

## Solutions for thefts in overhead-underground transition towers.

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Red Eléctrica de España (REE) is a Transmission System Operator and the main owner of transmission assets in Spain. The scope of their responsibilities includes management, development and maintenance operations. Red Eléctrica de España, currently, owns 40,044 km of 400kV, 220kV and 66kV overhead and underground transmission lines

The first theft of a screens cable's and arrester's downspouts by a transition overhead-underground tower (hereafter TT) in the Community of Madrid occurred the 3th of June 2009. During 2010 and 2011 sporadic thefts occurred and it is from 2011 when this type of vandalism acts was multiplied. Although initially these thefts occurred in Madrid, then spread to other areas of Spain (Levante, Valladolid and Canary Islands).

At first, Red Eléctrica de España (hereafter REE) simply replaced the stolen items and repaired the damage caused. However, when any of the previously stolen thefts in TT began to be repeated, REE identified the need to shield the TT.

Over time, the robberies, which initially affected only the nearest ground segment, were evolving, so they began to occur even with some type of shield and in higher areas of the tower, just from a few centimeters of the terminations.

REE has been improving their shields. The first consisted of placing a tube, secured by conventional clamps, where the cable which was centralizing the earth connection of the arresters and terminations got inside. Subsequently, this system got to to a more complete model in which the support is fully shielded from the inside of the base to the terminations and surge arresters support.

To date, there has been no robbery in towers with this kind of "super-shield", so we can say that this system is working well. Fig. 1 shows how the number of thefts has gone down while the number of armour-plates has increased.

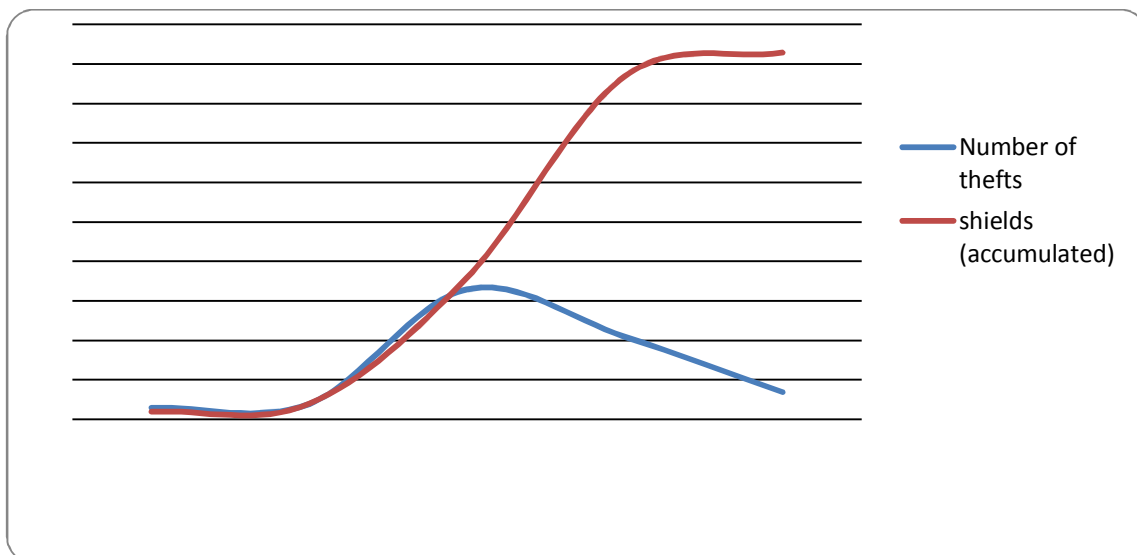


Fig. 1. Changes in the number of robberies and shields.