KRINNER
The Solar System

www.krinner.com

SOLAR PLANTS

modular · no concrete · environmentally friendly

SOLAR ENERGY

innovative · regenerative · environmentally friendly

Energy of the future?
Energy of the present!

Clean energy

The sun gives us what we need to live. Life as we know it requires the right temperature. And don't forget that photosynthesis and the Earth's hydrological cycle and air currents do also depend upon the sun. In addition, the sun is growing ever more important as an energy provider – energy that is sustainable and renewable.

Energy price hikes and an increasing shortage of fossil resources are what is driving the development and use of renewable energies. In solar energy in particular, KRINNER Solarsystems focuses its know-how acquired and its experience gained in foundation construction, power engineering and solar technology to provide an alternative in the field of renewable energies – alternatives for humans and for the environment! We implement the best clean-energy solutions – from the planning of solar plants to the installation and maintenance of customized free-standing solar solutions for companies and investors.

FOR BOTH – THE PEOPLE AND THE ENVIRONMENT

What is solar energy?

The sun produces energy that is emitted toward Earth in form of electromagnetic radiation. Solar energy is the basis of all life down here on Earth. The total energy emitted by the sun is much, much larger than what humanity is able to consume. Utilizing this free resource is not only an obvious way forward, it is also environmentally friendly.

What is photovoltaics?

The photovoltaic effect turns sunlight into electricity. The sunrays are absorbed by photovoltaic cells and converted into electricity. Every photovoltaic cell is made of wafer-thin layers of semi-conductor material, e.g. silicon. When sunrays hit the photovoltaic cell, a voltage drop occurs between its contact areas, which produces a direct current. An alternating-current converter converts this direct current into a grid-conforming alternating current.

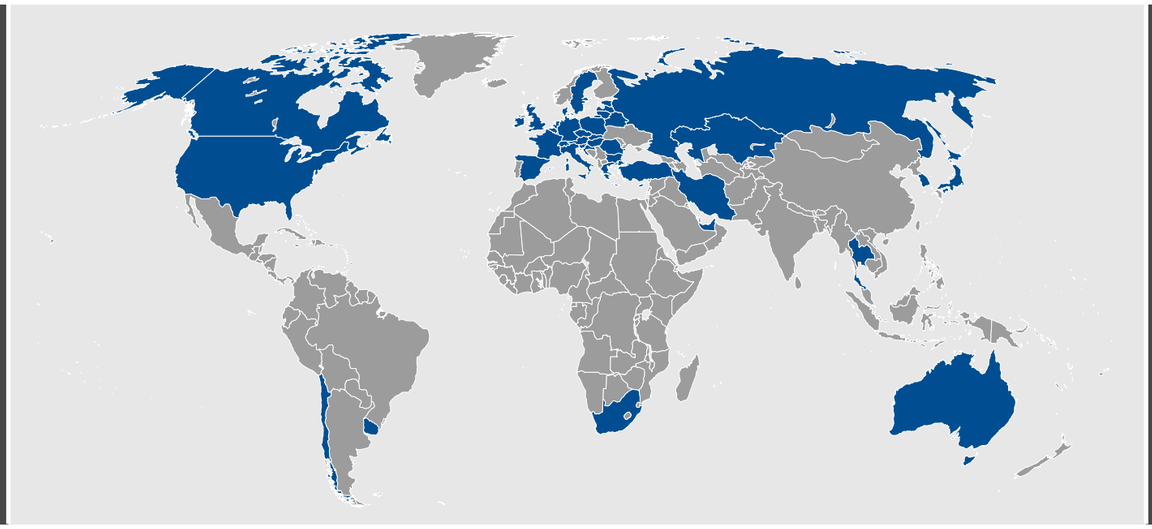
What is concentrated solar power?

Concentrated solar power (CSP) is another way of generating electricity by using solar energy. In photovoltaics, the sunlight is converted into electricity through a voltage drop. CSP, however, goes a more direct route. Focusing reflectors or large mirrors focus the sunrays in solar thermal power plants in order to use the developing heat to produce electricity in thermo-dynamical circular processors. In the field of large installations and solar power plants, CSP installations can be applied in a very forward-looking and efficient manner.

HISTORY

innovative · creative · international

More than 100 patents and innovations for our customers



Simple solutions, reliable solar systems

Innovative ideas, combined with a sophisticated and tried-and-tested functionality, built by means of optimised assembly processes for a sustainable and ecological use of nature – this is what KRINNER Solarsystems symbolises.

These German highquality products and solutions have revolutionized the market again and again: KRINNER Solarsystems sets new standards worldwide.

KRINNER Schraubfundamente puts much emphasis on regional growth and the preservation of jobs. After all, it is every single member of staff who contributes to the company's overall success through his or her fortes, commitment and personality. Moreover, KRINNER Schraubfundamente does without too much internal red tape, which shortens project periods and makes for fast response times.

A milestone for KRINNER Schraubfundamente and concreteless foundations was the patenting of the first ground screws in 1994. The sustainably ecological alternative to conventional concrete foundations established itself after only a very short period of time especially in the environment of open-space solar plants. It is in the solar industry in particular that with this innovative invention KRINNER Schraubfundamente stands for quality, competence, speed and dependability.

Today, KRINNER Schraubfundamente with its highly specialized products develops professional applications with, for example, KRINNER Solarsystems and the elevation of solar plants and CSP plants. Concreteless foundations are the environmentally friendly solution to elevate solar plants – and could even be dismantled and would thus be mobile and reusable. This is unique in the solar industry.

KRINNER Solarsystems worldwide

KRINNER Solarsystems will help you all over the world! We have many different sites, so no matter where our customers may plan a project, we can always provide them with the utmost quality and competence.

- Australia
- Austria
- Barbados
- Belgium
- Belorussia
- Bulgaria
- Canada
- Chile
- Croatia
- Czech Republic
- Denmark
- Dubai
- Estonia
- France
- Germany
- Great Britain
- Greece
- Hungary
- Iran
- Italy
- Japan
- Kazakhstan
- Latvia
- Lithuania
- Luxemburg
- Netherlands
- Poland
- Romania
- Russia
- Slovakia
- Slovenia
- South Africa
- South Korea
- Spain
- Sweden
- Switzerland
- Thailand
- Turkey
- Uruguay
- USA

ONE OF THE LARGEST SOLAR FARMS WORLDWIDE

innovative · modular · environmentally friendly

GÄNSDORF, GERMANY
Flex III-3 H50; two rows, vertical format
54,885 kWp total capacity
125,322m construction length
243,936 modules
52,060 ground screws

The construction was also ecological: No unnecessary and expensive temporary roads were built.

Flex III: no concrete, utmost stability

The “Gänsdorf Project” in Straßkirchen

We realized one of the largest solar farms woldwide in Lower Bavaria in no more than four months of construction time. Its surface area is that of about 270 football fields and it generates up to 54 megawatt.

Open-space capacity

The Straßkirchen solar farm was built on an area of 135ha. A fast realization was made possible by the KRINNER ground screw innovation. It only took four months to screw in more than 51,000 ground screws, bearing about 240,000 multi-crystalline solar modules.
The electricity generated here is approx. 60m kWh p.a., sufficient for up to 17,000 households.

Electricity for up to 17,000 households

Innovations for the environment

KRINNER Schraubfundamente is committed to functional and environmentally friendly solutions. This is why it is always coming up with new innovations and proprietary developments. Ground screws do not only have the advantage that the screw-in machines can be installed in no time, they can also be positioned exactly where needed, be adjusted exactly as needed and are storm-proof and suitable for all kinds of soil – even on slopes.

Another outstanding feature is that using ground screws renders concreting unnecessary. The ground remains unsealed – a gentle deconstruction after 20 or 30 years is possible. KRINNER Schraubfundamente also does without unnecessary and expensive temporary roads during construction and as an extra service can provide an industrial truck to transport the alternating-current converter.

An ideal alignment

Industrial truck for a ground-friendly transport

REFERENCES

worldwide · customized · versatile

GROSSENPINNING, GERMANY
The solar farm in Lower Bavaria was realized in 2010 with 770 ground screws and 3,124 modules on the argillaceous local soil and in a very short period of time.

Flex III-3 H50; two rows, vertical format
703 kWp total capacity
1,566m construction length
3,124 modules
770 ground screws

SENFTENBERG, GERMANY
With the Flex III-2 P FS6 system, the installation of this solar farm on the site of a former brown coal open-face mine only took two months. The thin-layer project put this recultivated area to a really good use.

18,453 kWp total capacity
48,991m construction length
239,760 modules
25,906 ground screws

LEIBERTINGEN, GERMANY
KRINNER Flex II
2.08 MWp total capacity
5,990m construction length
ca. 17,000 modules
121 watt/module
2,960 ground screws

LEIWEN, GERMANY
Flex II; eight rows, horizontal format
3,630 kWp total capacity
7,275m construction length
48,400 modules
3,508 ground screws

VEPREK, CZECH REPUBLIC
34.4 MWp total capacity
49,518m construction length
185,760 modules
23,578 ground screws

CARLINO, FRIULI/ITALY
25,154 kWp total capacity
117,604 modules
44,458 ground screws

LEIBERTINGEN, GERMANY
Despite an early winter, this plant was built from November until the end of 2010 – at 750m above sea level on a former rubble dump.

LEIWEN, GERMANY
Difficult soil, layers of slate 20 to 80cm deep below ground level. All foundations had to be pre-rammed.

VEPREK, CZECH REPUBLIC
In the Czech Republic, we built the country's largest solar farm. With 185,760 solar modules on 23,578 ground screws, it is one of the 20 largest worldwide.

Photo: © Suncarrier, A+F GmbH, Würzburg

CARLINO, FRIULI/ITALY
The difficult and soft soil required special foundations. The stable layers only starting 2.5m deep, the ground screws were installed at an anchoring depth of 3.5m.

SCHWARZHOF, GERMANY
It didn't even take one month to install 7,406 ground screws in Ponholz, Upper Palatinate. Neither the difficult terrain nor ground frost in December put the project at risk. 27,880 modules do now create clean energy.

MELBOURNE, AUSTRALIA
In Victoria near Melbourne, more than 480 ground screws were installed in for Australia rather soft loamy soil with the utmost precision.

MELBOURNE, AUSTRALIA
330 kWp total capacity
1,750m construction length
480 ground screws

SCHWARZHOF, GERMANY
6,273 kWp total capacity
14,323m construction length
27,880 modules
7,406 ground screws

SAULT STE MARIE, CANADA
KRINNER Solarsystems installed more than 30,000 specially built special foundations with welded plates for the difficult soft and sometimes craggy soil: a customized solution.

Photo: © Novatec Solar

SOUTHERN SPAIN
The foundations of the CSP plant in southern Spain consisted of 960 KRINNER ground screws.

SOUTHERN SPAIN
2,000 MWp total capacity
9.3 MWth thermal capacity
1.4 MWel electrical capacity
806 m solar field length
960 ground screws

SAULT STE MARIE, CANADA
22,225 kWp total capacity
52,225m construction length
101,160 modules
30,348 ground screws

SERVICES

individual · competent · comprehensive

Competence from the initial idea to its implementation: our highly qualified and committed team is made up of engineers and specialists.

KRINNER Solarsystems globally develops customized solutions and highly efficient open-space plants. From the initial idea to its realization and maintenance: We are the ideal partner who will provide you with an all-round package.

In order to guarantee safe and high returns, our specialists customize every system and only use components of the highest quality.

KRINNER Solarsystems is fully committed to protecting the environment. That is why we will continue to invest in environmentally friendly innovations. Why don't you also benefit from this commitment? By using our ground screws to anchor your solar plants you will not only generate clean energy but by keeping the soil unsealed you do also protect the environment!

Our services at a glance:

- Customized open-space installations
- Plant planning
- Production and procurement of the components
- Plant engineering
- Innovative service solutions
- Project management and service
- Consultancy and financing
- Planning and installation
- Maintenance and service solutions

THE FLEX III-SYSTEM

flexible · no concrete · efficient

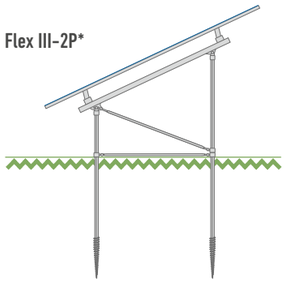
The Flex-system is installed fast and does not seal the soil:
Your 1st choice – in both economic and ecological terms!

The KRINNER Schraubfundamente Flex III-System is the perfect choice for free-standing solar and CSP plants. The concreteless and flexible ground screws do not seal the soil and can easily be aligned toward the sun.

Exemplary solutions and applications:

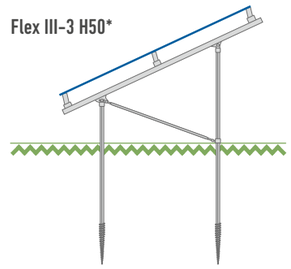
- Open-space solar plants, System "KRINNER Flex I and Flex III"
- Open-space solar plants, various system suppliers with KRINNER Schraubfundamente foundations
- Photovoltaic trackers
- Concentrated solar power (CSP)
- Fences for open-space solar plants

Flex III-2P*



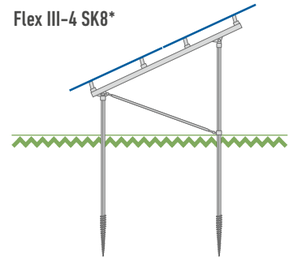
FOR THE ASSEMBLY OF:
First solar: five or six rows, horizontal
various thin-layer modules: two to three rows, vertical
crystalline modules: three to four rows, horizontal

Flex III-3 H50*



Crystalline modules: two rows, vertical
Module frame height: 40mm/46mm/50mm

Flex III-4 SK8*



Crystalline modules: two rows, vertical
three rows, horizontal

***more variants upon request**

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KRINNER Schraubfundamente revolutionizes foundation construction with its official representative offices in more than 40 countries worldwide.