

Making an Impact

Natural ester transformers change India's landscape

Pad Mounted Distribution Transformers filled with Cargill's Envirotemp™ FR3™ natural ester dielectric fluid are helping Tata Power to achieve up to 70% savings in substation space in crowded Mumbai metropolises

The peninsula of Mumbai, India is the third-most densely populated urban area on Earth. This "mega-city" is home to more than 53,000 people per square mile—roughly twice the current population density of New York City. As a result, electric power companies in Mumbai are facing space-constraint issues and challenges that are common to all fast growing cities around the world.

The Tata Power Company Limited has developed an impactful solution to overcome this challenge. They implemented FR3 natural ester fluid in their first-ever pad mounted distribution transformers.

"Pad mounted natural ester dielectric fluids offer a number of critical advantages over traditional pole and plinth mounted as well as packaged substations with mineral oil—especially when it comes to operating in densely populated areas," said Ashok Sethi, COO and Executive Director of Operations at The Tata Power Company Ltd.

FR3™ natural ester pad mounted transformers deliver significant space savings and reduce risk of fires

The Tata Power Company Limited is India's largest integrated power company with a growing international presence, serving more than 600,000 residential and commercial customers in Mumbai and more than 1,400,000 customers in New Delhi. It began exploring the use of natural ester fluid filled transformers in 2003, but didn't have a local manufacturer to provide the product and fluids expertise. When Cargill was able to offer a local solution in 2013, Tata Power began working with Cargill's dielectric team to incorporate FR3 natural ester across many of their transformers including:

- Refilling distribution transformers to increase the transformer capacity,
- Designing a more compact, 25 MVA transformer resulting in a power capacity of a 28MVA transformer with the footprint of a 20MVA transformer providing 16% cost savings and 17% footprint reduction,
- Their first-ever pad mounted transformers ranging from 25kVA to 750kVA. Pad mounted transformers have helped achieve 70% space savings at a significantly reduced cost compared to plinth and package substations. The pad mounted



transformer can be used to replace the pole mounted substations.

Tata Power's engineers, collaborating with Cargill's dielectric fluids team and a transformer manufacturer, brought expertise and know-how for this solution to India from the US and Japan, where this solution is already used.

The final pad mounted solution has the following highlights:

- 70% reduced footprint
- Up to 48% cost-savings
- Up to 50% reduced installation time
- Reduction of spares
- Increased fire safety (FR3 fluid is a K-class fluid, FM approved, UL certified)
- Enhanced environmental profile (FR3 fluid is biodegradable, carbon neutral* and non-toxic and non-hazardous in soil and water)

"Key drivers for us are reduced transformer installation size while increasing fire safety- in addition to the Indian government's push toward smart cities and a smart grid," said Sethi. "But the other properties of FR3 fluid—its high temperature capability and environmentally friendly characteristics were also very attractive to us. Finally, an additional key aspect was the abundant availability of locally supplied and manufactured product."

Innovative solutions impact entire industry landscape

Tata Power has a long history of innovation.

While they achieved many successes with the FR3 fluid-filled transformers, they aren't slowing down. Tata Power plans to further decrease the footprint and improve performance of all their transformers. These continued innovations could change the landscape of the power industry in India and create a new paradigm that can be adopted successfully in other regions around the world.

For more information visit envirotempfluids.com or contact us at indiaenvirotemp@cargill.com

*According to BEES 4.0 lifecycle analysis

The curious case of the shrinking, but more cost efficient transformer.

Considering the total cost perspective:

Truth be told, if only comparing the initial fluid cost of Envirotemp™ FR3™ fluid and mineral oil, FR3 fluid cost is higher. Yet



requires reprocessing for water, reduces routine maintenance, and may eliminate the need for expensive deluge systems. Given the natural

ester is ultimately biodegradable, spill remediation could be simplified, potentially requiring fewer man-hours for clean up.

Reduced replacement cycle by extended asset life: FR3 fluid

has been shown to extend insulation life from five to eight

of the dielectric fluid and its exponential value for your organization emerges.



CONSIDERING THE TOTAL COST OF OWNERSHIP

Download "A Practical Approach to Designing Cost Efficient Transformers" or connect with one of our specialists at envirotempfluids.com

Smaller, more cost efficient design:

The benefit of FR3 fluid's dielectric properties allow smaller transformer design at a specified transformer rating, which could possibly result in a lower cost per kVA.

times longer than mineral oil, which ultimately can result in a longer-lasting, more reliable transformer in the field.

Choosing Envirotemp™ FR3™ fluid over mineral oil allows smaller, more efficient power transformer design calling for potentially using up to 15% less fluid and 3% less construction materials.

Broader organizational impact: FR3 fluid's innovative

qualities can positively impact inventory management and enhance sustainable supply chain initiatives. There is no

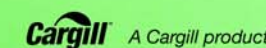
Meaning, essentially, utilities could purchase a 50kVA transformer with the footprint of a 37.5kVA.



mystery here. All the facts point to the inescapable conclusion: FR3 fluid can achieve significant efficiency

and performance gains for your organization. Case closed. chemistry makes it less flammable, less corrosive and self-drying. In normally operating transformers, it never

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