



ASTERION LI-ION
BATTERY SERIES

**TRACTION LITHIUM-ION
BATTERIES**
FOR WAREHOUSE AND CLEANING EQUIPMENT,
SPECIAL - PURPOSE SOLUTIONS

asterion-batt.com.tr



**ONE OF THE LARGEST SUPPLIERS OF INDUSTRIAL
LEAD-ACID RECHARGEABLE BATTERIES**

- ENERGON has been supplying comprehensive solutions for commercial and private facilities for over 20 years. The primary area is industrial rechargeable batteries, solar modules, and solutions based on those.
- Company products are currently represented in 22 countries under the following brands: DELTA, ASTERION, SMARTWATT, SECURITY Force, VOSTOK PRO and RED ENERGY.

ENERGON'S BRAND PORTFOLIO

ASTERION
BATTERY

ASTERION XPERT
BATTERY

SECURITY
FORCE

DELTA
BATTERY

INTERNATIONAL PRESENCE

BELARUS

KAZAKHSTAN

SOUTH AFRICA

TURKEY

UZBEKISTAN

UAE



- The application and manufacturing expertise gained from more than 20 years of development forces ENERGON to share the best practices across different countries by developing world-class production plants. Local production makes ENERGON closer to customer demands, reduce production costs as well as delivery time.
- With all the factors together company provides the markets of our presence with high quality products. We are proud to provide an individual approach in solving a wide range of demands in different customer applications and segments with focus on traction and energy storage solutions.
- ENERGON offers not only state-of-the-art technology products but provides education & consulting services for partners and industry specialists.
- Our production plant in Turkey is a result of the company's best practices. Production capacities allow us to produce Li-Ion solutions adapted to the needs of the local market.

ENERGON IN FIGURES



50 MLN
BATTERIES SOLD
SINCE 1998

400+
PROFESSIONALS IN THE
TEAM

4 LEVELS
OF QUALITY
CONTROL

600+
DEALS ON A
DAILY BASIS



**An advanced
network of base
service stations**



**Design and
development**



**Imported
components**



**Own
production**



**Testing
laboratory**

DIFFERENCE IN BATTERY OWNERSHIP: LEAD-ACID OR LITHIUM?

Difference between use of lead-acid and lithium-ion rechargeable batteries can be clearly demonstrated by whether battery support and commissioning services apply or do not.

REQUIRED EQUIPMENT AND RESOURCES	LEAD-ACID BATTERIES	ASTERION LI-ION BATTERIES
Equipment	+	+
A battery room with supply-and-exhaust ventilation	+	NOT REQUIRED
Maintenance staff	+	NOT REQUIRED
Roll-out table and other equipment to change the battery	+	NOT REQUIRED
Several batteries sets per 1 vehicle	+	NOT REQUIRED
Charger	+	+

ASTERION BATTERY

ADVANTAGES OF LITHIUM BATTERIES



SERVICE LIFE
2 to 3 times longer than that of lead batteries



NO MAINTENANCE COSTS

100%

CHARGING RATE:
up to 100 % for 1 to 2 hours



NON-TOXIC
saving on a battery room

3x

SHORT CHARGING TIME:
one lithium battery replaces 2 or 3 lead ones



NO "MEMORY EFFECT"
recharging at any convenient time

98%+

AVAILABLE CAPACITY
over 98 %

-30%

POWER CONSUMPTION
30 % lower (as compared to lead batteries)



WARRANTY for lithium batteries: 3 years
extended warranty: 5 years
(lead batteries: 1 to 2 years)

LITHIUM IS NEW PETROLEUM

- Lithium is one of the world's most sought-after rare metals in both military and civil industries.
- Lithium is the only fully fledged alternative to petrol and gas.

COMPOSITION OF TRACTION LI-ION BATTERIES



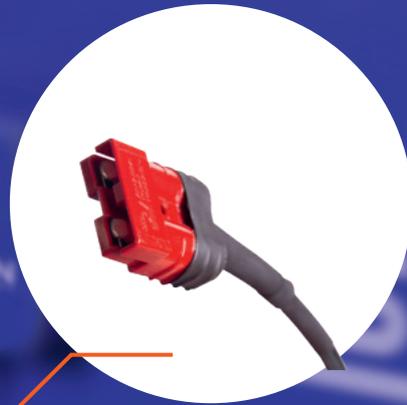
**BATTERY MANAGEMENT
SYSTEM (BMS)**



**LI-ION
CELLS**



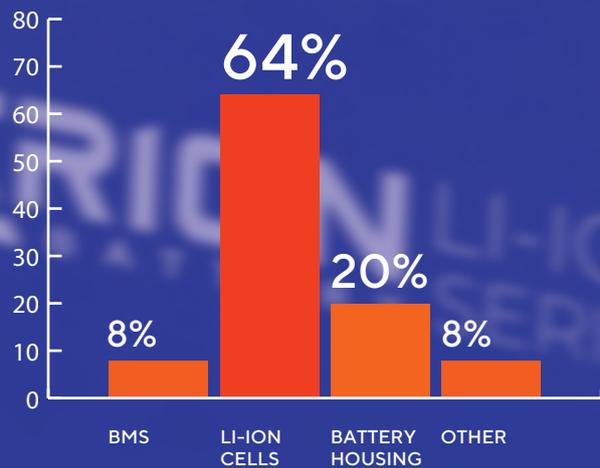
**HOUSING
(+ BALLAST)**



OTHER COMPONENTS

Other components may include power connectors, contactors, DC-to-DC converters, BMS harnesses, copper buses, power wiring, and other consumables.

COST STRUCTURE FOR TRACTION LI-ION BATTERIES



The key fraction in the cost structure of a traction Li-ion battery is Li-ion cells. Quality of cells defines the final battery cost.

In case of proper operation, the service life of lithium cells is 7 to 10 years, after which the cells can be renewed without replacing other components. Such replacement is considerably more cost-efficient than purchase of a new battery.

COMPONENTS SELECTION: BMS



Among the components used in ASTERION LFP batteries are two types of high-quality BMS: Original and Smart. The battery solution with BMS Smart is developed for those who require long running time without a remote monitoring function. The ASTERION LFP Smart battery is charged via a load connector, in a way similar to lead-acid batteries.

BATTERIES WITH BMS ORIGINAL

BATTERIES WITH BMS SMART

+	High-quality LiFePO4 cells	+
+	Overload and short-circuit protection	+
+	Protection against overcharge and deep discharge	+
+	Passive balancing of cells	+
+	Audible low-charge alarm	—
+	Optionally: Active balancing of cells	+
+	Optionally: Frost modification	+
+	An individual connector for charging	—
—	Charging via a load connector (similarly to lead-acid batteries)	+
+	Remote monitoring	—
+	The warranty period: 3 years or longer	+
\$\$\$	Cost	\$\$

ASTERION LFP BATTERY DESIGN

1

**BATTERY CHARGE
INDICATOR**

2

**BATTERY POWER-ON
BUTTON**

3

**CHARGER
CONNECTOR**

4





5

**A LOAD LINE CONNECTOR
OF THE BATTERY**

6

**THE BATTERY HOUSING
REPLICATING
THE ORIGINAL
STRUCTURAL CONCEPT**

**A MAGNET-MOUNT REMOTE
STATE OF CHARGE INDICATOR**

ASTERION LI-ION
BATTERY SERIES



Having extensive experience in switching machinery fleets from lead-acid batteries to lithium-ion ones, ENERCON has developed a few standard solutions for different applications, including special cold-resistant batteries. This Frost series is capable of operation at temperatures down to minus 50 °C.

COMPONENTS SELECTION: LI-ION CELLS

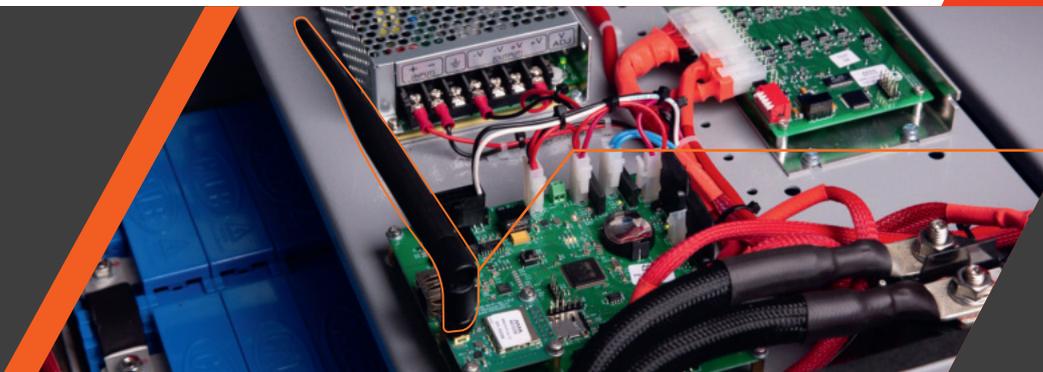
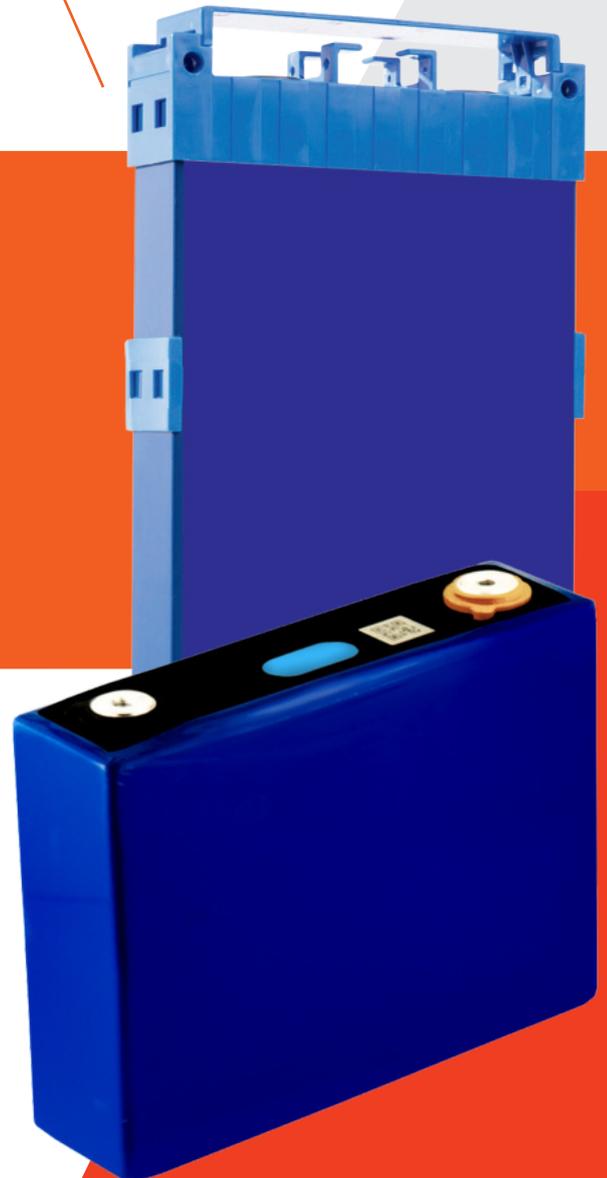
ASTERION lithium-ion batteries use the best LiFePO₄ cells in an aluminium housing in two capacity options: 100 Ah and 72 Ah.

- A safety valve
- An aluminium housing for better heat exchange
- A ceramic membrane for enhanced safety
- Over 3,000 charge–discharge cycles

When manufacturing its products, ENERCON uses only premium-quality cells, which are supplied to factories of Volkswagen and BMW automobile concerns as well as used in global aircraft engineering.

CHARACTERISTICS OF LI-ION CELLS OF ASTERION LI-ION SERIES BATTERIES

- + Rated voltage: 3.2 V
- + Rated capacity: 72 Ah, 100 Ah
- + Internal impedance: less than 0,5 mΩ
- + Two charging modes (nominal/quick): 2/1 hour



**DATA
TRANSMISSION
AND CLOUD
SERVICE**

BATTERY HOUSING



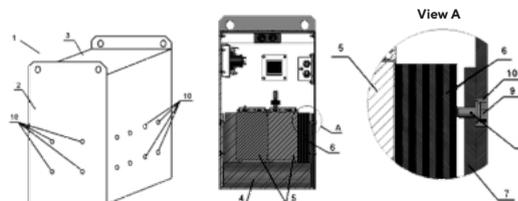
ENERGON developed 4 structural design variants of lithium-ion rechargeable batteries

ASTERION ORIGINAL	ASTERION FROST ❄️	ASTERION FUSION 🔥	ASTERION EX 🔥
STANDARD DESIGN VERSION	COLD-RESISTANT DESIGN VERSION	FOR HIGH-TEMPERATURE ZONES	EXPLOSION-PROOF DESIGN
IP54	IP54, additional heating, special heat-insulator of the housing	IP54, double cooling loop	IP66, intrinsically safe connection
Battery operating temperature range of 0 °C to +40 °C	Battery operating temperature range of -50 °C to +40 °C	Battery operating temperature range of -20 °C to +85 °C	Battery operating temperature range of 0 °C to +40 °C



PATENTED LI-ION CELL MOUNTING SYSTEM

Clamping the ballast sheets via a screw connection allows you to solve an issue related to high vibrations on the battery during equipment operation.



- Installation of a router in the charger housing
- Data transmission via a Wi-Fi channel for closed spaces and via a GSM channel for open spaces to a remote server

- Software for remote monitoring of lithium-ion batteries
- A possibility of storage and analysis of battery condition information in a cloud service

ASTERION LI-ION BATTERIES OFF-THE-SHELF SOLUTIONS FOR CLEANING AND PACKING EQUIPMENT



MODEL	LFP 24-72	LFP 24-100	LFP 24-144	LFP 24-200
Rated voltage, V / capacity, Ah	24/72	24/100	24/144	24/200
Max. discharging current, A	72	100	144	200
Dimensions (DxWxH), mm	275x270x215	300x332x230	288x274x330	368x428x240
Weight, kg	30	36,3	55	62,8

LFP 24-216	LFP 24-288	LFP 24-300	LFP 36-100	LFP 36-144
24/216	24/288	24/300	36/100	36/144
216	288	300	100	144
427x274x332	566x274x332	370x375x420	375x326x240	427x274x330
90	110	105,9	50,5	85

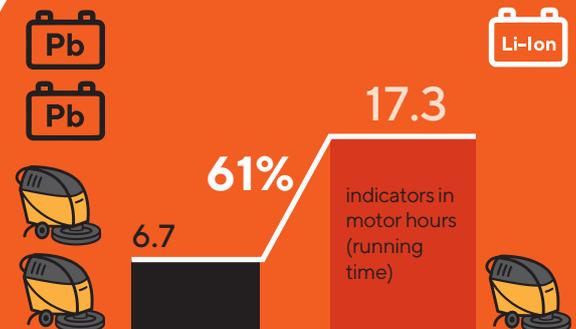
LFP 36-200	LFP 36-216	LFP 36-288	LFP 36-300	LFP 36-400
36/200	36/216	36/288	36/300	36/400
200	216	288	300	400
370x375x420	427x410x330	427x472x330	525x370x420	672x370x420
105,9	130	175	145,3	183,7

These are unified single-block solutions that do not require additional ballast. Three standard solutions can be offered for over 90 % of the existing floor scrubbers and floor sweepers models.

MAIN FEATURES OF STANDARD SOLUTIONS FOR CLEANING EQUIPMENT

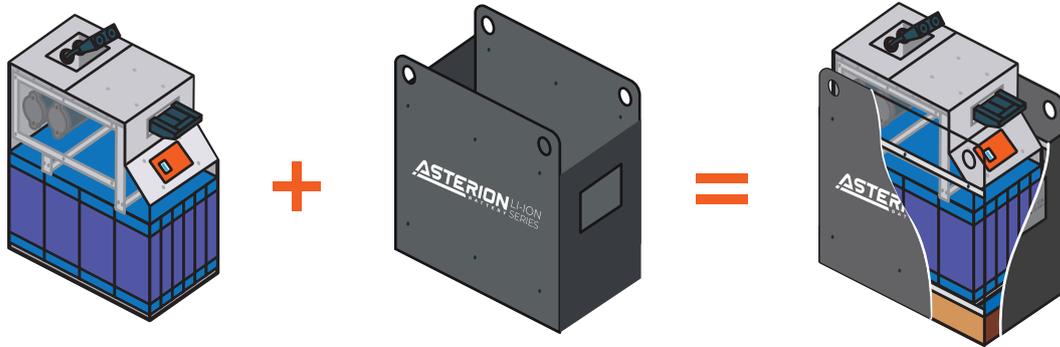
- + Complete with a remote charge indicator
- + Connection of batteries in parallel for increasing the total capacity
- + The IP54 dust-and-moisture-proof housing. Confirmed by a certificate of conformity with IEC 60529:2013
- + Maximum discharge current of up to 200 A (depends on rated capacity)

LITHIUM VS LEAD: ADVANTAGES FOR CLEANING EQUIPMENT



Li-ion batteries allow the running time to be increased significantly due to quick charging for 1 to 2 hours and the quantity of equipment units to be decreased

STANDARD SOLUTIONS OF ASTERION LI-ION BATTERIES FOR WAREHOUSE VEHICLES



EXAMPLES OF STANDARD TRACTION BATTERIES:

MODEL	LFP 24-144	LFP 24-216	LTA LFP 24-288
Rated voltage / capacity	24 V/144 Ah	24 V/216 Ah	24 V/288 Ah
Max. discharging current	≤200 A	≤200 A	≤200 A
Dimensions (DxWxH)	566 x 142 x 450 mm	566 x 208 x 450 mm	566 x 274 x 450 mm
Weight	75 kg	98 kg	120 kg

Standard solutions for warehouse vehicles are defined to a large extent by the ballast dimensions and weight, which allow unified traction lithium-ion batteries to be used for a wide range of equipment manufacturers while ensuring that batteries are consistent with the housing and characteristics of each particular vehicle model.

The ballast can be built into the battery housing as well as installed along with a single-block battery and assures that there is no heeling when lifting/lowering or moving any loads.

ADVANTAGES OF OFF-THE-SHELF AND STANDARD BATTERIES

- + A lower cost due to a large order of same-type components
- + In-stock availability of off-the-shelf and standard batteries, with the ballast manufacturing period of 1 to 3 days
- + A possibility of installing same-type batteries in various equipment due to a replaceable ballast
- + Exchange pool: no equipment downtime and fulfilment of obligations towards your customer
- + Updating a machinery fleet does not require purchasing a new extra battery



ADVANTAGES OF ASTERION SOLUTIONS

ENERGON takes its place in the market thanks to unconditional fulfilment of obligations towards its clients and persistently high quality of products.

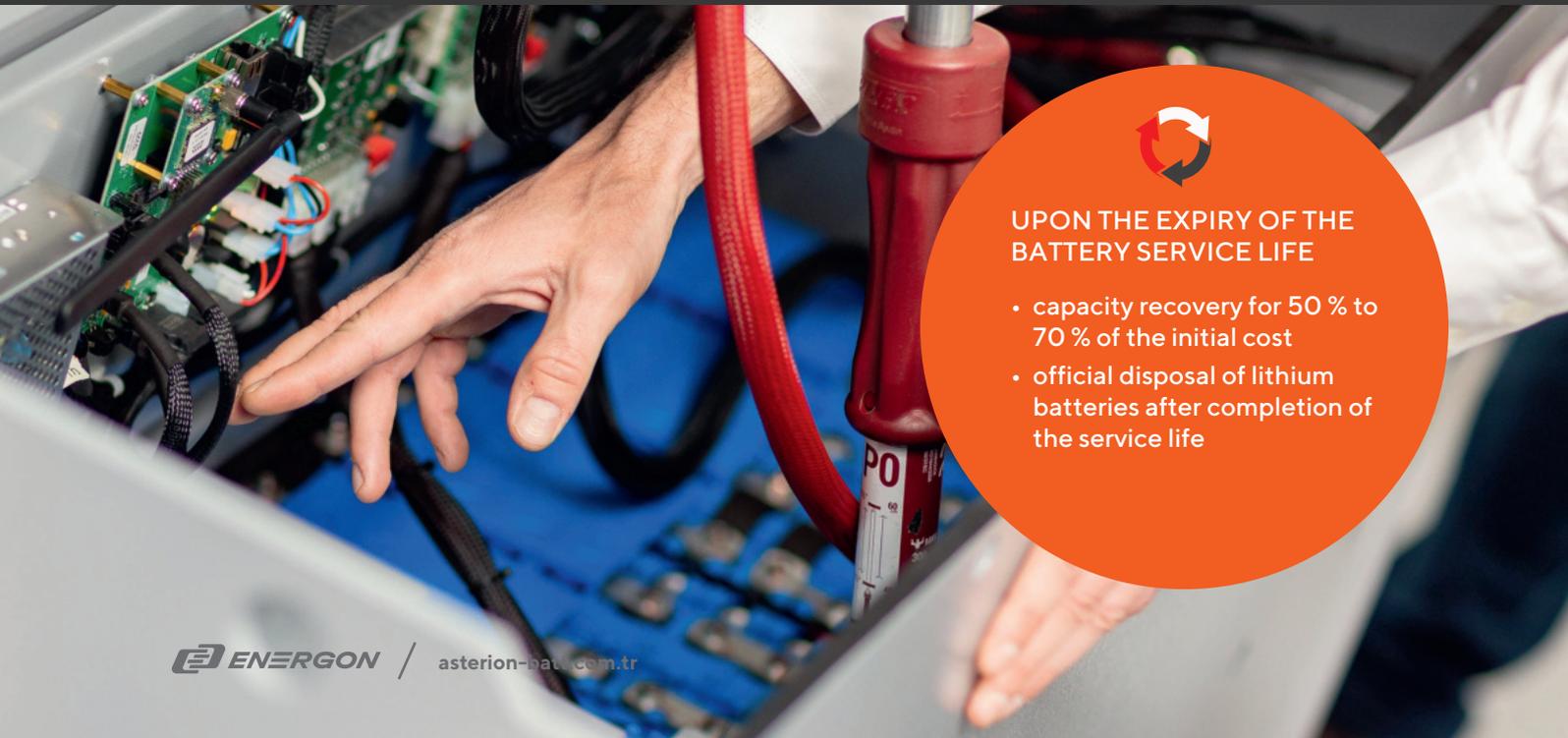
- +** AN INDIVIDUAL APPROACH TO EVERY PROJECT
- +** AS SHORT DELIVERY TIMES AS POSSIBLE: 4 TO 6 WEEKS
Due to permanent availability of all components at the production facility
- +** IN-STOCK AVAILABILITY OF BATTERIES AND CHARGERS

 - for standard solutions of warehouse equipment
 - for standard solutions of cleaning and packing equipment
- +** SUBSCRIPTION PROGRAMME
Granting a lease of batteries for running a trial and making a decision
- +** TRANSPARENT COMMERCIAL CONDITIONS
- +** FREE AUDIT OF EQUIPMENT AND PREMISES WHEN DEVELOPING THE PROJECT
- +** A TRADE-IN PROGRAMME
Official disposal of lead-acid batteries and an additional discount for Li-ion of up to 30 %
- +** INTERNATIONAL PRESENCE
And impressive engineering competence



CHARGERS

ENERGON has official distributor and service partnership with S.P.E., a reputable manufacturer of chargers in Italy, which traces its history back to 1972.



UPON THE EXPIRY OF THE BATTERY SERVICE LIFE

- capacity recovery for 50 % to 70 % of the initial cost
- official disposal of lithium batteries after completion of the service life

VERSATILE BATTERIES

ASTERION LFP Plastic batteries based on lithium-iron-phosphate are compact and light-weight batteries for a voltage of 24 V.

Application areas:

- Cleaning machines
- Water-borne vehicles
- Power storage devices for uninterruptible power supply systems



- + Quick charging - only 2 hours
- + The service life of 3,000 charge-discharge cycles or more
- + Continuous discharge current of up to 0.5C
- + Access to battery condition data via Bluetooth right from your smartphone
- + Operating temperature range: 0 °C to +40 °C
- + Minimum dimensions and light weight
- + Protection degree IP65

We recommend using an ASTERION LFP Charger for charging



MODEL	LFP Plastic 24V30Ah	LFP Plastic 24V54Ah
Rated voltage / capacity	25.6 V/30 Ah	25.6 V/54 Ah
Max. discharging current	229x138x217 mm	329x172x233 mm
Dimensions (DxWxH)	10 kg	13.5 kg
Weight	ASTERION LFP Charger 24V15A	ASTERION LFP Charger 24V20A

MONITORING VIA BLUETOOTH

Traction batteries equipped with BMS SMART provide for a possibility of battery status monitoring directly from a smartphone. The user can see the battery state of charge, voltage of each cell, and alerts about errors.



The app is available for smartphones based on the OS:

Android



iOS



Following the principles of social and environmental responsibility and forming an efficient ESG management system are among the crucial areas for ENERAGON's development strategy. We are building our business on the basis of long-term values, caring about preservation of the natural environment and improvement of quality of the society's and future generations' life. Our contribution to preservation of the planet's "green" future is directly connected to ENERAGON's activity. Following the mission "By working, we are charging the world!" we aim to raise our society's awareness of the conscious-consumption basics while actively developing areas of environmentally friendly energy sources. The key one among the latter is solar power plants, which have been successfully supplied by ENERAGON since 2016. Every plant built on the basis of equipment under the ASTERION Battery Solar Series brand and operating on renewable sun energy becomes an important step towards reduction in the use of natural resources, decarbonisation, and decrease in the carbon footprint. As part of the environmental responsibility programme, we also actively support a global tendency towards transition to use of lithium-ion batteries. Rechargeable batteries of our brand called ASTERION Li-Ion are developed on the basis of modern technologies taking decrease of a negative environmental impact into account. We are working to make our future cleaner and safer! ENERAGON's projects for equipping remote residential facilities with energy sources become a major contribution to improvement of quality of public life. Stand-alone nature and operation simplicity of rechargeable batteries and solar power plants make clean, inexpensive energy available to everyone, including for people who live in areas with poor infrastructure.

Caring for improvement of welfare and implementation of the principles of equal opportunity, ENERAGON pays special attention to creating affordable products and lines and expands representation of its products at retail facilities across the regions where the company operates. While following the "Everything for the Client" principle, we are continuously working on improvement of our services, offer our clients convenient services, hold training events, and use an individual approach when developing new products, executing projects, and implementing solutions. The core value of ENERAGON is people. The Company's concept of corporate management is built upon principles of continuous personnel development and training, arrangement of a comfortable working environment, and support of advancement opportunities for employees. We offer our employees efficient corporate training programmes, flexible working hours, and a "flexible office" free-placement system with a possibility of choosing a desired workplace upon a preliminary request. Over the last few years, ENERAGON has been successfully implementing a strategy for generating an in-house succession pool, which suggests individual retraining and professional development of employees who are motivated to work their way up the career ladder inside the Company. We successfully convert professional competences and skills of our specialists into benefit for partners, reliability of energy systems, and comfort and safety for people. ENERAGON's ESG strategy keeps evolving. Following the requirements of global and national initiatives in the sphere of social, environmental, and managerial business accountability, our company with every passing year is assimilating new areas and looking for new ways and solutions in order to mitigate ESG risks and to achieve our sustainability goals.

THE ASTERION BRAND HAS BEEN DEVELOPING IN THE MARKET OF THE RUSSIAN FEDERATION SINCE 1998

EQUIPMENT UNDER ENERCON'S BRANDS IS SUPPLIED TO GOVERNMENT AND
COMMERCIAL CUSTOMERS



JUNGHEINRICH

KÄRCHER

TOYOTA

MATERIAL HANDLING

TENNANT

CAT



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+90 212 951 00 59



asterion-batt.com.tr



info@energonturkey.com