

Why Europe is ready for a shift to micro-inverter based rooftop installations in residential PV



All over Europe, string-inverters have been the standard for decades, not only in large-scale industrial PV plants, but also in residential rooftop installations. Although there have been some alterations in the product standards to tackle performance, safety and other issues, there hasn't been a major reformation in the residential market for a long time. While Europe is still stuck with inflexible string-inverter solutions, installers and homeowners in many other parts of the world have recognized the benefits of micro-inverter based rooftop installations long ago.

Safety regulations determined by the National Electrical Code (NEC) have led to the implementation of single-module control in the United States, whether it be with micro-inverters or optimizers. Thanks to this development, US homeowners not only benefit from a superior safety standard. They also enjoy much longer warranties and a higher energy yield, since each module runs at its individual maximum power point and because single-module control makes more roof space accessible for PV installation.

Is it time for Europeans to become acquainted with this alternative system and benefit from its advantages?

Higher energy generation

In a residential PV plant with a string-inverter that is usually located in the basement of the building, even the slightest shadowing, dirt or defect of a single module can cut down the energy generation of the whole system dramatically. Either the output power of the complete string of PV modules is reduced, or the bypass diodes bridge over shaded sections of a PV module.

Single-module control, as achieved with micro-inverters or optimizers, however, can ensure that each panel delivers the maximum amount of energy at each point of time. This also means that various orientations and inclinations can be combined in a single string without any problem, opening up more space for the residential plant. Dormers, smaller rooftop areas and additional space, such as a balcony or canopy can be easily integrated into the PV plant.

In some cases, there is not even a minimum number of panels required. Especially in complex rooftop conditions, a PV system with micro-inverters can provide up to 30% more energy than a string-inverter-based plant would. And as a pleasant side effect, homeowners do not have to put up with that large, potentially buzzing device inside their living space.

Superior safety

In Europe, installers have had to accept handling dangerous high voltages of up to 1,000V for way too long. At the same time, homeowners had to live with the constant

danger emanated by that same high voltage on their roofs and inside their homes. Arcing is rare, but dangerous, and it can cause a fire.

In a PV plant with micro-inverters, DC current is transformed into AC right at the source and there is no high voltage in the entire system. This makes both the work of installers and the lives of homeowners much safer. Moreover, in the event of a fire for a different reason, the rapid-shutdown function comes into effect, allowing the firefighters to do their work securely and without any hindrance.

Enabler for a new trend: solar balcony plants

Most recently, fueled by the ongoing energy crisis, a new trend is growing in some parts of Europe that has put micro-inverters on the map on this side of the Atlantic: balcony PV. With these small 1- to 2-module plants, tenants who do not own a house can gain a certain level of energy and potentially save some Euros while energy prices are skyrocketing.

The need to become more independent from power suppliers and questionable energy sources has led to a high demand for green energy solutions that are accessible to almost anyone. Regulations in some European countries, such as Germany and

Austria, allowing their citizens to just plug in their PV plants with a maximum capacity of a few hundred kilowatts are paving the way for this trend.

In 2022, many suppliers faced much higher demand than they were able to meet. For PV plants of such a small size, micro-inverters are the perfect fit. Although they were not originally developed for this purpose, the easy plug-and-play installation of these products is well received by tenants as well as installers.

Easy planning and installation

Although tenants are allowed to install their balcony plant themselves in some European countries, many prefer to rely on an expert's help with handling the large and heavy PV modules and connecting the devices correctly. For some installers, this unexpected additional business is their first encounter with these smart plug-and-play micro-inverters.

Depending on the manufacturer, some systems are so easy to handle, installers might be tempted to stick with them for rooftop installations. In fact, they can not only save time doing the installation work, but also in the upfront planning process. While a rooftop plant with a central string-inverter must be designed carefully





according to each specific roof with the matching inverter size, the planning of a micro-inverter-based PV system is as easy as it gets: just include one inverter per module, no matter the total size of the plant. And in case you can fit more modules than expected during installation, the plant can be easily extended with additional micro-inverters.

Simple inventory and stock keeping

This characteristic of micro-inverter plants brings another advantage that can be of great importance to both large and small installation companies: just one single product can be used for any size of residential PV plant. Most companies are facing the complexities of managing a number of different string-inverters with varying wattages. Numerous products must be ordered, handled, and stored at the same time to be prepared for upcoming projects.

The alternative is to order the matching inverter after finalizing the planning of each plant, resulting in long lead times for the customers. If a project unexpectedly enables more panels to be added, or a homeowner wants to expand their plant at a later point, the string-inverter must be replaced with a bigger one.

All these complications are avoided by the use of micro-inverters. It is even possible to add a small number of panels to a roof with an existing plant without having to replace the existing string-inverter. As there is no minimum number of inverters per string or plant to get the system running, homeowners can just add a separate micro-inverter-plant to generate more energy than before, even if it contains only a very small number of panels. Additionally, installers do not need to handle large and heavy inverters anymore as these are replaced with small, handy micro-inverters.

Highest reliability, precise monitoring and error detection

Micro-inverters not only maximize the output of a residential PV plant when

everything runs smoothly. While the energy generation breaks down completely in the event of a defect in the string-inverter, the system stays live operating at only a slightly lower level in case one micro-inverter fails. Due to the monitoring on module level that is offered by most manufacturers of micro-inverter-based PV systems, the inverter in question can be detected precisely without having to get on top of the roof.

This is possible, because each individual inverter communicates with the system's gateway which is connected with the manufacturer's IT infrastructure, enabling the user to observe the system in detail by use of a

dedicated mobile app. Some micro-inverters even allow for over-the-air servicing in case the cause of the defect is on the firmware side, making maintenance extra easy and fast.

At the same time, the usual, limited product warranty for micro-inverters lasts 25 years, as opposed to a standard of five to 12 years in string-inverters. This suggests that micro-inverters are really built to last. Solarnative, a German startup manufacturer of micro-inverters and other components for residential PV installations, explains the exceptional durability of their product named Power Stick with its unique thermal design and a reduced component count.

Each component has a certain probability of failure, so a smaller number leads to lower product failure rates. The inverter's high-frequency technology allowed Solarnative's engineers to downsize the device and reduce the number of components by about 50% compared to other micro-inverters, perhaps making it the most reliable product in its category.

The company is planning to launch its innovative product this year. CEO Julian Mattheis states: 'We believe that Europe is more than ready for our Power Stick micro-inverter. It was designed to make life easier and safer for both installers and homeowners. Why should anyone pass on the benefits of single-module-control when it is brought to them on such comfortable terms?'

🌐 www.solarnative.com



Solarnative Power Stick micro-inverter