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Submitted to **Stakeholder consultation on the "Deterministic Frequency Deviations" report**
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Introduction

1 What is your name?

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4 I want my answer to remain anonymous. If you tick this box, we will publish your comments but we will not publish your name and organisation.

I want my answer to remain anonymous:
No

5 I want my answer to remain confidential - If you tick this box, we will not publish your answer to this consultation

I want my answer to remain confidential:
No

6 I agree to ENTSO-E's Consultation Hub privacy policy

I agree to ENTSO-E's Consultation Hub privacy policy:
Yes

Content related questions

1 Do you see any effects of Deterministic Frequency Deviations on consumers or generation units in your portfolio today?

Comments:
Synchronous generators as developed in the turbine and gas engine industry have their drive-train coupled with grid frequency. As such, they are directly impacted by deterministic frequency deviation. Unit in frequency sensitive mode deploy the necessary FCR, and impact for plant owner would be cost for deploying the FCR (mostly fuel cost and/or life use).

In the context of DFD not beyond ±200 mHz, the frequency deviation is minor enough to be considered as having a marginal impact on life of the equipment.

2 Are you already participating in any initiative to reduce frequency variations in Continental Europe ? If so, which one(s)?

Comments:
EUTurbines and EUGINE members design equipment and power plants to deliver the grid-code-required frequency response MW versus time trajectory.

3 One of the proposed solutions is to move towards 15 minute Market Time Unit for internal and cross-border energy exchanges. What would be the positive or negative effects of this on your business?

Comments:
It is neither a positive nor negative impact for the turbine or engine businesses, but our technologies potentially can have a positive impact to on the grid. The 15 minutes market time can, in some conditions, make the best use of the MW/min ramping capability of the generating units.

4 What do you see as main (remaining) hurdles to move towards 15 Minute Market Time Unit for Intraday and Day-Ahead energy markets?

Comments:
The information and controls infrastructure shall adapt to the 15 minutes timing. This means verifying that the information can flow back and forth through grid operator dispatch, plant owner dispatch, up to the power plant. This should not impact either Gas Turbine or Engine technologies.

5 One of the proposed solutions is to set requirements on ramping for Generation units. Do you have fast-acting generation units (ramping up or down in less than 5 minutes) in your portfolio?

Comments:
Yes – various technologies are available. Fast ramp for big units could be challenging if emission control shall be respected during transient condition, otherwise the requirement can be fulfilled.

6 Would you be willing to enable slower ramp up and ramp down (5 minutes or more) of these fast-acting generation units? What would you need in terms of rules or regulations?

Comments:
Yes – in principle it is possible to set a slow ramp on unit with high MW/min ramping capability. This does not require capital costs; the solution is to upgrade the plant or unit controller. Regarding regulation, a clear requirement on remotely setting the units ramp rate within a technically possible range would have a positive impact.

7 An identified cause of deterministic frequency deviations is the simultaneous starting or stopping of generation units or significant load at specific moments in time, usually at the change of an hour. Would you be willing to spread start and stop of units over a longer period ? What would you need in terms of rules or regulations to be able to do this?

Comments:
Yes. This does not require capital cost, the solution can be to upgrade the plant or unit controller. Start and stop commands are received from a higher level control not part of the specific generating unit.

8 One of the proposed solutions is to have ramping included in all Schedule exchanges between ISPs. What do you see as main hurdles towards implementation of such a solution?

Comments:
This would require information and controls system to read ramps. This appears as minor risk and complexity to adapt. The communication architecture shall be defined and the way the commands are provided are important taking into account the expected time windows considered. For example, higher level supervisory system can provide active power setting using a defined ramp rate which will be slower than the one set on the generating unit. However, in this case the expected maximum ramp rate shall be defined. It is not clear from the document how communication process is expected to work. A better and more technical answer can be provided once the way the signal exchange is planned to happen is clear.

9 Would the introduction of ramping in schedules lead to slower ramping of generation units in your case? What would you need in terms of rules or regulations?

Comments:
Yes – in principle it is possible to set a slow ramp on a unit with high MW/min ramping capability. This does not require capital cost, the solution can be to upgrade the plant or unit controller.

Proposal: Not necessarily; different ramp rates could be set depending on the type of service provided. If this slow ramp is requested, it could be remotely activated WHILE the service is being provided. In terms of regulations, clear requirements on this should be given, as well as clear methodologies to receive the activation commands.

10 Do you see a future in having Battery Storage participating to Fast Frequency Reserves, which would help to reduce DFD? Do you have access to Battery Storage with such capability?

Comments:
Although batteries can help, they appear to us not as a mandatory solution to reduce DFD. Frequency gradients as experience during DFD are couple of mHz/s, which means that under-the-second response may not be necessary on a grid with Continental EU inertia.

Furthermore, batteries could be considered as limited energy reservoir, compared to a thermal plant. Which means that holding the MW position during the ISPs will first-order impact their CAPEX.

We suggest considering controls upgrades on existing generation, assuming they have an inherent capability to provide the desired on-demand MW. It means achieving the DFD target with potential lower total cost.

11 Do you have any other important comment to share on the report?

Comments:
Some details are not clear from the report. We would like to know how the frequency and associated DFDs are measured in the different areas and how DFDs are detected. In terms of controllability.

Page 14: It seems that the DFDs worsened during winter time and evening. However, an evolution of the loads can be somehow predicted (Heating system switching off at 10 pm, change of tariffs on electricity, etc.) In addition to the time change, there could be a correlation with loads and habits that can be somehow considered and smoothed in some way.

Page 16 and 17: we much appreciated the consideration of the Gas Turbine intrinsic behavior. It has to be noted, however, that the major DFDs occurred in winter and during the night that could be considered best condition of operation for GT technology, and that the major power deviation occurs much far away from the FSM frequency range. On low frequency (for frequency below 48 Hz), a natural disconnection of loads from the grid is expected to occur.

Models: it is not exactly clear which is the validation criteria used (deviation of the model from the reality, no number is provided) and if any sensitivity analysis on

the assumption made had been carried out. It seems a quite extensive and interesting work had been carried out. We are wondering if the model data are available.

As a note, the acronyms table is missing a few definitions: BRP (Balance Responsible Parties) and ISP (Imbalance Settlement Periods).

Additional FCR will result in additional requirements to be stated in the codes (FSM-2 for example with a more aggressive droop), which will then need to be implemented in the controllers of the different technologies; if this is the way forward, time for implantation of these changes (with clear requirements) should be provided.