

Discussion Paper

# Plastics in the Electrical Industry



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German Electrical and Electronic Manufacturers' Association



Die Elektroindustrie

### Plastics in the Electrical Industry

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## Discussion paper

The German Electrical and Electronic Manufacturers' Association (ZVEI) supports the efforts of the EU Commission to boost the role of plastics in a circular economy. The electrical industry advocates improvements of resource efficiency as well as more efficient material and product cycles. Our member companies offer innovative, energy- and resource-efficient product solutions which already contribute to the implementation of a circular economy and to a sustainable use of plastics. We do not regard electronic products which have reached the end of their life as waste but rather as a recyclable resource.

But companies must be guaranteed the freedom to develop innovative products, while choosing their own technological solutions within an open framework. Now as in the future, manufacturers must be allowed to determine the design of their products independently and to find a balance between the use of primary and secondary raw materials (e.g. recycled plastics), efficiency while in use, operating lifespan, maintainability and recyclability. Moreover, the competitiveness of the electrical industry would be unilaterally compromised by one-sided European regulations, if imported products are not subjected to the same requirements.

The present document outlines the key points for discussion from the point of view of the manufacturers of electrical and electronic products.

# 1 Key Concern: Carefully prove any expansion of requirements

Before discussing specific requirements, lawmakers and the industry should first discuss potentially conflicting objectives in a dialog all along the value chains, always taking into account the entire lifecycle of a product and, in particular, potential interdisciplinary rebound effects (e.g. the side effects of an energy efficiency measure on resource efficiency). Any new product requirement has to yield an immediate and accountable added benefit for society and the environment. The electrical industry essentially uses engineering plastics in its products. Safety and quality standards as well as the functionality of a product always have to be ensured.

The European Circular Plastics Alliance (CPA), which we support via our European industry associations, Orgalim, Applia und Digital Europe, offers a platform for dialog. National solo efforts have to be avoided. Some of our member companies are already active within the framework of the CPA, but regardless of company-specific conditions, the industry (most of all SMEs) is facing enormous challenges in the field, given that – due to a variety of issues – recycled plastics cannot be used in products offhand.

In any regulatory proposals regarding plastics in electrical products, the following points have to be given particular consideration:

- **Packaging ≠ product:** Any regulations regarding packaging materials made of plastics should always be considered detached from guidelines for engineering plastics in products. The latter are certified plastics which – given their long operational lifespan (up to 50 years) and the required product safety – have to conform to the highest technical standards, in order to guarantee the product's safe use.
- **Broad product range:** The wide variety of products in the electrical and electronics industry has to be taken into account. Rather than imposing broad overall requirements, any regulation should consider the specific products to which it is meant to be applied and their respective function.
- **Product safety:** In general, product safety from the user's point of view has to take priority. The variety of engineering plastics in the electrical industry in many cases protects the user against electric shock (plugs, device housings, circuit-breaker panels, functional components, etc.) or serves as insulation for the system safety of industrial infrastructures.
- **Use of recyclates:** At this time, a supply of reliably available high-quality certified recyclates which fulfill the regulatory (including RoHS, REACH, product safety, fire safety), technical (e.g. standardization) and material specifications for the many different uses of a product over its service life (e.g. stress cracking resistance in contact with media), sufficient in quantity to cover an increased use of recycled materials, is not yet available.
- **Standards for recycled materials:** Developing product-specific standards for quality criteria of recycled plastics (secondary raw materials) as well as the promotion of (basic) research in the field of plastics recycling (independent of any specific recycling technology) are key elements in a practice-oriented implementation of the concept of a closed cycle for plastics.
- **SMERC:** As a basic principle, ZVEI demands for all proposals on product-related regulations that they be checked against the five SMERC criteria (specific, measurability, enforceability, relevance, and competition-friendly<sup>1</sup>).

<sup>1</sup> cf. ZVEI's position on the ecodesign directive, p. 4 (in German): <https://www.zvei.org/presse-medien/publikationen/die-oekodesign-richtlinie/>

## 2 Relevance and requirements of plastics in the Electrical and Electronics Industry

In the heterogeneous product portfolio of the electrical and electronic industry, we find a wide range of applications for plastics. Given their versatility, plastics offer decisive advantages over other materials. With their ability to insulate electric currents, combined with their high mechanical resilience, their variety, and their durability, plastics are ideal materials to be used in the electrical industry. The type, quantity, and lifespan of engineering plastics varies significantly from one electrical product to the other.

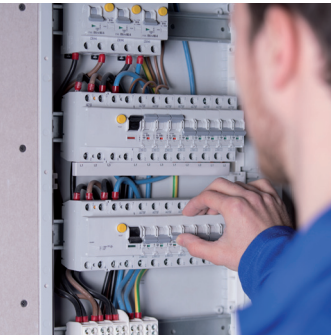
While the general ecological awareness of companies is of paramount concern in packaging, plastics fulfill many different requirements in electrotechnical products. These requirements are mechanical, material/technical, as well as visual/esthetical in nature, have to comply with product safety regulations and are designed to conform to the needs of the intended application over the entire service life of the product.

If a plastics product is to function as intended, it is necessary to choose component-specific materials in line with the processing technique, resulting in a complex mix of materials. Consequently, all requirements have to be assessed and implemented in detail:

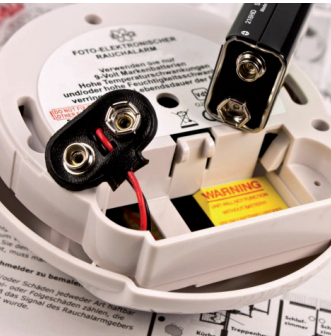
- **Product safety:** electric insulation, UV exposure, tracking resistance, temperature resistance, fire behavior, arc fault protection, color coding (to indicate specific functions in electrical components, e.g. kill switches or failsafe electric circuits in an explosion-protected area) and – related – color retention as well;
- **Mechanics:** wide freedom of design and thus fulfillment of even complex functional specifications (e.g. manufacture of tiny electronic components) with a minimum of materials;
- **Material/technical:** low density, food safety, long-term reliability, fiberglass reinforcement, increased rupture safety, and elasticity (allowing high energy absorption), less corrosion and more resistance to chemicals than metals, flame resistance, low thermal conductivity and electrical non-conductivity (use as insulation material);
- **Visual/esthetical:** variety of options in coloring, color retention (white should remain white over the entire operational lifespan), acoustics, odorlessness.

In addition, **commercial considerations** also come into play, of course:

- large quantities (injection molding) with a minimum of material and at a low component price;
- high dimensional accuracy/reproducibility of components, low spoilage rate;
- fully automated manufacture.



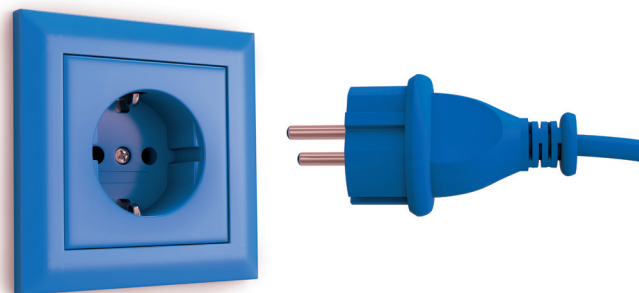
Source: Wellnhofer Designs – stock.adobe.com



Source: Pixelot – stock.adobe.com



Source: Jean Müller GmbH

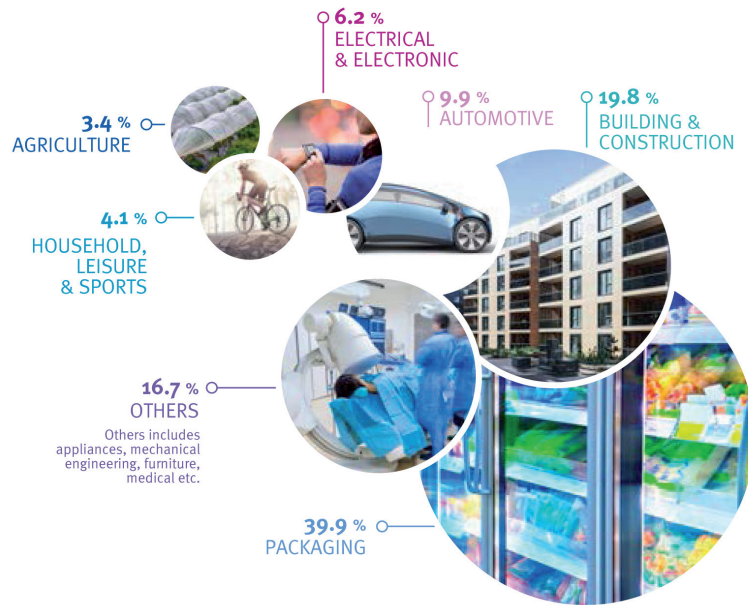


Source: electriceye – stock.adobe.com

# 3 Practical challenges in the use of recycled plastics

## Relevance of Plastic Packaging in the Electrical Industry

The largest quantity of plastics in Europe is used for packaging. For this reason, we welcome the EU Commission’s approach to advance a recycling-oriented use of packaging. Companies in the electrical industry are thus increasing their efforts to use plastic packaging in the most sustainable way possible.



Source: PlasticsEurope Market Research Group (PEMRG) / Conversio Market & Strategy GmbH

We would like to point out a few areas within the electrical industry with regard to plastic packaging:

- Plastic packaging fulfills important requirements for medical devices and accessory items for medical devices with patient contact which have to be kept sterile up to the time of use (including invasive applications).
- In the case of food contact materials, it is nearly impossible – with the technology available today – to use recycled materials, if the source of the recycled plastics is unknown. Moreover, approval procedures to ascertain compliance with food regulations are very lengthy, since the EU Commission lacks adequate capacities.
- Plastic packaging protects products from electrostatic charge and discharge (ESD). This is necessary to ensure the functionality of certain components. Moreover, ESD can have an impact on material properties, making it impossible, for example, to use certain labeling techniques.
- In order not to exceed the moisture sensitivity level (MSL) of products (e.g. for specific soldering methods), plastic packaging is used which has to be waterproof and gastight, among other things. In addition, sealed plastic packaging is used for preserving the technical material profile (especially for polyamides).
- Plastic packaging is used to prevent contamination which may have an impact on tracking or transfer resistance.

## Plastics recycling is not new to the electrical industry

The repelletizing of recycling material or production waste as a means of resource-saving production is already common practice for companies in the electrical industry today. This also includes plastics used in manufacturing.

The quality of a plastic and its potential use as a secondary raw material or recycle depend on the “living conditions” of the primary material. Due to the complex mix of materials, their aging and contamination, however, a reliable straightforward re-use of plastics is generally not possible.

### **The use of recycled materials depends on a variety of specifications.**

As a matter of principle, recycled plastics have to be available on the market in sufficient quality and quantity. This condition is currently only met in cases where challenges are comparatively small (packaging materials and disposable products). Moreover, these cases have a much larger potential for avoiding or reducing waste streams.

Additionally, the statutory provisions relating to plastics (e.g. REACH, RoHS, Food Contact) and the safety of electrical devices with a high percentage of plastics (including fire prevention, voltage protection, insulation current resistance) as well as normative product requirements pose enormous challenges for the use of recycled materials. The issues mentioned below explicate that a provision of homogenous plastics must be guaranteed, since plastics have to be standardized and, in most cases, also certifiable and approvable for their specific application. Anybody involved in the “plastics lifecycle” will have to keep these requirements in mind.

In the context of current certifications and normative requirements (e.g. flammability, tracking resistance, or relative temperature index), in most cases, only a certain percentage of repelletized – but not recycled – materials is accepted in plastics. However, it has to be taken into account that a specific type of plastic from different plastics manufacturers may have different properties. By mixing different varieties of the same plastic, product specifications cannot be guaranteed anymore. Moreover, the admixture of different additives results in a complexity of materials that makes it even harder to keep products recyclable. Considering the relevance of product specifications such as e.g. durability, the correlation between quality standards and the use of recyclates becomes obvious. As plastics age, external factors may alter the chemical properties of certain additives or even the molecular structure of the plastic material itself. Older plastic products intended for recycling may contain additives that cannot be used in new products. This aspect poses a challenge to the circular economy in general.

The use of recyclates from old appliances in new products thus has to be thoroughly examined in terms of legacy substances that may be contained in the old devices, since the secondary material may not comply with current material specifications or the continuously changing statutory requirements (“legacy substances”). Effective improvements can only be achieved through a modern and efficient recycling industry which is capable of sorting out “legacy substances”.

### **Taking into account existing legal requirements**

Especially in the light of the “balanced view of the interface between chemical, product and waste legislation” propagated by the EU Commission, we are critical of potential statutory provisions regarding the use of recycled plastics in products without adequate assessment. We have to wait for the results of ongoing studies on the interface between chemical, product and waste legislation as well as results of the Circular Plastics Alliance currently underway.



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