Innovative flash charging technology
The TOSA e-bus is a viable solution for urban mass transit, making catenaries, large and heavy batteries, range and schedule limitations as well as greenhouse gas and noise emissions a thing of the past.

ABB has developed and optimized its flash-charging technology and onboard traction equipment for high-frequency and high-capacity bus routes. By selecting the appropriate technologies and ensuring optimal energy management, the system can save as much as 1,000 tons of CO₂ on a bus line covering approximately 600,000 kilometers per year. In addition, the e-bus’ energy costs are 30 percent below those of a diesel bus.

Smart energy management
The flash-charging technology allows the bus to take on energy at selected bus stops along the route, reducing battery size and weight, and freeing space to accommodate up to 143 passengers. The energy from the charging equipment is stored in compact roof-mounted batteries, along with the vehicle’s braking energy, powering both the bus and its auxiliary services, such as interior lighting.

Feeding stations: flash/terminus/depot
There are three types of feeding stations:
• Flash-charging stations at selected bus stops providing a short high-power boost at 600 kilo-watt (kW) for 15 seconds (s).
• Terminal feeding stations delivering more prolonged charges of 4-5 minutes (min) at 400 kW.
• Depot stations applying a longer charge to provide the energy required to travel between the line and the depot location. Buses are recharged at 45 kW for about 30 min.
Flexible drivetrain solutions
ABB’s innovative drivetrain system includes a highly integrated traction and auxiliary converter for roof-mounting. The traction converter is of compact design and highly energy-efficient. The permanent magnet traction motor is especially designed for e-bus applications. The Lithium-titanate battery unit is capable of being rapidly charged and discharged. The solution is completed by the energy transfer system (ETS), a laser-controlled moving arm that docks into the overhead receptacle of the flash-charging station in less than a second, making it the world’s fastest connecting system.

High speed and fully automatic energy transfer system
• Fast connection to high-power charger in less than 1 s
• Fully automatic so that the driver is not distracted by the connection process and can focus on passengers, pedestrians and traffic.
• Full compensation for distance to sidewalk: 0 to 70 cm
• Receptacle: 3-meter length to optimize approaching speed
• High power: < 600 kW
• Energy efficiency: Less than 1 percent loss
• Health and safety: Compliant with RNI norms and directives (ICNIRP)

• Ambient conditions: Year round operation with snow, rain, hail, fog and ice. Resistant to dust and pollen pollution.

Efficiency vs Autonomy
The TOSA concept prioritizes efficiency over autonomy. This implies smaller onboard batteries and a lighter more energy-efficient bus, allowing for a higher passenger capacity.

Flash-charging stations at selected bus stops along the route recharge the buses’ batteries while passengers are embarking and disembarking. The opportunity-charging principle minimizes infrastructure investments while ensuring optimal and safe operation and also permitting higher flexibility in route layout and integration with other public transport systems including tramways.