



The battery of the future

2020-21

BUSINESS PROFILE

Energy storage systems provide a wide array of technological approaches to managing our power supply in order to create a more resilient energy infrastructure and bring cost savings to utilities and consumers. Go green and reduce the CO₂ foot print is the objective



CEO Message

Khubaib Khan

Our market strategy over the past year was to position the company for growth by selling products directly and through distribution channels. Management also focused on consolidating the business operations and identifying global Green Technology partners and integrators to prepare for expected growth in 2021. We strengthened our suppliers, trained our people, developed strategic partners, and built up our sales pipeline which typically requires a 12 – 18 months cycle.

Our value proposition is closely aligned with biomass energy producers and we are also working to become more than just a value-added supplier of equipment. We see real value in these types of applications as it creates more of a recurring revenue stream. Households, Commercial and industrial clients are our partner in spreading economical energy and reducing CO₂ emissions with substantial cost-effective Energy Storage Solution. As a result, we are identifying large and scalable opportunities in this area, including licensing agreements and potential mergers and acquisitions.

VISION

We are committed to utilize and sustain green energy sources to play our role for the global cause of CO₂ emission-free world.

MISSION

Lead the world in employing innovative energy and engineering solutions to sustainably manage the Earth's resources and to meet society's needs.



1

The newly-released **Third National Climate Assessment** has some eye-opening news about climate change. It confirms that if greenhouse gas emissions are not reduced it is likely

- Increased severity of dangerous smog and particulate pollution in many regions
- Intensified precipitation events, hurricanes, and storm surges
- Reduced precipitation and runoff in the arid West
- Reduced crop yields and livestock productivity
- Increases in fires and the prevalence of diseases transmitted by food, water, and insects
- Increased risk of illness and death due to extreme heat

More flooding

Other changes are even more dramatic. Residents of some coastal cities see their streets flood more regularly during storms and high tides. Inland cities near large rivers also experience more flooding.

2

Temporary reduction in daily global CO₂ emissions

At their peak, emissions in individual countries decreased by -26% on average. The impact on 2020 annual emissions depends on the duration of the confinement, with a low estimate of -4% (-2 to -7%) if per-pandemic conditions return, and a high estimate of -7% (-3 to -13%) if some restrictions remain worldwide

3

How can we play our role for the global cause

As a responsible citizen, we should think green by adopting green technology. ECO-ESS provide wide range of environmental friendly products to support this global cause. Go Green is the only solution to reduce greenhouse gas Emission.

4

Energy Storage Solution

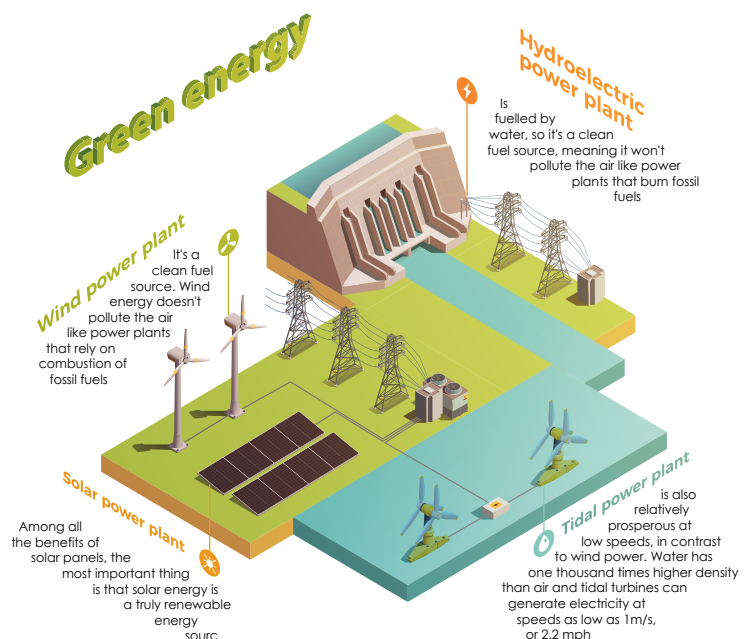
ECO-ESS is determined to procure and sell highly efficient Energy Storage Solution (ESS) in the UK & EU market and in surroundings which would contribute substantial value to the economy and society.

ECO ESS is looking for partners / distributors, dealing with residential and commercial projects, builders, consultants, contractors, Solar installers, Battery operated / backup suppliers, and renewable energy products suppliers for further expansion. With their well-structured planning and thorough market research, ECO ESS has identified the potential for fast-moving products Which should lead to saving energy, reduce electricity bills/cost, and CO₂ emission and pull towards mass job creations and growth into the national and international markets. ECO ESS would supply and provide a complete support package to their potential partners and keep a presence on-line and off-line through various distribution models for a B2B business, with the aim of achieving quicker growth.

We support our customers on their individual journeys toward decarbonization with customized needs of their ESS. We push the transition to a more sustainable energy world. Our products, solutions, and services cover nearly the entire energy value chain. We have the Know-how, the innovative technologies. We turn ideas into reality.



Beyond enabling the increased use of renewable electricity generation, improved energy storage technologies as well



Usage & Utilization

Implementation for house holds, commercial buildings, Solar system, Micro grid station, wind turbine, Telecom sector, Electric Vehicles, Rails and renewable other energy backups.

Product Range

- 1- Household ESS from 5KW/h - 10KW/h
- 2- 50AhUPS and start battery
- 3- 100AhUPS and start battery
- 4- 35Ah and 45Ah Telecom Station module
- 5- Punch module
- 6- For forklift 4P11S / 12P20S/4P12S
- 7- Intelligence charging ESS
- 8- For Robot ESS
- 9- 1Mwh Container
- 10- Mwh container

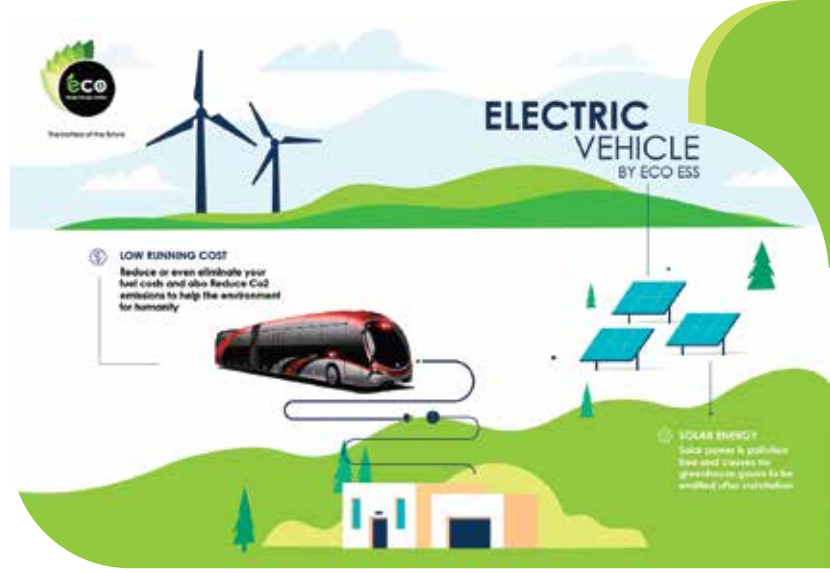
ESS LTO battery features

- 1- Altairnano is innovative and will provide market-leading ESS and batteries for the UK market – long lasting up to 30 years life and quick chargeable – saving energy and time and both are costly.

Electric Vehicle

Electric vehicles (also known as electric cars or EVs) are connected, fun, and practical. They can reduce emissions and even save your money.

Fueling with electricity offers some advantages not available in conventional internal combustion engine vehicles. Because electric motors react quickly, EVs are very responsive and have very good torque. EVs are often more digitally connected than conventional vehicles, with many EV charging stations providing the option to control charging from a smart-phone app.



- 2- Socio & economic support by ECO ESS and bespoke batteries that can be the greater energy saver contributor.
- 3- Highly efficient ESS
- 4- Patented, High-Efficiency LTO Battery Technology
- 5- Non-Explosive, Fireproof
- 6- Performance in a wide temperature range of -30 to 60 C°
- 7- Fast charge capabilities
- 8- Warranty of 5 years
- 9- 30 Years' service life
- 10- World-renowned clients such as Bombardier, Ford, BAE Systems, China State Grid Corporation, etc.
- 11- Only viable ESS solution for sub-zero conditions

EVs can also reduce the CO₂ emissions that contribute to climate change and smog, improving public health and reducing ecological damage. Charging your EV on renewable energy such as solar or wind minimizes these emissions even more.

“ECO- ESS Provides the best EVs from club car to public transport such as Electric buses & trains”



Why Lithium Battery?



Design life is up to 15 years

Our LFP battery capacity is over 80% left after 1C charge & discharge under 100% DOD condition for 3500 cycles. The design life is up to 15 years. But the lead-acid battery will only cycle 500 times at 80% DOD.



Free Maintenance

Free Maintenance. No waterfilling, no terminal tightening and cleaning of acid deposits on the top of our batteries.



Safety & environmental protection

The lithium-ion battery is environmentally friendly. No emission of toxic and hazardous chemicals. No lead evaporation.

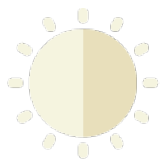
No hydrogen during charging. Less turf compaction due to lower vehicle weight.



Light weight

Half of the size and of the weight take a big load of of the turf, protecting one of customer's most valuable assets.

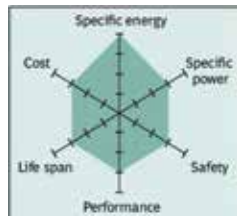
The lighter weight also means the golf cart can reach higher speeds with less effort and carry more weight without feeling sluggish to the occupants.



Why Lithium Titanate (Li_2TiO_3)-LTO



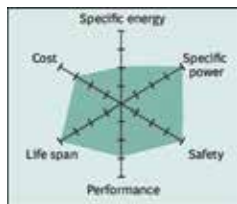
Lithium Nickel Manganese Cobalt Oxide (LiNiMnCoO_2) — NMC



Lithium Nickel Manganese Cobalt Oxide: LiNiMnCoO_2 , cathode, graphite anode
Short form: NMC (NCM, CMN, CNM, MNC, MCN similar with different metal combinations) Since 2008
Voltages 3.60V, 3.70V nominal; typical operating range 3.0–4.2V/cell, or higher
Specific energy (capacity) 150–220Wh/kg
Charge (C-rate) 0.7–1C, charges to 4.20V, some go to 4.30V; 3h charge typical. Charge current above 1C shortens battery life.
Discharge (C-rate) 1C; 2C possible on some cells; 2.50V cut-off
Cycle life 1000–2000 (related to depth of discharge, temperature)
Thermal runaway 210°C (410°F) typical. High charge promotes thermal runaway
Cost ~\$420 per kWh (Source: RWTH, Aachen)
Applications E-bikes, medical devices, EVs, industrial
Comments Provides high capacity and high power. Serves as Hybrid Cell. Favorite chemistry for many uses; market share is increasing. Leading system; dominant cathode chemistry.

2019 update

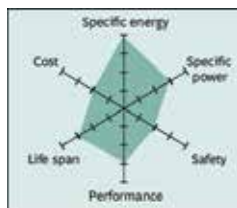
Lithium Iron Phosphate(LiFePO_4) — LFP



Lithium Iron Phosphate: LiFePO_4 , cathode, graphite anode
Short form: LFP or Li-phosphate - Since 1996
Voltages 3.20, 3.30V nominal; typical operating range 2.5–3.65V/cell
Specific energy (capacity) 90–120Wh/kg
Charge (C-rate) 1C typical, charges to 3.65V; 3h charge time typical
Discharge (C-rate) 1C, 25C on some cells; 40A pulse (2s); 2.50V cut-off (lower than 2V causes damage)
Cycle life 2000 and higher (related to depth of discharge, temperature)
Thermal runaway 270°C (518°F) Very safe battery even if fully charged
Cost ~\$580 per kWh (Source: RWTH, Aachen)
Applications Portable and stationary needing high load currents and endurance
Comments Very flat voltage discharge curve but low capacity. One of safest Li-ions. Used for special markets. Elevated self-discharge. Used primarily for energy storage, moderate growth.

2019 update

Lithium Nickel Cobalt Aluminum Oxide (LiNiCoAlO_2) — NCA



Lithium Nickel Cobalt Aluminum Oxide: LiNiCoAlO_2 , cathode (~9% Co), graphite anode
Short form: NCA or Li-aluminum - Since 1999
Voltages 3.60V nominal; typical operating range 3.0–4.2V/cell
Specific energy (capacity) 200–260Wh/kg; 300Wh/kg predictable 90–120Wh/kg
Charge (C-rate) 0.7C, charges to 4.20V (most cells), 3h charge typical, fast charge possible with some cells
Discharge (C-rate) 1C typical; 3.00V cut-off; high discharge rate shortens battery life
Cycle life 500 (related to depth of discharge, temperature)
Thermal runaway 150°C (302°F) typical, High charge promotes thermal runaway
Cost ~\$350 per kWh (Source: RWTH, Aachen)
Applications Medical devices, industrial, electric powertrain (Tesla)
Comments Shares similarities with Li-cobalt. Serves as Energy Cell. Mainly used by Panasonic and Tesla; growth potential.

2019 update

Lithium Titanate (Li_2TiO_3) — LTO



Lithium Titanate: Cathode can be lithium manganese oxide or NMC; Li_2TiO_3 (titanate) anode
Short form: LTO or Li-titanate Commercially available - since about 2008.
Voltages 2.40V nominal; typical operating range 1.8–2.85V/cell
Specific energy (capacity) 50–80Wh/kg
Charge (C-rate) 1C typical; 5C maximum, charges to 2.85V
Discharge (C-rate) 10C possible, 30C 5s pulse; 1.80V cut-off on LCO/LTO
Cycle life 3,000–7,000
Thermal runaway One of safest Li-ion batteries
Cost ~\$1,005 per kWh (Source: RWTH, Aachen)
Applications UPS, electric powertrain (Mitsubishi i-MiEV, Honda Fit EV), solar-powered street lighting
Comments Long life, fast charge, wide temperature range but low specific energy and expensive. Among safest Li-ion batteries
2019 update Ability to ultra-fast charge; high cost limits to special application.

Source: batteryuniversity.com - types_of_lithium_ion

“One of the greatest challenges humanity must face in the upcoming years is to produce sufficient sustainable energy to support the economic growth and to help lifting millions of people out of poverty.

Operating excellence and technology innovation are the key factors for winning this challenge”



CONTACT US

For any query please feel free to contact us



+ 44 (0) 7888429958
+ 44 (0) 116 366 9980



072- Evington Road,
LE2 1HH Leicester, UK



aazib@ecoess.co.uk
www.ecoess.co.uk



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