The European Association of Internal Combustion Engine Manufacturers

EUROMOT

EUROMOT POSITION

20 December 2012

2011 YEARS Promoting Engine in Society

ACER Opinion No. 08/2012 regarding Network Code on Requirements for Grid Connection applicable to all Generators from 13 October 2012

EUROMOT supports the development and completion of the European internal market for electricity and has actively been participating in the stakeholder consultation conducted by ENTSO-E regarding the "Network code for requirements for grid connection applicable to all generators" (NC RfG) which was submitted to ACER together with supporting documents on 13 July 2012.

The NC RfG together with the other network codes currently being prepared forms a very important part of developing the EU energy market. It is essential that any harmonised rules should be proportionate and cost-effective.

EUROMOT acknowledges that ENTSO-E has put a lot of effort into drafting the NC RfG and supporting documents and generally appreciates the work done. Nevertheless, EUROMOT does not agree with all assessments and continues to have substantial concerns regarding some issues, in particular the treatment of fault ride through (FRT), industrial combined heat and power production (CHP) and retroactively applying requirements.

Following ACER's opinion, EUROMOT therefore asks ENTSO-E to reconsider these two issues which we address in more detail with reference to the related articles of the NC RfG, especially 3.6.h (CHP), Article 9.3 (FRT) and having regard to ACER's reasoned opinion in paragraph 2.1 and 2.2 (Opinion No. 08/2012, 13 October 2012) and without prejudice to the effect of eventual national implementation of the code.

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ENGINE IN SOCIETY

A European Interest Representative (EU Transparency Register Id. No. 6284937371-73)

A Non Governmental Organisation in observer status with the UN Economic Commission for Europe (UNECE) and the International Maritime Organisation (IMO)

1. Article 3.6.h: Industrial Cogeneration, CHP

EUROMOT welcomes the intent of Article 3.6.h to exempt combined heat and power production (CHP). Although steam turbine processes with steam extractions are very common in industrial CHP installations, all other CHP types and solutions, i.e. hot water, direct flue or exhaust gas heating, etc., should be considered in this article as well. Often industrial CHP plants also consist of gas or diesel engines or turbines. The generation of heat and power in these types of CHP applications are also rigidly coupled. The current wording would mean that CHP plants producing for example hot water will not be eligible for treatment as described in Article 3.6.h. In EUROMOT's view all simultaneous production of heat and power from the same prime mover are CHP and should be eligible for the same and equal treatment under Article 3.6.h.

EUROMOT recommends including hot water producing CHP under the provisions of Article 3.6.h.

2. Article 9.3, Article (FRT)

EUROMOT recognises the need for a reasonable level of connection requirements regarding fault ride through (FRT). This is important for both generation and transmission system operators in order to provide society with the expected level of security of supply. However, the FRT requirements proposed by ENTSO-E in the RfG Network code submitted to ACER on 13th July 2012 will be technically very challenging and could un-necessarily create difficulties for generation as well as raising the overall cost level of electricity production, especially for B and C type units.

Unfortunately, one short-coming of the NC RfG drafting process is that no cost-benefit analysis was made to ensure that measures proposed are proportionate. Especially, the extreme fault ride through scenarios (e.g. 250 ms clearance time!) which form part of the ENTSO-E NC RfG proposal are neither proportionate nor cost-effective for smaller synchronous power modules and will be counterproductive with regards to the overall European targets of maintaining security of supply as well as increasing renewable power generation[1]. Synchronous generation modules, in our case driven by internal combustion engines, can provide different stabilizing services to the grid and – if powered by various bio-fuels – also form part of the renewable energy portfolio.

As the determining aspects on the network side are not exhaustively specified in the code, the material and design impact of unreasonably long fault clearance times or a zero level residual voltage during the fault cannot be exhaustively defined against the current requirements in Article 9.3 and Article 11.3 – e.g. grid side short circuit strength is location specific.

Nevertheless, in order to address point 8 from the ACER's Opinion No. 08/2012 and to promote more reasonable requirements for B and C type units, we would like to technically

[1] ACER, Framework Guidelines On Electricity Grid Connections FG-2011-E-001 20 July 2011

describe and explain with the help of examples the likely impact on design for a long specified fault clearance time, as foreseen under the current proposal.

On the generator module side, the capability of a synchronous generator module to successfully pass the FRT requirements is mainly dependent on the parameters module inertia, generator and interface system reactance.

An increase of inertia of a synchronous power generating module can contribute positively to the fault ride through capability; however, in order to achieve this, a drastic deviation from any economical dimensioning will have to be made. For example, to achieve an increase of 100 ms of fault clearance time from 150 to 250 ms a doubling of the rotating inertia of the synchronous power generating module[i] may be necessary. This will have a huge impact on the design and the amount of material needed.

Another possible solution would be to reduce the transient reactance of the generator in order to reduce the interface reactance. Unfortunately, the design changes necessary are also not economical and cost-effective. The reason for this is that if reactance has to be decreased at the same time flux will increase. Flux vs. volume cannot normally be increased without iron saturation. The only way to facilitate an increased flux is to increase the iron volume as well. This volume increase is done by increasing the length of the generator or increasing the diameter of the generator – again, this would have a large impact on the design and additional material needed.

As we have shown in the examples above, requiring unreasonably long FRT times can have a substantial material and design impact on synchronous power generating modules incurring high costs. Therefore, EUROMOT proposes a more balanced approach which would be closer to the natural capabilities of B and C type units and would ensure security of supply while at the same time being a technically proportionate and cost-effective solution:

- **B and C type Generation modules in distribution system < 110 kV**

  For B and C type generation modules in distribution systems the situation is different from the D type generation modules. In distribution systems the trip times for a fault are typically longer than in a transmission system. However, it is not likely that a fault in the distribution system is seen as a severe fault over a large area as the electrical distances are longer. It is also not likely to be seen as a severe fault in the transmission system.

  A reasonable FRT requirement for generation modules connected to distribution systems will take this into consideration and should be based on the short fault clearance times already existing in the transmission systems i.e. 100 - 150ms (transmission system faults can be seen over a wider area but are cleared quickly). This should be combined with the higher residual voltage seen by a potentially larger number of generators (i.e. a retained voltage of U_{ret} of 30%) together with a reasonable normal operational consideration, or the generator slightly overexcited at nominal voltage.

EUROMOT strongly recommends setting a clearance time of 100-150ms together with a retained voltage level (U_{ret}) of 30% and reasonable normal operational considerations generator slightly overexcited and at nominal voltage for generators of type B and C connected to the distribution system.

3. Conclusion

As outlined in Article 1: EUROMOT recommends including hot water producing CHP under the provisions of Article 3.6.h.

As outlined out in Article 2: EUROMOT's view both a reasonable fault clearance time and reasonable initial conditions assigned by the TSO and relevant network operator under Article 9.3.3-4 are necessary to facilitate a reasonable environment for synchronous generators to continue to support the grid and help to facilitate the foreseen paradigm change of the electrical system[2].

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[2] Entso-e "Network Code "Requirements for Generators" in view of the future European electricity system and the Third Package network codes

EUROMOT is the European Association of Internal Combustion Engine Manufacturers. It is committed to promoting the central role of the IC engine in modern society, reflects the importance of advanced technologies to sustain economic growth without endangering the global environment and communicates the assets of IC engine power to regulators worldwide. For more than 20 years we have been supporting our members - the leading manufacturers of internal combustion engines in Europe, USA and Japan - by providing expertise and up-to-date information and by campaigning on their behalf for internationally aligned legislation. The EUROMOT member companies employ all over the world about 200,000 thoroughly skilled and highly motivated men and women. The European market turnover for the business represented exceeds 25 bn euros. Our **EU Transparency Register** identification number is **6284937371-73.**

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[i] Fault ride-through capability of engine-driven power plants Jacob Klimstra, Wärtsilä Power Plants, Zwolle, NL PowerGen Europe, Cologne, May 26-28, 2009