

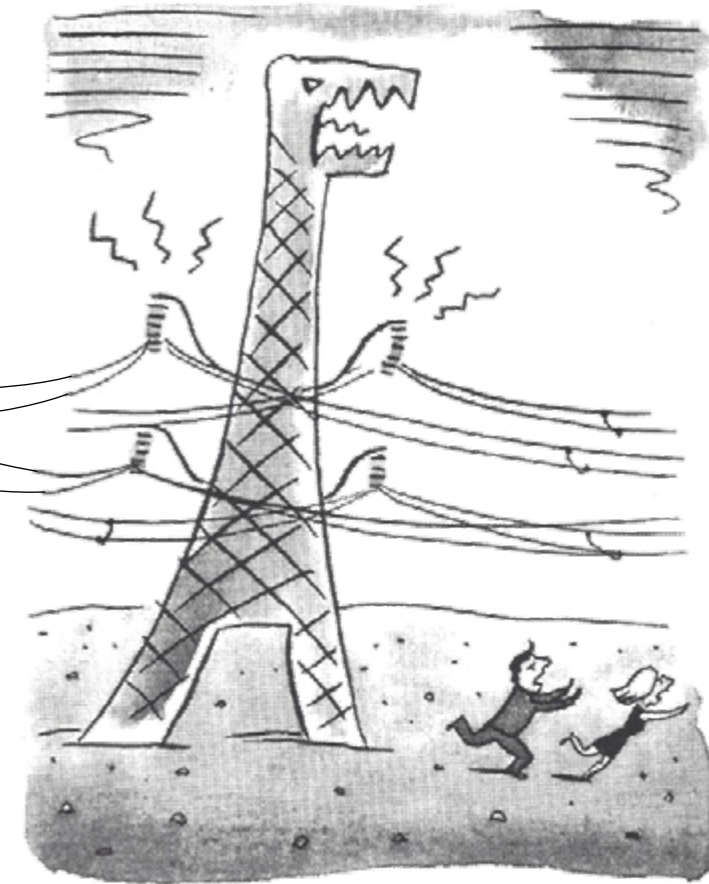
Who is afraid of the big bad towers?

To overcome people's instinctive aversion to high-voltage overhead power transmission lines, designers are trying to give structural supports more attractive and reassuring shapes.

Umberto Cosmai

48 | High-voltage overhead power lines, which are used for electricity transmission, are the modern infrastructure least appreciated by the population. The reasons for this include: the fear of the mysterious fluid that runs through the wires, the hindrance to vegetation around the area the lines occupy, the negative impact on the landscape which often has high aesthetic and cultural values, and the risk of birds or small aircrafts colliding with the lines. However, what is most disturbing to people who stay near transmission lines, especially in high humidity, is the so-called "corona effect". This "corona effect" is felt as an imponderable electrical activity that radiates into space and manifests itself as a buzzing, crackling noise and irregular blue-violet luminescence, with disturbances to radio transmissions. I remember that, a few years ago, ecologists demonstrated interactions between power lines and the surrounding environment by making dimly luminescent some tubular fluorescent lamps simply held in the hand near a high voltage overhead line. These electrical manifestations are mainly due to the intense forced ionization of the air around the conductors, which then generates a myriad of small electrical discharges. Although studies have shown that these electrical manifestations do not affect people's health, they still make people afraid.

The most obvious part of the lines is the structural supports (generally lattice-type) which are seen as the disturbing elements of landscape harmony. Ironically, they are more disturbing than an imposing viaduct or an ugly bell tower or a bulky hanging aqueduct tank. On the other hand, I like pylons, especially the Italian ones, because, as in many other Italian sectors of industrial design, their structure is excellent. Overseas, I have seen stocky and clumsy pylons with huge cross arms that look like the wings of a big airplane about to land on the heads of bystanders. I recognize the passion behind such structures, which comes from years of work on transmission lines. However, this passion is not generally shared. At the sight of a new landscape, my professional deformation leads me, at least initially, to focus on an existing transmission line, if any, and to read its characteristics; i.e. to guess the operating voltage by counting the insulators, to establish the number of circuits, the type of current transmitted, the presence of vibration dampers, etc. Regardless of my questionable taste, these structures have their aesthetic value: for example, what is the great Eiffel Tower if not a great latticework? The same can be said for the two beautiful 232m-high towers of the disused overhead electric crossing of the Straits of Messina, which were designed and built, in 1955, by Società Anonima di Elettificazione, SAE, of Milan. Even after the conductors



Cartoon ironic about the fear of power lines.

were removed in 1994, the towers have remained on-site as a monument to modern Italian engineering and, by now, the customary parts of a fascinating landscape, guardians of the Strait who warn the sailors that, down there, the mythological monsters Scylla and Charybdis still swirl the water of the sea. The Sicilian pylon is even illuminated at night with a system of coloured lights that enhance its profile. The Calabrian pylon was purchased by a private individual and its future is uncertain. In the first half of the last century, power lines were not considered from an aesthetic point of view. Instead, they were looked upon as simple structural elements required to obtain electricity, which was still considered a privilege because it was not accessible to everyone.

Between the 50s and 60s, in Italy, as in other European countries, after the initial phase of post-war reconstruction, the "economic miracle" occurred. This was characterized by strong growth in wealth, monetary stability, extensive employment and rapid technological development. With the improvement of social conditions, electricity for citizens became an indispensable right and for public administrations a service to be provided with the best quality, such that accidental interruptions were experienced with annoyance and often provoked complaints. Electricity transmission lines then became

part of the common infrastructure such as roads, railways, water networks, and concerns about their possible environmental incompatibility became priorities. The instinctive distrust, then, for power lines made the procedures for accepting new lines slow, complicated and full of bureaucratic obstacles.

It is, therefore, essential to consider the environmental impact and the aesthetic aspect when designing new transmission lines. In particular, the definition of the line route must find a compromise between the imperative need to transfer electricity to the places of consumption and the social, aesthetic, and health needs of the crossed territories. Therefore, less noticeable routes for the power transmission lines are sought as well as ways of camouflaging and minimizing the structures of the lines. These are considered to mitigate the visual impact of the lines and "aesthetic" solutions are invented for the structural supports, with special attention to the common symbols or icons of those communities such as natural forms, historical references, traditional architectural profiles. In other words, the aim is to obtain public consent, or at least to avoid strong opposition, establishing a familiar relationship between the population and the transmission lines.

Today, there is software associated with the Google Earth platform that can produce three-dimensional models of overhead power lines inserted in the context of the landscapes for which they are intended. This software can assess the projects and their possible variations from different points of view.



The electric crossing of the Strait of Messina, built in 1955 and put out of service in 1994.

A few years ago, the International Council of Large Electric Systems (CIGRE), an organization that promotes the exchange of technical knowledge between experts from all over the world, established a working group to define the state-of-the-art designs of structural supports in industrialized countries. The experts have drawn up the two documents mentioned in the bibliography, which represent the most detailed review existing on this subject.

In Italy, "compact" lines have been built, and they are characterized by supports with insulating cross arms that considerably reduce the space occupied by the structures.

In Finland, various aesthetic supports have been designed, including those that tend to reproduce plant profiles.

In Japan, the shape of the cross arms of some pylons recalls that of the curved roofs typical of oriental buildings.

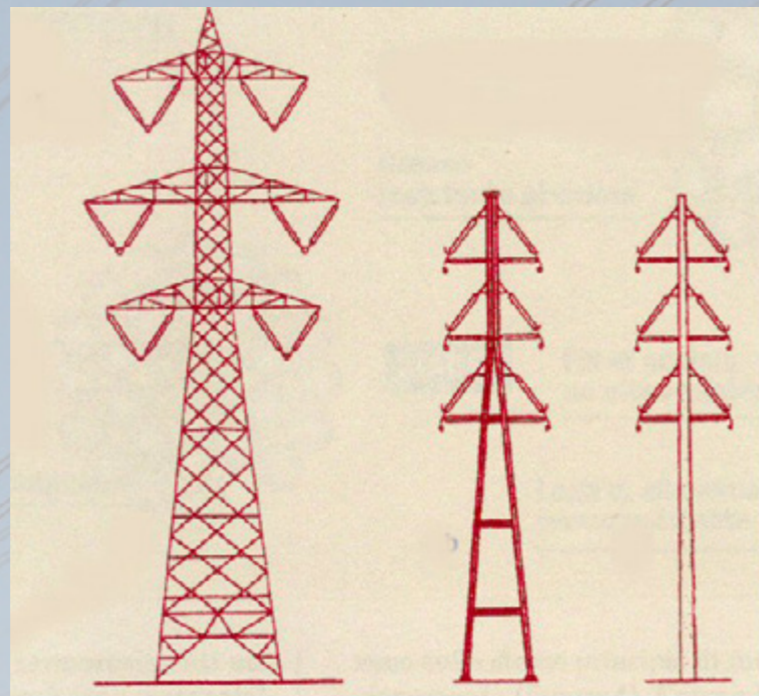
In the United States, near Orlando, Disneyland has suggested supports that reproduce the Mickey Mouse's profile. In another place, the supports recall the logo of the most famous fast-food chain in the world.

More elaborate, but certainly reassuring, are the anthropomorphic supports inspired by children's classic literature or modern Japanese cartoon robots. A variant of the zoomorphic supports that fit harmoniously into the suburban environment of the lines.

Near Amnéville les Thermes, in the north of France, Elena Paroucheva, a Bulgarian artist, in 2003, covered four towers of an existing 220 kV line with metal structures simulating long women's evening dresses, as the original shape was no longer in line with the town's growing tourist vocation.

This brief overview shows only a few examples of the dozens of solutions developed by the designers. Some of them have been realized, some are still on paper, while the irrational or aesthetically questionable ones have few possibilities of use: a bit like some sartorial models one sees in fashion shows.

Often, during discussions about the approval of a power-line project, engineers have been asked why they do not bury the power transmission lines so that they completely disappear from view, instead of spending so many resources trying to beautify the towers. It is known that modern cable technology would make it possible even for the very high operating voltages of large power lines; however, this cannot be done conveniently, because, compared to overhead power lines, underground power lines involve a greater occupation and fragmentation of the territory. Therefore, there will be more damage to vegetation and more cost of realization. Moreover, it has great functional limitations that make the transport of energy over long distances very complicated.



Comparison between a conventional support for a 380 kV double circuit tower (left) and two equivalent "compact" supports. (Italy)

Also, maintenance will be very costly and will require cumbersome excavations and free access to any point of the line. This is unlike an overhead line which can be accessed from the supports and, therefore, requires only a few passages per kilometre.

As things stand at present, to avoid overhead transmission lines, one can only hope that the science fiction free "wireless" transmission of electrical energy will become a reality. This type of transmission is through the air like electromagnetic waves, a technique to which Nikola Tesla had dedicated many studies, seemingly with some results, which at his death was hastily secreted by the U.S. government for the enormous social upheavals that would have involved the free access to this vital resource.

Therefore, at the moment, these structures that are now part of the modern landscape, together with roads, railways, industrial complexes, should be considered with tolerance. People should not reject overhead transmission lines a priori. They should instead limit themselves to exercising necessary control actions on the environmental compatibility of the power lines: an engineer should not build a high pylon in the parade ground of the Sforza Castle in Milan or St. Peter's Square in Rome.



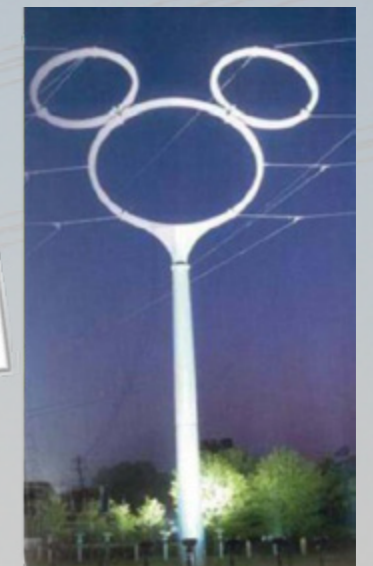
Support with plant shape.



Support with curved cross arms like the traditional roofs of oriental buildings.



Supports of 765 kV lines in South Africa, with eagle wing cross arms.



Support of an overhead line, with the Mickey Mouse profile, near Orlando, Florida, USA



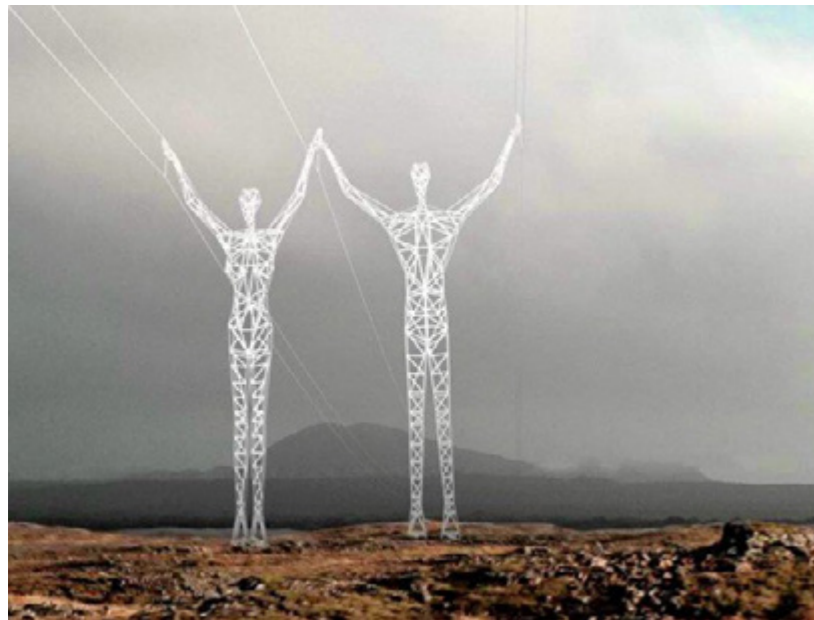
Tubular support shaped like the McDonald's logo.



Support Dutton-Rosental (bud pole) for a 380 kV transmission line in Italy.



Transmission line with zoomorphic supports.



Anthropomorphic supports for an overhead transmission line.



Dressing of a 220 kV line pylon near the spa town of Amnéville les Thermes, in the north of France, designed by Elena Paroucheva.

Bibliography

- [1] D'Aiello, Cauzillo, Nicolini, Paris, Biondi, Guastadisegni, Piendibene - Quantitative evaluation of the visual impact of overhead lines – CIGRE 22-210 – 1996
- [2] CIGRE Technical brochure No. 416 - Working Group B2.08 - Innovative Solutions for Overhead Line Supports – June 2010
- [3] CIGRE Technical brochure No. 416A - Working Group B2.08 - Innovative Solutions for Overhead Line Supports - (Annex to Technical Brochure 416) – June 2010



Lascia il tuo commento a questo link:

<https://www.editorialedelfino.it/who-is-afraid-of-th-big-bad-towers.html>