on LER. The potential long-run marginal costs of battery-based LER have been considered also in scenarios with a sharp decrease of their CAPEX.

2.3. Energy depletion and alert state

From the response it is clear that "reservoir size" and "time period for LER" are being used interchangeably in the methodology. While the energy depletion previous to entering alert state needs to be considered to determine reservoir size, it should not be considered when determining the time period for LER, which is limited to the alert state. The final reservoir size will be the sum of the reservoir size for the alert state + the reservoir size for the normal state, see in particular the additional properties [2]. By considering depletion previous to entering the alert state in the computation of the LER time period, there will be double counting of this energy and therefore overdimensioning of the LER reservoirs. This assumption has a huge impact on the total FCR that needs to be provided also, see our results below (FCR amount can be reduced by up to 31.8% considering energy activation during alert state only).

TSOs acknowledge that the interchangeable use of the two terms "reservoir size" and "time period for LER" in the documents can be misleading.
The methodology adopted for the calculations consider the usage of an "equivalent energy reservoir" having a size equal to double[2] the energy needed for FCR full activation lasting TminLER.
Since the starting equivalent State Of Charge is 50%, the energy available to cope with a long-lasting unidirectional frequency deviation is equal to FCR full activation lasting * TminLER.
This amount of energy is what is considered available to deal with a specific simulated event; the exhaustion of this amount of energy defines the "LER depletion" condition.
The energy usage occurs only if an alert state is triggered. It starts as the frequency starts to continuously exceed (±) 50 mHz in the framework of an event triggering the alert state.

[2] The double is related to the need to dispose simultaneously of upward and downward reserves.

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The real size of reservoir of LER will be bigger than that, one reason are the needs associated with the energy management in normal state).
The extra energy associated with these needs cannot be considered as available in the framework of an event triggering the alert state. To consider its contribution would mean to rely on an energy margin the continuous retention of which is not legally binding for LER.

3. Due process

CE NRAs approved the assumptions and methodology for the CBA on October 7th 2020. The results of the CBA were presented and submitted to consultation on February 27th 2020, before the assumptions and methodology were approved.

The delay in the approval of the methodology is merely due to a bureaucratic mishap. The methodology approved on 7th October is exactly the same on which the CBA was performed. No amendments have been made on the methodology after the consultation.

4. Answer to current proposal

4.1. Derating factor

In the explanatory document, a remuneration reduction mechanism is discussed (derating factor) [3]. This mechanism is questionable for two reasons:

- Its value is based on many assumptions that cannot be directly measured or verified. Therefore, the fairness of the mechanism cannot be guaranteed.
- Introducing derating factors would imply introducing a "pay for performance" system. When introducing a pay for performance system, this must be done consistently – i.e. also considering the positive contributions of the FCR providing units. In particular, since battery energy storage systems can ramp their power much faster than conventional FCR providing units, they can minimize the maximum frequency deviation before the steady state frequency is reached [4]. This reduces the likelihood of underfrequency load shedding, and the likelihood of distributed generators disconnecting, and thus the likelihood of cascading events that can heavily compromise system stability [5].

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.TSOs acknowledge your observation on the "pay on performance". In any case the contribution of battery-based LER (which btw are only part of the current CE LER fleet) to the dynamic behavior of the system will be considered in the FCR probabilistic dimensioning which TSOs are to perform according to Art.153(2) SO GL.

4.2. Impact of LER costs on LER share

In section "6. Costs analysis and proposal for a LER remuneration reduction mechanism" it is correctly assumed that the amount of new-LER entering the market depends on their costs and that thus LER costs and LER share cannot be consider independently. These are just given in an exemplary fashion. The final CBA results have not been updated accordingly.

Please consider the reply to the previous 2.2 section.

4.3. Interim period

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LER whose prequalification takes place before the entry into force of the proposal are to be exempted from the requirement for an interim period that has not been defined yet. Existing LER in most cases cannot increase the size of the reservoir to meet the new requirements. Therefore, their prequalified power will be significantly reduced when increasing the requirement on the activation time period from 15 to 30 minutes. To avoid value destruction, the interim period should last until August 2nd 2027, that is ten years after publishing SO GL.

TSOs acknowledge this proposal.
To meet the needs of existing and underway business cases, an interim period of at least 24 months following the entry into force of the present regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of such interim period. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

5. Concluding Remarks

Because of the diverse sources of bias in the methodology, the actual need to increase the FCR amount if the time period for the alert state remains 15 minutes, independently of the LER share, has not been fully substantiated. The potential need to increase the FCR amount under some scenarios is due to long lasting deviations, thus due to problems in the delivery of FRR and not due to the presence of LER. With the current proposal, LER are being penalized because of factors external to their performance. This is particularly problematic for existing LER.

TSOs acknowledge this position.

It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side. In addition, in the context of an extremely degraded system conditions (albeit rare, such as 2003, 2006, 2021 events) a large presence of LER (particularly having 15-minutes) represents an additional challenge for the TSOs, which cannot rely anymore on a long lasting FCR provision, but must consider this further time constraint in order to avoid a full black-out.

The following part of the comment is the same comment (same text) provided for previous consultation "All CE and Nordic TSOs' results of CBA in accordance with Art.156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017".
The presented issues have been addressed by TSOs in the replies to that consultation.

Answer to Stakeholder consultation on the ""All CE and Nordic TSOs' results of CBA in accordance with Art.156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017"" report / Opened 27 Feb 2020 / Closed 30 Apr 2020

6. Introductory remarks

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According to SO GL Art. 156 , the goal of the CBA is "to assess the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state" [6]. Therefore, it should be clear that:

- The results need to be interpreted as a time period to remain available, not an energy reservoir size.
- The time period to be defined applies to the alert state only, "as of triggering the alert state and during the alert state" [6].

The time period defined by TSOs according to SO GL Art. 156 has an impact on the required energy reservoir size for FCR providing units with limited energy reservoir (LER) to meet SO GL requirements, i.e. to remain "continuously available during normal state" and available "as of triggering the alert state and during the alert state" for a time period to be defined by the CBA [6]. However, to compute the needed actual reservoir size, further factors need to be taken into account, such as the strategy pursued for "active energy reservoir management" and the "ratio of rated power to prequalified power", which are out of scope of this CBA but are in particular contemplated in the additional properties of FCR, see [2].
It must be noted that the current CBA is not consistent with other documents of the synchronous area agreement, an in particular with the additional properties of FCR [2] (submitted for NRA approval), as we explained in detail below. NRAs have explicitly asked for consistency between the additional properties and the CBA [7], so it is imperative to ensure this.

7. Feedback on modelling of frequency, LER Depletion and FCR dimensioning

There are a number of assumptions and design choices in the methodology leading to biased results in disadvantage of FCR units with LER.

7.1 Simulation of energy depletion of LER

According to the explanatory document on the CBA methodology [8], section 5.4.3 regarding the model of energy depletion, energy depletion was not only considered in the alert state, but also in the normal state "pre-alert". Particularly, once the standard frequency range was exceeded before entering the alert state, this activation was accounted for: "The LER are considered without energy limitations while frequency remains inside the standard frequency range. Once the simulated frequency exceeds this range, the model starts to calculate the activated energy and the residual energy in the reservoir. The residual energy is taken into account even if the alert state is not yet triggered;" [8]. ENTSO-E also confirmed that energy activation during the normal state "post-alert" was also considered, for as long as the reservoir had not reached its target value (equal to half of the equivalent reservoir energy capacity [8]).
Considering energy depletion during normal state (pre- and post-alert) is in stark contrast with the actual goal of the CBA, which is to define an appropriate time period for full activation during the alert state. According to SO GL Art. 156 "For the CE and Nordic synchronous areas, each FCR provider shall ensure that the FCR from its FCR providing units or groups with LERs are continuously available during normal state. For the CE and Nordic synchronous areas, as of triggering the alert state and during the alert state, each FCR provider shall ensure that its FCR providing units or groups with LERs are able to fully activate FCR continuously for a time period to be defined pursuant to paragraphs 10 and 11." [6].
The reason given in the CBA methodology for considering energy depletion during normal state is the following "Considering the Nordic system thresholds as an example, even if the period between the overcoming of ±100mHz and the trigger of alert state can be considered as normal state, it is very unlikely that the LER can keep their energy reservoir fully available in this situation." [8]. This explanation shows that the current CBA is trying to determine an appropriate reservoir size, rather than an appropriate time for full activation during alert state, which is the goal set by SO GL Art. 156. This is again confirmed by the sentence the "energy content is equal to the full activation of FCR for the time period" [8].
This approach in the CBA is very problematic for the following reasons:

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A. The result of the CBA needs to be a time period, not a reservoir size. It is not possible to determine an appropriate reservoir size without taking into account active energy reservoir management. The CBA refrains explicitly from considering active reservoir management [9].
B. In any case, considering what happens during normal state as relevant to the time period requirement for the alert state, is not consistent with the requirement that "each FCR provider shall ensure that the FCR from its FCR providing units or groups with limited energy reservoirs are continuously available during normal state." [6], and therefore not consistent with SO GL. If the time period defined by the CBA is affected by frequency deviations during normal state, this will later lead to a double counting of energy activation during pre-alert state, when prequalification requirements are defined based on CBA results. In fact, looking at the additional properties of FCR: "FCR providing groups considered as LER have an energy reservoir dimensioning sufficient to cover a Frequency Deviation of 200 mHz for at least [15-30] minutes in positive and negative direction by additionally taking into account possible frequency deviations that might happen before entering into Alert State." [2]. Therefore, the current CBA methodology in combination with the additional properties of FCR [2] leads to a double counting of the "possible frequency deviations that might happen before entering into Alert State", since according to the additional properties of FCR [2] the requirements for normal state would come on top of the time period during alert state. The additional properties are consistent with SO GL Art. 156. The CBA in contrast is not in line with SO GL Art. 156 [6] nor with the additional properties [2], since it is effectively considering the frequency deviations before entering the alert state as part of the alert state.
C. The CBA treats effectively the point where frequency exceeds the standard frequency range as the point of alert state trigger (only if the event includes an alert state trigger to be precise). This leads to overestimating the time period required for full activation during alert state on the basis of system stability, since it is treating the pre-alert state as alert state effectively, and counting the energy activation there as energy activation during alert state. In the explanatory notes it is stated: "It must be highlighted that taking into account the energy consumption before the actual trigger of alert state does not imply any over dimensioning of the LER reservoir according to SO GL Art.156. The energy provided by LER before the moment in which the alert state is triggered is accounted for in the calculation. In fact, the time period used in the simulations is reflected in an energy content requested to LER reservoir. This energy content is equal to the full activation of FCR for the time period (e.g. a time period equal to 15 minutes in the Nordic system is reflected in an energy content equal to the provision of FCR due to 500 mHz deviation that lasts for 15 minutes). The energy consumed before the alert state trigger is included in this energy content." [8]. It must be noted again that SO GL Art. 156 does not mention reservoir size dimensioning, it mentions a time period during alert sate, so the reference to SO GL Art. 156 is not appropriate and this approach not consistent with SO GL Art. 156. In CE, the theoretical worst case possible transition from normal state to alert state is equivalent to 10 minutes of full activation (10 minutes at a deviation slightly below 100 mHz followed by 5 minutes at a deviation slightly below 200 mHz: 1/2x10+1x5=10), which shows why effectively counting this as alert state has huge implications (potentially only leaving 5 minutes for the true alert state). Looking at real frequency data in CE for 2008-2018, the input data used in the CBA, the worst-case transition from normal state to alert state was equivalent to 7 minutes of full activation (on 20.03.2012).
It must be noted that the NRAs have specifically criticized this assumption and have requested TSOs "to elaborate the outcomes and to set a delivery time period fully in line with the SO GL provisions" [7]. The Bundesnetzagentur in Germany has also separately mentioned this as a shortcoming, see [10] page 15 and [11] page 23-27. Failure to address this shortcoming means that the current results do not meet the standards set by NRAs.

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Our analysis of the most relevant events, see Annex A, shows that by considering energy activation in alert state only, the FCR amount can be reduced by up to 17.1% for the 2003 Italian Blackout (Table 4 vs Table 6), by up to 23% for CE 2006 East (Table 8 vs Table 10) and by up to 23.3% for CE 2006 South (Table 12 vs Table 14). Applying the same procedure to the frequency data of 2008-2018, the frequency data used as input in the CBA, it is shown that the FCR amount can be reduced by up to 31.8% considering energy activation during alert state only (Table 16 vs Table 17 in Annex C). In the Monte Carlo analysis, the FCR amount can also be reduced by up to 31.8% (Table 20 vs Table 21 in Annex E). In this case, no FCR amount increase is needed with a time period for the alert state of 20 minutes or higher.

7.2. Simulation of synchronous frequency restoration controller

According to the explanatory document [8], section 5.4.2, "The whole Frequency Restoration Process of the synchronous area is modelled with a single controller with a Full Activation Time (FAT) calculated as an average of the FAT of all the LFC areas belonging to the synchronous area weighted on FRR K-factor." By averaging between FRR with lower FAT and FRR with higher FAT, the action of faster FRR is effectively delayed in the simulation, leading to an overestimation of the energy that needs to be provided by FCR units while FRR is ramping up, or equivalently an overestimation of the duration of the alert state.
This assumption again leads potentially to an overestimation of the required time period in alert state. Simulating FRR with different FAT as separate clusters should definitely be possible without increasing modelling complexity significantly, leading to more realistic results regarding time period requirements and a fairer assessment of the requirements for FCR units with LER. According to our results, simulating three FRR clusters (FRR response being the weighted sum of the three responses at each time step) instead of a single one reduces the energy activation due to outages by 13%.

7.3. Management of energy reservoir

The current CBA has not taken into account the possibility for FCR providing units with limited energy reservoirs to manage their energy reservoir. In fact, this would not only be a possibility but a requirement, according to the additional properties of FCR [2].
Not modelling active energy reservoir management would not be problematic if the CBA would really be determining a required time period during alert state, as required by SO GL Art. 136, rather than estimating a required energy reservoir, which is indeed the case as explained above in 7.1. While the assessment of a time period does not need to model active reservoir management, to translate the time period requirement into an energy reservoir requirement, the characteristics of the active energy reservoir management need to be considered.
An example to make this point clear: In CE, a unit with a ratio of rated power to prequalified power of 1.5 could not only compensate 50 mHz deviations continuously but also 100 mHz deviations continuously, leading to smaller energy reservoir requirements for the normal state and for the alert state.
If our remarks in 7.1 are not taken into account (determining a time period rather than an energy reservoir size), then it is imperative that active energy reservoir management is modelled in the CBA. Even if under some circumstances the management of the energy reservoir would not be possible, this event should be modelled with a realistic probability, not as a certainty. It should be noted that at least one of the NRAs, the Bundesnetzagentur in Germany, has mentioned this aspect as a shortcoming, see [11] page 27 and 32.

7.4. Management of energy reservoir considering deterministic phenomena

Since deterministic phenomena, in particular market induced effects, are by definition predictable, a forward looking energy reservoir management would be able to take these into account and schedule its energy reservoir management actions to compensate them in advance (for example by purchasing the

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corresponding energy in the day-ahead or intra-day energy market and thus shifting their baseline correspondingly).
Given this possibility, it is questionable why deterministic phenomena should be taken into account at all to assess reservoir depletion. Increasing the required size of the energy reservoir would definitely be less cost effective than ensuring a forward-looking energy reservoir management accounting for deterministic phenomena.
We have run the Monte Carlo analysis with and without the effect of determinist phenomena to assess the contribution of these phenomena to energy reservoir depletion and alert state time period requirements. The results were identical with and without deterministic events (Table 20 vs Table 23 in Annex E). This is consistent with the CBA results, since DFD mitigation actions had no impact on results.
It seems therefore that deterministic phenomena do not play a major role in the alert state statistics. However, it is likely that the play a major role in normal state statistics. Therefore, we would like to point out that FCR providing units that are able to demonstrate their ability to compensate for these phenomena should therefore be allowed a correspondingly lower dimensioning of the energy reservoir reserved for the normal state.

7.5. Behaviour of FCR providing units with limited energy reservoir in the unlikely event of reservoir depletion

Even in the unlikely event of reservoir depletion, there are technical means to make sure that FCR providing units with LER are still contributing to system stability by responding to short-term frequency deviations. To put it in "All CE TSOs'" own words as specified in the additional properties of FCR [2]: "The idea of the Reserve Mode is to relieve FCR providing units with LER from the "mean deviation" of system frequency. By applying this approach, the availability of FCR providing units with LER can be prolonged […] depending on the mean value of system frequency."
Given that there are specific plans to introduce this Reserve Mode, it would only be logical to include this possibility in the assessment (at least as an additional scenario). Failure to do so leads again to underestimating the availability of FCR providing units with LER to stabilize the system and overestimating the need to increase the dimensioning of FCR as the share of FCR providing units with LER increases.

7.6. Benefits of fast responding FCR providing units with limited energy reservoir

It is stated in the CBA results that FCR providing units with LER nowadays are mainly run-of-river power plants and battery energy storage systems, see [12] section 7 and 9. New FCR providing units with LER are assumed to be batteries in the near future [13].
Since battery energy storage systems can ramp their power much faster than conventional FCR providing units, they can minimize the maximum frequency deviation before the steady state frequency is reached [4]. This reduces the likelihood of underfrequency load shedding, and the likelihood of distributed generators disconnecting, and thus the likelihood of cascading events that can heavily compromise system stability [5].
The methodology does not consider the FCR dynamic response, see [8] section 4.2, thus neglecting the positive effect on system stability of an increased share of FCR providing units in the form of battery energy storage systems.
Maybe this positive property of battery energy storage systems could have proved helpful in the 2003 and 2006 events mentioned in the CBA, where the frequency deviation exceeded 200 mHz. If a frequency deviation above 200 mHz could have been avoided, some of the corresponding cascading events could have been avoided, leading potentially to a different chain of events.

7.7. Effect of long lasting frequency deviations and deterministic frequency deviations

Long lasting frequency deviations are due to FRR saturation, while deterministic frequency deviations are due to market induced effects (power plants not ramping up/down appropriately). Measures to mitigate

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these effects have been taken in the past and are also currently being planned. Regarding the statistics for long lasting frequency deviations and deterministic frequency deviations, only the most recent years should be used in the model, the historic data dating back to 2008 not being relevant anymore and overestimating the magnitude and probability of these events. As far as long lasting events and alert state events are concerned, the years 2013-2018 show improved statistics respect to the earlier years, see Table 1 and Table 2. Running simulations similar to the simulations for the major events for the frequency data of 2013-2018 versus 2008-2018, the FCR amount can be reduced up to 26.8% (Table 16 vs Table 18). In general, it should be noted that mitigation actions to reduce the inappropriate behaviour of FRR or of power plants should be weighed against increasing the requirements for FCR providing units, see point 8.4 below.
We commented on the impact of deterministic events on results in 7.4 (no impact). We also performed an assessment of the impact of long lasting events on results. Without long lasting events, the FCR does not need to be increased at all, independently of the LER share (Table 20 vs Table 24). Therefore, it can be argued that any increase in the FCR amount is due to a performance issue of FRR (long lasting events), not to the LER share.

7.8. Overlapping outages and deterministic phenomena / long lasting deviations.
While with respect to long lasting deviations and deterministic phenomena it was claimed that a "potential overlap with recorded outages will be investigated in order to avoid double counting of phenomena" [14], the current CBA did not consider this. Therefore, double counting may happen, which leads to an overestimation of the likelihood of reservoir depletion.

7.9. Consideration of 2003 and 2006 events
It should be noted that at least one of the NRAs, the Bundesnetzagentur in Germany, has questioned the representativeness of using the events in 2003 and 2006 as a basis for the analysis, since measures have been taken by the TSOs to mitigate the problems experienced during these events to coordinate actions between TSOs, so that these are not experienced again, see [11] page 31.

7.10. Determining FCR amount for 2003 and 2006 events
A depletion was considered critical if the frequency deviation exceeded 200 mHz, irrespective of whether this threshold had been exceeded in the original event or not. In order to assess if the presence of LER would have worsened the situation during the event, the criterion to increase FCR in this simulation should be slightly modified. These two conditions should be met: a) frequency deviation exceeds 200 mHz, and b) frequency deviation exceeds the original frequency deviation. In that way, the FCR amount can be computed that would have avoided a worsening of the situation. The corresponding results are shown in Annex A. In the 2003 Italian Blackout, the FCR amount can be reduced by up to 8.1% (Table 4 vs Table 5). In the 2006 CE East event, by up to 53.4% (Table 8 vs Table 9).

In conclusion, several assumptions and methodological choices lead to a clear bias that overestimates the requirements for the alert state time period and underestimates the stabilizing effect of FCR providing units with LER.
A simple reality check: Between 2008 and 2018 there were only 3 alert state events exceeding the equivalent of 15 minutes of full FCR activation in CE (3 times in 11 years, 0.27 times per year on average), see Table 1. The last time an event occurred with an alert state exceeding the equivalent of 15 minutes of full activation in CE was on 24.12.2012. In the simulations presented in the CBA, the number of depletions is 1.11 per year on average for the 15 minute case, which is in stark contrast with the actual historic data, showing clearly the strong bias of the modelling and assumptions. If one would determine the required FCR based on the data for 2013-2018, considering depletion during alert state only, the FCR amount would not need to be increased independently of the share of LER, see Table 19. Our results for the

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Monte Carlo analysis considering depletion during alert state only show that the FCR amount does not need to be increased for an alert state time period of 20 minutes Table 21. Removing the impact of long lasting events, it can be shown that the FCR amount would not need to be increased independently of the share of LER, see Table 24.
SO GL Art. 156 specifically asks to take into account "experiences gathered with different timeframes and shares of emerging technologies in different LFC blocks", the CBA has instead followed questionable assumptions which lead to unrealistic and strongly biased results, which do not match real world evidence.
Given that many of the assumptions and methodological choices mentioned above have been questioned by NRAs, it is not understandable why the CBA has failed to address these. Failure to address these shortcomings means that the current results do not meet the standards set by NRAs and certainly fail to contribute to the "efficient operation and development of the electricity transmission system" as one of the main goals of SO GL [6] .

8. Feedback on cost-benefit assessment

8.1. Costs of new LER vs costs of non-LER

Based on the results presented in the CBA for Continental Europe, new LER units seem to have higher specific costs than existing non-LER units. This makes all scenarios where the LER share exceeds the current LER share more costly, independently of whether the total FCR amount needs to be increased or not. However, if new LER would be more costly than existing non-LER, new LER would not enter the market, so the higher LER shares would not materialize. Therefore, if the LER share is expected to increase, the cost calculations of the CBA must be unrealistic. In any case, setting a cap on the LER share because new LER are supposedly more expensive than existing non-LER would be an inacceptable and unnecessary market intervention.

8.2. Modelling of costs

The methodology assumes a competitive market, see [8] section 5.6.1. In practice, FCR being a niche market with low liquidity, this is not necessarily the case. Setting entry barriers to this market, either directly by limiting the share of FCR units with LER or indirectly by increasing the requirements for these units and thus investments cost, has therefore a negative impact on the competitiveness of the market and therefore leads to welfare losses not quantified in the CBA. Considering the price evolution in the FCR cooperation, this point becomes tangible:
FCR units with LER are mainly run-of-river power plants and battery energy storage systems according to the CBA, see [12] section 7 and 9. Battery energy storage systems have very low marginal costs. In markets with a large share of battery energy storage systems among FCR units, particularly in the FCR cooperation, auction results provide an evidence that battery energy storage systems have changed market dynamics and increased competitiveness, both due to increased market liquidity and due to their low marginal costs, resulting in lower procurement costs for TSOs.
Any measure taken to limit the participation of battery storage systems in FCR procurement, either directly by limiting the share of FCR units with limited energy reservoir or indirectly by increasing the requirements for these units and thus investments costs, will lead to an increase in procurement costs of FCR beyond the effect modelled in the CBA, which does not contemplate their positive effect on market competitiveness, since it assumes efficient markets from the start.

8.3. Energy to power ratio of FCR providing units with limited energy reservoir

The CBA assumes that the energy to power ratio of FCR providing units with limited energy reservoir is equivalent to two times the time of activation during alert state (for example E/P=0.5 hours in the 15 minute scenario), see [13] page 35. As explained above in 7.1 and 7.3, a time requirement cannot be

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translated into an energy to power ratio requirement without consideration of the active energy reservoir management strategy. Therefore, it would make sense to conduct a sensitivity analysis on this assumption.

8.4. Overdimensioning of FCR due to problems in the delivery of FRR

It is explained in [8] section 5.3 that long lasting frequency deviations are typically due to exhaustion of FRR in a single LFC area. Therefore, the costs of mitigating the problems in the delivery of FRR should be weighed against the costs of increasing the requirements for FCR providing units (by extending the delivery period from 15 to 30 minutes). It should be noted that at least one of the NRAs, the Bundesnetzagentur in Germany, has mentioned this aspect as a shortcoming, see [11] page page 20, claiming that FCR providing units should not be made responsible of correcting the problems of FRR providing units. Moreover, increasing the FCR amount due to problems in FRR in certain areas means that the costs of non-compliance in one area will be shared among all areas.

Our results show that without long lasting deviations, no FCR amount increase would be needed independently of the LER share and the defined time period during alert state, see 7.7. Therefore, it is clear that issues in the delivery of FRR are the source of the problem, not the presence of LER.

8.4. Overdimensioning of FCR due to problems in the delivery of FRR

Battery energy storage systems have a significantly faster response compared to conventional FCR proving units, thus limiting the maximum frequency deviation before steady state. By doing so, they limit the probability of underfrequency load shedding/distributed generator disconnection, which also represent costs to society. Thus, an increased share of battery energy storage systems leads to quantifiable benefits to society, in the form of avoided costs for underfrequency load shedding/distributed generator disconnection [5].

Any measure taken to limit the participation of battery storage systems in FCR procurement, either directly by limiting the share of FCR units with LER or indirectly by increasing the requirements for this units, will lead to a missed opportunity to reduce underfrequency load/generator shedding events and their related costs to society.

8.6. Costs for existing FCR providing units with limited energy reservoir

There are FCR providing units with LER currently prequalified according to a 15 minute time period. An increase of the time period beyond 15 minutes will lead to a reduction of their FCR prequalification (a retrofit being hardly an option in practice). The investments in these systems will not be recovered due this this fact. These costs (in the form of lost returns on investment) need to be quantified in the CBA, in particular in the first option "15 minutes with LER share limitation" (some participants will be excluded from the market) and third option "30 min without LER share limitation" (the prequalified power of some market participants will be reduced).

9. Feedback on CBA Process

The CBA process, an in particular its transparency, needs to be questioned due to the points below.

9.1. ENTSO-E has failed to inform all TSOs on the stakeholder "Webinar on CBA to assess the time period required for FCR with limited energy reservoirs (LERs)" on November 15th 2019.

9.2. ENTSO-E has shared the data needed to replicate the technical results (computation of needed FCR), but only did so after the initial deadline for the consultation had elapsed, one month after our initial data request.

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9.3. Upon request, ENTSO-E has failed to provide publicly available documents arguing these would be confidential.

10. Concluding Remarks

Because of the diverse source of bias in the methodology, the actual need to increase the FCR amount if the time period for the alert state remains 15 minutes, independently of the LER share, has not been fully substantiated. Specially looking at the recent history there is no evidence of a need additional FCR, see Table 19. If TSOs consider that there is a need to increase the FCR amount under some scenarios, this is clearly due to long lasting deviations, thus due to problems in the delivery of FRR and not due to the presence of LER.

Independently of this, implementing a cap on the LER share below the current LER share (Option 1 for CE) or changing prequalification rules for existing LER (Option 3) will have a huge impact on existing LER units and thus lead to value destruction. We believe that there is currently no solid basis to interfere in the market in such a way.

We are willing to share our simulation models and results with any interested party (contact: marina.gonzalezvaya@ekz.ch).

Annex A. Analysis of historic data 2008-2018

Table 1: Analysis of Alert State events in 2008-2018

Nr of events exceeding the equivalent of x minutes of full activation				
Year	0'	15'	20'	25' 30'
2008	58	0	0	0 0
2009	62	1	0	0 0
2010	69	0	0	0 0
2011	29	1	0	0 0
2012	48	1	0	0 0
2013	28	0	0	0 0
2014	16	0	0	0 0
2015	9	0	0	0 0
2016	14	0	0	0 0
2017	20	0	0	0 0
2018	18	0	0	0 0

Table 2: Analysis of Long Lasting events in 2008-2018

Nr of events exceeding the equivalent of x minutes of full activation				
Year	0'	15'	20'	25' 30'
2008	637	0	0	0 0
2009	599	2	1	0 0
2010	536	1	1	0 0
2011	379	2	2	1 1
2012	415	1	1	1 1
2013	318	1	0	0 0
2014	231	0	0	0 0
2015	163	0	0	0 0
2016	207	0	0	0 0
2017	276	0	0	0 0
2018	268	1	0	0 0

Table 3: Analysis of Deterministic evets in 2008-2018

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Year mean|df| at minutes 55 to 5
2008 0.021
2009 0.021
2010 0.021
2011 0.021
2012 0.022
2013 0.021
2014 0.020
2015 0.016
2016 0.021
2017 0.022
2018 0.022

Annex B. Results of the tests against the most relevant events
B.1. 2003 Italian Blackout
Table 4: Results for 2003 Italian Blackout following CBA methodology
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3700 4000 4500 5200 5900 6300 6800 8000 8200 8200
20' 3500 3900 4400 4700 5000 5200 6000 6800 6800 6800
25' 3300 3500 3800 4000 4200 4600 5500 5900 5900 5900
30' 3000 3000 3100 3400 3700 4300 4900 5100 5100 5100

Table 5: Results for 2003 Italian Blackout, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3400 3800 4300 5000 5900 6300 6800 8000 8200 8200
20' 3400 3800 4300 4700 5000 5200 6000 6800 6800 6800
25' 3300 3500 3800 4000 4200 4600 5500 5900 5900 5900
30' 3000 3000 3100 3400 3700 4300 4900 5100 5100 5100

Table 6: Results for 2003 Italian Blackout considering energy activation during alert state only, as explained in 7.1
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3500 3900 4500 4700 5100 5500 6200 6800 6800 6800
20' 3500 3700 4000 4200 4200 4600 5700 6200 6200 6200
25' 3100 3300 3500 3600 3800 4400 5100 5300 5300 5300
30' 3000 3000 3100 3200 3600 4100 4400 4500 4500 4500

Table 7: Results for 2003 Italian Blackout, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10, as well as considering energy activation during alert state only, as explained in 7.1.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3400 3800 4300 4700 5100 5500 6200 6800 6800 6800
20' 3400 3700 4000 4200 4200 4600 5700 6200 6200 6200
25' 3100 3300 3500 3600 3800 4400 5100 5300 5300 5300

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30' 3000 3000 3100 3200 3600 4100 4400 4500 4500 4500

B.2. 2006 CE East

Table 8: Results for 2006 CE East following CBA methodology

LER share

TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

15' 7300 7800 8200 9100 10600 11200 12600 12800 12800 12900

20' 6100 6900 7600 8300 8800 9600 9600 9800 9800 9900

25' 5900 6600 6600 7100 7700 7700 7800 7800 7800 7900

30' 5000 5300 5700 6300 6300 6500 6500 6500 6500 6600

Table 9: Results for 2006 CE East, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10

LER share

TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

15' 3400 3800 4300 5000 6000 7500 10000 12800 12800 12900

20' 3400 3800 4300 5000 6000 7500 9600 9800 9800 9900

25' 3400 3800 4300 5000 6000 7500 7800 7800 7800 7900

30' 3400 3800 4300 5000 6000 6500 6500 6500 6500 6600

Table 10: Results for 2006 CE East considering energy activation during alert state only, as explained in 7.1

LER share

TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

15' 6100 6900 7700 8700 8900 9700 9700 10000 10000 10200

20' 5900 6600 6900 7400 7900 8200 8400 8400 8400 8500

25' 5300 5600 5700 6500 6500 6700 6700 6700 6700 6800

30' 4400 5000 5100 5100 5500 5500 5500 5500 5500 5600

Table 11: Results for 2006 CE East, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10, as well as considering energy activation during alert state only, as explained in 7.1.

LER share

TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

15' 3400 3800 4300 5000 6000 7500 9700 10000 10000 10200

20' 3400 3800 4300 5000 6000 7500 8400 8400 8400 8500

25' 3400 3800 4300 5000 6000 6700 6700 6700 6700 6800

30' 3400 3800 4300 5000 5500 5500 5500 5500 5500 5600

B.3. 2006 CE South

Table 12: Results for 2006 CE South following CBA methodology

LER share

TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

15' 3000 3000 3000 3000 3300 3700 3800 4300 4300 4300

20' 3000 3000 3000 3000 3000 3000 3300 3300 3300 3300

25' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

30' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 13: Results for 2006 CE South, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10

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LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3000 3000 3000 3000 3300 3700 3800 4300 4300 4300
20' 3000 3000 3000 3000 3000 3000 3300 3300 3300 3300
25' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 14: Results for 2006 CE South considering energy activation during alert state only, as explained in 7.1
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3000 3000 3000 3000 3300 3300 3300 3300 3300 3300
20' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 15: Results for 2006 CE South, determining FCR needed for the situation not to have worsened due to the presence of LER as explained in 7.10, as well as considering energy activation during alert state only, as explained in 7.1.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15' 3000 3000 3000 3000 3300 3300 3300 3300 3300 3300
20' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30' 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Annex C. Results of the tests against the frequency of the period 2008-2018
Table 16: Results for 2008-2018 following CBA methodology
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3800 4500 4800 4800 4800 4800
20 3000 3000 3000 3200 3700 4200 4400 4400 4400 4400
25 3000 3000 3000 3100 3500 3900 4100 4100 4100 4100
30 3000 3000 3000 3000 3200 3500 3500 3500 3500 3500

Table 17: Results for 2008-2018 considering energy activation during alert state only, as explained in 7.1
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3500 3700 3800 3800 3800 3800
20 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Annex D. Results of the tests against the frequency of the period 2003-2018
Table 18: Results for 2013-2018 following CBA methodology
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3000 3100 3400 3800 3900 3900 3900
20 3000 3000 3000 3000 3000 3300 3300 3400 3400 3400

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25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 19: Results for 2013-2018 considering energy activation during alert state only, as explained in 7.1
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
20 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Annex E. Results of Monte Carlo analysis
Table 20: Results for Monte Carlo analysis following CBA methodology. Note that in some cases there is a difference of 100 to 300 MW in our results vs the CBA results which can be explained by the stochastic nature of the Monte Carlo method.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3800 4500 4600 4700 4800 4800
20 3000 3000 3000 3200 3700 4200 4400 4400 4400 4400
25 3000 3000 3000 3100 3500 3800 3800 3800 3900 3900
30 3000 3000 3000 3000 3200 3300 3300 3400 3400 3400

Table 21: Results for Monte Carlo, considering energy activation during alert state only, as explained in 7.1.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3500 3700 3800 3800 3800 3800
20 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 22: Results for Monte Carlo analysis, considering a more detailed FRR model, as explained in 7.2.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3800 4500 4600 4700 4800 4800
20 3000 3000 3000 3200 3700 4200 4400 4400 4400 4400
25 3000 3000 3000 3100 3500 3800 3800 3800 3900 3900
30 3000 3000 3000 3000 3200 3300 3300 3400 3400 3400

Table 23: Results for Monte Carlo analysis, not considering deterministic events, as explained in 7.7.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3800 4500 4600 4700 4800 4800
20 3000 3000 3000 3200 3700 4200 4400 4400 4400 4400
25 3000 3000 3000 3100 3500 3800 3800 3800 3900 3900
30 3000 3000 3000 3000 3200 3300 3300 3400 3400 3400

Table 24: Results for Monte Carlo analysis, not considering long lasting events, as explained in 7.7.
LER share

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TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
20 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

Table 25: Results for Monte Carlo analysis, only using the frequency data for 2013-2018 as input as explained in 7.7.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3200 3800 4500 4600 4700 4800 4800
20 3000 3000 3000 3200 3700 4200 4400 4400 4400 4400
25 3000 3000 3000 3100 3500 3800 3800 3800 3900 3900
30 3000 3000 3000 3000 3200 3300 3300 3400 3400 3400

Table 26: Results for Monte Carlo analysis, considering energy activation during alert state only, as explained in 7.1, considering a more detailed FRR model, as explained in 7.2 and not considering deterministic and long lasting events, as explained in 7.7.
LER share
TminLER 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
15 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
20 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
25 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000
30 3000 3000 3000 3000 3000 3000 3000 3000 3000 3000

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Centrica

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"Centrica endorses ENTSO-E's preferred proposal of setting TminLER at 30min for all LER (option D), as long as this option ensures full access to the FCR market for all LER assets and does not lead to additional constraints, such as for example a maximum LER penetration rate, the introduction of de-rating factors, the extension of pre-alert state requirements or the limitation of aggregation capabilities.

While Centrica believes a 30min reservoir is an ambitious but achievable target for LER assets, such reservoir size must also remain sufficient to satisfy the system operators needs. Requiring more energy beyond that value or additional requirements in order to cover for long-lasting events would neither be reasonable nor legitimate. Centrica believes that the purpose of FCR is not to handle extreme events triggering long-lasting frequency deviations, in particular where other products like aFRR are defaulting and creating these issues. Would such issues remain a concrete risk for the European grid, Centrica advocates for the creation of a dedicated product if needed, but disagrees with the idea that FCR should be able to cope with such events, as the product is not primarily designed to do so. Finally, Centrica reminds ENTSO-E that aggregation in the FCR market is in line with European regulation, and that the TminLER = 30min requirement therefore must apply at the (aggregated) pool level, rather than the individual asset level.

30 minutes requirement will not in any case be increased in the future since this is the maximum value set in Art.156(11) SO GL.
SO GL Art.156 refers to "FCR providing units or groups with limited energy reservoirs". It is intended that an energy limited providing unit within a larger pool is not considered a LER if the BSP could manage its FCR providing group in order to avoid the depletion.

Regarding the delay that will be granted to providers to adapt and move towards the new energy reservoir requirement once it will have been validated, Centrica advocates for a reasonable yet short transition period (6-12 months max). Anything beyond such timeframe would constitute a transitional exemption rather than a derogation period to adapt. LERs can indeed either adapt from one day to another or, if needed, undergo new prequalification processes to temporarily lower their FCR capacity until they find a solution to comply with the TminLER = 30min criteria. In addition, even if not validated yet, the idea of moving to TminLER = 30min has been presented by ENTSO-E as a likely option for a long time already, thereby providing market participants with sufficient visibility to prepare for such a change.

On the overall process, Centrica highlights that the overall timeline remains unclear at this stage. Centrica therefore asks ENTSO-E to clarify the foreseen next steps. In particular, it should be clarified by when the final decision is expected, and therefore by when the delay to adapt to Tmin = 30min would start running, and by when the new requirement would enter into force.

TSOs acknowledge your position on transition period.
TSOs have deemed as very important the safeguard of existing and underway business cases (currently under a 15 minutes requirement). To mitigate the impact on them an interim period of at least 24 months is provided. The 30 minutes requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will

be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

Finally, Centrica recalls that while this step towards a harmonized LER reservoir size is an important step forward, it will only partially harmonize the overall requirements for LER assets in the European FCR market. For example, several national TSOs do and will continue to require an additional reservoir size beyond the one for the alert state, in order to guarantee that LER also have enough energy for the pre-alert state period at all times. National TSOs also have very heterogeneous requirements when it comes to energy management strategies or aggregation capabilities for LER. Given that only the reservoir size for the alert state will be harmonised at European level, while many additional requirements remain non-harmonized, this still creates significant distortions between countries participating to the FCR Cooperation. Centrica regrets this lack of full harmonisation, and urges TSOs to further progress towards harmonised rules on pre-alert state requirements, energy management strategy requirements, monitoring rules, baseline methodologies, settlement processes, penalty formulas, and so on."

TSOs acknowledge the importance of a harmonized context also in term of further energetic constraints (e.g., for the pre-alert state). Such issue is however out of scope of the current consultation which is aimed at addressing the needs in alert state.

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Enel

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"Enel believes that in order to safeguard the past investments on existing LER, it should be allow to maintain a Tmin LER of 15 min (or different level) for existing LER units according to the regulation in place at the time of the investment decision.
In case further analysis and assessments will demonstrate that the 15 minutes Tmin has a negative impact on the system costs to achieve the same level of safety, then adequate measures could be discussed."

TSOs acknowledge the potential impacts of a 30 minutes requirement on LER already existing which are prequalified for 15 minutes. To minimize such impact, safeguarding existing and underway business cases, the requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for an exemption from the 30 minutes requirement, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

NW Joules

Vianney CHRISTOPHE (vianney.christophe@nw-groupe.fr)

"NW Joules is a French developer specialized in storage projects development and operation.
NW portfolio is composed of 60 MW French storage installations in operation and certified by RTE for the participation to the FCR cooperation. These capacities participate every day to the tenders.
In 2021, NW is installing 125 MW additional capacities in France which are actually in construction.
Thus, by the 2021 NW will have installed 185 of batteries in France.
For 2022, NW forecasted to develop many more projects in France and Europe (grid connection secured and equipments ordered).

NW takes note of ENTSOE's proposition to adopt a Tmin of 30 minutes for LER capacities.
NW wants to emphasize that this modification of regulation will impact its activities:

- NW will have to do new certifications for each of its installed batteries
- NW will have to study the best solution for its park, taking in fact the large technical restriction on the retrofit of its installation.
- NW will have to adapt its future projects, developed on a Tmin of 15 minutes

If this change is confirmed, the interim period must be set at a minimum of 5 years.

To limit the impacts of this regulation change, the interim period evocated in the study must be as long as possible."

TSOs acknowledge the potential impacts of a 30 minutes requirement on 15 minutes LER which already exist or are currently in the pipeline (as those mentioned in the comment). To minimize such impact, safeguarding existing and underway business cases, the requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

BDEW e. V.

Dr. Michael Wunnerlich (natalie.lob@bdew.de)

"BDEW welcomes the opportunity to comment on the proposal for the amendment of the minimum activation time period required for FCR providing units or groups with limited energy reservoirs (LER) to remain available during alert state in accordance with Article 156(11) SO GL. BDEW appreciates the TSOs' effort in that matter and thanks ENTSO-E for the postponement of the deadline.
As the German TSOs organized within BDEW are, among others, responsible for the drafting of the proposal and this consultation paper, the following BDEW comments have been developed without the German TSOs.

Proposal for a 30 minute minimum activation period time

BDEW appreciates the cost benefit analysis performed by the TSOs to determine the minimum activation period for LER units but is not totally in line with the assumptions made and the outcome of the analysis. BDEW especially does not agree that issues in other markets, namely the aFRR-market, are used as an argument to make changes in the FCR market. Issues in the aFRR market should be identified and solved together with stakeholders. Furthermore, aFRR replaces FCR over minutes and is put into action by the responsible parties, while mFRR partially complements and finally replaces aFRR by re-scheduling generation. As the three products for balancing energy build a complement and supersede each other, there is no need to enlarge the minimum activation peri-od time for LER-units in the FCR from 15 to 30 minutes.

The FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs. Beyond the FRR providers activation, there are several other aspects contributing to a correct FRP implementation. These aspects are technical as well as organizational. For instance, important roles are played by real-time power exchange measurements. Also the real-time coordination of the neighboring areas for the Area Control Error is very important.
Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side.
TSOs are implementing new procedures and policies to promptly identify, counteract and resolve such conditions. As of today, however, these conditions cannot be identified and resolved within a suitable time frame, due to their inherently multiple potential causes. As a consequence, FCR can be requested to keep counteracting power imbalance for longer than 15 minutes.
Whenever LFC would show improved performances in the next years (in terms of long-lasting frequency events), the FCR requirement could be reduced.

Changing the current activation period time from 15 minutes to 30 minutes would entail a setback, as the BNetzA (BK6-17-234) rejected the implementation of a German minimum activation time of 30 minutes. Based on that decision, market participants made investments that are now at risk. From an investor's point of view a stable regulatory environment is required to decide on new investments and it is important to have a security for investments already planned and realized. Changing the minimum activation time period for LER units like it is proposed, may result in stranded investments as they might not be profitable anymore or would have to undergo a lengthy and costly conversion.

SO GL (2nd August 2017) explicitly provide for the possibility of a minimum activation time period between 15 and 30 minutes. While it's true that a large number of areas are currently implementing a requirement of 15 minutes, this cannot be considered as a requirement applied at Continental Europe level.
TSOs acknowledge the potential uncertainty introduced by a change in the requirement for the areas currently requiring 15 minutes. In order to minimize such uncertainty and the impact on existing business cases, an interim period of at least 24 months following the entry into force of the regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period.

LER prequalified before the end of the interim period are exempted from the 30 minutes requirement and will therefore remain subject to the minimum activation time period locally provided at TSO level. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

With the increase of the minimum activation period time, parts of the now prequalified assets will therefore drop out of the market for FCR, reducing the potential of assets to supply TSOs with FCR. Thereby it must be considered that not all LER units can be converted to meet the requirements for an activation period of 30 minutes.

As a general approach, LER currently prequalified for 15 minutes could fulfill a longer requirement either increasing their reservoir capacity or – more easily – reducing the prequalified FCR under the same reservoir. The latter approach would entail a financial penalization for LER. In any case, the existing and underway LER will not be requested to adapt their time period to the new 30 minutes requirement since the previously mentioned interim period (which follows the entry into force of the present regulation) is provided. The 30 minutes requirement will apply only to LER prequalified after the end of the interim period, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

At the same time, BDEW fully supports the prime tasks of TSOs to ensure network security. The cost benefit analysis made clear that an activation period time of 30 minutes is necessary to do so. We acknowledge that it is the task and responsibility of TSOs to describe the respective products (and procure them on the market) that are needed for them to ensure network security.

Should the TSOs amend the minimum required activation period for LER units to 30 minutes, we recommend a sufficient interim period in order to allow for a required adaption. This adoption will take several years and will unduly affect investments planned, but not yet build. This also includes investments which were in the process of prequalification but have not finalised the process yet."

As previously stated, an interim period of at least 24 months is guaranteed for all LER prequalified before its end. Such are thus exempted from the 30 minutes requirement.

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Syndicat des Energies Renouvelables

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"Afin réduire ses émissions de gaz à effet de serre au regard de l'urgence climatique, l'Union Européenne (UE) a mis en place une politique énergétique basée sur le développement des énergies renouvelables, peu émettrices de gaz à effet de serre. Pour se faire, l'UE a s'est fixé comme objectif de porter la part d'énergies renouvelables à 32 % de la consommation finale d'énergie. Cet objectif, que la révision en cours pourrait porter à 40%, est ensuite traduit pour différents vecteurs énergétiques dont l'électricité.

Pour ce dernier, l'Union Européenne vise une forte augmentation des énergies renouvelables électriques afin notamment de réduire l'utilisation voire de remplacer les moyens carbonés de production d'électricité.

Cette diversification des mix électriques européens appelle à proposer des solutions permettant d'augmenter la flexibilité du système électrique européen. Le stockage de l'énergie représente une des solutions qu'il convient de développer pour répondre à des problématiques liées aux réseaux de manière globale ou de manière locale.

Pour inciter les acteurs du monde économique à étudier, développer et exploiter ces technologies de stockage, il est nécessaire de proposer un cadre économique clair et stable permettant d'influencer positivement les signaux d'investissement. Ces derniers donneront lieu à des décisions d'investissement permettant des innovations et des améliorations technologiques via la R&D mais surtout l'accélération du déploiement de ces systèmes de stockage nécessaires au bon fonctionnement du système électrique.

En ce sens, le cadre économique et règlementaire et ses évolutions doivent faciliter les décisions d'investissement. Dans le cadre de cette consultation de l'ENTSO-E, il convient de garantir la stabilité des règles de la FCR qui représente, en France, plus de 70% des revenus des systèmes de stockage de type batteries raccordées aux réseaux de transport. En ce sens, le Syndicat des Energies Renouvelables (SER) demande de garder une durée minimum d'activation pour la FCR (TLER) à 15 minutes afin que le cadre existant soit toujours adapté:

TSOs acknowledge the importance of the stability of the regulatory framework in order to foster the energetic transition.
TSOs highlight however that SO GL (2nd August 2017) explicitly provide for the possibility of a minimum activation time period between 15 and 30 minutes. While it's true that a large number of areas (such as France) are currently implementing a requirement of 15 minutes, this cannot be considered as a requirement applied at Continental Europe level.
TSOs acknowledge the potential uncertainty introduced by a change in the requirement for the areas currently requiring 15 minutes.
For these reasons, in order to safeguard existing and underway business cases, the 30 minutes requirement will apply only to LER prequalified after the end of an interim period of at least 24 months after the entry into force of the present regulation. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

- Aux installations existantes. Qu'il s'agisse d'installations d'hydroélectricité au fil de l'eau ou de batteries, ces deux technologies ont des réserves limitées. Aussi, pour que ces installations existantes puissent participer à la FCR avec une TLER de 30 minutes, de nouveaux investissements seraient nécessaires. Or, ces derniers ne sont pas toujours possibles pour des raisons techniques, juridiques et/ou administratives. Aussi, lorsque ces nouveaux investissements sont possibles, ils ne garantissent en aucun cas la rentabilité économique du projet dans son ensemble ou la rentabilité économique de ce nouvel investissement;

  TSOs are aware of the burdens which the existing LER with 15 minutes will have to face. To meet such needs an interim period of at least 24 months after the entry into force of the present regulation is provided. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.
  In any case, it should be considered that - as a general approach - LER currently prequalified for 15 minutes could theoretically fulfill a longer requirement either increasing their reservoir capacity or – more easily – reducing the prequalified FCR under the same reservoir. While the latter approach would entail a financial penalization for LER, it would also reduce the technical/administrative obstacles.

- Aux installations en cours de développement et de construction. En effet, afin de préparer l'accélération de déploiement des systèmes de stockage et de monter en compétence, un grand nombre d'acteurs travaillent sur le développement de nouveaux projets de stockage. Pour ces projets, ils se sont référés au cadre économique et règlementaire actuel pour lequel la durée minimum d'activation pour la FCR (TLER) est de 15 minutes. Ainsi, l'ensemble de ces actifs en cours de construction et notamment leur viabilité économique sont mis en danger par la modification proposée dans le cadre de cette consultation. Il est important de noter que la remise en cause de cette durée minimum d'activation (TLER) entrainerait les effets négatifs suivants :
  - Le dimensionnement des projets deviendrait inadapté. Ainsi, les revenus seraient significativement réduits jusqu'à ne plus assurer la viabilité économique des projets,
  - Les décisions d'investissement, les contrats déjà signés, les autorisations déjà délivrées, les emplois déjà engagés seraient remis en question,
  - Par ailleurs, ce sont des années de travail, de recherches et d'efforts de développement, de conception et de construction qui seraient stoppés.

  TSOs acknowledge the importance of considering the application of the measures aimed at reducing the impact on existing 15 LER also to projects currently underway. For this reason, the interim period is applied also to LER non-currently prequalified. All LER prequalified within the end of the interim period will be exempted from the 30 minutes requirement (if not already prequalified for more than 15 minutes).

Au regard de cela, le SER considère que les options C et D ne sont pas acceptables puisqu'elles proposent une durée minimum d'activation (TLER) de 30 minutes. Or, il est important de ne pas retenir ces options afin:

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- De ne pas remettre en cause les signaux d'investissement dans ce secteur indispensable et innovant. En France, le cadre de développement des installations de stockage est encore complexe et en cours de construction. Au regard de cela, les investissements dans ce secteur ne sont pas encore dé-risqués. Une telle modification des règles de la FCR à ce stade entrainerait un réel coup d'arrêt pour la filière française;
- De ne pas réduire le nombre d'installations dotées de réservoirs d'énergie limités (LER) participant actuellement à la FCR. En effet, les installations existantes ne pouvant se conformer aux nouvelles règles ne pourront plus participer à la FCR. Cela réduira la quantité de LER disponible et donc le gisement total de flexibilité offert pour la FCR. L'impact sera donc très négatif pour le système dans son ensemble ;
- De ne pas diminuer le nombre de futures installations qui seraient dotées de réservoirs d'énergie limités et qui pourraient participer à la FCR. En effet, les installations en cours de développement pourraient être abandonnées au regard des changement relatifs aux règles de la FCR. Ainsi, il y aura une influence négative sur le volume total de capacités pré-qualifiables pour la FCR ;
- D'avoir un cadre adapté aux technologies et aux expérimentations. En effet, nous indiquions précédemment que le cadre économique devait faciliter les décisions d'investissement (et l'innovation). Au regard des technologies de stockage disponibles à ce jour et notamment les batteries, une TLER à 15 minutes permet :
    - De dimensionner plus aisément des actifs de stockage ;
    - De faciliter le déploiement d'innovation au regard de la durée minimum d'activation qui est plus courte.

TSOs acknowledge the importance of the LER contribution for the system and the potential negative effects of a TminLER change in the areas currently under a 15 minutes requirement (which are addressed by means of the interim period granting the exemption for existing/underway LER projects). TSOs stress however the fact that the study performed according to Art.156(11) was not aimed at maximizing the possibilities of LER penetration in the FCR procurement. According to what is requested by SO GL, TSOs need to define the most suitable TminLER on the basis of several other aspects such as the total costs of FCR and the system stability risks. The choice to adopt 30 minutes stems indeed from considerations on these aspects.

Par ailleurs, comme indiqué dans le présent document, les acteurs économiques ont besoin de visibilité sur les règles applicables à leurs actifs et futurs actifs. Or, la mise en place d'un derating factor aurait un fort impact négatif en:

- Réduisant la visibilité liée aux potentiels revenus. En effet, les acteurs économiques ont besoin d'estimer leurs revenus avant tout investissement dans le projet. Avec la mise en place d'un derating factor, il est difficile voire impossible d'émettre des hypothèses sur la rémunération que actifs LER pourraient capter sur la FCR à moyen ou long terme;
- En réduisant de manière importante les revenus des LER pour la FCR (ce qui diminue par ailleurs les incitations à l'investissement). En effet, comme indiqué précédemment, la FCR représente plus de 50 % des revenus de certaines installations de stockage d'énergie comme les batteries. Aussi, réduire cette rémunération reviendrait à arrêter tout développement de cette technologie.

En ce sens, le SER se positionne contre la mise en place d'un derating factor et donc contre l'option B proposées dans le cadre de la présente consultation.

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The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

Au regard des éléments ci-dessus, l'option A ouvre les portes à une flexibilité de mise en œuvre des dispositions techniques qui peut à la fois préserver le passé et autoriser une concertation sur les modalités futures entre TSO et acteurs locaux. Cependant, le SER souhaite pouvoir échanger sur la méthodologie qui a donné lieu aux quatre options proposées par l'ENTSO-E dans le cadre de cette consultation. Certaines des hypothèses retenues dans la consultation ici proposée comme la prise en compte d'un aFFR défaillant sanctionnent le fonctionnement de la FCR ainsi que la place des LER sur ce marché. De ce fait, il nous parait légitime de pouvoir échanger sur la méthodologie retenue.

TSOs acknowledge your position regarding the Option A.

Pour finir, le SER insiste sur le fait que la décision de l'ENTSO-E ne doit pas reposer uniquement sur les coûts éventuels supportés par les gestionnaires de réseaux. Il est également nécessaire de prendre en compte les impacts induits sur l'ensemble du système. De manière générale, certains changements auront de fortes répercussions négatives sur les signaux d'investissement et réduiront ainsi le gisement total de flexibilité offert pour la FCR.

En ce sens, le SER demande que la décision finale de l'ENSTO-E intègre tous les paramètres permettant une analyse complète des impacts induits par chaque solution."

The analyses performed during 2020 (consulted in March-April 2020) implemented a Cost Benefit Analysis where the social welfare was calculated (considering both supply and demand sides). The results presented in 2020 already showed the presence of a minimum of the total costs in correspondence with a specific LER share (which in turn depends on the TminLER). Exceeding that LER share showed to lead to increased total costs due to the need for TSOs to purchase more FCR.

The process that TSOs have followed in the last year is presented in the section 7 of the Explanatory document currently under consultation. TSOs have considered the presence of the aforementioned minimum in the total costs with a specific LER share, but they also considered the infeasibility of a LER share limitation. Furthermore, the effect of LER share on the need of FCR increase are not reflected by proper market signals.

The study presented with the current consultation is thus to be considered as a further development of the previous study where all these issues have been addressed.

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The Mobility House, Renault SA, AUDI AG, Lechwerke AG (LEW), FENECON GmbH

Tobias Deß (tobias.dess@mobilityhouse.com)

Statement on the "All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485" and the corresponding explanatory document

This statement is supported by
- Renault SA,
- AUDI AG,
- Lechwerke AG (LEW),
- FENECON GmbH,
- The Mobility House GmbH.

Executive Summary

TMH and the above-mentioned partners question the presented results and reject the formulated proposal.
By introducing a 30-minute minimum activation time for Limited Energy Resources (LER) in a market where for several years LER have entered based on 15 minutes activation time, the TSO will endanger the participation of a significant share of the tendered volume in FCR. By doubling the minimum activation time, the maximum power for FCR from these assets will be cut to nearly 50%. In doing so, not only will many LER owner draw back from the market (due to other opportunities), but it will also prevent development and market entry of new Limited Energy Resources (LER). This will not only lead to higher costs in FCR, but also remove very accurate, fast, and highly available assets from a system-critical market. The discussion about the minimum activation time have existed for several years without any reasonable and valid arguments in favor of 30 minutes (proven e.g. by the German Federal Network Agency in 2019, see [1]). Instead of creating an environment with high regulatory risks and thus disincentives for future investments necessary to decarbonize our energy system, we encourage to strive towards a non-discriminatory environment where the development and implementation of new technologies is supported. Europe is striving towards an electrical energy system in which the minimization of the minimum conventional generation is an important factor from a cost, emission, and efficiency perspective. Excessive requirements for the substitution of conventional power plants, should therefore be rejected, if there is a lack of proof of technical necessary.

Comments to the Proposal of mandatory 30-minute-criteria for all limited energy resources (LER)

Visible display of high regulatory risk in the energy sector will disincentivize the future investments necessary to decarbonize our energy system

The proposal sets a concerning precedent for future energy storage and other decarbonization projects as it demonstrates that TSO's can change market access requirements without guaranteeing a reasonable time for investments to be recouped before significant and costly changes are imposed. This level of regulatory risk increases cost of capital necessary to implement projects and disincentivizes project

investment. This risk could be mitigated by a specified and reasonable period of exemption for systems planned to the point of grid connection application before the criteria change. Reasonable periods are rather decades than months, having the payback periods of power plants in general but also stationary batteries in mind.

TSOs acknowledge the importance of the stability of the regulatory framework in order to foster the energetic transition.
TSOs highlight however that SO GL (2nd August 2017) explicitly provide for the possibility of a minimum activation time period between 15 and 30 minutes. The possibility that a 15 minutes requirement could not be the stable and most suitable time period is directly derived from SO GL. The implementation of the CBA itself has indeed the purpose to understand the most suitable solution. The fact that the 15 minutes is the current requirement in several areas (albeit not in all) is certainly an aspect that TSOs need to consider.
In any case, in order to meet the concerns highlighted by stakeholders and to minimize the impact on existing and underway business cases, an exemption is granted to all LER prequalified before the end of an interim period (lasting not less than 24 months) following the entry into force of the present regulation. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

Timing of the consultation

TMH stresses that the timing of the consultation is suboptimal as it opens end of July and ends beginning of September and thus covers the whole vacation period of most countries. This puts pressure on many Balancing Service Providers in following the consultation.

Periodical recalculation of the FCR volume based on expected LER volume in the auction

It is not clear why this topic is addressed in this proposal of the minimum activation period. This topic should be addressed individually. Anyhow, considering only expected LER volume is discriminatory. It is neither mentioned on which basis the expected LER shall be determined nor why it should be a reliable dimensioning if only considering the availability of one provision characteristic instead of considering the expected state of the whole energy system covering all provision characteristics (e.g. speed of reaction) and external circumstances.

The whole issue of redefining the FCR calculation methodology is under investigation of TSOs according to Art.153(2) SO GL. The new methodology will consider all the features of FCR, including the dynamic performances of different technologies. The ability to ensure the FCR during long-lasting frequency deviation will be one of the aspects to be considered in the new FCR dimensioning. For this reason, the effect of LER presence (in terms of energetic content) has been calculated and presented as part of the presented analysis. The potential effects of LER depletion and the benefit deriving from the fast-dynamic response of (some of) the LER are different aspects and are not expected to be netted against each other. It means that the possibility of LER depletion will play an important – possibly limiting – role in the FCR dimensioning, depending on the LER share. The presented methodology to calculate the FCR increase

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(depending on LER share and TminLER) is not definitive, since the overall review of FCR dimensioning process is underway. It's however based on reasonable assumptions for what regards the acceptability of frequency worsening following a LER depletion. It provides therefore a good picture of the dependency amongst FCR needs and LER presence.

The German federal grid agency (BNetzA) already rolled back the 30 minutes criteria in Germany for multiple still valid reasons

With the BK6-17-234 on 09.05.2019 the BNetzA already rejected the implementation of the German TSO for a minimum activation time of 30 minutes. Most of the arguments from the BNetzA are still valid. In the here-referred Explanatory Document of the ENTSO-E we cannot see valid and reasonable explanations that weaken the arguments from the BNetzA two years ago (see [1]). Some of the reasons are also stated in this statement.

Not all LER can be feasibly retrofitted into 30-minute reserve capability

Retrofitting LER to 30 minutes minimum activation time will bring severe or unsolvable challenges in practice, risking stranded assets taking up grid connection space but not contributing to grid stability and financial returns for owners.

Potential technical bottlenecks (non-exhaustive list):

- Space (land, building volume, rack space, ...)
- Bulk availability and suitability primary technology components (battery type, adapters, custom parts, ...)
- Bulk availability and suitability of secondary technology components (cooling, management system, fire protection, ...)
- Original suppliers may not exist anymore

Potential financial bottlenecks (non-exhaustive list):

- Liquidity or availability of investors/credit
- Poorly scaling systems (e.g. Need to completely replace the cooling system since it is rarely modular)
- Collapsing business cases and bankrupting storage companies
- Old LER can be towards the end of the amortization period and cannot be economically retrofitted with new parts
- Building permit process for system extension incl. long duration of system acceptance process with authorities

As a general approach, LER currently prequalified for 15 minutes could fulfill a longer requirement either increasing their reservoir capacity or – more easily – reducing the prequalified FCR under the same reservoir. The latter approach would entail a financial penalization for LER. To meet the needs of existing and underway LER business cases, an exemption is granted to all LER prequalified before the end of an interim period (lasting not less than 24 months) following the entry into force of the present regulation.

The timeframe of the interim period in the proposal is unspecified but has major implications

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It is not acceptable that in the stage of a consultation the proposed interim period for already prequalified LER is not specified. Already prequalified (and LER under construction) should be permanently exempted from any changes that will be made in the future with impact on the biddable power. In any case the interim period should at least cover the project duration of such projects which is, at least for battery storages, typically 20 years.
For us, an interim period of 20 years would be the logical consequence of the following quote from the explanatory document (page 42): "TSOs are therefore committed to ensure a proper interim period for such providers to deal with the regulation change, both from the technical and financial point of view"

As previously stated, LER prequalified before the end of the interim period following the entry into force of the present regulation are exempted from the 30 minutes requirement.

Applicable LER should not be determined by the prequalification date but by the application for building permit

For every project where the decisions have been made under the framework condition prior the entry into force of this proposal shall not be applicable any new requirements with impact on the dimensioning and finalized engineering, development, and design decisions. Otherwise, all upfront costs (dimensioning, financing, legal, contracting, engineering, ...) will be wasted.

The exact duration of the interim period which follows the entry into force of the present regulation (within which the exemption is granted for newly prequalified LER) is not yet set and will be defined together with NRAs. Its minimum duration is however set to 24 months.

Prices of FCR could potentially rise with lower share of LER in the market

The purpose of reducing overall costs is one of the main arguments from the TSO to introduce a minimum activation time of 30 minutes. But in fact, introducing 30 will not only increase the investment costs for new LER (if new LER will be built at all) but will also lead to a significant reduction of bids made by LER, as they need to reserve more capacity per bid power. This will have a significant effect on the merit order and will lead to price increase for the whole market (an exemplary extreme case might be Netherlands).

The adoption of 30 minutes LER would simultaneously reduce the available FCR from LER and increase the long-run marginal costs of new LER. The combined effects could locally increase the FCR marginal prices. On the other side however, the LER presence (above a certain share) forces TSOs to increase the overall FCR amount to be procured at synchronous area level. The increased costs associated with such FCR increment appears to have an impact higher than the impact associated with a 15 minutes choice.

The aFRR and mFRR products are responsible for the time horizon after 15 minutes

The current market design for reserve markets consists of three products in chronological order. FCR within 30s, aFRR within 5 minutes and mFRR within 13.5 and 15 minutes respectively. With a sufficiently dimensioned and functioning aFRR and mFRR market, for FCR a minimum activation time in case of an alert state of 15 minutes must be sufficient, as all following products should be activated and replacing the FCR by then.
Furthermore, the German Federal Network Agency especially stressed this point in the decision from 2. May 2019. One main argument was that participants in the FCR market could not be required to demonstrate capabilities that would only be required if all other types of reserve markets were to fail. It is

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the job of the TSO to control the correct fulfillment of the requirements in aFRR and mFRR. It is not the job of LER FCR suppliers to provide (additional) backup for two other reserve markets.

It should be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
The choice of a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience some kind of malfunctioning. TSOs are working on procedures and policies to promptly identify, counteract and resolve such situations. As of today, however these conditions cannot be identified and resolved within a suitable time frame, with the consequence of the FCR to keeping counteracting a power imbalance. It should be considered that FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs.
For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Finally, the fact that SO GL explicitly provide for the possibility of a TminLER longer than Time To Restore Frequency implicitly implies that FCR can operate also in the timeframe where FRP shall operate.

Solving problems on the level of aFRR by increasing the requirements on the level of FCR creates an inefficient incentive structure

On Page 25 of the explanatory document, it is stated: "The main contributing factors to such [long lasting frequency deviation] events are usually related to malfunctioning of the aFRR mechanisms. The TSOs are putting in place several countermeasures to quickly identify, react to and solve problems related to FRR misbehavior. In the short term however, these countermeasures are still not effective enough in the intervals at which LER exhaustion could take place." This follows the rationale that insufficiencies of the aFRR and mFRR suppliers are outsourced to a third party, namely the FCR suppliers. If this becomes standard practice, there is less incentive to properly scale, secure and backup aFRR, making it a permanent problem.

Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side. In this sense the choice to cover such events with FCR is not a transfer of duty from FRR providers to FCR providers, but rather a way to deal with a technical issue.

No historical incident would have benefitted from a 30-minute minimum activation time of LER

The German Federal Grid Agency confirmed in the decision BK6-17-234 on 09.05.2019 that none of the stated incidents by the TSOs would have benefitted from a 30-minute minimum activation time of LER.

- 10.01.2017 (Faulty calculation of control area imbalance): No frequency deviation in range and time relevant for a 30-minute criteria.
- 04.11.2006 (System Split through Germany): Just in 11 minutes partially lower than 49.80 Hz in the western region. Insufficient inter-TSO co-ordination was identified as a main cause of this incident (see final UCTE report [2]).
- 28.09.2003 (System Split between Italia and Switzerland): 17 minutes were needed to get back lower than 50.20 Hz. During the time, the emergency mode was entered and that would have

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justified reduction of powerplant infeed. This incident included misunderstandings via telephone, that would not happen via modern communication equipment and data exchanges (see final UCTE report [3]).

The German Federal Grid Agency emphasizes in [1] that a 30-minute minimum activation period for LER is not justified in its length and substantiation, by the major incidents 2003, 2006 and 2017.
Overall, it is questionable that the incidents of 2003 and 2006 can take the same time again to be solved. The incidents of 2003 and 2006 led to the construction of the "ENTSO-E Awareness System" to detect the issues earlier, present during the 2003 and 2006 incidents. There was also significant investment in the coordination systems of the TSO in the last decades, promising shorter duration of failures.
This might also be true for the statement of Page 25 of the explanatory document regarding countermeasures to the FRR reliability issues: "In the short term however, these countermeasures are still not effective enough in the intervals at which LER exhaustion could take place." There is no proof provided for this statement. Proof should be available with reasonable effort and therefore should be obligatory, for such statements.

The analyses performed by TSOs show that if LER were present as of the mentioned events occurred, they would have depleted. The actual effect of LER depletion in such already degraded system condition is a complex issue to be understood and strongly depends on the LER share. The LER depletion would however certainly worsened the stability of the system since it would have resulted in a further loss of regulation.
Despite the fact that the system has improved since 2003-2006, preliminary analyses have shown that the event occurred in 2021 would have led LER 15 minutes in south-east area to depletion (in north-west the frequency was instead rapidly restored).

"Countermeasures are still not effective enough in the intervals at which LER exhaustion could take place" since they are implemented by TSOs on a longer timeframe.

TMH Battery Storage systems fulfilled a significant role during the last large incidents

During the last major incident, the system split on 8. January 2021, the Battery Storages operated by The Mobility House fulfilled their FCR obligation according to plan and helped to resolve this incident. The fast dynamic reaction time of battery technology helped us to be one of the first FCR appliances reacting to the fault event. This dynamic response prevented the system frequency to get worse faster. If battery technologies will be made unprofitable by the new requirements, the average reaction time of FCR will become slower again.
We operate more than 30 prequalified FCR MW in Germany, France and Netherlands and started in 2017. In all major frequency deviation events (2-3 per year), we proofed constant FCR operation without reaching capacity limits upon request of the TSOs.

TSOs acknowledge the importance of battery-based LER (which by the way represent only part of the LER currently installed in CE). The energetic aspect of LER are however equally important. As stated in the previous section, preliminary analyses have shown that the event occurred in 2021 would have led LER 15 minutes in south-east area to depletion (in north-west the frequency was instead rapidly restored).

 # Comments to the Explanatory document

Already addressed known drawbacks from past Cost-Benefit-Analysis (CBA)

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The last statement of TMH regarding the minimum activation time-period can be found in the annex of this statement. This document points out the drawbacks regarding the CBA, which this proposal is developed from.
The points are:
1. Definition of energy reservoir
2. Probabilistics of actual SoC at the beginning of a systematic deviation
3. Corrective measures reduce speed of depletion
4. FCR cost curve
5. Employed data
6. FRR behavior
These issues are still not adequately addressed in the explanatory document the proposal is based on.

Costs analysis and proposal for a LER remuneration reduction mechanism

We reject the proposal for a LER remuneration reduction mechanism. It is discriminatory to punish LER in FCR for the malfunction of downstream balancing markets (aFRR & mFRR, see comments above) and it consists of perplexing assumptions. We also question the way this proposal has been made. It is not part of the consultation and off-topic to the proposal of a minimum activation time.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

Options to solve the issues on the level of aFRR and mFRR are not explored

The main problem statement of not reliable enough aFRR and mFRR is not addressed by options to increase the reliability of these products. May it be more requirements, higher penalties, increased backup ratio or higher procured power.
Since aFRR and mFRR have lower dynamic requirements, they have also lower marginal costs, making it potentially more cost efficient to create solutions there. Since these options are not explored in the economic analysis, it is difficult to believe the proposed solution leads to the most cost-effective stable energy system.

The issue with FRP is nor about quantity or providers' reliability. It's instead about technical issue on how a complex process like FRP in a wide and structured synchronous area such as CE is technically implemented (real time operation and multiple TSOs coordination).

The most severe option for the stakeholder is chosen (Option D), while less severe options (Options A-C) are available

The explanatory document states four options to solve the problems described within the limited framework of the CBA. Options to solve the problems outside of the FCR regime are not formulated.
The options A and B bring in another layer of complexity and risk into the amortisation planning and can render battery energy storages financially impossible. The option C protects the existing investments but increases the economic difficulty to build the new sources of FCR to replace carbon-intensive options.

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Overall, we reject all the four options, but the option D poses the biggest threat to the existence of battery storages and the corresponding companies. This goes against the principle to cause the minimum amount of harm to the other parties involved, which should be a guiding principle on matters like this.

TSOs acknowledge your position.

Advantages of battery technology are not considered

We would also like to point out the advantages of batteries providing FCR. Batteries show faster and more accurate FCR provision than most other technologies. The implemented SoC management assures continuous FCR provision and can compensate long lasting frequency deviation. The accurate reaction of batteries can also be used in other applications, e.g., to assist conventional power plants to perform more accurate ramping, which would solve a root cause of deterministic frequency deviations.
Battery technology can be installed on all sufficiently strong grid connection points in a modular scalable way. For this, it has less impact on the local environment than thermal power plants (air pollution) or hydropower (aquatic life). They have also less restrictions to build new ones. New hydro powerplants are limited by viable sites and thermal power plant are dependent on limited CO2-certificates, which have significant uncertainty in price development. For this, battery technology is one of the best investible sources of FCR power to fill in the gap of FCR sources leaving the market (e.g., decommissioned power plants). Limit the development of those modular installations will also impact the development of local services like congestion management with an increasing demand in the future.
Second-life batteries and mobile batteries of electrical vehicles (providing FCR by TMH already) hold a high potential to provide FCR in the future and can contribute to a decrease in the carbon footprint of FCR providing technical units. An increase in the minimum activation time would make the use case FCR unprofitable for these technologies which would stop most projects in this field.

All the mentioned advantages of batteries are acknowledged by TSOs. TSOs stress however that the CBA, as provided for by SO GL, is intended to deal with the minimum energetic contribution to be requested by LER and not to assess the importance of a specific technology. Battery-based by the way represent only part of the current installed LER in CE (also a large amount of run-of river hydro power plant are present).

Fair requirements for battery LER lay the groundwork for future grid stability increasing products

Batteries do not only fulfill the dynamic requirements of FCR but exceed them. With a reaction time in the single second range, they have the potential to provide additional grid stability products.
If one day a Fast Frequency Response market will be established, it will help to already have a significant amount of battery energy storage systems in the FCR market, which is more challenging with a 30min criteria. Otherwise, the starting cost for this market will be considerably higher, since less suppliers exist which likely have pricing power.

As previously stated, the importance of the dynamic performances of part of the LER (the battery-based) is acknowledged. The energetic aspect of LER are however equally important and rather independent from the dynamic response. Such assessment of the minimum energy required by LER in alert state is indeed the object of the presented activity (according to Art.156(11)).

 # Sources:

[1]: BNetzA (German federal grid agency), Genehmigung des Vorschlags der regelzonenverantwortlichen deutschen Übertragungsnetzbetreiber für eine von FCR1 -Einheiten und -Gruppen mit begrenzten

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Energiespeichern zwischenzeitlich sicherzustellende Mindestaktivierungszeit gemäß Art. 156 Abs. 9 der Verordnung (EU) 2017/1485 der Kommission vom 2. August 2017 zur Festlegung einer Leitlinie für den Übertragungsnetzbetrieb (BK6-17-234), 09.05.2019, Link: https://www.bundesnetzagentur.de/DE/Beschlusskammern/1_GZ/BK6-GZ/2017/BK6-17-234/BK6-17-234_beschluss_2019_05_02.pdf

[2]: UCTE, FINAL REPORT System Disturbance on 4 November 2006, January 2007, Link: https://eepublicdownloads.entsoe.eu/clean-documents/pre2015/publications/ce/otherreports/Final-Report-20070130.pdf

[3]: UCTE, FINAL REPORT of the Investigation Committee on the 28 September 2003 Blackout in Italy, April 2004, Link: https://eepublicdownloads.entsoe.eu/clean-documents/pre2015/publications/ce/otherreports/20040427_UCTE_IC_Final_report.pdf

The following part of the comment is the same comment (same text) provided for previous consultation "All CE and Nordic TSOs' results of CBA in accordance with Art.156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017".
The presented issues have been addressed by TSOs in the replies to that consultation.

Annex: Our last statement to the Cost Benefit Analysis, with mostly not adequately adressed points in the current version of the CBA of the Explainatory Document

Statement on the Cost Benefit Analysis (CBA) by ENTSO-E in accordance with the requirements contained in Article 156 (11) of Commission Regulation 2017/1485
This statement is supported by
- Renault SA,
- Daimler AG,
- GETEC Energie AG,
- Coulomb GmbH, and
- The Mobility House GmbH.

The Mobility House GmbH (TMH) further supports the arguments issued by the Bundesverband Energiespeicher e.V. (BVES) and the Bundesverband Neue Energiewirtschaft e.V. (bne).

 # Executive Summary

TMH and the above-mentioned partners question the presented results and reject the proposed solutions formulated within the Cost Benefit Analysis (CBA). It is being attempted to formulate a far-reaching decision about the minimum activation period (TminLER) of FCR providers with Limited Energy Reservoir (LER) based on a truth that is based on partly non-transparent and discriminating assumptions.
We instead suggest striving towards a market-based solution reflecting the dynamic, complex and diverse reality of the cost structure of Frequency Containment Reserve (FCR) providing assets and the potential influence on the necessary FCR power to be tendered. Instead of a constant FCR demand curve, a flexible FCR demand curve depending on, for example, the estimated Deterministic Frequency Deviations (DFD) and composition of BSPs (such as LER vs. Non-LER), would be able to tackle several issues related to the operational security and would make the FCR procurement more efficient.
Our statement is based on the following key arguments that have not been holistically tackled in the performed simulation and the scope of the CBA:

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- An increase in FCR demand is suggested by the ENTSO-E in [4] to tackle deterministic frequency deviations. This increase would avoid all critical depletions even with a share of 100% LERs using a TminLER of 15 minutes.
- The applied methodology of the CBA is flawed, and applied data is not transparent:
    - The definition of the energy reservoir of batteries should be at least 1.5 times larger, as the CBA accounts for energy charge and discharge of the transition phase to the alert state and the alert state.
    - The actual State of Charge (SoC) at the beginning of a systematic frequency deviation is probabilistically not equal to the SoC limits that surround the non-alert SoC range but closer to a 50 % SoC.
    - Set point changes to manage the SoC are mandatory and therefore should not be ignored in cumulative depletion of the energy reservoir.
    - FRR behavior is modeled inadequately. As aFRR is fully activated after a time difference of 5 minutes, it is not apparent, why FCR should be provided for 30 minutes.
    - Cost assumptions for LERs and the resulting FCR cost curve are not sufficiently transparent to enable quantitative interpretation and lack a macroeconomic viewpoint.
- The process and transparency of the CBA has been inappropriate due to the lack of the provision of input data, the lack of accessibility to important document, and the lack of information on the procedure after the consultation.
- The introduction of TminLER = 30 minutes endangers the business case of many battery projects and therefore hinders the necessary substitution of conventional power plants by storage-based solutions in the ancillary services (limiting renewable energy shares by conventional must-run capacity).
- Retrofitting of existing and planned LERs that are designed according to a minimum activation period of TminLER = 15 minutes account for cost and should be avoided unless a compensation is paid.
- In [4], the ENTSO-E recommends the introduction of new FCR products that are suited to battery storage systems. A reversion to the minimum activation period of TminLER = 30 will lead to a stagnation or even reduction of LERs. This would jeopardize the required liquidity for these markets.

1. Methodology of CBA

 # Definition of energy reservoir

In Germany, the minimum prequalified size of energy reservoirs of batteries Emax is defined as

E_max = 3*(T_min_LER/60)*FCR_LER

as batteries that are prequalified for the 15-min.-criteria must satisfy a frequency deviation of 50% of maximum steady-state deviation (equal to 100 mHz deviation) for 15 minutes (transition from normal to alert state) and a subsequent frequency deviation of 100% of maximum steady-state deviation (equal to ±200 mHz deviation) for 15 minutes (alert state) [5]. This capacity is 1.5 times higher than the capacity used in the CBA and leads to significant fewer depletion as the available energy is higher than the defined capacity of the LER energy reservoir. In our experience all battery systems in FCR are dimensioned with even more capacity to reduce the cost of necessary SoC management.

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In France, the required sizing of the energy reservoir of an LER to provide FCR is even higher as in Germany. This is due to the fact that not the FCR power () but instead the power for continuous FCR provision is applied for the sizing of the energy reservoir, which equals around 1.25 times.

 # Probabilistics of actual SoC at the beginning of a systematic deviation

Furthermore, the actual energy available for FCR at the start of a frequency deviation is distributed statistically, as the LER rarely takes on SoC values close to the extreme ends of the required SoC range used for non-alert states. This should have been modeled in the CBA, e.g., by a probability curve as depicted in Figure 4 of [6].

 # Corrective measures reduce speed of depletion

Furthermore, the proposed methodology ignores the implemented corrective measures for SoC management of batteries, which would in most cases counteract part of the depletion from systematic frequency deviations [5]. To compensate systematic 50 mHz deviations the power for SoC management is 25% of PFCR as a minimum value. This power can be activated at each 15-minute change in case of SoC limit violation.

 # FCR cost curve

It is not clear, how the cost of LER is calculated and how the FCR cost curve is employed in the simulation. Additionally, the interaction between the 15- and the 30-minute criteria are not clear.
Similar studies with almost identical methodologies have shown that that in absolute terms the described LER, even at high investment cost levels, incurs in lower FCR provision costs than the simulated conventional plants [7]. This is contrary to the results shown in Tables 2-4. Therefore, the publication of the assumed costs for existing and non-existing LERs and non-LERs and its development over the considered time horizon is mandatory for a quantitative analysis.
Moreover, the prequalified FCR power of LERs has increased compared to the estimated values in the report. This should lead to a change in the costs of LERs, as for existing LERs capex costs should not be considered.
At current FCR prices, an imposed TminLER of 30 minutes would strongly affect and endanger the business (cases) of battery supplier, integrators, and operators and makes many of these businesses unprofitable. These long-term macroeconomic consequences should be considered when constructing the FCR cost curve.

 # Employed data

The consideration of most relevant frequency events includes events that are not up to date. Advances in technology and advances in TSO cooperation have made similar events as the mentioned 2003 and 2006 events improbable as of today. Furthermore, the root cause for DFDs and long-lasting frequency events is not the FCR provision of LERs. Actions recommended for the mitigation of the root cause of DFDs in [4] such as the increase in FCR demand should have been considered in the CBA.

 # FRR behavior

The FRR behavior assumed in the CBA should be clearly defined. The determination of the full activation time (FAT) that averages different FRR control reserve products, does not resemble the real FRR response. As aFRR is fully activated after a time difference of 5 minutes (mFRR after 15 minutes), it is not apparent,

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why FCR should be provided for 30 minutes. In general, an increase of demand for aFRR should be considered by the CBA. This might decrease the need to increase FCR or TminLER at lower cost.

2. Link to published report on Deterministic Frequency Deviations:

In 11/2019 the ENTSO-E published the "Report on Deterministic Frequency Deviations" (DFDs) [4]. A consolidation of this study with the CBA is necessary.
Based on the results of the report, the ENTSO-E proposes several solutions. These include solutions among others to

· increase the volume of Frequency Containment Reserve (FCR) available to control the DFDs (…) as a temporary measure, awaiting the implementation of other solutions, and
· additional introduction of a Very Fast Reserves from Battery Storage.

On page 42 of the report it is further stated that: Based on rough estimations and considering a network power/frequency characteristic of around 27000 MW/Hz, the FCR increase is expected to be around 5400 MW. (…) An alternative solution resulting in a lower required FCR increase (around 2000 MW) could consist of a specific new product with a full activation at 75 mHz.
In Table 1 of the performed CBA, depending on a given LER-share and TminLER, the necessary FCR to avoid critical depletions is displayed. Putting these results in context with the results of the report on DFDs, we are in favor of considering an adjustment FCR power demand. The suggested increase of 2000 MW would allow any share of LER to provide FCR independent of the minimum activation period.
As visible in Figure 3, all proposed solutions of the consultation show legal, organizational, and economical drawbacks that complicate an implementation and entail legal disputes. An increase in FCR power would not cause these issues.

3. Advantages of battery technologies

We would also like to point out the advantages of batteries that provide FCR. Batteries show faster and more accurate FCR provision than most other technologies. The implemented SoC management assures continuous FCR provision and can compensate long lasting frequency deviation. The CBA does not differ between LER based on battery and LER based on hydro power plants, which are expected to show different behavior while providing FCR (FCR dynamic response). The accurate reaction of batteries can also be used in other applications, e.g., to assist conventional power plants to perform more accurate ramping, which would solve a root cause of DFDs.
There exists a negative correlation between the share of batteries in the FCR and the total FCR cost. The increased share of LERs is partly responsible for the decrease in FCR price. A lower share of batteries in the market (e.g. caused by bankruptcy of battery operators) would most likely lead to increased FCR procurement prices.
Second-life batteries and mobile batteries of electrical vehicles (as prequalified for FCR by TMH already) hold a high potential to provide FCR in the future and can contribute to a decrease in the carbon footprint of FCR providing technical units. An increase in the minimum activation time would make the use case FCR unprofitable for these technologies which would stop most projects in this field.

Sources:

[4] https://consultations.entsoe.eu/system-development/deterministic_frequency_deviations_report/user_uploads/report_deterministic_frequency_deviations_final-draft-for-consultation.pdf

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[5] https://www.regelleistung.net/ext/download/PQ_Bedingungen_FCR_aFRR_mFRR

[6] R. Hollinger, A. M. Cortés, T. Erge and B. Engel, ""Analysis of the minimum activation period of batteries in frequency containment reserve,"" 2017 14th International Conference on the European Energy Market (EEM), Dresden, 2017, pp. 1-6. https://ieeexplore.ieee.org/document/7981904

[7] R. Hollinger, L. M. Diazgranados and T. Erge, ""Trends in the German PCR market: Perspectives for battery systems,"" 2015 12th International Conference on the European Energy Market (EEM), Lisbon, 2015, pp. 1-5. https://ieeexplore.ieee.org/document/7216661"

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The European Association for Storage of Energy (EASE)

Susan Taylor (s.taylor@ease-storage.eu)

"EASE Key Messages

EASE welcomes the efforts of ENTSO-E and all TSOs in the CE and Nordic synchronous area to determine a time period required for frequency containment reserve (FCR) providing units or groups with limited energy reservoirs (LER) to remain available during alert state, in accordance with Article 156(11) of SO GL.

The European Union as a whole has agreed on ambitious goals to increase renewable energy in the energy system and become carbon neutral by 2050. Energy storage technologies can provide an important contribution to system security while enabling the transition to a decarbonized energy system. The fast-dynamic response of energy storage devices is expected to help cope with the system inertia decrease and the RES variability, thereby contributing to grid stability. However, energy storage can only provide such services if there are no undue barriers in the network code provisions and market entry and development is attractive for LER.

EASE supports setting Tmin for FCR providers with LER to 15 minutes, however, EASE notes that the methodology itself should be re-assessed before it is possible to carry out the CBA and based on that, to discuss the results.

With this reply EASE would like to give our feedback to the proposal and draw attention to aspects where we find that the proposed methodology might in our view lead to strong distortions of the results or to an incomplete CBA, taking into consideration the following points:

- Simulation of energy depletion of LER is not in line with SO GL.
- Simulation of synchronous frequency restoration controller brings flawed results as modelling the Frequency Restoration Process of the synchronous area with a single controller leads to an overestimation of the required time period of the FCR providing units in alert state.
- Management of energy reservoir has not been taken into account.
- Energy reservoir depletion considering deterministic phenomena.
- Behaviour of FCR providing units with limited energy reservoir in the unlikely event of reservoir depletion is not fully assessed.
- Benefits of fast responding FCR providing units with limited energy reservoir have not been considered,
- Effect of long-lasting frequency deviations and deterministic frequency deviations cannot be appropriately assessed.
- Energy to power ratio of FCR providing units with limited energy reservoir cannot give accurate results.
- Over dimensioning of FCR due to problems in the delivery of FRR should not be a solution.
- Costs for existing FCR providing units with limited energy reservoir needs to be quantified.
- The cost assessment of some FCR devices is questionable because some externalities are not taken into account.

1. Introduction

On 3 August 2021 ENTSO-E opened public consultation on "All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL" (Proposal).

EASE welcomes the efforts of ENTSO-E and all TSOs in the CE and Nordic synchronous area to determine a time period required for frequency containment reserve (FCR) providing units or groups with limited energy reservoirs (LER) to remain available during alert state, in accordance with Article 156(11) of SO GL.

As the European energy system moves to a system dominated by renewables, opening the market to all market participants that can contribute to the security of supply is vital. Energy storage can provide much-needed flexibility in the grid and support security of supply in a carbon neutral way, which is essential to transition to a system dominated by variable renewables. Keeping in mind the overall goals of the European Union this proposal is not solely a technical requirement in itself. Therefore it is unfortunate that the proposal put on public consultation has been made based on flawed methodology leading to a result where some possible market participants would not be included and for which EASE has drawn to the TSOs attention on two separate occasions – in its 2018 reply and its 2020 reply.

EASE supports setting Tmin for FCR providers with LER to 15 minutes, however, EASE notes that the methodology itself should be re-assessed before it is possible to carry out the CBA and based on that, to discuss the results.

2. Considerations on the methodology

EASE would like to draw the attention to a number of assumptions and design choices in the methodology leading to biased results to the disadvantage of FCR units with limited energy reservoir, both coming from the methodology and the CBA:

2.1 Arguments to criticize the simulation

- Simulation of energy depletion of LER is not in line with SO GL. The explanation for CBA methodology shows very clearly that the current CBA is trying to determine an appropriate reservoir size, rather than - as it is the goal of SO GL art 156 - an appropriate time for full activation during alert state. The CBA treats effectively the point where frequency exceeds the standard frequency range as the point of alert state trigger, so also depletion before the alert state (only if the event includes an alert state trigger to be precise). The same is done for a post-alert time period, even within the standard frequency range. This is not consistent with SO GL, which requires LER to be continuously available during normal state. This leads to overestimating the time period required for full activation during alert state on the basis of system stability, since it is treating the pre-alert state, as well as the post-alert state, as alert state effectively, and counting the energy activation there as energy activation during alert state.
  TSOs acknowledge that the interchangeable use of the two terms "reservoir size" and "time period for LER" in the documents can be misleading.
  The methodology adopted for the calculations consider the usage of an "equivalent energy reservoir" having a size equal to double the energy needed for FCR full activation lasting TminLER. Since the starting equivalent State Of Charge is 50%, the energy available to cope with a long-lasting unidirectional frequency deviation is equal to FCR full activation lasting * TminLER.
  This amount of energy is what is considered available to deal with a specific simulated event; the exhaustion of this amount of energy defines the "LER depletion" condition.
  The energy usage occurs only if an alert state is triggered. It starts as the frequency starts to continuously exceed (±) 50 mHz in the framework of an event triggering the alert state.

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The real size of reservoir of LER will be bigger than that, one reason are the needs associated with the energy management in normal state).
The extra energy associated with these needs cannot be considered as available in the framework of an event triggering the alert state. To consider its contribution would mean to rely on an energy margin the continuous retention of which is not legally binding for LER.

The adopted methodology is in line with Art.156(11) since it considers only the required energy for dealing with the alert state.

- Simulation of synchronous frequency restoration controller brings flawed results as modelling the Frequency Restoration Process of the synchronous area with a single controller leads to an overestimation of the required time period of the FCR providing units in alert state.
  According to a sensitivity analyses with different FAT, the frequency restoration controller simplification result to have a very limited impact on the results. This is due to the fact that the most impacting factor on the results is the presence of long-lasting frequency deviations. The FRP controller is not applied to these frequency deviations since the actual FRR activation is inherently present in the its frequency trends (it's indeed the non-correct working of FRP which leads to the long-lasting event).
- Management of energy reservoir has not been taken into account. Not modelling active energy reservoir management would not be problematic if the CBA would really be determining a required time period during alert state, as required by SO GL art. 156.
  Energy management is not considered only as of frequency exceeds the standard frequency range in presence of alert state trigger. This choice derives from the fact that the possibility to operate an effective energy management in the framework of an alert state is questionable.
- Energy reservoir depletion considering deterministic phenomena. Deterministic phenomena, in particular market induced effects which normally create imbalances on the hour are by definition predictable since this is the result of the day-ahead and intra-day market results. Increasing the required size of the energy reservoir would definitely be less cost-effective than ensuring a forward-looking energy reservoir management accounting for deterministic phenomena. For that reason new CBA simulations need to be run with and without the effect of determinist phenomena to assess the contribution of these phenomena to energy reservoir depletion and alert state time period requirements.
  The CBA has actually been run also considering a scenario with DFD mitigation (as presented in the results previously consulted). The results are however not affected by such sensitivity since the most impacting factor on the results are not DFD, but long-lasting frequency deviation.
- Behaviour of FCR providing units with limited energy reservoir in the unlikely event of reservoir depletion is not fully assessed. Failure to do so leads again to underestimating the availability of FCR providing units with limited energy reservoir to stabilise the system and overestimating the need to increase the dimensioning of FCR as the share of FCR providing units with limited energy reservoir increases.
  The LER depletion modeling is indeed a simplification since the model assume that all LER would deplete instantaneously. It's likely that the depletion would occur more gradually (in a few minutes). This simplification is however acceptable since it's aimed at modeling an "average behavior" of LER. The fact that once LER are depleted the system loses their contribution in terms of regulation is instead a correct modeling of what would happens.

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- Effect of long-lasting frequency deviations and deterministic frequency deviations cannot be appropriately assessed. The calculation assumptions that have been used in the methodology and the real data of the current situation (last 12 years) is providing diametrically different results.

- Energy to power ratio of FCR providing units with limited energy reservoir cannot give accurate results. A time requirement cannot be translated into an energy to power ratio requirement without consideration of the active energy reservoir management strategy. Therefore, it would make sense to conduct a sensitivity analysis on this assumption.
  The study is aimed at addressing the issue associated with the alert state and not the overall energy reservoir size and consequently E/P ratio (which would include the need for the energy management).

2.2 Benefits of LER

Benefits of fast responding FCR providing units with limited energy reservoir have not been considered, thus neglecting the positive effect on system stability of an increased share of FCR providing units in the form of battery energy storage systems.

2.3 Cost Issues:

- Costs for existing FCR providing units with limited energy reservoir needs to be quantified. These costs (in the form of lost returns on investment) need to be quantified in the CBA in the corresponding scenarios. On page 42 of the proposal (All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL) it is stated TSOs are committed to ensure a proper interim period for LER providers to deal with the regulation change, both from the technical and financial point of view. Unfortunately, further specifications of the commitment is not given and creates uncertainty for the existing LER providers which would not comply under the proposed change.
  The interim period duration (after the entry into force of the present regulation) is not yet defined and will be agreed together with NRAs. Its minimum duration is instead already set to 24 months. All LER prequalified before the end of such interim period are granted from an exemption of the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

- The cost assessment of some FCR devices is questionable because some externalities are not taken into account. Taking into account 100% of the costs for new LER entrants considers implicitly that they are designed to provide this service only. This assumption is questionable and leads to incorrect results as most of the LER based on Energy Storage Systems (ESS) are used to stack several services on the same device, to be profitable.

  The study is indeed focused mainly on FCR-dedicated large LER installation (battery, run-of-river). This is due to the fact that distributed, small, portfolio-based assets (which have the FCR provision as a minor source of revenue, e.g., EV, heat pumps) are expected to play a marginal role in the short term, in terms of offered FCR.

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TSOs recognize the potential role in the future for these kinds of FCR providers. In particular, their presence could lower the FCR prices. Their FCR cost (and thus offered price) will be probably less than the one associated to FCR-dedicated large installation.
The FCR cost of dedicated large installation has indeed to consider a long-run marginal costs associated with a large initial investment. Non-FCR-dedicated LER have core businesses other than providing FCR. It means that their CAPEX is likely largely covered by their main sources of revenue. For this reason, they will probably be able to take advantage also of lower FCR prices, contributing to reducing them.
As a result of it, it's possible that – on a medium term – the presence of such providers in the FCR procurement could change the balance in favor of a larger FCR procurement with reduced minimum activation time period. In this respect, the approved calculation methodology according to Art.156(11) explicitly provides for the possibility of an update of the CBA, with a consequent review of the minimum activation time period for LER.
Nevertheless, the CBA needs to consider the current situation and what is expected in the short term. This is the reason why the non-FCR-dedicated installation are not considered. To allow a reduced minimum activation time (15 minutes) - aiming at promoting the development of smaller flexible assets - would result in a higher need for FCR to be procured by TSOs. This would translate into higher costs for TSOs and consequently for consumers. It would instead be more transparent to promote an explicit subsidy to foster the development of such kind of assets.
It should also be considered that requiring a 30-minutes full activation represents a relatively limited barrier to small flexible assets grouped in portfolios (e.g., EVs and heat-pumps). A longer activation time period reduces the FCR which can be offered under the same available energy, thus reducing the potential revenues from FCR. For these plants the provision of ancillary services represents however an additional source of revenues: their installation (and thus their bulk investment cost) is not dependent from the possibility or profitability of FCR provision. The profitability of FCR provision should thus be compared only with the actual costs to be borne in order to provide the service (control, communication, etc.) which are usually far less than the costs associated with energy storages and grid-reservoir interfaces.

3. Comments on the current Proposal

Over dimensioning of FCR due to problems in the delivery of FRR should not be a solution. FCR providing units should not be made responsible for correcting the problems of FRR providing units. Several other solutions are available and should be tested first, in addition to the implementation of the European-wide balancing platforms and the harmonisation of aFRR FAT and settlement period.

The issue with FRP is nor about quantity or providers' reliability. It's instead about technical issue on how a complex process like FRP in a wide and structured synchronous area such as CE is technically implemented (real time operation and multiple TSOs coordination). It cannot be resolved by increasing procured FRR or changing FAT. TSOs are working on procedures and policies to promptly identify, counteract and resolve such situations. As of today, however these conditions cannot be identified and resolved within a suitable time frame, with the consequence of the FCR to keeping counteracting a power imbalance.
For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Therefore, without any convincing demonstration on the need to increase Tmin for LER, EASE supports setting Tmin for FCR providers with LER to 15 minutes until a new CBA is led.

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TSOs acknowledge your position.

3.1 Derating Factor
Considering the contingency that a derating factor (DF) is used in the future, the scheme proposed by ENTSO-E should have to be reviewed. Indeed, it should be set up at 1 for LER30 (in case of Tmin=30 proposed by ENTSO-E) and not less than 0,5 for LER15min. A DF scheme should necessarily be accompanied by some guarantees to ensure investors visibility and not expose FCR providers to an additional factor of uncertainty.

The adoption of Derating Factors has been in any case ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

3.2 Duration of Interim period as mentioned in Article 3(3)
Regardless of previous arguments, we would like to take a statement on the proposed duration of the interim period. According to the Article 3(3) of the Proposal, LER whose prequalification takes place before the entry into force of the Proposal shall be exempted from the requirement in (1) for an interim period of XXX months. The footnote of the time period mentioned in the paragraph mentions that the duration of the interim period will be defined after the consultation process. EASE would like to emphasize that in order to guarantee the best possible adjustment for the market participants the time period should be set as at least 5 years."

TSOs acknowledge this position on the minimum duration of interim period. As previously stated, the interim period duration is not yet defined (its minimum duration will however be 24 months). The exemption granted to LER prequalified before the end of the interim period is permanent.

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Energie-Nederland

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"Energie-Nederland does neither support the proposal to change the minimum activation time period required for LER in alert state from 15 to 30 minutes nor the application of derating factors for LER, for the following reasons:

TSOs highlight that SO GL (2nd August 2017) explicitly provide for the possibility of a minimum activation time period between 15 and 30 minutes. While it's true that a large number of areas (such as Nederland) are currently implementing a requirement of 15 minutes, this cannot be considered as a requirement applied at Continental Europe level.

- We question the TSO's claim that the proposal would have a positive cost effect of 10%. This result depends on several assumptions, that are not made fully transparent. Moreover investment costs that market participants will have to undertake in order to change the configurations of their assets, are not included. Therefore, we do not think the assessment of the TSOs has been sufficiently executed.
  The financial burden associated with the adaptation of LER having 15 minutes to a 30 minutes requirement is not explicitly present in the calculation since the LER are assumed to be able to deal with the change either increasing their reservoir capacity or – more easily – reducing the prequalified FCR under the same reservoir.
  The effect of reduced FCR availability due to the reduction of prequalified FCR from LER (and the consequent effect on FCR cost) is instead present.
  In any case, existing and underway business cases are safeguarded by means of an exemption granted to all LER prequalified before the end of an interim period (lasting not less than 24 months) following the entry into force of the present regulation, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.
- Investments by market participants in flexible assets require a stable regulatory environment. A change from 15 to 30 minutes activation time will have a major impact on the value of such assets and would hit especially market participants that have recently invested in assets for which the FCR-market is the most important market segment.
  TSOs acknowledge the importance of the stability of the regulatory framework in order to foster the energetic transition.
  TSOs highlight however that SO GL (2nd August 2017) explicitly provide for the possibility of a minimum activation time period between 15 and 30 minutes. The possibility that a 15 minutes requirement could not be the stable and most suitable time period is directly derived from SO GL. The implementation of the CBA itself has indeed the purpose to understand the most suitable solution. The fact that the 15 minutes is the current requirement in several areas (albeit not in all) is certainly an aspect that TSOs need to consider. The provision of the exemption interim period is meant precisely to deal with such issue.
- In normal state FCR activation is replaced by FRR activation within 15 minutes. However, as the alert state can be announced at any moment, the increased minimum activation time would always apply. Energie-Nederland is of the opinion that TSOs should explore other - potentially less costly - measures to safeguard system security in the alert state. For example, additional measures can be considered that are activated in case system frequency falls below 49.8 Hz. The

incident on January 8, 2021 has shown that different Member States / TSOs apply very different emergency measures for such events. The absence of a harmonized approach is questionable as each TSO in a synchronous system is supposed to provide an equivalent contribution to system security The Dutch TSO has no such additional emergency measures in place; there are no contracts for load reduction, and the function for mutual frequency support on the DC interconnectors to the other synchronous areas (UK and Nordic) is not activated. If such additional measures are not being considered, the extension of the minimum activation time for LER seems unnecessary burdensome and is not justified."

The mentioned measures refer to emergency state (i.e., load shedding). The purpose of the performed activities is at keeping the system in normal or alert state, so the measures activated in emergency state are out of scope.

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ATEE Energy Storage Club

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PREAMBLE

The Energy Storage Club welcomes the efforts of ENTSO-E and all TSOs in the CE and Nordic synchronous area to determine a time period required for frequency containment reserve (FCR) providing units or groups with limited energy reservoirs (LER) to remain available during alert state, in accordance with Article 156(11) of SO GL.
Since 2010, the Club has brought a large contribution to the public debate on energy storage in France, in particular with the issue of several studies on the French potential assessment of different technologies such as electricity storage, heat storage, power to heat and power to gas. Furthermore, the Club intends to highlight the possible issues to storage development and to understand what changes could remove the barriers and therefore allow all the benefits of storage to be brought to the electrical system.
This paper is submitted on behalf of the Energy Storage Club (hereafter called "the Club") within the French Energy and Environment Technical Association (ATEE) based in Paris. The Club represents the interest of French stakeholders in the field of Energy Storage and brings together specialists from French industries, utilities and research institutes. The following contribution has been elaborated by its Working Group Regulation, these elements and their interpretation do not in any way commit the individual members of the Club, who may propose a personal contribution to the consultation.

COMMENTS ON THE PROPOSAL FOR THE DEFINITION OF A MINIMUM ACTIVATION TIME PERIOD REQUIRED FOR LER TO REMAIN AVAILABLE DURING ALERT STATE

The Club would like in the very first place to reiterate its early doubts about the need of the requirement described in article 156 (11) of the System Operation Guideline (SO GL), considering the lack of convincing justification of threat to system safety (provided neither during the development and adoption phases of SOGL and up to now). To be very precise, it is because of this lack of justification that the CBA process was introduced in comitology. This CBA has therefore to be carried out properly, the methodology and assumptions being in compliance with SOGL provisions (for instance, any simulation of energy depletion of LER should duly consider the alert state triggering in full compliance with SO GL), taking into account all positive and negative contributions of LER and justifying system needs.
We support ENTSO-E's general objective to strengthen the security of supply in Europe. However, the Club opposes the introduction of new requisites for FCR, that could limit the development of LERs, in order to address structural issues caused by other products (aFRR) or phenomenon. We are equally concerned by the possible introduction of a derating factor, that would further weaken the business cases without major reason. Therefore, we recommend TSOs to thoroughly investigate and present a plan to overcome technical issues and structural constraints that might also cause long-lasting devations, before implementing further conditions on FCR limiting the participation of some market participants.
Therefore, the Club asks for a new analysis, based on a methodology compliant with SO GL requirements and taking into account updated economical and technical data for both LER and networks, as well as benefits brought by LER. In the meantime, we pledge for maintaining a Tmin at 15 min.
Nevertheless in order to take discussions forward, the Club would like to express some considerations on the different options presented by ENTSOE and on the proposal elaborated.

The Club is convinced that the following principles shall be duly respected and taken into consideration when considering an evolution in FCR requirements:

1. Preserving the existing business cases for LER installations providing FCR, including those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before any change comes into force.
   It is therefore essential for these installations that they should be excluded from the proposed mechanism, without any change in the remuneration conditions which are currently applied to them.
   Regulatory insecurity would not be acceptable since existing LER providing FCR have proven beneficial on a system perspective and should not be threatened by a change in FCR requirements or remuneration.
   Regarding in particular projects engaged through public tenders, the continuity in remuneration scheme must be guaranteed until the end of the engagement period: in the case of France, at least until end of 2028 for the AOLT i.e. "long term call for tender" submitted by RTE).
   TSOs acknowledge this position/suggestion on the interim period duration. The exact duration of the interim period, which follows the entry into force of the present regulation and within which the exemption is granted for newly prequalified LER, is not yet set and will be defined together with NRAs. Its minimum duration is however set to 24 months.

2. For any new project initiated as for future projects, provide medium-term visibility in order to reassure investors and decision-makers. The Derating Factor scheme elaborated by ENTSOE does not provide sufficient visibility and the figures provided would lead to unacceptable cuts of remuneration for LER. A potential DF should necessarily be limited by sensible caps compatible with sustainable investissments.
   The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

3. Maintain sufficient leeway to correct an unsatisfactory situation if necessary and provide a Tmin mechanism in a timely manner that satisfies all parties. In that respect, setting a Tmin at 30 min now would represent a point of no return, that would not allow to re-evaluate the situation by a new analysis.
   The CBA approved methodology expressly provided for the possibility to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
   The possibility to re-evaluate the situation is therefore a realistic possibility.
   TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
   Considering TSOs study results, the 30 minutes choice appears to be the most suitable solution to deal with the current situation according to the aforementioned needs.
   Also the choice of 15 minutes (which in any case need to be addressed with an increase of procured FCR) could equally represents a point of no return since in this way always more LER with 15 minutes would be installed in the system with always greater difficulties to later increase the requirement.

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Regarding the options studied by all CE TSO, the following comments can be put forward :

- Options A and B:
  These options present the advantage to maintain a Tmin LER equal to 15 min, compliant with existing installations. However, the introduction of a derating factor (DF) cannot be acceptable without complying with the aforementioned requirements as well as several other conditions:
  - No change for the existing LER installations providing FCR, including those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before any change comes into force.
    The duration and of interim period is not yet defined and will be defined together with NRAs also in the light of the stakeholders' feedback. Its minimum duration will be 24 months after the entry into force of the present regulation. The exemption from the 30 minutes requirement will be granted to all LER prequalified before the end of the interim period.
  - For future LER installations, no DF should be applied to LER30 since they would provide the required service. In addition, a potential DF scheme should be concerted with stakeholders and regulators to set up the relevant parameters and implementing rules not to threaten business cases. The entire DF curve should be reviewed since it does not take into account the positive externalities LER FCR providers bring to the system. The proposed explanatory methodology would furthermore have to be reviewed as, in its current state, it does not provide sufficient incentives for LER FCR providers to proceed to the required investments to ensure that their installations remain available for as long as possible. Last, if the introduction of a DF allows keeping the possibility to readjust figures and incentives, its evolution should necessarily be borne by caps and principles publicly known in order to guarantee visibility for investors.
    The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.TSOs acknowledge your observation on the "positive externalities LER FCR providers bring to the system" and their importance in a "pay on performance" scheme.

- Option C:
  This option is not acceptable for the Club since it makes the system reach a point of no return without any convincing demonstration. Beside, this option does not explicitly exclude the application of a DF in addition to a Tmin set at 30 min.
  The requirement of Tmin=30min would not be applied to LER prequalified before a specific date which is not yet known, therefore putting engaged projects in a dangerous situation. "LER prequalified" should be replaced by "existing LER", defined as those already connected to the grid, those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before the proposal comes into force. Lastly, it would introduce competitive distortion with new entrants.
  The interim period (lasting not less than 24 months after the entry into force of the present regulation) will allow a permanent exemption from the 30 minutes requirement for all LER prequalified before its end. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

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The final duration of the interim period will be defined together with NRAs.

- Option D:
  This option, selected by TSOs, is not acceptable for the Club for the reasons explained above regarding setting the Tmin at 30 min.
  Applying the requirement of Tmin=30 min to all LER after an unknown transitory period preempts on any adjustment capacity if a further analysis (even more restrictive in the event that it would be carried out ex-post) should conclude on an overspecfication of LER Tmin.

In conclusion, the Club aknowledges that none of the options proposed by ENTSOE can be acceptable without respecting the criteria set out above, which leads to provide for a questioning and a reorientated new approach different to that adopted, with modifications and urges to keep the analysis going on.

We call for CE TSOs to reconsider the preliminary choice of option D that in this state does not ensure the preservation of the LER15 capacities for the provision of FCR services nor a proper cost sharing. The concertation should be maintained with all stakeholders, including project leaders, in order to lead a new analysis compliant with SOGL requirements without being constrained by an irremediable change such as a Tmin fixed at 30min. In any case the dynamic of development of LER, and in particular storage who has proven its technical performance and its ability to compete in this market, should not be threatened by undue restrictive remuneration conditions, and existing business cases should be guaranteed during their payback period."

TSOs acknowledge your position.

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ZE Energy

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"ZE Energy would like to thank ENTSO-E for the analysis work carried out to perform the cost-benefit analysis (the Analysis) regarding the definition of a minimum activation duration for Limited-Energy Reservoirs (LER) operating on the Frequency Containment Reserve (FCR). In this regard, ZE Energy submits the following comments.

An analysis to be completed, hence limiting the relevance of this consultation.
ZE Energy would like to stress out that critical elements published in the explanatory note, and about which the ENTSO-E requests market stakeholders' feedback, have not been duly explained, nor justified. The most questionable hypothesis supporting the Analysis is the computation of the LER contribution (or, according to the Analysis, lack there-of!) to the electric safety, and more precisely the null contribution of 15-minute LERs between 1000 and 2000 MW of participating capacity. Such an assumption is highly surprising, and its impact is such, that it deserves thorough justification and cross-checking, totally absent from the current explanatory note.

The reason of such a counterintuitive behavior can be explained as follows.
The simulated frequency deviation is derived from the input power imbalance assuming a certain MW/Hz curve representing the primary response behavior of the synchronous area.
Whenever a LER depletion is detected (i.e. the reservoir is completely full or completely empty), the system loses the regulation capacity of LER. The effect is a rescaling of the MW/Hz curve of the whole synchronous area since only non-LER are counteracting the power imbalance.
Comparing such condition with the normal operation (without LER depletion), this rescaling implies that - given the same power imbalance - the system will result in a wider simulated frequency deviation. An example of the comparison of simulated frequency deviation with and without LER depletion is provided in Figure 1 (provided merely for the sake of clarity).

During the interval of LER depletion (reservoir totally full) the loss of the regulating capacity of LER leads the simulated frequency deviation to higher values.
In order to counteract the same power imbalance, only non-LER are still operating. It means that the equilibrium is reached with higher frequency: the MW/Hz curve is indeed flattened.
Furthermore, by increasing the dimensioned value of FCR procured at synchronous area level, the MW/Hz changes. Since in CE the full activation of the procured FCR occurs at ±200 mHz, increase the procured FCR above the current value of 3000 MW allow to have reduced frequency deviation under the same power imbalance.
TSOs need to define a criterion to assess whether the frequency worsening is acceptable or not. TSOs have evaluated several criteria.
Regardless of the chosen criterion, once LER are depleted, the frequency deviation is determined only by the residual nonLER. This is the reason why the introduction of more LER in the system (keeping the same share of nonLER) has no impact on the frequency deviation quality as LER deplete: after the depletion only nonLER share matters.
However, a higher LER share in the system contributes to reduce the frequency deviation *before* the depletion occurs. The more FCR is present (either from LER or nonLER), the lesser the frequency deviation. More FCR means indeed that the MW/Hz curve is steeper, and the frequency equilibrium is reached at lower frequency deviation, under the same power imbalance.

A reduced frequency deviation lead to a lesser usage of the energy reservoir of LER and, as a consequence, to a delayed depletion. Increasing delaying LER depletion end up in avoiding it altogether: the power imbalance ends before the depletion itself.
The latter condition is also the reason why, once a certain level of overall FCR is reached (e.g., 4800 MW with LER 15), even a LER share of 100% is acceptable: with that amount of FCR deployed at 200 mHz, the LER depletion are not present anymore, no matter how a power imbalance would last.

Additionally, the Analysis relies on historical Long-Lasting frequency Deviations (LLDs), and on how system frequency reserves have been activated during those episodes. This approach is biased, as it does not consider how Transport System Operators (TSOs) processes have evolved since mid 2000s and may evolve in the future with the markets.
As correctly observed, the results derived, for the greatest part, from the simulation of real frequency deviation events which occurred in the CE power systems during the interval under observation (2008-2018). The possibility to experience a LER depletion is thus based on real observations of the potential effects that LER could have had on the system during those past events, if LER were installed at the time such events occurred. Of course, it could be questioned whether such kind of events could occur once again in the future, given the improvements in the system which have been implemented in the last years. In this sense, the TSOs choice has been however to base the whole study on the historical frequency trends rather than on assumptions on how the system will perform in the future. This approach is indeed what lies behind the approved methodology itself, based on the use of the past frequency trends. This represents a conservative approach, since the assumptions on future are clearly characterized by a certain level of uncertainty. The event occurred on the CE system on 8th January 2021 is an example of the fact that these events - despite all the measures put in place in order to avoid them - are still possible. A rough estimation of the frequency deviation experienced by the south-east part of the system has shown that LER (even with 30') would have depleted.

In particular, the FCR is not designed to be activated longer than a few minutes, beyond which the Frequency Restoration Reserve (FRR) and the Replacement Reserve (RR) shall be activated in order to free the activated FCR. The fact that historical incidents show FCR activations longer than 15 minutes shall not be interpreted as a requirement for FCR assets, but as the demonstration of a dysfunctional FRR, to be solved within the FRR framework. (In essence, it seems that the computations have been performed by ENTSO-E in such a way that FCR is supposed to take over the role of aFRR in cases aFRR is in default).

The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises from the fact that the FRP could experience malfunctioning (rather than defaults) which, as of today, cannot be identified and resolved within 15 minutes time frame.

If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Besides, the Analysis does not consider the differences between the various qualification procedures in Europe; in particular, French assets must demonstrate that they are able to follow FCR activations continuously over a several-year historic, being then equivalent, thanks to state-of-charge management, to unlimited reservoirs. The system would indeed benefit from first aligning qualification procedures to the appropriate service quality level, instead of compensating these differences by financial penalties.

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These assumptions constituting the major rationale for the ENTSO-E's current proposal (the Proposal), their lack of justification significantly limits the scope of this consultation.
Qualification process are up to each TSOs and their harmonization is out of scope of the performed analyses. It's however questionable how such harmonization would impact the performances of LER in alert state. The possibility of operating an effective energy management in alert state would result in a virtual impossibility to have a LER depletion no matter of the frequency deviation (out of emergency state). Such possibility is not considered in the study since it's deemed as unlikely. The purpose of the study is not to dimension the LER reservoir but to quantify the most suitable duration of LER in alert state according to what is provided by SO GL.

The ENTSO-E's proposal shall ensure consistency with the regulatory framework in force
The Proposal requires all LER to warrant 30-minute continuous activation, provided a possible adaptation period for already-qualified assets. Such a requirement obviously significantly degrades all business models derived for LER assets operating on the FCR, hence nearly all assets currently installed. More precisely, doubling the required energy capacity is roughly equivalent to dividing by two the power to be qualified, hence the asset revenues, hence the rate of return. Considering that most current debt-funded projects expect return rates on the 5-7% range, this additional requirement would basically result in projects being unable to meet their objectives and to go bankrupt.
Considering this implication, the Proposal would not only be in open contradiction with the European Union orientations to facilitate the development of assets reducing the carbon footprint of the electric system, but it would also annihilate on-going long-term regulatory frameworks, such as the long-term capacity tender in France .
As a consequence, the Proposal shall be revised to neutralize its impact on already funded or contractually committed assets, for which the 30-minute requirement shall not be applied.
TSOs acknowledge this position. The interim period minimum duration is set to 24 months (its actual duration will be defined together with NRAs). All LER prequalified before the end of the interim period will benefit of a permanent exemption from the present 30 minutes requirement for TminLER. In this way both existing and underway business cases are safeguarded. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

The derating factor scheme shall be proportioned and non-discriminatory
Considering the to-be-justified assumption that LER degrade system safety, ZE Energy understands the ENTSO-E's proposition to derate LER remuneration in order to ensure their financial contribution to the additional costs of FCR procurement. However, as proposed, the derating factor scheme merely forbids market access to most LER; hence, it is not acceptable.
The approach followed in the Proposal aims at strictly compensating for the energy constraint of LER; However, it does not consider any of the positive externalities of many of these projects: faster and more reliable response, downward pressure on market price, development of grid flexibility, positive contribution to system carbon footprint. LER are then penalized for their limitation in extremely rare occasions, which are rather linked to secondary and tertiary reserves mechanisms dysfunctions, while their permanently positive contributions are ignored.

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The financial derating factor scheme must be derived in the light of the Analysis revision recommended above; in any case, the proposed scheme shall ensure fair market access for all stakeholders, including LER, and abide by the following principles:

- no application to assets qualified for more than 30-minute activations, nor assets already contractually committed, especially within a long-term regulatory framework;
- progressive application to assets qualified for less than 30 minutes, and to the extent that this financial derating is ultimately capped by the "physical" derating corresponding to qualifying the asset for 30-minutes activations;
- variation both with the qualified LER capacity, and along time, in order to consider market evolutions and further analysis of LER contribution.

It is to be noted that the above principles have no adverse impact for assets already qualified for 30-minute activations; in fact, they merely provide additional revenue opportunities.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.
TSOs acknowledge your observation on the "positive externalities" and their importance in a "pay on performance" scheme.

Conclusions
Although ZE Energy appreciates the additional analysis performed by ENTSO-E to account for market perspectives, ZE Energy still points out that current assumptions are not robust enough to justify the limited number of options proposed to stakeholders, and even less enough to justify the preferred option to basically exclude LERs from the FCR market. More specifically:

- Option A (TminLER = 15 minutes, voluntary DF scheme) is not acceptable with the proposed DF scheme, which basically annihilates LER revenues;
- Option B (TminLER = 15 minutes, mandatory DF scheme) is not acceptable for the above reason;
- Option C (TminLER = 30 minutes for new assets, voluntary DF scheme) is not acceptable as it eventually excludes 15-minute assets from the market;
- Option D (TminLER = 30 minutes, no DF scheme) is not acceptable as it excludes 15-minute assets from the market.

Pending reliable demonstration, shared by market stakeholders, of LER degraded contribution to system safety, no decision shall be implemented which could jeopardize the industry development and contravene to European authorities' orientations.
In the perspective of this additional analysis, ZE Energy recommends the following principles to integrate LER in the FCR market in the short term:

- no derating factor for 30-minute LER, as recommended by the Proposal, nor for assets already operated, funded, or contractually committed;
- progressive application, to ensure sufficient adaptation time for operators, as well as better consistency with market experience;
- limited application, to ensure a profitability level consistent with funding requirements and fair market access to new stakeholders;
- limited application, to account for significant positive externalities in market nominal operation.

TSOs acknowledge your position.

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EDF

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"EDF welcomes the public consultation and highly appreciates the opportunity to express its views on the CE TSOs' proposal for the definition of a minimum activation time period (Tmin) required for limited energy reservoirs (LER) to remain available during alert state in Continental Europe (the proposal). EDF acknowledges and welcomes the efforts made to ensure transparency on the results of the Cost Benefit Analysis (CBA) to determine the Tmin.

EDF would like in the very first place to mention again its early doubts about the need of the requirement described in article 156 (11) of the System Operation Guideline (SO GL), considering the lack of convincing justification of threat to system safety (provided neither during the development and adoption phases of SOGL and up to now). To be very precise, it is because of this lack of justification that the CBA process was introduced in comitology. This CBA has therefore to be carried out properly, the methodology and assumptions being in compliance with SOGL provisions (for instance, any simulation of energy depletion of LER should duly consider the alert state triggering in full compliance with SO GL), taking into account all positive and negative contributions of LER and justifying system needs.

Thus, EDF would like to submit preliminary considerations on the assessment process which has been followed and on the need for a further CBA (A.) before commenting on the actual CE TSOs' proposal (B.).

A. Preliminary considerations on the process followed and need for further CBA

EDF believes that the current CBA has failed to take into account a number of parameters and to consequently properly justify setting up a Tmin at 30 minutes. In particular, the hypotheses of the methodology and the input data take into account old and very dimensioning events (which were mainly attributable to defaulting system operation processes), when they should be more forward-looking and representative of the measures implemented since then or planned, in our view.

In this regard, EDF would like to stress the following considerations:

- Long-lasting frequency deviations (LL) numbers and occurrences: The participation of LER in the FCR provision does not influence the number of occurrences of LLs. The latter stems mainly from malfunctions of other mechanisms like FRR or errors in measurements or schedules in automatic generation control (e.g., the incidents of 2019/01/10 or 2006/11/04). EDF consequentially believes that, before considering setting Tmin at 30 minutes, measures to reduce the number of LLs should be examined and their effects assessed by the CE TSOs. Among others, we believe that TSOs should assess and take into account:

  a) the effectiveness of measures aiming at reducing the occurrence and the duration of the LLs in the intervals at which LER exhaustion takes place. The measures to detect and resolve LLs may not today be sufficiently effective in a less than 30 minutes interval but CE TSOs are meant to implement several additional measures to reduce the number of LLs in accordance with the Long Lasting Frequency Deviations report of April 2021. These measures should reduce the risk of a worsening of the frequency deviation[3].

[3] In this regard, please note that "ENTSO-E is convinced that the implementation of these measures will reduce the LLFDs in both size and number of occurrences, therefore reducing the risk to grid security due to large frequency deviations where LLFDs are a contributing factor", according to the Long Lasting Frequency Deviations report of April 2021.

b) the implementation of the measures suggested by the 2020 Report on Deterministic Frequency Deviations[4] (DFD), such as the implementation of an imbalance settlement period at 15 minutes, and the expected reduced needs for balancing energy during DFD events;
c) the impact of
   i. the European-wide balancing platforms establishment (PICASSO and MARI projects),
   ii. the harmonization and the reduction of the Full Activation Time (FAT) of standard aFRR energy bids, or any other measures aiming at system balancing and operational security;
d) the establishment of effective countermeasures to solve the problems related to the FRR misbehaviors referred to in the explanatory document. For instance, FRR provision rules should duly take into account such misbehaviors. In this respect, the publication by the CE TSOs of detailed information about these malfunctions and the considered counter-measures would help market participants better contemplate the hypothesis;
e) the most relevant historical examples of frequency deviations, their impact on the operational security of the system and the measures which have been implemented since then to prevent any further such frequency deviations (emergency measures for instance).

TSOs acknowledge your proposal in terms of priority between the implementation of further countermeasures against LLs and the decision on TminLER = 30 min.
The proposal of TSOs is instead to exploit the possibility re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
From these reasons stems the proposal not to keep 15 minutes waiting for the assessment of the effectiveness of further LLs countermeasures.

- Impact of LER in case of LL: EDF acknowledges that high LER participation to FCR provision may lead to larger deviations in case of LLs. EDF would like however to point out that CE TSOs did not thoroughly quantify this risk nor its impact, and thus the associated need for a FCR increase. Defining the acceptable worsening of frequency deviations is a prerequisite for both the assessment of costs and the setting of Tmin. EDF notes that the criterion used in the report is significantly different from the one currently in effect in Synchronous Area Framework Agreement (absolute deviation in at least one scenario vs a risk of deviation higher than 1/20 years).
  The criterion of 1/20 years refers to the possibility of FCR exhaustion, meaning that the power imbalance to be contained is larger than the procured FCR. Any criterion regarding the LER exhaustion is meant to assess the frequency worsening which is deemed acceptable. It's important to remark that any frequency worsening due to LER depletion exposes (to a certain extent) the system to a higher risk. While the actual criterion to be chosen is a still open point that could be questioned, it's different from the 1/20 years criterion used for FCR deterministic dimensioning.

[4] Please note that "The recommendations of the final report will require the implementation of at least one of the suggested solutions by 2021, with the aim to meet the quality targets set for each LFC block of CE", according to the Report on Deterministic Frequency Deviations of 16thOctober 2020

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- FCR procurement costs vs. other positive externalities: EDF deems that the CBA should not be based only on the consideration of the FCR procurement costs, especially as a FCR increase cannot be duly evaluated without knowing precisely its benefits for the system. EDF suggests incorporating in the CBA report the frequency quality evaluation criteria as defined in Art 2(118) SOGL, based on the frequency simulations run on the ENTSOE's model. Also, it appears that the analysis did not consider the faster reaction and activation time of LER units (hydro run of the river, stationary batteries or V2G). LER entities (low carbon hydro or chemical storage) will be key components of the flexibility provision in the coming years and limiting LER15 participation to FCR would probably impede their overall development, as other balancing services require even larger stocks. EDF therefore believes that the CBA should be reviewed to adopt a more holistic view of the impact of LER on the operation of the power system.
  Positive externalities such as the dynamic performances of battery-based LER have been neglected in the TSOs study. This choice has been made in order to stick to the requirements provided by Art.156(11) of SO GL, which request to perform the CBA on the basis of LER energetic performances.

- Robustness of the methodology: EDF would like to take the opportunity to recall the doubts already expressed by the stakeholders during the dedicated ENTSO-E and ACER consultations and webinars about the methodological approach used by ENTSO-E. For example, not considering inertia is a strong hypothesis, not supported by a quantitative analysis and EDF notices that CE TSOs' assumptions of FCR marginal price are not consistent with the actual FCR Cooperation marginal prices. CE TSOs should explain how stakeholder's feedback from the previous consultations was taken into account and ensure full transparency on any further analysis carried out on this matter.
  The marginal prices resulting from the simulations are subject to all the adopted assumptions (see pg.14 of the Explanatory document). Considering such assumptions, these marginal prices are however roughly comparable with the FCR cooperation results.
  The choice to ignore inertia in the simulations is a consequence of the choice to neglect the frequency transient altogether (see previous comment/reply).
  For extensive replies to the doubts expressed on the methodology please refer to the previous ED comment provided by Mr. Antoine Rossé.

In light of the explanatory document published to support this public consultation, EDF understands that none of the above-mentioned considerations have been taken into account in the CBA. This leads to an overly negative appreciation of the LER impact on the power system, especially over the medium term, which is not appropriately justified. Setting up the Tmin at 30 minutes is consequently not justified either.

B. Comments on the TSO proposal and EDF's counterproposal

The substance of the proposal is contained in its Article 3, which establishes that:

1. the Tmin should be set at 30 minutes;
2. this Tmin should apply to all LER whose prequalification takes place after the entry into force of the proposal; and
3. this Tmin should not apply to the LER whose prequalification takes place before the entry into force for an interim period of time. This period is still to be set and we expect the TSOs to determine the most relevant period in light of the comments received during the public consultation.

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EDF would like to point out that the probabilistic dimensioning of FCR, according to Article 153 of SO GL, will in any case allow ensuring the security of the system for any configuration of LER participation to FCR provision. We therefore understand that the main issue of the CBA is to choose the better configuration to share the costs incurred by the FCR increase associated to the LER penetration in the market.

As previously explained in our preliminary considerations (part A.), we believe that neither the proposal nor its explanatory document clearly and sufficiently analyses and demonstrate the benefits of a Tmin set at 30 minutes instead of 15 minutes. Considering the economic impact of the decision on the existing and future LER projects, a detailed assessment should be completed and the efficiency of the decision carefully demonstrated.

Our recommendation is therefore to establish the Tmin at 15 minutes in the first paragraph of Article 3 and delete the subsequent paragraphs. We also recommend, regardless of the option selected, to explicitly provide for a transitional period for the implementation of the decision.

TSOs acknowledge your position.

However, considering all the elements underlined in part A. and their impact on the analysis' hypotheses, CE TSOs could update the CBA and its methodology. If the updated results demonstrate conclusively that setting a Tmin at 15 minutes is inefficient, two alternative modifications of the proposed Article 3 could be considered. When suggesting a time period required for FCR providing unit with LER to remain available during alert state, the CE TSOs could review Article 3 to either:

i. amend the 3rd paragraph so that it does not provide for an interim derogation for the Tmin at 30 minutes but rather for a permanent derogation for those existing LER, thereby following the RfG approach where existing facilities have only to ensure their already declared capabilities. Existing LER could be defined as those already connected to the grid and those that either have already filed for a connection agreement or for which a final and binding contract for the purchase of the main component has already been concluded before the proposal comes into force. This option would allow to maintain a single Tmin set at 30 minutes and to preserve the capacity of existing LER at 15 minutes under the framework of a derogation. This would also avoid stranded assets and unnecessary additional costly investments for LER at 15 minutes whose reconversion to comply with the requirement of a Tmin at 30 minutes could take years;
   A permanent derogation from the 30 minutes requirement is ensured to all LER being prequalified before the end of an interim period starting from the entry into force of the present regulation. This derogation has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.
   The duration of such interim period is still to be defined together with NRAs but its minimum duration is 24 months.

or

ii. amend the 1st paragraph to set the Tmin at 15 minutes and the 3rd paragraph to provide for the application of a Derating Factor (DF) to the remuneration of the FCR providers with a LER allowing only 15 minutes availability. For instance, if applying a DF of 0.9 is sufficient to ensure

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the operational security of the system, this would be more cost-effective and beneficial for existing LER and for the system than setting the Tmin at 30 minutes. However, LER30 should still be able to provide FCR without any DF applied to their capacity. Please see Annex 1 for our recommendations on the application of a DF. In the explanatory document, CE TSOs seem reluctant to implementing a DF mechanism, bringing forward complexity issues. We nevertheless urge CE TSOs to consider this option further as it could ensure the preservation of the LER15 capacities for the provision of FCR services while ensuring a proper cost sharing.
The adoption of Derating Factors has been ruled out by TSOs. No remuneration reduction will be applied to LER, no matter of their TLER.

We trust that those considerations and recommendations can prove useful to further improve the CE TSOs' proposal and we remain at your disposal should you have any follow up question or should you wish to exchange further on that matter.

ANNEX 1: EDF's comments on the Derating Factor scheme

As proposed in the explanatory document, the DF calculation methodology unduly focuses on the sole additional costs that the LER participation could represent. It does not take into account the fact that

i) LER will contribute on an equal footing with non-LER most of the time, when the system is in normal state as well as in alert state in some situations and

ii) LER penetration into the market lowers the FCR marginal price. The methodology implies to make LER FCR providers support the costs of a possible increase of LL occurrences, even though LER FCR providers are not responsible for such an increase. The DFs should reflect the positive externalities brought by LER. A too low DF could lead to driving LER out of the FCR market, thus reducing the total available FCR and increasing the prices.

The proposed explanatory methodology would furthermore have to be reviewed as, in its current state, it does not provide sufficient incentives for LER FCR providers to proceed to the required investments to ensure that their installations remain available for as long as possible. For instance, figures 13 of the explanatory document shows that a LER15 FCR provider, with 2000 MW of LER installed, would be subject to a DF of 0.35, which would be more detrimental than to qualify as LER30 by halving its capacity.

Therefore, EDF suggests applying the following principles for the calculation of the DF:

a) once calculated on the basis of the methodology proposed by the TSOs, the DF should be increased ex-post, for example by a multiplying factor > 1, to reflect the LERs' positive externalities.

b) since there would be no DFs for LER30 FCR provider, the minimum DF for LER15 should not be set lower than 0.5.

c) the assumptions for DFs calculation shall be as accurate as possible. For example, a wrong estimation of the FCR marginal prices may lead to a wrong estimation of the amount of LER participating in the FCR provision.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.
TSOs acknowledge your observations on the "positive externalities brought by LER" and their impact on the FDs calculation. TSOs acknowledge your observations on a proper comparison between the maximum of 30 minutes to be requested to LER and an hypothetical DF.

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It's worth noting that it would be easy to mitigate the effects of higher DFs, since the probabilistic dimensioning approach for FCR, according to Article 153 of SO GL, would ensure the security of the system for any configuration of LER participation to FCR provision.

The probabilistic dimensioning approach for FCR, according to Article 153 of SO GL will in any case take into account also the energetic aspect of FCR (i.e., the performances of LER during alert state). It is therefore likely (given the CBA results) that the system security will be ensured with an increase of the overall procured FCR. The results under consultation are indeed aimed at reducing the potential cost increase associated with such FCR increase as well as at investigating possible methodologies to establish a sharing of such increased costs.

In addition, EDF believes that the implementation of a DF should not be left to the sole responsibility of individual TSOs but should be harmonized for the whole CE synchronous area. The same calculation methodology should apply throughout the area. The reason why a DF scheme would be applicable only in LFC Blocks where an FCR market-based procurement is in place should be clarified in the report. In the blocks where TSOs adopt a mandatory FCR procurement, the prequalified FCR physical may instead be reduced by applying an equivalent factor.

TSOs acknowledge that the eventual application of DFs should have been harmonized at least amongst areas which are procuring FCR through a common procurement scheme. The decision not to adopt DFs makes this point not relevant anymore.

The FCR dimensioning and the DF recalculations should take place on regular basis and at least at any significant change of the expected LER share in the FCR provision. They should be carried out by CE TSOs in a transparent and harmonized way."

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FEBEG

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"FEBEG represents electricity producers, traders and suppliers of electricity and gas, as well as laboratories in the electricity and gas sector in Belgium.
FEBEG has 33 full members who together employ about 7,522 people and achieve a turnover of about EUR 17.4 billion. Please find hereafter our comments on the proposal.

We do not support the analysis done and consequently do not agree with the conclusions drawn by the TSOs of the Continental European region. Instead of locking out certain technologies from the FCR market, TSOs should continue using the existing 15 minutes period required for LER to remain available during alert state (TLER) until it can be proven that a system security concern arises requiring such change.

We are of the opinion that the existing level playing field based on technologic neutrality should be maintained and are concerned, that with the proposed design change especially batteries will be pushed out of the market for FCR provision. In addition to the proposed change to the minimum time for TLER, this also concerns the application of a Derating Factor which should be harmonised for the CE region in order to support the level playing field. Having the phase out of conventional generation in mind, not safeguarding the level playing is potentially dangerous as it precludes market participants from investing in technologies that will be required making the energy transition possible.

TSOs acknowledge the presented position regarding DFs and their application. In any case, the adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.
TSOs do not agree however on the possibility of batteries to be pushed out of FCR market requiring 30 minutes. While it's true that the imposition of a longer requirement impacts the long-run marginal costs of battery-based LER, the performed analyses envisage expected costs between 5.5 €/MW(h) and 9.4 €/MW(h). Such costs are expected to be still competitive, also considering the current spot prices on FCR cooperation (which are likely already heavily impacted by LER presence).

TSO's claim a positive cost effect of 10% which is based on many assumptions, the parameters for which have not been made publicly available and that are highly interdependent on each other. Changing those may lead to very different results in either direction. Considering that a 10% cost effect also does not include investment costs market participants will have to undertake in order to change the configurations of their assets the overall positive value attributes of the proposed change should be reconsidered.

The general assumptions on LER long-run marginal costs have been provided by TSOs during the workshop held on 17th October 2019. The figures used in the study are presented in Table 1 of the Explanatory note. Such assumptions are of course subject to a certain level of uncertainty. In order to deal with it, three different scenarios of CAPEX evolution have been considered.
The potential costs to be borne by LER to convert their asset from 15 to 30 minutes are not expressly considered in the study. It should however be considered that a lot of battery based LER (i.e. in Germany) are already able to provide 30 minutes of full activation since this was the requirement previously enforced. Several other 15 minutes LER could fulfill the longer requirement with a reduction of the provided FCR without assets' configuration changes (albeit with a profitability reduction). Only a limited number of market participant need to go through a substantial refurbishment in order to increase the minimum activation time period.

Furthermore, the impact on the FCR market of a reduced availability of existing LER because of a longer minimum activation time period is considered in the study.
In any case, the provision of the interim period (following the entry into force of the present regulation) ensure that all existing and underway business cases are safeguarded, being exempted from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

We would furthermore like to remind the TSOs that investments need a stable regulatory environment. The FCR market (which currently works and where no shortcomings could be identified in the past) should not be changed because of identified problems in other markets (namely the provision of aFRR). Instead, the establishment of the EU-wide balancing platforms PICASSO and MARI, the harmonisation and the reduction of the Full Activation Time of standard aFRR energy bids and the harmonisation of imbalance settlement periods to 15 minutes should also be considered, as well as any other measure aiming at system balancing and operational security, implemented or decided upon over the past years in light of the implementation of the European Balancing Guideline. It is now time to deliver all the related projects and see the positive (and/or negative) effects thereof. Only thereafter, should TSOs start thinking of finetuning the system where needed.

The need of a stable regulatory environment is definitely a value whose importance TSOs are aware of. The main challenge of a 30 minutes choice would be to deal with the impact on all existing plants by the means of proper measures.
For this reason, an interim period of at least 24 months following the entry into force of the present regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of such interim period. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. Such exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.
It should be highlighted that the possibility to have a 30 minutes requirement is expressly provided by Art.156(11), which set the minimum and the maximum time period respectively to 15 and 30 minutes.

We recommend to maintain a TLER of 15 minutes and has identified several weaknesses in the TSO argumentation and in the methodology.

TSOs claim that limitations in the activation period result in higher FCR demand. But, TSOs did not consider the higher quality of batteries due to their faster reaction time and higher accuracy in operation. Instead, TSOs claim that technologies with limited activation period have a lower value to the system. That the current system design with a 15 min TLER however allows to achieve the TSOs target of security of supply finds no mentioning either.

The battery-based LER represent only a part of the currently installed LER (another important component comes from run-of-river hydro power plants). The whole study is aimed at fulfilling what requested by Art.156(11) SO GL, that is to define the minimum activation time period. The analyses are therefore focused on the energetic issue and not to other features of FCR provision (such as the reduced deployment time of batteries). The valuable features which battery can provide will be considered in the

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probabilistic recalculation of FCR dimensioning (Art.153(2) SO GL). Such features however are out of scope in a study aimed at understanding which is the most suitable duration to be requested to FCR providers.

According to the analysis provided by the TSOs, only a small cost difference of about 10% was the result for different scenarios and activation periods. Considering the number of assumptions made to derive this result and the uncertainties behind them as well as the generation of stranded costs and value destruction related to the LER units that won't be able to fulfil this new requirement, we disagree that a TLER of 30 minutes clearly supersedes the 15min TLER.

The critical assumption is that the FCR demand increases proportionally to the growth of storage capacity when a storage capacity of 900 MW is reached. As this point, the TSOs assume that additional storage capacities of 1200 MW (for TLER 15 min) or 300 MW (for TLER 30min) do not replace conventional plants but will result in an increase of FCR demand of the same size. It is unclear to us why additional storage capacity should not have an effect at all.

Furthermore, in a situation with LER installations only, the FCR demand is assumed to be 4800 MW (for TLER 15 min) and 3500 MW (for TLER 30 min), respectively. In parallel, TSOs argue that the amount of energy required is the driver for additional FCR capacities in these cases. It is unclear to us, how 1200 MWh for TLER 15 min correspond to 1750 MWh for TLER 30 min.

The reason of such a counterintuitive behavior can be explained as follows.
The simulated frequency deviation is derived from the input power imbalance assuming a certain MW/Hz curve representing the primary response behavior of the synchronous area.
Whenever a LER depletion is detected (i.e. the reservoir is completely full or completely empty), the system loses the regulation capacity of LER. The effect is a rescaling of the MW/Hz curve of the whole synchronous area since only non-LER are counteracting the power imbalance.
Comparing such condition with the normal operation (without LER depletion), this rescaling implies that - given the same power imbalance - the system will result in a wider simulated frequency deviation. An example of the comparison of simulated frequency deviation with and without LER depletion is provided in Figure 1 (provided merely for the sake of clarity).

During the interval of LER depletion (reservoir totally full) the loss of the regulating capacity of LER leads the simulated frequency deviation to higher values.
In order to counteract the same power imbalance, only non-LER are still operating. It means that the equilibrium is reached with higher frequency: the MW/Hz curve is indeed flattened.
Furthermore, by increasing the dimensioned value of FCR procured at synchronous area level, the MW/Hz changes. Since in CE the full activation of the procured FCR occurs at ±200 mHz, increase the procured FCR above the current value of 3000 MW allow to have reduced frequency deviation under the same power imbalance.
TSOs need to define a criterion to assess whether the frequency worsening is acceptable or not. TSOs have evaluated several criteria.
Regardless of the chosen criterion, once LER are depleted, the frequency deviation is determined only by the residual nonLER. This is the reason why the introduction of more LER in the system (keeping the same share of nonLER) has no impact on the frequency deviation quality as LER deplete: after the depletion only nonLER share matters.
However, a higher LER share in the system contributes to reduce the frequency deviation *before* the depletion occurs. The more FCR is present (either from LER or nonLER), the lesser the frequency deviation. More FCR means indeed that the MW/Hz curve is steeper, and the frequency equilibrium is reached at lower frequency deviation, under the same power imbalance.

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A reduced frequency deviation lead to a lesser usage of the energy reservoir of LER and, as a consequence, to a delayed depletion. Increasing delaying LER depletion end up in avoiding it altogether: the power imbalance ends before the depletion itself.
The latter condition is also the reason why, once a certain level of overall FCR is reached (e.g., 4800 MW with LER 15), even a LER share of 100% is acceptable: with that amount of FCR deployed at 200 mHz, the LER depletion are not present anymore, no matter how a power imbalance would last.

Lastly, the analysis done by TSOs focuses on the future security of supply but is based on the generation fleet currently available. It thus disregards phase-out plans, age related dismantling, the build out of RES-E generation and additional investments in flexible capacity over the coming years. We think that in order to make the European energy transition possible, today's changes should be set as future-proof as possible so that investments do not face unnecessarily high regulatory risk. Disregarding the future will lead to further losses in confidence and add another layer of uncertainties for investors.

For what regard the nonLER provision, the analyses are based on the current fleet. The conventional generation phase out could indeed have an impact on FCR prices.
The choice to base the study on the current conditions (and on the past data, for what regards the frequency deviation statistics) has been undertaken in defining the CBA methodology, approved by NRAs. The limits associated with this choice (as those correctly highlighted in the comment) have been mitigated with the possibility – expressly provided for by the approved methodology – to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the cost benefit analysis will significantly change after entering into force of the Time Period" (Art.9 of the Methodology). TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side, even during a radical transitional period such as the one expected in the next decade.
For these reasons the choice to foresee the possibility of an update of Time Period has been adopted in the methodology in the first place.

Considering that the elements provided by TSOs contain several flaws and do not provide clear financial recommendation for a change as well as the lacking analysis of the impact of the LER on the system safety, TSOs should continue to apply a 15min TLER. In the event that further analysis and assessments demonstrate that the 15 min TLER has a negative impact on the system safety such effects may be considered, potentially resulting in the increase of the required FCR. Setting the TLER to 30 minutes prior to such conclusive analysis will have an unnecessary impact both on the existing LER, which already have a 15 minutes requirement, and the total costs for TSOs.
TSOs acknowledge the presented position.

Finally, should TSOs nonetheless go ahead with the change and adopt a 30min TLER, TSOs will have to commit to ensuring a proper interim period for already prequalified LER to deal with the regulation change, both from the technical and financial point of view. In this regard, we need to stress that switching 15 minutes TLER units to longer periods will take several years and will unduly affect investments planned but not yet build. Therefore one must also take into account the duration of the outstanding investments."

TSOs acknowledge the presented position.

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In any case, the issue associated with existing LER is addressed with the exemption from the new requirement for all LER prequalified before the end of the interim period.

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smartEn

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INTRODUCTION

smartEn welcomes the opportunity given by ENTSO-E to provide feedback to the proposal for the definition of a minimum activation time period required for LER (assets with a Limited Energy Reservoir) to remain available during alert state in accordance with Article 156(11) of the SO GL. We support ENTSO-E's general objective to strengthen the security of supply in Europe through this proposal. However, smartEn opposes the introduction of new requisites for FCR, that could limit the development of LERs, in order to address structural issues caused by other products (aFRR) and phenomenon like deterministic frequency deviations (DFD) and long-lasting deviations (LLD). We are equally concerned by the possible introduction of a derating factor, that would further weaken the business case for demand side flexibility (DSF).

IDENTIFYING AND ADDRESSING THE CHALLENGES TO THE GRID

Before imposing new requirements in FCR, TSOs should ensure the correct use of products like aFRR, and that the contracted quantities are delivered in time and form, to avoid impacts on the FCR procurement and increased costs for a subset of market participants. We therefore ask ENTSO-E to publicly address the issues stemming from defaulting aFRR or other phenomenon and their impact on FCR, together with a plan to solve these issues in the most cost-efficient way.

Before making a substantial change to the trading requirements for any product, the reasons why this change is required should be further investigated. The report states that a higher share of LER is increasing the need for FCR procurement and in turn increasing the costs for TSOs. The report also states that there are "technical problems inherent in a complex system such as the CE synchronous are", and points towards the long-lasting deviations caused by, among other, Deterministic Frequency Deviations (DFD). The report also states that long-lasting frequency deviations are "the most impacting elements leading to the possibility of LER exhaustion", which highlights the importance on dealing the structural and technical causes for these phenomena.

FCR was not designed to handle extreme events by itself. As mentioned in the explanatory document, the reasons for reaching the alert state are in many cases due to long-lasting deviations or due to the failure of aFRR to deliver. BSPs are committed to the delivery of the contracted aFRR. During the prequalification process, TSOs test the ability of Reserve Providing Groups/Reserve Providing Units to deliver aFRR as per the Network Code requirements. Furthermore, aFRR should in theory be fully activated 5 minutes after the alert state, with mFRR coming in after 15 minutes. The reason why FCR should be activated continuously for 30 minutes is not apparent in the context of other existing frequency restoration products. We request a full demonstration why this requirement is technically necessary. Currently the situation arises where a control area is not correctly fulfilling their aFRR obligations with a full activation in 15 minutes. These defaults in aFRR are being solved by shifting the issue to FCR, something it was not designed to do, increasing thus the required FCR size and the costs of procurement and the necessity for it to be provided for 30 minutes. This solution is not cost efficient, as also demonstrated by the presented consultation report.

The issue with FRP is nor about quantity or providers' reliability. It's instead about technical issue on how a complex process like FRP in a wide and structured synchronous area such as CE is technically implemented (real time operation and multiple TSOs coordination). It cannot be resolved by increasing procured FRR or changing FAT. TSOs are working on procedures and policies to promptly identify, counteract and resolve such situations. As of today, however these conditions cannot be identified and resolved within a suitable time frame, with the consequence of the FCR to keeping counteracting a power imbalance.
For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.
TSOs highlight moreover that SO GL explicitly provide for the possibility of a minimum activation time period above 15 minutes.

Furthermore, we recommend TSOs to thoroughly investigate and present a plan to overcome technical issues and structural constraints that might also cause long-lasting deviations, before implementing further conditions on FCR limiting the participation of some market participants.

TSOs acknowledge your proposal in terms of priority between the implementation of further countermeasures against LLs and the decision on TminLER = 30 min.
The proposal of TSOs is instead to exploit the possibility re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
From these reasons stems the proposal not to keep 15 minutes waiting for the assessment of the effectiveness of further LLs countermeasures.

The same report describes measures to deal with long-lasting deviations, which are one of the main causes for LER exhaustion as stated in the report (page 5), to later say that "these measures have not been considered in the following analysis" (page 5). We request ENTSO-E to clarify the reasons why these measures, that might partially solve the issue, were not considered in an analysis regarding LERs.

Such measures have indeed been considered in the decision. As stated in the explanatory note however, the measures that are already in place tend to be still not effective enough in the intervals at which LER exhaustion could take place. For this reason, they have not incorporated in the model.

ALTERNATIVE MEASURES
In ENTSO-E's 2019 report "Report on Deterministic Frequency Deviations" the increase in volume procured for FCR was already considered, as a temporary measure to deal with DFDs, up to 5 400 MW from the current 3 000 MW. The report also states that "the FCR dimensioning is currently undergoing a probabilistic recalculation". If this is the case, any further decisions should be postponed until this recalculation is finished and analysed.

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It's true that a probabilistic review of FCR dimensioning is underway. Such review will consider also the energetic aspect related to FCR (i.e., LER in alert state). The LER presence will represent therefore one of the constraints of this review.
TSOs acknowledge your proposal in terms of priority between the definition of a specific TminLER and the review of FCR processing.

Another proposed alternative would be the introduction of a new "Very Fast Reserve" product. We suggest for ENTSO-E to establish a link between these two reports, and better define what FCR's and aFRR's role should be in the future, and if required expand the procurement of FCR.

Non-symmetrical products could also be of value since not all events are similarly risky. Over-frequency beyond 15 minutes is easier to address (prices would drop and generators would reduce output), than under-frequency, which would require to have more generators on stand-by. In these cases, non-symmetrical products could benefit from LER technologies with variable speed drives, like HVAC, pumps or compressors. We ask ENTSO-E to explore this possibility in the context of FCR.

Finally, many of the concerns expressed by ENTSO-E in the report seem to stem from a lack of observability of LERs in the TSOs control rooms. While we fully understand this concern, it has a reasonable solution that would not negatively affect LERs. TSOs should update their back-end to be able to meter and monitor in real-time meter fast acting LER. The costs of this update should not be transferred to LER, and the benefits in reducing prices and integrating RES efficiently should be considered.

COST AND TECHNICAL ASSUMPTIONS

Cost assumptions

The report assumes that the costs associated with providing FCR will increase with a higher participation of LERs providing it, in particular due to the increased FCR capacity required (even when the need to increase FCR has not been satisfactorily demonstrated). However, what can be observed empirically today is the opposite: an increase of LERs participating in FCR has decreased its price. The main reason behind is that typically LERs are price takers rather than price makers, as correctly identified in the report (page 4). If the cost of LERs were to evolve in the way represented in the report's outcomes, LERs would soon be priced out of the FCR merit order, leaving non-LER units to provide it. This way, the market mechanism implicitly keeps the costs of LER share under control.

The increase of cost is derived, under the CBA assumptions, by the increase in FCR demand. This increase is not balanced by the effect of LER on FCR prices.
The "run-away" effect the TSO want to avoid is due to the fact that more LER in the FCR provision and – as long as LER long-run marginal costs remain below the FCR price – investors are incentivized to install more LER, leading to even more request of FCR. The LER further penetration itself however is keeping low the FCR prices, sending a signal to investors to continuing in LER installation.

smartEn already expressed concerns on the LER cost assumptions presented in the consultation on all CE and Nordic TSOs' results of CBA for FCR providing LER units from 2020. As mentioned then, further transparency on the cost assumptions would be particularly valuable, given that some of the results presented in the CBA seem to indicate inexplicably high costs linked to LER units. This includes an indication that in the model, the unitary cost of LERs is higher than the costs derived from procuring FCR from conventional technologies, which might indicate.

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The unitary costs of dedicated large battery-based installation can be indeed be higher than the FCR coming from a conventional plants having variable costs close to the DAM price.

Long-run marginal costs of LER can be close to zero for some technologies like V2G, where the CAPEX has already been paid by another use. This has not been included in the cost assumptions and is critical to properly value LER technologies. In particular because the same is assumed for non-LERs, as their costs in the modelling are based on the opportunity cost, since CAPEX has been paid by the need to generate power (page 14) and no long-run marginal costs are considered. For these reasons, we request complete transparency on the cost assumptions made for LER and non-LER technologies and to have equal treatment for LER and non-LER technologies in the modelling.

The study is focused mainly on FCR-dedicated large LER installation (battery, run-of-river). This is due to the fact that distributed, small, portfolio-based assets (which have the FCR provision as a minor source of revenue, e.g., EV, heat pumps) are expected to play a marginal role in the short term, in terms of offered FCR.

TSOs recognize the potential role in the future for these kinds of FCR providers. In particular, their presence could lower the FCR prices. Their FCR cost (and thus offered price) will be probably less than the one associated to FCR-dedicated large installation.

The FCR cost of dedicated large installation has indeed to consider a long-run marginal costs associated with a large initial investment. Non-FCR-dedicated LER have core businesses other than providing FCR. It means that their CAPEX is likely largely covered by their main sources of revenue. For this reason, they will probably be able to take advantage also of lower FCR prices, contributing to reducing them.

As a result of it, it's possible that – on a medium term – the presence of such providers in the FCR procurement could change the balance in favor of a larger FCR procurement with reduced minimum activation time period. In this respect, the approved calculation methodology according to Art.156(11) explicitly provides for the possibility of an update of the CBA, with a consequent review of the minimum activation time period for LER.

Nevertheless, the CBA needs to consider the current situation and what is expected in the short term. This is the reason why the non-FCR-dedicated installation are not considered. To allow a reduced minimum activation time (15 minutes) - aiming at promoting the development of smaller flexible assets - would result in a higher need for FCR to be procured by TSOs. This would translate into higher costs for TSOs and consequently for consumers. It would instead be more transparent to promote an explicit subsidy to foster the development of such kind of assets.

It should also be considered that requiring a 30-minutes full activation represents a relatively limited barrier to small flexible assets grouped in portfolios (e.g., EVs and heat-pumps). A longer activation time period reduces the FCR which can be offered under the same available energy, thus reducing the potential revenues from FCR. For these plants the provision of ancillary services represents however an additional source of revenues: their installation (and thus their bulk investment cost) is not dependent from the possibility or profitability of FCR provision. The profitability of FCR provision should thus be compared only with the actual costs to be borne in order to provide the service (control, communication, etc.) which are usually far less than the costs associated with energy storages and grid-reservoir interfaces.

In addition, the present report only considers additional costs for the system operator caused by the increased participation of LER in FCR. However, these assumptions do not consider other system wide benefits, like the efficient integration of RES and DERs through LERs like storage. It also leaves out the benefits of using a clean technology and the reduction of CO2 emissions accompanied by a higher share of

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flexibility sources. Any analysis that would limit the participation of LERs should also consider these variables that support the energy transition goals set by the European Commission.

The aspect considered as central in the study are those associated with the energetic contents of LER and not an overall assessment of cost and benefit of a specific LER technology (batteries). This choice has been made in order to stick to the requirements provided by Art.156(11) of SO GL, which request to perform the CBA on the basis of LER energetic performances.

Technical assumptions

Other technical assumptions made in the report are questionable from the industry perspective, or could be considered so improbable that valuing them the same way as other more probable occurrences would be inefficient. In page 6 of the report the case is considered of all LERs depleting at the same time. This seems like an extremely unlikely occurrence, akin to all power plants malfunctioning at the same time. Different LERs start at different moments in time, they have different capacity, different losses, different buffers, they might be stacking services at the same time and adapting the way they deplete. A similar assumption is made when in page 25, where it is said that LER "impose stricter time constraints than non-LER that could have time-unlimited FCR provision". Non-LER will deliver what they were contracted for, not more. Even non-LER have their limitations, there is no such thing as "unlimited" provision (e.g., they eventually run out of fuel).

If these extreme and highly unlikely cases should be included in the modelling, an appropriate probability should be given to them, and have it factored it into the most cost-efficient solution. We request ENTSO-E to assign probabilities to the "safe combinations" and "unsafe combinations" as stated in figure 1.

The model is a simplification, considering the real behavior of LER related different recharging strategies, different initial operating conditions, etc. The starting state of charge of LER considered in the model is however set at 50%, in this way a mean value has been assumed aiming at intercepting a "mean behavior" of LER. LER depletion would occur on a time distribution of a few minutes around the moment in which the model simulates the instantaneous full depletion.

For the sake of normal and emergency condition in CE, the nonLER provide a time unlimited service (as provided for in the SO GL). The possibility of conventional power plant to run out of fuel is not realistic.

Finally, the reasons to not include the "Reserve Mode", a condition recently included in the FCR properties, precisely to avoid total depletion of LER, is not apparent, in particular if all new LER will have to abide by it. Any modelling performed for the short- and medium-term should consider all parameters and conditions under which the participating technologies will be considered.

Additional properties for FCR foresee the possibility to introduce the so called "Reserve mode" for LER. LER switching to the "reserve mode" would request the regulation to counteract only minor, fast-fluctuating frequency deviation. The bulk regulation is expected to be taken over by FRR in order to avoid the full depletion of LER and to ensure a residual regulation capacity.
The "reserve mode", as explicitly defined by the approved regulation, shall be ensured "Besides ensuring that the energy reservoir is sufficient to continuously activate FCR in normal state and fully activate FCR in alert state for the time period pursuant to Article 156(9) of the SO Regulation".
It means that it cannot be considered as an extra energy/time margin in the case of a depletion, but rather as a way to ensure a limited regulating capacity from LER against small frequency fluctuations.
Furthermore, the "reserve mode" (which is applied to units prequalified for the first time after the entry into force of the regulation) relies on a process of shift of the regulating capacity from FCR to FRR.

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Whenever a long-lasting frequency deviation occurs, FRP is not working as expected, undermining the possibility of such a bumpless transfer of regulation.

LER REMUNERATION REDUCTION MECHANISM (DERATING FACTOR)

smartEn opposes the introduction of a remuneration reduction mechanism in the form of a derating factor that is only applicable to LERs. We do follow the argumentation used for the introduction of a remuneration reduction. It is argued that costs of LER will only decrease, facilitating the introduction of LER in the pool. And that this will force an increase in the FCR dimensioning. However, no justification is provided as to why the downward impact of FCR prices will be offset by the higher volumes of FCR procured. We ask ENTSO-E to provide a justification on this affirmation in page 25.
The derating factor proposed by ENTSO-E presents an important and unjustified reduction of remuneration at TLER=15. Whether the TLER is maintained at 15 or 30 minutes all market participants able to provide FCR should have access to the full FCR value. A derating factor would introduce an additional layer of uncertainty for investors and an uneven playing field with other technologies.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

SYSTEM DECARBONISATION AND EFFICIENT USE OF AVAILABLE TECHNOLOGIES

LERs play an important role in achieving the overall system decarbonisation targets set by the EU. Limiting the participation in system services of battery storage, electric vehicles, heating and cooling and other LERs, might have a severe impact in reaching those goals. For this reason, we strongly discourage the adoption of any scenario that includes limiting the share of LERs in FCR provision, or making their participation unnecessarily more costly. In the same way that the costs of including LERs need to be considered for an optimal FCR sizing, the system-wide benefits that these technologies provide from helping integrate RES, reducing CO2 emissions and helping with decarbonisation should also be factored in.

In the present report, all LER are considered as a monolithic technology, without highlighting why some of them are better suited for FCR provision than traditional assets. In particular, the benefits which battery storage provides, like a detailed and continuous state of charge management that guarantees efficient provision, accurate and fast reactions and ramping, and the increasingly availability thanks to the proliferation of electric vehicles should be considered.

As previously stated, the aspect considered in the study are those associated with the energetic contents of LER and not an overall assessment of cost and benefit of a specific LER technology.
The reason why LER different from dedicated large battery based installation have not be considered are described the reply about technical assumptions.

SUCCESS STORIES

To further complement our position, we ask ENTSO-E to consider numerous success stories of LERs providing balancing services as a cost-efficient option.

- Dynamic Containment reserve in the UK. National Grid has recently moved towards a fast-acting frequency reserve that mainly targets LERs, with the objective to introduce V2G in the near future.
- "Tesla big battery" and VPP in Australia: The Hornsdale Power Reserve in Australia is a perfect example of an LER providing grid stability, and it has now been expanded with a PowerWall & Autobidder platform to facilitate control room operators the management of the VPP.

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- Mileage scheme in PJM: A possibility to reduce additional costs for the additional capacity that would be paid to deliver small amounts would be a mileage scheme similar to PJM, that would pay for performance, or a mixed system that combines capacity and mileage.

Considering the economic impact and other implications of moving TLER to 30 minutes, and the significant open questions still remaining we ask ENTSO-E to maintain TLER at 15 minutes at least until:

- A thorough study has been performed with transparent cost assumptions
- A clear path has been determined to deal with DFDs and LLDs as well as with the correct delivery of aFRR
- All the concerns listed in this document have been clarified by ENTSO-E and backed up by thorough analysis.

TSOs acknowledge your position.

We remain at your full disposal if clarifications are necessary.

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Eurelectric

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Introduction

Eurelectric would like to thank ENTSOE for having performed further analyses of the CBA aiming at defining a minimum activation period (Tmin) for LER's and reviewing of the FCR procurement. Eurelectric's response to the consultation is split into two parts. We will first give our remarks on the conclusion of the analysis's results, as well as our remarks on the CBA. Secondly, we will explain what would be the prerequisite for a Tmin setting that would exclude some existing resources. These considerations will explain why we are opposed to changes that would require important investments on the LER assets, without being sufficiently certain that this is the most efficient remedy to the problem.

Comments on the proposal

Eurelectric's view is that, considering the elements provided by the TSOs and the insufficient analysis of the impact of the LER on system safety (see below), TSOs should set a Tmin of 15 minutes for the LER. Should further analysis and assessments demonstrate conclusively that the 15 minutes Tmin has a negative impact on the system costs to achieve the same level of safety, then adequate measures could be considered. These measures could be the increase of the required volume of FCR or the introduction of a Derating Factor (DF) scheme on LER remuneration, provided that DF's implementation fulfills the principles listed below (see our comments on the proposed Derating Factor scheme). For further details, please see our proposals below in the section "Recommendations/prerequisite prior to considering a Tmin extension".

Considering the economic impact of the decision, a detailed assessment should be completed, and the efficiency of the decision should be carefully demonstrated. This will impact the existing LER's, which have today a 15 minutes requirement, and the development of future LER capacities. In particular, TSOs should study the impact of applying a derating factor, which could in the end be sufficient to ensure the operational security of the system with a smaller cost than extending the Tmin. The TSOs deem the application of a derating factor complex without providing any clear demonstration. We nevertheless urge TSOs to consider this option further as it could ensure the preservation of the "LER15" capacities for the provision of FCR services while ensuring a better cost sharing between FCR market actors and the system via the procurement cost for TSOs.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

If the option D is selected by the NRAs, TSOs state they will commit to ensuring a proper interim period for already prequalified LER to deal with the regulation change, both from the technical and financial point of view. Current 15 minutes Tmin LER having to comply with a longer Tmin will take several years and will affect both ongoing and planned investments. An exemption should be granted to prequalified LER and to planned projects, defined as those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before the proposal comes into force.

TSOs acknowledge the need for a proper interim period. The duration of such period is still to be defined together with NRAs. Its minimum duration will be 24 months and it will start from the entry into force of the present regulation. The LER prequalified before the end of the interim period are exempted from the new 30 minutes requirement. Such exemption has however an exception for existing LER currently being

subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

We would like to recall the doubts already expressed by Eurelectric and many stakeholders during the dedicated ENTSO-E and ACER consultations, as well as the webinars organized on this issue and in the SO ESC, about the methodological approach used by ENTSO-E and its full compliance with the SO GL. TSOs should explain how stakeholder's feedback from the previous consultations was considered and ensure full transparency on any further analysis carried out by TSOs on this matter.
Considering the methodology of the CBA, Eurelectric considers that the problem should be studied with a more holistic and broader approach, in particular given the following points:

1. The assumptions and the methodology of any study on the acceptability criterion for frequency worsening caused by LER should consider the actual contribution provided by LER to system safety and be compliant with SO GL. For instance, any simulation of LER energy depletion should duly consider the alert state triggering in full compliance with SO GL. Not considering inertia may also affect the outcome of such analysis.
   The criteria which are considered for the trigger of alert state are those indicated in SO GL.
   The inertia is not considered but its effect on the results is totally negligible in the framework of a study about the energy duration of FCR provision.
2. Today, the impact of LER's depletion on the needed amount of FCR has not been properly assessed, mainly because the criteria of the maximum acceptable worsening of frequency deviation caused by LER is currently not defined.
   The acceptability criteria presented in the study cannot be definitive since these aspects are up to the ongoing FCR probabilistic review. The adopted criterion is however considered as based on an average value in line with SO GL.
3. The FCR dimensioning is evolving towards a probabilistic recalculation (according to Article 153(2)(c) of the SO GL). Therefore, the risk for the system of LER participation to FCR provision is limited.
   The probabilistic dimensioning approach for FCR, according to Article 153 of SO GL will in any case take into account also the energetic aspect of FCR (i.e., the performances of LER during alert state). It is therefore likely (given the CBA results) that the system security will be ensured with an increase of the overall procured FCR. The results under consultation are indeed aimed at reducing the potential cost increase associated with such FCR increase as well as at investigating possible methodologies to establish a sharing of such increased costs.
4. TSOs did not consider the faster reaction time and higher accuracy in operation of storage units providing FCR, as well as the system's inertia.
   According to Art.156(11) of SO GL, the purpose of the study is to assess the energetic effect of LER in the FCR provision and not to provide a comprehensive cost benefit analysis of a specific LER technology (battery-based). The dynamic performances of battery-based LER are therefore not considered.

5. The CBA is a theoretical approach, with a lot of "simplified" assumptions. For instance, the fact that no improvement on the balancing of the system, due to ongoing work on the reduction of the occurrence of Long-Lasting or Deterministic Frequency Deviations, is taken into account.

6. The likelihood and duration of events of Long-Lasting unidirectional frequency deviation should be forward looking rather than based on historical records. These events considered in the CBA, are the most impacting elements leading to the possibility of LER exhaustion LL's. More generally, we call for the inclusion of the different measures implemented since the most relevant incidents in the different simulations of the CBA, especially defense services.

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The TSOs choice has been to base the whole study on the historical frequency trends rather than on assumptions on how the system will perform in the future. This approach is indeed what lies behind the approved methodology itself, based on the use of the past frequency trends. This represents a conservative approach, since the assumptions on future are clearly characterized by a certain level of uncertainty.
Of course, it could be questioned whether such kind of events could occur once again in the future, given the improvements in the system which have been implemented in the last years.
The event occurred on the CE system on 8th January 2021 is an example of the fact that events deemed as not likely anymore are still possible, despite all the measures put in place in order to avoid them. A rough estimation of the frequency deviation experienced by the south-east part of the system has shown that LER (even with 30') would have depleted.

Furthermore, defense measures are not considered due to the fact that they would be triggered in emergency state.

7. The CBA should not be based only on the cost of the FCR procurement. Indeed, the TSOs overlook other externalities of LER development for the system. CBA should also consider assets' costs including existing LERs, investments, upgrades etc. One could also consider covering the worsening of the frequency deviations during LLs by dedicated services (activated a priori for a limited amount of time), rather than by increasing the total amount of FCR required. The relevant cost for the system would then be the procurement of this specific service.
   CBA considers all the relevant costs for the system for the procurement of FCR, it should be better pointed out which externalities to consider and how to monetize or include them in the methodology. Additional costs for the system for adopting a longer time period are already considered in the CBA, as the reduced volumes of existing LER with a shorter time period must be compensated by other providers.

Recommendations/prerequisite prior to considering a Tmin extension:

Eurelectric considers that more appropriate measures should be taken to act on the root causes of imbalances and their effects simulated in the CBA by the TSOs prior to considering Tmin extension:

1. The measures aiming at reducing the occurrence and the duration of the LL's may show to be effective also in the intervals at which LER exhaustion takes place, or reduce the occurrence of LL and thus reduce the probability of LER's depletion. It is in our view necessary to coordinate these measures, as well as those designed in line with the REX of network incidents. We would also like to stress that LER participation does not impact the number of occurrences of LLs, which ensue mainly from malfunctions of other mechanisms like FRR or errors in measurements or schedules in automatic generation control.

   TSOs acknowledge your proposal in terms of priority between the assessment of further countermeasures against LLs and the decision on TminLER = 30 min.
   The proposal of TSOs is instead to exploit the possibility re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
   TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental

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power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
From these reasons stems the proposal not to keep 15 minutes waiting for the assessment of the effectiveness of further LLs countermeasures.

2. Effective countermeasures to solve the problems related to the FRR misbehaviors should be put in place. FRR dimensioning rules should duly consider such misbehaviors to prevent them. In this respect, the publication by the TSOs of detailed information about these malfunctions and the countermeasures considered would be much appreciated.
The issue with FRP is nor about quantity or providers' reliability. It's instead about technical issue on how a complex process like FRP in a wide and structured synchronous area such as CE is technically implemented (real time operation and multiple TSOs coordination). Therefore, it cannot be resolved by increasing procured FRR.

3. Moreover, other measures may be adopted to address these issues. For example, we expect that putting in place the appropriate actions to reduce the occurrence and amplitude of Deterministic Frequency Deviations will reduce the associated activation of FCR.
The impact of DFD on the potential LER depletion is very limited, as revealed by the results of the CBA shared in February 2020. This is due to the fact DFD are limited in time, despite entailing potentially high frequency deviation. Their energetic content id therefore limited.
4. The establishment of the European-wide balancing platforms (PICASSO and MARI projects), the harmonization and the reduction of the Full Activation Time (FAT) of standard aFRR energy bids and the harmonization of imbalance settlement periods (ISP) to 15 minutes should be considered, as well as any other measure aiming at system balancing and operational security.
Please refer to the reply to the previous comment 2.
5. TSOs could consider additional emergency measures for the alert state for example in case frequency falls below 49.8 Hz. These measures are helpful in case of Long-Lasting frequency deviation and thus be considered in the CBA. In normal state, FCR only needs to be activated for less than 15 minutes, as it is replaced afterwards by FRR activation. However, LER-FCR providers always have to be able to provide 30 minutes, as the alert state can be announced at any moment. This seems to be an inefficient approach. Instead TSOs should consider to implement dedicated measures for the alert state. It is also necessary to coordinate and harmonize these measures. Nowadays, different approaches are followed to a different extent, so we recommend further analysis on this matter because such absence of harmonization is questionable, as the relative contribution of each TSO to frequency support should be equivalent. It is relevant that one of the elements that need to be considered before considering extension of the Tmin for LER-FCR providers.
Additional measures activated for the emergency state should not be considered for the normal and alert state.
In any case, the problem with LL is not about the availability of enough regulating capacity. Theoretically, a LL can be easily solved by dispatching traditional units (i.e., mFRR). The amount of dispatchable resource at CE level is huge if compared to the power imbalance related to a long-lasting frequency event. The problem is that such an event occurs not due to a shortage of regulating capacity, but due to some kind of malfunctioning in the FRP. The time needed to identify the potential issue and to solve it has shown to be way longer than 15 minutes. Only understanding the issue, it would be possible to identify the affected area(s) and operate the proper dispatching (either by mFRR, FRR or RES curtailment).

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6. The analysis conducted by TSOs focuses on the future security of supply but is based on the generation fleet currently available. It thus disregards phase-out plans, age-related dismantling, the build out of RES-E generation and additional investments in flexible capacity over the coming years. In order to make the European energy transition possible, today's changes should be set as future-proof as possible so that investments do not face unnecessarily high regulatory risk. All the measures that have been implemented to prevent the most relevant frequency events occurred in the past should be considered

   For what regard the nonLER provision, the analyses are based on the current fleet. The conventional generation phase out could indeed have an impact on FCR prices.
   The choice to base the study on the current conditions (and on the past data, for what regards the frequency deviation statistics) has been undertaken in defining the CBA methodology, approved by NRAs. The limits associated with this choice (as those correctly highlighted in the comment) have been mitigated with the possibility – expressly provided for by the approved methodology – to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the cost benefit analysis will significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
   TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side, even during a radical transitional period such as the one expected in the next decade.
   For these reasons the choice to foresee the possibility of an update of Time Period has been adopted in the methodology in the first place.

Comments on the proposed Derating Factor (DF) scheme

The assumptions for DFs calculation shall be as accurate as possible. For example, a wrong estimation of the FCR marginal prices may lead to the wrong estimation of the amount of LER in the FCR provision. We note that it would be easy to mitigate the effects of overestimated DFs, since the probabilistic dimensioning of FCR would always grant that the respect of the criterion for the acceptability level of frequency worsening. However, since the reserve capacity for FCR required for the synchronous area shall cover at least the reference incident, nothing will mitigate the cost-inefficiency of underestimated DFs. The DFs calculation methodology described by the TSOs does not share the increased costs amongst all the involved parts, it only makes FCR providers bear them all (including, for example, those due to the increase of LL occurrence for which LER are not responsible). Complying with a longer Tmin for existing entities would imply extra-costs (upgrade, qualification…). Such costs should be considered as an increased cost to be shared amongst all the involved parts in the DF model. In addition, the DFs shall reflect not only the increase of procurement costs due to FCR volume increase but also the fact that LER penetration into the market tends to lower the FCR marginal price. A too low DF may lead to the reduction of the submitted FCR capacity, which may be far lower than the prequalified value, and to the increase of the FCR cost borne by the TSOs (and thus by the consumers).

We suggest applying the following principles to DFs calculation methodology:

a) In the model presented in the report, LER will contribute in the same proportion to FCR provision as non-LER during a vast majority of the time but will always have a diminished remuneration. The

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DFs should guarantee a sufficient remuneration, which reflect their real contribution. One could for example consider increasing ex-post the calculated DFs in a linear way.

b) If no DF is applied to LER30 (as deemed acceptable in the TSOs' proposal), then the minimum DF for LER15 should be set at 0.5.

Besides, the implementation of DFs should be harmonized as much as possible through the whole CE synchronous area, to ensure a level-playing field across LFC blocks. Therefore, TSOs should use the same methodology to calculate DFs. The FCR dimensioning and the DF recalculations should take place on a regular basis and at least at any notable change of the expected LER share in the FCR provision. They should be carried out by TSOs in a transparent and harmonized way."

As previously stated, the adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

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Saft

Michael Lippert (Michael.lippert@saftbatteries.com)

"Saft, a France-based developer and manufacturer of advanced battery systems for the industry and long-standing player of the Energy-Storage -Systems (ESS) community in Europe has played and active role in implementing battery based ESS in Europe and worldwide, supporting the integration of renewable energy sources to the electricity system at all levels of the electricity value chain, and thus contributing to reducing the carbon intensity of our energy system.

Since 2012, we have contracted and supplied multiple ESS systems around the world providing frequency regulation services in multiple forms, including systems operating under current FCR rules applicable in Europe.

Saft welcomes the efforts of ENTSO-E and all TSOs in the CE and Nordic synchronous area to determine a time period required for frequency containment reserve (FCR) providing units or groups with limited energy reservoirs (LER) to remain available during alert state, in accordance with Article 156(11) of SO GL, and we support ENTSO-E's general objective to ensure the security of supply in Europe. In the same time, a future common policy on system security needs to take into account economic factors, i.e. the cost for the entire community as well as aspects of market dynamics and legitimate interests of investors and operators.

MINIMUM PERIOD FOR ACTIVATION

Threat of system not justified: Concerning the requirement described in article 156 (11) of the System Operation Guideline (SO GL), we considering there is a lack of convincing justification of threat to system safety (provided neither during the development and adoption phases of SOGL and up to now). The CBA, introduced in comitology precisely because of this lack of justification, has therefore to be carried out properly, the methodology and assumptions being in compliance with SOGL provisions (for instance, any simulation of energy depletion of LER should duly consider the alert state triggering in full compliance with SO GL), taking into account all positive and negative contributions of LER and justifying system needs.

No burden on FCR to address aFRR issues: We oppose the introduction of new conditions for FCR that could limit the development of LERs, in order to address structural issues caused by other products (aFRR) or phenomenon. Likewise, we do not approve the possible introduction of a derating factor, which would not only be difficult to implement, but also create undue market distortions by discriminating market players with a proven ability to provide the contracted service, and as a consequence would further weaken the business cases without major reason.
We recommend to thoroughly re-investigate the current plan and solutions sought to overcome technical issues and structural constraints, before implementing further conditions on FCR limiting the participation of some market participants.

Therefore, Saft asks for a new analysis, based on a methodology compliant with SO GL requirements and taking into account updated economical and technical data for both LER and networks, as well as benefits brought by LER. In the meantime, we pledge for maintaining a Tmin at 15 min.

TSOs acknowledge your position.

CONSIDERATIONS CONCERNING THE DIFFERENT OPTIONS presented by ENTSO-E

Nonwithstanding the above, we would like to express the following comments concerning the different options elaborated.

Generally speaking, we believe that the following principles shall be taken into account when considering an evolution in FCR requirements:

1. Preserving the existing business cases for LER installations providing FCR, including those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before any change comes into force. It is therefore essential for these installations that they should be excluded from the proposed mechanism, without any change in the remuneration conditions which are currently applied to them.
   Regulatory insecurity would not be acceptable since existing LER providing FCR have proven beneficial on a system perspective both in terms of technical performance and in terms of global cost, and should not be threatened by a change in FCR requirements or remuneration.
   Regarding in particular projects engaged through public tenders, the continuity in remuneration scheme must be guaranteed until the end of the engagement period : in the case of France, at least until end of 2028 for the AOLT i.e. "long term call for tender" submitted by RTE).
   TSOs acknowledge this position/suggestion on the interim period duration, which will be defined also in the light of the stakeholders' feedback. Its final duration will be decided together with NRAs and will not be less than 24 months (starting from the entry into force of the present regulation). LER prequalified before the interim period end will be exempted from the 30 minutes requirement, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

2. Provide medium-term visibility, in order to reassure investors and decision-makers. The Derating Factor scheme elaborated by ENTSOE does not provide sufficient visibility and the figures provided would lead to unacceptable cuts of remuneration for LER. A potential DF should necessarily be limited by sensible caps compatible with sustainable investments.
   The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

3. Maintain sufficient leeway to correct an unsatisfactory situation if necessary and provide a Tmin mechanism in a timely manner that satisfies all parties. In that respect, settting a Tmin at 30 min now would represent a point of no return, that would not allow to re-evaluate the situation by a new analysis.

   The CBA approved methodology expressly provided for the possibility to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology). The possibility to re-evaluate the situation is therefore a realistic possibility.
   TSOs are aware of the critical issues for investors of an approach in which the Time Period could potentially be further updated. It should however be considered that the FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system. The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.

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Considering TSOs study results, the 30 minutes choice appears to be the most suitable solution to deal with the current situation according to the aforementioned needs.
Also the choice of 15 minutes (which in any case need to be addressed with an increase of procured FCR) could equally represents a point of no return since in this way always more LER with 15 minutes would be installed in the system with always greater difficulties to later increase the requirement.

Regarding the options studied by all CE TSO, the following comments can be put forward :

- Options A and B:
  The introduction of a derating factor (DF) cannot be accepted without complying with the aforementioned requirements as well as several other conditions:
  - No change for the existing LER installations providing FCR, including those that have already filed for a connection agreement or those for which a final and binding contract for the purchase of the main component has already been concluded before any change comes into force.
    As previously stated, the duration and of interim period is not yet defined (even though will not be shorter than 24 months). The interim period will ensure the permanent exemption to all LER prequalified before its end.
  - For future LER installations, no DF should be applied to LER30 since they would provide the required service.
    In addition, a potential DF scheme needs to be agreed with stakeholders and regulators to set up a full and unbiased list of relevant parameters, including, e.g. speed of response which counts among the benefits of most LER's. Assessment against such parameters shall take into account real world practices, including the positive effects of energy management, the reality of Energy to Power ratios which are higher than theoretical minima, etc The DF curve needs to be reviewed since it does not take into account the positive externalities LER FCR providers bring to the system.
    The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.
    TSOs acknowledge your observation on the "positive externalities LER FCR providers bring to the system" and their importance in a "pay on performance" scheme.

- Options C and D
  Both options are not acceptable, as there is no convincing demonstration of the stringent need and effectiveness of setting Tmin to 30min, and because of the competitive distortions it would create towards new entrants. It would not only destabilize the current market for LER and - depending on the transition rules and timing adopted – threaten projects currently underway, but it would also impact negatively the attractiveness of this market on the medium and long term, which would in return be detrimental to the global target of reducing the carbon intensity of our electricity system.
  The choice on an exempting, long-lasting interim period (not shorter than 24 months) is aimed at safeguarding the existing and underway LER business cases and to ensure the maximum possible stability of the regulatory framework. LER prequalified after the end of the interim period will be subject to the 30 minutes requirement, with the partial exception of the LER already prequalified for more than 15 minutes: these LER are requested to provide their maximum activation in order to achieve the best results in terms of operational security without the need of any refurbishment.

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It should be stressed that the CBA is not aimed at maximizing the LER presence in the FCR procurement, but to ensure the FCR service maximizing the social welfare and minimizing the risk for system stability.

In conclusion, Saft believes that none of the options proposed by ENTSOE can be accepted without respecting the criteria set out above and urges ENTSO-E to continue the analysis taking into account the observations formulated by the different stakeholders.

We believe the preliminary choice of option D needs to be reconsidered as it does not ensure the preservation of the LER15 capacities for the provision of FCR services nor a proper cost sharing. The concertation should be maintained with all stakeholders, including project leaders, in order to lead a new analysis compliant with SOGL requirements without being constrained by an irremediable change such as a Tmin fixed at 30min. In any case the dynamic of development of LER, and in particular storage who has proven its technical performance and its ability to compete in this market, should not be threatened by undue restrictive remuneration conditions, and existing business cases should be guaranteed during their payback period."

TSOs acknowledge your position.

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Compagnie Nationale du Rhône (CNR)

MONTBROUSSOUS Christophe (c.montbroussous@cnr.tm.fr)

CNR 12/09/2021

A-INTRODUCTION

CNR thanks ENTSO-E for its complementary analysis and for this public consultation ""All Continental Europe TSOs' proposal for the definition of a minimum activation time period required for LER to remain available during alert state in accordance with Article 156(11) of the SO GL(xxxx2021)"" allowing to express their views on this further analysis.
CNR has previously contributed to the consultations on this subject, which is a high-stakes issue in terms of:

- consistency with the architecture of the electrical system and its current and future evolution; coordination work between TSOs aimed at implementing actions to avoid certain past system failures; proper sizing; the interweaving of the various services
- the future of existing facilities (which have also recently been subject to new FCR overspecification obligations),

B-RESUME:

CNR disagrees with some of the sets of assumptions, limitations, elements of analysis, in the latest ENTSOE document. These lead to proposals and comments that, presented as is and at this stage, cannot be acceptable given the stakes and the evolution of the system underway.
CNR is therefore opposed to changes as they stand, and requests that the 15-minute time limit be maintained without the constraint of downgrading.

CNR expresses below its remarks and requests (on the results, analysis and assumptions) and its comments (in particular on the proposed option, the interim period, the Derating Factor and the regulatory obligation) so that they can be taken into account by ENTSOE and the regulators in the evolution of the studies. Thank you in advance.

C-REMARKS AND CNR REQUESTS REGARDING THE RESULTS, THE ANALYSIS, THE HYPOTHESES:

Among the detailed comments and requests described below:

- Some of them have already been expressed by the stakeholders during the contributions and in webinars. We ask that ENTSOE formalize for a better transparency and understanding the way they have been (or will be) taken into account or not taken into account while identifying the possible impact on the results.
- CNR expressed the reasons why it did not consider the finalization of the study and proposals to be acceptable as it stood. In particular, these are the issues of:
    - the real contribution of FCR LER assets;
    - the failure to take into account the implementation of actions on the system as a whole and current and future developments for the correction and non-aggravation of the frequency (the cause of which does not come from the FCR assets (LER or non-LER))
    - and de facto of the theoretical depletion of the LER not correctly evaluated

C1) Consideration of the adjustment of FCR assets in a continuous and dynamic way

- Both LERs and non-LERs participate continuously and upstream of the alert state. Therefore, the adjustment is already operating before the alert is declared. Are the dynamics and inertia of the adjustment well taken into account upstream?
- Are the fast dynamics of FCR assets and the electromechanical inertia for synchronous machines (LER or non-LER) taken into account?
  Nor inertia or dynamics of both LER and nonLER are considered. Their effect is neglected since they have a very limited impact on the long-term evolution of the frequency during a long-lasting frequency event. Their effect is limited to transients, while the analyses are aimed at understanding the effects in terms of energy (integral).
  The whole study is based on steady-state frequency (1-minute sample rate): whatever occurs on faster dynamics (either positive or negative in terms of system safety) is neglected.

C2) Imbrication of the different services and evolution of the power system

- Frequency maintenance is part of a very fast sequence of services of which FCR is the first one: FCR then FRR (aFRR, mFRR, RR). The aFRR also starts with a response in a few seconds, the mFRR must be cleared in full in less than 13-15min and obviously starts upstream. How is this taken into account?
  The model implements a simplified FRR activation with FAT in line with the current parameters. For the sake of the results however, the main contributing factors are the so-called long-lasting frequency deviations. Such frequency trends are derived from real historical data and their trend inherently contains information on the whole LFC scheme as it actually worked during the real operation. During such event the FRR did not activate as expected, leading the frequency to remain far from 50 Hz for a period longer than Time To Restore Frequency.
- Have services such as interruptibility which reacts in a few seconds automatically on frequency threshold (well below 200mHz) been taken into account?
  Whatever measure activated in emergency state has not been considered since the whole study has the purpose to find system configuration avoiding the emergency state trigger (i.e., the trigger of emergency state due to a LER depletion has been considered a non-acceptable condition.
- The evolutions on the FRR balancing platforms (aFRR, mFRR, RR) are in progress at the European level: harmonization, standardization, energy. The 15-minute balancing step will be implemented at the European level. Have these elements and improvements been taken into account?
  They're not considered. The long-lasting frequency events are due to some kind of FRP malfunctioning. FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs. Beyond the FRR providers activation, there are several other aspects contributing to a correct FRP implementation. These aspects are technical as well as organizational. For instance, important roles are played by real-time power exchange measurements. Also the real-time coordination of the neighboring areas for the Area Control Error is very important. Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side.
  For their design and purposes, new FRR balancing platforms are not expected to contribute in the mitigation of long-lasting frequency events: the FRR activation on such platforms is indeed driven by FRR demands provided by TSOs. If such demands are subject to technical failure/malfunctioning in how they are calculated in real time, the FRR activation operated on these platforms instead of at national level will not make a difference on LLs.

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- The problems of poor FRR behavior are factual and known to ENTSOE. What levers are and will be put in place? The FCR should not mitigate FRR or other problems at the hand of TSOs as it may be described in the study limits/assumptions of the document. This is not conceivable for CNR.
  TSOs are implementing new procedures and policies to promptly identify, counteract and resolve such conditions. As of today, however, these conditions cannot be identified and resolved within a suitable time frame, due to their inherently multiple potential causes. As a consequence, FCR can be requested to keep counteracting power imbalance for longer than 15 minutes.
  Whenever LFC would show improved performances in the next years (in terms of long-lasting frequency events), the FCR requirement could be reduced.

C3) Decorrelation of frequency increases and the only FCR solution to address them (FCR not being the cause)

a) The analysis and conclusions seem to lead to asking the FCR to correct frequency aggravations that are not within its scope. As you note, these are aFRR failures or phenomena poorly detected by the TSOs that allow the frequency to deteriorate at times and for which corrective actions are planned and must be planned outside the FCR. In this sense, it is not conceivable to ask the FCR to correct problems already identified and which are being corrected by other services. Otherwise, this would mean that a new correction service is being created, so the FCR assets would be forced to carry it out by regulation.
   We therefore ask:
   - That these elements be taken into account in the study
   - That these corrections expected from the FRR (aFRR, mFRR, RR) and the other corrections of coordination between TSOs, the evolutions of the 15 min balancing step and consequently the evolutions of flexibility and tools in the stabilization of the frequency be well implemented before any conclusion on the FCR

   FCR represents an extremely valuable resource for TSOs, thanks to its features (automatic and independent activation, wide distribution, reliability). It's a central pillar for TSOs to ensure the stability of the continental power system and represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). The central role of TSOs is to ensure such stability under any possible conditions and they are thus committed to always operate on the safe side.
   TSOs highlight moreover that SO GL explicitly provide for the possibility of a minimum activation time period above Time To Restore Frequency, Art.156 set indeed 30 minutes as the maximum possible TminLER. The possibility of a need of a full activation of FCR longer than Time To Restore Frequency derives from the special role played by FCR in the LFCR scheme.

b) If by frequency aggravation and study leading to the TminLER, one implies events >200mHz for a duration > 15min, we do not understand the occurrences and elements taken into account. Indeed, historically it seems to us that the events are very rare and that during these past events the FCR worked with the LER in place. The minimum guarantee for the FCR to maintain the MW200mHz for 15min in alert state, and even more so with a final dynamic of 30s for all assets since 1 year, has never shown a particular concern at FCR level. The FRR and other services starting in a few seconds and well before 200mHz and before the end of the 15min, we do not understand how such conclusions limited to the FCR can be made. It is hardly conceivable on the

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one hand to ignore the real occurrences of these events on the frequency and on the other hand not take into account at the other services.
Long-lasting events are not event having frequency >200 mHz, otherwise they would be emergency state. The alert state can be triggered if the steady state system frequency deviation continuously exceeds either:

- ±100 mHz for a time period longer than 5 minutes or
- ±50 mHz for a time period longer than 15 minutes

These conditions (especially the second) occurred several times in the period used by TSOs for the analyses (2008-2018). It means that it has occurred to have a frequency deviation exceeding ±50 mHz (even if only slightly) for tens of minutes.

c) We note that for many years, the assets that do FCR (and of course the LERs) have been increasingly solicited by the changes in frequency. These alerts were made by the actors more than 10 years ago. It is therefore a phenomenon for which the FCR is not the cause and on the contrary that it compensates for other problems as reported: FRR, flexibility, energy market, energy transition. It would not be normal to blame all the problems on the FCR to compensate for real causes coming from elsewhere and for which the FCR assets are subject to an increasingly high cost of solicitation.
TSOs are not blaming FCR providers (either LER or nonLER) for the frequency deviation events. TSOs have however the role to keep the system safe under any circumstances; FCR in this sense is not only one of the several products of the LFC scheme. It is indeed the last line of defense at the disposal of TSOs to contain power imbalances regardless of the original cause of them (plant/HVDV outages, FRR malfunctioning, etc.).
It's true that the identification of the origin of LLs and their mitigation is a task of the TSOs. They are indeed operating to implement actions for this end.
Under the current circumstances, the presence of LER however adds a layer of complexity to the system safety. The consulted study tries to address these issues.

C4) Long Duration (LL) frequency deviation not correlated to the FCR
As noted in §4 of the ENTSOE document, ENTSOE working groups have issued improvements to avoid LL. These improvements have not been taken into account in the assumptions of the study and yet in the theory of the study, they are inputs that impact the results and would reduce the ""LER exhaustion probability theory"".
Moreover, it is clear that these LL are indeed due to causes independent of the FCR and that it is through the improvement actions planned on these causes (independent of the FCR) that they will decrease. It thus seems to us dubious and unwarranted to make the FCR study responsible for correcting problems that are not of its making.
Please refer to the previous section for clarifications on LLs causes.

The CBA approved methodology expressly provided for the possibility to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).

To be noted: The average frequency for certain 30min steps had been shown, for several years, to be different from 50Hz, and the cause was not related to the FCR assets which performed their role well without exhaustion. The failure came from the FRRs, the system and the possible improvements coordinated between TSOs on the system as well as other elements for which we do not have all the information.

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C5) Decorrelation of the cause of the need to increase FCR sizing and the presence of LERs

As described in C3c) and also in the ENTSOE studies specialized on the subject, the evolution of the frequency is linked to other phenomena intrinsic to the electric system and not to the FCR, which on the contrary has been subjected to it in the first line for several years. So the subject of increasing the size of the FCR is another subject that must be treated as such and whose conclusions will surely be an increase regardless of the type of asset FCR LER or not. It seems to us therefore unwarranted to bring an important weight on the subject in relation to the LER by mixing hypothesis, causes, consequence.

The probabilistic dimensioning approach for FCR, according to Article 153 of SO GL is an ongoing process. It will in any case take into account also the energetic aspect of FCR (i.e., the performances of LER during alert state). It is therefore likely (given the CBA results) that the system security will be ensured with an increase of the overall procured FCR. The results under consultation are indeed aimed at reducing the potential cost increase associated with such FCR increase as well as at investigating possible methodologies to establish a sharing of such increased costs.

D-COMMENTS ON THE PROPOSED OPTION, THE INTERIM PERIOD, THE DERATING FACTOR, THE PRODUCER'S OBLIGATION TO DO

The remarks and requests made by CNR above lead us not to support, at this stage, the ENTSOE proposal. The ENTSOE proposal is by default very much centered in the obligation to treat the LERs as an imperative solution without having managed and implemented the different points at issue in the electrical system (excluding FCR) and taken into account these different hypotheses in the FCR study.
If despite this request, ENTSOE were to impose an option, CNR is against the implementation of the derating factor and against the application of the requirements to the existing LERs.

In the context of option D proposed by the TSOs and if it were to be imposed without taking into account the remarks of the stakeholders, CNR wishes to indicate that:

- ""the interim period"" should indeed exist and be for a period of several years (more than 3-4 years) from the adoption of the rules at the national level and be able to be concerted depending on the type of asset and their constraints. Indeed, for assets that can evolve the Tmin after the validation of a study and specific tests while degrading the MW, the adaptation sites require time in study - verification - analysis of the entire process and the possible adaptation of the performance / security / stability sets - validation - - availability of machines - deployments – certification TSO. It is reminded that we do not change an old synchronous machine performance as if we were taking an off-the-shelf automatism and under a simple closed environment context. It should be noted that these old installations have undergone recent work and are currently being finalized for dynamic performance FCR upgrades.
  An interim period of at least 24 months after the entry into force of the regulation is provided. All LER prequalified before the end of the interim period are permanently exempted from the 30 minutes requirement. Such exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

- The value of the FCR asset would be degraded with higher operating costs, higher stress costs compared to the MWFCR, with the reduction of the MWFCR capacity or the impossibility in

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specific cases to achieve it. In this context, CNR is asking for the abolition of the obligation for producers to carry out FCR, as for other players other than producers, and for the abolition of the calculation of obligatory requirements for FCR exchanges for these producers. It would be abnormal to impose a substantive regulatory change (degrading the possible quantity of MWFCR and its value) without at the same time modifying in coherence the whole of the regulation and the old obligations, whether for existing installations or future installations in the same field of assets.
It should be noted that formally this new FCR framework would not be the same service as before.
The presence of an obligation to provide FCR, where in place, is a local requirement and must thus be resolved at national level.
TSOs however acknowledge the mentioned issue.

As stated above, CNR is against the implementation of derating factors (DF).
In case of further analysis on the subject by ENTSOE, CNR specifies beyond the arguments of competition/market/increasing marginal cost of the asset/impact on costs and in relation to the previous CNR remarks (point C1) 3) 4) 5)) :

- The LER assets also continuously perform the adjustment. If a DF should be calculated, it should be studied according to the cases of occurrences when the frequency exceeds 200mHz for 15min continuously, i.e. very rarely and pessimistically once every 5 years representing a probability of 0.0006 in a day (1/(365days*5)), i.e. DF ~1. It would therefore be absolutely abnormal to degrade assets that continuously performs the adjustment like others with the same type of solicitation and constraint except at best once every 5 years in the example given. Moreover, in these rare cases of occurrence, the other balancing services also take over for non-LERs and the duration of the event is limited to less than 24 hours.
  The DF cannot be justified. For CNR, the implementation of a DF would undermine the equity between players in relation to the reality of the service. CNR asks for special attention on this issue.
- LLs are not due to the FCR and must be corrected by the FRRs and other means at the TSOs' disposal (see remarks C4)). It would therefore be abnormal for a DF to exist on FCR assets based on these LL assumptions."

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

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SMART GRID ENERGY

Philippe GAY (philippe.gay@smartgridenergy.com)

Quick introduction of SMART GRID ENERGY

Smart Grid Energy is a leading capacity aggregator, mainly focusing on providing ancillary services to the French TSO with dispatchable electric assets connected to the French transmission & distribution grids. Our asset portfolio represents 1,5 GW of active capacity, of which 15% are dedicated to FCR and aFRR, 40% to mFRR and 55% to RR. We remotely control a combination of generation assets (40%), demand-response assets (50%) and storage assets (10%).
We address FCR market needs with a balance of LER and non-LER.

SMART GRID ENERGY IS NOT IN FAVOR of the D scenario, as proposed by ENTSOE

As stated in our previous contribution in March 2020, our position was to keep 15' as TminLER, while limiting the LER share, this limit being dynamically fixed in order to minimize the FCR cost, while meeting the system safety requirements.
We also mentioned that, over the long term, the most effective solution to keep the FCR cost under control, would be a market-based solution, allowing a fair competition between non LER and LER 15'.

The possibility of a LER share explicit limitation has been ruled out by TSOs. Such limitation would be infeasible from the legal point of view as well for technical reasons. The introduction of a maximum LER quantity in an auction clearing algorithm would result in the procurement of two separate products (LER and nonLER) with potentially different clearing price. Only a comprehensive market in which both prices and quantities of LER and non LER arise as market results could deal with it (please refer to the Explanatory note, Section 7.b). The potential introduction of such a market has been assessed by TSOs, but it resulted to be infeasible on the short-medium term. The extremely wide procurement mechanisms currently in place in CE as well as the potential effects on FRP (e.g., on k-factors) make a market-based approach not practicable.

Among the 4 considered scenarios, we believe that option A would be the only long-term acceptable option. Keeping a stable framework is necessary in order to create conditions for a better decision-making process.

TSOs acknowledge your position.

Indeed, as this has been highlighted by a number of participants in the ENTSOE consultation in March 2020, the CBA methodology should be revised - and likely will be in the short future, at least on the LL question, choosing whether the system safety during such events should be supported by FCR or by aFRR and mFRR, the latter being obviously the less expensive solution over the long term.

The TSOs choice has been to base the whole study on the historical frequency trends rather than on assumptions on how the system will perform in the future. This approach is indeed what lies behind the approved methodology itself, based on the use of the past frequency trends. This represents a conservative approach, since the assumptions on future are clearly characterized by a certain level of uncertainty.

The CBA approved methodology expressly provided for the possibility to re-run the CBA (i.e., to redefine the minimum activation time period) whenever "the assumptions adopted in the CBA would significantly change after entering into force of the Time Period" (Art.9 of the Methodology).
The possibility to re-evaluate the situation is therefore a realistic possibility.

In addition, the current decision process is based on simulation models representing the past & present situation, and thus ignoring the impact of FCR additional properties, especially the implementation of reserve mode for LER. Taking into account reserve mode would have probably led to a different conclusion.

Additional properties for FCR foresee the possibility to introduce the so called "Reserve mode" for LER. LER switching to the "reserve mode" would request the regulation to counteract only minor, fast-fluctuating frequency deviation. The bulk regulation is expected to be taken over by FRR in order to avoid the full depletion of LER and to ensure a residual regulation capacity.
The "reserve mode", as explicitly defined by the approved regulation, shall be ensured "Besides ensuring that the energy reservoir is sufficient to continuously activate FCR in normal state and fully activate FCR in alert state for the time period pursuant to Article 156(9) of the SO Regulation".
It means that it cannot be considered as an extra energy/time margin in the case of a depletion, but rather as a way to ensure a limited regulating capacity from LER against small frequency fluctuations.
Furthermore, the "reserve mode" (which is applied to units prequalified for the first time after the entry into force of the regulation) relies on a process of shift of the regulating capacity from FCR to FRR. Whenever a long-lasting frequency deviation occurs, FRP is not working as expected, undermining the possibility of such a bumpless transfer of regulation.

Finally, we are convinced, based on our operational experience of LER and non LER FCR assets, that ENTSOE simulation results are not fully representative because the load conversion factor of LER 15' into LER 30' is far too optimistic : 1126 MW of LER 15' would not end into 796 MW LER 30', especially over the time, due to ageing of batteries. Hence, opting for a TminLER of 30' may have much higher consequences on FCR price than expected and predicted by the ENTSOE simulation model.

TSOs acknowledge your point. The presented figures have been however defined by means of a survey performed amongst TSOs.

SMART GRID ENERGY is willing to point out the long-term consequences of the D option

Due to the undergoing decarbonation process of the European electricity sector, TSOs have to face huge technical and structural challenges, in order to maintain the system safety with a completely different set of generation resources and highly volatile electricity usages, with less electro-intensive industry.

In order to support this transition process, grid ancillary services have also to move toward the next step, and quite obviously, LER will be the leading cost-effective and low-carbon technology for FCR.
For this reason, it is important that LER developers receive clear and stable signals for maintaining their willingness to invest in LER.

As stated above, we are convinced, that updating the CBA and the ENTSOE simulation model would lead to a different optimum situation, most likely with higher FCR needs, due to more short-term instability brought by renewable generation assets.

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Moving TminLER to 30' without being able to exclude the fact that over the next years TminLER of 15' will be the right option, as it has been recently evidenced in Germany, will create major instability, and potential competition issues.

ENTSOE points out the fact that implementing TminLER 30' will require a transition period for existing qualified resources with a TminLER 15'.
Based on our discussions with LER developers, this process means:

- a significant time and of course significant costs as well as technical challenges to retrofit installations
- a significant revenue loss for the developer, as sometimes retrofit is not technically possible.

This leads us to point out that this transition process for LER may end at a point in time where evidence of the necessity to move back to TminLER at 15' will be made.

A future need for transition towards 15' minutes is possible since the CBA methodology explicitly provides for a re-run of the study whenever its main assumptions change. Such a reduction from 30 to 15 depends however on several factors which are at the moment not fully foreseeable. The main impacting factors at the current state are the long-lasting frequency events. While it's true that TSOs are working to identify, contain and resolve these conditions, the evolution of the power system is highly uncertain precisely because of the mentioned completely different set of generation resources and highly volatile electricity usages, with less electro-intensive industry.
The choice of adopting 30 minutes is indeed to ensure the safety of the system in the next years in face of the rapid change in the power system will experience.
TSOs are aware however of all the issues which the adoption of a 30 minutes requirement will cause. The definition of the exempting interim period is indeed aimed at mitigating them. As a general approach, LER currently prequalified for 15 minutes could theoretically fulfill a longer requirement either increasing their reservoir capacity or – more easily – reducing the prequalified FCR under the same reservoir. The latter approach would entail a financial penalization for LER but could drastically reduce the mentioned technical burdens (e.g., retrofit).
In any case, the presence of the interim period with the exemption for all LER prequalified before its end ensure a zero impact on existing and underway LER business cases.

For all the above reasons, we strongly recommend:

1. to select option A, in order not to move in a wrong direction, with the risk of having to roll back on the short term to the TminLER current situation at 15'
2. to run as soon as possible a new CBA, in order to include all the acquired experience and knowledge of LER developers and operators, as well as updated assumptions on electricity generation & usages.

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TotalEnergies Renewables International

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"Object: ENTSO-E Consultation – TotalEnergies views

As part of the European strategy for the development of renewable electric energies in order to gradually replace the carbon sources of the energy mixes of the member countries of the European Union, TotalEnergies, in line with this policy, is developing, in various geographies, solar projects, wind turbines and energy storage.
As part of a pioneering approach in the development of utility-scale battery projects in Europe, TotalEnergies was awarded 103 MW of capacity by the French TSO RTE in 2020 in the context of the long-term Call for Tender, with the condition of valorizing these projects on ancillary services for 7 years in a row. Two lots were awarded, starting in 2021 or 2022 respectively.

TotalEnergies, as a key developer in the market, wants to underline the importance of keeping a positive signal and a clear and transparent regulatory dynamic in order to encourage the development of the sector.
For this, regulatory stability is essential, and the protection of pioneer investors is a condition required to support the market.

We welcome the need for a permanent watch and a continuous analysis of the infrastructure of the European network as well as its stability, considering the rapid changes in the current market to ensure its long-term security.

After an in-depth study of the documents submitted by ENTSO-E for public consultation, TotalEnergies wants to share its conclusions, considering that the methodology has been validated in previous workshops by the various TSOs involved.

1. ENTSO-E study:

FCR: TLER

In the current regulations, the FCR is a service of 15 minutes maximum, used to stop the frequency deviations and allow the aFRR to start up in order to restore the frequency to its nominal value, until the launch of the mFRR in the case of the most important deviations to balance the system in the long term.

In fact, given the structure of the reserves put in place nowadays, to consider that the frequency might not have returned to its nominal value beyond 15min is a shadow suggestion of an aFRR default rather than an FCR default.
Setting up a 30min stock obligation for LERs on the FCR is contradictory to the nature of the FCR reserve, as defined by European regulations.

It therefore seems that a structural hypothesis of the study considers a failure of the actors of the aFRR, not being able to provide the service engaged, with as a consequence a transfer of responsibilities on the actors of the primary reserve, by imposing an increase in the minimum activation time from 15min to 30min or by increasing the volume of the contracted FCR.

The main contributing factor to the need of longer TminLER are indeed long-lasting frequency deviations. These long-lasting frequency events are indeed due to some kind of FRP malfunctioning. FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs. Beyond the FRR providers activation, there are several other aspects contributing to a correct FRP implementation. These aspects are technical as well as organizational. For instance, important roles are played by real-time power exchange measurements. Also the real-time coordination of the neighboring areas for the Area Control Error is very important. Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side.

The transfer of these responsibilities will have a significant financial impact on the actors operating LERs on the FCR:

- in the case of a change in the activation time to 30min: the LERs already engaged today will have the choice between a drastic drop in their engaged power on the market or a very significant investment to increase their stock of available energy

- in the case of maintaining 15 min and increasing the size of the FCR: the players will see their income impacted by a derating factor transferring the cost of the increase in the FCR volume to compensate aFRR failures

Whatever the scenario, the outcomes appear unjustified and penalizing for players operating assets in accordance with the role and nature of the FCR.

The issue with existing installation with 15 minutes is addressed with the interim period. Existing and underway LER business cases are safeguarded since an exemption from the 30 minutes requirement is provided for the duration of the interim period (at least 24 months following the entry into force of the present regulation). The 30 minutes requirement will apply only to LER prequalified after the end of such interim period. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.
The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

As it stands, we are positioning ourselves to keep a minimum activation time of 15 mins for FCR.

aFRR : market opening and standartization

The aFRR market will be liberalized in Europe in the coming months in order to optimize costs but also to harmonize products and consequently make balancing more efficient.
The activation time (FAT) on the aFRR will notably be harmonized between the various participating countries and will even be, for some, reduced, as is the case in France, with a drop from 400 seconds to 300 seconds.
This harmonization is a major step forward to improve the relay passage between the service provided by the FCR and the aFRR and should help reduce the time to restore the frequency to its nominal value.
Thus, since the number of occurrences of long frequency deviation events tends to decrease, it seems even more unjustified to want to lengthen the duration of the alert status of the LERs on the FCR.

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This major breakthrough for the balancing of the European network is not considered in the current study and we are in favor of a revision of the assumptions taking into account the regulatory framework and its developments as a whole.

For their design and purposes, new FRR balancing platforms as well as the overall products' harmonization are not expected to contribute in the mitigation of long-lasting frequency events: the FRR activation on such platforms is indeed driven by FRR demands provided by TSOs. If such demands are subject to technical failure/malfunctioning in how they are calculated in real time, the FRR activation operated on these platforms instead of at national level will not make a difference on LLs.
Furthermore, also the improvements on FAT of aFRR are not expected to play a role in the mitigation of LLs since their causes are not due to a lack or a delay on aFRR activation but rather to a technical dysfunction on the activation request on TSOs side.

- Scope of the study

  The current study only takes into account one type of battery park: entirely at 15 min or entirely at 30 min and draws conclusions on the impact of these parks on the sizing of the FCR and the relative cost for TSOs.
  However, this situation is entirely fictitious because many installations at 15min or 30min are already in operation or will soon be on the basis of current regulations.
  In fact, we suggest evaluating the changes in the FCR regulations to be put in place given the existing situation rather than considering that the existing one will have to adapt to reach the fictitious framework of the study.
  It should be noted that all the existing installations have had their operating modes duly validated and certified by the TSOs in order to provide the FCR service.

  A LER could either ensure 15 minutes or 30 minutes of full activation in alert state (or a specific intermediate value). The analyses have been performed considering the two most extreme cases:
  - All existing LER providing 30 minutes (considering the FCR cut to installation currently having 15 minutes) + new LER with 30 minutes requirement;
  - All existing LER providing 15 minutes + new LER with 15 minutes requirement;

  These two cases reflect the possible evolution of LER as a 15- or 30-minutes requirement is set. Depending on the definition of TminLER, the existing LER would adapt their provision accordingly; the coexistence of 15- and 30-minutes LER depends on the different requirements currently applied at national level.

  We are positioning ourselves for a study that would not call into question facilities already certified or in the process of being certified.

- Economic impact on public finances

  We would also like to stress the importance of organizing working groups with market actors when drawing up conclusions on financial impact. This financial impact on public finances is an essential argument on which the proposed options (A,B,C,D) are based.
  Assumptions, methodology and analyzes must be presented and discussed in a transparent manner with market actors.

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TSOs acknowledge this position on the need of joined working group.
However, the final proposal to NRAs for a Time Period need to be presented to NRAs in accordance with the time schedule provided in SO GL (one year after last NRA approval of methodology). Furthermore, SO GL identifies the TSOs as the organizations responsible for performing the CBA and for formalizing a proposal towards NRAs on the TminLER issue.
NRAs will take a decision according to the TSOs documentation but also on the basis of all the comments received from involved stakeholders in this consultation, including market actors.

We are positioning ourselves for working groups with the relevant market players in order to be able to share the information and the methodology of the model in order to reach conclusions unconditionally accepted by all stakeholders.

2. Investors protection :

Network security is essential and unavoidable, and we would like to recall that we are not against regulatory changes.

We would like to recall that most of the revenues of the BESS business models developed in recent years are made up of 70% of revenues from the primary FCR service. These business models were developed in accordance with the regulations in force and cannot be put at risk by bearing the costs linked to the failure of the players present in the aFRR, as explain before.
The protection of market players is essential for its future development.
Without protection, unfavorable regulatory support signals send to pioneer renewable energy developers and the collapse of currently operating business models, would bring uncertainty to the medium and long term market.
This uncertainty would result in negative and immediate responses from the funders (banks, etc.) of these innovative projects, who are already reluctant to get involved in sectors that are evolving quickly and where the market risk is significant.
The application of a derating factor, in addition to having a significant negative impact on remuneration, will create a cumbersome administration for its implementation and application.

The aforementioned interim period following the entry into force of the regulation will ensure that existing and underway LER projects are protected by the exemption. The duration of the interim period (not less than 24 months) will ensure that all business cases are safeguarded.

In all cases, we position ourselves:

- against the application of a derating factor
- for unconditional protection of business models in operation or under development
- for European regulatory support giving the renewable energy sector confidence in the future of its investments.

3. Options A,B, C ou D

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For the reasons expressed above, we position ourselves against the various options proposed (A, B, C or D), which would significantly destabilize the current LER market which, in addition to putting projects under way at risk in the short term, would greatly reduce its attractiveness in the medium and long term.

4. Conclusion

In conclusion, we call on ENTSO-E to review their current position having concluded to an application of a regulatory change seeing the minimum activation time for the FCR go from 15 minutes to 30 minutes without condition, with an undefined period of adaptation for existing LERs.

This position is not in line with the current market dynamics, nor the ambitions of the European Union to support LERs allowing support for the decarbonization of the energy mix.
We ask that future regulations take into consideration the benefits that LERs can bring to the network and integrate them into these changes.

TSOs acknowledge your position.

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Uniper

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We thank you for the opportunity to comment. We prefer option A as the barriers to market entry should be kept as low as possible.

TSOs acknowledge your position.

RES SAS

Clément Girard (clement.girard@res-group.com)

RES thanks ENTSO-E for this consultation and the efforts to define new rules which are suitable to all actors of the CE FCR market. As a developer of large energy storage systems, it is very important for RES to get visibility on the future evolution of the market rules in order to properly size the assets of on-going development projects and to secure fundings for their construction.

Although we understand this is not the objective of the present consultation, we would like to remind ENTSO-E that RES, like many other actors, question the methodology which was used to evaluate the impact of LER on the stability of the network. We believe that several flaws in the methodology conducted to a very pessimistic view on the risks linked to a high penetration of LERs with 15 minutes minimum activation time period available during alert state, and that more realistic assumptions would probably have resulted to other conclusions.

Having said that, RES analyzed the various options which were presented to votes to the TSOs of the CE platform and would like to share the following remarks.

1. Option B without any derating factor is according to us the option which should have been chosen should the CBA methodology be based on more relevant assumptions. Indeed we do not believe that a high share of LERs with 15 minutes activation time period during alert state implies a need to increase significantly the volume of FCR market, so it should be the most economical option for all actors and for the CE community.
   According to the results (under all the assumptions of the study), there is indeed a dependency between LER share and need for FCR increase. TminLER = 15 minutes significantly exacerbates such dependency.

2. The most important thing for the storage developers is to get visibility on the revenues they can get when participating to the FCR market. In an already volatile market, introducing a derating factor scheme would bring more uncertainty to the business models, unless the scheme is clearly defined from the very beginning, with agreed frames and caps regarding possible evolutions to address potential unbalance in the market.

3. In the case of options A, B and C, it is very important for RES to have the possibility to avoid the derating factor scheme as it might prevent the developers from convincing investors to fund the projects, due to a lack of visibility on revenues. As a consequence, we strongly recommend that in any chosen option, LER assets who would demonstrate a capability to remain available during alert state for 30 minutes would not be applied a derating factor and would get the same revenues that non-LER assets.

   The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

We hope that CE TSOs will reconsider the preliminary choice of option D, basing their judgement on more relevant assumptions, and that bringing visibility on market revenues to storage developers will be a key element when defining the final solution for harmonization of the market rules. Of course we stay

available should the CE TSOs want to deepen some of the ideas and opinions we describe in this document.

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Ifiec Europe

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IFIEC Europe refers to the proposal and the attached technical report as basis for the proposal. The proposal for a Time Period shall be considered as the common proposal of all Continental Europe TSOs in accordance with Article 156(11) of the SO Regulation.

IFIEC Europe supports all parameters that contribute to market integration. This involves maximizing European welfare with respect to economic efficiency. A key assumption for the European power intensive industry is competitive power prices and grid tariffs, a basis for global competitiveness. The objectives of the system operation regulation are safeguarding operational security, frequency quality and the efficient use of the interconnected system and resources.

According to the technical reports, the main result of the CBA performed in 2020 and the following further investigations which TSOs have carried out, it seems a fact that the LER presence in the FCR provision represents an important aspect to be considered for ensuring the safety of the CE system.

These considerations have lead the TSOs to the conclusion that the proposal of a minimum activation time period required LER to remain available during alert state shall be backed by a proposal for a way to deal with LER with the aim to keep the system at acceptable safety conditions.

The system safety shall then duly take into consideration LER presence in FCR provision, and also the foreseeable need of FCR increase, with a consequent cost increase. To set TminLER = 30 minutes has been considered as the most suitable way to limit such cost increase and simultaneously support operational aspects.

IFIEC Europe takes note of the conclusions in the technical report and underlines that the TSOs are in charge of ensuring the power system safety while minimizing the costs."

TSOs acknowledge your contribution.

Energy Storage System Asscociation (BVES)

Markus Rosenthal (m.rosenthal@bves.de)

"Comments on the ""Proposal of the Continental European TSOs to define a minimum activation time required for FCR units or groups with limited energy reserves to remain available during the alert state pursuant to Article 156(11) of Commission Regulation (EU) 2017/1485"" and the related explanatory document.

Summary

The Energy Storage System Association (BVES) opposes the proposal to introduce a 30-minute minimum activation time for limited energy resources (LER).
The discussion on minimum activation time has been going on for several years. According to all the results achieved therein, a minimum activation time of 30 minutes is not necessary with regard to system security. This was most recently explained in detail and convincingly by the Federal Network Agency in its decision BK6-17-234 of [2.5.19] (Annex). The added value of a minimum activation time of 30 minutes determined by ENTSO-E in the cost-benefit analysis is hypothetical. The costs associated with this would lead to an unnecessary increase in market prices and create disincentives for future investments that are necessary for the decarbonization of our energy system. Excessive requirements for the substitution of conventional power plants should be rejected if the proof of technical necessity is lacking. This is the case here.
BVES rejects retrospective technical discrimination - including through possible additional regulations in the case of 15-minute minimum activation times of the TSOs - as it could have a market-distorting effect. Uniform, transparent, equal and reliable rules for all technical installations are highly relevant for all market participants and especially for the further development of battery storage as an essential power provider in the future energy system.

TSOs acknowledge your position.

No evidence given for the necessity of a minimum activation period of 30 minutes

Irrespective of the fact that already the methodology of the cost-benefit analysis is or was to be doubted, the BVES also considers the conclusions that ENTSO-E draws from the analysis to be biased and neither compelling nor applicable.
The assumption by grid operators that system costs will increase dramatically due to a higher share of LER are speculative as neither a transparent financial modelling method has been presented nor arguments which are supporting the case. In recent years, an increasing share of LER has led to decreasing spending by TSOs in the FCR market. Why this effect should reverse, as assumed in the analysis, is not conclusively stated.
The presented cost increase is due to the increase of overall need of FCR as a consequence of LER presence and current frequency deviation. It's not a direct effect of LEr on FCR prices.
Rather, the result of the analysis shows a high level of additional costs for LER operators in the case of setting a minimum activation period of 30 minutes. However, this additional cost could only be justified if it were offset by a significant increase in actual system reliability. BVES is convinced that this is not the case.
TSOs are convinced that is true the other way around: under the current frequency deviation, even with 30 minutes activation time period there could be the potential conditions where FCR should be increased.

Once again, it has not been demonstrated that a minimum activation period of 15 minutes would not have been sufficient to restore system safety in certain major safety-relevant events. In this respect, we refer to the decision of the Federal Network Agency of 9 May 2019, in which the request of the German transmission system operators to set a minimum activation period of 30 minutes was rejected with detailed argumentation after the transmission system operators failed to provide any evidence in which cases such a long minimum activation period would have been necessary after pertinent questions by the Federal Network Agency.

The assumptions regarding LER-FCR depletion and thus outage in the cost-benefit analysis (p. 8) are at least inaccurate. According to the modeling, LERs fail completely immediately after the minimum sustainment period expires. In practice, this would not be the case. In fact, there is usually reserve capacity in the cluster that can be used to extend service delivery in an emergency. In addition, many ""LER"" units hide prosumer households. This means that there could be charging and discharging capability behind the grid connection point and exhaustion of FCR power could be dynamically countered without legally extending the minimum power delivery period to 30 minutes.

The methodology adopted for the calculations consider the usage of an "equivalent energy reservoir" having a size equal to double the energy needed for FCR full activation lasting TminLER.
Since the starting equivalent State Of Charge is 50%, the energy available to cope with a long-lasting unidirectional frequency deviation is equal to FCR full activation lasting * TminLER.
This amount of energy is what is considered available to deal with a specific simulated event; the exhaustion of this amount of energy defines the "LER depletion" condition.
The energy usage occurs only if an alert state is triggered. It starts as the frequency starts to continuously exceed (±) 50 mHz in the framework of an event triggering the alert state.

The real size of reservoir of LER will be bigger than that, one reason are the needs associated with the energy management in normal state).
The extra energy associated with these needs cannot be considered as available in the framework of an event triggering the alert state. To consider its contribution would mean to rely on an energy margin the continuous retention of which is not legally binding for LER.

The adopted methodology is in line with Art.156(11) since it considers only the required energy for dealing with the alert state.

The current proposal of ENTSO-E does not provide any new information or evidence in this respect. The argumentation of the Federal Network Agency thus remains completely unrebutted. Possible failures of aFRR and mFRR are not an argument.
The current market design for reserve markets consists of three products in chronological order. FCR within 30 seconds, aFRR within 5 minutes, and mFRR within 13.5 and 15 minutes, respectively. With a sufficiently sized and functioning aFRR and mFRR market, a minimum activation time in the event of an alarm condition of 15 minutes must be sufficient for the FCR, as all subsequent products should be activated and replacing the FCR by that time. To the extent that there is concern that the aFRR or the mFRR will fail, this cannot be used as an argument to unnecessarily extend the minimum activation period of the FCR - at significant cost. It is then rather the task of the TSOs to ensure the correct fulfillment of the requirements in aFRR and mFRR. It is not the responsibility of LER FCR providers to hedge aFRR or mFRR outages.

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Possible failures of aFRR and mFRR are indeed an argument. The long-lasting frequency events (which heavily impact the study's outcomes) are due to some kind of FRP malfunctioning. FRP in a wide and structured synchronous area such as CE is an extremely complex process, operating in real time and entailing the coordination of multiple TSOs. Beyond the FRR providers activation, there are several other aspects contributing to a correct FRP implementation. These aspects are technical as well as organizational. For instance, important roles are played by real-time power exchange measurements. Also the real-time coordination of the neighboring areas for the Area Control Error is very important. Long-lasting frequency deviation (which are relatively small in amplitude) can stem from various limited malfunctioning of such complex process, often without implying problems on the FRR provider side.
The issue with FRP is nor about quantity or providers' reliability. Therefore, it cannot be resolved by increasing procured FRR.
For TSOs the FCR is an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Impact on existing LER is significant

Applying a minimum activation period of 30 minutes to existing LERs would significantly interfere with grandfathering and result in significant additional investment for a large number of LERs. In some cases, LERs could even be forced out of the market because it would not be technically feasible to retrofit them accordingly, or at least the costs incurred could not be recovered.
In addition, the revenues of operators of existing storage facilities decrease because a renewed prequalification based on the 30-minute period may result in less capacity being prequalified, depending on the storage configuration. The resulting shortfalls on the revenue side may mean that storage facilities can no longer be operated economically and are shut down. This can be illustrated with the example of a storage facility that was prequalified for the 15 min rule at 9 MW. If the 30 min rule applies, it is expected that the prequalification test would only result in a permanent capacity of 7 or 8 MW, i.e., accordingly only 7 or 8 MW could be offered in the FCR market (11% less capacity for 8 MW, 22% less capacity for 7 MW). Storage revenues would decrease by 11% and 22%, respectively, regardless of the market price. Again, existing products become uneconomical because the loss of revenue due to the lower output to be placed on the market is substantial.
Consequently, the result would be a decrease in bid volume, which in turn would lead to an increase in the price of FCR. However, this was not considered at all in the cost-benefit analysis.
The reduction of existing LER volume due to their shift from 15 to 30 minutes is considered (please refer to pg.15 of the Explanatory note).
In addition, it must be taken into account that there should be transparent and clear market-based criteria for the tenders. It must not become permissible for the network operators to change the tenders in such a way that they do not allow energy storage systems or force them out of the market if the 15-minute rule is retained.
It is also essential to accept that battery storage systems have already been built under different regulations for FCR. It is crucial that the renewed adjustments to the regulation should not burden existing investments.
The impacts outlined can only be avoided by exempting existing LERs from the proposal altogether. If the 30-minute period is retained, a sufficient transition period of at least ten years must be provided.

TSOs acknowledge the described issues associated with the 30 minutes requirement on the existing 15 minutes installation. An interim period is indeed provided to deal with the issue. LER prequalified before the end of the interim period (which will last at least 24 months after the entry into force of the present

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regulation) are exempted from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

Attachment 1: Statement of the German Federal Network Agency (BNetzA) on a minimum disconnection time of 30 minutes (BK6-17-234 dated 9 May 2019, https://www.bundesnetzagentur.de/DE/Beschlusskammern/1_GZ/BK6-GZ/2017/BK6-17-234/BK6-17-234_beschluss_vom_02_05_2019.html).

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As the trade union of French solar energy professionals, Enerplan is a major advocate of the development of flexibility solutions in the EU and its Member States. Battery storage, demand-side management and renewable production curtailment all contribute to the stability of the continental grid. As such, legislation, grid codes and other regulations must allow for these solutions to be connected and contribute to grid services markets, energy markets, as well as alert state resorption procedures.
Enerplan would like to take the opportunity of this consultation to discuss the ENTSO-E's hypothesis supporting the analysis. The feedback of French solar energy professionals contradicts the absence of contribution of 15-minute Limited-Energy Reservoirs (LERs) between 1000 and 2000 MW of participating capacity. This assumption deserves thorough justification and cross-checking which was not found in the explanatory note. Our association suggests the opening of a work group or task force dedicated to this subject, which will enable ENTSO-E to collect data and insight from market players which could then bring precisions, further details and eventually corrections to this assumption.

The reason of the absence of contribution of 15-minute Limited-Energy Reservoirs (LERs) between 1000 and 2000 MW can be justified as follows.
The simulated frequency deviation is derived from the input power imbalance assuming a certain MW/Hz curve representing the primary response behavior of the synchronous area.
Whenever a LER depletion is detected (i.e. the reservoir is completely full or completely empty), the system loses the regulation capacity of LER. The effect is a rescaling of the MW/Hz curve of the whole synchronous area since only non-LER are counteracting the power imbalance.
Comparing such condition with the normal operation (without LER depletion), this rescaling implies that - given the same power imbalance - the system will result in a wider simulated frequency deviation. An example of the comparison of simulated frequency deviation with and without LER depletion is provided in Figure 1 (provided merely for the sake of clarity).

During the interval of LER depletion (reservoir totally full) the loss of the regulating capacity of LER leads the simulated frequency deviation to higher values.
In order to counteract the same power imbalance, only non-LER are still operating. It means that the equilibrium is reached with higher frequency: the MW/Hz curve is indeed flattened.
Furthermore, by increasing the dimensioned value of FCR procured at synchronous area level, the MW/Hz changes. Since in CE the full activation of the procured FCR occurs at ±200 mHz, increase the procured FCR above the current value of 3000 MW allow to have reduced frequency deviation under the same power imbalance.
TSOs need to define a criterion to assess whether the frequency worsening is acceptable or not. TSOs have evaluated several criteria.
Regardless of the chosen criterion, once LER are depleted, the frequency deviation is determined only by the residual nonLER. This is the reason why the introduction of more LER in the system (keeping the same share of nonLER) has no impact on the frequency deviation quality as LER deplete: after the depletion only nonLER share matters.
However, a higher LER share in the system contributes to reduce the frequency deviation *before* the depletion occurs. The more FCR is present (either from LER or nonLER), the lesser the frequency deviation.

More FCR means indeed that the MW/Hz curve is steeper, and the frequency equilibrium is reached at lower frequency deviation, under the same power imbalance.
A reduced frequency deviation lead to a lesser usage of the energy reservoir of LER and, as a consequence, to a delayed depletion. Increasing delaying LER depletion end up in avoiding it altogether: the power imbalance ends before the depletion itself.
The latter condition is also the reason why, once a certain level of overall FCR is reached (e.g., 4800 MW with LER 15), even a LER share of 100% is acceptable: with that amount of FCR deployed at 200 mHz, the LER depletion are not present anymore, no matter how a power imbalance would last.

The historical Long-Lasting frequency Deviations (LLDs) on which the analysis is based are another factor which could be redefined by considering the input of market players. This historical data does not take into consideration the process evolutions of European TSOs since the mid-2000s. As of today, the Frequency Containment Reserve (FCR) is not designed to be activated for more than a few minutes. Beyond this short time frame, the Frequency Restoration Reserve (FRR) and the Replacement Reserve (RR) mechanisms take its place. As such, historical occurrences of FCR activations longer than 15 minutes cannot be interpreted as a requirement for FCR assets, but as the demonstration of a dysfunctional FRR, to be solved within the FRR framework.

As correctly observed, these results derive, for the greatest part, from the simulation of real frequency deviation events which occurred in the CE power systems during the interval under observation (2008-2018). The possibility to experience a LER depletion is thus based on real observations of the potential effects that LER could have had on the system during those past events, if LER were installed at the time such events occurred.

Of course, it could be questioned whether such kind of events could occur once again in the future, given the improvements in the system which have been implemented in the last years. In this sense, the TSOs choice has been however to base the whole study on the historical frequency trends rather than on assumptions on how the system will perform in the future. This approach is indeed what lies behind the approved methodology itself, based on the use of the past frequency trends. This represents a conservative approach, since the assumptions on future are clearly characterized by a certain level of uncertainty. The event occurred on the CE system on 8th January 2021 is an example of the fact even unlikely events - despite all the measures put in place in order to avoid them - are still possible. A rough estimation of the frequency deviation experienced by the south-east part of the system has shown that LER (even with 30') would have depleted.

The need for a minimum activation time period longer than the time to restore frequency (15 minutes) arises indeed from the fact that the FRP could experience malfunctioning which, as of today, cannot be identified and resolved within 15 minutes time frame.

If such a condition occurs (as it did in the past years), TSOs need to rely on FCR to keep the system in normal/alert state. Considering the possibility of LER depletion, a high LER share imply the need for an increased request of FCR. For TSOs the FCR is indeed an extremely valuable resource since it represents the last line of defense to keep the system out of an emergency state (with consequent load-shedding). For this reason, TSOs consider the use of FCR to cope with an occasional FRR malfunctioning as a proper measure.

Furthermore, the analysis must be edited in order to take into consideration the qualification procedures in Europe applicable to FCR assets. For instance, French assets must demonstrate that they are able to

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follow FCR activations continuously over a several-year historic, being then equivalent, thanks to state-of-charge management, to unlimited reservoirs. The system would indeed benefit from first aligning qualification procedures to the appropriate service quality level, instead of compensating these differences by financial penalties.

Qualification process are up to each TSOs and their harmonization is out of scope of the performed analyses. It's however questionable how such harmonization would impact the performances of LER in alert state. The possibility of operating an effective energy management in alert state would result in a virtual impossibility to have a LER depletion no matter of the frequency deviation (out of emergency state). Such possibility is not considered in the study since it's deemed as unlikely. The purpose of the study is not to dimension the LER reservoir but to quantify the most suitable duration of LER in alert state according to what is provided by SO GL.

The ENTSO-E's proposal requires all LER to warrant 30-minute continuous activation, provided a possible adaptation period for already-qualified assets. This requirement would be a major retroactive change to the business models of assets deployed and dimensioned to provide 15-minute activations and currently providing such services to European TSOs. More precisely, doubling the required energy capacity is roughly equivalent to dividing by two the power to be qualified, hence the asset revenues, hence the rate of return. Considering that most current debt-funded projects expect return rates on the 5-7% range, this additional requirement would basically result in projects being unable to meet their objectives and to go bankrupt.
Considering this implication, the Proposal would not only be in open contradiction with the European Union orientations to facilitate the development of assets reducing the carbon footprint of the electric system, but it would also annihilate on-going long-term regulatory frameworks, such as the long-term capacity tender in France.

TSOs acknowledge this position.
To avoid the retroactivity on both existing and underway business cases, an interim period of at least 24 months following the entry into force of the present regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of such interim period. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.
The exact interim period duration will be defined together with NRAs.

Another aspect of the ENTSO-E's proposal Enerplan disagrees with is the derating of the LER remuneration in order to ensure their financial contribution to the additional costs of FCR procurement. However, as proposed, the derating factor scheme merely forbids market access to most LER. This proposal is based on an unjustified asumption that LER assets degrade system safety, disregarding the positive externalities of many of these projects: faster and more reliable response, downward pressure on market price, development of grid flexibility, positive contribution to system carbon footprint. LER are then penalized for their limitation in extremely rare occasions, which are rather linked to secondary and tertiary reserves mechanisms dysfunctions, while their permanently positive contributions are ignored.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

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TSOs acknowledge your observation on the "positive externalities" and their importance in a "pay on performance" scheme.

As such, Enerplan proposes that the ENTSO-E's analysis and subsequent proposed scheme be revised by abiding by the following principles:

- no derating factor for 30-minute LER, as recommended by the Proposal, nor for assets already operated, funded, or contractually committed;
- progressive application, to ensure sufficient adaptation time for operators, as well as better consistency with market experience;
- limited application, to ensure a profitability level consistent with funding requirements and fair market access to new stakeholders;
- limited application, to account for significant positive externalities in market nominal operation.

TSOs acknowledge your position.

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UFE – UNION FRANCAISE DE L'ELECTRICITE

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UFE thanks ENTSO-E for the possibility to comment on Europe TSOs' proposal for the definition of a minimum activation time period required for frequency containment reserve (FCR) providing units or groups with limited energy reservoirs to remain available during alert state in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485 (SO GL).

UFE is in favour of maintaining the minimum activation period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state at 15min and not to prolong it to 30 min.

TSOs acknowledge your position.

Before considering changes to the Tmin, UFE recommends

i) further measures to look into other means of reducing the number of frequency deviations and
ii) carrying out a thorough analysis regarding the change of Tmin requirements, including the impact to the existing LER which already have a 15min requirement. Indeed with a prolongation of the activation time period to 30min, many existing LERs would become unadapted with multiple effects: putting in question the investment signals already carried out, and limiting the available LER reservoirs for answering system constraints.

In particular, UFE recommends looking into amending current provisions regarding LERs, by amending the relevant paragraph so that there is no more interim derogation for the Tmin at 30 minutes but rather for a permanent derogation for those existing LER.

TSOs acknowledge that one of the most problematic issue associated with the adoption of a 30 minutes requirement is indeed the risk related to retroactivity to already installed LER having 15-minutes.

To avoid the retroactivity on both existing and underway business cases, an interim period of at least 24 months following the entry into force of the present regulation is provided. The 30 minutes requirement will apply only to LER prequalified after the end of such interim period. LER prequalified before the end of such interim period are granted for a exemption from the 30 minutes requirement. This exemption has however an exception for existing LER currently being subject to a 15 minutes requirement, but which have been already qualified in the past for more than 15 minutes. These LER will be requested to provide their maximum prequalified Tmin in order to achieve the best results in terms of operational security without the need of any refurbishment.

The exact interim period duration will be defined together with NRAs.

Moreover, UFE highlights that the analysis around the derating factor should be further discussed, as putting in place a derating factor could have negative effects, such as reducing visibility for FCRs on potential income.

The adoption of Derating Factors has been ruled out by TSOs and will not be further considered. No remuneration reduction for LER is considered in the final proposal.

Finally, UFE recommends consulting the power sector at large on the methodology which led to proposing the 4 options presented in ENTSOE's consultation and engaging a discussion to optimise the review of the primary reserve, in particular regarding the provisions related to LERs.

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