



CTF SOLAR

CNBM

CTF SOLAR Production Solutions

Ready-for-Excellence

Complete implementation of state of the art production tools together with working processes anywhere in the world. Far East materials sourcing with German materials testing and qualification for highly competitive PV modules.



Innovation. Empowering Excellence.



CTF SOLAR

CTF SOLAR Production Solutions Ready-for-Excellence

CTF SOLAR is the first and only company worldwide to offer equipment and solutions for the production of Thin Film PV modules based on the reliable cadmium telluride (CdTe) technology – which was originally developed by today's CTF scientists and engineers. After so many changes the worldwide PV market and solar manufacturing processes have undergone in the past, we can provide our customers with almost 30 years of relevant experience.

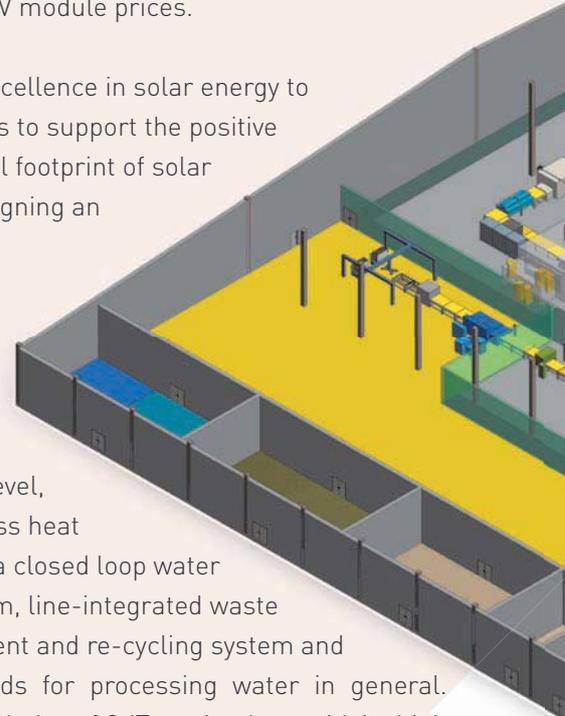
Having taken part in the development of one of the most powerful and promising solar technologies for the future, we know our business from the ground up. Ready-for-Excellence to us means the complete implementation of state of the art production tools together with working processes anywhere in the world. In close collaboration with our carefully selected partners for equipment supply we are constantly increasing standards, giving our customers the chance to focus on their core business while relying on a strong and internationally positioned partner.

From facility layout and equipment selection to the accurate design and integration of all components and processes, CTF SOLAR delivers high quality and the most advanced technology based on close cooperation with suppliers and longstanding partnerships with well-known international research institutions. To put the results of R&D into practice, together with our carefully selected suppliers, we create and continuously improve production tools that meet all requirements perfectly.

With our experience in the field of CdTe technology development, we guarantee for a low operating cost structure, low investment and low risk as a result from our proven implementation process to meet the economic figures to compete on the developed solar market. Our Ready-for-Excellence solutions in combination with Far East materials sourcing and German engineering testing and qualification enables customers to achieve the lowest possible module production cost, contributing to highly competitive PV module prices.

Striving for excellence in solar energy to us also means to support the positive environmental footprint of solar power by designing an emission free factory.

This includes cleaning of exhaust air on machine level, central process heat collection by a closed loop water cooling system, line-integrated waste water treatment and re-cycling system and very low needs for processing water in general. With our knowledge of CdTe technology with its high potential for future sunlight power exploitation, one of our main objectives is to make a contribution to reach grid parity as fast as possible. Continuous process development in our laboratories in order to boost modules efficiency further towards performance values beyond 20 %.

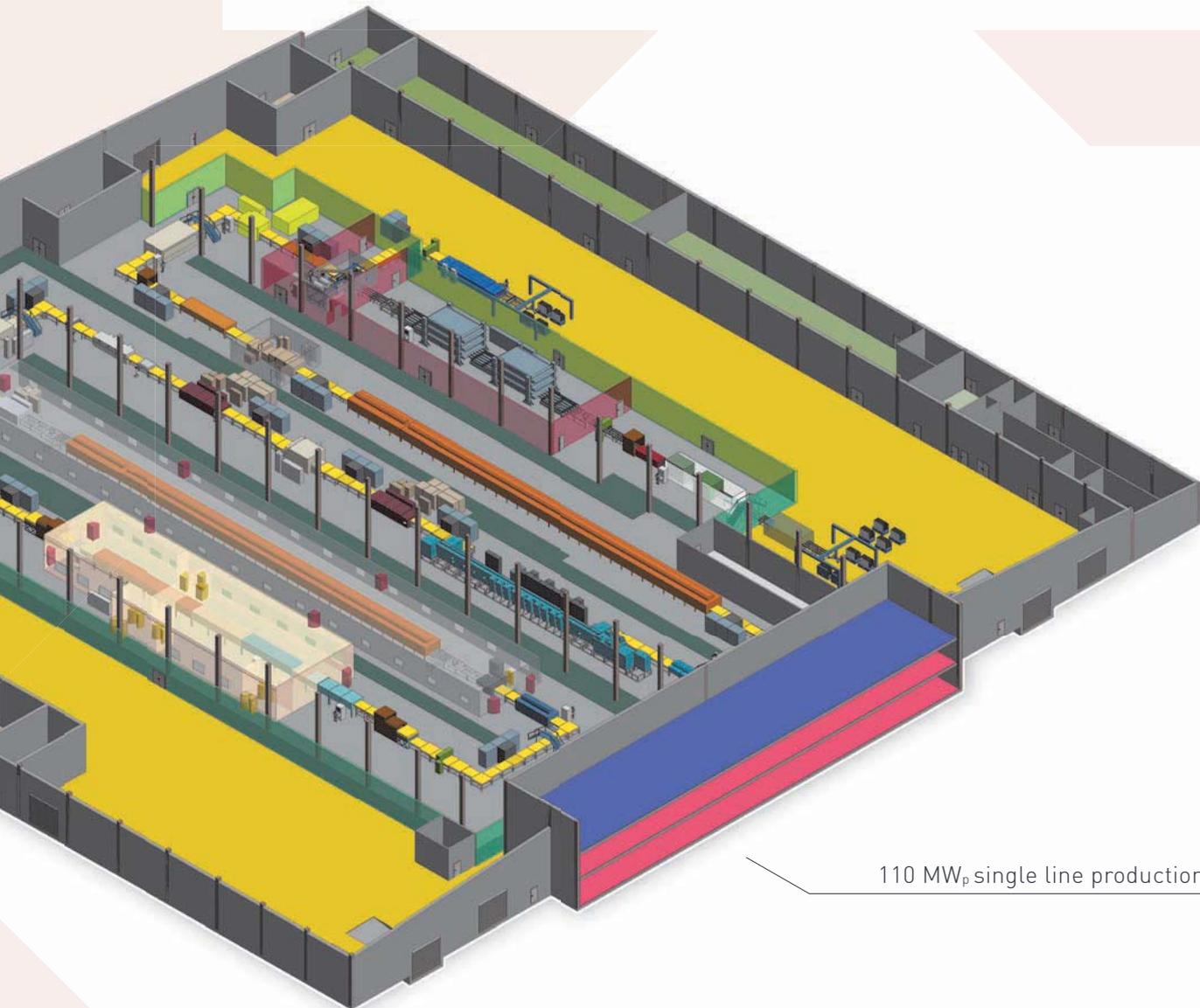


We are the perfect partner to start up an own thin film module production to:

- > **Lowest CAPEX**
- > **Lowest production costs**
- > **Outstanding technology characteristics**

EXCELLENT FIGURES:

- > **Size of production shop:** 100 to 300 MW (factory size)
- > **Module size:** 1.6 x 1.2 metres
- > **Module efficiencies (actual):** > 13%
- > **Efficiency roadmap:** up to 25%
- > **Capital expenditures:** 0,65 €/W_p down to 0.32 €/W_p depending on production shop size and services provided by CTF Solar
- > **Production costs (actual):** 0.33 to 0.37 €/W_p (raw materials, utilities, maintenance, labor)
- > **Production cost roadmap:** down to 0.13 €/W_p



110 MW_p single line production shop

Innovation. Empowering Excellence.



CTF SOLAR

CNBM

Under Construction

CdTe Solar Factory from CTF Solar in Chengdu, China



Innovation. Empowering Excellence.

CTF SOLAR GmbH

Frankfurt site
Industriestraße 2
65779 Kelkheim, Germany
Tel.: +49 6195 6763-0
Fax: +49 6195 6763-19
info@ctf-solar.com
www.ctf-solar.com

Dresden site
Zur Wetterwarte 50, Haus 303
01109 Dresden, Germany
Tel.: +49 351 896705-0
Fax: +49 351 896705-19
info@ctf-solar.com