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GROUP REF. : B1
PREF. SUBJECT : 3
QUESTION N° : 2

At the time of preparing this contribution, with the hot summer and associated weather events, all “mainstream” news outlet were dedicating a significant amount of air time to the topic of climate change, how we should all adapt to it, and change our models and practices to reduce negative impact on the environment. This is now a widely and increasingly accepted state-of-fact.

The trend for more sustainability in general is clear. It will, hopefully sooner than later, have an impact on all manufacturing activities, which are still required in the real world we all live in, to produce goods and materials.

From a material manufacturing standpoint, the future to achieve sustainability ambitions is the move from a linear model (make-consume-dispose) to a circular model, including reuse and recycle. More and more, commitment from players around the globe are being made to engage in this unavoidable process.

Today, a significant share of polyolefins applications are coming from a wrong perception on the value of the materials, considered as “cheap” and therefore disposable, used with very short service life. This is actually counter-intuitive, when considering what can be done with the materials in terms of robustness and stability over time. In that respect, cable applications (Insulation materials and jackets), with service life aiming at 40 years or beyond, are some of the longest-lasting applications around for polymers, and thereby among the most sustainable ones. Still, from a circularity and sustainability standpoint, polymeric cable materials development will benefit from learnings in other industries with shorter lifecycles, e.g. packaging. New materials development already does, and will increasingly include sustainability assessments to fit the future, circular model. This includes in particular end-of-life, and great progress is being made in recycling, to increase quality of mechanical recycling and, for more challenging products, to develop chemical recycling techniques.

With respect to lower emissions, a first angle of material development is to look at the material itself, using alternatives to conventional/fossil feedstocks. The use of bio-based renewable feedstock has the potential to significantly lower CO_2eq emissions impact. Second-generation renewable feedstock, issued from waste and residues, allows taking the benefit without competing with food supply chain. It is the way to go.

A second angle is to consider the materials’ impact on the finished good manufacturing – in our case, cable manufacturing, where materials can also contribute to lower emissions. We see the emergence of thermoplastics as one attempt to try and meet such goals. Optimising XLPE to improve cross-linking and lower degassing requirement is also a way that keeps being investigated, as it has been in the past from an economic viewpoint (to reduce production cycles) and is now also for sustainability reasons.

Lastly, a key angle is to consider the material in the finished good (cable) end-use, that is its contribution to the transport of electricity via cables. In the power system, a material with improved technical performance can have dramatic positive impact on environmental performance by e.g. lowering the amounts of cables required, lowering the consumption of other materials such as metals, reduce installation costs and associated emissions… An illustration of that is the impressive development of DC transmission now aiming at 2GW per cable pair, when the ‘standard’ was barely half that just a few years ago.

The bottom line is that every aspect is important, and a comprehensive view of a materials’ application is essential to optimally apprehend this materials’ current and future requirements. Considering that grid infrastructure does not get built in one day, time is of the essence to meet policy targets for energy systems and their contribution to “net-zero” goals. To develop this comprehensive view in as little time as possible, it is critical for stakeholders to exchange on the topic and associated targets to match development possibilities with the most optimal solution in terms of sustainability. In this respect, CIGRE B1’s choice to put sustainability as one of three preferential subjects in this year’s session is most welcome, and will hopefully encourage such dialogue.

The sustainability initiatives for cable systems will require a new review if properties are affected and in such a case to what extent. This goes all along the value chain from raw material suppliers to design, installation and end-use. Regarding the plastic components in the cable system, recycled plastics can and will be used with a certain a share and this will change some properties to some extent. A typical property could be cleanliness and the criticality has to be assessed. Recycled jacket containing post-consumer recyclates has to comply with international standards, but might differ from current industry practices which are based on virgin polymers. Utilities and project developers should be aware of these changes when considering increased use of recycled materials and a discussion with the materials supplier to clarify material characteristics and performance could avoid long re-testing to aim for “traditional” industry practice levels.

The fulfilment of standards and recommendations may be challenged in the future when the composition of the raw material such as plastics are containing post-consumer recycled content (from mechanical recycling). Other plastic components in the cable system, such as filling material in joints or in three-phase cables should also not be neglected to consist or contain recycled materials.

The driving force for increased sustainability will push for new developments which also should go hand-in-hand with the driving force for higher powers in cable systems. How can the industry find ways to demonstrate long-term reliability with the push for new or updated materials and designs given that track record and experience is a crucial component in cable system evolutions? For instance, the use of renewable feedstock as well as chemically recycled feedstock going from monomer to polymer will result in the same end-product as for the virgin polymer and will not need any requalification. From a regulatory standpoint, solutions based on 2nd generation bio-based or chemically recycled feedstock should be reckoned and accounted for as recycled, in order to accelerate the transition to these more sustainable solutions.