Success Story: Eaton's Bonn site

Markets Served
Photovoltaic

This project should give impetus to other companies in the industrial sector. With SMEs in Germany there is a great deal of potential for reducing operating costs using photovoltaic for increasing energy requirements and achieving a high level of planning safety at the same time.

Elmar C. Dalitz, CEO of nds konzept GmbH

Sustainable Practices

Location:
Bonn, Germany

Segment:
Renewable Energy

Problem:
Development of a PV system to reduce operating costs and use as demo installation

Solution:
Eaton ISG power inverter SOL30-SAFETY PV fireman's switch

Results:
A reliable PV installation with a total panel area of 165 m^2

Contact Information

Toni Mandt
tonimandt@eaton.com

Christian Bücker
Trade Press Manager
ChristianBuecker@Eaton.com

Background

In future, companies will not only have to try and minimize the negative impact on the environment that they make, but will be increasingly expected to improve the environment. Eaton is already engaged in actively meeting these new requirements and takes the issue of sustainability seriously. The company is therefore on the one hand offering innovative products for the effective and safe use of solar energy, and on the other hand, has recently started producing its own electricity from a PV installation at its Bonn site.

The benefits of solar energy are varied and also attractive for both private consumers and companies alike. It enables the environmentally-friendly production of energy at the place where it is normally needed without any carbon dioxide emissions. The sun is an energy source that provides 15,000 times the energy that is consumed worldwide, and will be available to us as a reliable and free energy source for many millions of years. These are benefits that Eaton also aimed to make use of.

"There were three major reasons why we considered a PV installation here in Bonn," explained Toni Mandt, head of finances and services for Eaton Industries GmbH. "In line with our worldwide corporate strategy, environmental protection and sustainability are top priorities for us. Added to this are the financial considerations as to how to reduce operating costs, as well as the idea of using our PV products in a demo installation."

Challenges

Three companies were involved in the tender project last year. Both the installation of a tracking system on one of the car parks or a roof-mounted system for the existing building infrastructure were considered. The studies involved detailed profitability analyses, and it was concluded that tracking systems that follow the sun are currently not viable in Germany. It was therefore decided to install a PV installation with a total panel area of 165 m2 on one of the office buildings. This installation is designed for 24 kWp and is therefore three to four times larger than that of a detached house. Based on the average number of hours of sunshine for Bonn determined by the German Weather Service, the total output is expected to be 22,000 kWh per annum.

The planning and design of the PV installation was carried out by nds konzept, a company based in Bornheim. They supplied the viability study, the planning, the agreements with the grid operator, the construction and project management, as well as the VDE approval certification. The profitability study from nds konzept calculated that the investment for Eaton would pay for itself in less than six years. "Normally a plant operator will have paid back his expenses within eight to ten years," Elmar C. Dalitz, CEO of nds konzept, explained. "This very short amortization period was possible here because

Powering Business Worldwide

Eaton took responsibility for the installation and provided their own components." The products supplied by Eaton for photovoltaic applications include high quality switching devices for isolating, switching and protection, as well as inverters for grid-connected and grid independent installations in residential buildings. In all these products, safety is a top priority.

Solution

The installation in Bonn consists of 100 polycrystalline solar panels. The core of the system consists of six power inverters which convert the DC current generated by the solar panels into AC current and feed it into the grid of the local utility via the meter box. Either eight or ten of the solar panels are connected as strings in series in order to achieve the required input DC voltage for the inverters. An inverter for achieving the appropriate power is connected to every two strings.

Eaton's power inverters of the ISG series for residential applications up to 4,600 W or 6,000 W have been specially developed for the requirements of the EMEA region, and have already been launched successfully on the market in France, Italy, the Czech Republic and Poland, as well as Germany, Austria and Switzerland. They are suitable for both mono-crystalline and also polycrystalline PV generators. The ISG series includes variants that are designed with IP43 protection for indoor installation and also IP65 protection for indoor and outdoor installation. All inverters stand out on account of their maintenance-free design, easy installation and operation. Thanks to convection cooling, the inverters do not require fans and are quiet during operation. The reliable and compact devices offer a higher performance capacity than similar products with the same dimensions. They have an efficiency of more than 96 %, and the MPPT (maximum power point tracking) function makes it possible to achieve optimum power in different conditions from any PV generator.

Eaton's SOL30-SAFETY PV fireman's switches were installed in order to prevent the risk of electric shock to rescue services in emergencies, such as when extinguishing a fire. A PV off switch is installed in the entrance building near the janitor. In the event of a fire, the PV fireman's switches can thus be tripped from here in order to safely and quickly isolate the DC line between the PV panels and the inverter. The PV fireman's switches are available as complete ready to install and connect device combinations. Depending on the number of strings, two, three, four or six PV fireman's switches are installed in a common housing. The maximum rated voltage is 1,000 V DC. The undervoltage release has a delayed response and bridges momentary grid interruptions up to 600 ms in order to prevent temporary voltage dips in the grid from causing the PV fireman's switch to trip accidentally.

For grid and installation protection in accordance with VDE-AR-N 4105, Eaton offers both ready to install and connect complete solutions and individual components, such as contactors with a low sealing power and motor-operated circuit-breakers with low-power undervoltage releases. The contactors are approved as coupling switches for installations up to 100 kVA. Motor-operated circuit-breakers or switch-disconnectors are suitable for larger installations. The portfolio includes three or four-pole solutions that cover a rating range from 14 kVA to 866 kVA (20 A to 1,250 A). As the output of the PV installation in Bonn is below 30 kVA, no additional grid and installation protection is needed. Eaton's NH1 fuse switch-disconnector for a rated operational current of 100 A is used here instead.

"Our customers can now see directly the features and benefits of Eaton products for the PV sector for themselves in our 64 m^2 showroom in Bonn," Toni Mandt expresses his delight. A display is installed in the visitors' floor that provides employees and guests with information about the productivity of the installation since its commissioning at the end of April 2012. The actual power output (Watt), the daily yield (kWh), the total yield (kWh) and the saving in CO_2 emissions (kg) are shown. nds konzept also monitors the yield values remotely and can carry out detailed diagnostics in the event of a fault right through to the power inverter, thus ensuring trouble-free and optimum operation.

Results

"The expertise available at Eaton has impressed me greatly," says Elmar C. Dalitz, CEO of nds konzept GmbH. "I hope I will always have as good and productive a cooperation in all our future projects as we had here. This project should give impetus to other companies in the industrial sector. Particularly with SMEs in Germany, I believe there is a great deal of potential for reducing operating costs using photovoltaics for increasing energy requirements and achieving a high level of planning safety at the same time."

Toni Mandt, head of Finances & Services at the Eaton site in Bonn: "We had three good reasons for installing an PV demo installation: "1. Compliance with environmental protection and sustainability requirements set by Eaton's corporate strategy, 2. Reduction of operating costs and 3. Onsite presentation of the Eaton PV product range."

Eaton's power inverters of the ISG series for residential applications up to 4,600 W and 6,000 W have been specially developed for the requirements in the EMEA region.

Eaton Industries Manufacturing GmbH
Eaton Electrical Sector EMEA
Route de la Longeraie 7
1110 Morges, Switzerland
www.eaton.eu

Powering Business Worldwide