

## HESOP BRAKING FOR POWER



A HESOP substation in testing on a La Rochelle experimental track in September 2009.

### PRINCIPLE

HESOP\* is a tramway substation that captures the energy produced during braking and reinfuses it into the electrical grid, all the while prioritizing the natural flow of energy between vehicles.

HESOP's design optimises the power system, starting with a perfect control of the current and quality of the energy consumed then reinfused into the EDF grid.

Currently available for 750 V rail networks, HESOP is being developed for 1500 V to 3kV urban (metro) and suburban networks. In July 2010, one of these reversible substations will be installed on the 1 line of the Parisian tramway, at the Pablo Picasso station.

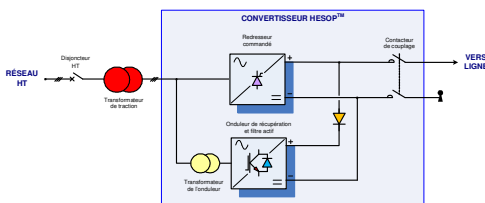
### HOW IT WORKS

In direct current, a traditional substation only lets power flow in one direction: when the vehicle brakes, its electric power is transmitted along the conversion line and reinfused into the catenary to feed other nearby vehicles.

The HESOP substation's novelty lies in its added undulator that, in hauling phases, optimises power use, and during braking, captures at least 99% of recoverable energy and reinfuses it upstream into the grid.

The savings benchmark on urban transit networks is 15% of the annual power used in traction.

HESOP works best for rail networks on hilly landscapes or with frequent stops where brakes are tapped often: tramways, subways or RER.



HESOP compensates for harmonics and provides optimal recovery of braking power.

### AVANTAGES

- 15% power savings on urban networks
- Compatible with direct current 600V to 3kV fed lines.
- Ecodesigned with clean and recyclable materials for minimal environmental impact.

\*Harmonic and Energy Saving Optimizer