

TRANSMISSION LINES ENCIRCLING METROPOLITAN HARTFORD AREA*

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TO discuss the transmission lines encircling the Metropolitan Hartford area, you must understand the facilities of two utility organizations have been developed and pooled for operation as a single integrated system for the benefit of both companies and their customers.

These utilities are independent corporations associated only in operation. One, The Hartford Electric Light Company, provides the power; and the other, The Connecticut Power Company, owns and maintains the transmission plant.

Between these two companies "the old buyer and seller relationship has given way to a pooling of bulk power and transmission facilities and an equitable sharing of all costs, including investment cost, based on use."

While The Connecticut Power Company has some generating plant connected to its transmission plant, the bulk of power production is the responsibility of The Hartford Electric Light Company. Two steam generating stations, South Meadow at Hartford, and the new Middletown unit provide all but a minor portion of the system needs.

Historically, the first unit in the existing transmission system did not touch Hartford by encirclement or otherwise, but was built by The Connecticut Power Company (then under Stone & Webster management) to carry current at 69 KV on a double circuit tower line from its Falls Village hydroelectric station to Berlin. Enroute it supplied energy to Torrington, Thomaston, Bristol and New Britain, with a single circuit wood pole line from Berlin to Cromwell and Middletown.

In 1915-16, a single circuit 69 KV wood pole line, Berlin to Hartford, connected this line with The Hartford Electric Light Company, which was then constructing a 22000v line to supply the small utility servicing Unionville and Farmington. At this time Hartford's major source of power was its Dutch Point Station. In 1919, Manchester, already served at 11 KV, was reinforced in service by a new 2-circuit 11 KV line to South Manchester.

In December 1921, South Meadow Power Station came into operation and in 1924 a double circuit steel tower line replaced the single circuit

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wood line between Hartford, Middletown and a point on the old Falls Village line, then known as Point 12 in the town of Berlin. These lines were designed for 115 KV. but operated at 69 KV

In February 1925, Hartford was interconnected with the Western Massachusetts Companies by a two -circuit steel tower line between Hartford's South Meadow Station and Western Massachusetts' Agawam substation. This line, designed for 115 KV, operated at 69 KV, and following its completion the western end of the CP Company system was connected with the transmission system of New York State's utilities by a steel tower line from Falls Village to Poughkeepsie.

About this time (1925), the country's first power pooling operation came into being, for with the formation of the Connecticut Valley Power Exchange, a sort of master load dispatcher controlled the operation of generating units and transmission facilities for the best efficiency and common good of interconnected companies and their customers. No longer need capital be tied up in idle stand-by equipment as required in independent utility operation.

In 1941, it became necessary to increase voltage on the Hartford-Agawam line from 69 KV to 115 KV. This was in line with increased South Meadow Station generation and area load demands. And in 1941, a single circuit tie between this line at Tariffville to 69 KV lines at Torrington was begun.

This 115 KV interconnection through an auto-transformer 115/69 KV at Torrington Terminal between the old Falls Village line and the Hartford-Agawam line introduced a type of transmission construction new to Connecticut. It is supported by an adaption of the polearm type of structure originally designed and used by the New England Power Company, and is, I believe, the only example of its kind within our state.

Time at my disposal and the limitations of this subject forbid a discussion of the load growth in Metropolitan Hartford, the increases in subtransmission and distribution plant, or even the increase in generating facilities. Suffice it to say that by 1947 an organized program of System Planning was set up within the Hartford company to direct the thinking on further expansion.

By 1949, South Meadow Station had reached the limit of its possibilities for further expansion and it was obvious that new generation must be developed at some other site. Middletown Station, of whose development you have just heard, has been the answer to that need.

Obviously, a strengthening and extension of transmission facilities to the south was essential for the utilization of power from the new generating source. Owing to the growing congestion at South Meadow from the expansion of 22 KV subtransmission serving the distribution areas radially from that station, it was decided that the optimum routing of power from

Middletown into the system should permit the establishment of bulk power centers whereby transformation short radial subtransmission at 22 KV might serve distribution area substations at load centers. Such a bulk station was already in operation in Manchester by The Connecticut Power Company and supplied with energy from Hartford's South Meadow Station via a two-circuit 115 KV steel tower transmission line.

In furtherance of this plan, Point 12, so-called, was converted into the Berlin Substation of The Connecticut Power Company, a junction switching point.

Power generated in both South Meadow Station and Middletown Station is transmitted to Berlin Substation from which it may be carried to The Connecticut Light & Power Company via a rebuilt section of the old Falls Village-Point 12 line and to the Connecticut Power Company's new bulk substation at Newington over seven miles of single circuit 115 KV wood H-frame line. The 16½ miles of transmission line from Middletown Station to Berlin Substation is similar in design to that from Berlin to Newington. Both have been constructed recently.

Within this past year a similar bulk substation has been built in Bloomfield by the Hartford Electric Light Company which is fed at 115 KV by a short CP Company loop from its Hartford-Agawam transmission line.

The purchase of rights-of-way is now in progress for two transmission routes. The first, to provide a link between the Newington substation and a future bulk substation at Tariffville, tied in with the Agawam and Torrington lines, will complete the encirclement of Hartford by 115 KV transmission facilities. The second, connecting Middletown Station of The Hartford Electric Light Company with Manchester substation of The Connecticut Power Company, will insure that center of two sources of power. Upon completion of these latter projects, the Metropolitan Hartford area will be surrounded by what amounts virtually to a 115 KV ring bus, from which blocks of power may be dropped by transformation to subtransmission voltage wherever area load growth may dictate.

So much for the history of the establishment and growth of this transmission ring. Time does not permit going into details of specification or design. Suffice to say that all such transmission lines conform to the specification or rules laid down by the National Electric Safety Code. All come under the regulation and approval of the Public Utilities Commission of Connecticut.

However, it would be remiss to neglect to cover briefly the physical location of such lines. Throughout their lengths, they, like railroads, are constructed within the limits of continuous rights-of-way.

Such rights-of-way vary in width dependent upon the number and types of lines which must be provided for. In this connection it is interesting to note that existing lines and rights-of-ways are ample for expansion to deliver

approximately three times their present rated capacities; and "System Planning" is looking as far ahead as 1975.

Choice of routing involves the economic study of construction costs, best use of the terrain, physical obstructions and accessibility. In its solution all media of investigation are employed. Among these may be mentioned aerial surveys, Coast and Geodetic map study, search of Land Records, and lastly, field reconnaissance and survey.

Once chosen, routing is seldom changed, and the required rights are purchased in either fee or easement. Occasionally, the right of eminent domain must be invoked when all negotiations fail. It may be of interest to note that within the past thirty-five years the average cost of right-of-way has risen from about 10 cents per lineal foot of center line length to as much as \$4.00 per lineal foot. Strange as it may seem the width of right-of-way seems to have little bearing on the average cost per foot.

In closing, may I hope that I may have shown why it is impossible to escape from Hartford without crossing under some transmission line, conveying the thought that your Metropolitan area power supply will continue to be ample for its needs.

I thank you.