



Novec™

Brand

Meeting strict environmental and supply standards in power generation: Iberdrola chooses Novec 1230 fluid

Keeping the lights on

Following a series of blackouts, many of which were caused by substation fires, the city government in Madrid, Spain, passed a new law regulating its electricity utility provider [Iberdrola](#). The Electricity Supply Law required that every consumer has access to electricity supplied from at least two sources of power and that Iberdrola must restore electrical power to every consumer within six hours of an outage. Because fires had been such a common cause of outages, the law also mandated that all electric substations have efficient and modern fire extinguishing systems.

To meet these requirements, Iberdrola planned its largest-ever infrastructure investment, a €400 million plan to build 17 new substations in the Madrid area and to move all the city's substations and other electrical distribution facilities underground. Each new substation was expected to have a lifetime measured in decades, so any [fire suppression solution](#) implemented had to be both protected from further regulatory action and able to fit into the limited space available in these underground facilities.

In addition, the fire suppression system agent needed to be non-conductive and safe to use around energized transformers and other electrical equipment – and, most importantly, safe for occupants.

Putting systems and solutions to the test

Iberdrola conducted a full-scale evaluation to determine the best fire suppression solution, considering a full range of options including water mist, foam, CO₂, HFCs and [3M™ Novec™ 1230 Fire Protection Fluid](#). The company found that:

- ▶ **Water** – Water mist was ineffective at extinguishing full-scale transformer vault fires, and also had difficulty extinguishing smoldering fires within transformers.
- ▶ **Foam** – Aqueous Film Forming Foam was tested, but as a two-dimensional agent that relies on forming a film over the fire, it was not effective on three-dimensional fires such as those in complex transformer equipment.

- ▶ **CO₂** – While CO₂ was effective at extinguishing test fires, it was unsuitable for use in substations because it is lethal at its design concentration, requiring lockout periods and evacuations to protect the station's engineers. In addition, the underground substations did not have enough space to accommodate the number of cylinders of CO₂ gas that would be required.

Avoiding regulatory risk and phase-downs

Iberdrola also considered HFC-based fire suppression agents. However, these agents posed a substantial environmental and regulatory risk to the company. HFCs have an extremely high global warming potential – for many common fire suppression agents, more than 3,000 times greater than CO₂ – and remain for decades in the atmosphere. In the environmentally conscious energy sector, this was unacceptable. Iberdrola proudly claims to supply the cleanest energy on the planet and in 2018 was the top renewable energy producer in Europe and the U.S.;¹ the company wanted a cleaner and environmentally sustainable solution.

Another drawback for HFCs was that they were already facing regulatory phase downs in the E.U. under the F-Gas regulations (mandating a 79% reduction in HFCs on the market in the coming years) and in the U.S. as a result of regulatory action by the California Air Resources Board and numerous state legislatures. When choosing a fire suppression solution to help protect its critical infrastructure for decades to come, Iberdrola needed an agent that provided peace of mind and protection from future regulatory phase downs.



Combining performance, safety and sustainability

Finally, Iberdrola tested 3M™ Novec™ 1230 Fire Protection Fluid. Novec 1230 fluid is a fluoroketone-based clean agent that works by removing heat from the fire. It's non-conductive, so it can be safely discharged around energized transformer equipment, and then evaporates rapidly without leaving any residue that would damage the equipment. In addition, it has the highest margin of safety for human occupants of any clean agent², helping protect engineers who might be working in a substation when or if a discharge takes place. And the system cylinders take up significantly less space than CO₂, because the agent is stored as a

liquid and discharged as a gas – so systems using Novec 1230 fluid fit more easily into confined equipment rooms.

Novec 1230 fluid also surpassed all of Iberdrola's requirements for environmental sustainability. With less global warming potential than CO₂ and an atmospheric lifetime of only five days, it was well suited for the company's needs. Because it's so sustainable, it's not subject to the F-Gas regulations or any other current global phase downs or regulatory actions³, and it's backed by the industry-first 20-year [3M™ Blue Sky™ Warranty](#), which protects system owners from regulatory bans or restrictions on the fluid.

Based on the results of its comprehensive testing and evaluation program, Iberdrola chose 3M™ Novec™ 1230 Fire Protection Fluid for all of its 17 new Madrid substations, plus new substations in Valencia, Bilbao and many other locations throughout Spain. The choice of Novec 1230 fluid provides Iberdrola management with peace of mind that they have adopted a smart, safe and sustainable fire suppression solution that will protect their substations, and the citizens of Spain, for decades into the future.

¹ <https://www.iberdrola.com/about-us/lines-business>. Accessed February 4, 2019.

² Compared with clean agents in the NFPA 2001 standard, 2018 edition.

³ As of February 2019.

Smart. Safe. Sustainable.

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of proprietary 3M products. Although each has its own unique formula and performance properties, all Novec products are designed in common to address the need for smart, safe and sustainable solutions in industry-specific applications. These include precision and electronics cleaning, heat transfer, fire protection, protective coatings, immersion cooling, advanced insulation media replacement solutions and several specialty chemical applications.

3M™ Novec™ Engineered Fluids • 3M™ Novec™ Aerosol Cleaners • 3M™ Novec™ 1230 Fire Protection Fluid • 3M™ Novec™ Electronic Grade Coatings • 3M™ Novec™ Electronic Surfactants • 3M™ Novec™ Insulating Gases

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Electronics Materials Solutions Division

3M Center, Building 224-3N-11
St. Paul, MN 55144-1000 USA

Web 3M.com/Novec
Phone 1-800-810-8513

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