



Common feedback by CEDEC, E.DSO, Eurelectric and GEODE on the report from the European Commission assessing the availability of alternatives to fluorinated greenhouse gases in switchgear and related equipment, including medium-voltage secondary switchgear

CEDEC, E.DSO, Eurelectric and GEODE (hereafter the associations) are supportive of the EU commitment to reduce global greenhouse gas emissions towards the achievement of climate neutrality by 2050, as part of the European Green Deal objectives, and is willing to commit further efforts to reduce emissions of fluorinated gases (F-gases) as far as possible.

Main findings of the present report

The European Commission recently published a report assessing the availability of alternatives to F-gases in switchgear and related equipment.¹

- For medium voltage (MV) secondary switchgear, the report mentions a period of 2 to 5 years for wider commercialisation of SF₆-free alternative solutions. Regarding to MV primary distribution switchgear, the report concludes that the transition to SF₆-free solutions could take place within a period of 2-3 years.² The associations agree with the comments made by the EC that the introduction of new alternatives in secondary distribution requires a number of steps and is more complex than in primary distribution.
- As far as higher voltage levels are concerned, the report indicates that the time needed for the transition to SF₆-free products depends mainly on the voltage level: a mature portfolio of commercial solutions for the voltage range up to 145 kV might be available within 5 years while alternatives for higher voltage levels still need to be developed and piloted.

Comments on the report

As a preliminary remark, the definition of medium voltage used in the present report is too wide and thus inappropriate. Furthermore, the report should not only distinguish types of switchgear based on their voltage level but also on the current level as the needed solution varies according to the current intensity.

From the associations' point of view, the report falls short with regard to three important aspects which are depicted in the following.

- **Need for reliable products:** The security of electricity supply has to be guaranteed at all times. In this context, all technical grid equipment must meet strong reliability criteria during the entire life-cycle. This also applies to electrical switchgear. Therefore, any future SF₆-free technical solution must be proven to be as reliable as SF₆ technology which has been deployed and continuously improved over the last six decades. **The report lacks any consideration of the fact that system operators and generators need time to adequately evaluate the reliability during operation.** As an example, a generic issue such as a failure mode could require an immediate operational ban on all such switchgear with consequent impacts on the existing customer and renewable connections³.

¹ C(2020) 6635 final (https://ec.europa.eu/clima/sites/clima/files/news/docs/c_2020_6635_en.pdf)

² Furthermore, a simple definition of MV 'as up to 52kV' includes 52kV switchgear for which non-SF₆ versions are not readily available.

³ Depending on the switchgear's location in the electricity system, an immediate operational ban could cause safety issues either on the electricity generation unit or for the grid stability.

- **Need for suitable products:** SF₆-free alternatives must fulfil the same or at least comparable operational suitability requirements as current SF₆ solutions. Currently, the operational suitability of SF₆-free alternative products is still limited with regard to the following aspects:
 - SF₆ offers the most compact technological switchgear solution. Especially in urban areas it will be challenging to install alternative technologies in certain cases due to **limitation in the available space**. Finding and accepting new solutions, e. g. alternative locations, requires a shift in urban space management. For this process, an adequate transition time is needed.
 - The alternative non-SF₆ switchgear must be suitable to be used in very cold temperature or where the temperature cannot be controlled. They may be limited to certain areas with **specific operation conditions**, particularly in the case of outside high voltage (HV) installations.
 - SF₆-free switchgear shall have similar lifetime of approximately 40 years or longer. In this context, it should be realised that most of the currently available SF₆ gas substitutes have themselves a GWP greater than 1 and should not themselves require to be replaced in the future because of legislative change before the ending of the lifetime.
 - Finally, there is insufficient knowledge of the **toxicology** associated with alternatives to SF₆ gases, as certified studies on targeted quantities have not yet been carried out. This aspect should be assessed in order to avoid potential environmental and safety risks on a proposed deployment of non-SF₆ solutions.
- **Market availability of SF₆-free products:** The availability of suitable and reliable alternatives to SF₆ switchgear for use on the distribution networks is a prerequisite to gradually shift away from SF₆ use. **The report does not provide strong supporting evidence that the timeframes** presented are achievable. On the contrary, the report gives the impression that SF₆ free solutions are available in a wider variety. Based on the knowledge of the associations' members, beyond announcements and presentations, very few manufacturers have made SF₆-free products commercially available in the voltage levels above 12 kV⁴. **Today, for the above detailed reasons, a sufficient availability is not yet guaranteed and the timeframe underlined in the present report appears too challenging.** It will take time for manufacturers to develop the full product range and for system operators and generators to test it thoroughly before implementing it on a large scale. Only when it is clear that the products fulfil the reliability, suitability and health requirements mentioned above, manufactures will be willing to build up the needed production capacity to serve the full market. In this context it is important to avoid European industries to be dependent on non-European solutions. This would be the case in particular if the only authorized molecules were subject to non-European patents. This issue is not being addressed in the report.

System operators and generators are ready to assume their responsibility to support the introduction and deployment of climate-neutral SF₆-free technologies. For this purpose, DSOs and generators are willing to continue and extend their R&D activities together with switchgear manufacturers and to integrate newly developed technologies into their grids and installations in order to gain experience.

It is clear that a gradual transition to non-SF₆ products will incur additional costs for system operators and generators. According to the knowledge of the associations' members, costs for SF₆-free primary MV switchgear are up to 30% higher and therefore far away from being "equal or marginally higher" than for SF₆ products. Additionally, higher installation costs can also occur which have not been mentioned by the report. In view of the various requirements presented above, consideration of equipment costs is a distant second –

⁴ **Secondary MV:** 2-3 suppliers for up to 12 kV and 1 supplier for 24 kV. SF₆-free load break switch fuse combinations have been presented to the public but are not yet commercially available. **Primary MV:** Air-insulated switchgear (AIS) for up to 36 kV is a niche market, since space/environment limitations apply. Yet, 1 supplier for SF₆-free gas-insulated switchgear (GIS) up to 36 kV. Up to 145 kV, variety not yet sufficient and long-term operational experience missing. Testing of products by DSOs needs further time.



equipment must meet the reliability and ‘fit for purpose’ (suitability) criteria, and only then does cost come into play.

While recognizing the above-mentioned existing variety of technical requirements and peculiarities, the European Commission should consider the use of non-SF₆ products in a manner that maintains costs economically neutral to customers, for example by avoiding the prohibition of SF₆ in new switchgear, at least in the short-term.