TrinaPro

HOW TRINAPRO DELIVERS A BETTER SOLUTION FOR YOUR SOLAR PROJECT'S SUCCESS.

A Major Step Forward For the Solar Industry

TrinaPro Solution Guide Book

Trinasolar

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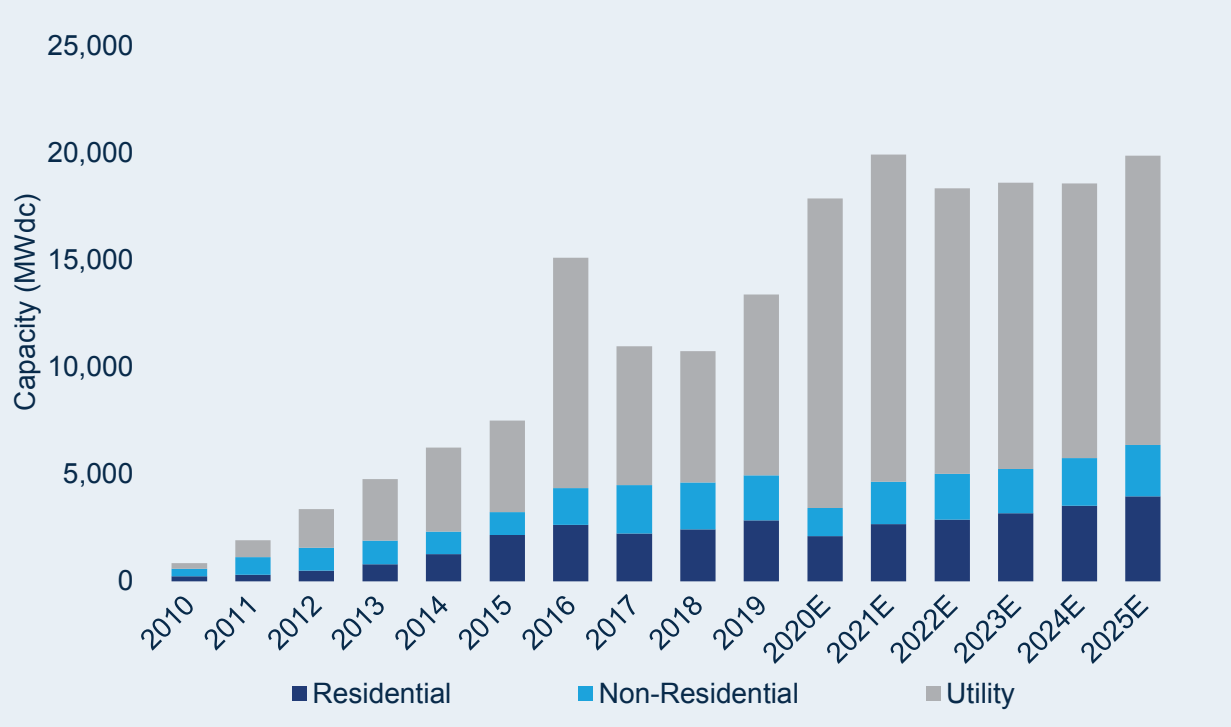
SOLAR ENERGY GROWTH **REMAINS STRONG**

After record-breaking growth in 2019, the solar industry shows no indication of slowing down. Industry analysts and experts are forecasting even higher growth projections into 2021 and beyond, even with the pandemic delaying some project timelines and in some cases, halting construction in the short term.

Consider these promising statistics:[1]

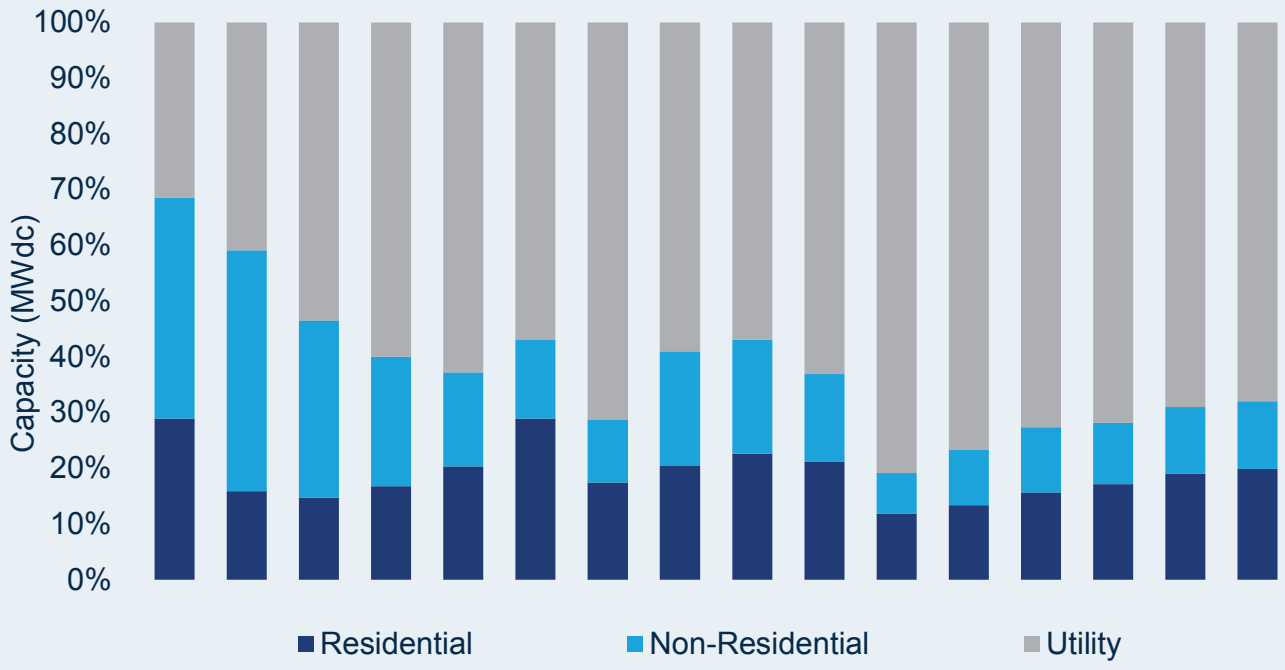
U.S. SOLAR PV FORECASTS

Figure 5.1 U.S. PV installation forecast, 2010-2024E



U.S. Solar Market Insight Executive summary Q2 2020

Figure 5.2 U.S. PV installation forecast by segment, 2010-2024E



- The last quarter of 2019 saw the U.S. install 13.3 gigawatts (GW) of solar PV capacity, bringing the country's total installed capacity to a staggering 77.7 GW.
- That equates to about the energy needed to power 14.5 million homes in the U.S.
- Solar also accounted for the largest share of new electric generating capacity added to the country's grid in 2019, with 40 percent of all new capacity.

This isn't limited to a single sector either, as utility-scale, solar C&I and residential solar are all expected to see significant continued gains.

However, as the solar industry advances along this historic growth trajectory, engineering, procurement and construction (EPCs) professionals, as well as solar project developers, will continue facing an ever more competitive and disruptive landscape. This competitive and disruptive landscape is creating new challenges and opportunities that will require new solutions and strategies.

CHALLENGES & OPPORTUNITIES FOR SOLAR EPCs & PROJECT DEVELOPERS

Real challenges facing solar EPCs and developers include:

Access to high-quality components with optimal compatibility

Uncertainty surrounding the post-ITC market

International tariffs & trade disputes

Pandemic-driven uncertainty and supply chain slowdowns

For now, industry analysts forecast utility-scale installations in 2020 to only experience a slight COVID-19 impact while still maintaining growth of up to 17 GW compared to 13.3 GW in 2019. Solar's proven economic and environmental benefits simply remain too strong for the current pandemic to inhibit industry growth over the mid to long term.

DESPITE THESE CHALLENGES, NEW OPPORTUNITIES INCLUDE:

- **Commoditization relief throughout the supply chain due to business consolidation and partnerships**
- **Rising corporate purchasing, community solar developments and residential adoption**
- **Greater integration between solar generation and storage**

New challenges and opportunities are redefining how the solar industry operates. In turn, EPCs and developers must redefine customer needs to include streamlined procurement, quality component performance and compatibility, system support, one-stop bankability and even the potential for power guarantee.

To solve these customer needs, EPCs and developers must remain strategic in optimizing each solar PV installation and interconnection. One way to accomplish this goal involves TrinaPro, the latest innovative offering from Trina Solar. TrinaPro, the all-in-one smart solar solution for utility-scale projects, helps EPCs and solar project developers achieve their goals of increasing project energy output and return while decreasing overall costs and installation and logistics time.

In this ebook, we dive into what makes TrinaPro different and the added value these differences can generate for solar developers, EPCs and project financiers.

[2] Renewable Energy Magazine - "REC market analysts believe solar power will emerge from the COVID-19 crisis even stronger than before https://www.renewableenergymagazine.com/pv_solar/rec-market-analysts-believe-solar-power-will-20200424

AN ALL-IN-ONE SMART ENERGY SOLUTION: THE RIGHT SOLAR COMPONENTS OPTIMIZED FOR LONG TERM PERFORMANCE AND ENERGY GENERATION

Designed as an all-in-one smart solar PV solution, TrinaPro is a major step forward for the industry. At its core, the TrinaPro provides a highly optimized combination of three bundled components for utility-scale projects: solar modules, trackers and inverters.

Industry-Leading Solar Modules:

TrinaPro offers a range of durable and resilient solar modules for use in utility-scale installations anywhere in the world.

Bifacial modules with the highest utility scale module wattages in the industry and max-power algorithms. These durable and long-lasting modules capture sunlight on both the front and back surfaces of the modules. They are also able to utilize the sunlight as it passes through the panel and are particularly useful when paired with trackers. Allowing flexible system design, they can handle high wind, snow and sand loads.

Beginning 2021, Trinapro will be the first NA region PV System to showcase Vertex, the industry's first 500W modules with efficiency up to 21%. Technical innovations like superimposed three-slice split cell, non-destructive wafer cutting, higher density form factor, and nine bus bars reduce resistive power losses, improve anti-hot spot performance, and increase energy harvest while improving module mechanical strength. The back-side generation from the bifacial modules can further increase energy generation by 5%-25%, depending upon the project albedo. This enables high power output.

State-of-the-Art Solar Trackers' from Nclave:

Coupled with the modules, TrinaPro offers a wide selection of central and distributed drive trackers. Multiple racking choices allows for site flexibility, system optimization and encourages a focus on improved LCOE performance.

Optimized Pairing with String and/or Central Inverters:

Alongside the modules and trackers, TrinaPro pairs either string or central inverters to perform high-efficiency DC-to-AC conversions of utility solar installations. The converted energy is usable in standard electrical grids.

TrinaPro facilitates streamlined procurement of these premium components through its worldwide supply chain. All products originate from the same procurement source packaged with Trina's renowned service. This means there's no need to juggle multiple vendors, which reduces project risk and improves efficiency.

Let's take a look at how these bundled components work together to maximize energy gains and raise project visibility for developers and financiers.

TRINA SOLAR: RELIABLE AND FULLY BANKABLE ACROSS THE GLOBE

When it comes to finding the right solar partner, project developers and financiers need a guarantee that they can take to the bank. A company's bankability indicates that it can deliver innovative high-quality products while remaining solvent and stable enough to repay loans.

To ensure the company's bankability, Trina Solar focuses on seven dimensions for its due diligence evaluation process, including:

- **The company**
- **Product technology**
- **Performance**
- **Reliability/durability**
- **Manufacturing and quality**
- **Installation and service, and Field Performance.**

Due to this commitment, Trina Solar has been consistently ranked as a reliable and fully bankable module manufacturer by multiple third-party sources.

Bloomberg New Energy Finance (BNEF) awarded Trina a best-in-class top rating in its annual module and inverter bankability report. Trina stands as the only module manufacturer rated as fully bankable for four consecutive years by 100 percent of BNEF survey participants.

PV-Tech research gave Trina an 'A' rating in its bankability rating for Q1 2020, based on its analysis of the financial and commercial health of the company.

DNV GL/PVEL's "Module Reliability Scorecards" have ranked Trina Solar as a Top Performer for six consecutive years. This ranking demonstrates Trina Solar's commitment to product quality and ensuring high PV system performance.

- DNV GL released The Technology Assessment Report for the TrinaPro Smart Solar Solution. The report's findings highlight how the turn-key aspect of the TrinaPro solution improves system performance and increases solar energy gains, which can potentially expedite ROI.

  In the assessment, DNV GL reported that it:

  - expects the field performance of the 410 W DUOMAX Twin to be leading that of similar PERC modules of the same nameplate rating
  - rates Trina Solar's monocrystalline PERC cell as 'proven'
  - considers the bifacial module technology, the dual-glass construction, the half-cell design, and the multi-busbar design as 'qualified' ranks Trina Solar's annual degradation rate and last year's performance as leading the industry.

DECREASING LCOE WITH A **SMART ENERGY SOLUTION**

EPCs and project developers gain additional benefits from the advanced product solutions contained within TrinaPro. As a smart energy solution, TrinaPro utilizes hardware, software and cloud platforms that leverage edge computing and professional system design to further lower levelized cost of electricity (LCOE) and improve power gains.

Specifically, TrinaPro's core features sync up to drive additional project visibility though the following:

The inverters match perfectly with the system voltage and overloading ratio of Trina Solar's modules.

The software-optimized algorithm of the trackers boost its sun-tracking precision for maximum harvest in a variety of complex environments.

The self-learning tracker system enables continued optimization over time to achieve the best tracking angle at any time of the day.

These features also use an integrated design and construction process that speeds up installation and ensures higher system reliability. TrinaPro not only harnesses advanced technologies like bifacial modules, but also integrated turn-key services from O&M partners and comprehensive warranties.

These make TrinaPro a value-added solution that connects the right technologies and technical expertise for low-carbon, high-ROI solar PV installations. TrinaPro provides industry-high yields that meet the requirements of even the most demanding projects, while delivering the lowest possible LCOE.

The addition of the VERTEX series of Bifacial modules in 2021 will significantly add to TrinaPro system capabilities and financial returns. Based on the world's first 210mm solar wafer and monocrystalline PERC cell, the new modules feature several innovative design features enabling high power output and module efficiency up to 21%, enhancing TrinaPro's global PV leadership. Compared with conventional 410W bifacial double-glass modules, the 500W VERTEX can reduce BOS costs by ~8% and LCOE by ~4% (preliminary estimates).

In other words: TrinaPro is both technically sophisticated and highly practical. Let's look at the solution's other value-added benefits.

INCREASED POWER AND DECREASED LCOE EQUALS MORE VALUE

The advanced technologies and bundled services from TrinaPro's features combine to provide significant benefits and savings.

Since efficiency is the name of the game with PV installations, the tracking system raises yields substantially in most cases to maximize the total kilowatt-hours generated from a given tract of land. As incentives such as the solar investment tax credit in the U.S. wind down and applicable tariffs come and go, the energy boost from trackers is essential in keeping utility projects consistently in the black.

Through optimized component matching, TrinaPro can increase power generation capacity by up to 30 percent versus fixed tilt installations, and up to 3 percent versus non-integrated tracker systems. At the same time, it can reduce LCOE costs by 8-12 percent vs. fixed tilt, and up to 3 percent vs. non-integrated tracker systems.

THE 210mm 500W VERTEX modules can reduce BOS costs by ~8% and LCOE by ~4%

Increased power generation by

30%

Decreased LCOE by

8-15%

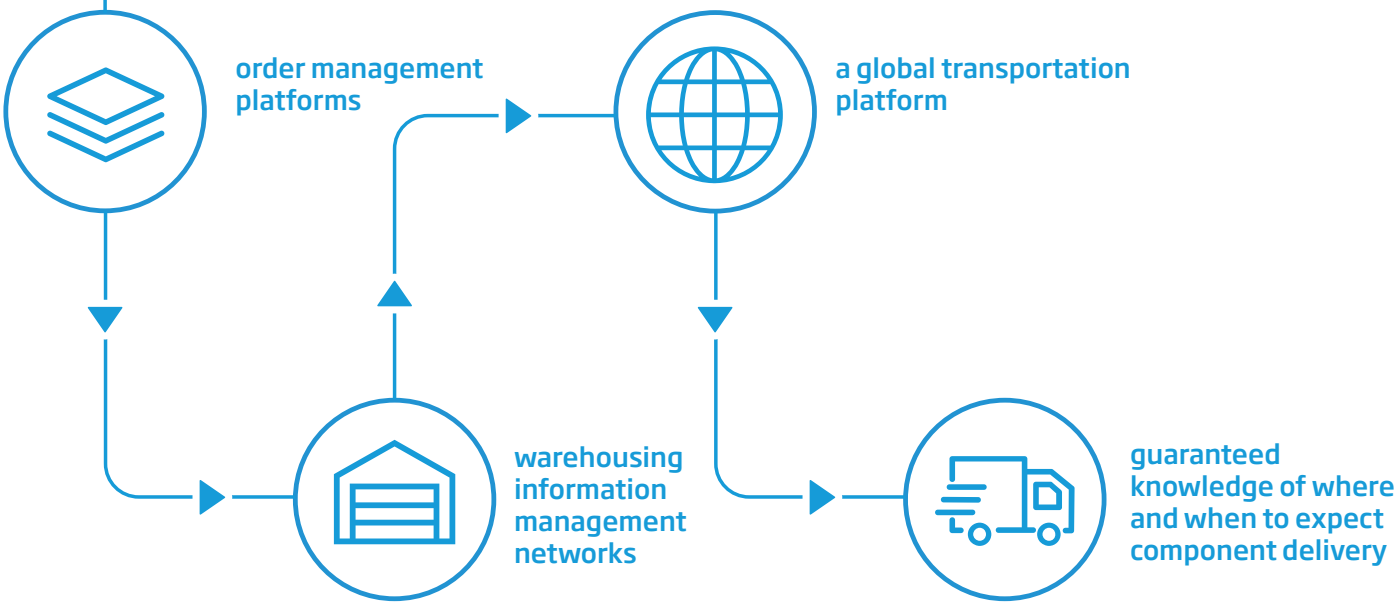
Ultimately, TrinaPro guarantees a higher internal rate of return (IRR) for solar installations.

In the next section, we look into how TrinaPro also ensures projects remain on schedule.

KEEPING PROJECTS ON **TRACK WITH TRINAPRO**

Beyond component procurement and optimization, the solar experts at TrinaPro are there to help guide the project from the onset through installation and interconnection and into O&M. This includes providing custom drawings, structural designs and permitting in the TrinaPro solution, helping ensure optimized component pairing and higher energy gains.

Following system design, TrinaPro guarantees component delivery with a worry-free system that keeps projects on track. Partners can rely on:



Once onsite, the modules, trackers and inverters are bundled in an easy-to-assemble patented installation solution, which minimizes installation and interconnection times.

Packaged as it is in a one-stop shop offering, TrinaPro is a comprehensive and convenient solution that produces tangible results for utility-scale solar PV installations globally.

There's even more to TrinaPro than its components and services, though, starting with its Energy Production Guarantee.

THE TRINAPRO PRODUCT
PRODUCTION GUARANTEE

It's one thing for a company to guarantee a particular component, it's quite another to guarantee the actual energy production. But this is precisely what TrinaPro does.

To support low LCOE and high ROI in future, TrinaPro also includes a product performance guarantee of our system components. Performance Plus effectively mitigates the risk of not knowing what happens when a system is put under strain or goes down. This means the ensuing project risks, service guesswork and finger-pointing all become relics of the past.

TrinaPro includes:

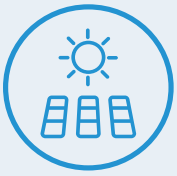
- **system-level performance guarantee with a 5-year guarantee period that covers the system's return of investment.**
- **30 items that fall under the guarantee scope, covering 95 percent of common issues.**

This all contributes to a lowered LCOE figure, which is pivotal since the LCOE serves as a concise indicator of the solar installation's economic value compared to relying on the conventional grid. Therefore, EPCs, project owners and project developers cannot afford for it to be high, jeopardizing key project commitments.

In addition to the Performance Plus, TrinaPro also offers a variety of warranties to further guarantee optimal system operation.

DNV GL HIGHLIGHTS TRINAPRO'S **HIGHER ENERGY GAINS**

DNV GL, a leading global quality assurance and risk-management company, recently performed two types of hourly simulations in PVsyst at the TrinaPro test site in Spain. The assessment found that TrinaPro's tracking algorithm could:



Provides annual energy gains of up to 1 percent.

Increase energy gains upto 1.9 percent on cloudy days.

Boost annual energy gains up to 5 percent under specific scenarios.

TRINAPRO SUPPORT **& WARRANTIES**

Given the number of different components integral to a PV system's performance, multiple warranties are required. TrinaPro conveniently bundles all of them – for modules, inverters, and trackers – into one easily managed package that can be customized further.

Resulting from the higher reliability and lower annual power degradation, the standard dual-glass bifacial power warranty for the Trina modules runs for 30 years. The inverters have a 5-year product warranty.

The inverters have a 5-year product warranty. The trackers have a 5-year overall unit warranty, 10-year warranty for structural components and 20-year for anti-corrosion surface warranty. However, adding further flexibility, TrinaPro offers an option to upgrade them to extended warranties lasting up to twice as long.

An optional performance warranty also governs the bifacial module and tracker combo. This warranty, paired with an uptime guarantee, reduces risk and provides peace of mind for utility customers who need the most reliable service from their TrinaPro-powered solar PV systems.

CUSTOMER SUCCESS STORIES

Several recents projects partnered with TrinaPro for increased benefits and better ROI for utility-scale solar project developers.

THE MARCHIHUE PV POWER PLANT

Located in the Cardenal Caro Province of Chile's sixth region of O'Higgins, the Marchihue PV Power Plant officially went into commercial operation in February 2019.

The specs on this ground-mounted project include:

- 3 MW of capacity
- 9,072 Trina Tallmax-Poly 330 W modules
- Nclave horizontal single-axis SP160 trackers
- Expected annual energy generation of not less than 64,444 MWh
- Expected annual reduction of CO^2 is about 6424 Tons

THE COBRA SOLAR PARK

Located in Alcázar Ciudad Real Province, Spain, the Cobra Solar Park officially went into operation in December 2019.

The specs on this ground-mounted project include:

- 189.76 MW of capacity
- 560,000 Trina Poly Splitmax 345 W half-cut modules
- Nclave horizontal single-axis SP160 trackers
- Expected annual energy generation of not less than 391.02 GWh
- Expected annual reduction of CO^2 is 281.53 million tons

CONCLUSION

TRINAPRO, THE SINGULAR **SOLUTION FOR SOLAR**

TrinaPro is a breakthrough smart PV solution for utility-scale solar installations that will only improve over time as new features and services are integrated into its platform. Focusing on enhancing customer ease-of-use, Trina Solar has long distinguished itself from the competition by taking innovative steps such as integrating PV trackers into the Trina Solar portfolio. That move and others illustrate its commitment to building highly integrated solutions that streamline the otherwise complex operations associated with utility solar projects world-wide.

As EPCs and project developers continue to seek out ways to lower LCOE, boost energy generation and speed up ROI, TrinaPro provides the one-stop solar solution they need to succeed.

Trina Solar is excited to show our customers the value of TrinaPro. Visit our site or subscribe to our newsletters to stay up-to-date on our latest production and solution announcements.

APPENDIX:
ABOUT TRINA SOLAR

Trina Solar is a solar pioneer with deep technology roots. Founded in 1997, the company rapidly expanded beyond its origins in China to become a global leader in the renewable energy industry.

Through global growth, Trina achieved its first major milestone of 1GW of quarterly shipped capacity in 2015. It also received the best-in-class "fully bankable" rating from Bloomberg NEF for the fourth consecutive year in 2019 – the only manufacturer to do so. It maintains major commitment to innovative energy applications within the IoT as well as smart PV solution segments.

Via TrinaPro, which Trina Solar introduced in 2018, the company became the first module manufacturer to bundle a module, inverter, and single axis-tracker paired solution. TrinaPro is a one-stop shop for utility solar, capable of delivering value efficiency with powerful, reliable, and scalable infrastructure.

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