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## **Despite Problems, Catenary Wires Beat Third Rails for Metro-North: Cameron on Transportation**

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There is hardly a season that goes by without Metro-North service disrupted by a “wires down” accident.

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That's when the overhead catenary that powers the trains breaks or is ripped from its poles, cutting electricity and service — ruining the commute for thousands.

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But why do we rely on such fragile wires, some of them installed 100 years ago? Isn't there a better way of powering our trains? Probably not.

Consider this: Metro-North is the only commuter railroad in the U.S. that relies on three modes of power: AC, DC and diesel.

Trains leaving Grand Central first operate on 750 DC current picked up from the third rail, just like New York's subways. Around Pelham, N.Y., the trains raise their pantographs (those triangular-shaped contraptions atop the cars) and convert to 12,500 volt AC current picked up from the catenary, hence the phrase "operating under the wire."

But there is no electricity on the Danbury and Waterbury branch lines, so those trains are powered by diesel. But even those diesels must operate on third-rail power in the Park Avenue tunnels for environmental and safety reasons.

That's a lot of technology for one railroad to administer and a lot of electronics. That is why the M8 cars that operate on AC and DC require separate power processing, adding to their cost.

The third-rail M7 cars that run on the Hudson and Harlem lines each cost about \$2 million. But our newer and more complicated M8s cost about \$2.75 million apiece.

So a lot of people ask: "Why not just use one power source by converting the entire line to third rail?"

As with so many other seemingly simple solutions, there are several good reasons why it wouldn't work.

The state Department of Transportation studied the idea in the 1980s. But it rejected it for these reasons:

- **There's not enough room** to add a third rail along most of the four-track system. The tracks would need to be moved, the right-of-way widened and the bridges and tunnels expanded. Imagine the cost.
- **Even if we did convert to third rail, we'd still have to maintain the overhead catenary system for Amtrak** whose locomotives are powered under the wire.
- **A third-rail power system needs more real estate.** Power substations are needed every few miles, adding to construction and cost.
- **Third-rail DC power is nowhere near as efficient** as overhead wire AC power. That means slower acceleration in third-rail territory and speed limits of about 75 mph vs 90 mph under the wire. The fastest trains in the world (like the TGV and Shinkansen) operate under the wire, though theirs is not as aged and brittle as ours.
- **A third rail is much more dangerous** to track workers and trespassers compared to overhead wires.
- **The third rail can ice up and get buried in blizzards**, causing short-circuits. We've had some amazing winter weather in Connecticut, but nothing that piled snow high enough to touch the overhead wires.
- Weather does cause problems for the catenary. In extreme heat, it can expand and sag. In bitter cold, it can become brittle and snap. **Both conditions require our trains to operate even more slowly,**

**but they still reach their destination.**

So what's the solution to our "wires down" problems? Accelerated replacement of old wire, better maintenance of pantographs and a little common sense — and not conversion to third-rail.

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