

FIXED PRICE BIDDING FOR LINE CLEARANCE¹

by Walter R. Rossman and Sandra L. Howard

Abstract. Penelec redirected its policy and procedure for accomplishing its line clearance program in 1979 to incorporate prioritizing all line clearance projects and fixed price competitive bidding. During the ensuing years the change in direction of the program has been accomplished with continuing success and improvement while incorporating substantial budget increases. Substantial savings in dollars have been achieved over the 4-year period using the new method of contract.

Pennsylvania Electric Company (Penelec) is a wholly owned subsidiary of General Public Utilities Corporation (GPU), and has a service area of 17,615 miles in all or parts of 31 northern tier, northwestern, west central and south central counties of Pennsylvania. The company headquarters are in Johnstown. Our service area is predominantly rural with Erie being the largest city served. Erie, incidentally, is the largest city in the entire GPU system, which is made up of Penelec, Metropolitan Edison Company at Reading, PA, and Jersey Central Power & Light, Morristown, NJ. The three companies are operated to take advantage of the specific strength of each. Penelec, a winter peaking company, under normal conditions would provide the extra generation needed by the summer peaking companies to the east, and they in turn would ship power west during the heating season.

In the area served by Penelec there is a population of approximately 1.5 million. Penelec serves 520,000 customers; 88% residential, 10% commercial, 1% industrial and others.

The wide ranging and diverse area is administered from 8 divisions. Customers served through the division offices range from 91,000 at Johnstown to 55,000 at the Warren division. In May 1983, there were over 1,600 employees throughout the system in division assignments, with half of these employees involved directly with line operations. The size of the staff varies since the territories supervised by each vary in customer density and square mileage.

In the Penelec service area of Pennsylvania of approximately 17,615 square miles, we maintain over 22,000 pole miles of transmission and distribution lines. Of this number 2,745 are transmission lines and 19,412 are distribution lines.

Penelec has a total installed generating capacity of 2,658,000 kilowatts (summer rating) or 2,736,000 kilowatts (winter rating). We operate steam and coal-fired stations at Erie, Homer City, Seward, Shawville, Warren, and Williamsburg. Hydroelectric stations are located at Deep Creek, MD, Piney Dam and Seneca. Internal combustion and combustion turbine plants are located at Benton, Blossburg, Shawville, Meadville, Warren and Homer City. We also operate for a consortium of owners, two mine-mouth stations at Keystone and Conemaugh. The generating division of the company has approximately 1,850 employees. Overall, Penelec has 4,080 employees at the headquarters complex in Johnstown, the generating stations and the 8 divisions. The company generation and transmission facilities and those of its two sister companies are developed and operated on an integrated and coordinated basis.

Penelec accomplishes its entire line clearance program with outside line clearance contractors. Prior to 1979 Penelec's distribution line clearance program had consisted primarily of responding to tree/wire conflicts on a day to day basis. The contractor tree crews were directly responsible and under the control of the Penelec district line departments. Penelec foresters' input was restricted to methodology, productivity measurements, resolving damage claims and record keeping and analysis.

Late in 1979 Penelec management determined that a different course of action should be initiated for future line clearance activities of the Penelec system. System forestry was directed to design and implement a line clearance project prioritization scheme for 1980 and future years. Line

1. Presented at the annual conference of the International Society of Arboriculture in Indianapolis, Indiana in August, 1983.

clearance budgets will be incrementally increased over a 7-year period to reach a 5-year cycle of line clearance for all over-head distribution line circuits. A 5-year cycle will require approximately 4,000 miles of line clearance per year when the program reaches the maximum spending level in the seventh year.

A prioritization score sheet was developed and implemented for the 1980 distribution and transmission budget year. The line clearance projects that were approved for 1980 became line items in the Operating Department budget that was adopted for that year.

Concurrently, with the development of prioritization of line clearance projects and incrementally increasing line clearance budgets, the System Forestry Department was requested to investigate, develop and implement a satisfactory method of competitive bidding of line clearance projects. Up to this time, Penelec had awarded line clearance work to contractors who had performed satisfactorily in previous years on a time and materials basis for the number of crews that the assigned budget would permit. Various methods were pursued to measure and control productivity of contractor crews with less than satisfactory confidence in the results obtained. One of the problems in measuring productivity being lack of adequate field personnel to check numbers being supplied by contractor foremen. Another problem was the wide diversity of conditions experienced over the extensive and varied Penelec system. In order to have confidence that the increasing numbers of dollars being expended were being spent judiciously and prudently, the present system of fixed price per mile by competitive bidding was adopted.

In order to provide the flexibility required and a reasonable degree of control of the program, a unique contacting procedure was developed. A basic contract was written for each approved line clearance contractor covering all the necessary terms of the agreement except the specifics of each job to be bid. Then as the jobs were awarded to the successful contractor, a release was written against the basic agreement stating the lines to be cleared, the miles to be cleared, the time frame, and the bid price per mile. A specification sheet included with the bid information describes

the chemical treatment method and herbicide to be used in addition to any clearing requirements unique to the individual job. The methodology of line clearance tree trimming, tree removal, brush clearing, and chemical treatment is described in two specification manuals developed by the Penelec Forestry Department. They are *Specifications for Line Clearance* and *Vegetation Management of Power Line Rights-of-Way*.

In 1980 approximately 10% of the distribution budget was completed by fixed price per line mile competitively bid. After evaluation of this first year of cost comparisons it was decided to gradually increase the portion of work being performed by the competitive bid method. In subsequent years we increased as follows: 1981 (20%), 1982 (50%), and 1983 (80%). For 1984 we are planning for 95% of both the distribution and transmission line clearance program to be dedicated to prioritized line projects and that the work be contracted by competitive bid, fixed price per mile method.

Each Penelec operating division is responsible for obtaining and using funds budgeted for their line clearance program. At present, the preparation and approval process which determines the budget is done in three steps.

Step one is the completion of one line clearance prioritization score sheet for every substation and associated line in the division. Using a combination of field reviews, computer-supplied data, and



Figure 1. Penelec Division Foresters (left to right), M.C. McNamara, M.D. Snavely, S.L. Howard (co-author), System Forester, C.J. Olenik and Division Forester, C.J. Harrington confer on right-of-way vegetation management problem.

discussions with district general line supervisors, each forester obtains the information necessary to score each substation. These forms permit direct comparison and evaluation from a wide range of factors.

The second phase combines all score sheets, by division, into one large ledger. Ranked by total score, the highest number represents the worst right-of-way condition. The ledgers are then sent to Penelec headquarters for evaluation.

Step three is a company-wide overview of all the ledgers, and separate budgets are then drawn up for each of Penelec's 8 divisions. A set percentage, which is used company-wide, of the total budget allocation must be put out for bid on a fixed price basis. Each budget changes annually as does the percentage figure. Miscellaneous or emergency work done on a time and materials or cost-plus arrangement is added to the total amount of bid work for a complete budget picture.

The coordination of a fixed price bid job can be arranged into six sequential steps. The first step is the preparation of a purchase requisition, an internal document initiated by the division forester. The purchase requisition provides the Penelec Contracts Department with the required information to process bid requests, which includes preparing bid packages and notifying approved contractors.

A pre-bid meeting and field tour for the contractors comprises the second step. The tour and meeting are held several weeks in advance of the due date for bids and gives those invited companies a chance to closely inspect the available work. A full set of maps are provided for each company representative and any questions or problems are answered or clarified.

Step three begins with opening the sealed bids received by the contracts department on or before the due date. The bids are then evaluated on a per-mile or per-acre basis (whichever is requested), and the lowest price per-unit is normally recommended for acceptance. A per-unit bid request system is easily adjusted when the miles or acres actually worked are different from the original estimate. A copy of the evaluation is circulated for Division concurrence with the Contracts Department recommendation, and upon agreement, the successful contractors are notified.

The fourth step is the actual job start-up. With the time-frame specified by Penelec, each contractor may select their own starting date and location to begin working. During the first or second day of the actual work, the division forester meets with the contractor general foreman and crew foreman in the field to assure contractor's adherence to Penelec's line clearance standards and safety rules.

Step five consists of regular field visits by Penelec personnel, including district general line supervisors, the division safety director, and the forester, and daily location telephone calls from crew foreman to the forester. Time sheets submitted weekly by every crew foreman give the division forester a measure of the actual mileage as it is completed.

The sixth and final step, is the invoicing by the contractor for completed line miles or acres of work. The forester and the contractor's general foreman make a field inspection of the entire job. Any unsatisfactory condition is corrected by the contractor and then re-checked by the forester. Occasionally property owners complain about the work that has been performed on their land. Division foresters usually are the first to learn of a property owner's dissatisfaction, but the contractor is informed of the complaint and is responsible for handling the problem. When the job has been completed to Penelec's specifications, then the contractor submits an invoice, copies of the time



Figure 2. Manager of Forestry, W.R. Rossman (co-author) and Division Forester, C. Shannon review results of right-of-way vegetation research project.

sheets, and Penelec computer input documents for payment.

Line clearance work performed on a fixed price bid basis conveys a different tone than time and material work merely by the nature of the design. Each time a contractor successfully bids for Penelec work, there are two factors taking precedence over all others: 1) the successful per-unit price is low enough that no other company felt the work could be done for that rate; and 2) the work must be done in accordance with Penelec's time frame and line clearance standards.

Advantages and disadvantages of fixed price bid work exist for both the contractor and electric utility. Aiming to provide uninterrupted service, Penelec recognized that line clearance work is definitely important, and by using fixed price bidding the overriding factor has been a decreased cost per-mile over the past few years. A few advantages from Penelec's viewpoint include: 1) crew productivity is not a primary concern because payment is based on work completed not length of time spent on the job; 2) appearance of tree trimming work and effectiveness of spray technique must satisfy Penelec, and whenever the contractor must repeat work that is not acceptable, no additional cost is incurred by Penelec; and 3) monthly invoices are avoided, eliminating some paperwork, and no payments are made until completion of the job. Penelec's view includes the following disadvantages: 1) crews cannot be moved if Penelec desires — contractors follow their own "game plan" until job completion; 2) more customer complaints tend to arise from crews that are hurrying and performing sloppy work, and work that is done without first obtaining property owner's permission; and 3) all invoicing, including computer input documents, is based on correctly filled-out time sheets, therefore, much time is spent teaching the foremen how to fill them out and correcting them to eliminate errors that would delay payment.

Fixed price bidding for line clearance work has been handled well by the contractors and Penelec is receiving a satisfactory product. Tighter, more specific line clearance standards by Penelec and higher rate of efficiency from the contractors will definitely add to the use of more fixed price bidding in the future and a much better right-of-way

management program.

As in any new and innovative program such as this, a certain number of problems and objections can be anticipated. In this instance we certainly were not disappointed. Certain contractors were overtly vociferous in the objections to the fixed price bid method. Many Penelec Operating Department personnel were greatly concerned about the direction "their" line clearance program would be going. For some people it meant losing a degree of control, for others it meant working with unfamiliar people and seeing equipment painted in unfamiliar colors. There were many problems with people who did not want to accept change. In addition, there were situations that arose during this period of time that caused us to make some adjustments. A 100 day strike of the Penelec bargaining unit occurred in 1980. A reorganization of the company structure from five operating divisions to eight operating divisions took place in 1981. A proposed merger of Penelec and Met-Ed operating companies into one operating company with headquarters in Reading, PA was finally abandoned. Each of these events made the accomplishment of our program a little more difficult and interesting, but we did persevere and we are on schedule for 1983 and plans are progressing for 1984.

Credit for the success of the program is attributed to many people. We are fortunate in having a staff of professional foresters at the division and corporate level who are innovative, adaptable to change and who welcome new challenges.

There are six division foresters working in Penelec's system. Five of them are 4-year graduates of accredited forestry schools including Penn State, University of Michigan, West Virginia and Michigan Tech.

Prior to coming to Penelec, they were working at positions with minimum responsibilities not associated with line clearance. Since coming to Penelec they have had to plan, budget, arrange tours and bid meetings, supervise product of the contractor, determine satisfactory performance of the contract and authorize the payment of the contracted fee. The degree of professionalism possessed by the forestry staff has been greatly responsible for the success of the line clearance program.

Another of the requisites for the success of our program was the development of an adequate and accurate method of record keeping. Fortunately, at Penelec and GPU the foresters had, over the past several years, developed a comprehensive computerized record keeping and analysis system that is working very well in tracking our line clearance program. A weekly crew report was developed to fit with a computer input document including codes for work type, location, herbicide identity, and accounting needs. From this basic information various reports have been developed that provide the necessary documentation of our progress to satisfy corporate requirements. We are also able to analyze each crew, contractor, and job in order to keep track of costs.

I applaud the contractors who worked with us and have achieved success for themselves as well as our program. We have expanded our competitive base from two major and three minor contractors to ten approved contractors presently bidding on Penelec line clearance projects. I have been observing contractors increasingly manipulating crew manpower and equipment to gain greater efficiency in their operations. I believe some contractors are beginning to utilize cash incentives so that the working crew and field supervision can also benefit from improved efficiency and productivity. I feel strongly that given

the opportunity and incentive to perform, the contractor will manage productivity much more effectively than we have been able to do.

We had the cooperation of our Penelec contracts department who designed an innovative basic agreement with a release system to give us the degree of control and flexibility needed to make the system work. Above all we had the support of management to make the decisions stick when the criticisms and complaints were heaviest. All this was achieved during two personnel changes at the operating department vice president level.

The program has not been without flaws and problems, but I think the results more than justify the effort. From a cost standpoint, we are showing more than 30% savings per mile over time and material costs or 1.3 million dollars in savings in 1982, and we anticipate greater savings when 1983 is completed. I have confidence for the future of Penelec's line clearance program and in particular the fine group of young professional foresters who are directing the program.

*Manager-Forestry and Northeastern Division
Forester, respectively
Pennsylvania Electric Company
1001 Broad Street
Johnstown, PA 15907*

ABSTRACT

RUARK, G.A., D.L. MADER, and T.A. TATTAR. 1983. The influence of soil compaction and aeration on the root growth and vigor of trees—a literature review. Part 1. Arboric. J. 6: 251-265.

The soil environment is often a key determining factor as to whether a tree is to survive and grow or whether it will die. Although all trees encounter some stress from soil conditions where they are growing, trees in an urban environment undergo stress factors not encountered in a rural forested setting. The urban environment is an artificial ecosystem that often bears so little resemblance to the natural forest ecosystem that it is difficult if not impossible to draw parallels between the same tree species growing in both systems. The lack of knowledge of urban soils is one of the major limiting factors in the more effective use of trees in the urban environment. The objectives of this review were to examine the literature on the effects of physical soil conditions on root growth and vigor of trees, and to apply this information, whenever possible, to the problems of trees growing in urban environments.