



# Enviline ESS – Energy Storage System

Reduce energy and peak power costs

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## Reduce energy and peak power costs

**Transportation is energy intensive and it is not surprising that electric rail transit operators are amongst the largest consumers of electricity in their urban territory. To increase sustainability, these operators can no longer consider energy as just a cost of operation and need to look for ways to reduce both their consumption and peak power demands.**

Fortunately, mass urban transit systems offer an inherent opportunity to recover braking energy and as a large base load, can modulate their consumption to participate in other ancillary services to support grid stability and security. When trains brake, their kinetic energy is converted into electricity and returned on the traction power line. Most of the time, on-board loads and distant trains can only take a portion of this energy, and the surplus is wasted into resistors.

**Enviline™ ESS is a wayside energy storage system that stores and recycles this surplus energy, helping reduce the energy consumption up to 30 percent\*.**

The ESS captures this braking energy and returns it seconds later to sustain the acceleration. Built with high performance and configurable controls, the ESS can be programmed to work optimally under a variety of site conditions and application requirements. The high power and large number of cycles that are generated by the train braking effort make super capacitors an ideal and effective storage. For more energy intensive applications, the ESS can easily adapt to Li-Ion batteries, and/or other means of storing energy.

Trains also draw excessive peaks of power during their acceleration. This causes voltage drops which can lead to performance problems and results in large demand charges and peak power penalties from the utility company.

The Enviline ESS is an ideal solution for demand charge reduction and voltage support. Because it returns the energy during the acceleration, the ESS limits the power drawn from the grid and sustains the voltage level of the train power. This reduces the demand charges as well as peak power penalties and can also be used to avoid or defer potential capital investments to fix voltage levels and quality problems.

### Key benefits

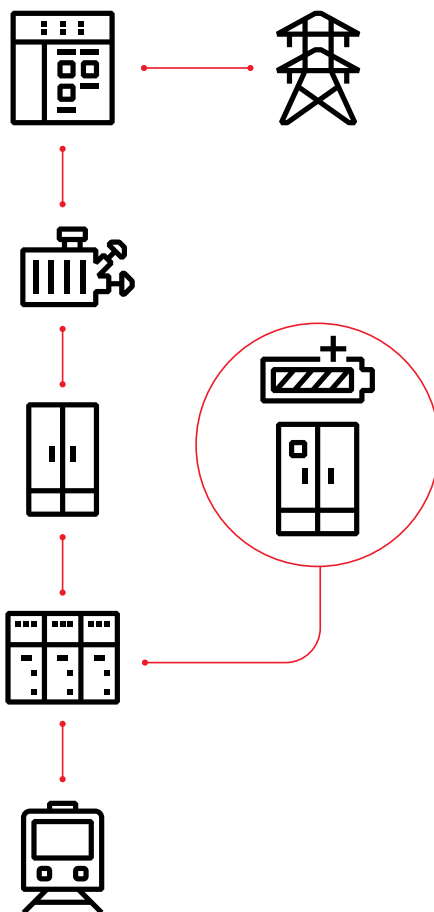
- Lowers energy costs through energy recovery
- Reduces the demand charge and peak power penalties by cutting the starting power of trains
- Defers capital expenditures needed to sustain the voltage level of the DC traction power line
- Makes the substation smart and capable of generating benefits on the local grid and additional revenues for the rail operator
- Compatible with existing train systems and deployed with no impact on the train operation and traction power system
- Can be used for emergency traction power during power outages

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\*The level of savings will depend on the operating conditions of the system. ABB can assist in determining the expected level of energy savings for specific scenarios

## Envine

Reliability and efficiency on track



### Fixed or mobile off-grid power

Long spacing between substations, maintenance activities and outages can often leave the rail operator with complex challenges and expensive measures to ensure reliable service

The Envine ESS can be deployed as a fixed or mobile off-grid substation connected solely to the overhead catenary system (OCS) or 3rd rail power. During the coasting period of the train, the existing infrastructure supplies virtually no power. The ESS uses these periods to capture and store energy, enabling it to later supply it back as needed to sustain the voltage and train operation.

### A smart substation that can generate revenues

Utilities are challenged to remove their fossil-based generation in favor of renewable energies. For them, implementing demand response can be much more economical than building for peak capacity in the generation, transmission and distribution.

The ESS can be configured with super capacitors and batteries to combine the benefits of braking energy recovery and peak power reduction with local grid support services such as frequency regulation, peak shaving or demand shifting. Talk to ABB to see how the ESS was deployed in Philadelphia to provide the regional train operator with revenue generating frequency regulation services on the local energy market of PJM.

### Key features

- Operates on 600, 750, 1500 and 3000 V
- Modular packaging allows independent sizing of power and storage
- Automatic rebalancing of the super capacitors to maintain the storage capacity
- Flexible programming to ensure optimum operation at each site
- Ease of deployment with no AC connection
- Expandable with batteries to provide smart grid services and revenue generation
- Expandable to 5.2 MW, 121 MJ (EDLC) and 2.5 MWh (Li-Ion) per line-up and parallelable for large applications
- Remote access and email notification
- Energy metering, operational dashboards and downloadable data files

Technical data	Enviline ESS 750	Enviline ESS 1500	Enviline ESS 3000
Nominal voltage	750 VDC	1500 VDC	3000 VDC
Rated system voltage	900 VDC	1800 VDC	3600 VDC
Rated system power	1.35 / 2.7 MW	2.6 / 5.2 MW	2.1 MW
Rated system current	1800 / 3600 ADC	1740 / 3480 ADC	580 ADC
Converter width	2000 / 3000 mm	2200 / 3200 mm	2200 mm
Converter depth	1600 mm	1600 mm	1600 mm
Converter height	2300 mm	2300 mm	2300 mm
Converter weight	2500 / 4000 kg	2700 / 4400 kg	4000 kg
Duty cycle class	I-X / IEC 62924:2017*	I-X / IEC 62924:2017*	I-X / IEC 62924:2017*
Earthing	acc. to IEC 61992-7-1 / IEEE 1653.6	acc. to IEC 61992-7-1 / IEEE 1653.6	acc. to IEC 61992-7-1 / IEEE 1653.6
Installation	Indoor / Container	Indoor / Container	Indoor / Container
Operating temperature	up to 40°C*	up to 40°C*	up to 40°C*
Degree of protection	NEMA 2 / IP 21*	NEMA 2 / IP 21*	NEMA 2 / IP 21*
Remote access	TCP/IP / RS485 (Modbus) / DNP 3*	TCP/IP / RS485 (Modbus) / DNP 3*	TCP/IP / RS485 (Modbus) / DNP 3*
SCADA output	4 contacts*	4 contacts*	4 contacts*
Standards and tests	IEC 62924:2017	IEC 62924:2017	IEC 62924:2017
<b>Energy Storage (EDLC)</b>			
Rated energy up to	25.3 kWh / 91.2 MJ	33.8 kWh / 121.6 MJ	33.8 kWh / 121.6 MJ
Rated energy per panel	2.1 kWh / 7.6 MJ	2.1 kWh / 7.6 MJ	4.2 kWh / 15.2 MJ
Panel dimension (WxDxH)	600x1600x2300 mm	600x1600x2300 mm	1200x1600x2300 mm
Panel weight	1100 kg	1100 kg	2200 kg
<b>Energy Storage (Li-ion battery)**</b>			
Rated energy	100 kWh – 2500 kWh	100 kWh – 2500 kWh	100 kWh – 2500 kWh

\* other on request, \*\* project specific

For more information and local contacts, please visit:  
<https://new.abb.com/medium-voltage/switchgear/railway-switchgear/dc-traction-power-supply>

[abb.com/contact](https://new.abb.com/contact)

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