

Reach for the sky,
power the globe





Our new R&D centre in Dresden is a symbol of our commitment to innovation.



A message from Dr. Michael Harr, CEO

Outstanding results require exceptional balance. Performance and cost, innovation and reliability, plant size and construction speed. Too much of one, not enough of the other, and projects can run off course.

At CTF Solar, we take balance very seriously. Instead of juggling the ingredients of a successful project while leaning on one core strength, we've constructed sturdy foundations under each corner of our solar park EPC business. The result is unmatched stability and efficiency—solid groundwork that our customers rely upon.

What CTF Solar is building serves as a guidepost for where the energy sector is headed: green investment portfolios. Energy mixes less dependent upon fuel prices. Stronger local and national economies

with improved trade balances and greater energy security. A more sustainable future for our planet.

It's what we dreamed of as pioneers of thin film cadmium telluride modules decades ago. Now, we've perfected our CdTe technology and a production process that allows it to achieve its full potential. As an EPC provider, we draw on this expertise, yet also gladly use other leading technologies to provide each customer the balance that's right for them.

Transforming the world's energy supply is a global task. Our technology and backing from one of the world's largest building materials firms positions us as a truly global provider. We hope you'll join us in accomplishing this important work.

German engineering meets Chinese efficiency

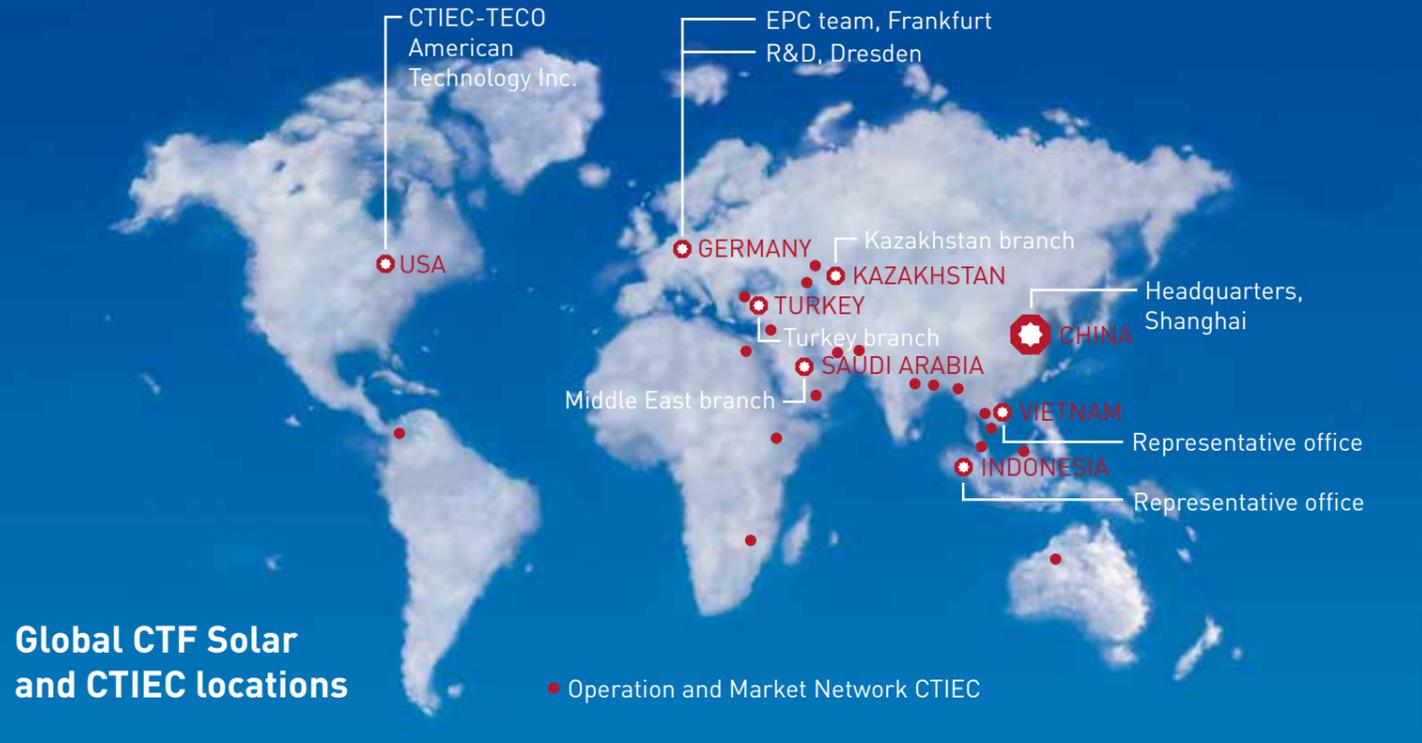
CTF Solar is a powerful alliance for building global solutions managed by pioneering German photovoltaic engineers. We are wholly-owned by China Triumph International Engineering Co., Ltd. (CTIEC), a top-200 global design and engineering company that is part of the CNBM Group. The Chinese state-owned CNBM Group is a Global Fortune 500 company, the largest building materials supplier in Asia, and one of the world's largest manufacturers of front glass for solar panels. CTF Solar is a global synergy of industry-leading innovations paired with unrivalled expertise in the procurement, construction, financing and production of photovoltaic modules and power plants.

Benefit from a global PV powerhouse

- break even faster, earn higher returns with cost-efficient thin-film modules
- German engineering and high quality for reliable yields throughout the project life cycle
- increase profits with lower levelized cost of energy (LCOE)
- global construction network for low BOS costs anywhere in the world
- simplified financing available through in-house financial services, stability of bankable state-run conglomerate with an outstanding track record

CTF Solar is proud partner of:



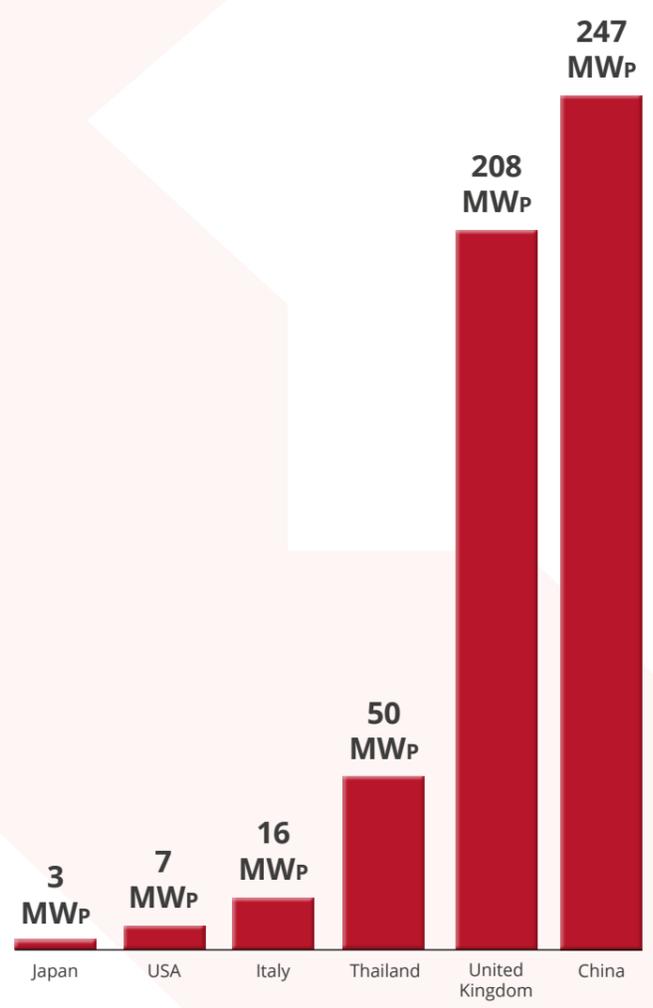


CTIEC and CTF Solar have installed over 530 MWp of PV capacity around the globe.

A world of PV capabilities

Mankind has embarked on a massive undertaking—the transition to renewable energy. It’s an objective that can only be obtained with a sustained global effort. With successful utility-scale installations around the globe, CTF Solar is uniquely positioned to make a lasting contribution. As part of the CNBM Group, our supply chain, capabilities, and mindset are all global. That means you can rely on us for permitting, financing, procurement, and large-scale PV construction anywhere on the planet.

Whether your interest is in project development support, cost-effective PV modules, a utility-scale solar power plant, or your own thin-film module factory, we’re ready to assist you anywhere.



CTF Solar & CTIEC global installed capacity

The global advantages of CTF Solar

CTF Solar’s global presence brings with it a unique set of strengths. Add them up, and you’ve got a considerable advantage for your next PV project.

- technology agnostic—regularly procures tier-1 panels, inverters
- global footprint—ability to execute large-scale PV projects anywhere
- covers complete project life cycle—from co-development and EPC through to operations and maintenance (O&M)
- own thin-film 80MWp production facility—for module cost advantage
- efficient thin-film production facility design—available as constructed turnkey fab
- stability and bankability—of a Chinese state-run conglomerate
- efficient procurement—owned by construction materials giant
- simplified financing—with in-house financial services
- advanced thin film technology—from CdTe pioneers
- reliability & quality—German engineering
- cost-effective construction—global construction industry player



CTF Solar applies its PV expertise to every phase of your project.



Building the future

Our world has fundamentally changed. We've arrived in a new era, with grid-parity fading in our rear-view mirror. Over 1% of the 20 trillion kWh of electricity the world consumes each year comes from solar energy. More than 200 GW_p of PV panels are already installed worldwide. And we're only getting started. That number is set to double within just a few years.

Ramping up production and construction quickly enough to build those systems will be a sizable undertaking. It's a challenge that can only be met with a concerted effort—and the support of global players like CTF Solar. As a turnkey EPC contractor, our contribution starts with project co-development and extends all the way through operations and maintenance.

But it's not just capacity that counts. Each individual project must maximize yields and revenues for investors. Excellent photovoltaic power plant investments are a product of excellence in EPC. That means installing quality that lasts, and quickly. Because the faster your grid connection is in place, the sooner you see a revenue stream—and break-even.

Efficiency gains of as little as 1% can have a dramatic impact on returns. The more bankable your EPC provider, the more favourable your financing conditions will be. CTF Solar is uniquely structured to maximize your yield, ROI, and agility through every available means including construction, financing, and PV technology.



Your path to excellence

CTF Solar helps get your project off the ground quickly with professional services to support your project development. In-house financial services greatly simplify the process of obtaining advantageous financing. Our considerable engineering, procurement, and construction expertise

is reflected in a track record of successful utility-scale solar projects. Upon completion of your turnkey solar park—or for existing facilities—we offer operations and maintenance to maximize output and reliability throughout the life of the power plant.





To maximize revenues, a solar park must achieve expected performance levels for decades.



Smarter design, sourcing, and execution

Engineered in Germany, the PV technology capital of the world

Our engineering team is part of a long tradition of ground-breaking research, development, and innovation in Germany. With decades of industry experience, we define the state of the art to more efficiently boost your PV yields.

Procurement that's not limited to any one technology or manufacturer

Our proprietary thin-film CdTe technology is one of the most cost-effective on the planet. But when it's time to source all the materials and equipment for your solar power plant, CTF Solar is technology- and vendor-agnostic. As part of one of the largest construction materials and solar front glass suppliers in the world, we have extensive contacts and relationships in the industry. The world-class solar companies

in the CNBM portfolio including names such as Jetion and Avancis give CTF Solar a unique procurement advantage. We source tier-1 crystalline modules, inverters, and mounting systems from the most renowned manufacturers in the industry on a daily basis to maximize your return on investment.

Construction of PV projects throughout the world is our strength

The CNBM Group of companies achieves annual revenues of over €17 billion in building materials and related industries. As part of this global construction leader, CTF Solar has a vast network of resources both physical and financial that it draws upon for solar construction projects of every size. Reduce your balance of system (BOS) costs and LCOE by taking advantage of our extensive network.



O&M — how an investment earns its keep

Starting out with an efficient, cost-effective, and reliable PV power plant is the first step. Now it's time for the investment to perform. We maximize your returns throughout the life cycle of your plant with the following services:

- 24/7 monitoring by trained staff
- service line
- warranty management
- on-site repairs by expert technicians
- inspections
- reporting / investor communications
- grounds maintenance & vegetation control
- module cleaning
- yield forecasting

Our philosophy when it comes to operations and management goes beyond mere cost efficiency. O&M is a golden opportunity to squeeze every last bit of energy out of your solar park. Simply keeping modules clean, operational, and free of vegetation has a considerable impact.

Add to that service staff and expert CTF Solar PV technicians trained to detect potential problems before they impact power generation, and you've got a powerful tool for maximizing performance. Sophisticated around-the-clock monitoring, inspections, and yield forecasting offer a strong programme for enhancing your return on investment—throughout the entire project life cycle.

Hayford Farm

9.8 MW_p

Shrewsbury, UK

- › 39,238 polycrystalline Jettion PV modules (250 W_p)
- › 4 central inverter stations
- › mono pile mounts
- › 10-week construction time
- › September 2014 grid connection
- › construction finance: CTIEC
- › general EPC: CTIEC / CTF Solar GmbH



Pentre Farm

6.1 MW_p

Llanelli, UK

- › 24,012 polycrystalline Jettion PV modules (255 W_p)
- › 3 central inverter stations
- › mono pile mounts
- › 7-week construction time
- › September 2014 grid connection
- › construction finance: CTIEC
- › general EPC: CTIEC / CTF Solar GmbH



Raventhorpe Farm

39.3 MW_p

Scunthorpe, UK

- › 153,617 polycrystalline Jettion PV modules (260 W_p)
- › 17 central inverter stations
- › mono pile and ballasted mounts
- › 6-week construction time
- › March 2015 grid connection
- › construction finance: CTIEC
- › general EPC: CTIEC / CTF Solar GmbH



Roanhead Farm

7.1 MW_p

Barrow-in-Furness, UK

- › 28,382 polycrystalline Jettion PV modules (255 W_p)
- › 3 central inverter stations
- › mono pile mounts
- › 5-week construction time
- › March 2015 grid connection
- › construction finance: CTIEC
- › general EPC: CTIEC / CTF Solar GmbH



Thin film CdTe PV factories offer low capex and production cost per W_p.



CdTe — a technology whose time has come

In 1969, Dr. Dieter Bonnet created the world's first functioning cadmium telluride (CdTe) solar cell. Together with CTF Solar founder Dr. Michael Harr, he also built the world's first thin film CdTe production facility in the 1990s. Now, CdTe is gaining momentum—thanks to its high efficiency, low capital expenditure, and low production cost per W_p. That's why, in Chengdu, China, we have our own 80 MW_p module factory. And thanks to our turnkey production facility design and construction services, you can, too.

Chengdu facility

- › 250 W_p modules at 13% efficiency
- › 1200 x 1600 x 7 mm modules
- › coating technology by CTF Solar
- › 24/7 operation, 1 production line

- › 65 modules per hour
- › 95% uptime & 95% yield
- › factory construction: 12 months
- › zero-emission design

Your facility

CdTe is an exceptional technology to invest in today, with projected efficiency increases expected to soon rival silicon modules, but at far lower capital and production costs. CTF Solar constructs turnkey CdTe production facilities including factory buildings, production lines, and all the necessary equipment and services.

- › 100-300 MW_p production output
- › production costs €0.33 - €0.37 / W_p
- › CdTe module efficiency roadmap up to 24% with production costs < 0,2€ / W_p

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