

# **BATTERY SYSTEMS TO ACCOMPANY THE GREENING OF THE RAIL LANDSCAPE**

January 2019  
Forsee Power

### Batteries that benefit the environment, comfort and the public purse

The pace of the energy transition is accelerating in transport markets. Following on from the shift to electric power for buses in China and Europe, the rail industry is now close behind as it moves towards a sustainable energy transition. First in Asia and now in Europe, many projects are underway simultaneously, not only for passenger transport, but also for maintenance operations.

Batteries play a dominant role in the operation of these new hybrid energy trains. The autonomous solution offered by onboard lithium-ion battery systems enables not only cleaner traction with significantly lower emission levels, but also assured continuity of service and onboard comfort for passengers and service personnel, especially when the train is platformed and no longer connected to electrical power by the catenaries: air conditioning/ventilation, door opening or even keeping fridges cold in restaurant cars.

For maintenance personnel working outside trains, the use of batteries delivers significant improvement in working conditions by eliminating the pollution and noise generated by diesel engines, especially during repair work in tunnels.

Opting to fit trains with batteries also allows some sections of track to be free of electric infrastructures like catenaries, which are extremely expensive and complex to install and maintain. Over and above infrastructures, maintenance costs are much lower for clean energy vehicles.

### Multiple energy combination options

Batteries are effective in combination with many different energy sources, including electric catenaries, diesel and hydrogen, and offer benefits that are not solely ecological, but also economical and improve passenger and maintenance operator comfort.

- **Batteries + hydrogen**

Batteries are inherent to hydrogen-based traction solutions. The fuel cell converts hydrogen to fuel the batteries. The batteries then regulate the process by storing energy when the fuel cell supplies surplus energy, and releases it when the opposite applies.

- Cleaner, cheaper transport that limits the use of electrical power infrastructures.

- **Batteries + diesel**

Batteries are the most economical way of greening today's diesel trains. The battery takes over from the conventional diesel engine, thereby reducing CO<sub>2</sub> emissions, especially in stations, making life more comfortable for station personnel and travellers.

The energy is recovered and then stored during braking. It is then reused during the traction phases over short distances (leaving the station or travelling to the depot). In the event of main power supply failure, the battery ensures traveller comfort and safety by providing power for lighting, door operation, ventilation, communication systems, etc.

- Cleaner, cheaper transport that limits the use of electrical power infrastructures.

- **Batteries + catenaries**

Installing catenaries can be extremely costly and very complex (from a simple task to something ten times more challenging, depending whether the installation is for a standard track or in a tunnel). Incorporating batteries provides a simpler and more economical solution for extending the network. The energy provided by the batteries powers those sections of train sets not fitted with catenaries, which are therefore unpowered.

- A zero-emissions transport option that costs less (lower investment and infrastructure maintenance costs) and leaves the natural landscape intact.

*N.B.*

*In terms of track maintenance, a 100% electric option is being introduced to improve working conditions for maintenance technicians: lower CO<sub>2</sub> emissions and less noise, both of which are very well received in confined spaces like tunnels. Manufacturers such as SOCOFER are developing new products for this market, and RTM has already placed orders for speeders that will be used in the Marseille metro system and for its associated maintenance.*

### **A French electric mobility sector committed to making railways greener**

Battery manufacturers now have a mature high-technology offering that has already proved itself in electric buses, and are now working with rail industry manufacturers. One of them is Forsee Power, the French manufacturer of smart battery systems.

The French company offers the most comprehensive choice of batteries for the transport market, with 3 ranges: the high-energy (NMC lithium-ion) Zen range, the high-power Pulse range (LTO), and the Flex range for a balanced mix of energy and power (NMC). It works alongside leading French and international manufacturers.

## Briefing note

Its batteries are manufactured at the company's new production facility in Poitiers, which opened this summer, already employs more than 100 people, and will employ 300 by 2021.

SOCOFER, the French company that has been manufacturing rail infrastructure equipment since 1920, has opted to fit its locomotives with Flex 7 battery solutions that will deliver 150 and 500 kWh of energy and 300 to 1500 kW of power. This system will be fitted to the maintenance locomotives operated by the Régie des Transports Métropolitains network in Marseille.

Alstom has chosen Forsee Power for its project to hybridise (diesel + battery) the Regiolis regional express train. This project involves replacing half of its diesel train sets with high-power lithium-ion batteries that will recover braking energy for storage, and will then use that energy in stations and dense traffic areas. The first tests using the Pulse (LTO) high-power battery adapted for rail applications will be run in 2020 ahead of full deployment the following year. The project aims to reduce energy consumption by 20%.