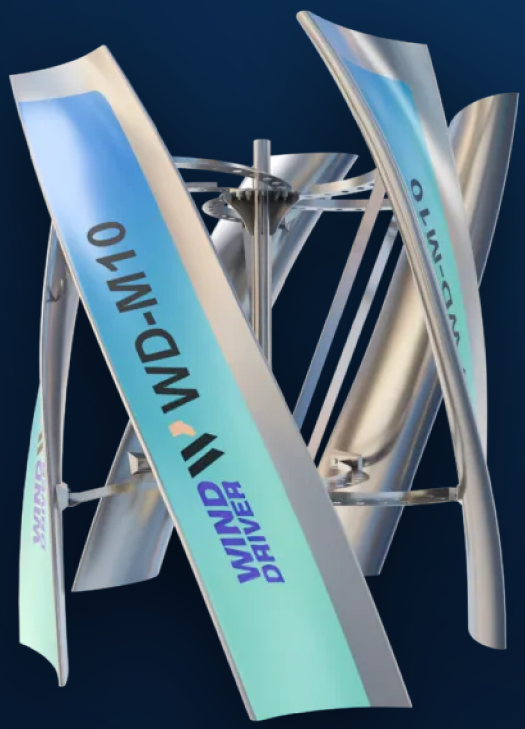
KFA Yenilenebilir ENERJI

SMART ENERGY CONVERSION • 100% MANUFACTURED IN TÜRKIYE

WD-10 SMART VERTICAL AXIS WIND TURBINES

10 kWp High-Yield Hybrid Wind Energy Architecture



1.8 m/s	< 35 dBA	360°	20 Yrs
ULTRA-LOW CUT-IN SPEED	WHISPER-SILENT ACOUSTICS	OMNIDIRECTIONAL WIND CAPTURE	PERFORMANCE WARRANTY

KFA RENEWABLE ENERGY INC. • Sultaniye Mah. 350. Sk. Selale Plaza 1/81 Esenyurt/Istanbul **Tel:** +90 543 763 27 49 • **Web:** kfayenilenebilirenerji.com.tr

ENGINEERING EXCELLENCE & CLEAN ENERGY TRANSITION

Corporate Profile and Industry 4.0 Vision

KFA Renewable Energy Inc. is a pioneering clean-tech engineering company specializing in the design, advanced manufacturing, and turnkey deployment of distributed renewable energy solutions worldwide.

Powered by Nature, Driven by the Future

Active in the energy transition since 2024, KFA Energy delivers total energy independence for individual residences, commercial buildings, and industrial manufacturing plants.

By algorithmically modeling micro-climatic wind regimes and solar irradiance data, our engineering teams build tailor-made systems maximizing kilowatt-hour (kWh) yield and financial ROI.

Industry 4.0 & Smart Microgrids

Transforming consumers from passive recipients into active prosumers, we deploy Internet of Things (IoT) driven smart microgrids that dynamically balance generation, storage, and loads.

Our cloud-integrated controllers ensure sub-second grid synchronization, predictive maintenance, and seamless battery storage optimization.

Comprehensive Clean Energy Portfolio

Vertical Wind Turbines (VAWT)

Patented helical aerofoil vertical wind turbines engineered for urban, commercial, and residential distributed power.

Rooftop & Ground Solar PV

Tier-1 high-efficiency monocrystalline TOPCon and half-cut photovoltaic plants for commercial and industrial rooftops.

Cogeneration / Trigeneration

Combined high-efficiency energy systems producing electricity, heating, and cooling simultaneously for maximum efficiency.

In-House R&D, Registered Patents & Global Standards

With continuous R&D investments and an extensive patent portfolio, KFA Energy manufactures in full compliance with national and international standards.

CE MARK | ISO 9001:2015 | GRID-CODE COMPLIANT

AERODYNAMIC INNOVATION & WHISPER-QUIET POWER

Why Vertical Axis Wind Turbines (VAWT)?

Overcoming the noise pollution, mechanical yaw failures, and storm vulnerability of traditional horizontal propeller turbines, the **WD Series Helical VAWT** delivers breakthrough performance in urban, coastal, and residential environments.

1. 360° Omnidirectional Capture

Eliminates mechanical yaw motors. Instantly captures turbulent, gusting, rising, and multidirectional urban wind currents.

2. 1.8 m/s Cut-in Speed (1.8 - 2.5 m/s)

Starts generating and charging battery banks in breezes as gentle as 1.8 m/s, well before massive horizontal turbines begin rotating.

3. Self-Regulating Aerodynamics

Requires no external friction brake disks during severe gales. Aerodynamic stall geometry and eddy-current magnetic braking cap RPM safely.

4. Whisper-Quiet (< 35 dBA)

Operates at merely 32-35 dBA at 10 m in 6 m/s winds (library whisper level). Internal mechanical acoustic noise is < 10 dB.

5. Vibration-Free Rooftop Fit

Vertical center of gravity exerts purely axial downward load, preventing dynamic harmonic vibration into building roof structures.

6. Wildlife & Bird-Friendly

A calm rotational speed of 10-40 RPM presents a solid, highly visible profile, completely safeguarding bird populations.



WIND DRIVER Power Curve

Cut-in at 1.8 m/s, 15% rated capacity at 2.5 m/s, 55% at 6 m/s, reaching 100% nominal peak power between 9-10 m/s with a linear and stable curve.

7. Direct-Drive PMG & Zero Mechanical Maintenance

Across all WD series models (WD-1, WD-3, WD-5, WD-10), the direct-drive PMG architecture eliminates gearboxes with zero mechanical maintenance or oiling. A simple annual inspection checking cables for wear and bolts for tightness is all that is required.

8. Dynamic Rotor Blade Advertising Canvas

The graceful, slow rotation of the wide aerofoil blades provides an eye-catching surface for corporate logos, branding, and premium sponsorships.

ENGINEERING DATASHEET & SYSTEM SPECIFICATIONS

WD Series Vertical Wind Turbines Technical Datasheet

Engineered across **1 kWp, 3 kWp, 5 kWp, and 10 kWp** nominal power ratings, the WD product line delivers uninterrupted clean energy across the most demanding environmental conditions. Field installations primarily deploy **5 kWp and 10 kWp** configurations.

Technical Parameter / Model	WD-1 (1 kWp)	WD-3 (3 kWp)	WD-5 (5 kWp)	WD-10 (10 kWp)
Rated / Maximum Output Power	1.0 kW / 1.2 kWp	3.0 kW / 3.5 kWp	**5.0 kW / 6.0 kWp**	**10.0 kW / 12.0 kWp**
Output Voltage	48V / 96V / 220V	48V / 96V / 220V / 380V	48V / 96V / 220V / 380V	**48V – 380V Multi-Bus**
Physical Dimensions (H x D) & Weight	1.0 m × 0.7 m • 32 kg	1.0 m × 0.8 m • 52 kg	**1.4 m × 1.2 m • 78 kg**	**2.08 m × 2.0 m • 110 kg**
Cut-in Wind Speed	1.8 m/s	1.8 m/s	1.8 m/s	**1.8 m/s (Baseload)**
Rated / Survival Wind Speed	9.0 m/s / 45 m/s	9.0 m/s / 45 m/s	9.0 m/s / 45 m/s	9.0 m/s / 45 m/s (Class I)
Aerodynamic Noise Level	< 28 dBA	< 32 dBA	< 35 dBA	**< 38 dBA (Silent)**
Aero-Brake & Safety Systems	Dual Redundancy: Dynamic Electromagnetic Resistance Braking + Mechanical Aerodynamic Stall			
Generator Type & Efficiency	Three-Phase Brushless Permanent Magnet Synchronous Generator (PMG - NdFeB) • Efficiency: > 96%			
Operating Temperature	-35°C to +60°C extreme thermal range			
Grid Interconnection	Hybrid Smart Inverter: Both On-Grid (Net-Metering) and Off-Grid (Island Mode)			
Warranty Coverage	**2-Year Full Mechanical Warranty • 20-Year 90% Performance Warranty**			

KFA Energy Turnkey Commercial Equipment Configurations

5 kWp Turbine Set
5 kWp VAWT + MPPT Smart Controller

10 kWp Turbine Set
10 kWp WD-10 + Smart Controller

20 kW Hybrid Inverter
Three-Phase Hybrid Inverter

Lithium Storage Banks
51.2V 100Ah (5.1 kWh) & 314Ah (16 kWh)

OFFICIAL TEST DATA & ENGINEERING CHARACTERISTICS

WD-10 (10 kWp) Wind Speed vs. Power Output (Power Curve)

Measured in strict compliance with international IEC wind turbine standards, our flagship **WD-10** vertical turbine begins charging at an ultra-low **1.8 m/s**, reaches nominal rated **10.0 kWp (100%)** at **10.0 m/s**, and maintains a stable flat 10 kW plateau in high gale conditions (12–25 m/s).

1.8 m/s	7.4 m/s	10.0 kWp	45.0 m/s
CUT-IN WIND SPEED	**7.5 KW (75% CAPACITY)**	**RATED POWER (10 M/S)**	**SURVIVAL WIND LIMIT**
Generation start in light air	2.8-Year Fast ROI Field	100% Full Nominal Output	Eddy-Current Magnetic Brake

Wind Speed (m/s)	Speed (km/h)	Power Output (kW)	Power (W)	Capacity Factor	Rotor Speed	Operational Status & Description
1.8 m/s	6.5 km/h	**0.20 kW**	200 W	**2.0%**	12 - 15 RPM	**Cut-in Speed:** Battery charging & generation start
2.5 m/s	9.0 km/h	**1.50 kW**	1,500 W	15.0%	18 - 22 RPM	**Light Breeze:** Continuous low-torque generation
4.0 m/s	14.4 km/h	**3.20 kW**	3,200 W	32.0%	26 - 30 RPM	**Low Wind Regime:** ~5.5-year estimated payback band
6.0 m/s	21.6 km/h	**5.50 kW**	5,500 W	55.0%	34 - 38 RPM	**Moderate Wind:** Whisper-quiet (<35 dBA) operation
7.4 m/s	26.6 km/h	**7.50 kW**	7,500 W	**75.0%**	40 RPM	**Design Baseline:** 2.8-Year Fast Payback Benchmark
10.0 m/s	36.0 km/h	**10.00 kW**	10,000 W	**100.0%**	**45 RPM**	**Rated Wind Speed:** 100% full nominal capacity
12.0 – 25.0 m/s	43.2 – 90.0 km/h	**10.00 kW**	10,000 W	**100.0%**	42 - 45 RPM	**Storm Plateau:** Passive aerodynamic stall holding 10 kW
> 25.0 – 45.0 m/s	> 90 – 162 km/h	**Protected**	Safe Hold	0.0%	**Locked**	**Survival Limit:** Non-wearing eddy brake protection

Patented Passive Aerodynamic Stall Governing

While horizontal-axis wind turbines (HAWT) abruptly shut down above 20 m/s using mechanical disc brakes, the WD-10 employs patented helical aerofoils that passively limit aerodynamic lift at high velocities. This produces a rock-solid **10.0 kW power plateau** between 10 – 25 m/s without friction, disc wear, or mechanical servicing.

Annual Energy Yield (AEP) & Payback Modeling

At benchmark project sites with 7.4 m/s mean wind speeds, the WD-10 delivers **42,000 – 48,000 kWh/year**, yielding a verified financial payback of **2.8 years**. In moderate-to-low wind regions (4 – 6 m/s), annual generation reaches **18,500 – 36,000 kWh/year** with an estimated return period of **5.0 – 5.5 years**.

10 KWP FLAGSHIP HYBRID ARCHITECTURE

10 kWp Hybrid Clean Energy: Wind at Night, Solar by Day

Solar arrays only generate during clear daylight hours; our **10 kWp WD-10 Vertical Axis Wind Turbine** achieves peak yield during evenings, winter seasons, and storm systems. Synchronizing both resources delivers **20,000 to 28,000 kWh/year** of reliable electricity.



40% Battery Cost Reduction

Because the 10 kWp turbine generates power throughout the night, battery cycling stress is eliminated and required storage capacity decreases by 40%.

1. 10 kWp WD-10 Vertical Axis Wind Turbine

360° omnidirectional helical blades and a 380V direct-drive PMG generator deliver continuous 10 kWp peak generation through overnight and morning winds.

2. Tier-1 Photovoltaic Solar Modules (10 kWp - 20 kWp)

High-efficiency 595W Monocrystalline TOPCon bifacial modules cover daytime base loads and replenish storage batteries.

3. 20 kW Three-Phase Hybrid Inverter

Dual MPPT channels synchronize wind and solar inputs, feeding surplus electricity to the grid or switching to island mode in under 10 ms during grid outages.

4. 16 kWh - 32 kWh High-Cycle LiFePO4 Storage

51.2V 314Ah industrial Lithium Iron Phosphate cells provide 6,000+ cycles, securing 2-3 days of complete off-grid autonomy for villas and businesses.

10 kWp Standard Hybrid Turnkey Configuration

10 kWp	10-20 kWp	20 kW	16 - 32 kWh
WD-10 Wind Turbine	Tier-1 Rooftop Solar PV	Three-Phase Inverter	51.2V LiFePO4 Storage

SMART CITY & STREET LIGHTING HYBRID INNOVATION

WD-UP4 Vertical Hybrid Wind Turbine for Lighting Poles

Engineered and supplied by KFA Renewable Energy Inc., the **WD-UP4 Smart Hybrid Wind Turbine** mounts directly onto the top flange of existing and new street, park, highway, and campus lighting poles—converting urban air currents and solar radiation into 24/7 autonomous illumination power.



Universal Pole Flange Connection, Helical Rotor & Top Solar PV Module



Urban Park & Pedestrian Pathway Grid-Independent Night Illumination Setup

Universal Pole Flange Fit

Mounts seamlessly onto standard street and park lighting poles without structural alterations. Ultra-lightweight 6 kg body adds virtually zero structural stress to existing poles.

1.2 m/s Cut-in & <10 dB Silence

Initiates smooth rotation at an ultra-low 1.2 m/s gentle urban breeze. Direct-drive brushless PMG generator ensures whisper-silent operation in parks and residential areas.

Solar PV & Built-in Lithium Storage

Integrated monocrystalline top PV module, internal LiFePO4 battery pack, and intelligent MPPT LED driver deliver 365-day autonomous off-grid lighting with zero trenching.

WD-UP4 Technical Engineering Specifications

Rated Power: 100 W (Peak: 110 W) • **Cut-in Speed:** 1.2 m/s • **Survival Speed:** 45 m/s • **Dimensions:** 50 cm x 45 cm • **Weight:** 6 kg • **Noise:** <10 dB • **Maintenance:** Zero Mechanical Maintenance

SMART CITY & PARK | 100% OFF-GRID

FLAGSHIP ENGINEERING DEEP DIVE

WD-10 (10 kWp) Flagship VAWT Advanced Engineering

As KFA Renewable Energy Inc.'s premier flagship turbine, the **WD-10 (10 kWp)** incorporates patented helical aerofoil blade profiles, direct-drive permanent-magnet generation, and intelligent dual-stage fail-safe controls.

1. Direct-Drive Neodymium PMG Generator

Built with high-coercivity NdFeB permanent magnets. Direct coupling to the rotor shaft eliminates gearboxes, achieving over 94% electromechanical conversion efficiency.

2. Dual-Stage Aerodynamic & Magnetic Braking

1) Aerodynamic Stall: Helical aerofoils induce boundary-layer stall in storm winds to naturally limit RPM.
2) Eddy-Current Electromagnetic Brake: Clamps rotor speed safely even during sudden grid disconnection (withstands 50 m/s gales).

3. Carbon-Reinforced Aviation Composite Blades

Engineered from aerospace-grade polymer composite resistant to UV radiation, maritime salt corrosion, and hail impact, delivering a 20+ year performance life.

4. Intelligent Microprocessor MPPT Tracking

Millisecond torque adjustments track the instantaneous aerodynamic power curve, maximizing energy harvesting in light and shifting wind gusts.



Vibration-Free WD-10 (10 kWp) Commercial Rooftop Mount

Zero Structural Vibration

High-damping elastomeric vibration isolators isolate dynamic forces, transmitting zero acoustic resonance to building structural columns.

Zero Mechanical Maintenance Architecture (Annual Inspection)

The WD-10 vertical turbine requires zero mechanical maintenance, gearbox servicing, or oiling. Thanks to its sealed direct-drive design, a simple inspection **once a year**—checking electrical cables for wear and ensuring bolts remain firmly tightened—guarantees 20+ years of operation.

ZERO MAINTENANCE

URBAN PRESTIGE & ADVERTISING REVENUE

Multi-Functional Hybrid Urban Totem & Transit Shelter

Unifying wind generation, solar PV arrays, municipal LED lighting, and a high-definition double-sided outdoor digital LED screen into a single architectural spire, this **Multi-Functional Energy Totem** generates power while producing advertising cash flow.





Multi-Functional Spire Specifications

Wind Turbine	5-Blade / **5 kWp (5,000 W)** VAWT (Retractable Aerofoil Mechanism)
Solar PV Panels	**5 kWp (5,000 W)** High-Efficiency Monocrystalline Array (4 Panels)
LED Lighting	2 x 150 W Array • **25 m² Net Illumination Footprint**
Digital LED Display	**125 cm x 250 cm** Double-Sided Outdoor HD Media Display
Battery Base Cabinet	Integrated Climate-Controlled LiFePO4 Battery & Electronics Vault

Smart Transit Shelter Concept

Designed for municipal passenger stops, integrating dual micro-VAWTs and rooftop solar PV:

- Powers 24/7 high-lumen safety LED shelter lighting automatically.
- Provides multi-port fast USB phone and device charging ports for waiting riders.
- Powers real-time dynamic digital bus arrival displays and timetable totems.
- Eliminates trenching and cabling costs for municipal transit departments.

Self-Financing Commercial ROI Architecture

Installed in marinas, fueling stations, retail plazas, and university campuses, commercial advertising revenues pay back total capital expenditure in under 24 months.

VERIFIED FIELD DATA & 6 PROVEN SUCCESS CASES

Real-World Field Installations and Proven Success Cases

From mission-critical telecommunication stations to corporate headquarters rooftops, luxury estates, and international industrial facilities, KFA Energy VAWT systems deliver verified high-yield clean power.



TURKCELL & VODAFONE — 10 kWp WD-10

GSM & Telecom Base Stations

Critical Cellular Infrastructure / Türkiye

Delivers 24/7 continuous electricity to remote cellular towers; reduces diesel generator runtime and logistics costs by up to 80%.

+80% Fuel & Grid Autonomy



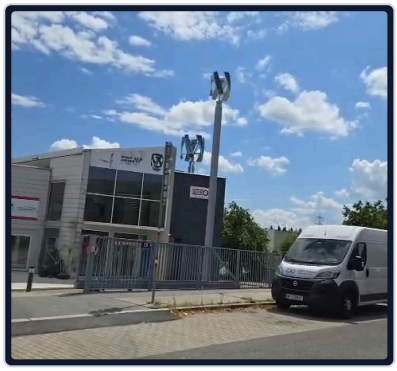
ALLIANZ ROOFTOP — 10 kWp WD-10

Allianz Insurance Headquarters

Corporate Headquarters Rooftop / Istanbul

Operates atop corporate headquarters plaza with zero mechanical vibration, <35 dBA ultra-quiet sound, and LEED green building certification.

LEED Prestige • Zero Structural Vibration



AUSTRIA FACILITY — 30 kWp (3x10 kW)

Austria Commercial Facility

International Rooftop VAWT Array / Austria (EU)

Triple vertical turbine array installed on commercial rooftop terrace. Supplies baseline industrial power under harsh European weather standards with CE certification.

Capacity: 3 x 10 kWp = 30 kWp Array



PELICAN HILL — 30 kWp Hybrid

Pelican Hill Luxury Estate

Büyükçekmece / Istanbul

20 kWp Rooftop Solar PV + 10 kWp WD Vertical Turbine landscape integration fulfilling over 80% of estate power demands.

Annual Yield: ~41,500 kWh (+80%)



TEPEKENT VILLAS — 10 kWp WD-10

Tepekent Villas Project

Büyükçekmece / Istanbul

Converts hilltop wind breezes into clean baseload power, ensuring continuous residential independence from grid disruptions.

Annual Yield: ~13,500 kWh Autonomy



YAĞMUR ELEKTRIK HQ — 15 kWp Hybrid

Yağmur Elektrik Showroom

Esenyurt / Istanbul

5 kWp WD-5 Turbine and 10 kWp Solar PV fulfilling over 80% of commercial showroom electrical demand with prestigious architectural integration.

Coverage: +80% Commercial Load

FULL LIFECYCLE EPC (ENGINEERING, PROCUREMENT, CONSTRUCTION)

7-Step Turnkey Engineering and Utility Interconnection Process

The KFA Energy Project Management Office coordinates every step—from high-resolution wind lidar assessment through structural engineering, formal utility interconnection approvals, and grid commissioning.

1. **Site Feasibility Study (SFS) & Aerodynamic Simulation**
   Micro-siting analysis incorporating local wind statistical databases, solar irradiance modeling, rooftop pitch, and 3D terrain shading obstruction surveys.

2. **System Sizing & Techno-Economic Optimization**
   Evaluating past consumption profiles to size 5 kWp / 10 kWp WD wind & solar PV capacity for the fastest ROI according to local wind speeds (2.8 years at 7.4 m/s average wind, extending to 5.5 years at 4-6 m/s wind speed).

3. **Statutory Filings & Grid Connection Call Letter**
   Submitting official regulatory applications under distributed generation frameworks to secure capacity reservation and interconnection approval from regional grid operators.

4. **Certified Electrical & Structural Engineering Plans**
   Formally stamping single-line diagrams, short-circuit protection schemes, and civil structural wind-load certifications per national building codes.

5. **Procurement, Certified Construction & Waterproofing**
   Installing Tier-1 modules, stainless mounting structures with 100% waterproof roof sealing, 5 kWp / 10 kWp WD mast anchoring, and marine-grade wiring by certified teams.

6. **Utility Commissioning & Bi-Directional Net-Metering**
   Conducting joint electrical safety inspections with utility engineers, installing smart bi-directional revenue meters, and formalizing net-metering contracts.

7. **24/7 Cloud Telemetry & Zero Mechanical Maintenance (Annual Check across 1 - 10 kWp)**
   Continuous remote monitoring via mobile app. Across all 1 to 10 kWp models, zero mechanical maintenance or lubrication is required; an annual check of cable integrity and bolt tightening guarantees maximum uptime.

FINANCIAL RETURNS & SUSTAINABILITY METRICS

Techno-Economic Payback (ROI) and Environmental Impact

KFA Energy Hybrid Wind & Solar Systems achieve **+80% permanent bill savings**. The capital payback period directly correlates with regional wind regimes: reaching full ROI in **2.8 years at 7.4 m/s average wind speed**, and **5.5 years at 4 - 6 m/s wind speeds**, generating 20 years of free clean power.

+80%	2.8 - 5.5 Yrs	20 Yrs	10.6 Tons
BILL SAVINGS	WIND-BASED PAYBACK	PERFORMANCE WARRANTY	ANNUAL CO2 OFFSET

Capital Payback (ROI) Matrix by Average Regional Wind Velocity

FASTEST CAPITAL PAYBACK

≥ 7.4 m/s Wind Regime

2.8 Years

Coastal corridors, hilltop estates, and open plains. High year-round capacity factor delivering maximum clean kWh yields and rapid capital recovery.

Peak Yield • Fastest Payback

STANDARD REGIONAL REGIME

5.0 – 6.0 m/s Wind Regime

5.0 – 5.5 Years

Residential estates, commercial facilities, and rooftop arrays. Balanced wind-solar synergy delivering +80% permanent bill reduction.

Balanced Output • 365-Day Energy Shield

URBAN & BASE LOAD

4.0 – 5.0 m/s Wind Regime

5.5 Years

Urban residential and sheltered terrain. 1.8 m/s cut-in speed generates uninterrupted nighttime baseload power when horizontal turbines remain stalled.

1.8 m/s Cut-in • 24/7 Power Flow

Permanent Hedge Against Utility Rate Inflation

Protected by two-way On-Grid Net-Metering against rising tiered tariffs, locking in **+80% net utility savings** and providing green building LEED / BREEAM credits.

✓ Full Payback in 2.8 Yrs at 7.4 m/s Wind (5.5 Yrs at 4-6 m/s), Followed by 20 Yrs Free Power

Environmental Impact & Zero Mechanical Maintenance

Zero mechanical upkeep or oil expenses. A quick annual inspection of wiring integrity and bolt tightness secures 20 years of continuous clean power.

≈ 477
TREES EQUIV.
/ Yr Offset

*Calculation Benchmark: Based on national grid carbon emission intensity (0.46 kg CO2/kWh) and mature tree annual carbon sequestration rate (22 kg CO2/year).

INTERNATIONAL ACCREDITATIONS & DIRECT CONTACT

Quality Certifications and Corporate Contacts

All KFA Energy engineering, manufacturing, and deployment procedures strictly conform to European CE directives and international management quality benchmarks.

CE & IEC

European Conformity

IEC 61215, IEC 61730-I electrical, mechanical, and safety compliance.

ISO 9001 & 14001

Quality & Environment

ISO 9001:2015 manufacturing quality and ISO 14001:2015 environmental standards.

ISO 45001 & 50001

Occupational & Energy

ISO 45001 safety, ISO 10002 customer satisfaction, and 50001 energy efficiency.

KFA Energy Assurance, 20-Year Warranty & Zero Mechanical Maintenance Standard

2-Year Full Mechanical Warranty: Complete system and component coverage against manufacturing or installation defects.
20-Year 90% Performance Warranty: Guaranteed PMG magnet field retention and solar cell generation yields.
Zero Mechanical Maintenance (Across 1 - 10 kWp Range): The WD product family requires zero mechanical upkeep, gearbox servicing, or oiling; a single annual check for cable wear and bolt tightness is all that is needed.

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