What trend can be foreseen in cable insulation material development, including optimisation of XLPE, shift to thermoplastic solutions or others ?

Demand for power continues to grow at a rapid pace and hence the need for efficient insulation material systems as well. For a cable manufacturer, insulation systems that improve production efficiency while ensuring the highest quality of product are critical. For the Transmission system operator or Utility, the transmission losses are a key piece of the puzzle. This is also crucial from a decarbonization perspective. The contributions of novel cross-linked polyethylene solutions will help the value chain to meet these needs

Rapid urbanization, the growth of renewable energy and upgrade of the existing grid are intensifying demand for reliable high voltage cable systems. Cable manufacturers need solutions that enable faster cable production times, lower emissions, and higher transmission rates.

Current cross-linked polyethylene insulation systems require degassing periods of up to a few weeks to reduce the cross-linking by-product concentration to an acceptable limit. This extends production cycles and increases business costs.

Since the degassing process is the most time-intensive process in a cable manufacturing factory, reducing the degassing time represents significant productivity improvements for the cable manufacturer. The productivity improvements are generated due to a combination of factors such as:

1. Lower energy consumption from degassing chambers
2. Reduced inventory cost
3. Improved cycle time and potential capacity increase by de-bottlenecking of the degassing process

The reduced degassing energy consumption as well as the reduced methane emissions from the cable also contribute to CO_2 footprint reduction from cable processing.
The power sector is undergoing a global transformation with decarbonization becoming a major priority across continents. Thermoplastic materials are hence an interesting option as they do not require the degassing process, thus reducing the CO_2 footprint from cable processing. With novel XLPE compounds offering ‘zero degassing’ or ‘low degassing’ solutions, this gap has been bridged while still delivering a fully cross-linked system that reduces concerns about cable deformation during extreme thermal overload situations.

Most of the CO_2 emissions for a power cable are generated during the cable use phase. The thermal resistivity of XLPE is 3.5 mK/W whereas that of thermoplastic materials used as cable insulation is 4.5 mK/W. This would result in higher energy losses during the cable use phase thus increasing the overall CO_2 footprint of the cable over its lifetime. Hence a holistic approach that involves material suppliers, cable producers and Transmission system operators/utilities/end users is required to address the decarbonisation challenge.