
Enphase[®] **Commercial Solar**



Enphase® **Commercial Solar** // Overview

Capture More Value

with Enphase Commercial Solar

Design Unrestrained

- Streamlined design and installation
- Easily extensible, with standardized methodology
- Cost reductions throughout system life cycle

Enphase's power conversion and monitoring technology

has revolutionized the solar industry's approach to commercial installations while generating significant long-term value for solar installers and their customers. Since **Enphase launched its microinverter technology** more than six years ago, innovators in the solar industry have partnered with us to utilize Enphase microinverters in commercial installations delivering over 90MW of solar power around the globe.

Benefits at a Glance

Performance

Utilizing the very latest technology, the Enphase System maximizes the performance of each panel by pairing it with its own dedicated microinverter. This ensures you will achieve maximum power point tracking on each panel and get the best energy yield from your array, even in low-light and shaded conditions.

Reliability

With no single point of system failure, Enphase microinverters offer the highest field reliability of any solar inverter and are backed by an industry-leading 25-year warranty. With online monitoring, troubleshooting of system issues can be achieved quickly via remote system access, lowering your operating and maintenance costs.

Safety

Enphase's advanced microinverters utilize plug-and-play, all-AC components and wiring, eliminating the arcing and fire risks associated with high-voltage DC architecture used in traditional inverter systems. For complete peace of mind Enphase's Enlighten monitoring platform provides built-in detection and mitigation of wiring faults.

Simplicity

Designed for ease of installation and use, Enphase systems provide system owners and installers with an unmatched level of information about the health and performance of their solar array. Enlighten, Enphase's web-based system monitoring and management platform, allows you to ascertain and quickly resolve any performance issues by offering module-level insight both online and on your smartphone at no extra charge.

Long-Term Returns Require Long-Term Thinking

Few people would purchase a home without knowing the mortgage, insurance, or maintenance costs of the property. Similarly, you would never purchase a car without understanding its fuel efficiency, warranty, or service costs. But with solar photovoltaic (PV) systems, it is common for project stakeholders to focus solely on year-zero equipment, installation, and commissioning costs during the scoping phase. **Decisions that stakeholders make at the outset can impact long-term project financials substantially**, and it's critical to consider how technology choices impact both lifetime system energy production and operating costs, as well as upfront costs. PV systems deliver a strong return on investment because they predictably generate energy for 25 years or more. Starting with a long-term cost/benefit analysis of technology options is crucial to understanding how a system will perform financially.

It's critical to consider how technology choices impact both lifetime system performance and operating costs.

The Enphase System

The Enphase System is designed to deliver the absolute best performance out of your solar array, offering new standards in safety, simplicity, and reliability.

Unlike traditional string inverter systems, Enphase microinverters convert the power from each solar module directly to AC electricity, removing the need for additional hardware and greatly reducing the voltages operating across the system, while virtually eliminating the risks posed by high-voltage DC wiring systems.

An integral part of your system, our Envoy Communications Gateway connects easily to your existing wiring, monitoring the system and sending performance information via a standard internet connection, eliminating the possibility of inconsistent Wi-Fi issues.

Empowering you with unprecedented granularity, Enlighten allows you to monitor the performance of individual modules in addition to system performance online and via a web-enabled mobile device.

Enphase System Technology



M250 Microinverter

Maximum Performance

The M250 is Enphase's fourth-generation microinverter. Installing one inverter per panel achieves maximum power point tracking across the entire array.

- Greater energy yield even in low-light conditions
- Industry-leading reliability, backed by a 25-year warranty
- No high-voltage DC in the system
- Integrated ground means no GEC required

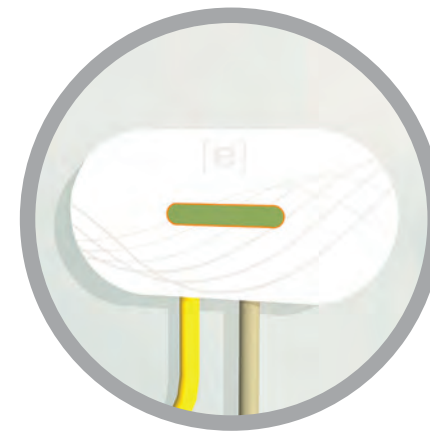


Enlighten Software

Advanced Monitoring

Enlighten web-based software provides system owners and installers with detailed performance information and analytics about their solar array, as well as instant feedback and automated alerts.

- Powerful web-based and mobile monitoring
- Instant access to array performance
- Simple control and management functions
- Remote diagnostics and maintenance

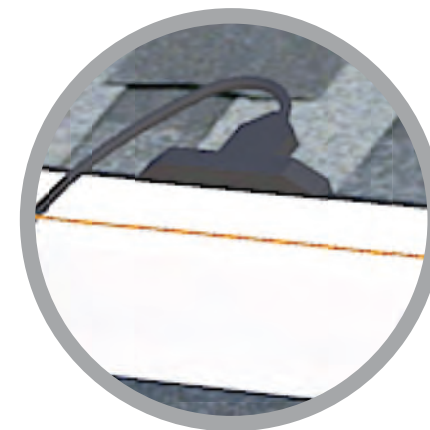


Envoy Communications Gateway

Simplified Networking

The Envoy Communications Gateway monitors the health and performance of each microinverter and solar module. Information is sent directly to the system owner and installer via the Internet.

- Connects easily to standard broadband router
- Bi-directional communications for web-based management and software updates
- Powerline communications mean no additional wiring and no issues associated with intermittent Wi-Fi performance



Engage Cable System

Plug-and-Play Cabling

The Engage cabling system is designed for ease of use and rapid installations.

- Pre-wired connectors for quick and easy installation
- Available in landscape and portrait orientation
- Can be spliced or terminated at any point
- Safe and easy, all-AC wiring
- Both three-phase and single-phase wiring options available



Performance Uninterrupted

- Zero catastrophic downtime
- Unparalleled safety
- Lower-cost maintenance



Flexible design configurations allow Enphase-based systems to adapt to the needs of any site without string planning requirements.

Value Untapped

- Lower LCOE
- Higher project profitability
- Accurate, predictable cost planning

Unprecedented Design Flexibility

Enphase is ideal for meeting the challenges that commercial solar installations can present. The modular architecture of the Enphase System brings unprecedented adaptability and flexibility to photovoltaic (PV) system design.

Free from the constraints of DC string parameters, the Enphase System can adapt to any site, giving commercial installers access to more rooftop real estate, so they can create a solar design that delivers maximum performance. The overall flexibility of Enphase's microinverter technology promotes accelerated system installation time, and supports easy in-field reconfiguration when required. The Enphase System eliminates the need to plan systems and strings according to the capacity limitations of string and central inverters. This key architectural benefit helps to streamline the system design process, where a commercial site virtually becomes a blank canvas for the implementation of a limitlessly scalable and flexible installation.

Both the physical placement and design requirements of a high-voltage DC central inverter force constraints on PV systems of all sizes. For larger-scale systems, for

example, accommodating the “central inverter factor” in a traditional solar system can mean pouring concrete for mounting slabs and employing heavy machinery, leading to thousands of extra dollars spent. Furthermore, some commercial sites such as schools and other high-traffic areas can't tolerate HVDC, or high-voltage DC unduly complicates PV system design. Serious safety and insurance considerations accompany the use of central and string inverters. In addition, the procurement of specialized component parts and expertise for handling high-voltage DC throughout the solar system life cycle must be factored into any project design in every single application.

Distributing power conversion technology into a PV system in the form of the Enphase System enables an inherently more reliable system than the centralized or string-based approach to DC-to-AC power conversion.

The benefits of the Enphase approach include:

- Predictable, scheduled O&M only
- Project cash flow stability
- Increased safety with no HVDC

No System-Wide Point of Failure

Unlike a central inverter-based system, where an inverter failure will take down the entire system, Enphase systems have no single point of system-wide power conversion failure. This results in increased long-term availability, meaning that the amount of time the system can perform at its peak potential is not limited by central inverter maintenance or replacement requirements.

Unlikely as they are, an individual microinverter failure only impacts the energy harvest of a single module and is fully covered under Enphase's industry-leading 25-year limited microinverter warranty. If a microinverter must be replaced, it is a non-urgent, low-impact, easy-to-schedule task that does not require highly specialized HVDC labor or a dedicated central inverter technician.

Predictable, Scheduled O&M Only

Typically, project developers and system owners don't scrutinize a PV project's long-term operations and maintenance (O&M) costs with the same level of rigor they apply to capital expenditure (CapEx) costs, but O&M is a critical component of a project's net present value (NPV)

nonetheless. When evaluating how O&M costs will impact a project's NPV, factoring in both preventative and reactive maintenance components is critical. Reactive maintenance costs—such as responding to an emergency like a central inverter failure—can negatively impact project NPV in no time. With the Enphase microinverter System, however, reactive maintenance costs are minimized since a single microinverter outage has a miniscule impact on total system energy harvest. Hence, O&M costs and activities become much more predictable and cost less.

Lowering the Levelized Cost of Energy

The Enphase System helps deliver a lower levelized cost of energy (LCOE) via:

- Increased energy harvest
- Increased system availability—with zero catastrophic downtime due to inverter failure
- Infrequent, minor O&M activities that do not required highly skilled labor.

Enphase systems also reduce uncertainty in system-wide cost planning for installers. This leads to accuracy and predictability in assessing BoS costs, contingency costs, and business processes. Design costs are reduced as well, since no

Partnership Benefits

- Design consultations
- Robust customer support
- Training resources

highly-specialized DC design and string planning are required. The microinverter approach also mitigates risk and project uncertainties for commercial solar installations by offering predictability in cost, accuracy in design, and reliability in performance.

Creating Value Through Partnerships

Enphase is more than a manufacturer of solar technology: we collaborate with commercial installers every step of the way—and help them grow their businesses. Commercial installers can access our dedicated commercial resources, robust customer support,

and training when planning systems. By partnering with Enphase, commercial installers reduce risks to slippage on project schedules through a reliable supply chain with a short lead time on product orders.

Thousands of installers from San Francisco to Seattle, Boston to Bordeaux, and Montreal to Milan use Enphase microinverter technology to power and monitor systems and take advantage of limitless growth potential by partnering with Enphase Energy.

Enphase Energy delivers microinverter technology for the solar industry that increases energy harvest, simplifies design and installation, improves system uptime and reliability, reduces fire safety risk, and provides a platform for intelligent energy management. Our semiconductor-based microinverter system converts energy at the individual solar module level and brings a systems-based, high-technology approach to solar energy generation.

To learn more about Enphase microinverter technology for commercial installations, visit enphase.com/commercial.



26kW



25kW



660kW



53.5kW



166.5kW



100kW



123kW



40kW



100kW

Enphase®
**Commercial
 Solar**
 Capture More Value.

Design unrestrained.
 Performance uninterrupted.
 Partnership on demand.
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