An international leader in the development of biochemicals and bioproducts

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The dominant economic model of the final decades of the 20th century and the first decade of the 21st century was a linear model, inherently **dissipative and degenerative**, in which raw materials, coming mainly from nonrenewable sources, were exploited to create industrial products that at the end of their service life are often thrown away. While this industrial model brought technical and economic achievements, it created an economy based on the continuous depletion of soil and natural resources. Such an increasingly globalized economy, with increasingly short-term objectives, is growing faster and faster and will not be sustainable long term as it aims solely to secure a profit, to the detriment of the quality of life and of natural capital.

It is time to think about the products in a different way. It is necessary to conceive products in a circular economy system where they are designed to represent a solution during their use **and not a problem when their service life comes to an end**. Conversely, they can become a resource, a raw material useful to be introduced again in the value chain, in a circular bioeconomy perspective.

NOVAMONT has recently developed two dielectric fluids for oil filled transformers, applying a completely new approach in the selection and synthesis of new raw materials, their refining and composition.

To establish this new system, technical challenges are even harder but a new perspective is possible.

Environmental and social issues are becoming more and more important and will shape the way the industry in every sector will act. Transformer industry is not an exception, with the growing demand for Eco-Design and more efficient, high performance and low impact products.

NOVAMONT mission is to develop materials and products from renewable sources, by putting together chemistry and agriculture, activating biorefineries that are integrated into the territory and providing application solutions that have a low environmental impact, that guarantee an efficient use of resources throughout their life cycle, with social, economic and environmental advantages for the system.

NOVAMONT promotes a **model of bioeconomy** as a factor of **territorial regeneration**, based on three pillars:

- **Reindustrialisation** of no longer competitive sites thanks to **proprietary technologies first in the world** in order to create "**bioeconomy infrastructures**", integrated with the territory and interconnected each other;
- Development of **low impact value chains** through the valorisation of marginal land not in competition with food production, integrated in local areas and connected with the bioeconomy infrastructures;
- Products and value chains are conceived and designed to provide **sustainable solutions** for specific environmental, social and economic problems.

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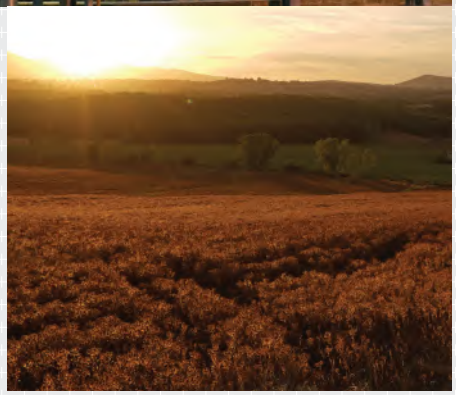
Photo: Novamont, Shutterstock



Since the invention of oil immersed transformers, many different attempts have been done to develop valid alternatives to mineral based dielectric fluids. Sometimes such attempts resulted in good technical performances, having on the other side huge environmental, health and safety drawbacks (think about PCBs). Despite their high performances in insulation and cooling, low viscosity mineral oils also have several drawbacks: above all, they are highly flammable, having a fire point often lower than 160°C, and they do not protect the solid insulating part of the transformer – the Kraft paper. Furthermore, they come from a non-renewable source, they are not biodegradable and, may have adverse health effects.

Novamont is now able to offer two grades of dielectric fluid, Matrol-Bi FDV01A and Matrol-Bi FDE01A. **Both grades** not only represent a better option from an environmental point of view, but they **overcome the performances of mineral oils, assuring many technical advantages**. Matrol-Bi **flash and fire points** are definitely higher than most of the widespread dielectric mineral oils. **Matrol-Bi** fluids are based on natural or synthetic based esters and guarantee a **reduced fire risk and limited damage in case of accidents** with the possibility to increase the safety level of transformers installed in densely populated areas. The reduced risk of fire and accidents can also lead to lower prevention, maintenance and insurance costs. Thanks to their higher polarity (compared to mineral oils), natural and synthetic esters are capable to dissolve higher amounts of water without compromising their dielectric performances. While mineral oils are generally able to absorb up to 60-100 ppm of water, Matrol-Bi FDV and FDE are able to absorb up to 1000 ppm. **They can prolong the life of the insulating Kraft Paper**, absorbing water and slowing paper ageing, and thus prolonging the service life of the transformer.

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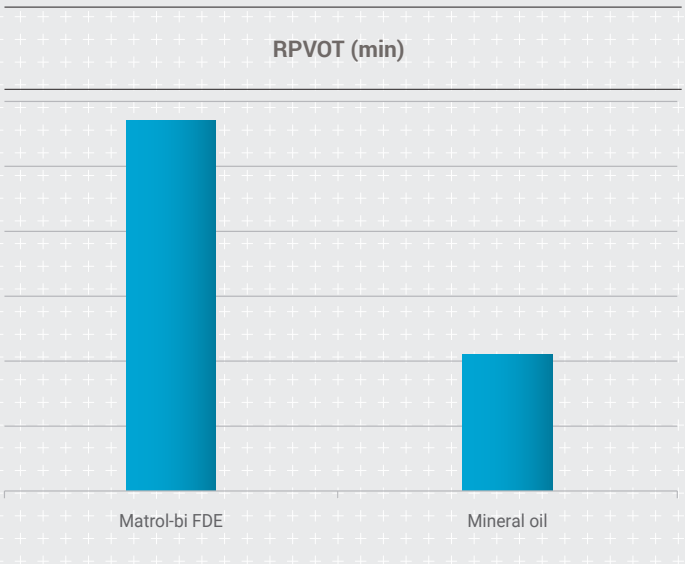

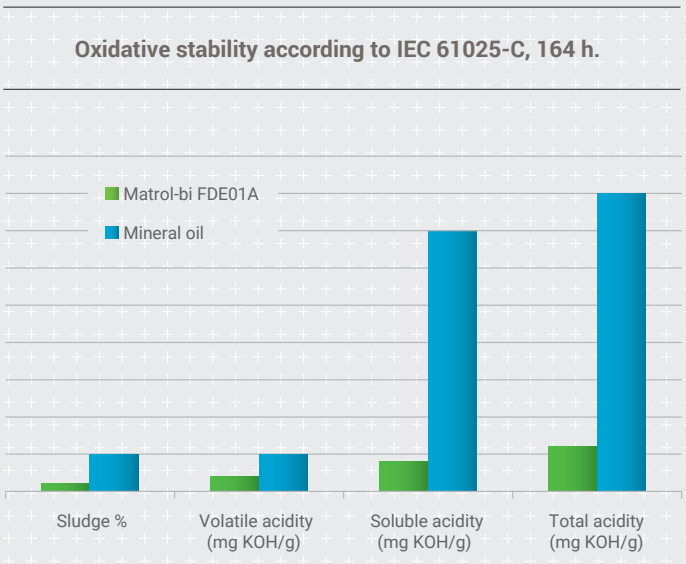

Despite the elevated oxidative stability, low temperature fluidity is outstanding.

Viscosity (cSt)	100°C	40°C	20°C	0°C	-20°C
Matrol-Bi FDV01A	9	41.5	92.2	256	982

Matrol-Bi FDV01A fulfils and exceeds IEC 62770 standard requirements.

Matrol-Bi FDE01A is a patented synthetic ester fluid which has a low viscosity compared to other commercial synthetic dielectric fluids, very close to the viscosity of mineral oils. This parameter is critical because the lower the viscosity, the greater the capacity of the fluid to impregnate the solid insulation and protect it, to remove and disperse the heat. **Thanks to low viscosity and excellent low temperature fluidity, Matrol-Bi FDE01A is particularly suitable for retrofilling of old transformers designed for mineral oils since there is no need to change the design of transformer.**

Viscosity (Cst)	100°C	40°C	20°C	0°C	-20°C
Matrol-Bi FDE01A	4.75	21.9	48.4	143	644
Mineral oil	3.7	15.6	37.7	129	765

Despite low viscosity the ester has high flash and fire points (>250°C and >300°C), **fulfilling and exceeding all the requirements of IEC61099 standard**. Compared to a widely used mineral oil, it has exceptional oxidative stability and a low tendency to form sludge and deposits.

The aim to combine excellent performance with respect for the environment is today possible. High-performances, extended transformer life, high oxidation stability and low gassing tendency, enhanced asset performance and biodegradability are the key attributes of Matrol-Bi.

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Both Matrol-Bi synthetic and natural esters are renewable (>85%) and readily biodegradable, reducing long term risk to the environment in case of accidents and spilling. The amount of gasification is low and the specific heat is comparable to that of mineral based dielectric fluids.

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Photo: Novamont