

Frequency Quality Criteria - EDF Proposal

EDF proposes to allow only 1.8% of time in which the System Frequency is outside the Standard Frequency Range, which is equivalent to 9461 minutes per year. The Drafting Team ('DT') considers this value to be unreasonably low and in Article 19(4) 15000 minutes per year are proposed.

EDF reaches the proposal of 1.8% of time with the incorrect assumption that UCTE's Operation Handbook Policy 1 Appendix states that the range of ± 20 mHz shall be used as the standard deviation of the System Frequency and therefore the range of ± 50 mHz is equivalent to 2.5σ or 2.5 times the standard deviation of the frequency data. There is no direct recommendation in UCTE's Operation Handbook Policy 1 or in its Appendix about a specific standard deviation of the frequency distribution. There was a recommendation in the UCPTTE document *Recommandations relatives aux réglages primaire et secondaire de la fréquence et de la puissance dans l'UCPTE* which stated that: *Over an extended period of operation the quality of control and the readiness of the control reserves can be considered satisfactory if the value σ_{90} (the numerical value of σ that is not exceeded in 90% of the monitoring intervals) is less than 40 mHz, and the value σ_{99} (the numerical value of σ that is not exceeded in 99% of the monitoring intervals) is less than 60 mHz.*

If it is assumed that the System Frequency follows a normal distribution, the σ_{90} range recommended to be 40 mHz corresponds to a frequency of 1.645σ and the σ_{99} range recommended to be 60 mHz corresponds to a frequency of 2.576σ . The standard deviation of the System Frequency distribution would be 24.3 mHz in the first case and 23.3 mHz in the second case, values considerably higher than the 20 mHz assumed by EDF in the proposal.

In reality, the System Frequency doesn't follow a perfect normal distribution, but a so called modified normal distribution. Using a Coefficient for Transposition from Normal distribution to frequency Range (CTNR) to describe the System Frequency distribution as a coefficient that can be used to estimate the probability for the System Frequency to be outside a certain range compared to the probability of a normal distribution with the same standard deviation as the System Frequency to be outside this same range. Using a CTNR for ± 40 and ± 60 mHz with real frequency data yields that the recommendations of UCPTTE are equivalent to recommending that the System Frequency distribution should be a modified normal distribution with a standard deviation between 24.11 mHz (calculated with the ± 40 mHz range) and 20.89 mHz (calculated with the ± 60 mHz range). Both values are higher than the proposed 20 mHz.

If a CTNR for ± 50 mHz of 1.42 is used the standard deviation of a modified normal distribution with 15000 minutes or 2.85% of time outside the ± 50 mHz range would be of 22.83 mHz, value which is within the recommended range given by the former UCPTTE.

As it is assumed that the frequency data follows a certain modified normal distribution the use of a second frequency range at ± 75 mHz for setting an additional target for the frequency quality does not provide relevant additional information. Nonetheless, the

wording of Article 21 allows setting additional frequency quality evaluation criteria if it is deemed necessary.