Early Electric **Railway** Lays **Tracks** for the **Future—Part 1**

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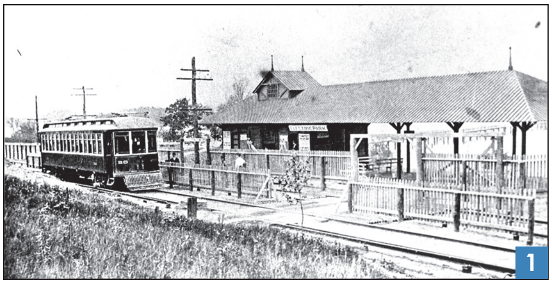
The wire fencing surrounding the Albany and Hudson Fast Line, an early third-rail electric railway system, was said to be pig proof, mule high, and bull strong. According to [2], it was the wire fencing and a generous distribution of danger signs that kept the animals and humans at a safe distance from the live current. Local lore tells a different story about the safety of that ground-level electrified third rail, from the little old lady who touched her umbrella to the rail and was sent airborne to a long series of unfortunate dogs whose lives came to an abrupt end after heeding nature's call on the rail.

The Albany and Hudson Railway and Power Company opened its electric railroad on 22 November 1900. Believed to be one of the first purpose-built, electric third-rail roads erected in the United States, the new line was one of many interurban lines serving the United States in the early 20th century (Figure 1). It used miles of new track to connect and extend the existing steam rail lines laid by a handful of smaller, local companies. Considered the longest road of its type at the time, the 37-mi line started in Hudson, New York, and passed north along Kinderhook Creek to reach the city of Rensselaer. Rights were obtained for an additional 1.2 mi of track to extend the line from Rensselaer to downtown Albany, the capital of New York.

Maximum speed on the Hudson local was 6 mi/h, but the speed on the through line reached 60 mi/h. A ride on the express run, from one end to the other, took as little as one hour and 13 minutes. The fast-line Hudson Limited provided commuting convenience for businesses and students; it left Hudson in the morning and returned directly from Albany in the afternoon. The railway, whose bright yellow and orange cars carried freight as well as people, derived its 600-V direct current power from a unique combination of steam and hydroelectric generation delivered from a dam and power station on the Kinderhook Creek, located about midway on the line at Stuyvesant Falls, New York.



The Electric Park train station in Kinderhook, taken in 1901. The fence kept visitors away from the third rail, which was charged with 600 V of electricity. (Photo courtesy of North Chatham Historical Society.)

The hydroelectric power project comprised a dam, water conveyance, powerhouse, and generating equipment. Constructed of coursed ashlar limestone with Portland cement mortar, the new dam was built downstream from the remains of an old timber dam dating to 1827 (Figure 2). The limestone blocks had been quarried nearby and transported to the work site by narrow gauge rail. The rail extended over the crest of the timber dam during construction, allowing workers to lift blocks directly to the new dam using gin poles rigged with block and tackle. After completion, the dam stood 13.5-ft high and 260-ft wide, abutted by the creek's natural rock walls.

At the east end of the dam, a water intake of cut stone with concrete overlays was constructed to guide water into two riveted steel penstocks. The intake, which was 11-ft wide and 42-ft high, included two steel head gates, a steel taintor gate (17-ft high and 10-ft wide), and a steel trash sluice. The penstocks, furnished and assembled by the Riter-Conley Manufacturing Company of Pittsburgh, Pennsylvania, measured 90 in (in diameter), with thicknesses ranging from 3/16- to a 1/2-in thick. They extended 2,860-ft downstream of the dam to the powerhouse. The powerhouse, which was 82 × 142 ft in plan and 35-ft high, was of gable-end type construction built with local brick. The downstream bay on the south side of the powerhouse was three stories high and ran the full length of the building. The lowest level of the south bay enclosed the turbine cases, the second level housed the low-voltage switchboards and transformers,

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and the third level held the high-voltage switchboards.

The power station housed ten turbines manufactured by the Stilwell-Bierce & Smith-Vaile Manufacturing Company of Dayton, Ohio (Figure 3). The ten Francis-type turbines ranged from a 15-in diameter turbine to a 33-in double-runner turbine and were housed in horizontal pressure cases. Four 33-in diameter turbines operating at 375 r/min drove 750-kW, 12,000-V, and three-phase 25-Hz generators. This power was transmitted to remote substations, where it was converted to direct current for traction power. Three 21-in turbines operating at 600 r/min drove both 125-kW and 50-kW generators operating at 2,200 V, single-phase, and 60 Hz for lighting circuits and for transmission along the tracks to remote communities. Local traction supply for the rail line was furnished by two 30-in turbines operating at 450 r/min, which drove direct current machines, each with 200-kW capacity operating at 600-V direct current. Excitation for all generators was produced by two 15-in turbines operating at 975 r/min that powered two 45-kW, 60-V direct-current generators. Lombard hydraulic governors controlled all turbines.

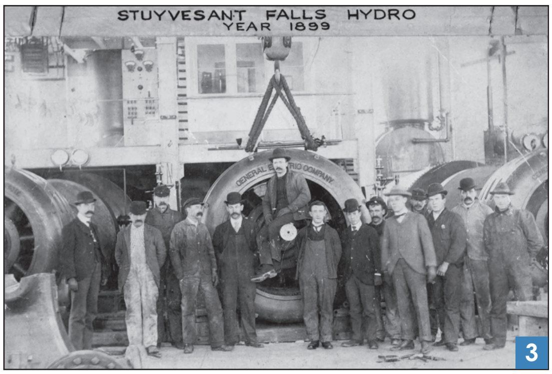
Building the new dam below the remains of the 1827 timber dam.

The alternating current was stepped up at the powerhouse to either 11 or 22 kV for transmission to three remote substations lying 9-mi south and 10- and 18-mi north. At the remote substations, the alternating current was stepped down to 380 V and then commutated to 600-V direct current by rotary converters that powered the third rail of the railway. The transmission line branched near the station, with one line feeding the northern substations and another feeding the southern. According to Gordon [1],

> The high tension poles followed the right-of-way the greater part of the distance between the generating station site and substation sites, the poles at that time being almost exclusively devoted to the high tension line . . . . The wires were mounted on 35-ft chestnut poles with 8-in tops, spaced at 100-ft intervals. At the top was a four-pin cross-arm carrying duplicate single-phase, 60-cycle lighting current lines and, below this, a six-pin cross-arm carrying to the south duplicate three-phase, 25-cycle current lines to the Hudson substation. The line to the north supplying North Chatham and East Greenbush substations was designed for a 5.6% drop to the North Chatham rotaries, with both substations loaded, and a 8.7% drop to the East Greenbush rotaries under the same conditions. The third rail was carried at ground level, unprotected on extended bed ties.

The rail line started with seven interurban-type electric-powered cars built by Wason Manufacturing Company of Springfield, Massachusetts. These cars, both passenger type (53–56-ft long) and express type (43-ft long), were powered by four General Electric Model 51, 80-hp motors with two GE Model L-4 controllers for each car. The cars were geared for 59 mi/h. A typical car weighed 54,000 lb unloaded. The current for each car was transmitted from the third rail at grade through two sets of shoes extending on either side of the cars depending on the direction of travel. These shoes were switched along with the trolley pole, which was used on sections without the third rail, by the conductor. Later cars were of both the direct-drive powered type as well as a variety of nonpowered gondolas, box cars, freight cars, and cabooses hauled by electric locomotives. As rail line usage grew, new rolling stock was purchased, with the last of the passenger cars purchased in 1925. After the line was shut down in 1929, much of the rolling stock was sold to other lines, where it continued in service until as late as 1951.

The railroad company, understanding its obligation to provide reliable service even during times of low water, also built a steam plant integral to the hydroelectric plant to generate supplemental electric power. The steam plant comprised two triple-drum water boilers of 1,750 hp each. Steam was generated in 150 psig and supplied to marine-type condensing engines, the largest of which had 48-in diameter cylinders. The engines were belted to each of the 750-kW alternating current generators and to the 250-kW lighting generators. The steam plant ran on heavy fuel oil, which was transported to the plant through a 6-in diameter pipe supply line running over the Kinderhook Creek from an oil-storage depot adjacent to the rail line. The combined hydro and steam plant's highest production was in 1937 when it generated 15,952,000 kWh.



Installation of the turbines during initial construction of the powerhouse.

Electric Park Gets People On Board

To encourage use of the railways, especially during the slower weekends, the Albany and Hudson Railroad and Power Company took a cue from New York's popular Coney Island amusement park. Using its abundant power to full advantage, in 1901, the company opened Electric Park, a pleasure resort on Kinderhook Lake. Sometimes called White City, the park was advertised as a place "where

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ladies and children can go unattended." No liquor was permitted on the grounds; however, six nearby saloons on islands and the lakeshore made it possible for the men to "go fishing" for a beer or two. The only charge for admission to the park was the 40-cent rail excursion fare (or ten cents for walk-ins).

Double tracking had been added to 9 mi of the eastern portion of the rail line in 1900. With increased park and lake usage, 16 mi of double tracking were added to the southern route, completing the job on 3 July 1910, just in time for Independence Day festivities. Aside from water activities such as boating and fishing, park attractions included a carousel, roller coaster, two Ferris wheels, and a Shoot the Chutes wooden slide, most of which used electrical power. The park was well lit by hundreds of incandescent lamps that added brilliance to the dancing pavilion featuring music furnished by an electric orchestrion. Additionally, the Rustic Theatre served as a performance venue for top-notch vaudeville shows booked through New York City and, later, motion pictures. This park, and many others like it, closed during World War I and never again enjoyed its earlier success.

The railway company, which had been reorganized as the Albany and Hudson Railroad Company in March 1903, went bankrupt in 1908. The year had marked a period of many business failures because of a general economic recession in the United States, though the company's difficulties may have been exacerbated by several serious railway accidents. On 26 May 1904, *The New York Times* reported that five people were killed and 40 injured when the driver of the southbound train apparently decided to try to beat the northbound train to a switch. At 40 mi/h, the result was a horrific head-on collision occurring on a sharp curve of the track. For this accident alone, injury claims against the Albany and Hudson Railroad Company exceeded US$330,000.

The company's assets were merged with those of East Albany Gas Light Company, Rensselaer Lighting Company, and Jansen Electric Power Co. to create the Albany Southern Railroad in September 1909. Albany Southern was reincorporated as Eastern New York Utilities Corporation in October 1924, with New York Power and Light Company holding the controlling shares and also becoming the successor company in 1929. Changes in fares and increasing use of interurban buses and private automobiles led to fewer passengers on the railway. With a decline in both usage and value of the railway, the owners rationalized that their gas and electric businesses were more profitable. Unable to sell the railway, transit operations were suspended, and the final run ended just after midnight on 22 December 1929. The abandoned rail lines were removed over time during the 1930s and later as part of World War II scrap drives.

THE ONLY CHARGE FOR ADMISSION TO THE PARK WAS THE 40-CENT RAIL EXCURSION FARE.

Changing Times

By 1942, Niagara Hudson Power Company (through its subsidiary New York Power and Light Company) owned the plant, and the United States was at war. As a wartime precaution, the federal government mandated

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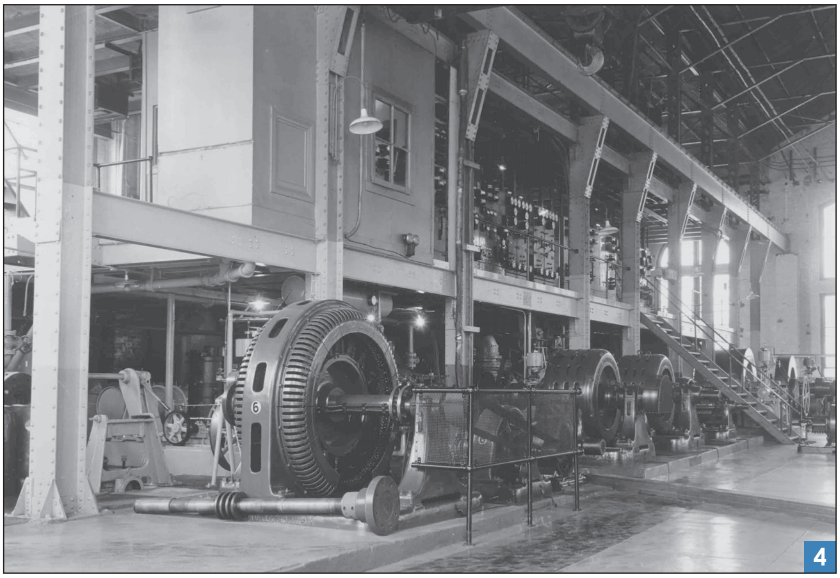

Powerhouse interior, c.1900.

periodic blackouts of the entire area, and plant operators practiced the procedure for shutting down the plant. The first practice shutdown occurred on 9 February 1942, just two months after the 7 December 1941 attack on Pearl Harbor.

With the country at war, Niagara Hudson needed to augment power production. They planned substantial modifications to increase reliability as well as provide power at a uniform voltage and frequency for use in their expanding electric transmission and distribution system. One of the best years of generation on record was in 1945 when the plant produced 19,544,400 kWh.

The operation of the station was manned 24 hours a day, seven days a week. As surviving photographs attest, much pride was taken in the operation of the station (Figure 4): the clean floors glistened, flowerbeds were well tended, and lawns were neatly trimmed. The station boasted an interior that was white and spotless. In 1949, Niagara Hudson Power Company was subsumed along with other New York power companies into Niagara Mohawk Power Corporation, which owned the plant until 1999.

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A popular local legend describes the hydroelectric station in full operation during the Northeast Blackout of 1965. Although evidence from the operator's logbooks (maintained since 1900) indicates that the station did go black, it was probably brought back online by the plant operator who lived nearby. This predated the New York Power Pool and a coordinated power control system, so it's likely that someone made the individual decision to black start the plant that night. Another favorite story reports that the independently illuminated hamlet of Stuyvesant Falls could be seen from space when the rest of the Northeast was cloaked in darkness. There wasn't anyone in space watching back then, but the tale of "the little plant that could" makes a good story.

After the late 1960s, Niagara Mohawk Power Corporation shuttered many of its small hydroplants in favor of constructing larger nuclear facilities. The plants were old, many dating from the 1890s. Not only had the times changed, but also the post-World War II generation of operators was aging and moving toward retirement. Spurred by local initiatives, Niagara Mohawk sporadically tried to rejuvenate the Stuyvesant Falls plant, but the increasing frequency of outages and the extensive penstock leakage problems were discouraging. Much effort went into repairing the afflicted penstocks with welding, but the welding led to thermal changes that affected the original riveted construction and only made matters worse.

The town of Stuyvesant took enormous pride in their small plant, and when Niagara Mohawk decided to shut down the plant in 1993, the town hoped to find an interested power producer to acquire it. However, with Niagara Mohawk paying rates in the range of 1 cent/kWh—an amount insufficient to even pay the property tax—finding a new owner was unlikely. The operating license for the plant, issued by the Federal Energy Regulatory Commission (FERC), was surrendered by Niagara Mohawk in 1996. The town fought the surrender; but in the end, FERC accepted Niagara Mohawk's application for license surrender on 17 February 1999, and the plant was shuttered.

Hence, the picturesque history of a locally significant power plant came to an end—or so it would seem. However, in reality, the story is not over. New life is being breathed back into the little Stuyvesant Falls hydroplant, and the facility is scheduled for reconnection to the grid in 2011.

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