

MANAGEMENT'S VIEW OF THE TREE TRIMMING BUDGET¹

by Philip B. Perry

Utility companies, like all other companies, are obligated to control costs. And for us, the obligation means building, maintaining, and operating lines as economically as possible with careful consideration to safety and continuity of service. The most economical way to distribute electricity, in most instances, is with overhead lines. And to bring electric service to 694,000 customers in our 1,700 square mile service area, we utilize 7,250 circuit miles of overhead primary distribution lines and 2,000 circuit miles of transmission and subtransmission lines.

We continue to build new lines overhead on the streets and highways and to maintain a substantial network of existing overhead lines on the rear lot lines of our customers. Here, as you well know, is where the trees are, and, despite our best engineering efforts and line construction practices, we must still acquire and maintain tree clearances for these lines. Tree trimming is a substantial part of a utility's operating expenses. In our company, for example, under the direction of forestry inspectors, the actual tree work is done by a contractor's tree crews. What you may not be aware of, however, is that our annual direct labor expenditure for tree trimming and removals for line clearance is close to \$2 million. This is approximately \$3 per customer, a lot of money just for trimming trees.

Thus, the tree trimming budget sum is a significant part of the total operating budget and appears to be controllable to a degree. Its expenditure, therefore, is constantly subject to scrutiny.

Objective of maintenance budget

The objective of a tree trimming budget is the attainment of a proper balance between costs, reliability and customer acceptance. Factors affecting this balance include the type of construction, line routing, regulation, and weather. And, finally, to a great degree, the determination

of acceptable risk.

Economic factors of maintenance trimming budget

Maintenance expenditures are a cost deduction from income. A balance must, therefore, be considered in terms of what must be given up in other areas if at some point it was determined that an exceptionally large tree maintenance budget was needed. If, for example, we were to determine that a \$10 million annual tree trimming budget would be appropriate for our system, the impact of this on planned expenditures for new generation facilities, perhaps, or in other areas which provide additional revenue directly, would have to be considered. It is also necessary to consider what can be purchased by budget expenditures for tree trimming in terms of reliability. At The Illuminating Company, for example, with our trimming budget at approximately \$2 million annually, we are experiencing an annual tree-caused outage rate of 8% of total outages. How much greater reliability would a \$10 million expenditure attain? Obviously, we do not believe it could be justified.

Another viewpoint is to spend less money, but attain greater reliability through a more severe trimming cycle. Our standards call for a three-year trim cycle. A longer trim cycle might reduce tree maintenance cost requirements. It is unlikely, however, that our customers would accept this approach. Conversely, easier customer acceptance would be possible with a one-year tree cycle, but this would sharply increase costs.

There are three key factors entering into a basic decision on the tree trimming budget. First, the requirement of management to determine the influence of this cost on the total annual operating budget. Second, the relationship between dollar expenditures and the infrequencies of line outages. And third, the acceptable level in your particular case.

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Some companies have determined that only limited tree maintenance is necessary. Others occasionally eliminate tree maintenance completely for periods of time. We have occasionally tempered our expenditures, but have never completely terminated our tree maintenance program. This is a matter of being able to optimize long-term instead of merely short-term results.

Weather conditions in a utility's service area have a significant effect on the tree trimming maintenance budget. Areas with insignificant wind and lightning problems may allow significantly reduced clearance standards. High incidents of wind and ice with associated tree damage, on the other hand, will require more severe requirements.

After reaching a decision on the appropriate level of expenditures for a tree maintenance budget, it is important to determine the most economical way of performing the work. Certainly, a major consideration is in-house versus contractor utilization. At The Illuminating Company, virtually all of our tree maintenance is provided by outside service contractors. Other companies may use only their own people. Others, still, may use their own people in part and also outside providers of this service. The evaluation here, obviously, is the determination of how effectively the job is being done. Whenever prices or the quality of an outside supplier is determined to be out of line with our expectations, consideration can be given to building up an in-house work force. Customer relations are also an important factor. For example, if some contractors provide low-cost service but our customers simply cannot tolerate their work methods, this would be unacceptable to us. On the other hand, good quality performance in regard to work completions and customer ac-

ceptance could also be out of line if the costs are too high, and again other alternatives would be considered.

Results evaluation

Perhaps no phase of an electric utility's operation is so beset with intangibles or with units that are so difficult to measure as tree trimming for line clearance. The word "tree" may mean any size, from a four-inch diameter tree, waist height, to a forest giant of many feet in circumference. It may be any variety. It may be located in the country where it can be cut on the spot, or it may be in a residential area where even small branches must be lowered on ropes and carefully disposed of. Public relations is an important aspect of tree trimming because, let's face it, the most treasured trees in all the world are those inside a customer's property lines.

At The Illuminating Company our goal is to effect a three-year trimming cycle on distribution lines. With the full cooperation of the municipality and the homeowner, three-year clearance can be obtained. Two years, however, is a more common actuality in many cases, since many people just do not want their trees trimmed to the degree necessary for this cycle.

Coordination in tree trimming is more likely to be achieved when our request is ideally timed. This generally occurs after communities have experienced tree-caused service outages. Examples of these instances, however, would most often include severe weather occurrences, such as tornadoes, which cause widespread damage to distribution lines as well as to private property.

We have experienced only about one tree-caused outage per year on our 2,000 circuit miles of overhead transmission and sub-transmission lines. This usually affects one of our 33 KV circuits.

Table 1.

Year	Tree faults	%	Customers affected	%	Customer minutes	%
1973	388	7.73	27,862	4.75	1,915,229	5.50
1974	568	8.52	43,600	5.66	4,316,156	7.90
1975	598	8.44	57,091	7.43	6,014,848	10.89
1976 (1/2)	196	8.21	22,407	8.93	1,587,726	13.30

Since 1973, tree problems have caused a fairly constant 8% of our distribution system faults (Table 1). However, the percentage of total customer-minutes of interruption these faults contribute has steadily increased from 5.5% in 1973 to 13.3% for the first half of 1976. This is due, in part, to the high level of storm activity we have experienced in recent years.

I have mentioned the \$2,000,000 annual expenditure to achieve these results, which I believe are good. The magnitude of the operation, however, can best be seen when we realize that this involves trim and cut work on over 330,000 trees on distribution lines alone, at an average cost, including overheads of \$6.27 per unit.

Value assurance techniques

An effective organization for administering the tree clearance program is vital. At The Illuminating Company, our organization comprises five district field inspectors and a forestry advisor; these activities are under the management of supervisors in our districts and the Distribution Division Manager. Essentially, these people are responsible for establishing basic budgets and directing the work to be done by contract crews. Determinations of approaches in regard to removal versus trim, and clearances and trimming cycles, including evaluation of risk and flexibility in times of budget difficulties, are an essential part of their management activities. Contractor performance is also a major concern inasmuch as we wish to obtain value received for the costs of these operations. Our inspectors prepare reports and evaluations monthly on tree trimming and cut-down expenses. This analysis is computerized and a print-out compares cost evaluation in the various districts.

We are, through our management people, continually evaluating the results of our approaches. This includes flat rates versus time and material contractor rates. Specifically, we are now evaluating ten to 30 grids each year in terms of the relative economics of the different contractor rates. We are also determining cost analysis from the standpoint of distribution feeder costs and are analyzing five feeders this year on a new approach.

Since it is our objective to insure a stable rather than a varying work force, a uniform number of contract crews are employed throughout the year. Obviously, the ideal would be to employ a larger work force during the months when crews are better able to work and are not hampered by weather. However, it is our opinion a skilled and stable work force is more effective in accomplishing our objectives.

An important further gain from effective organization is prompt evaluation of problems that are experienced. Such problems include poor workmanship, lack of demonstrated performance, and difficulties that arise in understandings between management, customers, and workers. Overall, however, continued cost analysis is the principal objective.

Conclusion

Tree operations in the electric utility industry are of substantial proportions. It is believed that collectively, overhead line companies throughout our industry use as many manhours in the trimming and removal of trees and brush annually as all other shade tree programs combined. Here in our area, it is essential that the cost to our company for this activity be kept to reasonable levels. Arboriculture societies, tree service companies, and utilities must, therefore, work together on common objectives, including cost effectiveness.

From the standpoint of The Illuminating Company, in order to obtain our share of residential, commercial, and industrial growth, and to retain industry now located in our service area, electric service must provide value and remain competitive. We cannot bury all overhead lines solely to avoid tree conflict since this would increase rates in a proportion that would not be in the best interest of our community.

It is not a simple problem to coordinate overhead power distribution with all the requirements of modern communities and community areas. What is now common practice has been arrived at patiently and thoughtfully over the years. Economy, reliability, public relations, and legality have all had due consideration and careful application. We need your help to control our tree trimming costs.

We recognize tree service contractors as the

experts who know how to get the best job done at the lowest cost. We look for, and welcome, initiative on your part in the development of new maintenance trimming techniques, mechanization, and other means for improved productivity.

Arboriculture societies can assist greatly in beautifying the developments in communities along with due consideration to conflicts that often arise in tree plantings. Desirable trees and the encouragement of desirable tree plantings will do much to avoid future problems and reduce costs in new plants and coordination.

On our part, we will continue to employ construction methods which observe optimum standards of clearance for overhead lines. Our lines will continue to be designed to provide adequate initial tree clearances as well as clearances from

other property. Appropriate standards will be developed for future shifts to higher transmission and distribution voltages. Consideration will continue to be given to customer sensitivity in regard to both line construction for tree maintenance and its impact on the environment. The goals of good public relations are integrated with all of our construction practices.

From a manager's viewpoint, the future will not be easy. It is a future which will demand of each of us our best if we are to achieve our objectives. I am confident that we will meet the challenge.

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ABSTRACTS

Read, R.A. 1976. **Provenance testing and introductions.** p. 147-153. *In* Shelterbelts of the Great Plains. Proc. Symp. [Denver, Colo., Apr. 1976] Great Plains Agric. Council. Publ. 78, 218 p.

What can be done to improve the mediocre showing in survival and growth of trees in the Plains? We are all aware of the most obvious reasons for dead trees — lack of precipitation and extreme desiccation. We know also that even with adequate rainfall, there are other reasons for failure — such as lack of care in handling planting stock, lack of site preparation, poor planting methods, lack of weed control, lack of rodent control, and lack of protection from domestic animals. There is one factor that can make a difference in tree survival and growth. This factor is the genetic makeup — the inherent constitution of the trees themselves. Well designed provenance tests of all tree species of potential value in the Plains are needed to find and develop for use a greater choice of better-adapted, disease- and insect-resistant planting materials. Seed origins of exotic conifer and broadleaf species from other parts of the World need to be selected by means of climatic analogues, and provenance tests of these origins established at locations throughout the Plains.

Beckwith, R.C. and A.E. Helmers. 1976. **A penetrometer to quantify leaf toughness in studies of defoliators.** *Environ. Ent.* 5(2): 291-294.

The foliage of host plants has a definite influence on the feeding behavior of phytophagous insects. Many oligophagous species have a definite preference for certain hosts or benefit from certain host conditions. The Douglas fir tuccosk moth prefers new foliage over old. Feeny suggests that spring feeding by the winter moth is related to seasonal changes in the texture and chemical composition of the leaves. The elm spanworm develops more rapidly and to a greater maximum size, and is more fecund on hickory leaves than on oak leaves, and the large aspen tortrix is greatly influenced by its foliage source. An understanding of the physical characteristics of a leaf is necessary in feeding behavior studies of phytophagous insects. A penetrometer based on a strain gauge transducer, miniature lathe, and recorder readout was devised to measure leaf toughness. Details of its construction and use are reported.