High altitude ABB inverters

Terranuova Bracciolini, Italia, 11 Marzo, 2015 – ABB, the leading power and automation technology group, has provided solar inverters for a plant at 3,452 meters on Mont Blanc’s Pointe Helbronner, to support the energy needs of a new cable car station.

One can easily describe the experience of going up in the cable car towards Mont Blanc as the “Eighth Wonder of the World”. With its exquisite scenery perched between granite towers, one has the sensation of being able to stretch out a hand and touch the very summit of Europe. From 2015 that ascent has become even more spectacular thanks to a world-renowned engineering feat. A new cable car system now connects the base station at Pontal d’Entrèves (Courmayeur) to Pointe Helbronner passing through a transit point at Pavillon du Mont Fréty.

Glass, steel and high technology have been combined to literally “immerse” visitors into the natural scenery of Mont Blanc through the use of cabins that rotate on themselves giving a 360° view. It is possible to view a similar breathtaking panorama on the 3,452 meter Pointe Helbronner thanks to a 14 meter diameter circular terrace positioned on the Dent du Géant facing Mont Blanc’s summit and the Vallée Blanche.

Zero Impact
In order to respect the extraordinary natural value of the area, the project paid particular attention to restricting environmental impact and energy consumption. With “Zero Energy” buildings as an objective, structures have been carefully integrated into the landscape, high insulation materials have been used and pump heating systems were run from large expanses of solar panels. The Cordée Mont Blanc consortium has relied upon the technologies of EnergyGlass to supply the solar panel plant. EnergyGlass is a Cantù-based (Como) company founded in 2007 that specializes in multi-functional construction components for building envelopes which amplify primary architectural functions in addition to producing energy using the sun’s rays. EnergyGlass installed a 13.3 kWp solar panel plant at the Pontal d’Entrèves’ base station made up of 92 triple-layered glass panels of 29.04 mm thickness over an area of 160 square metres and a second 12.9 kWp plant at Pointe Helbronner where 84 panels cover an area of 120 square meters. In this second installation, triple-layered double-cell glass panels of 69.5 mm have been used due to the extremely challenging environmental conditions.

Sun and Frost
The solar panel plants installed by EnergyGlass are connected to the grid network into which the generated clean energy creates a pay-back from the energy distribution company. The solar panel plant generators are connected to solar inverters supplied by ABB, a leader in energy and automation technology. ABB has for some time supplied products, solutions and services for the solar energy market with ranges suitable for small private residential buildings as well as large industrial plants.

The Pointe Helbronner station needed a solar inverter with specifications appropriate to a site at an altitude of 3,500m. Antonio Rossi, EMEA Technical Sales Manager at ABB, who ran the project, explained that an installation at this altitude required an accurate evaluation of the solar panel generators to ensure the best results from an inverter working in such extreme environmental conditions. Rossi explained that “the working conditions of both the inverter and the solar panel generators must be assessed carefully to take into account how the inverter’s electrical rating changes at altitudes above 2,000m due to the rarity of the atmosphere. As a consequence, the calibration of the solar panel generator has to be done precisely to ensure maximum performance in these extreme conditions.”

In order to supply EnergyGlass with the correct specification, Rossi and the ABB technical team carefully studied working conditions at high altitude to take into account the two aspects that strongly affect the
operational efficiency of a solar panel plant. The first, as previously suggested, is the rarity of the air at the altitude in which the plant is situated and the second is the high levels of radiation to which the generator is exposed as a result of a higher direct component (a rarefied atmosphere filters less solar radiation) and reflection (the strong glare given by a covering of snow and ice for much of the year).

Inverter Triad
EnergyGlass used three different types of solar panels to get the best out of the three different orientations of the solar panels. To manage the solar generators two models of ABB string inverters were chosen, PVI-3.6-TL-OUTD-S and PVI-6000-TL-OUTD-S, which are part of the UNO family of single-phase inverters that represent the most efficient solution for the majority of rooftop installations. Furthermore, the UNO family is a line of inverters for external use which are ideally suited to resist extreme environmental conditions. In particular, the presence of two solar panel orientations led to the choice of a PVI-3.6-TL-OUTD-S inverter, which has (like all UNO inverters with a power rating over 3kW) a double input which manages separately, through two independent input sources, the power rating of two separate lines with differing orientations. Rossi confirmed, “This solution is particularly useful for installations of differing orientations such as those of the new cable car stations at Mont Blanc because it allows one to manage two generators with different working conditions with a single inverter.”

Another peculiarity of the high altitude project is the relatively low installed power in comparison to the standard. “Due to the rarefied air at high altitudes”, explained Rossi, “the heat exchange with the surrounding environment is less.” Moreover, due to higher levels of radiation in comparison to those of conventional installations (due to the reduced filtering effect of the atmosphere and the presence of significant glare) along with a reduced cell operating temperature, the solar panels give off a higher power rating than when under standard conditions (STC).

The inverters were chosen from the full range of products and services that ABB offers for the generation, transmission and distribution of solar energy – in both solar panel systems connected to the grid and hybrid systems – operating along the entire solar value chain.

The ABB product offering includes a large portfolio of inverters for both large and small installations ideal for commercial, residential, utility and industrial use.

Useful Links
Project website: http://www.cordeemontblanc.eu
Construction site photo gallery: http://www.cordeemontblanc.eu/web/?page_id=64

To learn more about ABB’s solar inverter products, please visit www.abb.com/solarinverters.

About ABB
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