New high voltage line with reduced magnetic field

TenneT

Life

Movares

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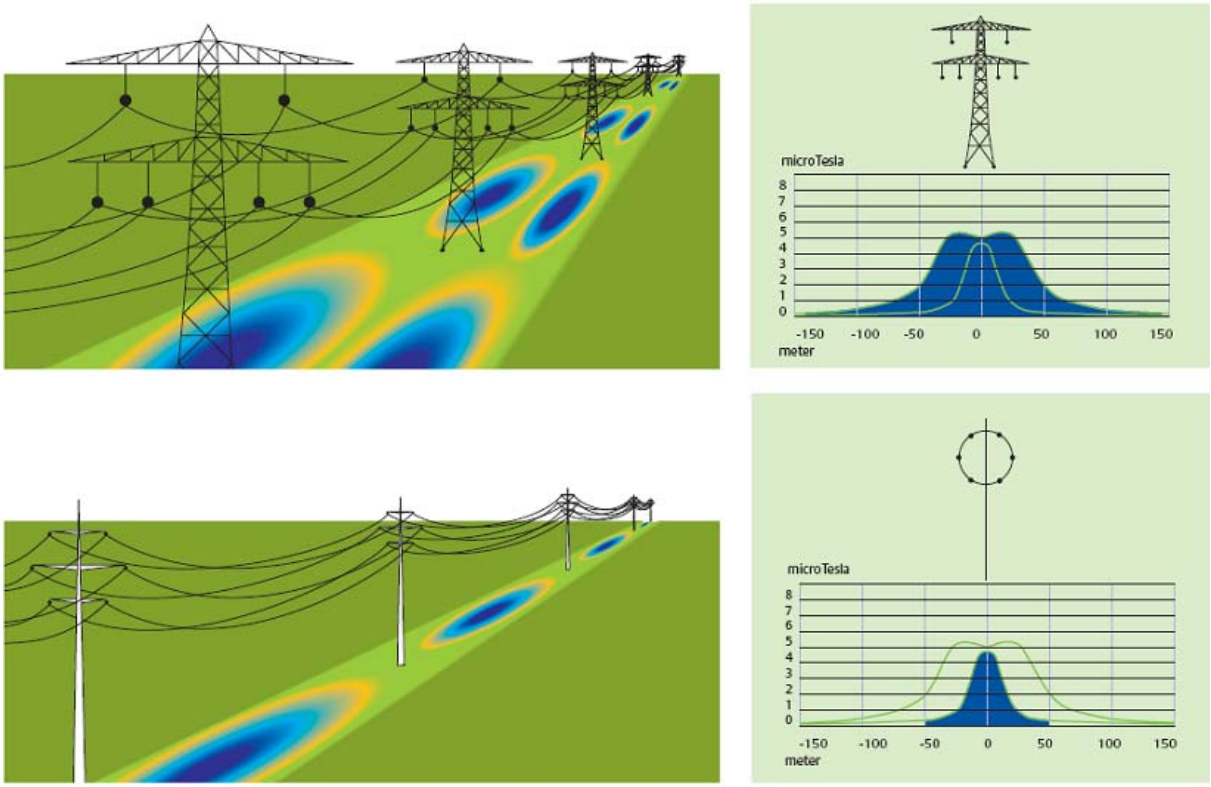
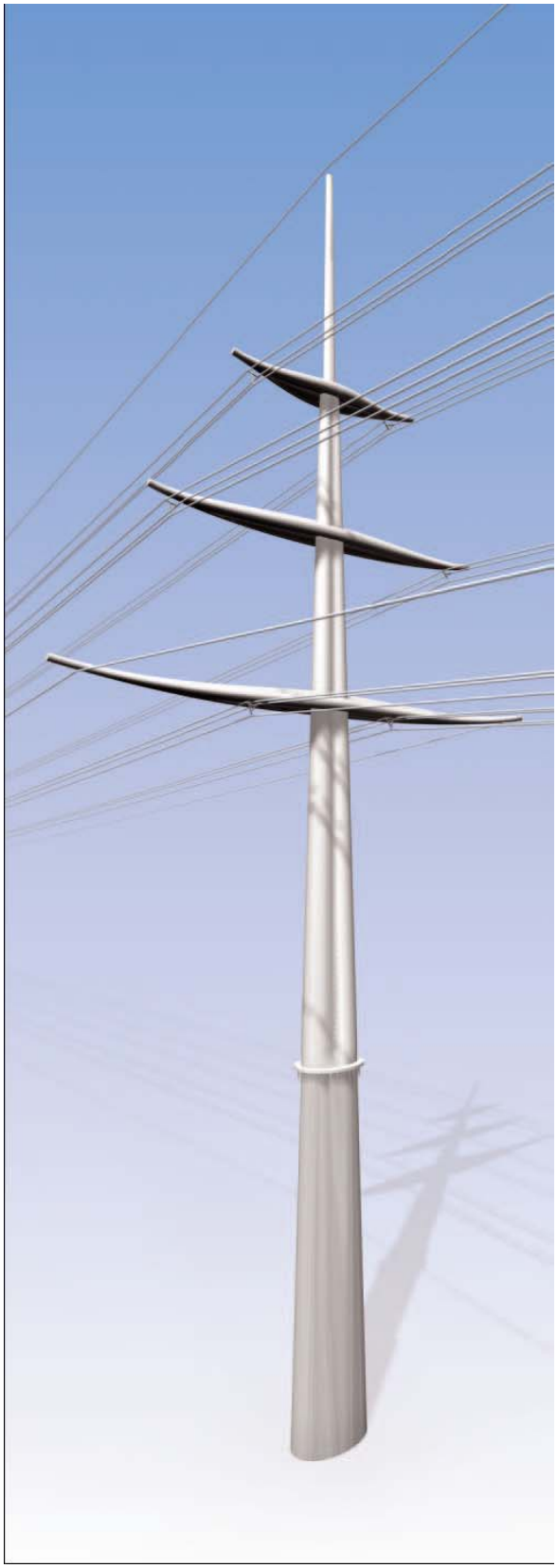
TenneT in its capacity as independent operator of the national Dutch high voltage grid, is continually striving to change things for the better, in anticipation of social and technological trends. An example is the development of Wintrack, a novel high voltage line concept on which TenneT has been working in partnership with Movares as engineering consultancy. The objective of this Wintrack-project was to develop and demonstrate a new type of overhead line, with lower magnetic field, lower environmental impact and lower life cycle costs. The project has been financially supported by the European Union as a LIFE-Environment demonstration project.

In 2005 the government advised to avoid new situations in which children are permanently exposed to magnetic fields of high voltage overhead lines. 0.4 microTesla was considered to be a safe upper limit. This advice would imply a ban on building houses and schools along a strip of some 150 metres at either side of the line, compared with only 38 metres if the Wintrack technology were applied. So, Wintrack enables a considerable cost reduction for new high voltage lines in densely populated area's.

The illustrations below through the different colours used demonstrate the difference in magnetic field intensity between an existing high voltage line and the new Wintrack line.

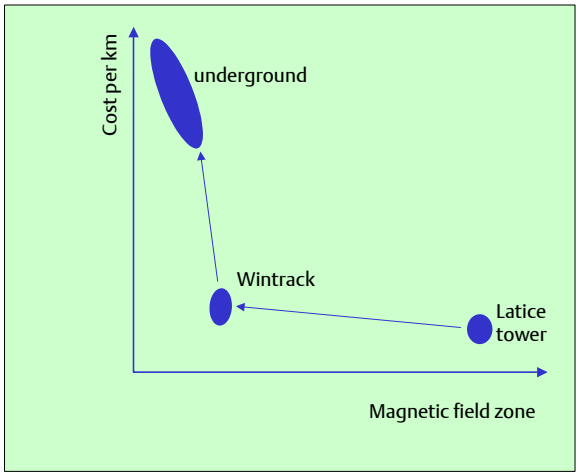


New pylon design
New pylons were to be developed for the Wintrack high voltage line. These were planned to be made of composite material, with only a few metal components. Composite pylons require very little maintenance, thus enabling maintenance cost savings to be made. Another advantage would be that these pylons are environmentally friendlier than the traditional steel lattice towers. The lower maintenance requirement would also benefit the reliability of supply of the electricity system, as the new lines would not need to be taken out of service due to maintenance work being carried out with the same frequency as is currently the case. Although not everyone will appreciate the appearance of electricity pylons in the landscape, here too Wintrack would be an improvement. In addition to being quite a bit smaller, the new Wintrack pylons look considerably less intimidating than the existing lattice steel towers.



Development paths
The new line concept, the application of composite material and the innovative design bring an extensive trial path with them. In June 2005 the engineering of the innovative Wintrack high voltage line was completed and laid down in a Basic Design Report. Next step was to manufacture and test the Wintrack components and a prototype. A tendering procedure was started in June 2005, by publishing an announcement according to the regulations for EU-procurement. Only a limited number of consortia met the selection criteria and could be prequalified. These consortia were invited (in November) to submit a quotation according to the Specification. After a thorough assessment of the quotations which were issued, the evaluation team concluded that the quotations deviated substantially from the Specification. Costs and risks for manufacturing and testing of a prototype would be too high. Consequently it would not be possible to grant the Wintrack order to one of the bidders and TenneT had to decide to terminate the procurement in May 2006.

An analyses showed that the manufacturing of the composite traverses appeared to be the major risk, mainly caused by the dimensions and the complex shape. The analyses also demonstrated the technical and economical feasibility of an alternative Wintrack line, which is constructed of standard components and materials. TenneT worked out a plan for the realisation mid 2009 of such a Wintrack-alternative, which most probably will meet the objectives of the original Wintrack project. This will be a separate project that will not be funded as a EU LIFE-project.



Cost
The new type of pylon is more expensive than the existing steel lattice tower model. However the reduced maintenance requirement implies that the longer-term cost would be lower. The alternative scenario, i.e. construction of underground high voltage lines (cabling), would be considerably more expensive than the new Wintrack concept.

LIFE Wintrack project results are:

- A Basic Design of an innovative Wintrack line
- The knowlegde that this Wintrack design could not be realised within a reasonable budget and risks
- The knowledge that an alternative Wintrack-line, based on standard components and materials, can be realised most problably within the original LIFE Wintrack objectives.

Policy

People are exposed to magnetic fields in all kinds of situations, for example when they use their electric shaver, hair dryer, microwave oven or PC. The potential impact of human exposure to magnetic fields in relation to high voltage lines has given rise to anxiety in the community as well as sparking public debate. As TenneT appreciates the public's concern, it is investing in research aimed at minimising the magnetic fields where possible.

High voltage lines worldwide are subject to the magnetic field standards adopted by ICNIRP, the International Commission for Non Ionising Radiation Protection, which applies a standard of 100 microTesla (microTesla, as the unit of measurement for magnetic field strength). As an indication: the magnetic fields under the Dutch high voltage lines normally do not exceed 15 microTesla. The Dutch Ministry of Housing, Spatial Planning and the Environment applies a precautionary policy with respect to magnetic fields and the areas throughout which overhead high voltage lines may be newly planned. For new situations the Ministry wants to avoid long lasting exposure of children to magnetic fields caused by high voltage overhead lines. In this context the Ministry will be adhering
to the significantly lower threshold of 0.4 microTesla for high voltage lines in close proximity to houses or schools.

TenneT is making every effort to find the appropriate balance between the reliability of the domestic electricity supply system, the associated costs and the social responsibilities with which it is charged. The development of the new Wintrack line concept fits perfectly well in this effort.

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