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Is there any plan for large scale use of such towers in future?

By now, the Norwegian TSO, Statnett, has plan to design and build a set (~20 towers) of these aluminium structures in the next couple of years on a new 420 kV line in western part of Norway (Haugesund region).

Why guyed modular aluminium alloy structures (similar to those used frequently as part of Emergency Restoration Systems) were not considered as an option?

We suppose that the standard ERS structures that are found on the market are developed for speed of emergency installations. They are probably not conceived for a lifespan of over 60 years, to tackle climate loads over a return period of 150/500 years. We also believe that these systems are not well suited to work for cable tension equalizing under uneven ice loading event, which is common in Norwegian conditions.

Moreover, such structures are probably developed for a couple of strength classes, which can tackle most of the transmission line arrangements, independently of the conductor type, span configurations, climate loads, etc… They are thus likely not always efficient (in terms of strength usage and structure weight) for all site-specific loadings.

Because of the significantly higher price of the raw material of aluminium compared to steel, it is desirable to optimize the design, decrease the weight of the structure as well as reduce the production costs as much as possible to make the structure economically competitive.

For these reasons, an existing "standard" ERS mast found on the market would probably not be suitable. It would likely be necessary to develop own type of guyed mast, with different strength modules, and with adapted production processes (for example assess the use of welding and cutting/drilling), tailor made for the Norwegian conditions.

However, other aspects come into considerations.

One of the requirements for the design of the structure is to have a flat horizontal configuration of the phase conductors to keep the towers low for visual impact and keep the conductors close to the ground to reduce wind exposure as well as the risk for in-cloud icing.

Modular mast like those used for Emergency Restoration Systems (ERS) are designed to hold only one phase at a time or all the phases in a vertical configuration, above each other, on a single mast. Horizontal configuration of the phase conductors generally requires using several mast (chainette, 1 phase per mast or 4 columns structure (see Figure 1 and Figure 2)). A window structure over a single guyed mast could nevertheless also be an alternative.

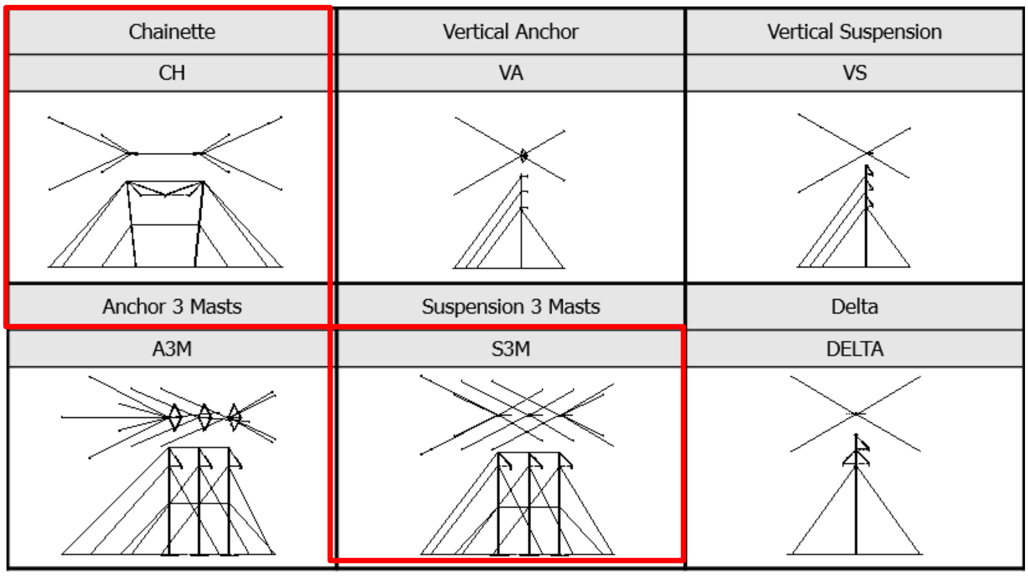

Figure 1 ERS mast configurations (example from SBB)


Figure 2 4 columns structure (example Lindsey)

Such configurations require many guywires to support the structure and increase the number of foundations necessary to set the masts on and to anchor the guywires to. It is likely to increase the foundation work and the related costs.

The footprint of such structures is significantly bigger than what is necessary for the internally guyed portal structure that was retained. Under the typical terrain conditions found in Norway, it is a decisive advantage to limit the footprint of the towers. Large footprint can make tower site selection difficult, not to say impossible in certain terrain conditions.

Therefore, self-supported and internally guyed portal towers were considered initially.