

Dressing the power lines to bring more renewables into cities

February 12 2016, by Sorina Buzatu

A higher volume of electricity delivered to the grid requires adaptation of existing transmission lines and improvement of the system's security. To this end, innovative materials and geometries of components are being designed and tested

To date, European consumers pay more for energy from renewables than for energy from conventional resources.

One of the reasons is the immaturity of the technology used for harnessing and distributing renewable energy. In addition, some power stations are far away from consumption centres. Such is the case of the wind farms, many of which are located on offshore sites, in the North and Baltic Seas.

To transport the electricity over long distances, the existing alternating current (AC) [transmission lines](#) must be upgraded or new lines built.

"Using innovative materials and geometries for pylons, conductors and insulators helps to keep within the space already used, while allowing for a higher electrical capacity," says Vanessa Gombert, project manager at 50Hertz, a power transmission operator, in Berlin, Germany.

Insulated cross arms can reduce the pylon widths, and high-temperature, low-sag conductors can transmit higher electrical capacity without having to increase pylon height. "Nevertheless, we need to make sure that the [innovative materials](#) and geometries of the line components are

reliable throughout their planned lifetime and that they don't interfere with any of the other components," says Gombert.

Other scientists agree. Changes in the design of the lines can lead to a higher volume of electricity carried.

"For example, we use aluminium conductors and add steel in the middle of the conductor for mechanical reasons. Researchers are looking into conductors capable of carrying more electricity because land for building new pylons comes at a high price," notes Nicolae Golovanov, professor at the power engineering faculty, Polytechnic University of Bucharest, Romania.

New power lines will remain expensive until new energy producers come in and redraw the areas of consumption, according to Nicolae Mogoreanu, Ph.D. in technical science at the Technical University in Chisinau, Republic of Moldova.

That's why the structural adjustments in power line components are key to connecting "green" energy to the national grid.

"We would go forward with redimensioning the existing networks, partially reshaping the grid geography to fit the new conditions of electricity generation and with upgrading where necessary," explains Mogoreanu.

Repowering of the AC transmission lines faces other challenges, namely their dependence on the availability and intensity of the respective renewable energies: sun, wind and water.

"We need good weather forecasting for [electricity generation](#). This will enable us to precisely plan the feed-in to the grid," says Vanessa Gombert. She adds that part of her team's work is the development of a

low-cost sensor to assess the prevailing conditions correctly and to secure a safe line operation.

The downtime could be reduced if the maintenance work was conducted during the operation of the line. It implies working on a "live" high-voltage line.

The experts are also looking at ways to increase flexibility: "Our main goal is to use our grid in the most efficient way, working also on the distribution systems: transformers, intelligent breakers, etc." notes Federico Caleno, head of New Technology and Global Infrastructure and Networks Innovation at the Enel Group, in Rome, Italy.

Optimisation of the transmission capacity on existing lines is suitable for reducing the overall investment costs, conclude the experts working on the European Best Paths research project, whose partner is 50 Herz. According to Vanessa Gombert, they expect a reduction in downtime of the lines by the end of the project in 2018.

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