

Frequently asked questions (WS Trackers series)

WS Energia Lda., Portugal designs, develops and produces solar trackers and solar concentrators for photovoltaic applications.

In this document we present a general overview of the benefits resulting from making use of solar trackers or solar concentrators together with general information on the features of the systems.

1. How much is the annual energy increase of a solar tracker?

On average, by using a dual axis solar tracking system, the annual energy yield increases of about + 30% — +35%, depending on latitude and shadowing, compared to fixed systems tilted South. The trackers produced by WS Energia are precise, reliable and designed to last above 25 years.

2. How much space do I need?

Solar trackers produce more energy and make shadow. In general, you would need a space of about 40 m² per kW of installed power. To have zero shadowing, you would need a space of 60 m² per kW of installed power.

3. How much is the annual energy increase of DoubleSun solar concentrators?

The DoubleSun® solar concentrators produced by WS Energia have two effects: follow the sun with a two axis tracking system (30% more energy); use a series of mirrors to concentrate the sun and increase the power of the modules by 51%. The integration of this two effect results in a +80% increase in annual energy output compared to fixed systems.

4. Do the systems resist to high winds?

The solar concentrators and solar trackers produced by WS Energia are designed following the European Standards for wind resistance: EN 1991-1-1. The solar concentrators and solar trackers are also designed following the Portuguese regulation on wind conditions: such regulations are far more demanding than EU standards. In simple values, the products can resist winds up to 90 km/h and wind gust up to 130 km/h. The option of local control and wind monitoring allow tracking operation in demanding areas.

5. What happen in high winds conditions?

In hi-wind conditions, the trackers feel a pressure on its surface. The pressure is transmitted to the motors and to the SunGravityControl system, which can take several actions as stopping, moving south etc.... As standard, the system stands still. When requested, the system could move horizontally.

As an option, it is possible to integrate a wind sensor that drives the system in the horizontal position when wind bows above a certain speed.

6. Is it difficult to install a WS Tracker?

The trackers produced by WS Energia are delivered semi-assembled. Three people (or two people + lifter) can install the trackers in 2 hours. The trackers are delivered with an easy to use installation manual.

7. Which kind of basement is required for a WS Tracker?

The trackers requires a concrete basement 55 cm high, with a square surface of 2,2 m of side. Local engineers would have to fit the dimensions to local soil conditions and wind. The mast is inserted in the hole in the middle of the basement

8. Can we use the systems on roof-top?

The solar trackers WS T1000 can be installed over the roof of commercial or residential building. The roof must be solid and resist to the weight of the complete solution that is about 200 kg. As an option, a tripod to distribute weight over the roof can replace the mast.

9. What is the lifetime of the WS Energia products?

The products manufactured by WS Energia are designed to have an estimated lifetime of about 25 years.

10. What is the warranty period?

The warranty of WS Energia products is 2 years. Optionally, the warranty can be extended to 5, 10 and 15 years.

11. What are the benefits of delivering semi-assembled products?

The products delivered by WS Energia can be installed in half the time compared to other products of the same size. The number of components is reduced to half, mitigating mounting errors.

12. How much time do I need to install a WS Energia structures?

As an example, the time for assembling a WS Energia product is the following:

- Position head (112 kg) and closing 3 screw: ½ hour
- Positioning motors and fixing 2 screws each motor: ½ hour
- DoubleSun®: positioning 2 bars for module fixation and closing 8 screws: ½ hour
- WS T1000: positioning 2 bars + 4 bars for module fixation and closing 24 screws: 1 hour
- WS T1000: positioning 2 bars + 4 bars for module fixation and closing 32 screws: 1 hour

As a result, even the structure larger trackers can be installed in about 2 hours time with less than half the number of pieces.

13. How do the trackers follow the sun?

The trackers are controlled by the SunGravityControl robotic system that measures the vector of gravity (state of the art technology used also in the iPhone or in the console Wii), calculates the position of the tracking surface by comparing the angles of orientation with gravity, and power the motors to move the trackers towards the Sun. The position of the sun is calculated using an internal clock. SunGravityControl is precise and does not require external sensors (exposed to weather and UV radiations).

For high-precision, SunGravityControl can integrate extra sensors to reach ± 1 degree of precision on every axis.

14. Why an internal sensor is better than a sensor installed over the tracker?

The large share of trackers on the market uses external sensors that are exposed to weather. To be precise, the sensors must be installed properly and stay in the same position for 25 years.

The SunGravityControl systems uses an inclinometer (that measures gravity) integrated on the electronic board, inside the control box. The box, which is installed behind the modules and protected from UV, snow, rain, and wind provides 25 years IP65 safety standards. The inclinometer is installed using pick-and-place techniques that are extremely precise. The sensor is calibrated in a controlled environment. In simple words, the sensors is pre-installed on the board, pre-calibrated, and it is stored in a IP65 box (protected from wind, snow, rain and UV) that is fixed with stainless steel 4 screws to the tracking structure. This architecture provides the conditions for 25 years operation.

15. How much time do I need to install a SunGravityControl?

The SunGravityControl robotic system which power the trackers and the concentrators is very easy to install. Once the 4 screws have been fixed to the structure, the robotics is installed in two steps:

- Connecting the motors

- Connecting the AC supply
- Put the system in “Auto” and enjoy the sun.

16. The electronics will fail soon?

The SunGravityControl robotic systems are usually connected to the AC power grid. To avoid large currents and unwanted power peaks, the energy that powers the motors is stored in special devices.

The storage devices are SuperCaps, state of the art components that resist more than 500.000 charging cycles. Considering that during 25 years, the system moves back and forth 25 years x 2 times per day x 365 days / year = 18.250 times, it could be estimated that the energy storage devices might resist about 250 years. The other components have been used for decades in the electronic industry and have a long lifetime.

17. How much time do I need to install the photovoltaic modules?

WS Energia products are compact and the modules can be installed with foot on ground. As a result, module fixation is easy and fast. Every module is fixed with 4 clips; each clip requires about 2 minutes to install. Compared to the structures which are 5 meters high, the WS Energia structures allows eliminating module translation up to 5 meters, installation in half the time by foot on ground, and cost saving since no lifter is required.

18. How much money you save by installing a WS Energia tracking structure compared to large structures?

WS Energia's tracker structures are installed by foot on ground, with no need of a lifter or a moving platform. As a results, by assuming the cost of technicians and platform to be about 20 euros/ hour, the cost of installing a WS Energia Tracker can be estimated to be 2 hours x 3 people x 20 euros/person = 120 € / tracker.

Larger trackers require a moving platform and extra person for manoeuvring. They require double time since the tracker is delivered in pieces. The cost can be estimated as 4 hours x (4 people + 1 platform) x 20 euros/hour = 400 € / tracker.

Without considering saving related to reduced safety cost and error mitigation, installing WS Energia products is 280 euros / tracker cheaper than installing larger trackers.

19. How much money you save installing the modules on WS Energia trackers compared to large trackers?

Installing the solar modules with foot on ground and easy-clips results in reducing the module installation time and eliminating the lifter/platform costs. As an example, installing the modules above a WS T1600 would require 12 modules x 4 clips per module x 2 minutes per clips x 2 people = 3 hours and 12 minutes = 64 euros. A larger tracker, at 5 meters of altitude, would require one extra person to move the module, a platform to move the operators and modules (estimated cost: 20 euros / hour) and clips fixation time increase to 5 minute each due to operation on platform. The total cost would be = 12 modules x (4 clips per module x 5 minutes per clips + 5 minutes per lifting the modules) / 60 min x 20 euros/hour/person (3 people + 1 lifter) = 400 euros. The cost saving during installation of solar modules is about 400 – 64 ~330 euros / tracker. Safety costs have been neglected for sake of easiness, and can be estimated to be as an extra hour of work per each person and machine = 100 euros / tracker.

In conclusion, by using WS Energia products easy to mount by foot on ground, the total installation cost is about 420 euros / tracker cheaper than other large trackers available on the market. Assuming 180 W module, the cost saving would add to $420/12/0,180 = 190$ euros / kW.

20. In total, how much money do I save during the installation of WS Energia trackers compared to large trackers?

In total, by using WS Energia products that are delivered quasi-assembled and can be installed by foot on ground, the total saving due to fast and easy installation can be listed as:

280 euros/tracker saving due to fast structure installation

330 euros/tracker saving due to module installation by foot on ground

100 euros/tracker saving due to mitigation of safety costs

In total, the saving sum to a total of 710 euros / tracker. Assuming 180 W module, the cost saving would add to $710/12/0,180 = 328$ euros / kW.

21. How expensive is the maintenance of the structure?

The WS Energia products make use of maintenance free linear actuators. The maintenance consists in checking once per year the status of the actuators and eventually add some paste.

22. How expensive is the maintenance of the modules on the structure?

Washing and checking of the solar modules is performed from the ground, it is easy, safe and does not require moving platforms.

23. What happens if a motor breaks?

Two people can perform the substitution on the linear actuators used in WS Energia products in ½ hour. The operation is as easy as taking out two screws, position the new actuators and closing the two screws again. Commercial trackers make use of a rotating motors fixed in the mast and its substitution consists in taking away the modules, lifting the trackers and changing the motors or the toothed wheel.

Compared to the other solutions on the market, the easiness of WS Energia maintenance saves the costs of removing the structure and re-positioning it on the mast. As estimated above, the cost of installing other solutions on the market is about 400 euros/tracker. Taking and re-positioning the structure would cost about 800 euros. Statistics indicate that such an operation is performed at least once during 20 year/operation. In conclusion, WS Energia products reduce the preventive maintenance cost of about 40 euros / year / tracker.

24. Can I monitor the trackers or the concentrators?

Yes, both trackers and trackers with concentrators can be monitored either by a local computer or remotely by gsm modem or web based interface. WS Energia the leader in providing connectivity solutions for solar parks.

25. How can I upgrade the tracking software?

Software for tracking the sun is continuously evolving. The SunGravityControl robotics developed by WS Energia has an USB-on-the-go interface which allows the user to upgrade the firmware on the tracker by simply connecting a USB pen. The latest software can be downloaded from internet.

26. Can I connect a PC to the trackers?

Yes, you can connect a PC to the trackers by using the following ports: two I2C, CAN and RS232. Optionally you can use a GSM modem. The interface with a PC allows the final clients to match the operating parameters (such as sleeping position, inclination angles) to their real applications (region with a lot of snow or high winds or close to a Highway and so on....).

27. Can I connect the trackers between them?

Yes, in solar parks all the trackers are connected one to the other and to a central station. The trackers can be remotely moved and controlled to release snow, change operating parameters, change angles and detect malfunctioning.

28. Is it important to remotely control trackers?



Yes, the remote control allows the immediate detection of failure and potential remote solution of the problem. Time is energy and energy is money.

29. I am a project developer. Can you help me?

Yes, please contact WS Energia or one of our dealers in your country to receive maximum technical support in developing your project. We can provide software to calculate the energy yield in your area using concentrators, data on correct positioning of the trackers, suggestions on inverter dimensioning and so on. Our objective is to turn your energy project into highly efficient solar generators.

30. Can I contact you if I have questions?

Yes, please contact WS Energia or one of our dealers for any questions regarding commercial conditions, technical installation and any other additional information that you would require for your project

WS Energia Lda, Portugal
Hi-Tech Photovoltaic Concentrators
Quality Division