Godkännande av förslag till ändrade dimensioneringsregler för frekvensåterställningsreserver

Beslut

1 Energimarknadsinspektionen (Ei) godkänner Affärsverket svenska kraftnäts (Svenska kraftnät) förslag till ändrade dimensioneringsregler för frekvensåterställningsreserver. Dimensioneringsregler för frekvensåterställningsreserver framgår efter dessa ändringar av bilaga 1.

2 Beslutet gäller under förutsättning att samtliga berörda tillsynsmyndigheter fattar ett beslut med samma innebörd inom den tidsfrist som anges i kommissionsförordningen SO.

3 Detta beslut kan komma att ändras eller upphävas efter begäran av Europeiska kommissionen.

Beskrivning av ärendet

Bakgrund

I Europa pågår ett arbete med att koppla ihop EU:s energimarknader. Syftet är att upprätta en inre energimarknad som kan trygga energiförsörjningen, öka konkurrensen och ge konsumenter möjlighet att köpa energi till överkomliga priser. Europeiska kommissionen har som ett led i detta arbete bland annat antagit flera förordningar inom elmarknadsområdet.

I Kommissionens förordning (EU) 2017/1485 av den 2 augusti 2017 om fastställande av riktlinjer för driften av elöverföringssystem (SO) fastställs gemensamma krav och principer för driftsäkerheten i elöverföringssystem. Av SO framgår att Svenska kraftnät ska vara med och ta fram ett antal metoder och villkor vad gäller driften av elöverföringssystemet. Några av dessa metoder och villkor tas fram gemensamt av samtliga systemansvariga för överföringssystem inom EU medan andra tas fram av systemansvariga för överföringssystem

(systemansvariga) inom synkronområdet för Norden. I synkronområdet Norden är Svenska kraftnät, Energinet (Danmark), Fingrid Oyj (Finland) och Statnett SF (Norge) samt Kraftnät Åland AB (Åland) systemansvariga för överföringssystem (systemansvariga i Norden).

Systemansvariga inom ett synkronområde har enligt SO rätt att i driftavtal om synkronområden gemensamt ta fram förslag till dimensioneringsregler för frekvensåterställningsreserver (FRR[1]). Förslaget ska godkännas av samtliga tillsynsmyndigheter inom regionen inom sex månader från det att de tagit emot förslaget eller från det att den sista berörda tillsynsmyndigheten gjort det.

Om tillsynsmyndigheterna begär en ändring för att kunna godkänna förslaget ska de besluta om de ändrade villkoren eller metoderna inom två månader från det att de lämnats in.

FRR är de aktiva reserver som finns tillgängliga för att återställa systemfrekvensen till nominell frekvens och, för ett synkronområde som består av mer än ett kontrollområde för lastfrekvensreglering, för att återställa effektbalansen till det planerade värdet.

Enligt artikel 157.1 i SO ska systemansvariga i ett kontrollblock fastställa dimensioneringsregler för FRR i driftavtalet om kontrollblocket. Av artikel 157.2 i SO framgår vad dimensioneringsreglerna åtminstone ska omfatta.

Svenska kraftnät kom den 14 september 2018 in med ett förslag till dimensioneringsregler för FRR i enlighet med artikel 157.1 i SO. Ei beslutade att förslaget kunde godkännas den 11 juli 2019[2].

Det aktuella förslaget

Den 29 juni 2022 kom Svenska kraftnät in med ett förslag till ändrade dimensioneringsregler för FRR. I förslaget har Svenska kraftnät inkluderat fler detaljer och ökat transparensen i dimensioneringsprocessen för FRR jämfört med den tidigare godkända metoden. Utöver detta har Svenska kraftnät även inkluderat en metod för hur man bestämmer förhållandet mellan aFRR och mFRR vid dimensionering av FRR. En annan ändring från den första godkända metoden är tid för full aktivering av aFRR och mFRR. Svenska kraftnät har föreslagit att

[1] Frequency Restoration Reserve
[2] Ei:s ärendenummer: 2018-102170

detta ska harmoniseras med reglerna för standardprodukter för aFRR och mFRR i enlighet med förordningen (EU) 2017/2195.

Ei har analyserat förslaget tillsammans med de övriga tillsynsmyndigheterna i synkronområdet Norden, Försyningstilsynet i Danmark, Energiavirasto i Finland och den norska tillsynsmyndigheten Norges vassdrags- og energidirektorat samt Ålands energimyndighet (tillsynsmyndigheterna).

Efter den gemensamma bedömningen, kom tillsynsmyndigheterna överens om att det aktuella förslaget behövde ändras för att respektive tillsynsmyndighet skulle kunna godkänna det.

Ei skickade därför, den 21 december 2022, en begäran till Svenska kraftnät om att ändra det aktuella förslaget. Svenska kraftnät kom in med ett reviderat förslag den 13 februari 2023.

Efter den gemensamma bedömningen, kom tillsynsmyndigheterna överens om att systemansvarigas reviderade förslag inte tog tillräcklig hänsyn till alla punkter i tillsynsmyndigheternas begäran om ändring. Tillsynsmyndigheterna inledde därför processen med att revidera förslaget i enlighet med artikel 5.6 i förordningen (EU) 2019/942.

Samråd

Systemansvariga för överföringssystem ska i enlighet med artikel 11 i SO samråda med intressenter, inklusive de berörda myndigheterna i varje medlemsstat, om de utkast till förslag till villkor eller metoder som beskrivs i artikel 6.3. Samrådet ska vara i minst en månad. De synpunkter som kommer fram under samrådet ska tas i beaktande när metoden färdigställs.

Svenska kraftnät har uppgett att de under perioden den 1 mars – 1 april 2022 har genomfört ett samråd om förslaget. Svenska kraftnät har i förslaget som lämnats till Ei bifogat ett förklarande dokument som beskriver hur de, tillsammans med de andra systemansvariga i synkronområdet Norden har beaktat synpunkterna.

I samband med att tillsynsmyndigheterna inledde processen med att revidera förslaget i enlighet med förordningen (EU) 2019/942 genomförde tillsynsmyndigheterna ett samråd med Entso för el och systemansvariga i Norden under perioden den 14 mars – 28 mars 2023. Tillsynsmyndigheterna fick inget samrådssvar från Entso för el. Tillsynsmyndigheterna fick ett samrådssvar från systemansvariga i Norden där de föreslog att ersätta tillsynsmyndigheternas

föreslagna textändring "Systemansvariga strävar efter att dimensionera FRR för referensincidenten på daglig basis och FRR för normala obalanser på kvartalsbasis." med "Systemansvariga strävar efter att dimensionera FRR på en daglig basis". Systemansvariga i Norden har i sitt samrådssvar angett att de har startat ett separat projekt som syftar till att utveckla en gemensam nordisk modell för dynamisk dimensionering av FRR. Mot denna bakgrund föreslog systemansvariga i Norden att texten justeras. Tillsynsmyndigheterna har accepterat och införlivat den föreslagna ändringen i det reviderade förslaget.

Samordning under ärendets handläggning

Ei har berett ärendet tillsammans med de övriga tillsynsmyndigheterna.

Den 5 april 2023 kom tillsynsmyndigheterna överens om att det reviderade förslaget till ändrade dimensioneringsregler för FRR bör godkännas.

Bestämmelser som ligger till grund för beslutet

Kommissionens förordning (EU) 2017/1485 av den 2 augusti 2017 om fastställande av riktlinjer för driften av elöverföringssystem (SO)

Syftet med förordningen är att … c) fastställa gemensamma processer och strukturer för lastfrekvensreglering, d) säkerställa förutsättningarna för bibehållen driftsäkerhet i hela unionen, e) säkerställa förutsättningarna för bibehållen kvalitetsnivå för frekvenser i alla synkronområden i hela unionen, … h) bidra till en effektiv drift och utveckling av elöverföringssystemet och elsektorn i unionen (artikel 4.1).

Systemansvariga för överföringssystem ska utarbeta de villkor eller metoder som krävs enligt denna förordning och överlämna dem till de behöriga tillsynsmyndigheterna för godkännande i enlighet med artikel 6.2 och 6.3 eller till den enhet som utses av medlemsstaten för godkännande i enlighet med artikel 6.4 inom de respektive tidsfrister som anges i denna förordning (artikel 5.1).

Förslag till följande villkor eller metoder, och eventuella ändringar av dessa, ska vara föremål för godkännande av alla tillsynsmyndigheter i den berörda regionen, vilket en medlemsstat har möjlighet att yttra sig över till den berörda tillsynsmyndigheten: e) Metoder och villkor som anges i de driftavtal om kontrollblock för lastfrekvensreglering som avses i artikel 119, när det gäller följande: iv) Dimensioneringsregler för frekvensåterställningsreserver i enlighet med artikel 157.1. (artikel 6.3.e.iv).

Förslaget till metoder ska innehålla ett förslag till tidplan för genomförande och en beskrivning av metodens förväntade inverkan på målen för förordningen (artikel 6.6).

Om godkännandet av metod kräver ett beslut av mer än en tillsynsmyndighet ska de behöriga tillsynsmyndigheterna samråda och samordna med varandra för att nå en överenskommelse. Tillsynsmyndigheterna ska fatta beslut om de inlämnade villkoren eller metoderna i enlighet med punkterna 2 och 3 (däribland metoder för att bygga de gemensamma nätmodellerna) inom sex månader från det att tillsynsmyndigheten tagit emot metoden eller ifrån det att den sista berörda tillsynsmyndigheten tagit emot metoden (artikel 6.7).

Om byrån eller samtliga behöriga tillsynsmyndigheter gemensamt begär en ändring för att godkänna de villkor eller metoder som lämnats in i enlighet med artikel 6.2 respektive 6.3, ska de berörda systemansvariga för överföringssystemen inom två månader från byråns eller tillsynsmyndigheternas begäran lämna in ett förslag till ändrade villkor eller metoder för godkännande. Byrån eller de behöriga tillsynsmyndigheterna ska besluta om de ändrade villkoren eller metoderna inom två månader från det att de lämnats in (artikel 7.1)

De systemansvariga för överföringssystemen med ansvar för att lämna in förslag till metod i enlighet med förordningen, ska samråda med intressenter, inklusive de berörda myndigheterna i varje medlemsstat, om de utkast till förslag till metod som förtecknas i artikel 6.2 och 6.3. Samrådet ska vara i minst en månad (artikel 11.1).

De förslag till metod som lämnats in av de systemansvariga för överföringssystemen på regional nivå ska offentliggöras och lämnas in för offentligt samråd på regional nivå (artikel 11.2).

De systemansvariga för överföringssystemen med ansvar för att ta fram förslag till metod ska beakta de synpunkter från intressenter som framkommit vid samråden innan förslaget lämnas in för formellt godkännande. I samtliga fall ska en välgrundad motivering för eller emot införande av synpunkterna från samrådet tillhandahållas, tillsammans med det förslag som lämnas in, och offentliggöras i god tid före, eller samtidigt med, offentliggörandet av förslaget till villkor eller metoder (artikel 11.3).

Senast tolv månader efter denna förordnings ikraftträdande ska alla systemansvariga för överföringssystem i varje kontrollblock för

lastfrekvensreglering tillsammans utarbeta gemensamma förslag till dimensioneringsregler för frekvensåterställningsreserver, fastställda i enlighet med artikel 157.1 (artikel 119.1 h).

Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering fastställa dimensioneringsregler för frekvensåterställningsreserver i driftavtalet om kontrollblocket (artikel 157.1).

Dimensioneringsreglerna för frekvensåterställningsreserver ska omfatta åtminstone följande:

a) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering i synkronområdena för kontinentala Europa (CE) och Norden ska bestämma den nödvändiga reservkapaciteten i form av kontrollblockets frekvensåterställningsreserver, på grundval av fortlöpande historiska uppgifter som omfattar åtminstone de historiska värdena för kontrollblockets obalanser. Urvalet av dessa historiska uppgifter ska omfatta åtminstone frekvensåterställningstiden. Tidsperioden för dessa uppgifter ska vara representativ och omfatta åtminstone ett helt år som slutar maximalt sex månader före beräkningsdagen.

b) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering i synkronområdena för kontinentala Europa (CE) och Norden ska bestämma reservkapaciteten i form av frekvensåterställningsreserver i kontrollblocket så att den är tillräcklig för att ta hänsyn till de aktuella målparametrarna för inställningsfel vid frekvensåterställning i artikel 128 under den tidsperiod som avses i led a, på grundval av åtminstone en sannolikhetsbaserad metod. De systemansvariga för överföringssystemen ska genom att använda denna sannolikhetsbaserade metod ta hänsyn till de begränsningar som fastställs i avtalen om delning eller utbyte av reserver på grund av eventuella överträdelser avseende driftsäkerheten och tillgänglighetskraven för frekvensåterställningsreserverna. Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska ta hänsyn till eventuella förväntade betydande ändringar i fördelningen av obalanser för kontrollblock eller till andra inverkande faktorer som rör den tidsperiod som behandlas.

c) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska fastställa förhållandet mellan automatiska och manuella frekvensåterställningsreserver samt tid för full aktivering av automatiska

respektive manuella frekvensåterställningsreserver för att uppfylla kravet i punkt b. För detta ändamål får tiden för full aktivering av automatisk frekvensåterställningsreserv i ett kontrollblock för lastfrekvensreglering och tiden för full aktivering av manuell frekvensåterställningsreserv i kontrollblocket inte vara längre än frekvensåterställningstiden.

d) De systemansvariga för överföringssystemen i ett kontrollblock för lastfrekvensreglering ska bestämma storleken för referensincidenten, vilken ska vara den största obalans som kan bli följden av en momentan ändring av aktiv effekt från en enstaka kraftproduktionsmodul, en enstaka förbrukningsanläggning eller en enstaka sammanlänkning för högspänd likström, eller från en utlöst växelströmsledning, i kontrollblocket.

e) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska bestämma den positiva reservkapaciteten i form av frekvensåterställningsreserver, vilken inte får vara mindre än kontrollblockets positiva dimensionerande incident.

f) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska bestämma den negativa reservkapaciteten i form av frekvensåterställningsreserver, vilken inte får vara mindre än kontrollblockets negativa dimensionerande incident.

g) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska bestämma reservkapaciteten i form av frekvensåterställningsreserver i kontrollblocket, eventuella geografiska begränsningar för dess fördelning inom kontrollblocket och eventuella geografiska begränsningar för varje utbyte/delning av reserver med andra kontrollblock för att klara gränserna för driftsäkerhet.

h) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska säkerställa att den positiva reservkapaciteten i form av frekvensåterställningsreserver, eller en kombination av reservkapacitet i form av frekvensåterställningsreserver och ersättningsreserver, är tillräcklig för att täcka de positiva obalanserna i blocket under minst 99 % av tiden, på grundval av de historiska uppgifter som avses i led a.

i) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering ska säkerställa att den negativa reservkapaciteten i form av frekvensåterställningsreserver, eller en kombination av reservkapacitet i form av

frekvensåterställningsreserver och ersättningsreserver, är tillräcklig för att täcka de negativa obalanserna i blocket under minst 99 % av tiden, på grundval av de historiska uppgifter som avses i led a.

j) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering får minska den positiva reservkapaciteten i form av frekvensåterställningsreserver i kontrollblocket på grundval av resultatet från dimensioneringsprocessen för frekvensåterställningsreserverna, genom att ingå ett avtal om delning av frekvensåterställningsreserver med andra kontrollblock för lastfrekvensreglering i enlighet med bestämmelserna i avdelning 8. Följande krav ska gälla för detta avtal om delning:

i. För synkronområdena för kontinentala Europa (CE) och Norden: minskningen av den positiva reservkapaciteten i form av frekvensåterställningsreserver ska begränsas till skillnaden, om den är positiv, mellan storleken på den positiva dimensionerande incidenten och den reservkapacitet i form av frekvensåterställningsreserver som krävs för att klara de positiva obalanserna för kontrollblocket för lastfrekvensreglering under 99 % av tiden, på grundval av de historiska uppgifter som avses i led a. Minskningen av den positiva reservkapaciteten får inte vara större än 30 % av storleken på den positiva dimensionerande incidenten.

ii. För synkronområdena för Storbritannien (GB) och Irland-Nordirland (IE/NI): den positiva reservkapaciteten i form av frekvensåterställningsreserver och risken för utebliven leverans på grund av delning ska bedömas fortlöpande av de systemansvariga för överföringssystemen i kontrollblocket för lastfrekvensreglering.

k) Alla systemansvariga för överföringssystem i ett kontrollblock för lastfrekvensreglering får minska den negativa reservkapacitet i form av frekvensåterställningsreserver i kontrollblocket som är ett resultat av dimensioneringsprocessen för frekvensåterställningsreserverna, genom att ingå ett avtal om delning av frekvensåterställningsreserver med andra kontrollblock för lastfrekvensreglering i enlighet med bestämmelserna i avdelning 8. Följande krav ska gälla för detta avtal om delning:

i. För synkronområdena för kontinentala Europa (CE) och Norden: minskningen av den negativa reservkapaciteten i form av frekvensåterställningsreserver ska begränsas till skillnaden, om den är positiv, mellan storleken på den negativa

dimensionerande incidenten och den reservkapacitet i form av frekvensåterställningsreserver som krävs för att klara de negativa obalanserna för kontrollblocket för lastfrekvensreglering under 99 % av tiden, på grundval av de historiska uppgifter som avses i led a.

ii. För synkronområdena för Storbritannien (GB) och Irland-Nordirland (IE/NI): den negativa reservkapaciteten i form av frekvensåterställningsreserver och risken för utebliven leverans på grund av delning ska bedömas fortlöpande av de systemansvariga för överföringssystem i kontrollblocket för lastfrekvensreglering (artikel 157.2).

Europaparlamentets och rådets förordning (EU) 2019/942 av den 5 juni 2019 om inrättande av Europeiska unionens byrå för samarbete mellan energitillsynsmyndigheter

När en av följande rättsakter innehåller bestämmelser om utarbetande av förslag till villkor eller metoder för genomförandet av nätföreskrifter och riktlinjer som kräver godkännande från alla tillsynsmyndigheter i den berörda regionen, ska dessa tillsynsmyndigheter enhälligt komma överens om de gemensamma villkor eller metoder som ska godkännas av var och en av dessa tillsynsmyndigheter: a) en unionslagstiftningsakt som antagits enligt det ordinarie lagstiftningsförfarandet, b) nätföreskrifter och riktlinjer som antagits före den 4 juli 2019, och senare översyner av dessa nätföreskrifter och riktlinjer, eller c) nätföreskrifter och riktlinjer som antagits som genomförandeakter i enlighet med artikel 5 i förordning (EU) nr 182/2011. De förslag som avses i första stycket ska anmälas till Acer inom en vecka efter det att de lämnats in till tillsynsmyndigheterna. Tillsynsmyndigheterna får hänskjuta förslagen till Acer för godkännande enligt artikel 6.10 b andra stycket, och ska göra detta enligt artikel 6.10 a andra stycket om ett enhälligt beslut som avses i första stycket saknas. Direktören eller tillsynsnämnden får, på eget initiativ eller på förslag av en eller flera av nämndens ledamöter, begära att tillsynsmyndigheterna i den berörda regionen hänskjuter förslaget till Acer för godkännande. En sådan begäran ska begränsas till fall i vilka det regionalt överenskomna förslaget skulle få en påtaglig inverkan på den inre marknaden för energi eller på försörjningstryggheten utanför regionen (artikel 5.3).

Innan de villkor eller metoder som avses i punkterna 2 och 3 godkänns ska tillsynsmyndigheterna eller Acer, när den har behörighet, se över dem där så behövs, efter att ha hört Entso för el, Entso för gas eller EU-enheten för systemansvariga för distributionssystem, för att säkerställa att de är förenliga med nätföreskriftens eller riktlinjens syfte och bidrar till marknadsintegrering, icke-

diskriminering, effektiv konkurrens och en välfungerande marknad. Acer ska fatta beslut om godkännande inom den period som fastställs i de relevanta nätföreskrifterna och riktlinjerna. Perioden ska börja dagen efter den dag då förslaget hänsköts till Acer (artikel 5.6).

Ellagen (1997:857)

I ett beslut av nätmyndigheten enligt sådana riktlinjer som har antagits med stöd av förordning (EG) nr 714/2009 ska det anges att beslutet kan komma att ändras eller upphävas efter begäran av Europeiska kommissionen (12 kap. 1 b §).

Ei:s motivering till beslutet

Formella förutsättningar för att kunna godkänna ansökan

Ei har samordnat detta beslut med övriga berörda tillsynsmyndigheter. Svenska kraftnät har genomfört samråd om förslaget. Ei har genomfört samråd med ENSTO-E och systemansvariga i Norden om revidering av förslaget. De formella förutsättningarna i SO och förordningen (EU) 2019/942 för förslagets beredning och revidering är därmed uppfyllda.

Provning i sak

Svenska kraftnäts förslag till ändrade dimensioneringsregler för FRR innebär fler detaljer och ökat transparens i dimensioneringsprocessen för FRR jämfört med den tidigare godkända metoden. Utöver detta har Svenska kraftnät även inkluderat en metod för hur man bestämmer förhållandet mellan aFRR och mFRR vid dimensionering av FRR. En annan ändring från den första godkända metoden är tid för full aktivering av aFRR och mFRR. Svenska kraftnät har föreslagit att detta ska harmoniseras med reglerna för standardprodukter för aFRR och mFRR i enlighet med förordningen (EU) 2017/2195.

Ei bedömer att förslaget till ändrade dimensioneringsregler för FRR är tillräckligt väl beskrivet. Förslaget innehåller en rimlig tidsplan för genomförandet. Svenska kraftnäts förslag till ändrade dimensioneringsregler för FRR bedöms uppfylla de övergripande målen som anges i SO. Sammantaget anser Ei att förslaget kan godkännas.

Beslutet i detta ärende förutsätter för sin giltighet att samtliga berörda tillsynsmyndigheter inom regionen fattar ett beslut med samma innebörd.

De gemensamma bestämmelserna kommer att börja tillämpas först när samtliga berörda tillsynsmyndigheter har beslutat att godkänna bestämmelserna. När bestämmelserna har beslutats av tillsynsmyndigheterna ska Svenska kraftnät offentliggöra de godkända bestämmelserna enligt artikel 8.1 i SO.

Ei:s beslut kan komma att ändras eller upphävas efter begäran av Europeiska kommissionen.

Detta beslut har fattats av avdelningschefen Carl Johan Wallnerström. Föredragande var analytikern Reza Baradar.

Beslutet har fattats digitalt och saknar därför underskrifter.

Carl Johan Wallnerström

Reza Baradar

Bilagor

1 Ansökan - Amended Nordic LFC block methodology for FRR dimensioning in accordance with Article 157(1) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

2 Överklagandehänvisning

Skickas till

Affärsverket svenska kraftnät (delges)

Byrån för samarbete mellan energitillsynsmyndigheter, ACER (för kännedom)

Amended Nordic LFC block methodology for FRR dimensioning in accordance with Article 157(1) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

04 April 2023

All TSOs of the Nordic LFC block, taking into account the following:

Whereas

(1) This document is a common methodology developed by all Transmission System Operators within the Nordic synchronous area (hereafter referred to as "**TSOs**") for the FRR dimensioning rules in accordance with Article 157(1) 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**'. The methodology is an amended version of the methodology *'Amended Nordic synchronous area proposal for the FRR dimensioning rules in accordance with Article 157(1) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation'* of 13 May 2019 that was approved by the NRAs in July 2019.

(2) The Methodology takes into account the general principles and goals set in SO Regulation as well as Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (Regulation (EU) No 2019/943). Article 119(1)(h) of the SO Regulation sets for this purpose requirements for the TSOs to "*jointly develop common proposals for: [..] the FRR dimensioning rules defined in accordance with Article 157(1);"*

(3) Article 157(1) of the SO Regulation defines the scope of this Methodology: *"1. All TSOs of a LFC Block shall set out FRR dimensioning rules in the LFC Block operational agreement.".* In Article 157(2) of the SO Regulation, the minimum requirements for the FRR dimensioning rules are specified.

(4) The TSOs apply two types of Frequency Restoration Reserves (FRR). This Methodology covers the dimensioning of both manual FRR (mFRR) and automatic FRR (aFRR).

(5) 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: […]

(e) methodologies and conditions included in the LFC block operational agreements in Article 119, concerning: […]

(iv) the FRR dimensioning rules in accordance with Article 157(1);"

(6) 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.

(7) 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 contributes to these objectives by specifying the dimensioning rules for mFRR and aFRR, which are key reserves that are used in the common Nordic load-frequency control processes. Sufficient mFRR and aFRR guarantee the right FRCE and frequency quality level and consequently maintain the operational security by reducing the risk for automatic Low Frequency Demand Disconnection (LFDD), forced manual load shedding, tripping or automatic reduction of generation and for system blackouts due to under or over frequency. The Methodology also considers available transmission capacity for exchange of balancing energy.

(8) 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 AMENDED METHODOLOGY FOR THE DIMENSIONING RULES FOR FRR TO ALL REGULATORY AUTHORITIES OF THE NORDIC LFC BLOCK:

Article 1 - Subject matter and scope

The FRR dimensioning rules described in this Methodology are the common methodology of TSOs in accordance with article 157(1) of the SO Regulation. The Methodology applies solely to the Nordic LFC block.

The Nordic LFC block comprises the Nordic synchronous area which 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.

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.
2. In addition, this Methodology applies the following definitions and interpretations:
    a. Normal imbalances: Imbalances caused by the continuous mismatch between generation, demand, import and export. Normal imbalances include stochastic imbalances, deterministic imbalances and forecast errors; In this Methodology the imbalances are represented by the Area Control Error Open Loop (ACE OL);
        i Fast-changing imbalance: The fast-changing imbalance are the imbalances that are intended to be handled by FRR. They are obtained by filtering ACE OL data, imbalances which change faster than the maximum Full Activation Time of automatic FRR are filtered out.
        ii Slow-changing imbalance: The slow-changing imbalance are the imbalances that are intended to be handled with manual FRR. They are obtained by filtering ACE OL data, imbalances which change faster than the Time to Restore Frequency are filtered out.
        iii Short-term imbalances: The short-term imbalances are calculated by subtracting the slow-changing imbalance time series from the fast-changing imbalance time series. In the context of FRR dimensioning the short term imbalances are defined as the variation in normal imbalance during a quarter hour.
    b. Available transmission capacity (ATC): In this Methodology ATC is the cross-zonal capacity available for exchange of balancing energy across a border between two LFC areas. It is equivalent to the remaining cross-zonal capacity after the clearing of the intraday market. Exchange of balancing energy encompasses both imbalance netting and transmission of FRR.
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 – FRR dimensioning for the LFC block

1. The total amount of reserve capacity on FRR for the LFC block shall be the combination of the automatic and manual FRR for normal imbalances and the manual FRR for reference incident in both positive and negative direction.
2. The reserve requirements on automatic and manual FRR indicated in paragraph 1 will set the ratio between automatic and manual FRR for the LFC block and per LFC area, and the ratio will be dynamic. Dimensioning of reserve capacity on automatic FRR is described in Article 8(5).
3. All TSOs shall use the input data as described in Article 5.
4. All TSOs shall dimension FRR with the objective to minimise, within geographical limitations, the total amount of required FRR for the LFC block taking into account:
    a. The rules for dimensioning the total amount of reserve capacity on FRR for the LFC block as described in Article 6;
    b. The rules for dimensioning FRR for reference incident as described in Article 7;
    c. The rules for dimensioning FRR for normal imbalances as described in Article 8.
5. The TSOs geographically distribute the required FRR by dimensioning FRR per LFC area in accordance with the rules set out in Article 7 and 8.

Article 4 – Full Activation Time for FRR

Full Activation Time, FAT, for mFRR and aFRR are in accordance with Electricity Balancing Guideline Article 25, 4(c), (EU) 2017/2195.

Article 5– Input to FRR dimensioning methodology

The input to the FRR dimensioning methodology shall be:

a. *Historical LFC block imbalance*: aggregated historical LFC area imbalance of all LFC areas with a sample rate of minimum one minute;
b. *Historical LFC area imbalance* for each LFC area, consisting of consecutive historical records of the LFC area imbalance in accordance with the requirements for historical records in Article 157(2)(a) of the SO Regulation. The sampling of those historical records shall be minimum one minute. The LFC area imbalance will be calculated as the power deficit or surplus, if the TSO would not have taken any regulation actions to restore FRCE of the LFC area to zero;
c. *Reference incident for the LFC Block* in both positive and negative direction: the largest of the reference incidents of all control areas, which shall be the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, single HVDC interconnector or from a tripping of an AC line within the LFC block;
d. *Reference incident for each control area* in both positive and negative direction*:* the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, single HVDC interconnector or from a tripping of an AC line within the control area;
e. *Reference incident for each LFC area* in both positive and negative direction*:* the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, single HVDC interconnector or from a tripping of an AC line within the LFC area;
f. *Historical data on ATC* per LFC area border and direction with a sample rate of minimum one minute.

Article 6 – Rules for dimensioning the total amount of reserve capacity on FRR for the LFC block

1. The total amount of reserve capacity on positive FRR for the LFC block shall be sufficient to cover the positive LFC block imbalances for at least 99 % of the time, based on the historical records referred to in Article 5(1)(a);
2. The total amount of reserve capacity on negative FRR for the LFC block shall be sufficient to cover the negative LFC block imbalances for at least 99 % of the time, based on the historical records referred to in Article 5(1)(a);
3. The reserve capacity on FRR of the LFC block shall be sufficient to respect the current FRCE target parameters for the LFC block as specified in the synchronous area operational agreement in accordance with Article 118(1)(d)/128 of the SO Regulation. The TSOs shall ensure that the following probabilistic restrictions are fulfilled:
    a. The probability that the FRCE of the LFC block shall be outside the Level 1 FRCE range shall be less than 30 %; and
    b. The probability that the FRCE of the LFC block shall be outside the Level 2 FRCE range shall be less than 5 %.
4. A probabilistic methodology is used for dimensioning of FRR reserves for the LFC block, and to fulfil the FRCE target parameters set out in paragraph 3 of this article, the TSOs shall take into account:
    a. The ATC per LFC area border and direction based on historical records;

b. The restrictions defined in the agreements for sharing or exchange of reserves due to possible violations of operational security and the FRR availability requirements as specified in the LFC block operational agreement in accordance with Article 119(1)(l)/158(2) of the SO Regulation;
c. Any expected significant changes to the distribution of LFC block imbalances; or
d. Other relevant influencing factors relative to the time period considered.

Article 7 – Rules for dimensioning FRR for reference incident

1. The reserve capacity on positive FRR for reference incident for the LFC block shall be the sum of reserve capacity on positive FRR for reference incident for all control areas after possible sharing according to Article 7(3);
2. For each control area, the required capacity on positive FRR for reference incident shall cover at least the positive reference incident for the control area. Each TSO shall make sure that each LFC area within its control area will have access to sufficient positive FRR for reference incident to cover the positive reference incident for the LFC area, taking into account the ATC between LFC areas;
3. The required reserve capacity on positive FRR for reference incident for the LFC block shall be reduced by sharing of the required reserve capacity on positive FRR for reference incident of control areas subject to all of the following conditions:
    a. Agreement on sharing by all TSOs of the LFC block;
    b. The probability that the required ATC will be available shall be calculated based on the historical data on ATC (specified in Article 5(1)(f)). and shall not be less than a specified threshold of 99% (hereafter referred to as “ATC threshold”). The ATC threshold is evaluated and updated at least once a year in order to meet the objective specified in Article 3(4) and the requirements for the LFC block as specified in Article 6);
4. Paragraph 3(a) and 3(b) shall take into account known long-term grid outages, cross-zonal capacity allocated for the exchange of balancing capacity by the market and other factors which may impact the results for the time period for which FRR is dimensioned.
5. The reserve capacity on negative FRR for reference incident for the LFC block shall be the sum of reserve capacity on negative FRR for reference incident for all control areas after possible sharing according to Article 7(6);
6. For each control area, the required capacity on negative FRR for reference incident shall cover at least the negative reference incident for the control area. Each TSO shall make sure that each LFC area within its control area will have access to sufficient negative FRR for reference incident to cover the negative reference incident for the LFC area, taking into account the ATC between LFC areas;
7. The required reserve capacity on negative FRR for reference incident for the LFC block shall be reduced by sharing of the required reserve capacity on negative FRR for reference incident of control areas subject to all of the following conditions:
    a. Agreement on sharing by all TSOs of the LFC block;
    b. The probability that the required ATC will be available shall be calculated based on the historical data on ATC (specified in Article 5(1)(f)) and shall not be less than a specified threshold of 99% (hereafter referred to as “ATC threshold”). The ATC threshold is evaluated and updated at least once a year in order to meet the objective specified in article 3(4) and the requirements for the LFC block as specified in Article 6.;
8. Paragraph 7(a) and 7(b) shall take into account known long-term grid outages, cross-zonal capacity allocated for the exchange of balancing capacity by the market and other factors which may impact the results for the time period for which FRR is dimensioned.
9. The minimum reserve capacity for automatic FRR is 0, as this reserve is not dimensioned to handle reference incidents.

Article 8 – Rules for dimensioning FRR for normal imbalances

1. The reserve capacity on positive FRR for normal imbalances for the LFC block shall be the sum of reserve capacities on positive FRR for normal imbalances for all LFC areas;
2. The reserve capacity on positive FRR for normal imbalances for the LFC block shall be minimised within the geographical limitations for the distribution of these reserves over the LFC block, based on the following rules:
    a. For each LFC area, it shall be taken into account that a normal imbalance can be partly or completely covered by imbalance netting.. This is done by performing an aggregation of normal imbalances between LFC areas within the control block, taking the remaining ATC after the dimensioning of reserve capacity on positive and negative FRR for reference incident into account in the aggregation. The result of the imbalance netting is a new set of normal imbalances for each LFC area;
    b. For each LFC area, the probability that the imbalances, after imbalance netting is taken into account, can be completely covered by reserve capacity on positive FRR for normal imbalances shall not be less than a defined risk level for the LFC Block. The risk level is applied to each individual LFC area to set the FRR need. The risk level is determined in accordance with Article 10;
    c. Paragraph a. and b. shall take into account known long-term grid outages, cross-zonal capacity allocated for the exchange of balancing capacity by the market and other factors, which may impact the results for the time period for which FRR is dimensioned.
3. The reserve capacity on negative FRR for normal imbalances for the LFC block shall be the sum of reserve capacities on negative FRR for normal imbalances for all LFC areas;
4. The reserve capacity on negative FRR for normal imbalances for the LFC block shall be minimised within the geographical limitations for the distribution of these reserves over the LFC block, based on the following rules:
    a. For each LFC area, it shall be taken into account that a normal imbalance can be partly or completely covered by imbalance netting. This is done by performing an aggregation of normal imbalances between LFC areas within the control block, taking the remaining ATC after the dimensioning of reserve capacity on positive and negative FRR for reference incident into account in the aggregation. The result of the imbalance netting is a new set of normal imbalances for each LFC area;
    b. For each LFC area, the probability that the imbalances, after imbalance netting is taken into account, can be completely covered by reserve capacity on negative FRR for normal imbalances shall not be less than a defined risk level for the LFC Block. The risk level is applied to each individual LFC area to set the FRR need. The risk level is determined in accordance with Article 10;
    c. Paragraph a. and b. shall take into account known long-term grid outages, cross-zonal capacity allocated for the exchange of balancing capacity by the market and other factors, which may impact the results for the time period for which FRR is dimensioned.
5. The minimum reserve capacity on automatic FRR for normal imbalances for the LFC areas are calculated from the short-term imbalances. The short-term imbalances represent the imbalances that are intended to be handled with automatic FRR. The determination of short-term imbalances shall take into account the activation time of automatic FRR and the manual FRR, the full activation time of automatic FRR and manual FRR are stated in Article 4.

Article 9 – Process for FRR dimensioning

The FRR dimensioning process shall follow step 1 to 3 of this Article and be conducted at least once a year. The TSOs aim to dimension FRR on a daily basis.

1. Collection of input data including the input data specified in Article 5;
2. Dimensioning calculations in accordance with the rules in Article 3 to 8, including
    a. baseline calculations, including
        i. stand-alone FRR requirements per LFC area based on a confidence interval on the probability distribution of historical ACE OL data, where the confidence interval corresponds to the risk level;
        ii. calculation of minimum LFC block and control area requirements, without taking limitations in ATC into account (so called copper plate), by applying a confidence interval on the probability distribution of the historical ACE OL of the LFC block. The confidence interval corresponds to the risk level.
    b. optimisations, including
        i. aggregation of reserve capacity on FRR for reference incident between the LFC areas within a control area taking limitations in ATC into account in accordance with Article 7(2) and 7(5);
        ii. sharing of FRR for reference incident between control areas taking limitations in ATC into account in accordance with Article 7(3) and 7(6);
        iii. statistical aggregation of normal imbalances between LFC areas within a control area taking limitations in ATC into account in accordance with Article 8(2)(a) and 8(4)(a);
        iv. statistical aggregation of normal imbalances between LFC areas within the LFC block taking limitations in ATC into account in accordance with Article 8(2)(a) and 8(4)(a).
    c. calculation of minimum amount of aFRR in accordance with the rules in Article 8(5).
3. Determination of FRR volume requirements and the minimum requirement for aFRR;

Article 10 – Process for yearly tuning of the FRR dimensioning

1. The FRR dimensioning process shall be evaluated yearly in order to ensure compliance for the LFC Block with Article 6(1-3). The evaluation is based on operational experience with the results from the dimensioning process.
2. A yearly tuning of the parameters ATC threshold, mentioned in Article 7(3)(b) and 7(7)(b), and risk level, mentioned in Article 8(2)(b) and Article 8(4)(b), shall be performed based on the results of the evaluation.

Article 11 – 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. The TSOs shall implement the dimensioning rules for FRR when all TSOs in Nordic LFC Block are using fully ACE based balancing.

Article 12 - 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.

Explanatory document for the amended Nordic LFC block methodology for FRR dimensioning in accordance with Article 157(1) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

13 February 2023

1. Introduction

The Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereinafter **"SO Regulation"**) sets out rules on relevant subjects that should be coordinated between Transmission System Operators, as well as between TSOs and Distribution System Operators and with significant grid users, where applicable. The goal of the SO Regulation is to ensure provision of an efficient functioning of the interconnected transmission systems to support all market activities. In order to deliver these objectives, a number of steps are required.

One of these steps is to define a methodology for FRR dimensioning. Pursuant to Article 119(1)(h) of the SO Regulation, all Transmission System Operators in the Nordic LFC Block shall jointly develop common proposals for the FRR dimensioning rules defined in accordance with Article 157(1).

This document contains an explanation of the common methodology developed by all Transmission System Operators within the Nordic synchronous area (hereinafter "**TSOs**") dated 06.09.2022. This methodology is hereafter referred to as '**Methodology**'.

This explanatory document is structured as follows: The legal requirements for the Methodology are presented in Chapter 2. Chapter 3 describes the objective of the Methodology. Chapter 4 provides an overview of the existing situation. The proposed FRR dimensioning rules are described and explained in Chapter 5. Chapter 6 describes the expected impact on the relevant objectives of the SO Regulation. Finally, Chapter 7 provides the timeline for implementation and Chapter 8 describes the public consultation.

2. Legal requirements and interpretation

2.1 Legal references and requirements

Several articles in the SO Regulation set out requirements, which the Methodology must take into account. These are cited below.

(1) Article 119(1)(h) and (2) of the SO Regulation constitutes the legal basis that the Methodology should take into account. Article 119 has the following content:

"1. By 12 months after entry into force of this Regulation, all TSOs of each LFC block shall jointly develop common proposals for: […]

(h) the FRR dimensioning rules defined in accordance with Article 157(1); […]

2. All TSOs of each LFC block shall submit the methodologies and conditions listed in Article 6(3)(e) for approval by all the regulatory authorities of the concerned LFC block. Within 1 month after the approval of these methodologies and conditions, all TSOs of each LFC block shall conclude an LFC block operational agreement which shall enter into force within 3 months after the approval of the methodologies and conditions;"

(2) Article 157 of the SO Regulation has the following content:

"1. All TSOs of a LFC Block shall set out FRR dimensioning rules in the LFC Block operational agreement.

2. The FRR dimensioning rules shall include at least the following:

(a) all TSOs of a LFC block in the CE and Nordic synchronous areas shall determine the required reserve capacity of FRR of the LFC block based on consecutive historical records comprising at least the historical LFC block imbalance values. The sampling of those historical records shall cover at least the time to restore frequency. The time period considered for those records shall be representative and include at least one full year period ending not earlier than6 months before the calculation date;

(b) all TSOs of a LFC block in the CE and Nordic synchronous areas shall determine the reserve capacity on FRR of the LFC block sufficient to respect the current FRCE target parameters in Article 128 for the time period referred to in point (a) based at least on a probabilistic methodology. In using that probabilistic methodology, the TSOs shall take into account the restrictions defined in the agreements for the sharing or exchange of reserves due to possible violations of operational security and the FRR availability requirements. All TSOs of a LFC block shall take into account any expected significant changes to the distribution of LFC block imbalances or take into account other relevant influencing factors relative to the time period considered;

(c) all TSOs of a LFC block shall determine the ratio of automatic FRR, manual FRR, the automatic FRR full activation time and manual FRR full activation time in order to comply with the requirement of paragraph (b). For that purpose, the automatic FRR full activation time of a LFC block and the manual FRR full activation time of the LFC block shall not be more than the time to restore frequency;

(d) the TSOs of a LFC block shall determine the size of the reference incident which shall be the largest imbalance that may result from an instantaneous change of active power of a single power generating module, single demand facility, or single HVDC interconnector or from a tripping of an AC line within the LFC block;

(e) all TSOs of a LFC block shall determine the positive reserve capacity on FRR, which shall not be less than the positive dimensioning incident of the LFC block;

(f) all TSOs of a LFC block shall determine the negative reserve capacity on FRR, which shall not be less than the negative dimensioning incident of the LFC block;

(g) all TSOs of a LFC block shall determine the reserve capacity on FRR of a LFC block, any possible geographical limitations for its distribution within the LFC block and any possible geographical limitations for any exchange of reserves or sharing of reserves with other LFC blocks to comply with the operational security limits;

(h) all TSOs of a LFC block shall ensure that the positive reserve capacity on FRR or a combination of reserve capacity on FRR and RR is sufficient to cover the positive LFC block imbalances for at least 99 % of the time, based on the historical records referred to in point (a);

(i) all TSOs of a LFC block shall ensure that the negative reserve capacity on FRR or a combination of reserve capacity on FRR and RR is sufficient to cover the negative LFC block imbalances for at least 99 % of the time, based on the historical record referred to in point (a);

(j) all TSOs of a LFC block may reduce the positive reserve capacity on FRR of the LFC block resulting from the FRR dimensioning process by concluding a FRR sharing agreement with other LFC blocks in accordance with provisions in Title 8. The following requirements shall apply to that sharing agreement:

(i) for the CE and Nordic synchronous areas, the reduction of the positive reserve capacity on FRR of a LFC block shall be limited to the difference, if positive, between the size of the positive dimensioning incident and the reserve capacity on FRR required to cover the positive LFC block imbalances during 99 % of the time, based on the historical records referred to in point (a). The reduction of the positive reserve capacity shall not exceed 30 % of the size of the positive dimensioning incident;

(ii) for the GB and IE/NI synchronous areas, the positive reserve capacity on FRR and the risk of non-delivery due to sharing shall be assessed continually by the TSOs of the LFC block;

(k) all TSOs of a LFC block may reduce the negative reserve capacity on FRR of the LFC block, resulting from the FRR dimensioning process by concluding a FRR sharing agreement with other LFC blocks in accordance with the provisions of Title 8. The following requirements shall apply to that sharing agreement:

(i) for the CE and Nordic synchronous areas, the reduction of the negative reserve capacity on FRR of a LFC block shall be limited to the difference, if positive, between the size of the negative dimensioning incident and the reserve capacity on FRR required to cover the negative LFC block imbalances during 99 % of the time, based on the historical records referred to in point (a);

(ii) for the GB and IE/NI synchronous areas, the negative reserve capacity on FRR and the risk of non-delivery due to sharing shall be assessed continually by the TSOs of the LFC block.

3. All TSOs of a LFC block where the LFC block comprises more than one TSO shall set out, in the LFC block operational agreement, the specific allocation of responsibilities between the TSOs of the LFC areas for the implementation of the obligations established in paragraph 2.

4. All TSOs of a LFC block shall have sufficient reserve capacity on FRR at any time in accordance with the FRR dimensioning rules. The TSOs of a LFC block shall specify in the LFC block

operational agreement an escalation procedure for cases of severe risk of insufficient reserve capacity on FRR in the LFC block."

(3) Article 6(3)(e)(iv) 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: […]
(e) methodologies and conditions included in the LFC block operational agreements in Article 119, concerning: […]
(iv) the FRR dimensioning rules in accordance with Article 157(1);"

(4) Article 152(1) of the SO Regulation has the following content:

"1. Each TSO shall operate its control area with sufficient upward and downward active power reserve, which may include shared or exchanged reserves, to face imbalances between demand and supply within its control area. Each TSO shall control the FRCE as defined in the Article 143 in order to reach the required frequency quality within the synchronous area in cooperation with all TSOs in the same synchronous area."

2.2 Interpretation and scope of the Methodology

The SO Regulation requires NRA approval for the FRR dimensioning rules in accordance with Article 157(1). Article 157(1) requires that all TSOs of a LFC block shall set out FRR dimensioning rules in the LFC block operational agreement. Article 157(2) further specifies the minimum requirements to the FRR dimensioning rules. The TSOs therefore consider that Article 157(1) and (2) of the SO Regulation set out the scope for this Methodology. These articles can however not be seen completely separate from Article 152(1) which requires each TSO to operate its control area with sufficient upward and downward FRR, which may include shared and exchanged reserves, to face imbalances between demand and supply within its control area. In accordance with Article 157(1) and (2) of the SO Regulation, the scope of this Methodology shall include the dimensioning of both manual FRR (mFRR) and automatic FRR (aFRR) for the Nordic LFC Block. The results of the dimensioning are the required amounts of upward and downward mFRR and aFRR for the Nordic LFC Block, including the geographical distribution.

Article 157(2)(j) and (k) refer to reducing the result of the FRR dimensioning by sharing of FRR with other LFC blocks. The TSOs consider that this reduction will take place after FRR dimensioning and shall therefore be outside the scope of this Methodology. The conditions specified in article 157(2)(j) and (k) are taken into account in the TSOs' proposal for the methodology to determine limits on the amount of exchange of FRR between synchronous areas in accordance with article 118(1)(z) of the SO Regulation.

Although Articles 119(1)(j)/157(3) and 119(1)(k)/157(4) require proposals that need to be included in the LFC block operational agreement, these proposals do not require NRA approval and are not part of the scope of this Methodology. Similarly, outside the scope of this Methodology is how the TSOs of the Nordic LFC block will ensure that sufficient FRR will be available in practice as referred to in Article 157(4) of the SO Regulation. Consequently, outside the scope of this Methodology are issues like procurement, pricing, acceptance of bids, settlement and (other) issues regulated in the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EBGL).

3. Objective of FRR dimensioning

The main purpose of FRR is restoring FRCE in the Nordic LFC block and consequently to replace activations of FCR. mFRR can also be pro-actively activated to prevent for FRCE deviations, e.g. in case of (expected) deterministic frequency deviations. FRR shall be sufficiently available to maintain the FRCE quality, and to be within system security limits. The objective of FRR dimensioning is to determine a volume of aFRR and mFRR that shall be available in the Nordic LFC block. As the Nordic LFC block experiences frequent congestions in the grid, the dimensioning shall take the geographical requirements for distribution of FRR into account.

4. The existing situation

In this chapter, the existing FRR dimensioning rules at the time of the submission of this amended methodology are described. The Manual Frequency Restoration Process (mFRP) and the Automatic Frequency Restoration Process (aFRP) are under development in the Nordics, migrating from frequency based to ACE based activation. The manual frequency restoration process (mFRP) is currently the dominant process for balancing, Section 4.1 describes mFRR dimensioning, while section 4.2 elaborates on aFRR.

4.1 mFRR dimensioning

mFRR shall exist in order to restore the faster reserves FCR-N, FCR-D and aFRR when these reserves have been activated and to control flows in the grid within applicable limits. mFRR is also pro-actively activated to prevent frequency deviations, e.g. in case of expected frequency deviations. The mFRR shall in normal operation exist and be localized to the extent that the synchronous system can be balanced at any time. mFRR is dimensioned by the individual TSOs based on their control area assessment of local requirements. Bottlenecks in the network, reference incident and similar are included when assessing this.

The requirements for mFRR volumes in upward direction are currently defined by large national N-1 incidents: Each control area shall have mFRR volumes available equivalent to or greater than the reference incident in the subsystem.

In addition, the TSOs must also have reserves or other measures available to handle other imbalances which are correlated with N-1 incidents or two or more simultaneous faults, if they are likely to occur at the same time, within the TSOs control area and on the borders to other control areas.

In practice, all four TSOs dimension the mFRR volumes for their control area and determine the required distribution within the control area. The mFRR volumes are based on the reference incident in the control area, as described above. However, some mFRR capacity is shared between Sweden and Denmark. mFRR that shall be available for handling of 'normal' BRP imbalances are not explicitly dimensioned for in Denmark East, Finland and Sweden. For this, these TSOs rely on voluntary mFRR energy bids that are available in the Nordic Regulating Power market. Statnett relies on voluntary mFRR energy bids when recent experience shows that such bids are delivered with sufficient volume. However, if the probability for availability of sufficient mFRR up or down is too low, Statnett contracts upward mFRR or downward mFRR reserves as required.

The TSOs see that there is sometimes a lack of reserves based on the voluntary bids, the plan is to resolve this using the mFRR capacity mechanism.

4.2 aFRR dimensioning

aFRR was introduced in the Nordic synchronous area in January 2013. The background for implementing and developing aFRR in the Nordics was the deteriorating frequency quality and aFRR was identified and agreed on as one of the main measures to stop the weakening of the frequency quality.

The aFRR product shall be seen as an automatic "complement" to mFRR in the Frequency Restoration process. The Nordic LFC block centrally activates aFRR from a single Load Frequency Controller (LFC). Based on the measured frequency, this LFC calculates the required activation of aFRR and distributes the activation requests to the Nordic TSOs pro-rata. Consequently, each Nordic TSO distributes the requests to the contracted aFRR providers in its control area.

Currently, only procured aFRR capacity can be activated and therefore the complete dimensioned amount shall be procured. Each quarter of a year, all Nordic TSOs determine the hours for which aFRR shall be dimensioned. These hours include the hours where the frequency variations are most challenging. Likewise, the required total aFRR in the Nordic LFC block is updated quarterly, the update is based on the targeted frequency quality and FRCE quality. The total volume is shared between the TSO's using a sharing key, which the Nordic TSOs have agreed upon.

5. Proposal for FRR dimensioning rules

On a high level, the goal for the FRR dimensioning rules is to have access to sufficient FRR in the LFC block to handle imbalances in all LFC areas at least 99% of time and respect the FRCE targets for the LFC block. In addition, each TSO is responsible for being able to handle potential reference incidents in their LFC areas. Different measures may be used to handle reference incidents, but each TSO shall have access to sufficient FRR to handle the Control area Reference Incident as a minimum.

The Methodology reflects this goal as it will be applied in the new Nordic Balancing Model. Below, the articles in the Methodology have been explained individually.

5.1 Article 2(2): Definitions

For the purpose of the Methodology, the TSOs distinguish two types of imbalances: normal imbalances (defined in section 5.1.1) and reference incidents (defined in section 5.1.2).

5.1.1 Normal imbalances

Normal imbalances are the imbalances that continuously happen in power systems. They are caused by stochastic deviations in load and generation, deterministic events at given times (e.g. shifts of hours) and forecast errors. Usually, normal imbalances consist of many small and large imbalances which partly compensate for each other since they are in the opposite direction. The aggregated normal imbalances changes continuously and results in a frequency deviation. The challenge for the TSOs is to keep the frequency within the standard frequency range (± 100 mHz).

5.1.2 Reference incidents

Imbalances can be caused by contingencies, including faults in a power generating module, a demand facility, a HVDC interconnector or from a tripping of an AC line. These imbalances are different from normal imbalances (which occur constantly) as large power deviations of this kind occur only occasionally and result in an instantaneous (within seconds) power surplus or deficit. An instantaneous power surplus or deficit produces an instantaneous frequency deviation, and may result in a frequency outside the standard frequency range. In these situations, the TSOs shall restore the frequency to the frequency restoration range (± 100 mHz) within time to restore frequency (15 minutes).

Article 3(1)(58) of the SO Regulation defines the term reference incident as "*the maximum positive or negative power deviation occurring instantaneously between generation and demand in a synchronous area, considered in the FCR dimensioning*". In a Nordic context, this would then be the maximum power deviation resulting from a contingency in the synchronous area that can occur in the time period for which the FRR dimensioning applies. The Nordic synchronous area and LFC block encompass the same bidding zones which means that in the context of reference incident they are interchangeable.

The Methodology sometimes refer to "reference incident for the LFC area" or "reference incident for the control area". This should be understood as the maximum positive or negative power deviation occurring instantaneously from generation, demand or an Interconnector in a LFC area or control area respectively. To make the distinction clear to the reader the Methodology always specifies the area which is evaluated for its possible maximum power deviation, even in the case of the synchronous area.

5.1.3 Dimensioning incident

Article 3(1)(109) of the SO Regulation defines the term dimensioning incident as *"the highest expected instantaneously occurring active power imbalance within a LFC block in both positive and negative direction*". In a Nordic terminology, this would be the maximum imbalance for the LFC Block, regardless of what is the cause(s) of the imbalance.

5.1.4 Available transmission capacity (ATC)

Balancing energy may be transferred between LFC areas but, as previously mentioned, the Nordic LFC block experiences frequent congestions in the grid. When FRR is activated the power lines between LFC areas already transmit the power exchanged on the day ahead- and intraday markets, only the capacity not used by the market will be available for transmission of reserves. This remaining unused transmission capacity after day ahead- and intraday markets is referred to as ATC in this Methodology.

5.2 Article 3: FRR dimensioning for the LFC block

The rules in this Methodology will result in the dimensioning of the automatic and manual FRR products. All together, the ratio of aFRR and mFRR, as referred to in article 157(2)(c), results from these individual components, as explained in paragraph 2 of this article. This means that firstly the reserve requirements for each LFC area on FRR and aFRR are calculated. When the volumes are known the part of the total FRR consisting of aFRR will give the ratio. The reserve requirement on aFRR is thus not calculated using the ratio, rather the ratio is calculated based on the reserve requirement on aFRR. The ratio is dynamic (it will change each time the dimensioning is repeated) and varies between LFC areas. The rules on the determination of this ratio are implicitly explained in Article 7(7) and 8(5).

Paragraph 4 of this article describes the general objective of FRR dimensioning which tries to find the optimal balance between efficiency and security of supply. I.e. the amount of FRR shall be sufficient to meet the rules that ensure a sufficient level of security of supply, but not more than that. The dimensioning shall have the objective to minimise the total amount of reserve capacity on FRR for the LFC block, within the geographical constraints (see Textbox 1) and without breaching the rules referred to in paragraph 4.

Textbox 1: FRR dimensioning in constrained Nordic LFC block

The Nordic LFC block consists of 11 LFC areas, which are equal to the 11 bidding zones. Since cross zonal capacity (CZC) is limited, day-ahead and intraday trading between the LFC areas/bidding zones is only possible up to a certain limit. The CZC that is used by the day-ahead and intraday markets, cannot be used by FRR. Consequently, considering these constraints in the Nordic system, TSOs shall make sure that FRR shall be distributed to the LFC areas in a way that supports FRR activation without breaching the constraints. In order to safeguard these conditions, the TSOs start the FRR dimensioning process by determining the required FRR for each LFC area (this gives the upper bound of the sizing) and for the LFC block (this gives the lower bound of the sizing) respectively. Based on the available grid capacity, the TSOs will accordingly aggregate their reserve need for the LFC areas (this calculation combines the individual LFC Area needs for both standard FRR products).

5.3 Article 4: Full Activation Time (FAT) for FRR

The full activation time means the period in time between the activation request by the TSO and the delivery of the full power contracted for the concerned product by the Balance Service Provider.

The full activation times are different for each product. EBGL article 25 defines framework conditions for the standard products and the actual FATs have been set in the common European activation platforms. In PICASSO the FAT for aFRR have been set to 5 minutes and in MARI the FAT for mFRR have been set to 12,5 minutes.

5.4 Article 5: Input to FRR dimensioning methodology

FRR dimensioning of the LFC block shall take into account the constrained Nordic LFC block and therefore also the FRR dimensioning per LFC area shall be considered. This is further clarified in Textbox 1. Consequently, the input that is specified in paragraph 1(a)-(f) in the Methodology includes both data for the LFC block and for the LFC area. Historical imbalances (paragraph (1)(a)-(b)) are calculated as the difference between the schedules and the measurements, corrected for the activation of reserves. This is commonly referred to as the Area Control Error Open Loop (ACE OL).

The annual calculation defining static values will be calculated with the previous year's data for LFC Area imbalance and ATC. The TSOs may additionally calculate the dimensioning on a daily basis using a smaller data set together with forecast data, including imbalance and ATC. This implies that additional input to what is listed in Article 5 may become relevant to the FRR dimensioning methodology, primarily forecast data, for example forecasts on remaining ATC or imbalance forecasts.

5.5 Article 6 – Rules for dimensioning the total amount of reserve capacity on FRR for the LFC block

FRR dimensioning will in principle take place separately for FRR for reference incidents (see section 5.6) and FRR for normal imbalances (see section 5.7). However, article 157(2)(b), (h) and (i) of the SO Regulation include several requirements that can only be applied to the total amount of reserve capacity on FRR. These requirements shall be taken into account by the TSOs in the dimensioning process and are included in Article 6.

Paragraph 3 refers to the FRCE target parameters for the LFC block, which are defined in the synchronous area operational agreement and are calculated in accordance with a separate approved methodology. The FRCE target parameters mirror the frequency quality target parameter that has been approved by the regulators in the frequency quality methodology[1].

Paragraphs 4(a)-(d) refer to the conditions in the second and third sentence of Article 157(2)(b) of the SO Regulation; *In using that probabilistic methodology, the TSOs shall take into account the restrictions defined in the agreements for the sharing or exchange of reserves due to possible violations of operational security and the FRR availability requirements. All TSOs of a LFC block shall take into account any expected significant changes to the distribution of LFC block imbalances or take into account other relevant influencing factors relative to the time period considered,* which have been literally taken into account in the FRR dimensioning rules.

[1] "Nordic synchronous area proposal for the frequency quality defining parameters and the frequency quality target parameter in accordance with Article 127 of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation", dated 10 September 2018.

5.6 Article 7 – Rules for dimensioning FRR for reference incident

Similar to what is discussed in the previous section and Textbox 1, dimensioning FRR for reference incidents in the Nordic LFC block requires that congestion shall be taken into account. To safeguard this, paragraph 2 and 5 specify the initial requirement for FRR dimensioning for reference incidents on a control area level.

The choice for dimensioning FRR for reference incident per 'control area' relates to the requirement in Article 152(1) of the SO Regulation that states that *'each TSO shall operate its control area with sufficient upward and downward active power reserve, which may include shared or exchanged reserves, to face imbalances between demand and supply within its control area [..]'*. TSOs operating more than one LFC area will further make sure that each of their LFC areas has access to sufficient FRR to cover a single reference incident at one point in time in any of the LFC areas.

This first sentence of Article 7(2) states that *'the required capacity on positive FRR for reference incidents shall cover at least the positive reference incident for the control area'*. This does not mean that the control area shall be self-sufficient or that the reserves shall be located in the control area itself. However, the TSO shall make sure that the control area has sufficient access to FRR to cover the requirement for its control area. Sharing of FRR with other control areas is one of the possibilities to achieve this. Article 7(3) and (6) explains that sharing between control areas will reduce the required FRR for the LFC block.

Since reference incidents only require occasional FRR activation and it is unlikely that reference incidents take place at the same time in all control areas, it may well be feasible to share FRR for reference incidents over more than one control area. This is described in paragraph 3 and 6, including the rules for sharing. Sharing of FRR requires the availability of transmission capacity. The availability of transmission capacity will be assessed by considering historical data on ATC and information on known outages, or, alternatively, the ATC forecast for the period under consideration.

As bigger reference incidents will occur rarely compared to normal imbalances, and FRCE in these cases shall be restored within Time to restore frequency, it is not necessary to dimension automatic FRR for this purpose but this part of total FRR volume can be covered by mFRR. For this reason, paragraph 7 indicates that the minimum reserve capacity on aFRR for reference incident per control area / LFC area is 0 MW.

5.7 Article 8 – Rules for dimensioning FRR for normal imbalances

As explained in Textbox 1, FRR dimensioning shall take the ATC between the LFC areas into account when aggregating the FRR need for the LFC areas. Accordingly, paragraph 2 and 4 include a number of rules related to the FRR requirements for LFC areas.

Paragraph 2(a) and 4(a) states that aggregation of normal imbalances between LFC areas within the control block shall be performed as part of the dimensioning. This is referred to as imbalance netting, see Textbox 2. When performing imbalance netting both the normal imbalances of the individual LFC areas are taking into account as well as the ATC. Transmission constraints will be taken into account by considering historical data on ATC and adjusting it according to information on known outages, cross-zonal capacity allocated for the exchange of balancing capacity by the market and other factors which may impact the results for the time period for which FRR is dimensioned. This should provide the best indication of the probability that sufficient transmission capacity will be available. Additionally, ATC already allocated to the dimensioning of FRR for reference incidents is deducted. Imbalance netting is performed in two steps:

1. Imbalance netting on a control area level, i.e. a statistical aggregation of normal imbalances between all LFC areas within a control area using remaining ATC after the dimensioning of FRR for reference incidents.

2. Imbalance netting on a LFC block level, i.e. a statistical aggregation of normal imbalances between all LFC areas within a LFC block using remaining ATC after step 1.

The reason why the procedure is performed in two steps is to guarantee that the TSOs which control area consists of multiple LFC areas are not unduly disadvantaged by the FRR dimensioning methodology. The result from imbalance netting is a new imbalance dataset for all LFC areas where the imbalances, when possible, have been reduced by imbalance netting.

Textbox 2: Imbalance netting

It is often the case in the Nordic LFC block that one LFC area has a positive imbalance while another LFC area has a negative imbalance. When that happens, those imbalances can be netted against each other meaning that, in that point in time, one area will completely cover its FRR need with netting while the other may activate less FRR since part of the need was covered by netting. The FRR need for an LFC area can thus be reduced by considering the probability that the area may be able to net some of its imbalances against other imbalances inside the LFC block. This reduction is limited by the remaining ATC, it is only possible to net two imbalances against each other if there is available transmission capacity. For an example of imbalance netting, see the Figure 1 below

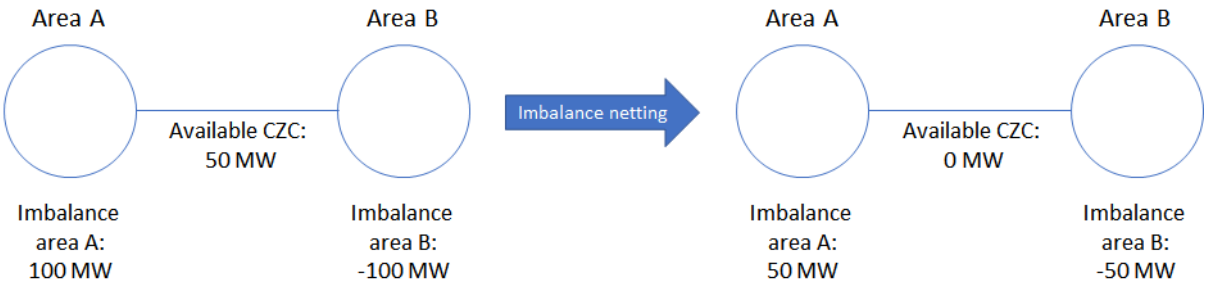

Figure 1: An example illustrating imbalance netting

Paragraphs 2(b) and 4(b) refer to a risk level, this is the accepted risk of insufficient reserve capacity on FRR in a LFC area. It is applied after imbalance netting in the dimensioning process. The risk level shall be subject to a periodic evaluation that will take place at least once a year, see Article 10 in the Methodology. If the risk level would have been fixed in the Methodology, FRR dimensioning could result in either over dimensioning or insufficient FRR to safeguard security of supply. A regular evaluation addresses these issues by applying the evaluation criteria as discussed in Textbox 3.

Textbox 3: Evaluation criteria for dimensioning

The dimensioning process will be regularly evaluated and adjusted based on experiences from real time operation. Relevant evaluation criteria may include:

a) Saturation of aFRR;
b) Access to resources for Reference Incidents for each LFC area;
c) Statistics for time with flows exceeding TTC on lines/cuts between LFC areas;
d) Yearly frequency quality target, distributed per quarter or shorter (related to e.g. seasonal variations in inertia);
e) FRCE target levels performance (ACE quality target levels);
f) Unnecessary large volumes of unused FRR capacity;
g) Costs for capacity procurement over time;
h) Alert state conditions and observed operational incidents;

Paragraph 5 explains the rules for determining the minimum reserve capacity on automatic FRR for normal imbalances per LFC area, which will be based on what is here referred to as the short-term imbalance per LFC area (see Textbox 3 for the definition). These short-term imbalances represent the imbalances that are to be handled by automatic FRR. The required minimum volumes of automatic FRR shall be based on an appropriate confidence interval on the probability distribution of the short-term imbalances, see the risk level referred to in 2(b) and 4(b). This will result in individual volumes for each LFC area based on its particular challenges.

Textbox 4: Definition of short-term imbalance

Short-term imbalances are the imbalances that are intended to be handled with automatic FRR. The determination of short-term imbalances shall take into account the automatic FRR and the manual FRR full activation times. In order to extract the short-term imbalances, the original time series of imbalance data is filtered twice to extract the fast-changing and slow-changing imbalance. The filtering can for example be performed by applying a rolling average to the data. To extract the fast-changing imbalance a shorter time window is used for the rolling average, for example 5 minutes to match the full activation time of the automatic FRR. A longer time window is applied when filtering the imbalance data to extract the slow-moving imbalances, for example 15 minutes to match the manual FRR EAM time frame. The time series for slow-changing imbalances are then subtracted from the time series for fast-changing imbalances, which gives us the short-term imbalances. Figure 2 illustrates this process.

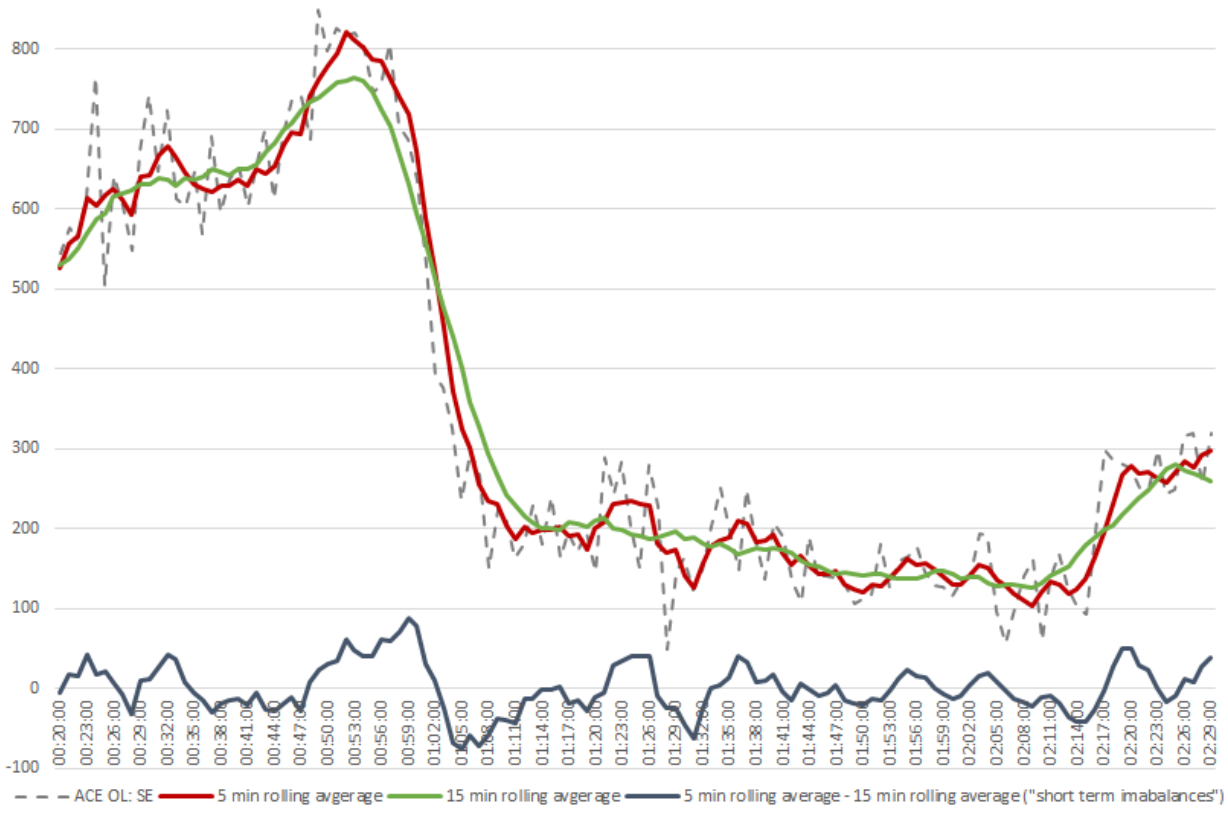

Figure 2: Definition of short-term imbalances.

It shall be noted that FRR for normal imbalances is "implicitly shared" between TSOs of the LFC block in the optimisation process for dimensioning and cannot be shared further.

5.8 Article 9 – Process for FRR dimensioning

Based on the rules in the Methodology, the TSOs develop the detailed FRR dimensioning methodology, paragraph 1-3 describes the steps of this methodology. The first step is the collection of input data, all TSOs of the LFC block will contribute with the necessary data, as described in Article 5.

When the input data is available, the upper and lower bounds of the dimensioning of reserve capacity on FRR can be determined. Calculation of the upper bound is described in paragraph 2(a)(i) and calculation of the lower bound is described in paragraph 2(a)(ii). The upper bound for the LFC areas corresponds to the FRR requirement if each LFC area was in itself an LFC block, i.e. calculation of reserve capacity on FRR for reference incident for each LFC area, instead of for each control area, and no imbalance netting when calculating the reserve capacity on FRR for normal imbalances. For the LFC block, the upper bound on reserve capacity on FRR is given by the sum of the upper bounds of the LFC areas. The lower bound is the reserve requirement on FRR if the LFC block only consisted of one LFC area and there were no geographical limitations for the distribution of the reserves within the LFC block.

Paragraph 2(b) describes the actual dimensioning. The calculation of reserve capacity on FRR for reference incidents is described in paragraph 2(b)(i) and 2(b)(ii). Paragraph 2(b)(i) corresponds to the first step in the dimensioning of reserve capacity on FRR for reference incident. In the first step the necessary capacity is determined so that each LFC area within a TSOs control area has access to sufficient capacity on FRR for reference incident to cover the LFC area reference incident. This will result in a reserve requirement per LFC area. In the next step the reserve requirement is reduced by sharing of reserves between control areas as described in paragraph 2(b)(ii).

The calculation of reserve capacity on FRR for normal imbalances is described in paragraph 2(b)(iii) and 2(b)(iv). Paragraph 2(b)(iii) corresponds to imbalance netting on a control area level (step 1 in section 5.7) and paragraph 2(b)(iv) corresponds to imbalance netting on a LFC block level (step 2 in section 5.7). Figure 3 shows an illustration of the process for calculating reserve capacity on FRR for normal imbalances. It illustrates where the netting fits into the FRR dimensioning methodology. Netting is part of dimensioning FRR for normal imbalances, it is not part of dimensioning FRR for reference incidents. For more information on imbalance netting see Article 8 in the Methodology or chapter 5.7 in this explanatory document.

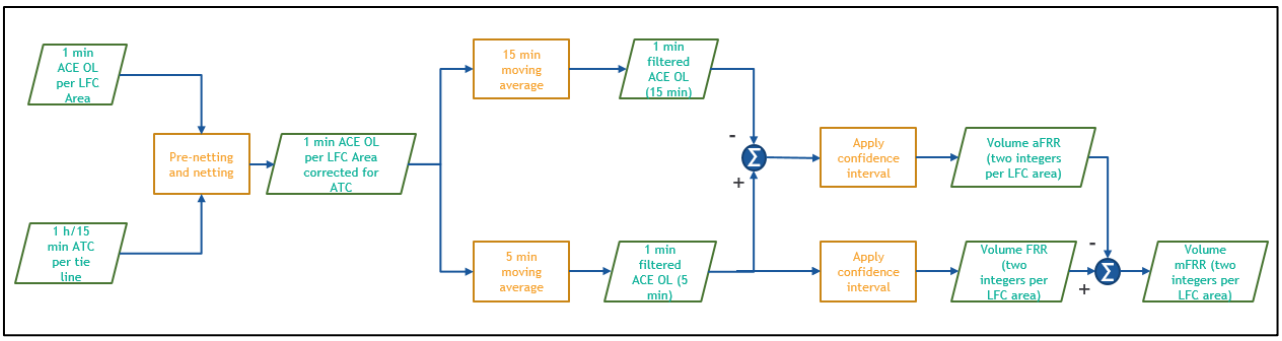

Figure 3: Process illustration for FRR dimensioning, normal imbalances

If the output after the steps described in 2(b) is outside the interval set up by the upper and lower bound it will be limited to either the upper or lower bound, depending on whether it is above or below the interval. The result after going through the steps in paragraph 1-3 will be the reserve capacity on FRR for normal imbalances per LFC area, including the minimum required aFRR volume.

5.9 Article 10 – Process for yearly tuning of the FRR dimensioning

Paragraph 1 and 2 states that the process of FRR dimensioning – together with provisioning and operation – includes a continuous optimisation cycle based on regular evaluations. This will allow improving the detailed FRR dimensioning process continuously, which will be essential considering the near future changes in the Nordic LFC block including (but not limited to) the implementation of the New Nordic Balancing Model, the introduction of the 15 minute ISP, new HVDC interconnectors and more intermittent generation. The TSOs can only respond swiftly if the TSOs have sufficient flexibility in improving their processes. Including a detailed process in the Methodology would therefore not be preferable. Because the detailed process shall be compliant with the rules in the Methodology, the objectives and the requirements for the process are safeguarded.

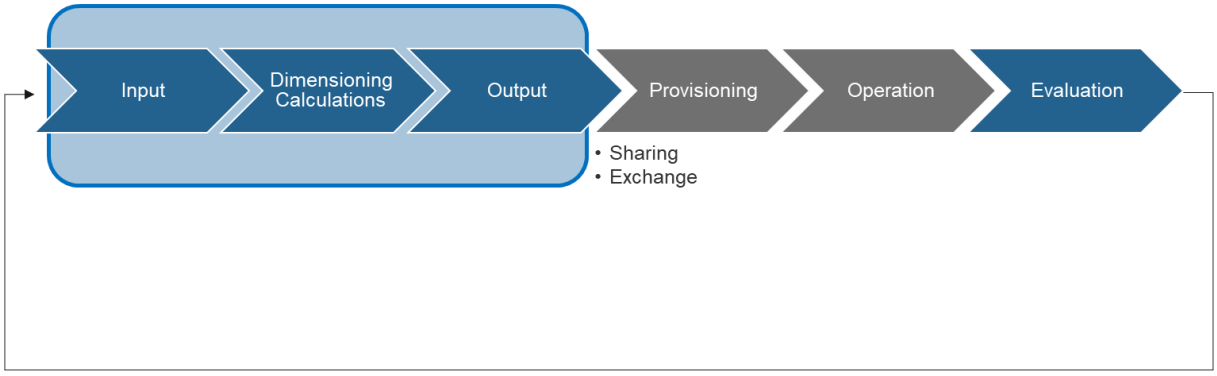

Figure 4: FRR process overview

6. Expected impact of the Methodology on the relevant objectives of the SO Regulation

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:

- Article 4(1)(c) determining common load-frequency control processes and control structures;
- Article 4(1)(d) ensuring the conditions for maintaining operational security throughout the Union;
- Article 4(1)(e) ensuring the conditions for maintaining a frequency quality level of all synchronous areas throughout the Union; and

The Methodology contributes to these objectives by specifying the dimensioning rules for mFRR and aFRR, which are key reserves that are used in the common Nordic load-frequency control processes. Sufficient mFRR and aFRR guarantee the right FRCE and frequency quality level and consequently contribute to maintaining the operational security by reducing the risk for automatic under and over Frequency Load Shedding (UFLS and OFLS), automatic reduction of generation and for system blackouts due to under or over frequency.

7. Timescale for the implementation

The implementation of the FRR dimensioning rules will be one task within the Nordic Balancing Model project and will consist of many sub tasks including IT development, implementation in control centres and education. The migration from frequency-based balancing for the entire LFC block collectively, to Area

Control Error (ACE) based balancing each LFC area individually, means that the situation changes significantly. For this reason, full implementation of the Methodology will not be finalized until after the implementation of the new balancing concept.

A dedicated website[2] explains and shows the high level roadmap of the Nordic Balancing Model project. According to this roadmap, FRR dimensioning is scheduled to be implemented fully when the Nordic TSOs connect to the MARI and PICASSO platforms.

Before connecting to MARI and PICASSO, the TSOs may apply the Methodology to produce estimates on required FRR in the future.

When the Methodology is fully implemented the dimensioning of FRR for reference incidents will be performed daily.

The long term goal of the dimensioning of FRR for normal imbalances is to perform the dimensioning process daily. However, when this methodology is fully implemented this process may still be performed quarterly.

8. Public consultation, transparency and stakeholder involvement

Article 11 of the SO Regulation states that: *"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 one month."*

This means that the TSOs shall invite their stakeholders for a public consultation. For this reason, the TSOs published the Methodology for consultation from 1 March 2022 to 1 April 2022. The TSOs received 0 responses. Appendix 1 includes their individual comments, if any.

[2] http://nordicbalancingmodel.net

Appendix: Results of Public Consultation