



EUTurbines
ENTSO-E Public Workshop – RoCoF

Online
30 November 2022



EUTurbines- ROCOF main areas of concern

- The specification of the RoCof withstand capability applied to Gas and Steam turbine generating units shall be realistic and take into account all specific features of these units (high power, high inertia, direct connection of the synchronous generator to the grid,...).
- Based on simulations performed for big gas and steam turbine and nuclear units, EUTurbines considers that the rocof value (for frequency dip) shall not exceed the limit of 1Hz/s during 500ms (not “measurement” rolling window, the statement is that the frequency dip of 1Hz/s ends after 500ms).
- Higher values or durations could put the unit and the grid at severe risk due to a trip of the unit resulting of the loss of synchronism of the generating unit (pole slip protection).
- This is absolutely NOT due to a problem of design or control of the unit, but this is simply due the features of these units (laws of physics...).
- On the contrary, the benefits for the grid stabilization of these high inertia units such as gas turbine and nuclear units shall be recognized by TSOs.



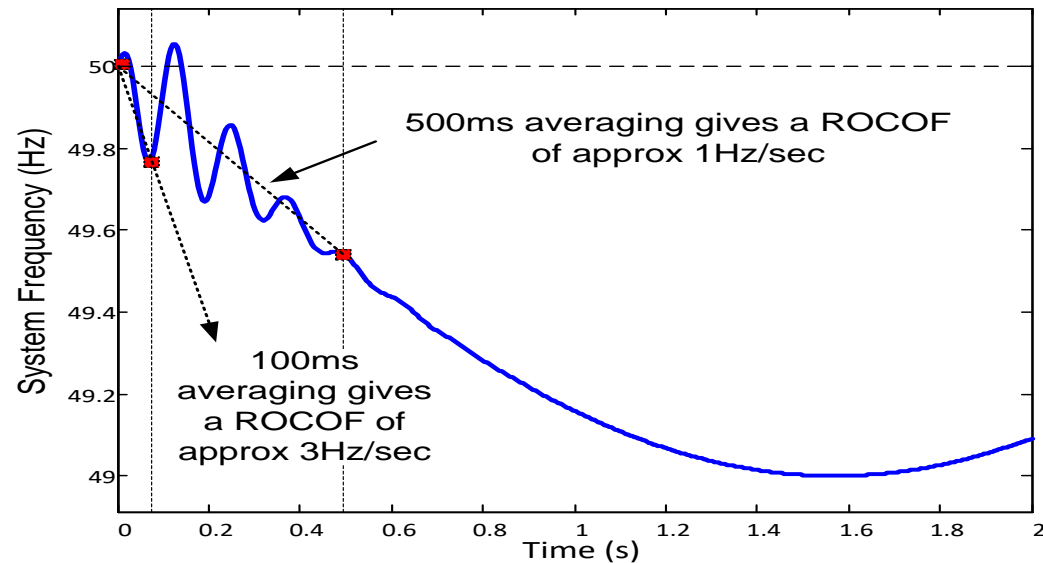
EUTurbines- ROCOF Max Value

- ENTSOE and TSOs stated in several meeting and presentation and the Maximum permissible ROCOF on the electrical system is 1Hz/s.
- EUTurbine recommends that 1Hz/s for a period of 500ms shall be adopted as a target value in the SOGL regulation for example as reference in the definition of Inertia evaluation for the synchronous areas, but also to be used in RfG Code as capability value for generating unit



EUTurbines- ROCOF as a single value

- EUTurbine is sponsoring the representation of ROCOF using a single value associated with a time duration as requirement: 1Hz/s for 500 ms.
- EUTurbine considers that the single value is already representative of ROCOF for shorter time interval; this was also the conclusion after the test campaign carried out in Ireland.





EUTurbines- ROCOF containment „local“ and „global“ based on inertia preservation strategy „local“ and „global

- A set of ROCOF values has been proposed to be adopted in the RfG **which** shall be considered a criteria for robustness of the generating unit
- The values seems to be based on reports and studies presented during the **web conference** on ROCOF and where it has been mentioned a “global” ROCOF limit which corresponds to 1 Hz/s and “local” ROCOF which can be much higher from the “global” ROCOF
- EUTurbine considers that “local” ROCOF are affected by “local” inertia; it is unlikely to expect high “local” ROCOF in presence of high “local” inertia. As a consequence imposing high ROCOF requirements to generating unit with high inertia is NOT technically correct, not even considering robustness criteria. It can risk to make specific generating unit not compliant for which derogation process is necessary
-> we consider this a **WRONG** approach



EUTurbines- ROCOF containment „local“ and „global“ based on inertia preservation strategy „local“ and „global

- ROCOF is considered associated to inertia of the system, as a “global” definition and “local definition”
- In previous presentation ROCOF is expected to increase in the future
- SOGI defines as an obligation the evaluation of inertia of the system and associated containment strategy (driving 3 DSM meetings)
- EUTurbine has been requesting ROCOF webconf on inertia preserving strategy that are going to be put in place, since the topic is considered urgent
- Inertia containment shall be considered “local” as well as “global” like the ROCOF definition and the expectation is for frequency containment strategy “local” and “global”
- Note: EUTurbine does not consider a good solution the possibility to choose a ROCOF value at MSs. ROCOF concept is not a simple one and has sizing implication (robustness shall be properly factored)



EUTurbines- ROCOF compliance verification

ROCOF compliance verification is not a simple matter, hence **EUTurbine recommends to address the compliance requirements in technical standards with some caveat to be taken in consideration:**

- 🕒 For small generating units (maybe up to 100 kW) ROCOF can be tested in laboratories that permits fast changing of frequency and associated measurements
- 🕒 In 23.11 presentation a curve has been proposed that does not seem to be practical when it has to be created and measured in a laboratory



EUTurbines- ROCOF compliance verification

- For generating that cannot test ROCOF requirement in a laboratory:
 - the phenomena can be simulated or
 - frequency deviation can be “injected” in the generating unit controller, but it is still difficult to make a very fast frequency change for limited period of time
 - an unbalance phenomena can be replicated (like load rejection when possible) not necessarily leading to the desired value, as part of supportive documentation. (Note the load rejection, corresponds to the maximum unbalance associated to the generating unit -> 100% load variation..)

- ROCOF shall be considered a test on his own; present testing process at national level already consider tests associated to frequency and voltage limits capabilities and separately ROCOF

- Present European standard was already working on ROCOF testing procedure.



Thank you!