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## rolling stock innovation

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Written by William C. Vantuono

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Bombardier will build NJT's new Multilevel III fleet, which includes

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powered cars.

**By 2026, provided the procurement is fully funded and all options are exercised, New Jersey Transit—empowered by an infusion of much-needed funding by Governor Phil Murphy following a starvation diet imposed by his predecessor, Chris Christie—will have replaced its entire fleet of aging single-level cars with nearly 650 new Multilevels, many of which will be powered electric vehicles, the first of their type in North America.**

On Dec. 12, NJT, as part of its Fiscal Year 2018 budget, awarded Bombardier Transportation a \$669.1 million contract for 113 Multilevel III regional/commuter railcars: 58 powered cars with electric propulsion (AC catenary), and 55 non-powered cars—33 cab cars and 22 trailer cars, 6 of those with ADA-compliant restrooms. With all options exercised—886 additional cars, including 636 for NJT and 250 for SEPTA, in a joint procurement—the total value of the contract for Bombardier is \$3.6 billion.

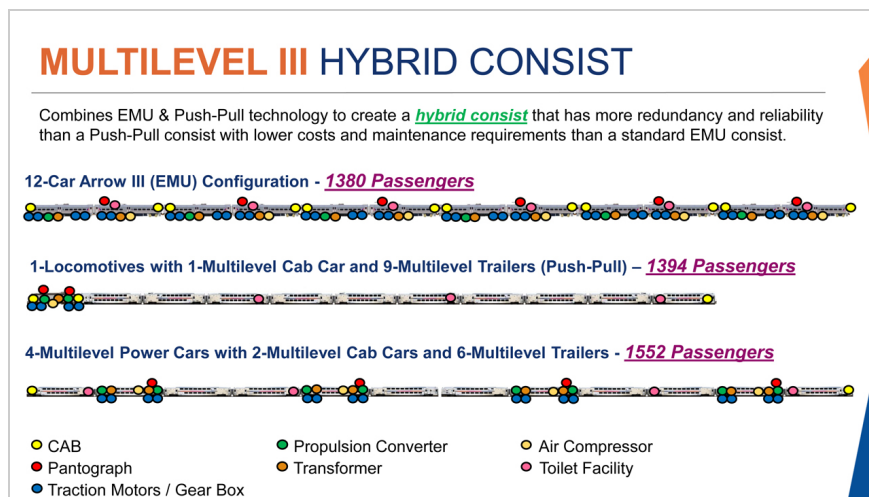


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Bombardier, which has supplied 421 Multilevel railcars plus a fleet of ALP-45DP dual-power (AC electric/diesel) and ALP-46 electric locomotives in recent years, won the Multilevel III contract over China's CRRC, the only other bidder.

LTK Engineering Services, NJT's primary vehicle design, engineering and manufacturing consultant that has worked on numerous contracts, was awarded a \$42 million contract (\$36.7 million plus 5% for contingencies) for the Multilevel III build. The new vehicles are scheduled to begin testing in the third quarter of 2022 and are expected to enter revenue service during the second quarter of 2023.



The order for 113 Multilevel IIIs, NJT's largest railcar order in recent years, will allow the agency to begin replacing the oldest equipment in its fleet, starting with the remaining 160 Arrow III EMU (electric multiple-unit) cars—which date to the 1970s and were rebuilt by ABB Traction in 1993—continuing with the Comet II, III, IV and V single-level cars.

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| December 12, 2018



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### **VIA Rail selects Siemens for flagship fleet renewal**

“This historic purchase is a perfect example of how NJ Transit is reclaiming its position as a national leader in transportation,” said Executive Director Kevin Corbett. “The new [powered] Multilevel III cars break new ground in railroad technology, and we’re proud that NJ Transit is leading the way. With this investment, we’ll be able to retire the oldest railcars in our fleet, while increasing reliability, efficiency and customer comfort.”

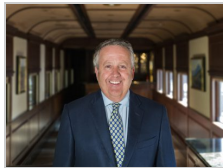
ARROW III & MULTILEVEL III COMPARISON		
 (1976 – PRESENT) 		
✗ No	Compliant with current Americans with Disabilities Act (ADA) regulations	✓ Yes
✗ No	Navigate phase gaps with different voltages automatically	✓ Yes
✗ Higher	Cost of operation, maintenance and spare parts	✓ Lower
✗ No	Compatible with existing Multilevel Vehicles & Locomotives	✓ Yes
✗ No	Regenerates power to the catenary	✓ Yes
80 MPH	Maximum Speed	110 MPH
✗ No	2 x 2 seating	✓ Yes
1380 Seats	12 Car consist capacity	1552 Seats
40,046 Miles	Mean Distance Between Failure (based on October 2018 data)	370,575 Miles

The groundbreaking aspect of this order is the 58 powered cars that, when combined with non-powered trailers and cab cars, will create “Hybrid EMU” bi-directional trainsets, with a cab car at each end. Each powered car, equipped with a single pantograph for AC current collection (from multiple voltage sources ranging from 11,000 to 25,000 volts AC) and two propulsion packages (transformer plus powered two-axle trucks with AC traction motors, one set at each end of the car), can haul up to two trailers/cabs. Thus, a 12-car Hybrid EMU trainset would consist of 4 powered cars, 6 trailers and two cabs. The maximum-size trainset NJT envisions, based on available platform length, not propulsion power, is 14 cars.

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| December 12, 2018

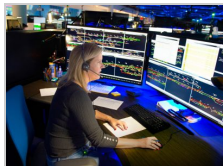


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| December 10, 2018

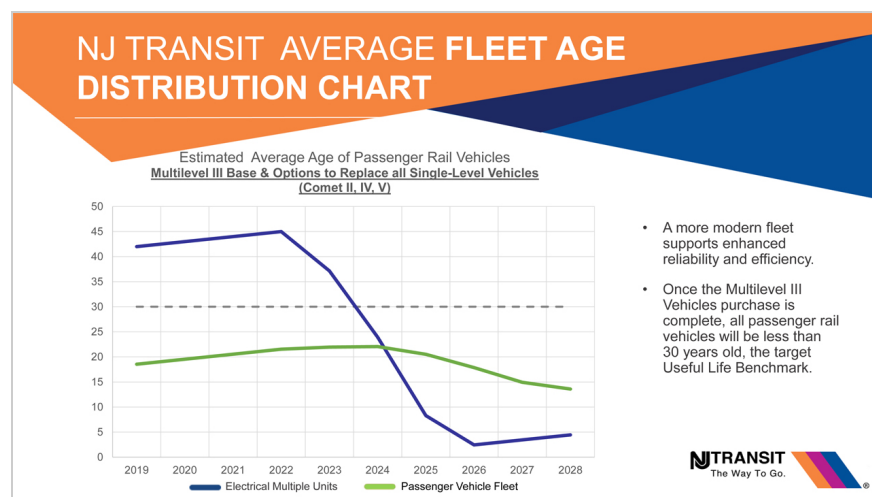


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**At Norfolk Southern, automation is driving information**  
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Since each powered car is equipped with two propulsion packages, there is no single point of failure, unlike locomotive-hauled consists. These units will feature regenerative braking that puts AC electricity back into the catenary power grid, and RDS (remote diagnostics). They will also feature FRA-mandated 180-day inspection cycles, as opposed to the 92-day Arrow III cycles. And once the NJT fleet is fully built out, it will be far more operationally flexible than what exists today.



Like NJT's 52 ALP-45DP locomotives (35 in service; 17 on order), the Multilevel IIIs will be the first of their type in North America. They are of course not the first EMUs in North America, but they are the first to combine current collection from AC catenary with AC traction motors and regenerative braking, and operate as a stand-alone vehicle (not in "married pairs"). They are also the first so-equipped multi-levels, with three seating levels (upper, lower and mid-level, at the car ends), as opposed to, for example, the gallery-style cars used by Chicago's Metra Electric service. As well, they can be mixed and matched in various

## automation-is-driving-information/)

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| December 12, 2018



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## It's official: Norfolk Southern to move HQ to Atlanta

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| December 12, 2018

configurations with non-powered trailers and cab cars, providing a great deal of trainset configuration flexibility. They increase seating capacity from 1,380 seats on a 12-car Arrow III trainset to 1,552 seats on a new 12-car Multilevel III trainset. They will feature the roomier and popular two-by-two seating, introduced on the Multilevel I and II fleets, as opposed to the uncomfortable and cramped three-two bench seats on all the single-level cars. Other customer amenities include USB charging ports and new, onboard information displays.

“This purchase is allowing NJ TRANSIT to take a step toward the goal of having the overall average age of all rail vehicles under 30 years old, making for a more modern fleet that supports enhanced comfort, reliability and efficiency,” NJT said. “The benefits of the Multilevel IIIs include reduced operating costs, higher acceleration [rates] and an 11% increase in seating capacity. The Multilevels also have a higher Mean Distance Between Failure (MDBF): 370,575 miles, compared to 40,046 miles for the Arrow IIIs, based on October 2018 data.”





As well, the Arrow III fleet is certified for an MOS (maximum operating speed) of 80 mph. The Multilevels, whether in self-powered Hybrid EMU or locomotive-powered push-pull trainsets, have an MOS of 110 mph.

*Editor's Note: Is NJ Transit back from the oblivion masterminded by the meddling, egocentric Chris Christie? Maybe not completely, but it's getting close. Way to Go, Kevin Corbett and NJT employees! I would also like to acknowledge the assistance of NJT Senior Director Equipment Design and Engineering Dave Carter, and Nancy Snyder from the Corporate Communications staff, in preparing this article. Rail transit advocates and historians Jeff Marinoff and Randy Glucksman provided historical information pertaining to EMU cars.*

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