



# Thermoplastic Blends



## NEW INSULATION MATERIALS

### HIGH PERFORMANCE THERMOPLASTIC INSULATION

With our expertise in polymer science and engineering we have developed advanced nanocomposites and polymer blends to replace insulation for high voltage power cables. We have also developed self-healing technology that can prolong the life of HV cables.

### ADVANCED POLYMER BLENDS

As technologies advance, so do the requirements for the materials used. Foreseeably, there is a risk that existing materials in your supply chain no longer meet your future requirements in terms of performance. Not tackling this issue can cause an unacceptable delay in your product pipeline. Kinectrics can work with you to create material selection options by customising your materials to achieve targeted performance enhancements.

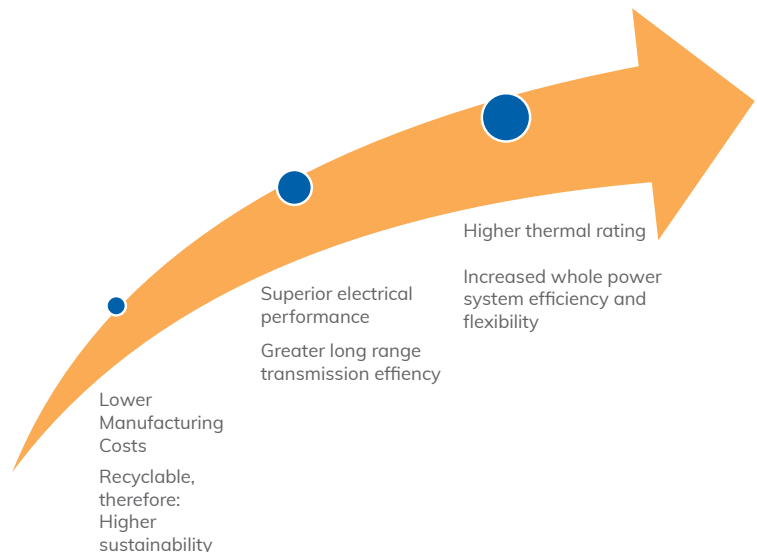
Kinectrics has extensive experience in producing polymer blends, using our laboratory scale solution reactors, melt extruder and compounders. We have produced reliable polyolefin blends with excellent electrical performance and improved mechanical properties for use in the electrical cable applications. In addition to the blend components, additives, such as antioxidants and stabilisers, should also be considered to make the materials fit for purpose.



Kinectrics has successfully moved lab-scale materials through to scale up to pre-commercialisation production volumes in a number of projects.

### THE NEED:

- To deal with increased peak demand in the UK Energy Transmission Network
- To reduce the whole life environmental impact, from manufacture to end-of-life, increased recyclability, reduced waste and CO2
- Increase whole power system efficiency
- Enhance sustainability, (particularly under peak load and fault management) through flexible AC transmission (FACTS)
- Use cable systems with increased peak-load thermal tolerance

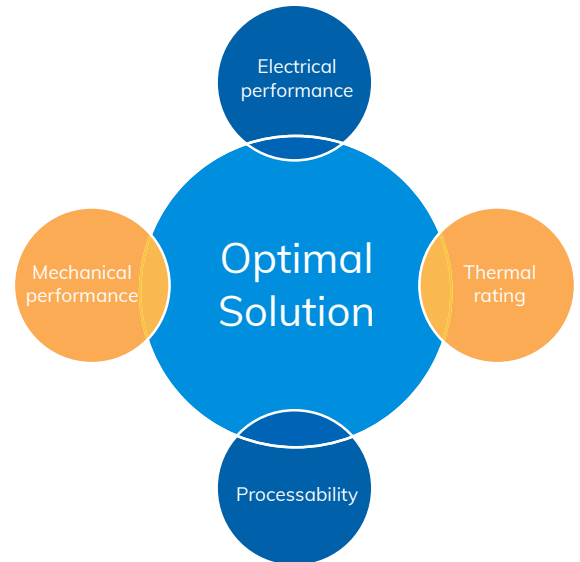


## DEVELOPMENT:

Polyethylene and polypropylene blends were developed to meet specific insulation property requirements, for example improved breakdown strength and increased operating temperature. Formulations have been tailored to be processable and also meet mechanical specification.

Size of crystals and crystal boundary strength have an effect on electrical breakdown and Kinectrics is experienced in targeting materials that will complement each other and in scaling formulation production.

We have worked with cable makers to develop and test prototype cables, taking into account their process requirements. The outcomes were positive with the cable performing well in comparison with conventional XLPE cables.



## OUTCOMES:

- Improve reliability and efficiency of connections to renewable generation and extreme environments
- Improve high temperature cable performance
- Greater long-range transmission efficiency (particularly for HVDC and EHV cables)
- Higher purity therefore reduced transmission loss
- Increase network flexibility and reduce redundancy
- Superior electrical, dielectric, thermal and mechanical properties
- Circular economy integration of distributed assets
- Recyclable to add value to asset end-of-life processing



## SUSTAINABILITY BENEFITS

Kinectrics carried out life cycle assessment comparing new materials (thermoplastic blends) with XLPE.

- Lower manufacturing costs and global warming potential (GWP) contribution, due to reduction in energy and chemical use
- End-of life GWP and cost advantages of thermoplastic insulation substantial through low-energy recyclability of thermoplastic insulation; promotes asset recovery strategy

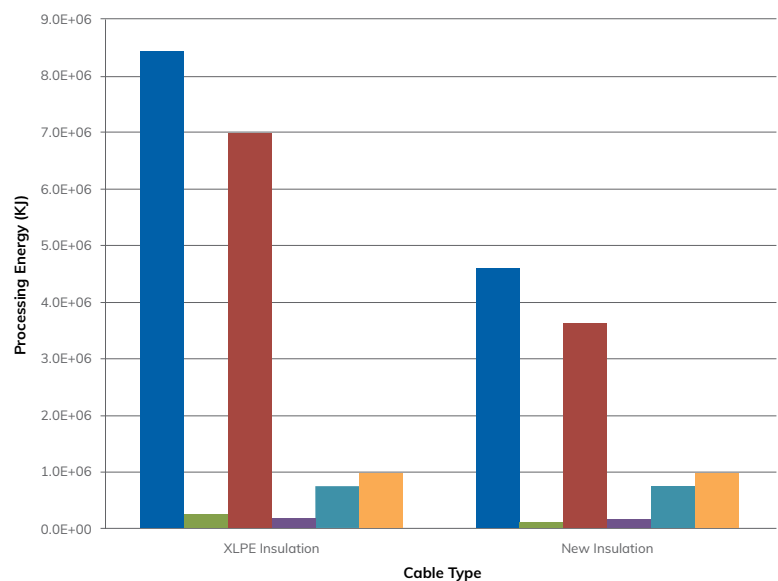


Illustration of the sustainability benefits of new insulation materials v's XLPE



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