OXOTRACKER

# SİNGLE AXİS SOLAR TRACKER

## MASTER THE DANCE OF SUN AND SHADOW WITH OXOTRACKER

2025

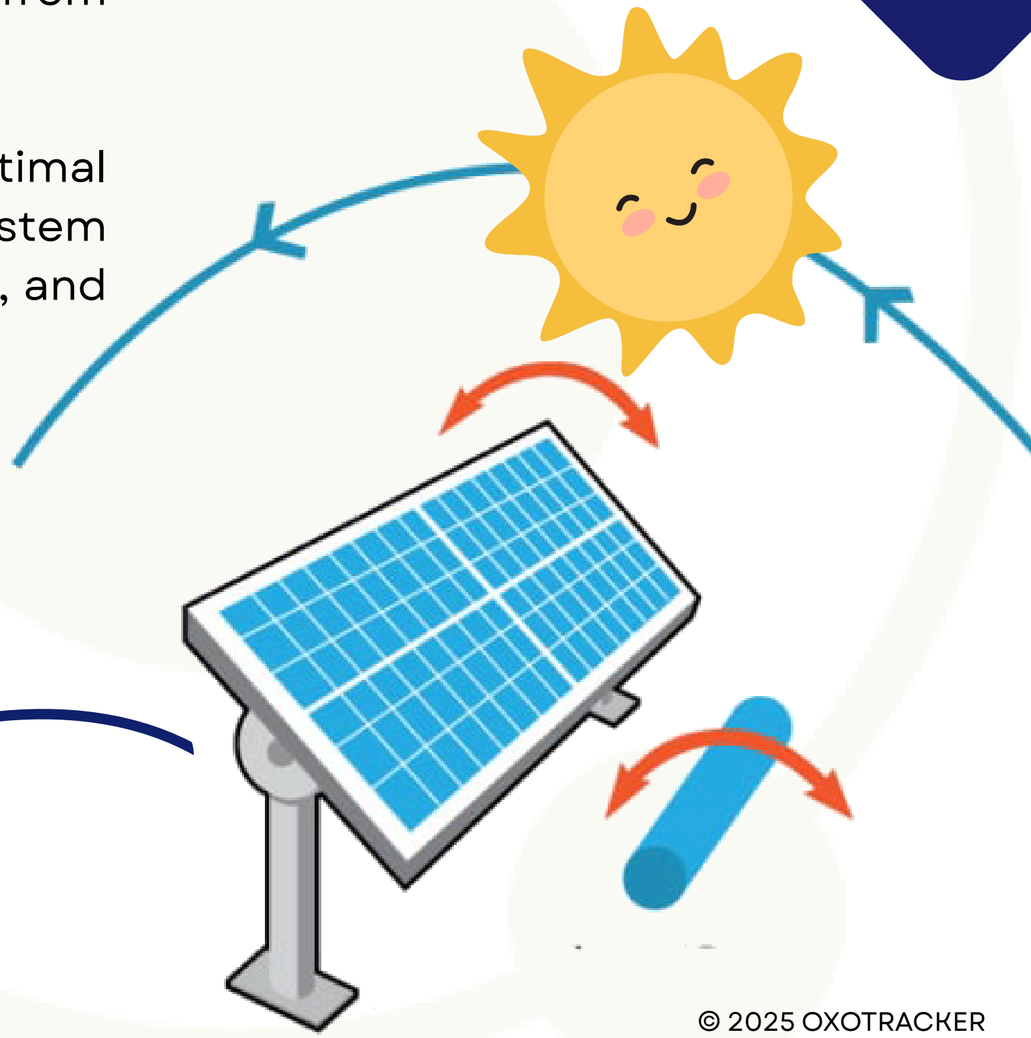
+90 312 235 55 23
www.oxotracker.com

OXOTRACKER

# What is Single Axis Solar Tracker?

A single-axis solar tracking system is a mechanical and electronic structure that enables photovoltaic panels to follow the sun from east to west throughout the day along a single axis.

This movement allows the panel surface to remain at the optimal angle to the sun’s rays for a longer period of time. The system operates in integration with sensors, motors, and control units, and can be designed to adapt to different geographical conditions.



It moves intermittently from east to west along a single axis throughout the day.

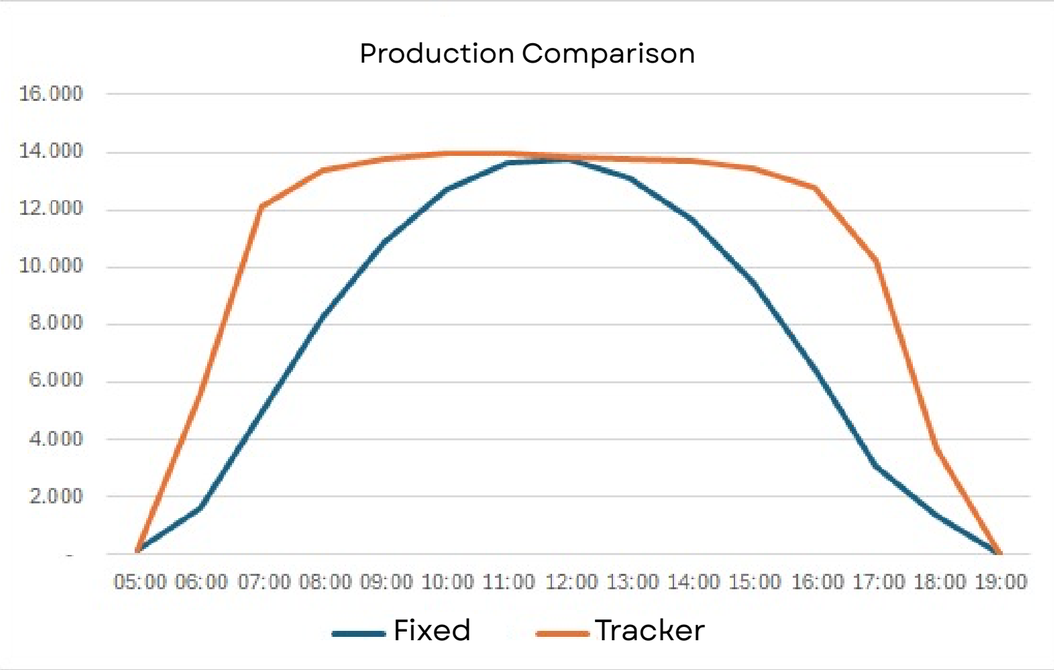
OXOTRACKER

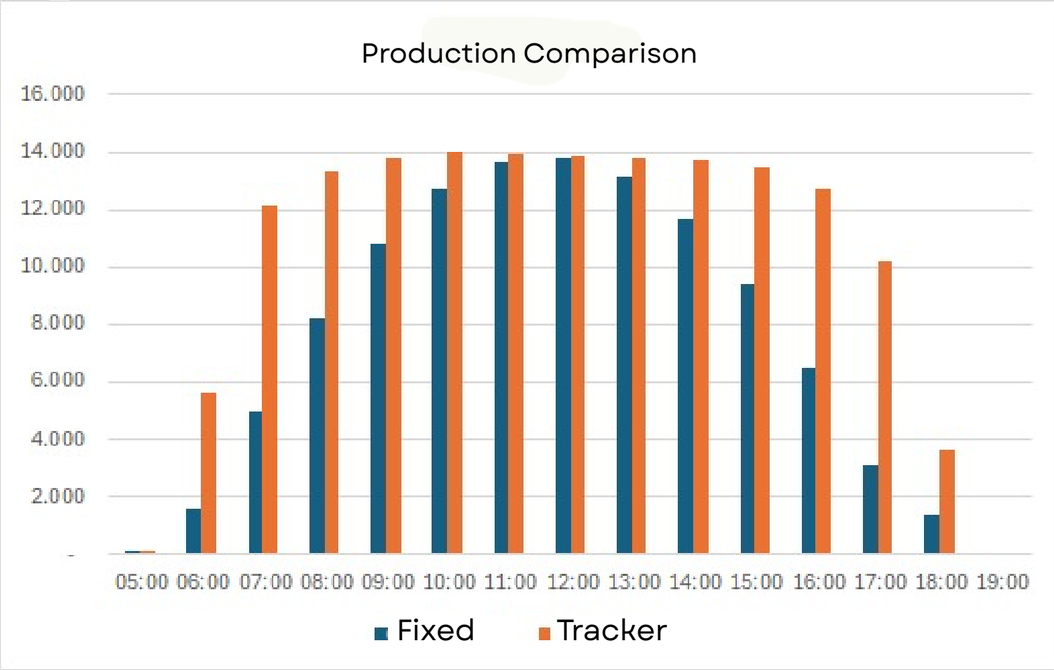
# Why Tracker?

- 15%–25% increase in annual energy production
- More balanced and extended energy generation throughout the day
- Faster return on investment (ROI)
- Better compatibility with energy storage systems
- More adaptable to different energy sales strategies

It's worth the difference!

This is where the tracker makes the difference!



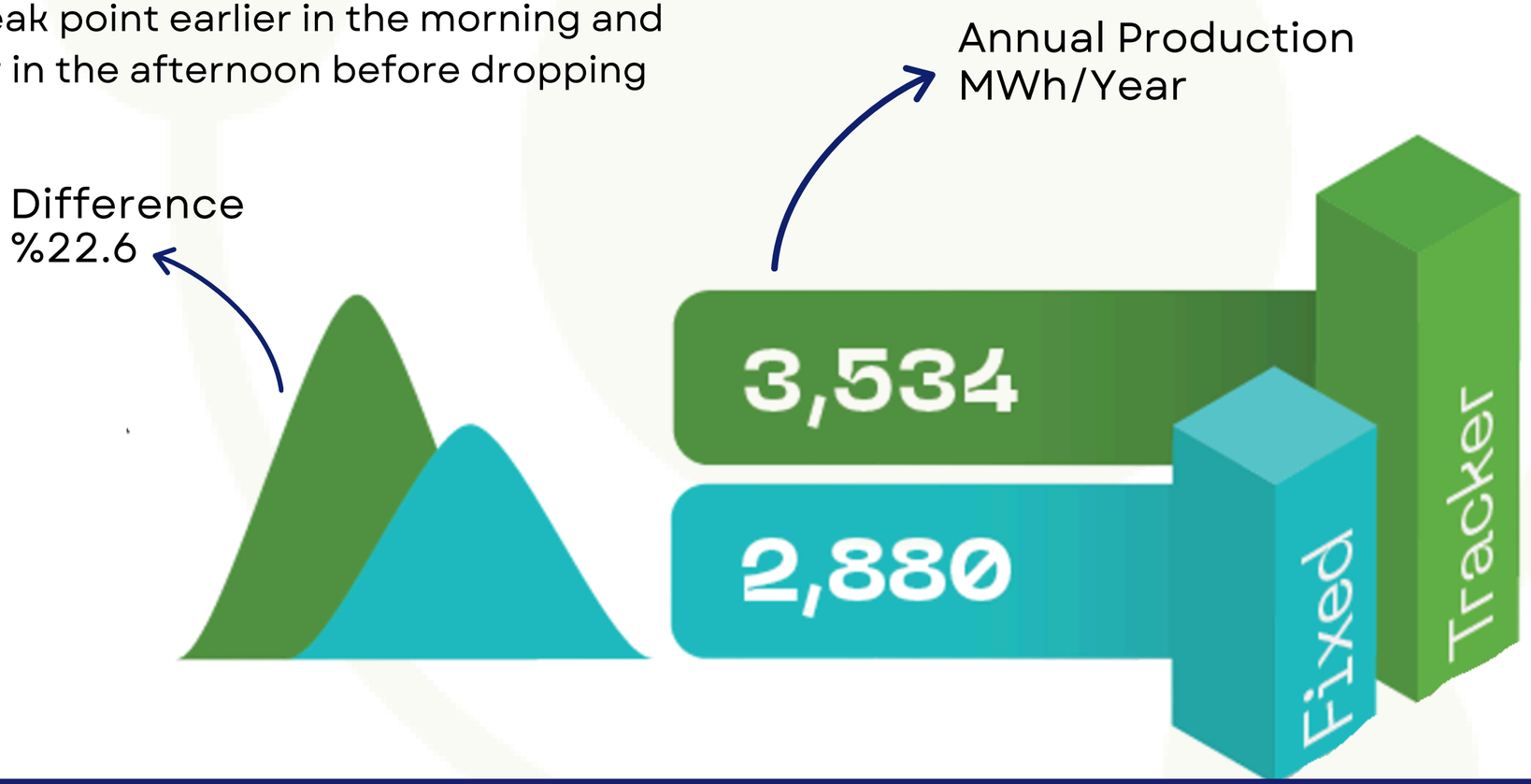




Because the sun is worth tracking...

OXOTRACKER

# Fixed System – Tracker Comparison

- The production graphs of two different sites in Van – one fixed and one with a tracker – are compared on the right.
- The tracker plant reaches its peak point earlier in the morning and maintains production until later in the afternoon before dropping from its peak.




Because the sun is worth tracking...

OXOTRACKER

# Tracker Advantages

## According to Electricity Sales Models

### Free Market

Sell more energy during hours when electricity is expensive

### Storage-Integrated System

Store energy when prices are low, sell when prices are high

Compatible with both low and high C-rate applications

### Government-Guaranteed Purchase Projects (PPA)

Higher annual total production results in greater revenue

Because the sun is worth tracking...

OXOTRACKER

# Why OxoTracker?

Why OxoTracker?

## Standards-Compliant Design and Flexible Solutions

## Durable and Easy-to-Implement Engineering

## Smart and Cost-Effective Operation and Service Solutions

OXOTRACKER

# Standards-Compliant Design and Flexible Solutions

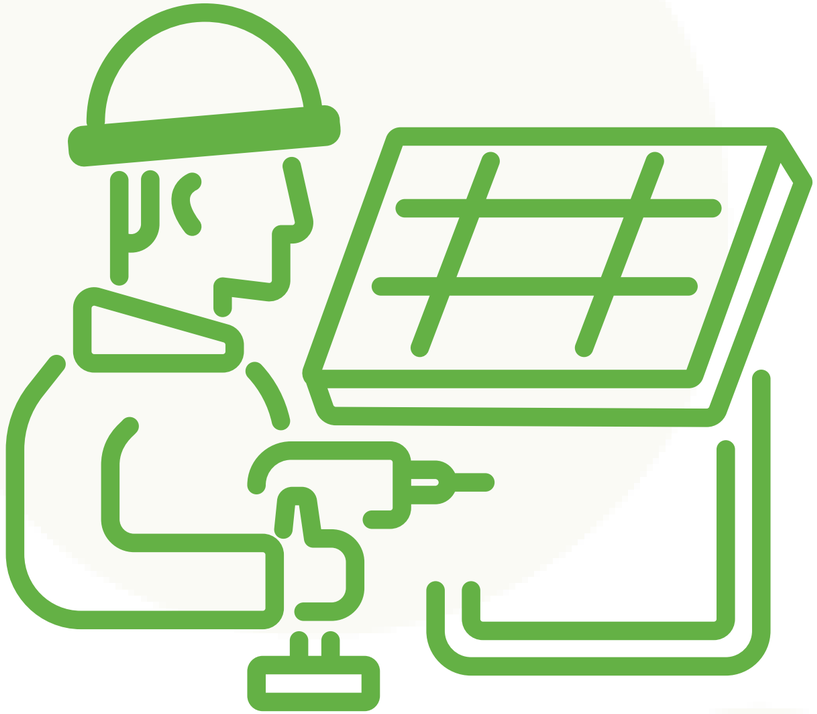
- IEC 62817 and CE Certified
- Supported by TÜBİTAK
- Flexible solutions tailored to different needs
- Locally designed and manufactured
- Engineering expertise
- WindDance – Smart Stow Strategy
- Professional support throughout all stages:
- Design, proposal, implementation, and after-sales

Because the sun is worth tracking...

OXOTRACKER

# Durable and Easy-to-Implement Engineering

- Easy Installation
- Modular connections with no torque loss
- Durable structure for harsh weather conditions
- Self-powered control unit



Because the sun is worth tracking...

OXOTRACKER

# Smart and Cost-Effective Operation and Service Solutions

- Online remote monitoring and smart control
- High durability and low maintenance cost
- Fault detection and prevention systems ensure long-term reliable operation
- On-site and rapid support for possible issues

Because the sun is worth tracking...

OXOTRACKER

# IEC 62817: The International Standard for Tracker Quality

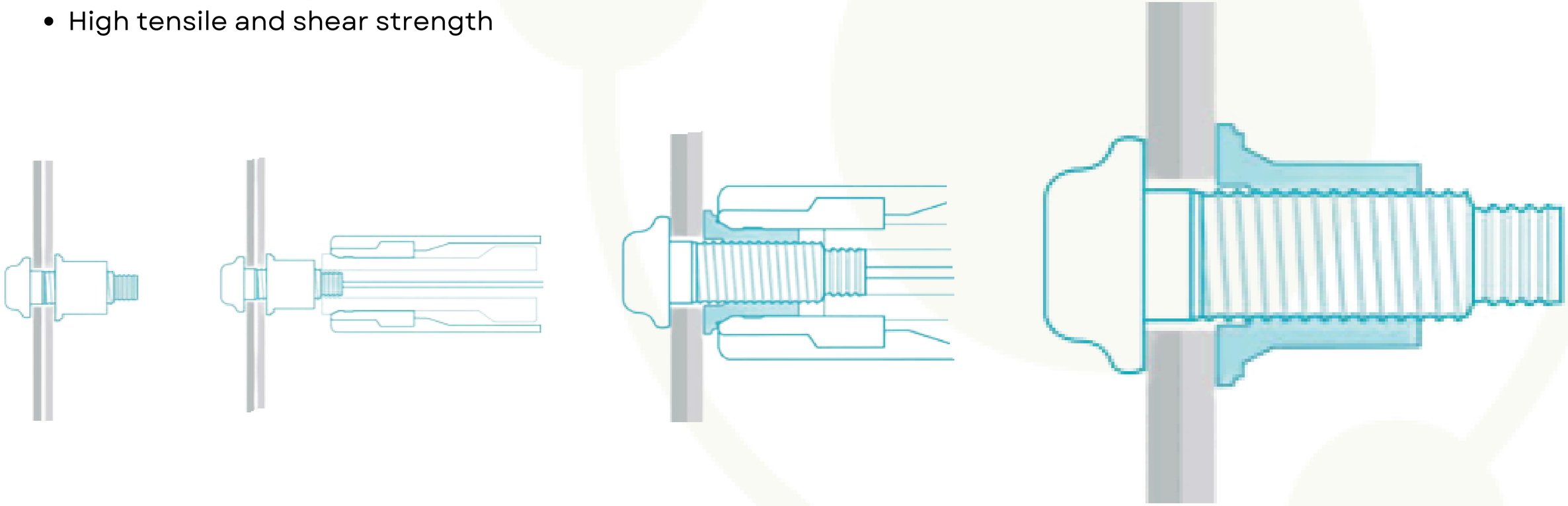
- IEC 62817 is not just a certificate – it’s a guarantee.
- It is an internationally recognized benchmark for the mechanical durability, tracking accuracy, and environmental resilience of solar tracking systems.
- Why it matters:
- This certification ensures that the system is designed to operate reliably under real-world field conditions.
- Only the best pass:
- Systems undergo rigorous pass/fail testing procedures to eliminate unreliable designs and certify long-lasting performance.
- 🔍 As the first and only company in Turkey to receive the IEC 62817 certification, OxoTracker proudly demonstrates its commitment to durability, precision, and global standards.


Because the sun is worth tracking...

OXOTRACKER

# PV Panel Connection With ZERO Torqe-Loss

- Fast and easy installation
- Maintains torque for a lifetime
- High-level security against theft
- High tensile and shear strength

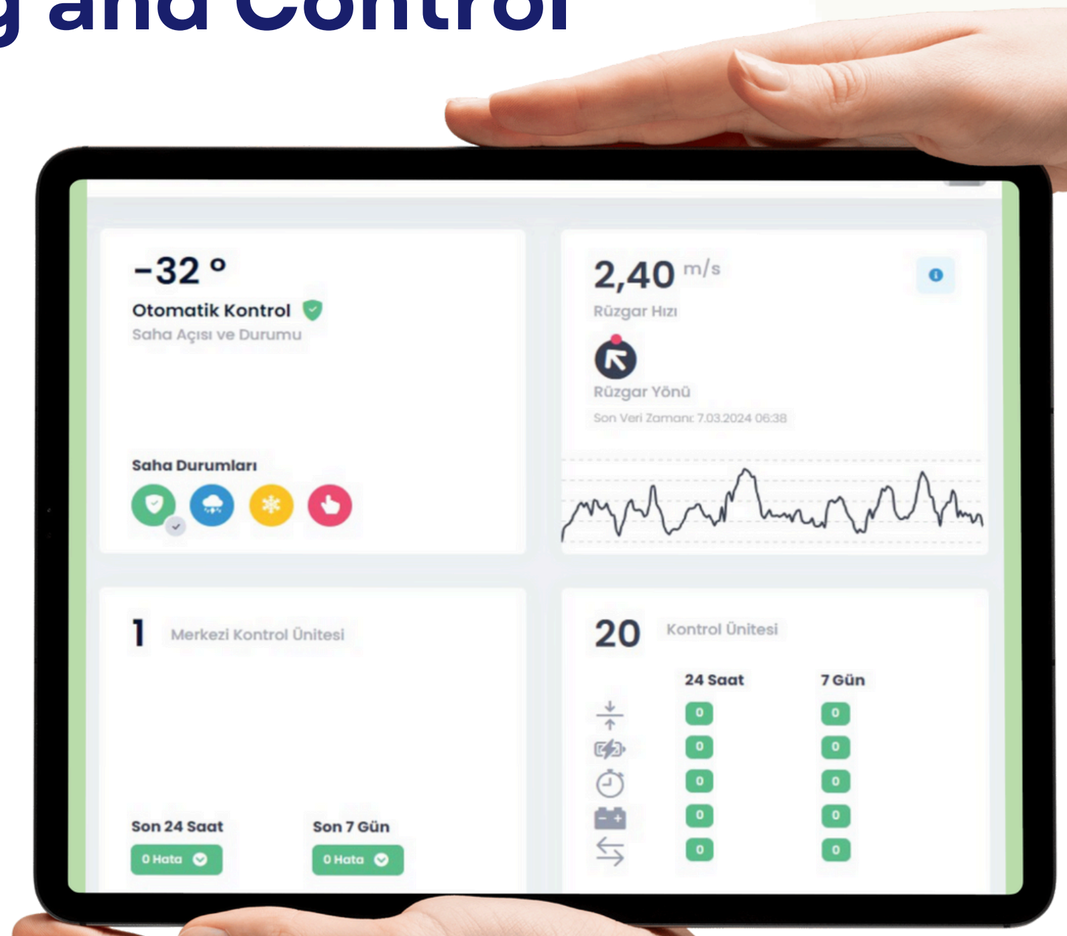


Because the sun is worth tracking...

OXOTRACKER

# Online Monitoring and Control

- Real-time online monitoring
- Preventive maintenance & fault prediction
- Remote control
- Mobile and web integration
- Proactive alert system

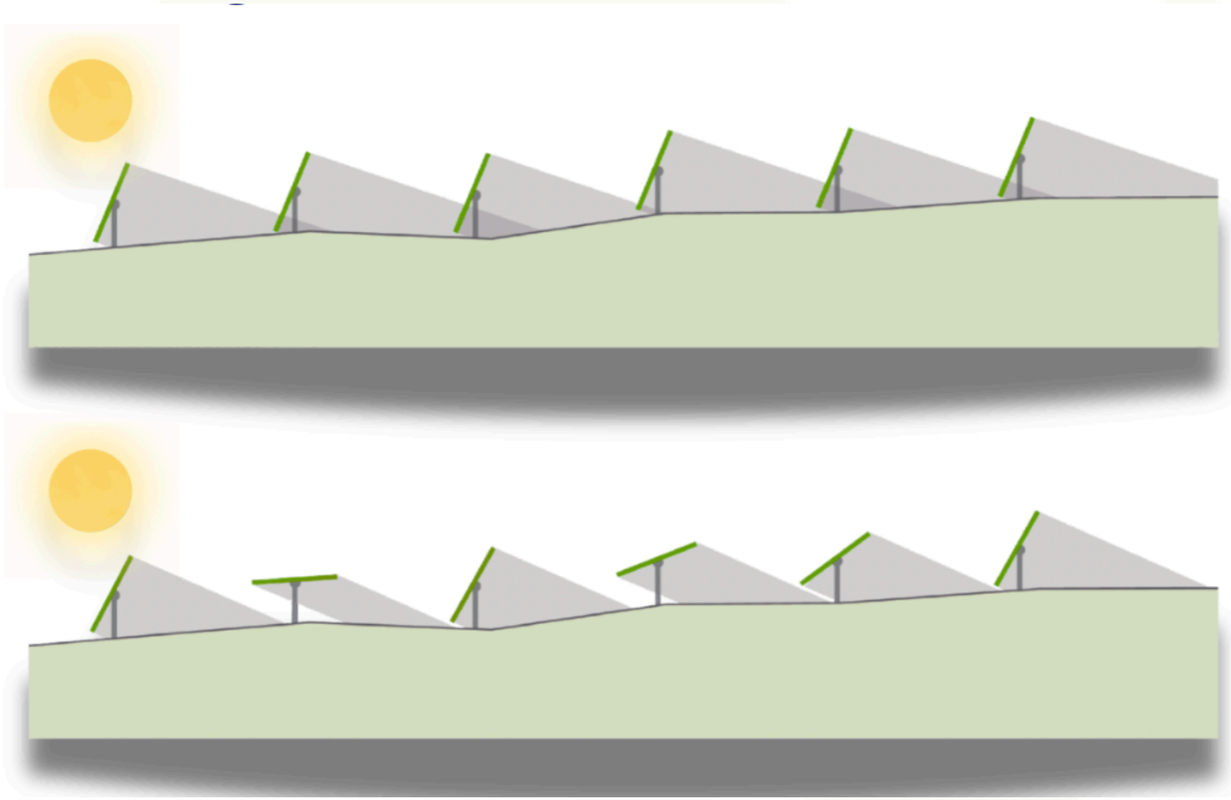

Because the sun is worth tracking...

OXOTRACKER

# Smart Tracking Algorithm

## Maximizes energy production.

- Astronomical algorithm, requires no external sensor.
- Operates autonomously, always orienting the PV panels toward the sun, even if communication is lost.
- Performs back-tracking based on multiple parameters – such as panel layout, terrain slope, and weather conditions – to prevent shading.



Because the sun is worth tracking...

OXOTRACKER

# Self-Powered System

⚡Uninterrupted Operation:
Production and communication remain uninterrupted even under harsh weather and field conditions.

🌡️ Wide Temperature Range:
Thanks to the LiFePO4 battery, it operates reliably in both low and high temperatures.

💰 CAPEX & OPEX Optimization:
No additional AC power infrastructure is needed, reducing both installation and maintenance costs.

🛰️ Field Independence:
Provides full protection against grid outages or energy infrastructure issues.

📌 This system gives solar tracker solutions both energy independence and reliable monitoring capability based on smart data.


Because the sun is worth tracking...

OXOTRACKER

# Zigbee-Based Wireless Communication

## Why Zigbee? (Advantages over Wi-Fi, LoRa, and Modbus)

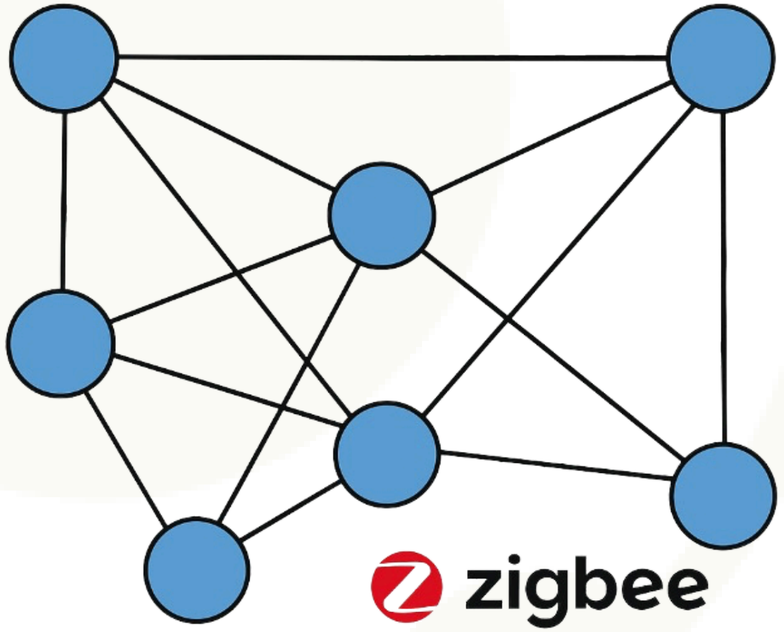
🔋 Low Power Consumption:
Can operate for years on small batteries – ideal for solar tracking systems.

🔁 Reliable Mesh Network Structure:
Each unit acts as a signal repeater, requiring no additional infrastructure.

📈 High Scalability, Low Cost:
Supports hundreds of devices on a single network.

🛡️ Industrial Durability:
Highly resistant to harsh outdoor conditions and signal interference.

⚡ Optimized for Real-Time Control:
Low latency makes it ideal for solar tracker control.



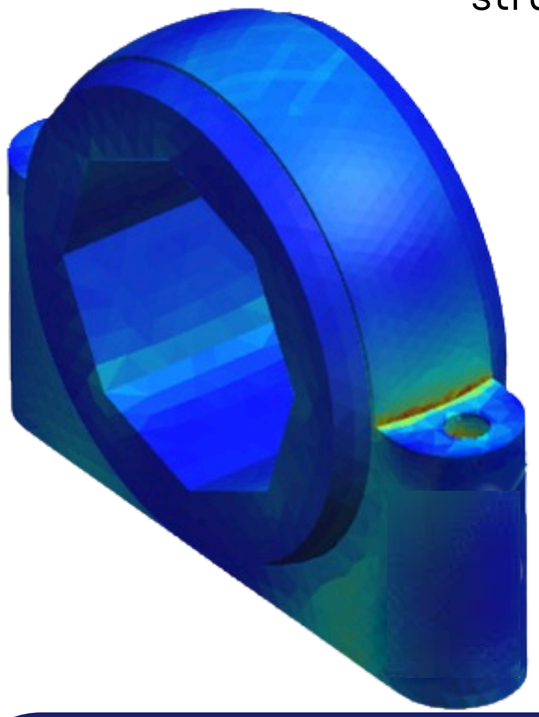

Because the sun is worth tracking...

OXOTRACKER

# Robust Structure

## Supported by CFD Analysis and Field Testing

- All system components have been analyzed for static and dynamic loads.
- The most durable and cost-effective structural elements are used for the sites.



Because the sun is worth tracking...

OXOTRACKER

# Resistant to Harsh Weather Conditions

**Snow and Hail**
Protects panels by switching them to a protective mode.

**Sudden Wind Gusts**
Provides protection against high-frequency vibrations caused by sudden winds using the WindDance algorithm.

**Storms**
Offers full protection against the high forces generated by storms with the WindDance algorithm.

OXOTRACKER

# OxoTracker WindDance

## We don’t fight the wind, we dance with it

🔄 **Real-Time Wind Detection**
Instant data is collected via sensors; wind speed, direction, and behavior are analyzed.

🧠 **Smart Stow Strategy**
Solar modules automatically adjust to the angle where wind load is minimized.

🛡️ **Torsion and Structural Load Protection**
Reduces complex wind effects, such as torsional gallop, preserving the integrity of the steel structure and modules.

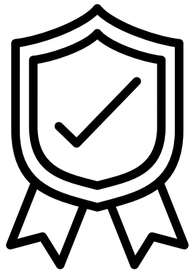
⚙️ **Component Safety**
Motors, control units, and other sensitive parts are protected against sudden wind loads.

💨 **Storm-Ready Mode**
Rapidly changing wind conditions are detected, and the system is immediately moved to a protective position.

Because the sun is worth tracking...

OXOTRACKER

# Warranty & Maintenance



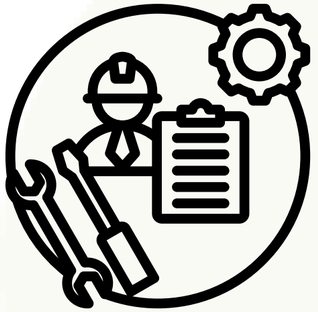
**Standard Warranty**

🔩 Steel structure – 10 years

⚙️ Moving parts – 5 years

🔌 Electronic units – 5 years

🔋 Battery – 3 years



**Maintenance**

⚙️ Thanks to clamp-free technology, torque control is not required for panel connections.

💻 The online monitoring system notifies faults in advance or in real time.

🛢️ Annual lubrication may be required for the motors.

Because the sun is worth tracking...

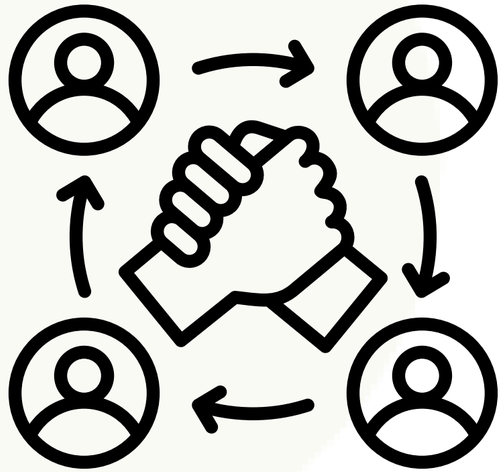
OXOTRACKER

# 24/7 Technical Support

## Service capacity that makes a difference

Support teams are located in Ankara, Antalya, Kayseri, Kahramanmaraş, İzmir, Istanbul, Samsun, and Bucharest.

They respond to faults immediately.



Because the sun is worth tracking...

OXOTRACKER

# FAQ

1.Fixed systems seems more economical and hassle-free, so why should I choose a solar tracking system?

2. Are motor failures common in solar tracking systems? If such a failure occurs, will it cause significant downtime?

3. What happens if a battery-powered system runs out of energy? Will a depleted battery cause technical issues, and is battery replacement costly?

4. What happens if the trackers stop? What kind of loss occurs during a fault?

5. How can I detect a fault, and what should I do to resolve it?

6. After the warranty period ends, how long will the system continue to operate properly?

Because the sun is worth tracking...

OXOTRACKER

# Fixed systems seems more economical and hassle-free, so why should I choose a solar tracking system?

**Higher Energy Production**
Solar tracking systems produce 15%–25% more energy compared to fixed systems.
This additional production more than compensates for the initial investment cost difference.
**Faster Return on Investment**
Thanks to the extra energy generated, the ROI (Return on Investment) period is shortened.
The cost per kWh produced decreases (LCOE advantage).
**A Technology Worth the Effort**
Mechanical moving parts are not as complex as often perceived.
With proper engineering, maintenance requirements are minimized.
The “effort” involved is more than offset by the additional revenue.
**Investment Strategy for the Future**
Although fixed systems may seem attractive initially,
tracker systems are unrivaled in total revenue and long-term profitability.
By following the sun’s angle 24 hours a day, they eliminate efficiency losses.

**Conclusion:**
**The tracker pays for itself through the extra energy it produces. This effort is worth it.**

Because the sun is worth tracking...

OXOTRACKER

# Are motor failures common in solar tracking systems? If such a failure occurs, will it cause significant downtime?

**Low Risk of Failure**

Today’s solar tracker motors are manufactured to industrial-quality standards.
DC motors with IP protection, resistant to dust and water, are preferred.
The lifespan of a quality DC motor – in a properly designed system – far exceeds the warranty period.

**Even if a Failure Occurs, Major Downtime is Unlikely**

Motor failures are rare, but if they occur:
Only the affected row stops moving; the entire plant does not halt.
The row continues operating at a fixed angle, so energy production is not completely lost.

**Easy and Cost-Effective Intervention**

The motor is modular and can be easily replaced on-site.
Spare part costs are low.
With OxoTracker’s remote fault detection and alarm system, warnings are sent before or immediately when a fault occurs.

**Conclusion:**

Motor failures are rare, and even if they happen, they do not cause significant downtime.
The overall system efficiency is maintained, and the risk is manageable thanks to the additional energy production advantage.

OXOTRACKER

# What happens if a battery-powered system runs out of energy? Will a depleted battery cause technical issues, and is battery replacement costly?

**What Happens if the Battery Runs Out?**

Before the battery is fully depleted, the OxoTracker online monitoring system detects the status and issues necessary alerts.

If the battery is not replaced despite warnings and runs out:

The system stops adjusting its orientation but remains fixed at its current angle.

The modules continue operating at that fixed angle; energy production is not completely lost.

Once power is restored, the system resumes operation from where it left off.

**Will There Be Any Technical Issues?**

Battery depletion does not cause any physical damage to the system or modules.

Only the tracking function is temporarily disabled.

**Is Battery Replacement Expensive?**

Batteries used in tracking systems are typically long-life (5–10 years) LiFePO4 type.

The cost of a replacement battery is low compared to the additional revenue generated by the tracker.

The OxoTracker control unit maximizes battery life through solar panel charging, low-power motors, and smart energy management.

**Conclusion:**

Battery depletion does not stop production, and replacement costs are low and manageable.

Battery-powered systems offer superior mobility in environments without on-site energy infrastructure.

OXOTRACKER

# What happens if the trackers stop? What kind of loss occurs during a fault?

**Production Does Not Stop Completely**

- When trackers stop, the panel rows remain fixed in their current position.
- Sunlight continues to hit the panels, so:
- Total energy production is not completely lost.
- Only the affected row experiences a temporary drop in output.

**Limited Loss Rate**

- The fault is confined to the specific row or motor; the entire plant is not affected.
- Once the fault is resolved, the system automatically resumes normal operation.

**Fault Impact is Manageable**

- Trackers are modular, making maintenance or replacement easy.
- With quick intervention, a motor or sliding component can be replaced within a few hours.
- Early warnings from the smart monitoring system minimize losses.

**Conclusion:**

- If a tracker stops, production continues; losses are limited and manageable.
- The additional energy generated by trackers more than compensates for this risk.

OXOTRACKER

# Loss Analysis Based on an Unrealistic Risk Scenario

**Assumptions:**

- In a flat site in Konya with 27 trackers per MWp, it is assumed that 10 trackers per MW remain stationary for an entire year.
- 17 trackers per MW are assumed to continue operating normally.
- The production of this severe scenario is compared with that of a fixed system and a fully operational tracker system.
- Stationary trackers are assumed to remain at 0°.

**Result:**

- Even if 10 trackers per MW stop and remain at 0° throughout the year, the tracker system still produces 11% more energy than a fixed system in this scenario.
- There is a 9% reduction compared to the expected extra energy generation.
- Despite this, the site still generates more energy than a fixed system.

| | Annual Production kWh/kWp | Diff. Comparing Fixed |
|---|---|---|
| **Tracker** | 2044 | %21 |
| **Fixed System** | 1695 | |
| **Full Faulty Tracker** | 1637 | -%3 |
| **Particular Faulty Tracker (10 Rows/ MWp)** | 1881 | %11 |

Because the sun is worth tracking...

OXOTRACKER

# How can I detect a fault, and what should I do to resolve it?

**Fault Detection – Instant Alerts via Cloud-Based Monitoring**

- Each row (tracker) in the solar tracking system is connected to a cloud-based monitoring infrastructure.
- The control unit collects data via sensors and sends it in real time to the cloud monitoring dashboard.
- The dashboard can be accessed via web or mobile application.
- In critical situations, the system automatically sends push notifications, emails, or SMS alerts for:
- Increased motor current
- Position deviation
- Low battery level
- Communication interruption

**Additional Advantages:**

- Access the monitoring system from anywhere: office, tablet, or smartphone.
- The affected row remains fixed until the fault is resolved, so energy production continues.
- Spare parts are low-cost and easily accessible, and intervention time is minimized.

**Conclusion:**

- With cloud-based monitoring, every fault is detected immediately and resolved quickly.
- The smart tracking system secures production and minimizes the risk of losses.

OXOTRACKER

# After the warranty period ends, how long will the system continue to operate properly?

**Design Life Can Extend Up to 25 Years**

- A quality tracker system is designed with an operational life target of 25 years or more, similar to PV modules.
- The mechanical components (steel structure, connection elements) are highly durable; if properly designed for the applied loads, a service life of 30 years is feasible.

**Critical Components Have Long Lifespan**

- DC motors, slew drives, and gearboxes: Typical lifespan of 15–20 years; can be renewed with suitable spare parts if needed.
- Control units and sensors: Can operate reliably for 10+ years; replacements are modular and low-cost.
- Battery (if present): May require replacement every 5–10 years, but the system continues to operate.

**Warranty Ends, Operation Continues**

- The warranty period is typically 5–10 years, representing the period guaranteed by the manufacturer.
- Once the warranty expires, the system does not stop; only free parts/service coverage ends.
- With regular periodic maintenance, the system can operate safely for 15+ years beyond the warranty.

**Clear Message for Investors**

- "When the warranty ends, the tracker system does not stop functioning; only the maintenance responsibility shifts to you. The mechanical infrastructure is designed to operate efficiently throughout the system’s lifecycle (25+ years)."

OXOTRACKER

# Thank You

## For a quote, we are just a phone call or a click away


**For more info...**

**Phone**
+90312 235 55 23

**Web Page**
www.oxotracker.com

**E-Mail**
satis@oxotracker.com

**Address**
Alcı OSB 2007. Cd. No:2 06909
Sincan/Ankara

Because the sun is worth tracking...