energiavirasto
energimyndigheten

Tämä on Energiaviraston sähköisesti allekirjoittama asiakirja.		Asiakirjan päivämäärä on:	08.10.2021
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Esittelijä / Föredragande / Referendary

Nimi / Namn / Name:	Tarvo Siukola
Pvm / Datum / Date:	08.10.2021

Ratkaisija / Beslutsfattare / Decision-maker

Nimi / Namn / Name:	Simo Nurmi
Pvm / Datum / Date:	08.10.2021

Tämä asiakirja koostuu seuraavista osista:

- Kansilehti (tämä sivu)
- Alkuperäinen asiakirja tai alkuperäiset asiakirjat Allekirjoitettu asiakirja alkaa seuraavalta sivulta. >

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Fingrid Oyj
PL 503
00101 Helsinki

Fingrid Oyj:n ehdotus energiavarastojen lyhimmästä aktivointiajasta 25.3.2021

Päätös Fingrid Oyj:n ehdotukseen taajuuden vakautusreservien lyhimmästä aktivointiajasta

Asianosainen

Fingrid Oyj

Vireilletulo

14.4.2021

Ratkaisu

Energiavirasto vahvistaa Fingrid Oyj:n 25.3.2021 toimittaman ehdotuksen taajuuden vakautusreservien lyhimmästä aktivointiajasta.

Energiavirasto korvaa tällä päätöksellä Energiaviraston päätöksen (1834/433/2018) SO suuntaviivojen 156 artiklan 9 kohdan mukaisesta tilapäisesti sovellettavasta lyhimmästä aktivointiajasta.

Päätös on voimassa toistaiseksi.

Päätöstä on noudatettava muutoksenhausta huolimatta.

Selostus asiasta

Sähkön siirtoverkon käyttöä koskevista suuntaviivoista annetun Euroopan komission asetuksen (EU) 2017/1485 (jäljempänä myös SO suuntaviivat) 156 kohdan 10 mukaisesti Manner-Euroopan ja Pohjoismaiden synkronialueiden siirtoverkonhaltijoiden on laadittava ehdotus lyhimmästä aktivointiajasta, joka taajuuden vakautusreservien tarjoajien on varmistettava.

SO suuntaviivojen 156 artiklan 10 kohdan mukaisesti määritelty aika ei saa olla pidempi kuin 30 minuuttia tai lyhyempi kuin 15 minuuttia. Ehdotuksessa on otettava täysin huomioon 11 artiklan mukaisesti tehdyn kustannus-hyötyanalyysin tulokset. Energiavirasto on 16.4.2019 antamallaan päätöksellä (840/433/2018) vahvistanut kustannus-hyötyanalyysissä käytettävät oletukset ja menetelmät, joissa on määritelty muun muassa vaadittavan lyhimmän aktivointiajan laskentaperiaate.

SO suuntaviivojen 6 artiklan 3(d)(v) kohdan mukaiselle ehdotukselle, joka koskee pienintä aktivointiaikaa, joka taajuuden vakautusreservien tarjoajien on taattava, tarvitaan asianomaisen alueen kaikkien sääntelyviranomaisten hyväksyntä.

Pohjoismaisen synkronialueen siirtoverkonhaltijat toimittivat ehdotukset kansallisten sääntelyviranomaisten hyväksyttäväksi keväällä 2021. Viimeinen siirtoverkonhaltija toimitti ehdotuksensa 14.4.2021, joten asian katsotaan tulleen vireille tuolla päivämäärällä.

Energiaviraston toimivalta

Euroopan parlamentin ja neuvoston direktiivin 2009/72/EY 35 artiklan mukaan kunkin jäsenvaltion on nimettävä yksi kansallinen sääntelyviranomainen kansallisella tasolla.

Lain Energiavirastosta (870/2013) 1 §:n 2 momentin mukaan Energiavirasto hoitaa kansalliselle sääntelyviranomaiselle kuuluvat tehtävät, joista säädetään:

3) sähkön sisämarkkinoita koskevista yhteisistä säännöistä ja direktiivin 2003/54/EY kumoamisesta annetun Euroopan parlamentin ja neuvoston direktiivin 2009/72/EY, jäljempänä sähkömarkkinadirektiivi, nojalla annetuissa, suuntaviivoja koskevissa komission asetuksissa tai päätöksissä.

Asiaan liittyvä lainsäädäntö

Komission asetus (EU) 2017/1485 sähkön siirtoverkon käyttöä koskevista suuntaviivoista

SO suuntaviivojen 4 artiklan mukaan:

” 1. Tämän asetuksen tavoitteena on

a) määrittää yhteiset käyttövarmuutta koskevat vaatimukset ja periaatteet;

b) määrittää yhteiset yhteenliitetyn verkon käyttötoiminnan suunnittelun periaatteet;

c) määrittää yhteiset taajuudensäätöprosessit ja -rakenteet;

d) varmistaa olosuhteet, joissa käyttövarmuutta voidaan ylläpitää kaikkialla unionissa;

e) varmistaa olosuhteet, joissa kaikkien synkronialueiden taajuuden laatutasoa voidaan ylläpitää kaikkialla unionissa;

f) edistää verkon käyttöä ja käyttötoiminnan suunnittelua koskevaa koordinointia;

g) varmistaa siirtoverkon toimintaa koskevien tietojen läpinäkyvyys ja luotettavuus ja parantaa sitä;

h) edistää unionin sähkönsiirtoverkon ja sähköalan tehokasta toimintaa ja kehittämistä.

2. Jäsenvaltioiden, toimivaltaisten viranomaisten ja verkonhaltijoiden on tätä asetusta soveltaessaan

a) sovellettava suhteellisuuden ja syrjimättömyyden periaatteita;

b) varmistettava avoimuus;

c) sovellettava periaatetta, jonka mukaan suurin kokonaistehokkuus ja alhaisimmat kokonaiskustannukset optimoidaan kaikkien asianomaisten osapuolten kesken;

d) varmistettava, että siirtoverkonhaltijat hyödyntävät, niin pitkälti kuin mahdollista, markkinapohjaisia mekanismeja verkon käyttövarmuuden ja stabiilisuuden varmistamiseksi;

e) kunnioitettava paikalliselle siirtoverkonhaltijalle annettua vastuuta varmistaa käyttövarmuus, myös kansallisessa lainsäädännössä vaaditulla tavalla;

f) kuultava asianomaisia jakeluverkonhaltijoita ja otettava huomioon niiden järjestelmään mahdollisesti kohdistuvat vaikutukset; ja

g) otettava huomioon sovitut eurooppalaiset standardit ja tekniset spesifikaatiot.”

SO suuntaviivojen 5 artiklan mukaan:

” 1. Siirtoverkonhaltijoiden on laadittava tässä asetuksessa edellytetyt ehdot ja edellytykset tai menetelmät ja annettava ne toimivaltaisten sääntelyviranomaisten hyväksyttäviksi 6 artiklan 2 ja 3 kohdan mukaisesti tai jäsenvaltion nimeämän elimen hyväksyttäviksi 6 artiklan 4 kohdan mukaisesti tässä asetuksessa asetettuihin määräaikoihin mennessä.”

SO suuntaviivojen 6 artiklan mukaan:

” 3. Seuraavia ehtoja ja edellytyksiä tai menetelmiä koskeville ehdotuksille tarvitaan asianomaisen alueen kaikkien sääntelyviranomaisten hyväksyntä, josta jäsenvaltio voi antaa lausunnon asianomaiselle sääntelyviranomaiselle:

d) 118 artiklan mukaisiin synkronialueen käyttösopimuksiin sisältyvät menetelmät, ehdot ja arvot, jotka koskevat seuraavia näkökohtia:

v) Manner-Euroopan ja Pohjoismaiden synkronialueiden osalta 156 artiklan 10 kohdan mukainen pienin aktivointiaika, joka taajuuden vakautusreservien tarjoajien on taattava”

” 6. Ehtoja ja edellytyksiä tai menetelmiä koskevaan ehdotukseen on sisällyttävä ehdotettu täytäntöönpanoaikataulu ja kuvaus niiden odotetuista vaikutuksista tämän asetuksen tavoitteisiin. Ehtoja ja edellytyksiä tai menetelmiä koskevat ehdotukset, joille tarvitaan useiden tai kaikkien sääntelyviranomaisten hyväksyntä, on toimitettava virastolle samaan aikaan kun ne annetaan sääntelyviranomaisten hyväksyttäviksi. Viraston on toimivaltaisten sääntelyviranomaisten pyynnöstä annettava lausunto näistä ehtoja ja edellytyksiä tai menetelmiä koskevista ehdotuksista kolmen kuukauden kuluessa.”

” 9. Jos ehtoja ja edellytyksiä tai menetelmiä koskevan ehdotuksen hyväksyminen edellyttää yhden nimetyn elimen päätöstä 4 kohdan mukaisesti, nimetyn elimen on tehtävä päätös kuuden kuukauden kuluessa ehtojen ja edellytysten tai menetelmien vastaanottamisesta.”

SO suuntaviivojen 156 artiklan mukaan:

” 10. Manner-Euroopan ja Pohjoismaiden synkronialueilla kaikkien siirtoverkonhaltijoiden on laadittava ehdotus lyhimmästä aktivointiajasta, joka taajuuden vakautusreservien tarjoajien on pystyttävä varmistamaan. Määritelty aika ei saa olla pidempi kuin 30 minuuttia tai lyhyempi kuin 15 minuuttia. Ehdotuksessa on otettava täysin huomioon 11 artiklan mukaisesti tehdyn kustannus-hyötyanalyysin tulokset.

” 11. Manner-Euroopan ja Pohjoismaiden synkronialueiden siirtoverkonhaltijoiden on viimeistään kuuden kuukauden kuluttua tämän asetuksen voimaantulosta laadittava ehdotus tehtävässä kustannus-hyötyanalyysissa käytettävistä oletuksista ja menetelmistä, jotta voidaan arvioida aikaa, jonka sellaiset taajuuden vakautusreservejä tarjoavat yksiköt tai ryhmät, joiden energiavarastot ovat rajalliset, tarvitsevat pysyäkseen käytettävissä hälytystilassa. Manner-Euroopan ja Pohjoismaiden synkronialueiden siirtoverkonhaltijoiden on viimeistään 12 kuukauden kuluttua siitä, kun kyseessä olevan alueen kaikki sääntelyviranomaiset ovat hyväksyneet oletukset ja menetelmän, toimitettava asianomaisille sääntelyviranomaisille kustannus-hyötyanalyysinsä tulokset, joissa ehdotetaan aikaa, joka ei saa olla pidempi kuin 30 minuuttia tai lyhyempi kuin 15 minuuttia. Kustannus-hyötyanalyysissa on otettava huomioon vähintään seuraavat tekijät:

a) eri aikaväleistä ja kehitteillä olevien teknologioiden osuuksista saadut kokemukset eri taajuudensäätöblokeissa;

b) määritellyn ajan vaikutus taajuuden vakautusreservien kokonaiskustannuksiin synkronialueella;

c) määritellyn ajan vaikutus verkon stabiilisuusriskeihin, erityisesti pitkäkestoisten tai toistuvien taajuustapahtumien kautta;

d) vaikutus verkon stabiilisuusriskeihin ja taajuuden vakautusreservien kokonaiskustannuksiin, jos taajuuden vakautusreservien kokonaismäärä kasvaa;

e) tekniikan kehityksen vaikutus käytettävyysaikojen kustannuksiin energiavarastoiltaan rajallisten taajuuden vakautusreservejä tarjoavien yksiköiden tai ryhmien taajuuden vakautusreserveissä.”

Perustelut

Fingrid Oyj toimitti 25.3.2021 Energiavirastoon ehdotuksen taajuuden vakautusreservien lyhimmästä aktivointiajasta. Ehdotuksen mukaan lyhin aktivointiaika sähköjärjestelmän hätätilassa olisi 15 minuuttia. Ehdotuksen mukaan sen ovat laatineet Energinet, Fingrid Oyj, Kraftnät Åland AB, Svenska kraftnät ja Statnett SF.

Ehdotuksesta on järjestetty artiklan 11 mukainen julkinen kuuleminen 14.12.2020-25.1.2021. Ehdotuksen liitteenä on toimitettu taustadokumentti, jossa on selvitetty julkisen kuulemisen tuloksia. Sen mukaan ehdotuksesta ei vastaanotettu kuulemisen aikana asiaa koskevia kommentteja.

Energiavirasto on 6 artiklan 7 kohdan mukaisesti kuullut, koordinoinut ja tehnyt tiivistä yhteistyötä muiden toimivaltaisten sääntelyviranomaisten kanssa ennen yhteisen päätöksen tekemistä.

Energiavirasto katsoo, että Fingridin 25.3.2021 toimittama ehdotus taajuuden vakautusreservien lyhimmästä aktivointiajasta täyttää SO suuntaviivojen vaatimukset ja tavoitteet. Ehdotettu 15 minuutin aktivointiaika on SO suuntaviivojen artikla 156(10) mukaisesti 15 ja 30 minuutin välillä, ja aktivointiaika perustuu SO suuntaviivojen artikla 156(11) mukaiseen kustannushyötyanalyysiin.

Sovelletut säännökset

Komission asetus (EU) 2017/1485 4 artikla, 5 artikla, 6 artikla, 156 artikla

Laki sähkö- ja maakaasumarkkinoiden valvonnasta (590/2013) 36 §

Muutoksenhaku

Muutoksenhakua koskeva ohjeistus liitteenä.

Liitteet Valitusosoitus Markkinaoikeuteen

Agreement by All Regulatory Authorities in the Nordic Synchronous area on Nordic synchronous area proposal for minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, 17 September 2021

Nordic synchronous area methodology for the minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, 24 March 2021

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, 29 May 2020

Jakelu Fingrid Oyj

Tiedoksi

VALITUSOSOITUS

Valitusoikeus hallintopäätöksestä

Energiaviraston antamaan hallintopäätökseen saa hakea muutosta valittamalla siten kuin laissa oikeudenkäynnistä hallintoasioissa (808/2019) säädetään. Valituskelpoisella hallintopäätöksellä tarkoitetaan päätöstä, jolla asia on ratkaistu tai jätetty tutkimatta.

Hallintopäätökseen saa hakea muutosta valittamalla se, johon päätös on kohdistettu tai jonka oikeuteen, velvollisuuteen tai etuun päätös välittömästi vaikuttaa ja se, jonka valitusoikeudesta laissa erikseen säädetään.

Valitusviranomainen

Valitusviranomainen Energiaviraston päätökseen on markkinaoikeus.

Valituksen tekeminen ja valitusaika

Valituksen saa tehdä sillä perusteella, että päätös on lainvastainen.

Valitus on tehtävä kirjallisesti 30 päivän kuluessa päätöksen tiedoksisaannista.

Jos tiedoksianto on toimitettu tavallisena tiedoksiantona postitse kirjeellä vastaanottajalle, katsotaan hänen saaneen asiasta tiedon seitsemäntenä päivänä kirjeen lähettämisestä, jollei muuta näytetä. Mikäli päätös annetaan hakijalle tiedoksi sähköisenä viestinä, päätös katsotaan annetuksi tiedoksi kolmantena päivänä viestin lähettämisestä, jollei muuta näytetä. Jos päätös on postitettu saantitodistusta vastaan, vastaanottajan katsotaan saaneen asiasta tiedon saantitodistuksen osoittamana aikana. Valitusaikaa laskettaessa tiedoksiantopäivää ei oteta lukuun.

Milloin kysymyksessä on sijaistiedoksianto, tiedoksisaannin katsotaan tapahtuneen kolmantena päivänä sijaistiedoksiantoa koskevan tiedoksiantotodistuksen osoittamasta päivästä. Viranomaisen tietoon asian katsotaan tulleen kirjeen saapumispäivänä.

Kun valituksen tekemisen määräajan viimeinen päivä on pyhäpäivä, itsenäisyyspäivä, vapunpäivä, joulu- tai juhannusaatto tahi arkilauantai, saa valituksen toimittaa ensimmäisenä arkipäivänä sen jälkeen. Valitus on toimitettava valitusviranomaiselle viimeistään valitusajan viimeisenä päivänä ennen valitusviranomaisen aukioloajan päättymistä.

Valituksen tekemisestä säädetään lisäksi sähköisestä asioinnista viranomaistoiminnassa annetussa laissa (13/2003). Määräaikojen laskemisesta säädetään säädettyjen määräaikain laskemisesta annetussa laissa (150/1930).

Valituksen sisältö

Valituksessa on ilmoitettava:

- päätös, johon haetaan muutosta (*valituksen kohteena oleva päätös*);
- miltä kohdin päätökseen haetaan muutosta ja mitä muutoksia siihen vaaditaan tehtäväksi (*vaatimukset*);
- vaatimusten perustelut; sekä
- mihin valitusoikeus perustuu, jos valituksen kohteena oleva päätös ei kohdistu valittajaan.

Valituksessa on lisäksi ilmoitettava valittajan nimi ja yhteystiedot. Jos puhevaltaa käyttää valittajan laillinen edustaja tai asiamies, myös tämän yhteystiedot on ilmoitettava. Yhteystietojen muutoksesta on valituksen vireillä ollessa ilmoitettava viipymättä tuomioistuimelle.

Valituksessa on ilmoitettava myös se postiosoite ja mahdollinen muu osoite, johon oikeudenkäyntiin liittyvät asiakirjat voidaan lähettää (*prosessiosoite*). Mikäli valittaja on ilmoittanut enemmän kuin yhden prosessiosoitteen, voi tuomioistuin valita, mihin ilmoitetuista osoitteista se toimittaa oikeudenkäyntiin liittyvät asiakirjat.

Oikaisuvaatimuksen tekijä saa valittaessaan oikaisuvaatimuspäätöksestä esittää vaatimuksilleen uusia perusteluja. Hän saa esittää uuden vaatimuksen vain, jos se perustuu olosuhteiden muutokseen tai oikaisuvaatimuksen tekemisen määräajan päättymisen jälkeen valittajan tietoon tulleeseen seikkaan.

Valituksen liitteet

Valitukseen on liitettävä:

- valituksen kohteena oleva päätös valitusosoituksineen;
- selvitys siitä, milloin valittaja on saanut päätöksen tiedoksi, tai muu selvitys valitusajan alkamisen ajankohdasta; sekä
- asiakirjat, joihin valittaja vetoaa vaatimuksensa tueksi, jollei niitä ole jo aikaisemmin toimitettu viranomaiselle.
- asiamiestä käytettäessä valtakirja, sen mukaan kuin oikeudenkäynnistä hallintoasioissa annetun lain 32 §:ssä säädetään.

Valituskirjelmän toimittaminen valitusviranomaiselle

Valituskirjelmä on toimitettava valitusajan kuluessa markkinaoikeuteen, jonka osoite on:

Markkinaoikeus
Radanrakentajantie 5
00520 HELSINKI

faksi: 029 56 43314

sähköposti: markkinaoikeus@oikeus.fi

Valituskirjelmä voidaan toimittaa valitusviranomaiselle myös postitse.

V*alituksen voi tehdä myös hallinto- ja erityistuomioistuinten asiointipalvelussa osoitteessa https://asiointi2.oikeus.fi/hallintotuomioistuimet*

Kun valituskirjelmä toimitetaan hallinto- ja erityistuomioistuinten asiointipalvelun kautta, liitteet voi toimittaa skannattuna asiointipalvelussa tai kirjeitse. Kirjeitse toimitettaessa mainitse asiasta asiointipalvelun Viesti-kentässä.

Valituskirjelmän lähettäminen postitse tai sähköisesti tapahtuu lähettäjän omalla vastuulla.

Oikeudenkäyntimaksu

Valittajalta peritään markkinaoikeudessa oikeudenkäyntimaksu 2050 euroa. Yksityishenkilön oikeudenkäyntimaksu on 510 euroa. Tuomioistuinmaksulaissa (1455/2015) on erikseen säädetty tapauksista, joissa maksua ei peritä.

Agreement by All Regulatory Authorities in the Nordic Synchronous area

on

Nordic synchronous area proposal for minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

17 September 2021

I. Introduction and legal context

This document elaborates an agreement of all Regulatory Authorities in the Nordic synchronous area (hereinafter referred to as NRAs). An agreement was made on September 17, 2021, on the Nordic TSOs (hereinafter referred to as TSOs) "Nordic synchronous area proposal for the minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing guideline on electricity transmission system operation" dated 14 April 2021 (hereinafter referred to as respectively "minimum activation time to be ensured by FCR providers proposal" and "Regulation 2017/1485").

This agreement of the NRAs shall provide evidence that a decision on the minimum activation time to be ensured by FCR providers proposal does not need to be adopted by European Union Agency of the Cooperation of Energy (ACER) pursuant to Article 6(8) of the Regulation 2017/1485 at this stage. This document is intended to constitute the basis on which all NRAs will each subsequently make national decisions pursuant to Regulation 2017/1485 Article 6(1) to approve the minimum activation time to be ensured by FCR providers proposal from the TSOs. The TSOs are Fingrid Oyj, Svenska kraftnät, Energinet, Kraftnät Åland AB and Statnett SF.

The legal provisions relevant to the submission and approval of the minimum activation time to be ensured by FCR providers proposal, and this all NRAs agreed opinion, are Articles 4(1), 5(1), 6(3)(d)(v), 6(6), 6(7), 11, 118(1)(r), 156(9) and 156(10) of Regulation 2017/1485, listed below.

Article 4(1)
This Regulation aims at:
a) determining common operational security requirements and principles;
b) determining common interconnected system operational planning principles;
c) determining common load-frequency control processes and control structures;
d) ensuring the conditions for maintaining operational security throughout the Union;
e) ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union;
f) promoting the coordination of system operation and operational planning;
g) ensuring and enhancing the transparency and reliability of information on transmission system operation;
h) contributing to the efficient operation and development of the electricity transmission system and electricity sector in the Union.

Article 5(1)
TSOs shall develop the terms and conditions or methodologies required by this Regulation and submit them for approval to the competent regulatory authorities in accordance with Article 6(2) and (3) or for approval to the entity designated by the Member State in accordance with Article 6(4) within the respective deadlines set out in this Regulation.

Article 6(3)(d)(v)

The proposals for the following terms and conditions or methodologies shall be subject to approval by all regulatory authorities of the concerned region, on which a Member State may provide an opinion to the concerned regulatory authority:
methodologies, conditions and values included in the synchronous area operational agreements in Article 118 concerning:
for the CE and Nordic synchronous areas, the minimum activation period to be ensured by FCR providers in accordance with Article 156(10);

Article 6(6)
The proposal for terms and conditions or methodologies shall include a proposed timescale for their implementation and a description of their expected impact on the objectives of this Regulation. Proposals on terms and conditions or methodologies subject to the approval by several or all regulatory authorities shall be submitted to the Agency at the same time that they are submitted to regulatory authorities. Upon request by the competent regulatory authorities, the Agency shall issue an opinion within 3 months on the proposals for terms and conditions or methodologies.

Article 6(7)
Where the approval of the terms and conditions or methodologies requires a decision by more than one regulatory authority, the competent regulatory authorities shall consult and closely cooperate and coordinate with each other in order to reach an agreement. Where the Agency issues an opinion, the competent regulatory authorities shall take that opinion into account. Regulatory authorities shall take decisions concerning the submitted terms and conditions or methodologies in accordance with paragraphs (2) and (3), within 6 months following the receipt of the terms and conditions or methodologies by the regulatory authority or, where applicable, by the last regulatory authority concerned.

Article 11
1 TSOs responsible for submitting proposals for terms and conditions or methodologies or their amendments in accordance with this Regulation shall consult stakeholders, including the relevant authorities of each Member State, on the draft proposals for terms and conditions or methodologies listed in Article 6(2) and (3). The consultation shall last for a period of not less than 1 month.

2 The proposals for terms and conditions or methodologies submitted by the TSOs at Union level shall be published and submitted to public consultation at Union level. Proposals submitted by the TSOs at regional level shall be submitted to public consultation at least at regional level. Parties submitting proposals at bilateral or at multilateral level shall carry out a public consultation at least in the Member States concerned.

3 The TSOs responsible for developing the proposal for terms and conditions or methodologies shall duly take into account the views of stakeholders resulting from the consultations prior to its submission for regulatory approval. In all cases, a sound justification for including or not including the views resulting from the consultation shall be provided together with the submission of the proposal and published in a timely manner before, or simultaneously with the publication of the proposal for terms and conditions or methodologies.

Article 118(1)(r)
By 12 months after entry into force of this Regulation, all TSOs of each synchronous area shall jointly develop common proposals for:
for the CE and Nordic synchronous areas, the minimum activation period to be ensured by FCR providers in accordance with Article 156(10);

Article 156(9)
For the CE and Nordic synchronous areas, 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. 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 limited energy reservoirs are able to fully activate FCR continuously for a time period to be defined pursuant to paragraphs 10 and 11. Where no period has been determined pursuant to paragraphs 10 and 11, each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes.

Article 156(10)
For the CE and Nordic synchronous areas, all TSOs shall develop a proposal concerning the minimum activation period to be ensured by FCR providers. The period determined shall not be greater than 30 or smaller than 15 minutes. The proposal shall take full account of the results of the cost-benefit analysis conducted pursuant to paragraph 11.

II. The TSO proposal

The minimum activation time to be ensured by FCR providers proposal was submitted to the NRAs on April 14, 2021, together with a separate document on the result of their public consultation. The proposal from the TSOs suggests a minimum activation time to be ensured by FCR providers to be 15 minutes. This period is within the requirement given in article 156(10) that the activation time should be between 15 minutes and 30 minutes. The proposed period of 15 minutes is based on the result from the cost benefit analysis (CBA) conducted according to article 156(11). The methodology for the CBA was approved by the NRAs in April 2019. The NRAs received the results from the CBA in June 2020. A description of the impact of the minimum activation time to be ensured by FCR providers proposal on the objectives of Regulation 2017/1485 was included in the proposal. An implementation timeline is included in the proposal.

Regulation 2017/1485 requires NRAs to consult and closely cooperate and coordinate with each other in order to reach agreement and make decisions within six months following receipt of submissions of the last NRA concerned. A decision is therefore required by each NRA by October 14, 2021.

III. NRAs' position

The minimum activation time to be ensured by FCR providers proposal dated April 14, 2021 propose the same activation period of 15 minutes as the result of the CBA conducted in accordance with article 156(11) approved by the NRAs.

As this minimum activation time is based on a CBA conducted the TSOs shall, if needed based on changes in topology, load, generation or other relevant factors in the synchronous area, conduct a new CBA according to article 156(11). NRAs should be informed by the results of such analysis, and if needed based on the results the TSOs should propose to amend the methodology given by article 156(10).

It is important to have a common understanding of the implementation of the methodology. The implementation and the transparency of the methodology must be clarified after the national decisions.

The NRAs have reached an agreement that the minimum activation time to be ensured by FCR providers proposal can be approved.

IV. Conclusions

All NRAs have assessed, consulted and closely cooperated to reach an agreement that the minimum activation time to be ensured by FCR providers proposal meet the requirements of Regulation 2017/1485 and as such can be approved by all NRAs.

NRAs shall, based on this agreement, make their national decisions by October 14, 2021. The minimum activation time to be ensured by FCR providers proposal will be adopted upon the decision of the last the NRA in the synchronous area. Following the national decisions by all NRAs, TSOs are required to publish the minimum activation time to be ensured by FCR providers proposal as approved, according to Article 8(1) of Regulation 2017/1485. All TSOs must respect the implementation deadlines provided in the minimum activation time to be ensured by FCR providers proposal.

Nordic synchronous area methodology for the minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

24 March 2021

All TSOs of the Nordic synchronous area, taking into account the following:

Whereas

(1) This document is the common methodology developed by all Transmission System Operators within the Nordic synchronous area (hereafter referred to as "**TSOs**") for the minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as "**SO Regulation**"). This methodology is hereafter referred to as "**Methodology**".

(2) The Methodology takes into account the general principles and goals set in SO Regulation as well as Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross border exchanges in electricity (hereafter referred to as **"Regulation (EC) No 714/2009"**). The goal of the SO Regulation/Regulation (EC) No 714/2009 is the safeguarding of operational security, frequency quality and the efficient use of the interconnected system and resources. Article 118(1)(r) of the SO Regulation sets for this purpose requirements for the TSOs to "*jointly develop common proposals for: [..] the minimum activation period to be ensured by FCR providers in accordance with Article 156(10);"*

(3) Article 156(10) of the SO Regulation defines the scope of this Methodology. The article states that *"For the CE and Nordic synchronous areas, all TSOs shall develop a proposal concerning the minimum activation period to be ensured by FCR providers. The period determined shall not be greater than 30 or smaller than 15 minutes. The proposal shall take full account of the results of the cost-benefit analysis conducted pursuant to paragraph 11."*.

(4) Together with the TSOs of the CE synchronous area, the TSOs conducted a cost-benefit analysis pursuant to paragraph 11 of article 156 of the SO Regulation. The assumptions and methodology for this cost-benefit analysis have been approved by the Nordic NRAs on 16 April 2019. The TSOs published the results for public consultation from 27 February to 30 April 2020. The TSOs sent the results of their cost-benefit analysis to their NRAs in June 2020.

(5) The Nordic Frequency Containment Process (FCP) applies two types of Frequency Containment Reserves (FCR). FCR for normal operation (FCR-N) is used for continuous imbalances to keep the frequency within the ± 100mHz range, which typically takes place in the normal (system) state. FCR for disturbance situations (FCR-D) is used to mitigate the impact of incidental disturbances once the frequency is outside the ± 100mHz range. FCR-D is used in both the normal and the alert state.

(6) Article 156(9) stipulates 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."*. The TSOs conclude that this applies to both FCR-N and FCR-D.

(7) Article 156(9) further states that *"as of triggering the alert state and during the alert state, each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously for a time period to be defined pursuant to paragraphs 10 and 11."*. This means that the minimum activation time that is addressed in Article 156(10) of

the SO Regulation is applicable in the alert system state and therefore the TSOs conclude that it only applies to FCR-D. Accordingly, this Methodology specifies the minimum activation time only for FCR-D.

(8) In regard to regulatory approval, Article 6(3) of the SO Regulation states:

"The proposals for the following terms and conditions or methodologies shall be subject to approval by all regulatory authorities of the concerned region, on which a Member State may provide an opinion to the concerned regulatory authority: […]
(d) methodologies, conditions and values included in the synchronous area operational agreements in Article 118 concerning: […]
(v) for the CE and Nordic synchronous areas, the minimum activation period to be ensured by FCR providers in accordance with Article 156(10);"

(9) According to Article 6(6) of the SO Regulation the expected impact of the Methodology on the objectives of the SO Regulation has to be described and is presented below.

(10) The Methodology generally contributes to and does not in any way hamper the achievement of the objectives of Article 4 of the SO Regulation. In particular, the Methodology serves the objectives to (1)(a) determining common operational security requirements and principles; (1)(c) determining common load-frequency control processes and control structures, (1)(d) ensuring the conditions for maintaining operational security throughout the Union, (1)(e) ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union and (1)(h) contributing to the efficient operation and development of the electricity transmission system and electricity sector in the Union. The Methodology contributes to these objectives by specifying the *common Nordic* minimum activation period to be ensured by FCR-D providers with limited energy resources. FCR-D is one of the key reserves that is used in the common Nordic load-frequency control processes to reduce the risk for automatic Low Frequency Demand Disconnection (LFDD), automatic reduction of generation and for system blackouts due to under or over frequency. The Methodology carefully balances both the impact of the minimum activation period on the cost of FCR-D and outage risk and therefore ensures efficient operation of the electricity transmission system.

(11) In conclusion, the Methodology contributes to the general objectives of the SO Regulation to the benefit of all market participants and electricity end consumers.

SUBMIT THE FOLLOWING METHODOLOGY TO ALL REGULATORY AUTHORITIES OF THE NORDIC SYNCHRONOUS AREA:

Article 1 - Subject matter and scope

1. The minimum activation period to be ensured by FCR providers described in this Methodology are the common methodology of TSOs in accordance with article 156(10) of the SO Regulation. The Methodology applies solely to the Nordic synchronous area.

   The Nordic synchronous area covers transmission systems of East-Denmark (DK2), Finland, Sweden and Norway.

   This Methodology has been developed by Energinet, Fingrid Oyj, Kraftnät Åland AB, Svenska kraftnät
   and Statnett SF.

2. This Methodology is subject to approval in accordance with Article 6(3) of the SO Regulation.

Article 2 - Definitions and interpretation

1. For the purposes of this Methodology, the terms used shall have the meaning of the definitions included in Article 3 of the SO Regulation and in Article 2 of Commission Regulation (EU) 2017/2195.
2. For the purpose of this Methodology and in accordance with Article 156 (9) of the SO Regulation, the 'minimum activation period to be ensured by FCR providers' means the time for which each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously, as of triggering the alert state and during the alert state.
3. In this Methodology, unless the context requires otherwise:
   a. the singular indicates the plural and vice versa;
   b. the headings are inserted for convenience only and do not affect the interpretation of the Methodology; and
   c. any reference to legislation, regulations, directives, orders, instruments, codes or any other enactment shall include any modification, extension or re-enactment of it when in force.

Article 3 – Minimum activation period to be ensured by FCR providers

1. The minimum activation period to be ensured by FCR-D providers is 15 minutes.

Article 4 – Publication and implementation

1. The relevant TSOs shall publish (in accordance with Article 8 of the SO Regulation) the Methodology without undue delay after the competent NRAs have approved the Methodology or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 6 of the SO Regulation.

2. Energinet and Svenska kraftnät have already implemented a minimum activation period to be ensured by FCR providers in accordance with Article 3. Fingrid and Statnett shall implement the minimum activation period to be ensured by FCR providers in Article 3 within 12 months after this

Methodology has been approved by all Nordic NRAs. Kraftnät Åland does not need to implement the Methodology since Kraftnät Åland does not contract FCR.

Article 5 - Language

The reference language for this Methodology shall be English. For the avoidance of doubt, where TSOs needs to translate this Methodology into national language(s), in the event of inconsistencies between the English version published by TSOs in Nordic Synchronous Area in accordance with Article 8(1) of the SO Regulation and any version in another language the relevant TSOs shall, in accordance with national legislation, provide the relevant national regulatory authority with an updated translation of the Methodology.

European Network of
Transmission System Operators
for Electricity

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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

- Final Report -

29 May 2020

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1. Contents

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2. Disclaimer

This report presents the CBA approved Methodology, the results of the CBA analysis and details the pros and cons of all possible options of minimum activation time period for both Continental Europe and Nordic. The results have been submitted for public consultation from 27 February 2020 until 30 April 2020.

3. Reference and Acronyms

CBA	Cost Benefit Analysis compliant with the requirements contained in Article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017
SA	Synchronous Area
DFD	Deterministic Frequency Deviations
LL	Long Lasting frequency deviation events
CE	Continental Europe Synchronous Area
Nordic	Nordic Synchronous Area
FCR	Frequency Containment Reserve
FRR	Frequency Restoration Reserve
FAT	Full Activation Time of FRR
LER	FCR providers with Limited Energy Reservoir
TminLER	As of triggering the alert state and during the alert state, time for which each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously
SOC	State of Charge of LER
MaxSSdf	Maximum Steady State frequency deviation (0.2 Hz in CE and 0.5 Hz in the Nordic)

[1] All Continental Europe and Nordic TSOs' proposal for assumptions and a Cost Benefit Analysis methodology in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

[2] Explanatory document of the proposal for assumptions and methodology for a Cost Benefit Analysis (CBA) compliant with the requirements contained in Article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (System Operation Guideline Regulation – SOGR)

[3] COMMISSION REGULATION (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

[4] FCR provision by Limited Energy Reservoirs - Focus on approach and collection of inputs – Updated version (https://www.entsoe.eu/events/2019/11/15/webinar-on-cba-to-assess-the-time-period-required-for-fcr-with-limited-energy-reservoirs-lers/)

4. Background

This document is aiming at reporting the results of the Cost Benefit Analysis carried out by all Continental Europe and Nordic TSO's in accordance with the requirements contained in Article 156(11) of Commission Regulation 2017/1485 of 2 august 2017.

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In March 2019 all TSOs of the CE and Nordic synchronous areas have submitted for regulatory approval assumptions and methodology for the CBA to be conducted, in order to assess the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state.

All Nordic NRAs have approved the assumptions and methodology for the CBA on 16th April 2019, whereas all CE NRAs have given their approval on 23rd May 2019.

All the assumptions regarding the input data and the methodology to be used to undertake the CBA are described in [1] and [2].

Article 156(11) provides that by 12 months after all NRAs approval, all TSO's of the CE and Nordic synchronous areas are requested to submit the results of the CBA to the regulatory authorities.

5. General information on the methodology

According to [1] and [2] the CBA analyses a set of scenarios. For each synchronous area, the scenarios are defined considering the following criteria:

- Different TminLER: 15 min, 20 min, 25 min and 30 min.
- Different share of LER[1] in the FCR provision: from 0% to 100% with 10% steps.
- Presence or absence of mitigation action against the DFD.

Given the previous criteria, a total number of 88 scenarios have been investigated.

According to [1] and [2] the CBA is based on a probabilistic approach. For each synchronous area and each scenario, the probabilistic dimensioning of FCR needed to avoid critical LER depletions[2] is calculated. To each dimensioned FCR a cost is associated; it is divided in cost due to LER and cost due to non-LER.

The procedure adopted to calculate the needed FCR in each scenario and the resultant costs is shown in the Figure 1.

[1] The LER share is referred to the proportion of LER amongst the FCR provider selected to fulfil the requirements. E.g.: a LER share equal to 50% in CE with a FCR requirement of 3000 MW means that 1500 MW of FCR are given by LER.

[2] According to [1], a critical LER depletion is a condition in which occur both a LER depletion (reservoir completely empty or completely full) and an exceeding of steady state frequency deviation over the maximum steady state frequency deviation as defined in [3] Annex III Table 1.

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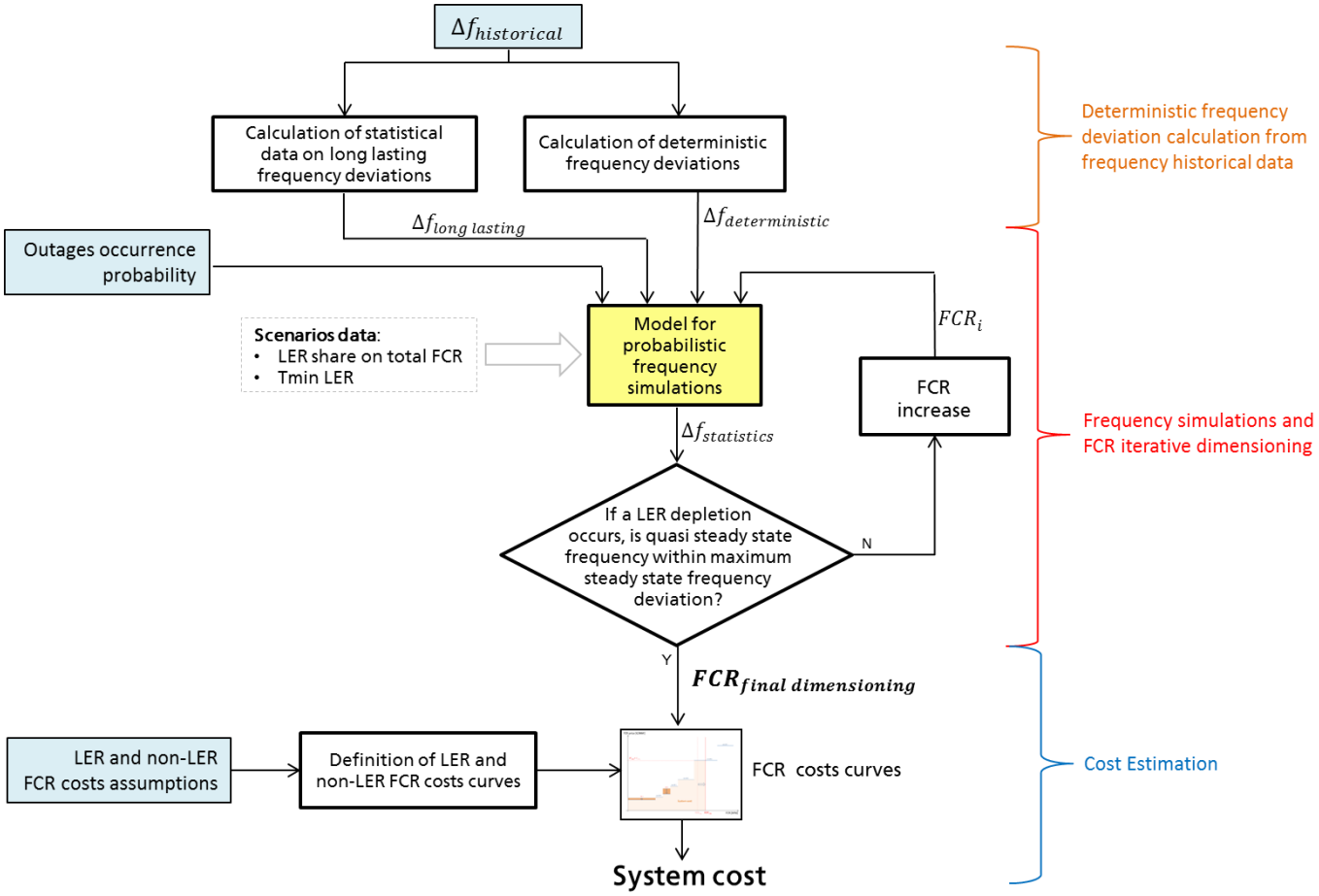

Figure 1 The calculation process for the needed FCR in each scenario and the resultant costs

The previous diagram shows in light blue the input[3]:

- historical frequency deviations;
- occurrence probability of outages leading to loss of production in the system;
- assumptions on FCR costs for both LER and non-LER providers.

Further information on the input data used in the methodology are provided in [4].

As shown in Figure 1, the procedure is based on a probabilistic frequency simulation model to verify if it is possible a critical depletion in the system. This probabilistic model exploits a Monte Carlo methodology: it simulates a large number of working conditions for the power system, randomly extracting the occurrence of outages and frequency deviations patterns due to long lasting events and DFD.

The results presented in this report are associated with Monte Carlo simulations over a working period of the system of 200 years. It means the Monte Carlo model has simulated 200 different years of work; in each year a different set of random extractions is performed.

The simulated frequency deviation trends - resulting from the randomly extracted outages, DFD and LL - are calculated by mean of a simplified simulation model whose assumptions are described in [1] and [2].

[3] A detailed description of the meaning of each input can be found in [1] and [2].

The main parameters adopted for the analysis presented in this report are sum up in the following list.

- **Starting FCR value**: 3000 MW for CE – 2050 MW for Nordic
  It is the current dimensioning value for FCR. If the model detects a critical depletion, the iterative increase of FCR starts from this value.
- **FCR increase step**: 100 MW for CE – 50 MW for Nordic.
  It is the iterative increase step for FCR.
- **FAT**: 10.5 min for CE – 12.1 min for Nordic.
  The FRR is simulated considering a simplified single centralized controller for each synchronous area which operates only to restore the frequency deviation to 0 mHz. The FAT value affects how fast the controller operates.
- **Recharge time**: 120 minutes for both synchronous areas.
  It represents the time needed for LER to completely recover from depletion conditions (either full or empty). After a depletion, it is the time needed to reach the condition such that state of charge is equal to 50% of the reservoir.
- **Minutes around change of hour (DFD)**: 5 minutes for both synchronous areas.
  For both synchronous areas the DFD are considered within an interval of ±5 minutes around the change of the hour.
- **DFD Mitigation coefficient**: 0.8 for both synchronous areas.
  For both synchronous areas, the scenarios with mitigation actions on DFDs are calculated reducing the current DFD of a factor equal to 0.8. The reduction factor for DFDs results in a reduction in amplitude of the associated frequency deviations. The DFDs used as input for the model in the scenarios with DFDs reduction have an amplitude equal to 80% of DFDs in the scenarios without reduction.

According to [1], the simplified simulation model has been used also for testing all the scenarios against a set of most relevant frequency events actually occurred in the past.

For Nordic the two worst significant frequency deviations have been tested; they occurred on:

- 03/10/2011 h 21-23;
- 09/05/2018 h 00-02.

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6. Results for Nordic synchronous area

Results of the probabilistic analysis

FCR dimensioning

The results in terms of FCR needed to avoid critical depletion are presented in the Table 1.

The scenarios are organized in a matrix having different TminLER on the rows and different LER share on the columns.

Table 1: FCR required to avoid critical depletions in Nordic [MW]

	LER share										
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
15'	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2200**	**2400**	**2400**	**2400**	**2400**
20'	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2200**	**2200**	**2200**	**2200**	**2200**
25'	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**
30'	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**

The results with and without DFD mitigation actions are completely the same.

Costs associated to increased FCR

The costs for providing FCR along a year in each scenario are shown in the following Table 2 (the values are in M€/year).

The Table 3 and Table 4 show respectively the costs due to non-LER and the costs due to LER.

Table 2: Total yearly costs to provide FCR in Nordic [M€/year]

	LER share											
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15'	313.8	248.0	194.2	140.3	86.5	61.0	77.8	102.2	118.6	134.9	151.2	148.0
20'	313.8	252.1	199.0	145.9	92.8	68.0	85.8	101.5	117.2	132.9	148.6	150.7
25'	313.8	256.7	204.2	151.7	99.3	75.1	87.1	102.3	117.6	132.9	148.2	153.5
30'	313.8	261.6	209.8	158.0	106.2	82.6	95.3	111.2	127.1	143.1	159.0	160.7
Mean	313.8	254.6	201.8	149.0	96.2	71.7	86.5	104.3	120.1	135.9	151.8	

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Table 3: Yearly costs to provide FCR in Nordic due to non-LER [M€/year]

	LER share											
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15'	313.8	246.0	178.3	110.5	42.8	3.3	0.0	0.0	0.0	0.0	0.0	81.3
20'	313.8	246.0	178.3	110.5	42.8	3.3	0.0	0.0	0.0	0.0	0.0	81.3
25'	313.8	246.0	178.3	110.5	42.8	3.3	0.0	0.0	0.0	0.0	0.0	81.3
30	313.8	246.0	178.3	110.5	42.8	3.3	0.0	0.0	0.0	0.0	0.0	81.3
Mean	313.8	246.0	178.3	110.5	42.8	3.3	0.0	0.0	0.0	0.0	0.0	

Table 4: Yearly costs to provide FCR in Nordic due to LER [M€/year]

	LER share											
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15'	0.0	1.9	15.9	29.8	43.8	57.7	77.8	102.2	118.6	134.9	151.2	66.7
20'	0.0	6.1	20.8	35.4	50.0	64.7	85.7	101.5	117.2	132.9	148.6	69.4
25'	0.0	10.6	25.9	41.2	56.5	71.8	87.1	102.3	117.6	132.9	148.2	72.2
30'	0.0	15.5	31.5	47.4	63.4	79.3	95.3	111.2	127.1	143.1	159.0	79.4
Mean	0.0	8.6	23.5	38.5	53.4	68.4	86.5	104.3	120.1	135.9	151.8	

Yearly average LER depletions

The yearly average number of depletion that occur for each scenario are presented in the following Table 5. The results are referred to simulations in which the FCR requirement is not increased (FCR equal to 2050 MW).

Table 5: Yearly average depletion number in Nordic (with FCR = 2050 MW)

	LER share										
TminLER	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15'	**0.83**	**0.83**	**0.83**	**0.83**	**0.83**	**0.83**	**0.83**	**0.83**	**0.83**	**0.82**	0.83
20'	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**	**0.10**	0.10
25'	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0.00
30'	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0.00
Mean	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	

The yearly average number of critical depletion without FCR increase (FCR equal to 2050 MW) is shown in Table 6.

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Table 6: Yearly critical average depletion number in Nordic (with FCR = 2050 MW)

	LER share										
TminLER	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15	**0**	**0**	**0**	**0**	**0**	**0.14**	**0.68**	**0.76**	**0.83**	**0.83**	0.29
20	**0**	**0**	**0**	**0**	**0**	**0.04**	**0.10**	**0.10**	**0.10**	**0.10**	0.04
25	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
Mean	0	0	0	0	0	0.04	0.20	0.22	0.23	0.23	

Results of the test against the most relevant events

In the Nordic synchronous area, the only tested events are the two worst recorded events.

The results are shown in the following Table 7.

Table 7: Results of most relevant event tests on Nordic system [MW]

	LER share										
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
15	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2100**	**2250**	**2250**	**2250**	**2250**
20	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**
25	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**
30	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**

Event 03/10/2011 h21:09

	LER share										
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
15	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2200**	**2400**	**2400**	**2400**	**2400**
20	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2200**	**2200**	**2200**	**2200**	**2200**
25	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**
30	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**	**2050**

Event 09/05/2019 h00:26

The most relevant results do not provide any further information in addition to the output of the probabilistic approach.

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7. Minimum activation time period for Nordic

The current installed LER in Nordic is about:

- 177 MW with TminLER of 15 minutes (8.6 % LER share);
- 120 MW with TminLER of 20 minutes (5.9 % LER share);
- 62 MW with TminLER of 25 minutes (3.0 % LER share);
- 5 MW with TminLER of 30minutes (0.2 % LER share).

The dependence of installed LER from TminLER is mainly due to run-of-river in Norway.

The situation in terms of current LER share is shown in Figure 2.

	LER share											
TminLER	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Mean
15	314	248	194	140	87	61	78	102	119	135	151	148
20	314	252	199	146	93	68	86	101	117	133	149	151
25	314	257	204	152	99	75	87	102	118	133	148	154
30	314	262	210	158	106	83	95	111	127	143	159	161
Mean	314	255	202	149	96	72	86	104	120	136	152	

Current LER share

Most economical path for increasing LER

Area with need to increase FCR

Figure 2: Current LER share in Nordic

Given the current situation the most economical solution is 15 minutes.

The current LER share is well below the thresholds above which an FCR increase is needed.

If the LER share exceeded 60% an FCR increase would be needed. In this situation the most economical solution depends on the LER share itself:

with 60% 15'
with 70%&80% 20'
with 90% 20'&25'
with 100% 25'

The differences between different scenarios costs are however very small.

The time period choice will only apply to FCR-D.

Minimum activation time period choice for Nordic synchronous area

Considering the results of the CBA and the current presence of LER in the Nordic synchronous area, the all Nordic TSOs proposal is to set 15 minutes minimum activation time period.

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8. Consideration on the impact of the input on the results

In the following an overview of the effect of the different input on the final results is provided.

Each main category of input is briefly described and analysed and its effect on either the final FCR matrix and on the costs matrix is considered.

Frequency deviation

According to the methodology, the frequency deviation used as input by the Monte Carlo model are the historical Nordic and CE frequency trends.

According to Article 4(2) of [1], the historical frequency data have been analysed to elaborate statistics of both deterministic frequency deviations and long-lasting frequency events.

These statistics are then used for the random extractions made by the Monte Carlo model.

Long-lasting frequency deviation

Long lasting frequency events are events with an average steady state frequency deviation larger than the standard frequency range over a period longer than the time to restore frequency.

According to this definition, the historical frequency trends have been analysed to find out all the occurrence of this kind of conditions. The list of all the long-lasting events has been then used to define a statistics description of their occurrence (e.g. minutes in which they usually start).

These statistics are then used by Monte Carlo model to extract the long-lasting event to be simulated. A specific extraction of a long-lasting event by the Monte Carlo means that a single really-occurred long-lasting event is simulated in the model. The extraction of the events takes into account the years in which the long-lastings occurred: the most recent years are weighted more than the less recent ones.

The occurrence of long-lasting event in the Monte Carlo simulation (e.g. the number of long-lasting which are on average extracted in a simulated year) is roughly the same as the real occurrence of long-lasting (average number of long-lasting occurred in the system).

The long-lasting event are by far the input having the larger energy content amongst all the input; it means that the energy used by FCR to contain these event is usually larger than the energy used for containing outages and DFDs. Furthermore, the simulation model does not activate FRR to restore frequency during these event: this choice is related to the fact that the long-lasting event already implicitly contain the FRR action. One of the main reason for a long-lasting to occur is a problem in the FRR activation.

For the previous reasons, the long-lasting event are by far the most impacting input on the results in terms of final FCR needed to avoid critical depletion (and Table 1).

Deterministic frequency deviation

The deterministic frequency deviations are extracted from historical data around the change of hour (from minute 55 to minute 05). The Monte Carlo model extract deterministic frequency deviation weighting more the most recent data than the less recent ones.

Even if the deterministic frequency deviation can reach significant values, their energy contents is usually not very large thanks to their limited duration. For this reason, the impact of them to the depletion of LER is minimal. Even reducing the amplitude of extracted DFDs of a 0.8 factor, the final FCR needed values (**Error! Reference source not found.** and Table 1) do not change.

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It is worth highlighting that DFDs and long-lasting extractions do not overlap each other. If a long-lasting is extracted, no DFDs is extracted as long as the long-lasting ends.

As for long-lastings, the simulation model does not activate FRR to restore frequency during DFDs: this choice is related to the fact that the DFDs already implicitly contain the FRR activation.

Outages

The outages are randomly extracted from a list of possible events (total or partial trip of generation units, trip of HVDC connecting a different synchronous area). The failure rates associated to different event categories have been provided in [4].

The energy content associated with the frequency deviation caused by an outage depends on the FRR FAT modelized in the simulation model. The FRR FAT are indicated in 0.

Considering the adopted FRR FATs and the failure rates, the energy content of the frequency deviation associated with outages is far less than the energy content of long-lasting. The impact on the results (in terms of FCR needed values) is minimal.

LER cost

The detail on how the costs associated to the LER have been defined are provided in [4].

The already existing LER have costs which do not consider the investment. The investment cost for them has been considered as a sunk cost. For them only the variable costs are taken into account (e.g. related to round trip efficiency and maintenance).

The newly installed LER have costs accounting for both investment and variable costs.

The effects of different approach on LER costs would obviously impact the max of overall costs (, , Table 2 and Table 4).

If the installation costs of LER decrease, the yearly costs to provide FCR due to LER would decrease only for the scenarios with LER share above the current situation. The already installed LER are not impacted by a change in the assumptions on installation costs.

If the OPEX of LER (e.g. maintenance) decrease, the yearly costs to provide FCR due to LER would decrease for all the scenarios.

It is important to highlight that, for the electrochemical storage (the reference technology of newly installed LER), the CAPEX costs do not increase proportionally with the increase of the energy-to-power ratio. The installation costs include elements independent from the energy capacity of the plant, such as power electronics, grid connection and civil work. Also the OPEX do not increase proportionally with energy-to-power ratio.

The impact of different assumptions in LER costs shall then be considered looking at all the different components: either the energy-dependant and the energy-independent.

Non LER cost

A detailed description of how the FCR provided by non-LER has been defined is provided in [4].

There are several factors that can impact the results in term of costs on non-LER, the main are:

- a change in the qualified FCR that the different technologies currently provide (e.g. related to decarbonisation).

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- a change in the variable costs of traditional generation (e.g. variation of gas/oil/coal/CO_2 costs);
- a change in the energy price (day ahead markets).

It is important however to highlight that even if these changes would potentially change the non-LER costs curve, the impact on the final CBA results (, , Table 2 and Table 3) is not proportional and shall be investigated to understand the effects.

For example, a change in the energy price (while all the other factors are the same) would make cheaper some provider and more expensive other providers. It all depends on the shift of opportunity costs. Therefore, it's hard to know a-priori the effects of different non-LER assumptions on the yearly costs to provide FCR due to non-LER.

Furthermore, these effect occurs only for the part of the cost curve below the clearing point: the changes in costs of "expensive" FCR would not impact the final results.

9. Consideration on FCR Additional Properties - Art.154(2) of SOGL

The whole CBA has been realized without taking into account the FCR Additional Properties (Art.154(2) of [2]), which are currently in discussion and not enforced yet, and which will impact a series of regulatory and technical aspects (increase of aFRR dimensioning, costs to be associated, transitional period will be provided, how to deal with existing plants, impact on FCR availability of existing LER with 15'). As stated in the methodology, when relevant changes in the assumptions will occur, the CBA shall be accordingly run again.

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