ABB ELSB contribution to the ECHA consultation on PFAS

Who is ABB Electrification Smart Buildings (ELSB)?

ABB ELSB is part of the ABB Group and is one of the market leaders in the segment of electrical power distribution and data networking in low voltage installations. ABB ELSB serves both the EU and global markets, with products manufactured both in the EU and outside the EU. For a wide range of products, the leading development centers and the leading factories are in Europe. ABB's headquarters are in Switzerland. ABB has about 105,000 employees globally.

ABB ELSB key facts:

- Approx. 14,000 employees.
- $2.75 - $3.25 billion revenues.
- 34 production sites.

ABB ELSB's product portfolio includes a wide range of products needed for the distribution and networking of power and data in buildings and other low voltage installations. These products are very important for the transition of our society to a fully electric and digital society throughout the renewal and expansion of electrical power network and data infrastructure. Given the importance of energy efficient buildings, we expect the segment to grow significantly in the coming years. All this strongly supports the Green Deal as one of the major EU initiatives.

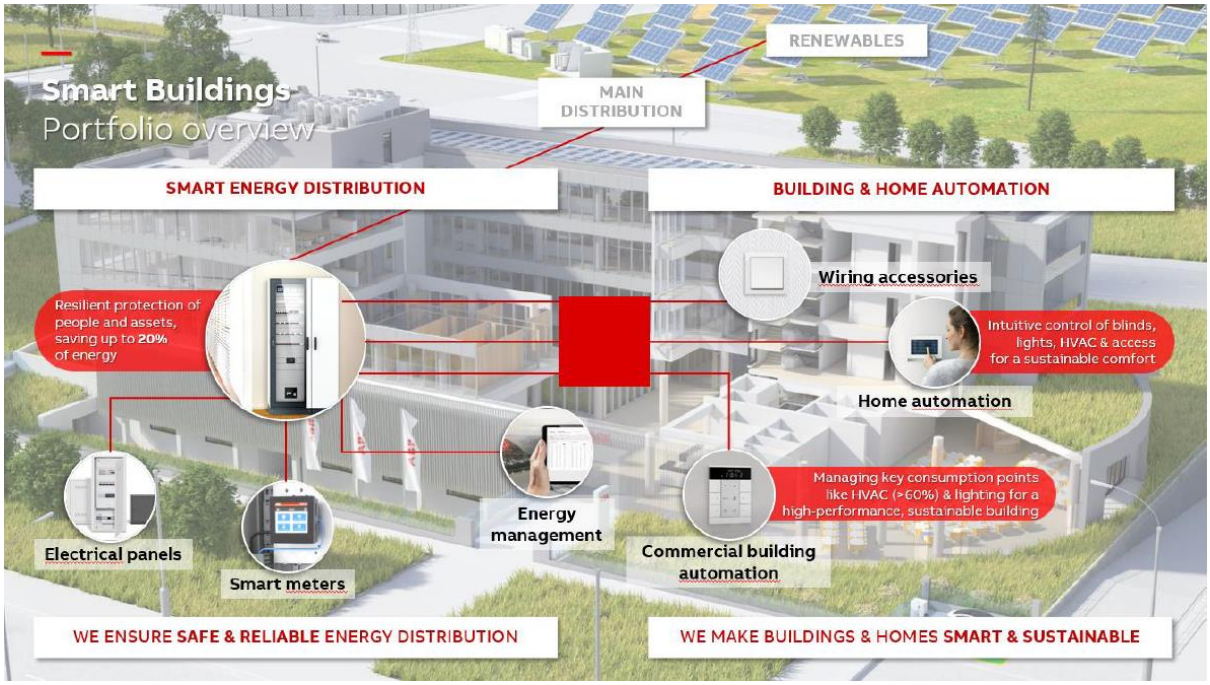

Figure 1: Low voltage energy distribution and building automation infrastructures.

Low-voltage electrical devices are the products in the energy and data network in buildings and other installations with which end users come into direct contact and which must therefore meet special safety requirements. Many products and relevant components are developed and manufactured by ABB itself, like, e.g.:

- Smart home products.
- Building automation & control products.
- Door entry systems.
- HVAC control products.
- Access control & security products.
- Emergency lighting & battery systems.
- Wiring accessories (socket outlets, switches, dimmers, etc.)
- Industrial plugs & sockets
- Protection products (miniature circuit breakers, residual current circuit breakers & monitors, arc fault detection devices, surge protection devices, relays, switches, etc., and accessories thereof)
- Distribution enclosures (main distribution enclosures, sub-distribution enclosures, final distribution enclosures, junction boxes for electrical installations, etc.)
- Energy efficiency products (energy meters, power meters, connectivity solutions, etc.)

The present document is dedicated to the last three product types, namely protection products, distribution enclosures and energy efficiency solutions, that fall under the larger set of low voltage energy distribution products. Figure 2 shows some examples.

The main requirement for the entire product range is the high level of safety, quality, and reliability, as the expected service life of the market is very high (>25 years). The failure rates of the products must be above average. This requires the use of highest quality materials with excellent performance, reliability and for a wide temperature range. All these requirements are partly well supported by PFAS materials or PFAS additives in materials.

During their long time of use, as far as we know electrical installation devices are expected not to spontaneously release PFAS in the environment, unless PFAS is intentionally extracted by external agents, for instance by means of mechanical and/or chemical attacks (which is unrealistic and alien from the expected use of the products). Anyway, with reference to the very low amount of PFAS in the case of contamination (25 ppb), which is addressed in the present contribution, also these theoretical possibilities are assumed to be practically unrealistic and immaterial.

When electrical installation equipment has reached the end of its service life or even when the entire building must be demolished, laws regulate how to dispose of low voltage electrical installation devices. Considering for instance Germany, electrical installation equipment must be labelled and registered with the EAR, in accordance with the WEEE Directive 2012/19/EU, and disposed of properly at the end of its service life. For batteries and accumulators, disposal is regulated by the Battery Regulation in the EU. National laws such as the German ElektroG and BattG supplement the European legal acts and ensure that electrical installation devices are not disposed of in residual waste. Similar provisions apply in the other EU countries.

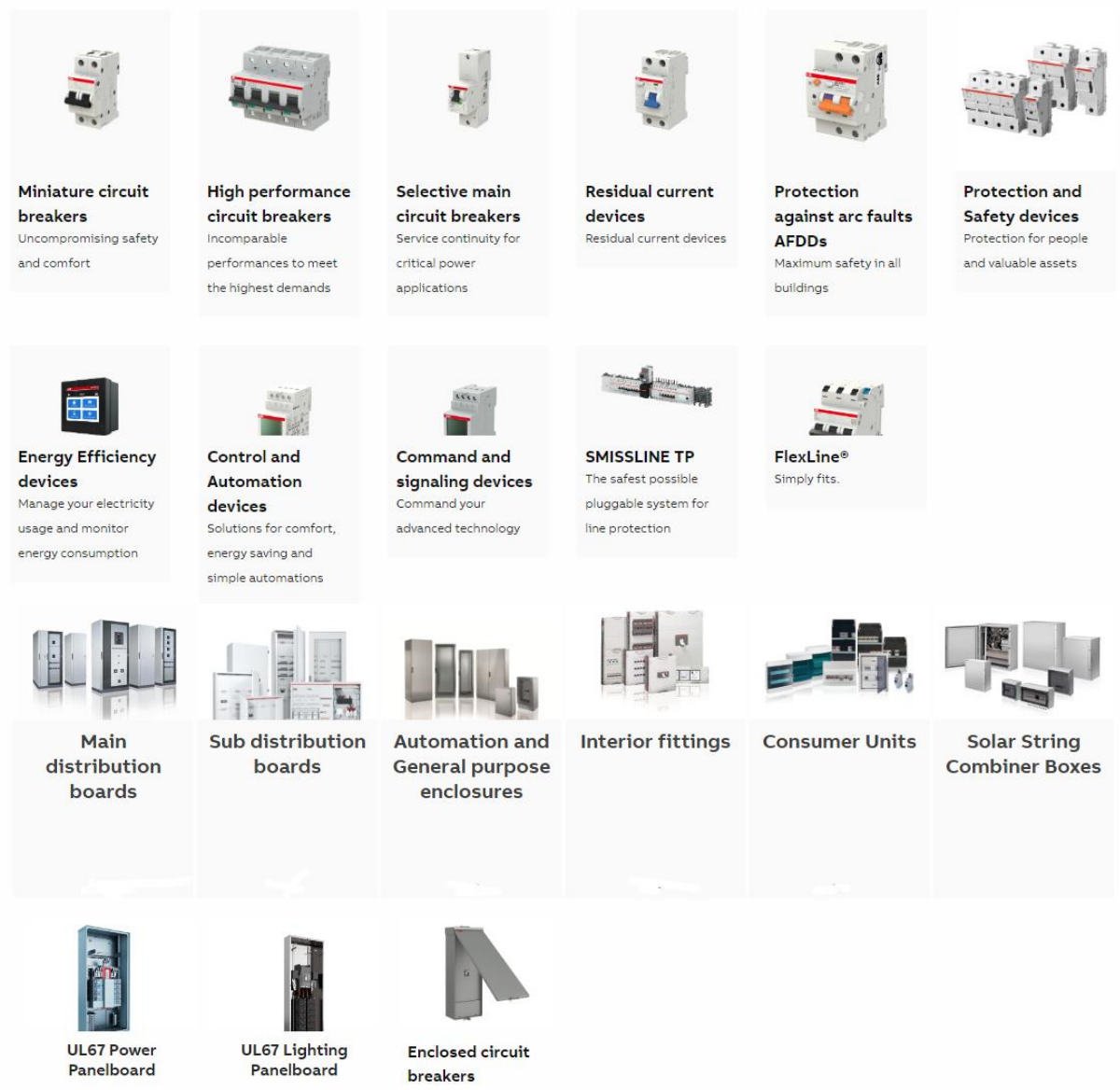

Figure 2: Examples of low voltage energy distribution products.

Why is ABB contributing to the ECHA consultation on PFAS?

As PFAS are widely used in electrical equipment, ABB ELSB, like all other electrical equipment manufacturers, will be greatly affected by the proposed restrictions on PFAS, including the ban at very low concentrations. Without changes to the regulation, this could result in a ban on the manufacture and sale of many low voltage energy distribution and building automation products for ABB and other manufacturers.

ABB is interested and willing to find a compromise to replace PFAS in a realistic timeframe where it is technically feasible, reasonable, and relatively beneficial for the environment and society. To this end, we have prepared and uploaded specific submissions, this being one of them.

We ask ECHA's technical experts to carefully consider these contributions and take them into account when drafting the final regulation.

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 4
Topic: Electrical equipment for low voltage energy distribution - B
Targets: Re-definition of threshold level to higher value

Electrical equipment for low voltage energy distribution consists of the above-mentioned **protection** products, **distribution enclosures** and **energy efficiency** products. The three classes of products include very complex products with daily stress and a long service life of more than 25 years. Products are rated for voltage levels up to 1500 V in AC and 1000 V in DC and currents in a broad range up to 125 A. Protection products are safety critical, since their main function is to protect human lives and equipment from electrical faults and their consequences, such as fires. An example familiar to all people are circuit breakers, that everyone must have at home in electric distribution panelboards. They operate rarely, if ever, but must remain vigilant for decades to detect a fault and, in case, they must absolutely work and clear the fault, by opening the concerned electric circuit. More generally, all or almost all products are maintenance free, have to be certified vs. Standards, including severe safety provisions.

To make this possible in combination with high levels of safety and quality, high quality materials are used. For some of the technical functions PFAS materials are intentionally used or they can be used as components of materials from other manufacturers.

Basing on the presence of PFAS, the product and component portfolio for low voltage energy distribution can be divided into the following four groups.

1) Products or components where one or more PFAS has been **intentionally specified** by the equipment manufacturer (i.e., ABB) by design, as a material or as an ingredient of a material mixture, for a specifically defined function.

   Examples include (but are not necessarily limited to):

   a. Protection devices such as circuit breakers (miniature circuit breakers, residual current circuit breakers, arc fault detection devices, relays, switches, etc., and accessories thereof), whose internal mechanisms are mostly constituted by polymeric parts (e.g., polyamide, PA) where PTFE is added to the compound mixture as a lubricant. These products are produced in volumes of the order of 100 million items per annum.
   b. Protection devices, distribution enclosures and energy efficiency devices comprising polymeric parts (e.g., polycarbonate, PC) where PTFE is added to the compound mixture as anti-dripping or flame-retardant agent, which is necessary to grant safety from fires.

2) Products or components where PFAS has **not** been **explicitly specified** by the equipment manufacturer (i.e., ABB) but might be contained as an ingredient of a material mixture, based on the **definition of the material manufacturer** to match the functional requirements specified by the equipment manufacturer.

   Examples may include (but are not necessarily limited to):

   a. Protection devices such a circuit breakers (miniature circuit breakers, residual current circuit breakers, arc fault detection devices, relays, switches, etc., and accessories thereof), whose internal mechanisms are mostly constituted by polymeric parts (e.g., polyamide, PA) where some PFAS can be added to the compound mixture as a lubricant.
   b. Protection devices, distribution enclosures and energy efficiency devices comprising polymeric parts (e.g., polycarbonate, PC) where some PFAS is added to the compound mixture as anti-dripping or flame-retardant agent, which is necessary to grant safety from fires.

3) Components **independently developed and supplied by 3rd party suppliers**. In this case, PFAS have not been specified by the equipment manufacturer (i.e., ABB) but might be contained as ingredients of a material mixture or as materials, based on the **definition of the product/component manufacturer** (i.e., the supplier), **or of the material manufacturer** for the materials used in the component.

   Examples may include (but are not necessarily limited to):

   a. Capacitors.
   b. Relays.
   c. Printed circuit boards.
   d. Displays, including liquid crystal displays.
   e. Other electronic components.

4) Products or components where one or more PFAS is a **contaminant** from the production process. Due to the extremely low threshold level of 25 ppb, contamination is hard to control, especially if the manufacturing of parts or components are outside the EU, where no restriction on PFAS exists.

   Examples may include (but are not necessarily limited to):

   a. PFAS as release agent used in an injection molding process to allow easy demolding.
   b. Surface treatment using PFAS or PFAS containing substances.
   c. Electronic components such as semiconductors, micro-processors, etc.
   d. Contamination of PFAS in the production machine.
   e. Contamination of PFAS due to proximity to the production line of products with PFAS (that could be exempted from the PFAS ban).

For 1) the manufacturer of the electrical equipment (e.g., ABB) is called to identify and search for alternatives. This process has already started.

Case 2) is more complex, for the inquiry on the possible usage of PFAS involves the supply chain, not only ABB.

Case 3) is even more complex and time consuming, as the process is not under ABB ownership and can barely be influenced by the electrical equipment manufacturer (i.e., ABB). The responsibility is totally on the supplier side. The most relevant example is probably electronic components, such as semiconductors or others, where it has been announced from the industry that it is almost impossible to offer PFAS free solution in short- to mid-term.

For 4) it is unclear how a declaration of PFAS-free could be achieved.

A difficult challenge is **the extremely low threshold level of 25 ppb, which not only limits the identification process to intended ingredients, but it extends it also to contaminants during the production process**. The PFAS-free assessment would be extremely difficult (if not impossible) owing to both the vastity of the product portfolio (and, a fortiori, of the parts in products), and the analytical, diagnostic side. As for the former, the magnitude of distinct items in ABB ELSB portfolio is of the order of 100,000 items. Each item may contain dozens, or hundreds, or thousands of distinct parts. For strategic reasons such business continuity, each part or material has multiple suppliers (preferably, at least three).

To issue PFAS-free declarations that also exclude the presence of contaminants, the electrical equipment manufacturer (i.e., ABB) would need to receive similar declarations from the supply chain. Then, technically, the only way known to us is to perform a chemical analysis of a material sample in a specified lab, searching for a specific, known substance. Since analyzing all parts (from all relevant suppliers) vs. all PFAS (in the order of 10,000) would be not viable, one should refer to, e.g., substances

indicated as a peak in a GC-MS spectrogram. Then, the concentration quantification of such substance requires reference measurements with the same chemical substances (i.e., the PFAS). Since the PFAS component to be quantified is not fully known (as only a fragment of the chemical structure is given), the quantification with a reference material will be very difficult, if not impossible or non-conclusive, owing to the accuracy threshold of the diagnostic method. This request of extremely sensitive and expensive analytics will create a high burden, as the total quantity and the total investment for the analysis of millions of articles would be extremely high. The problem is intrinsic and common to all competitors. Again, this could cause shortage of electrical equipment with huge financial impact and a delay of the green deal.

The alternative would be to analyze and quantify the total fluorine content, but this will not give any information on which PFAS is contained, or if the fluorine is originated from chemistry containing fluorine but not falling under the PFAS definition.

The vast majority of the about 10,000 individual substances covered by the restriction proposal are currently not classified as hazardous in accordance with the CLP Regulation (EC) No. 1272/2008 nor identified as substances of very high concern (SVHCs) under REACH Regulation (EC) No 1907/2006. Thus, information on PFAS contained in mixtures and articles is usually not communicated along the supply chain. Interacting with many suppliers, and their supply chain, is a lengthy process that may take months, or years.

In conclusion, for low voltage energy distribution equipment:

- ABB ELSB recommends **defining a higher permitted threshold level, for example 1000 ppm (or, alternatively, 0.1%wt) or 100 ppm (or, alternatively, 0.01%wt) for each distinct PFAS**, so that intended use is only addressed, i.e., PFAS intentionally added in a mixture of material components.

Luca Ghezzi, Ph.D.
Corporate Executive Engineer

ABB S.p.A.
Via dell'Industria, 18
I-20009 Vittuone
Italy
Mobile: [redacted]
Phone: [redacted]
E-mail: [redacted]@it.abb.com