ABB ELDS contribution to the ECHA consultation on PFAS

ABB Electrification Distribution Solutions (ELDS)

ABB ELDS is a part of the ABB group covering the segment of electrical distribution systems in medium voltage (MV) up to 52 kV. ABB ELDS is market leader in power distribution solutions. ABB ELDS serves the EU, as well as the global market, with products produced in both within and outside of the EU. For a wide range of products, the lead development centres and the lead factories are located in Europe. ABB ELDS factories in the EU are located in Germany, Finland, Poland, Czech Republic and Italy with a total of several thousand employees. In addition to direct jobs, we are connected to a wide supplier base in the EU, serving ABB with components and material.

The product portfolio of ABB ELDS covers a wide range of products required for the distribution of electricity. These products are important for the EU electrification by upgrading and extending the electrical networks. Due to the growing distributed energy generation in the medium voltage level by wind and solar power, we expect a significant growth of the segment in the coming years.

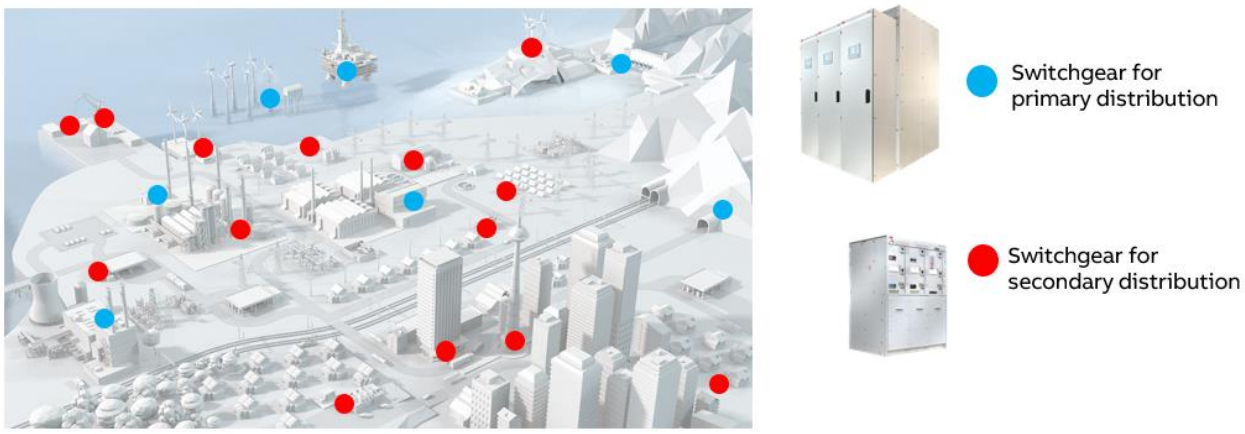

Figure 1: Location of products of ELDS in a typical electrical MV network

Medium voltage switchgear are the top product level in the distribution network. They are either air insulated (AIS) or gas insulated (GIS). Many of the components are designed and manufactured by ABB, such as circuit breakers, cable bushings, instrument transformers and control- and protection relays.
These components are used to build ABB switchgear, but are also manufactured for other companies to be used and sold in their own products. In some markets, outdoor circuit breaker are used in the network without a switchgear. Special applications as railway use e.g. a circuit breaker on the train.

The main requirement for the complete product range is the high quality and reliability level, as the lifetime expectation from the market is extremely high (>40 years) and the maintenance effort for the customer has to be kept low. Failure rates of the products are expected to be extremely low. This requires the use of top quality materials with outstanding performance, reliability for a wide temperature range. All these requirements are supported by PFAS materials or PFAS additives in materials. A part of the complex ABB ELDS product portfolio and how they are linked together is shown in figure 2. The red arrows are pointing to the next level product of ABB, but these components are also sold to 3rd parties for their own products.

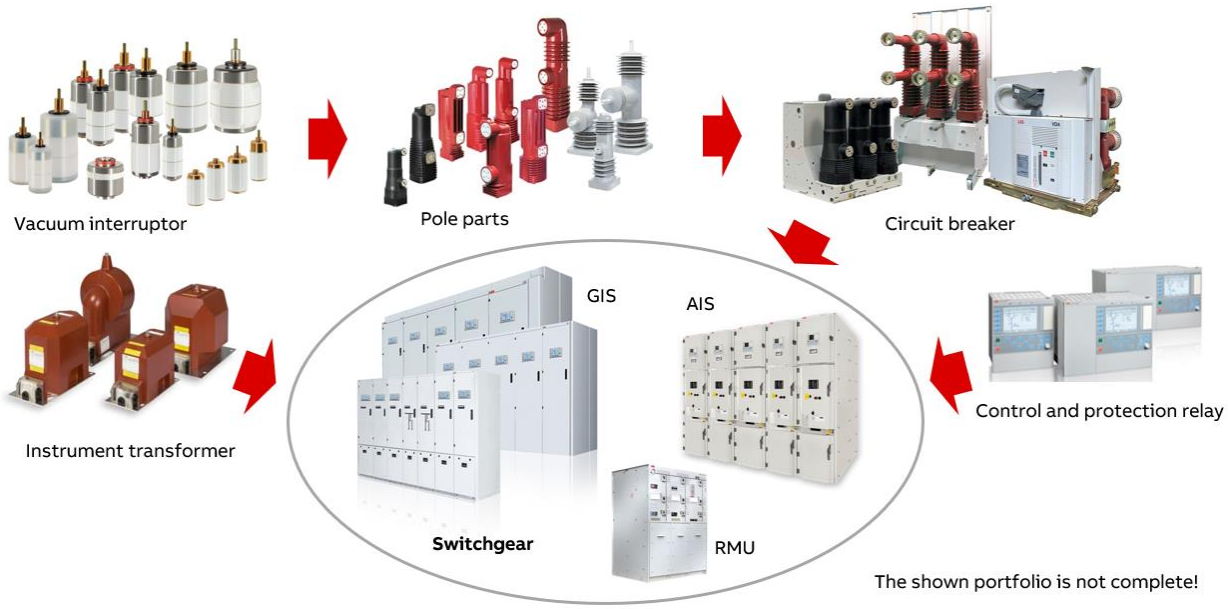

Figure 2: ELDS products and their use in ABB and non-ABB products

Why is ABB contributing to the ECHA consultation on PFAS?

As PFAS are widely used in electrical equipment, ABB ELDS, together with other manufacturers, will be strongly affected by the proposed restrictions, including the very broad ban at very low concentration levels.

ABB is committed to finding an alternative to replace PFAS in a realistic time frame, where it is technically possible, where it is advantageous for the environment and the society. For this we have prepared and uploaded specific contributions on the issue. We ask the ECHA technical experts to review these contributions carefully and consider them in the preparation of the final restriction, taking into account requested exemptions.

In case of additional questions, required background information or direct request for discussion, please feel free to contact us, using the contact details at the end of this document.

Contribution 6:
Topic: PTFE nozzles in load break switches
Target: Exemption from the restriction for additional 8 years

PTFE is used as material for nozzles in load break switches in medium voltage (MV) switchgears of air insulated and gas insulated type. Load break switches are comparable simple switches for voltages of 12, 24 and in GIS also 36 kV applications. They can interrupt the load current, but not the short circuit current. This principle is widely used in the medium voltage marked since decades, as it is simple, cost effective and reliable. No complex electronics, auxiliary power or drive mechanisms are required. In open position the AIS designs allow a simple verification, that power is disconnected.

The switching principle is the following:

- After electrical contact opening an arc between the contacts is ignited.
- By a combination of contact separation and arc blowing with the insulation gas (ambient air in AIS or SF_6 in GIS) the arc is cooled.
- The nozzle has as first function to guide the gas in the area of the arc to improve cooling. PTFE can fulfil this function, as it is a very robust material which will not be ignited by the arc and is

neither melting nor burning due to the high melting point of 327°C. It keeps the shape for a high number of operations.

- As second, but very important function, small quantities of the PTFE material is evaporated by the arc, which has a temperature of several 1000°C, when it gets in contact with the surface. This is releasing Fluorine, which was bound in the PFTE nozzle material, in the area of the arc. The fluorine supports the quenching of the arc and finally the interruption of the current. Without this effect, the arc will not be extinguished.

This switch principle is also known as hard-gas switch and widely spread in the lower end of electrical distribution systems. It is not only used by ABB but also by many other electrical equipment manufacturer.

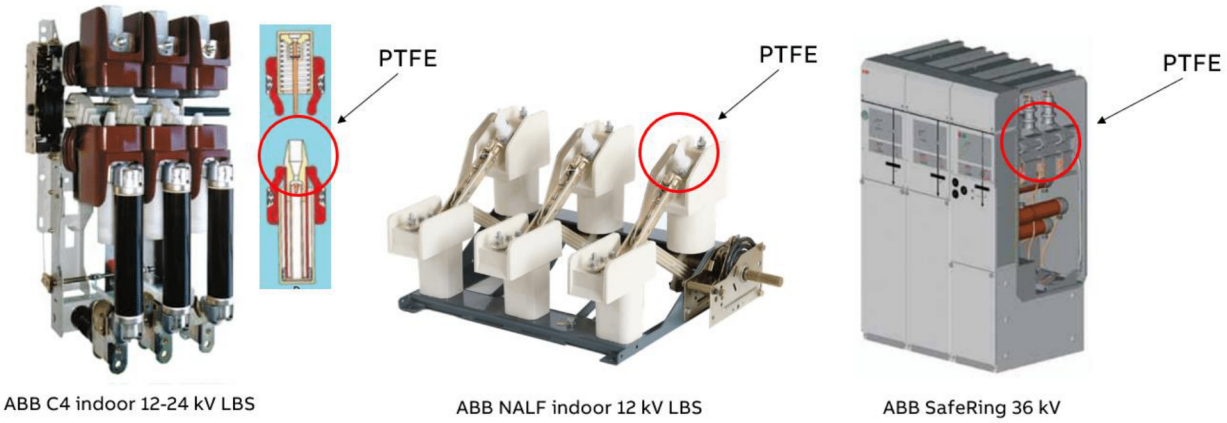

Figure 3: Some ELDS products using the hard-gas switching principle

As PTFE is a PFAS, it is planned to be restricted which has a severe impact on this type of switch.
The search for replacement materials is very complex for this kind of function. Insulators with a high temperature resistance and melting point can be identified, e.g. ceramics. But these materials are only guiding the flow of insulation gas for cooling the arc but are not giving the required support to interrupt the current by releasing Fluorine. Known materials which might release Fluorine are all PFAS. As Fluorine has a very high arc quenching performance a full replacement has not been found up to now and might not be identified in the future. The search for an alternative in that case does not mean a search for a replacement material, but a search for a complete different technology.
There are other technical solutions available, which can interrupt currents, e.g. vacuum circuit breaker. But these technologies are much more complex in the design, require much more material and are significant more expensive. Taking into account that a vacuum interrupter needs a disconnector in series, auxiliary voltage to be operated and a more complex protection relay, the system costs can be up to 10 times higher.

For this ABB ELDS asks for an extended transition time of additional 8 years to complete the transition to PFAS-free solutions. As up to now it is still unclear if a technical solution can be identified, the possibility of a further exemption after the 8 years should be offered, if it is proven that the replacement projects are not completed. Alternatively, a non-limited exemption should be considered.

Dr. Maik Hyrenbach
Corporate Executive Engineer

ABB AG
Oberhausener Str. 33
40472 Ratingen
Mobile: [redacted]
Phone: [redacted]
E-mail: [redacted]@de.abb.com