

# Q&A

## UNDERSTANDING THE IMPORTANCE OF ADVANCED TRANSFORMER OILS

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### What do changes in power generation mean for transformer oils?

How we generate, transmit, and consume electricity is changing in ways which place a greater demand than ever on key infrastructure, particularly electrical transformers. From an increased need for power, which places stress on often aging infrastructure; to the siting of renewable power generation capacity in locations susceptible to extreme weather, transformers are required to deliver under more challenging conditions than ever before.

The increasing integration of renewable energy sources of generation – that are often situated away from population centres - into the grid, requires long-distance electricity supply – and higher voltages to ensure efficient transmission. This alone increases stress on electrical transformers which were often designed with much lower loads and lower operating temperatures in mind.

To maintain operation with peak performance, the industry needs new and smart transformers to meet those changing requirements on the oil - providing extended periods of reliable operations to enable transformers to work hard for longer; performing at the higher voltages required for longer distance electricity transfer; and operating under higher temperatures at the limits of transformer design specifications.

Meanwhile oil must be well equipped to support the transformers to be reliable in these more challenging environments – it also signals the influx of sustainable measures across the board; and this includes for the oil itself. Cradle to grave offsetting of emissions is at the front of many customers' minds; as is the recyclability and biodegradability of an oil – which is particularly important in environmentally sensitive locations.

At Shell Lubricant Solutions, our challenge is to develop and supply best in class transformer oils that will fulfil both today's requirements and those of the future. With more than 80 years of experience in the sector, we have developed a range of naphthenic and paraffinic oils; which we added to with our GTL options in 2013, and most recently with our biodegradable product this year as we look to ever evolve our offering ahead of market demand.



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# Q&A



## Why are transformer oils so important in effective and reliable equipment operations?

Transformer oils are integral to the overall reliability of the equipment. They play an important role in securing the electrical supply and ensuring that equipment functions optimally.

While the high dielectric strength of advanced transformer oils means they act as an insulator where appropriate. Another key function is to enable efficient cooling in the equipment. A poor-quality transformer oil can quickly oxidise which forms sludge which will then block the cooling tubes. Whereas an advanced option, such as those in Shell's GTL range of transformer oils have high oxidation resistance to mitigate this risk of sludge build up and therefore increase performance reliability. The cooler a transformer runs, the more energy efficient it can be, and helps preventing any unplanned cease of operate.

High sulphur levels are other implication of poor-quality transformer oils that can be costly for operators. When this sulphur comes into contact with the copper in transformers, it forms cuprous sulphide, which greatly reduces the dielectric properties of insulating materials, reducing their performance and increasing the chance of failure. The high temperatures at which many transformers now operate increases the likelihood that deposits of cuprous sulphide form.

A range of factors has increased the demands placed on transformer oil, and only through innovative responses to these challenges can power generators and suppliers guarantee continued quality of service, cost efficiency and return on investment.

Shell Lubricant Solutions has pioneered the innovation of oils based on its gas-to-liquids (GTL) technology, which converts natural gas into high-quality liquid products. GTL-based products contain almost none of impurities like sulphur, aromatics and nitrogen, making them ideally suited to use in high-demand environments such as electrical transformers.



### What innovative technologies are the industry developing to meet the changes in the sector?

Shell Lubricant Solutions has pioneered the innovation of oils based on its gas-to-liquids (GTL) technology. GTL technology converts natural gas into high-quality liquid products. Electrical oils based on crude oil often have relatively high levels of impurities including sulphur, aromatics and nitrogen. In contrast, GTL-based products contain almost none of these elements, making them ideally suited to use in high-demand environments such as electrical transformers.



Shell has launched Shell Diala S5 BD, a GTL-based transformer oil which meets and exceeds specifications of Type A classification in IEC 60296 edition 5, 2020, is suitable for use in environmentally sensitive locations, being readily biodegradable, but does not compromise on performance or durability.

### What is Shell doing to meet the need for next-generation transformer oils?

Shell has launched Shell Diala S5 BD, a GTL-based transformer oil which meets and exceeds specifications of Type A classification in IEC 60296 edition 5, 2020, is suitable for use in environmentally sensitive locations, being readily biodegradable, but does not compromise on performance or durability.

The new oil has a very low pour point: below  $-51^{\circ}\text{C}$ . This, along with its good flow properties allow it to provide excellent cold temperature performance. It is robust in its resistance to ageing and degradation, has excellent heat transfer and cooling properties, and can enhance system efficiency, helping operators to reduce unplanned costly downtime.

Shell Diala S5 BD is compatible with standard mineral transformer oils (for ease of retrofitting) and meets the performance requirements of power transformers worldwide.