



# Utility Opts for Pole-Mounted Circuit-Switcher for Transmission-Line Switching

**S&C Featured Solution:** S&C Mark V Circuit-Switcher

**Location:** Brazil

## Customer Challenge

Government-owned utility CELESC in southern Brazil serves 92% of the state of Santa Catarina, with more than 3 million customers in a service area totaling 95,700 square kilometers. Its extensive 138-kV transmission line serves not only its own distribution substations but also those of large industrial customers.

Because of the lower kilowatt-hour rates at 138-kV primary metering, CELESC receives between two and five requests per year from large industrial customers seeking to connect to the utility's transmission-line system. These connections require the customers to build a switching substation to interconnect with the utility's system.

Because of their size, switching substations in most cases cannot be located on the customer's property and most often require customers to purchase additional land adjacent to the transmission line. The property can be as large as 3,000 square meters and can contain a significant amount of equipment.

This typical switching substation costs on average R\$3.5 million (US\$650,000), not including the land-acquisition costs. The customer builds the switching substation and then transfers ownership of the substation to CELESC. These substations have high Operations and Maintenance (O&M) costs over their useful life. The large number of different types of equipment also results in less reliability because of the increased potential points of failure.

Because of the high costs of land and equipment and long lead times, CELESC decided to look for an alternative to switching substations so it could quickly and efficiently connect new industrial customers.

## S&C Solution

CELESC's engineers were aware of a unique solution S&C developed with another large utility in Brazil that involved transmission-tower mounted Mark V Circuit-Switchers. Working together, engineers from CELESC and S&C developed a new design for a pole-mounted Mark V Circuit-Switcher that could quickly and easily connect industrial customers to the utility's transmission system. They concluded the pole-mounted circuit-switcher would be more visually appealing and have both a lower overall initial cost and a much lower lifetime O&M cost compared to traditional switching substations.

CELESC decided to invest in a two-year pilot installation to test use of the Mark V Circuit-Switcher to connect a large industrial facility to its system.

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*The S&C Mark V Circuit-Switcher solution for connecting large industrial customers is a much simpler and more cost-effective solution compared to the traditional substation."*

*– Guilherme Massami T. Kobayashi,  
Manager of Engineering and Standards Division,  
CELESC*

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**S&C's Mark V Circuit-Switcher is simplifying the connection of large industrial customers to the Brazilian utility's transmission system.**



## Results

CELESC completed its first pilot installation of the pole-mounted Mark V Circuit-Switcher at a large meat-processing industrial facility in the city of Chapecó in the state of Santa Catarina. The installation cost from using the Mark V Circuit-Switcher was R\$2 million (US\$360,000), or 43% lower than the budgeted costs for the switching substation for this project. The total construction time also was significantly shorter, and CELESC expects future O&M costs to be lower as well because one circuit-switcher can be used instead of numerous pieces of equipment typically used in a switching substation. In addition, with less equipment, reliability also increases on the transmission line.

Based on the outcome of the pilot installation, CELESC has approved use of pole-mounted Mark V Circuit-Switcher for all future industrial customer connections. It then becomes the industrial customer's option to use a switching substation or the Mark V Circuit-Switcher when connecting to CELESC's transmission system. Given the proven benefits the pole-mounted Mark V Circuit-Switcher demonstrated, CELESC expects most industrial customers will opt for this new faster, less-expensive interconnection solution.

*Figure 1. The installed Mark V Circuit-Switchers.*



*Figure 2. A side view of the Mark V Circuit-Switcher installation.*

