

## **System Forester Best Management Practices Cost Drivers**

### **Introduction**

This paper summarizes key issues regarding electric utility line-clearance program cost drivers. Well managed line-clearance programs play a key role in the safe and reliable transmission and distribution of electricity.

The routine maintenance of trees growing along power lines is a significant expense to the utilities, and line-clearance programs are often the focus utility regulators.

The Utility Arborist Association's (UAA) System Forester Task Force has researched and evaluated the many factors that influence the cost and management of line-clearance programs and provides these Best Management Practices (BMPs) as guidelines for their peers and the utility line-clearance industry.

### **Problem Statements**

The variables that drive line clearance costs are well understood.

Utility and contractor costs are interdependent.

Data supporting the System Forester's opinions is lacking and requires research.

### **Overview**

Vegetation Management (VM) program managers and contractors can lower their costs and improve performance by understanding and managing line-clearance cost drivers. Cost drivers consist of the management activities, program requirements, and allocation of resources that impact the total cost of a line-clearance program. Rarely are cost drivers stand alone items, more commonly they are strongly interrelated, with changes in one area usually resulting in changes in others.

Electric utilities depend on contract labor to perform most, if not all of their vegetation management work. Selecting the best contractors based on price and performance and providing a well planned and consistent work scope to the contractor are inseparable if the greatest value per VM dollar is to be realized. A well trained, highly skilled workforce is essential to the success of a safe, cost effective line-clearance program. Developing and retaining this workforce requires effort and cooperation from both the utility and the contractors.

The Utility Vegetation Management service industry is very competitive. In order to most effectively meet the goals of a VM program, suppliers and buyers need a thorough understanding of the dynamics of their business, their company strategy, and what approach to apply in order to best achieve satisfactory results for both parties.

It is beneficial to examine some of the common cost drivers for both the contracting utility and the VM contractor.

### **Utility Cost Drivers**

Cycle Length  
Work Specification  
Contract Stability  
Contract Size & Length  
Regulatory requirements  
System Diversity  
Line Voltage  
Contract Type (Bid vs T&M)

### **Contractor Cost Drivers**

Labor  
Equipment  
Mobilization/Demobilization  
Safety  
Fuel  
Contract Size & Length  
Labor Unions  
Stockholder/Corporate Expectations  
Location  
Competition

### **Utility Cost Drivers**

There is a direct correlation between utility contract strategy, and contract cost and success.

Cycle length and work specification are two prime factors in determining the degree of difficulty and cost of routine maintenance. Cycle length is the number of years between routine maintenance pruning activities. It determines the amount (volume in miles of line and biomass) and difficulty of the tree and brush work. Scheduled maintenance clearance specifications are normally based on tree growth and pruning clearance. Clearance is the distance that trees are pruned away from conductors. The optimum cycle is the length of time it takes for the average tree to grow back to a point where it is not compliant with the utility or regulatory agency's minimum clearance requirements. Each year that the work extends beyond the specified clearance cycle increases cost; industry estimates show a 20% increase<sup>1</sup> in cost for every year the cycle is extended. As the pruning cycle is extended beyond the specified interval, the number of tree/wire conflicts increases. As a result:

- visual and physical access degrades
- permanent and momentary faults increase
- restoration time increases (can't find it to fix it)
- minor storms become major storms, there is more damage to equipment, more oil spills
- hot spotting (an inefficient use of resources) increases
- the prospect of regulatory scrutiny increases
- customer satisfaction degrades because of the removal of more leaf area
- poorer service reliability results

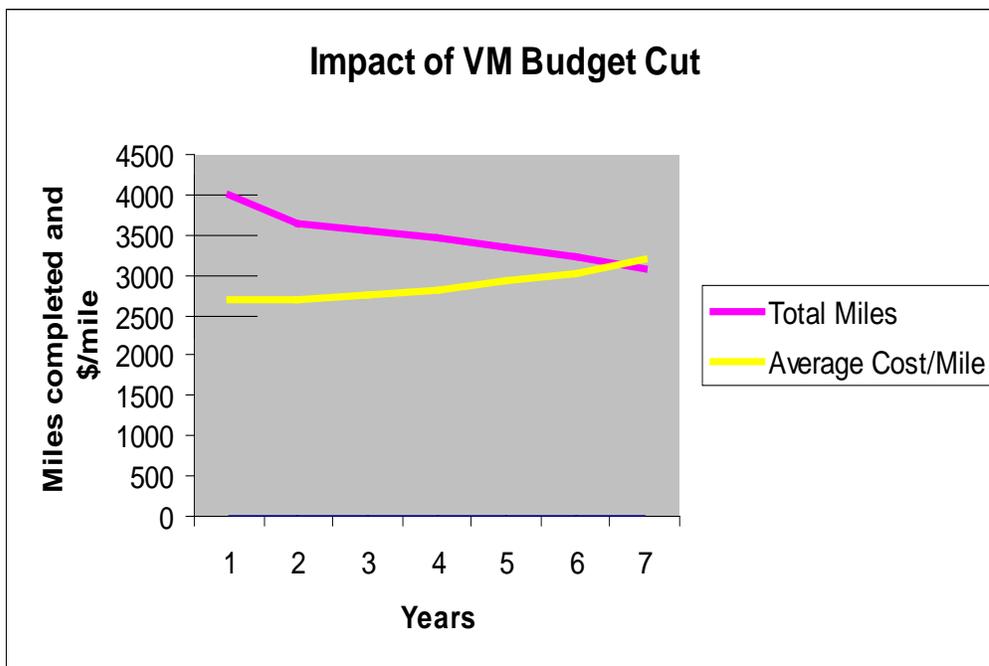
Extended cycle pruning is also more hazardous to line clearance tree workers. In some instances, where limbs are contacting the conductors and growing between phases, outages must be scheduled so the work can be performed safely.

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<sup>1</sup> "The Economic Impacts of Deferring Electric Utility Tree Maintenance"; D. Mark Browning; Environmental Consultants, Inc.; April 1997

The cost/mile for extended cycles also increases because there is increased biomass (more wood to cut, more trips to dump chips, more tree owner resistance to a greater visual impact), and line clearance crews work slower (for safety, to prevent outages, when trees or brush are close or touching the conductor, maneuvering the lift and tools is more difficult), making multiple cuts, first to clear limbs in contact or close to energized facilities followed by cuts to re-establish the clearance zone.

The chart below illustrates how a (non-replaced) budget cut results in a subsequent cost/mile increase while the miles completed/dollar decreases. Without a budget correction, higher costs/mile and fewer miles completed drives the program into a downward spiral of poorer and poorer performance, ultimately resulting in regulatory intervention. Maintaining status quo with the schedule requires more than maintaining status quo with the budget. Increasing labor and equipment costs require increases in the line clearance budget just to stay on schedule.



The stability, size and length of contracts drive contractor risk, overheads, and economies of scale. The debate within the line clearance industry over what is the best contract method – time and materials, lump sum, unit, not-to-exceed – is longstanding and there does not appear to be an industry consensus coming any time soon. This will be the subject of another whitepaper.

Contract Utility Vegetation Management is a professional service (people) rather than commodity (widgets) business, and as such it depends on skilled labor. In many areas, quality tree workers are difficult to recruit, train and retain at the price the industry is willing to pay. For some workers, an alternative to higher pay is maintaining a more stable work environment. Unlike construction and some green industry work that is seasonal, utility tree work is a year-round profession and can provide the consistent

paycheck and benefits that are crucial to developing and retaining a quality workforce. The line-clearance work scope and spending must also be consistent. Labor cannot be turned on and off like a faucet without significant and costly consequences.

Fluctuating, unstable budgets increase labor and equipment costs – starting up and shutting down are expensive, especially in tight labor markets. Budget swings have a negative impact on the labor pool – worker safety, experience, work quality, and worker familiarity with tree work specifications, laws, customers, public officials, and local geography all suffer. With a budget reduction the best employees will leave and often not come back as they can often find better and more stable jobs elsewhere.

Larger and longer contracts improve:

- economies of scale
- worker stability and familiarity
- improved safety
- better value
- increased customer satisfaction (or maybe just less complaints)
- improved reliability
- contractor buy-in and ownership

Utilities must comply with strict regulatory requirements (NERC and FERC) when managing vegetation for transmission lines. In some states, regulatory requirements for cycle length, clearances or spending limits drive costs.

When contracting for line clearance, the VM Manager must be aware that price or cost/mile comparisons between utilities, or in some cases within a utility, can be deceiving without a clear understanding of the diversity of tree and line conditions. Tree species, density and growth rates, geographic and topographic influences, and community and customer relations must be considered. Line voltage and construction may also influence how and how often line clearance should be performed.

### **Contractor Cost Drivers**

Labor

Equipment

Mobilization/Demobilization

Safety

Fuel

Contract Size & Length

Labor Unions

Stockholder/Corporate Expectations

Location

Competition

The number of qualified contractors in the line clearance industry has been whittled down to a very few. Price and performance usually determine market share at a single utility or

geographic area. Line clearance contractors can lower the costs within their control or improve their performance, which will ultimately benefit the utility customer.

Hiring, training, and retaining skilled workers is the foundation of a successful line-clearance contractor. Hiring a well-trained and experienced staff can increase hourly costs of the contractor, but productivity improvements, reduced accidents and lower turnover rates can drive down the effective program cost. Specialized training, such as obtaining and maintaining herbicide licenses, Commercial Drivers Licenses, arborist or state tree expert licenses all factor into labor costs. As with most other contractor costs, these overheads can be controlled and minimized on a billing hour basis through longer term contracts and a stable, motivated work force.

Fully equipped line clearance crews require expensive aerial lifts, chippers, hydraulic tools, chain saws, and other tools. This equipment is not only expensive to purchase, but also to insure, operate and maintain. Equipment can be less expensive when purchased in large volumes. And if it can be amortized over a longer contract term and used to full capacity (as opposed to sitting idle), the hourly costs can be reduced.

Mobilization and demobilization costs are yet another cost that must be built into a line clearance contract price. These costs should typically be one time costs in a given contract duration, and while not entirely fixed, are not proportionate to hours worked. Therefore, every hour worked tends to reduce mobilization and demobilization costs. However, in the case where a contract is unexpectedly cut back or temporarily halted, costs can quickly double, even if the cutback is only a month or two in duration. There are also hidden costs that come from repeated or unexpected work stoppages, including loss of morale, loss of skilled workers, loss of trust, increased training costs, lowered production as skilled workers are lost, and contractors allowing for stoppages in pricing from utilities known to stop work, even if stoppages are not explicitly included in original contracts.

Safety and insurance expenses are a major cost driver for contractors. A well-trained and safe workforce costs less to insure, but requires an on-going investment in training and supervision. The best line-clearance contractors value their employees and invest a great deal in safety equipment, training, and monitoring.

Fuel is one of the three or four highest expenses of a line-clearance operation. Both usage and price can dramatically impact contractor costs. Fuel consumption can be improved by using more efficient vehicles and chain saws and through better planning. GPS in vehicles is becoming an industry standard and is resulting in more efficient use of vehicles. Training equipment operators how to control fuel use without sacrificing production can help reduce fuel costs, but the price paid for fuel is by far the most significant factor. A fuel clause in the contract that adjusts the price based on regional fuel price averages may take the risk out of price fluctuations.

Both contract length and size have a substantial impact on contractor costs. Overheads are reduced on a cost/person basis when the workforce is larger, safer, stable, and

committed. When line-clearance tree workers work with the same utility over a period of years, they tend to associate themselves with the utility and take ownership of the VM program. Both supervisory and administrative costs per production hour can vary substantially depending on the size and length of contract. There are a number of smaller overhead reductions typically seen in longer or larger contracts such as:

- More efficient routing, less travel time, fewer delays as labor and supervision become familiar with local traffic and best times and routes to move through the contract area.
- Knowing in advance where more upfront customer contact is necessary to avoid refusals and other delays.
- Identifying best locations for fuel purchase.
- Identifying best locations for equipment staging.
- Identifying best locations for office or other administrative space.
- Identifying best providers for equipment parts and service.

Union labor costs can vary significantly from an identical non-labor workforce. Since direct labor is the single largest cost driver for a line clearance contractor, there can be a substantial impact on contractor costs if a unionized labor force is required

Line-clearance company stockholder expectations are always an underlying cost driver that is typically included as an overhead, but are not fixed the way a gallon of fuel or a truck tire are. Profit expectations and ROI can vary between companies, just as with an IOU, and must be built into every contract.

Location of a contract impacts contractor costs in many ways, including:

- Cost of living for employees, impacting salary requirements.
- Cost of doing business locally, fuel, vehicle maintenance, facilities.
- State and local requirements, licenses, permits, taxes.
- Non contractor safety requirements, police, or railroad details.

Anyone that has ever taken Economics 101 understands that competition affects price. It is no different in the line clearance industry. Generally, competition drives line clearance contractors to higher levels of performance.

### **Summary – Best Management Practices**

Successful VM programs are managed by utilities and contractors that understand the long term nature of VM and work together as partners on a strategy that sustains a stable work scope and skilled line-clearance workforce.

BMPs for a utility focus the size, work specification, term, and performance requirements of their contracts.

Contractor BMPs focus primarily on labor and equipment. Economies of scale can lower costs for the purchase and maintenance of tools and equipment. However it is clear that

in a service industry like line clearance, a skilled and motivated workforce – crews, supervision and management – is the foundation of a successful VM program.

More up to date research on the cost of deferred of line clearance and the total cost of can be Vegetation Management is needed.

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