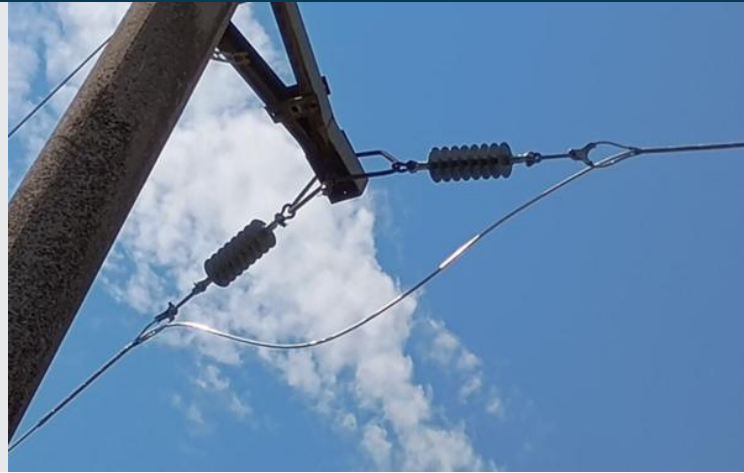


SUCCESS CASE 16.2026

NEXT-GEN GRID UPDATE

BOOSTING CAPACITY WITHOUT
NEW STRUCTURES - HTLS
CONDUCTORS FOR
DISTRIBUTION NETWORKS



THE CHALLENGE

The ongoing electrification of end-use sectors and the rapid growth of distributed renewable energy sources are placing increasing pressure on distribution networks, requiring a significant and accelerated expansion of their hosting capacity. A key challenge lies in upgrading existing infrastructure to accommodate higher power flows, particularly by increasing the current-carrying capability of overhead line conductors, easing permitting time delaying procedures. In many cases, critical bottlenecks within medium-voltage distribution grids are represented by legacy overhead lines equipped with undersized copper conductors (e.g., 35 mm²), which limit network capacity and hinder the integration of new generation and loads. Addressing these constraints is essential to enable efficient grid operation, ensure reliability, and support the energy transition.

THE SOLUTION

The solution involves the adoption of High-Temperature Low-Sag (HTLS) conductors with a carbon-core reinforcement, typically used in transmission systems, adapted to cross-sections comparable to legacy copper conductors. This approach enables rapid repowering of existing overhead distribution lines by significantly increasing their current-carrying capacity without requiring substantial structural modifications. By leveraging the superior thermal and mechanical properties of HTLS technology, it becomes possible to reuse the existing support structures in most cases, thus avoiding costly and time-consuming replacements.



MAIN ACHIEVEMENTS

The pilot solution already implemented has enabled, from the very early stages, the use of standard stringing techniques, ensuring full compatibility with existing construction practices. The replacement of standard MV copper conductors with the new conductor has demonstrated a ~40% increase in hosting capacity (in terms of current carrying capacity). At the same time, the solution has delivered a cost reduction of about 17% already during the pilot phase, with an expected decrease of up to 25% at full deployment compared to traditional repowering approaches. From a regulatory perspective, the intervention remains minimally invasive, significantly reducing the impact on existing infrastructure and allowing for permitting time reductions estimated at 70–80%. Overall, the pilot confirms clear and tangible benefits in terms of network capacity, cost efficiency, and deployment speed.

KEY SUCCESS FACTORS

- **High Ampacity Gain:** Significant increase in current-carrying capacity enabled by HTLS conductors, allowing higher power transfer without enlarging conductor size. (**+ 40% in case of copper 35 mmq**)
- **Minimal Structural Impact:** Reuse of existing support structures in most cases, avoiding costly reinforcements or replacements.
- **Reduced Deployment Time:** Faster implementation due to simplified construction activities and compatibility with standard installation techniques. (**- 40/50%**)
- **Streamlined Permitting:** Limited environmental and visual impact leads to quicker authorization processes compared to conventional grid upgrades. (**- 70/80%**)
- **Cost Efficiency:** Optimization of capital expenditure by minimizing civil works and leveraging existing infrastructure. **Up to -25% at full scale.**
- **Scalability and Replicability:** Applicable across a wide range of distribution networks facing similar bottlenecks.
- **Enhanced Grid Flexibility:** Improved hosting capacity to accommodate both electrification loads and distributed renewable energy generation.

WAY FORWARD

Integrate the component into the standard catalogue of materials used for both maintenance and construction activities, enabling its systematic adoption and widespread deployment across the network.