

# EV power play

NEW POWER PROGRESS TALKS TO ESAGONO ENERGIA, MANUFACTURER OF ALL-ELECTRIC UTILITY VEHICLES WHICH FEATURE LFP BATTERY TECHNOLOGY FROM FLASH BATTERY. BY ROBERTA PRANDI



Electric vehicles from Esagono Energia

It was nothing less than a vision of the future that convinced Stefano Carmeli, CEO of Esagono Energia, to convert his electronic components manufacturing company to the production of electric-powered utility vehicles. That was in 2011. Just four years later, supported by the introduction of lithium iron phosphate (LFP) batteries produced by another Italian company, Flash Battery, Esagono unveiled its first vehicle, a compact shuttlebus.

Massimo Tabacco, chief technical officer at Esagono Energia, explains that before being introduced to Flash Battery the company had been using lead acid batteries that were considerably larger and heavier. After that encounter, the two companies worked to develop a solution based on a pack comprised of the more compact and lighter LFP cells. The final product was homologated for on-highway use in 2016.

LFP batteries are highly customisable, which allows all of the solutions delivered by



Esagono Shuttle

Flash Battery to be tailored for the specific application. Since 2012, the company has delivered more than 200 MWh for a series of industrial machines and electric vehicle projects around the world. This has resulted in the development, customisation and production of more than 500 different battery models.

## BMS AND DATA CENTER

The technology behind Flash Battery's products includes some other key features, such as the proprietary battery management system (BMS). This includes the Flash Data Center remote software, which is able to monitor the health of each battery cell. The automatic data control is an important feature of the Flash Data Center, offering analysis of the battery condition on a daily basis. Based on these self-diagnostics, any anomalies generate a warning in real time, helping to support predictive maintenance schedules.

The Flash Balancing System is another feature which goes beyond conventional BMS operation (20A). Acting both actively and passively, the tech can balance power

throughout the charging cycle and during discharge. This delivers several advantages, such as ultra-quick balancing times (under 30 minutes) and maximum run time for the battery packs.

Last but not least, development of third-generation cells has enabled Flash Battery to significantly increase energy density of the battery packs, from 134 to 207 Wh/L in only three years. This improved energy density means reduced battery pack volume, without affecting guaranteed safety levels.

## KEY CHARACTERISTICS

Esagono has gone on to use LFP cells across all its N1 category vehicles, the packs incorporating Flash Battery's BMS. The line up has evolved beyond passenger minibuses to include utility vehicles up to 2.2-ton GVW, suitable for waste collection, street cleaning, or irrigation in agricultural settings. A specially-adapted vehicle supplied to an Australian customer is even being used for railway maintenance.

There are two key characteristics to vehicles produced by Esagono. The all-aluminium chassis is very light, only weighing



Massimo Tabacco with an Esagono EV



Flash Battery  
LFP battery  
packs



## Delivered specs

Matteo Donelli, sales director at Flash Battery, explained some of the characteristics of battery packs developed specifically for Esagono Energia.

"We have validated five product codes with voltages between 64 and 76.8 Vdc. These battery packs cover a power range from 8 to 26.8 kWh." He said that these packs have been specially designed to cover all functionality required in this market sector, such as a heating system, automotive-type connectors, IP65 housings, rapid charging capability, combined balancing at high power, etc.

"Esagono Energia is one of Flash Battery's main customers in the EV market, a strategic market for our company," concluded Donelli.

about 130 kg. Combined with the lightweight powertrain and a battery pack this delivers a clear advantage in range and operating hours. Tabacco explains that the pickup vehicle, fitted with 16 kWh LFP pack and a 3.2 cubic metre tipping body for waste collection, has a total vehicle weight under 1.3 tonnes (including the electro-hydraulic system for tipping). He adds that the battery pack for a 2.2-tonne waste recovery vehicle could have a capacity of up to 26.8 kWh when using 420 Ah cells. All vehicles feature a brake regeneration system, which sends charge back to the battery pack.

The other characteristic is that all Esagono vehicles are made in Italy. Located near Milan, assembly is completed using parts sourced nationally from quality suppliers. "The driveline is composed of a driven rigid rear axle and transfer case. The asynchronous electric motor, mounted in the transfer case, has a nominal power output of 10 kW, supported with fan-driven air cooling," says Tabacco.

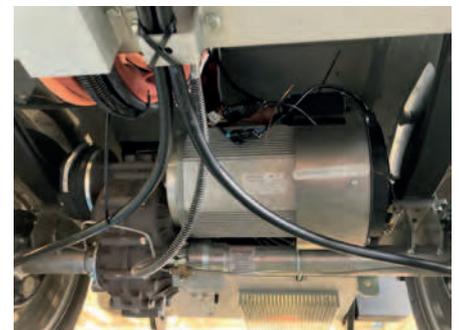
"The front axle is non-driven, while the

battery pack is positioned safely between the front and rear axle, with 400 mm of ground clearance."

Tabacco explains that the drivetrain (rear axle, differential, electric motor) that delivers best performance with regards to power and noise reduction is the TX2 Series from Benevelli Group.

"The adoption of LFP batteries has proven to be the breakthrough for our vehicles," comments Tabacco. "After overcoming battery cost, our customers have realised that the additional investment can be recovered after four years of vehicle operation. It's also offset by other factors, including reliability, flexibility - in terms of charging and discharging cycles - ease of use and extended working life."

Tabacco explains that Flash Battery LFP units applied to Esagono vehicles have surpassed the volumes of all other battery types. They feature on vehicles marketed in Italy and other EU countries, including The Netherlands, Spain, Portugal, Germany, France, the UK and Northern Ireland. Vehicles



Rear axle from Benevelli Group

are also exported to Mexico, the Middle East, and some countries in East Asia.

Esagono Energia operates a 'quality first' assembly process, where all components are tested before being applied to the vehicle. Every finished machine is run on a rolling test bench, which is followed by a 12 km test on a track designed to simulate a range of driving conditions. "We were attracted by Flash Battery's products for the very same reason," says Tabacco. "They also have a rigorous process to support product quality, something which is not very common in the small-scale automotive market."

**NPP**



Finished vehicle testing at the Esagono factory