

Connecting The Financial Insight Offered By The Avoided-Cost-of-Pruning Model To Engineering Solutions To Tree Problems

On many distribution systems trees are the single, largest cause of service interruptions. That does not mean, however, that the utility vegetation management group should accept the sole responsibility for resolving these outages. Good communication and cooperation with other groups within the utility offers options that may be financially superior and thereby better for both company shareholders and ratepayers.

But how do you get the engineering group to invest in a project to resolve tree issues, which they see as your responsibility? You will need to demonstrate that actions within their domain are more cost effective and thereby, a better decision for the company.

Let's look at how the Avoided-Cost-of-Pruning Model can be used to explore and evaluate a range of mitigation options.

Assume you have two spans running across private property and the right of way is thick with trees, which because of landowner conditions, you cannot remove and need to trim every two years. Let's also assume that while you've had some reliability problems, your greater concern is public safety because of the location. So, these two spans cost well above the average to maintain and that still doesn't make you comfortable on the safety front. You could resolve the reliability issue and most of your safety concerns by pruning annually but that represents a further doubling of an already high cost. Are there better options?

An inspection of the site reveals that there 78 trees that are being pruned. You note that the area on the other side of the roadway is free of trees. You also speak to the landowner about a possible tree replacement program. The conditions imposed by the landowner are that you are to provide one tree replacement for every tree removed, use minimum 1½" diameter stock, cover the planting and soft landscaping costs. The landowner agrees to water the trees to ensure establishment.

Back at your office you contact a landscape contractor and they offer to grind the stumps of the existing trees, supply and plant 78 trees and do the landscaping for \$205 per tree or \$15,990. Your regular contractor will remove the trees and you know the average price will be \$30 per tree. It will cost a total of \$18,330 to implement the tree replacement alternative.

You are now ready to assess the alternatives within your direct control. You open the Avoided-Cost-of-Pruning Model (if you have a copy I recommend you open it and follow along... there's no better way to see how quick and easy it is) and enter your unit pruning cost, which you know to be \$35 per tree, 78 units to prune, a 2 year pruning cycle and the cost of the tree replacement alternative, which is \$18,330. Next, see the result.

FINANCIAL ASSESSMENT OF ALTERNATIVES TO PRUNING BASED ON PRESENT VALUE OF AVOIDED COST OF PRUNING

Pruning Cost	\$35.00	Per Unit	Landowner/Location Information
Units to Prune	78	Number	
Trim Cycle	2	1 - 10 (Years)	
Tree Ownership	p	(P for private; M for municipality)	
Term	15	Years	
Discount Rate	10.00%	Based on required rate of return or opportunity cost	
Avoided Cost (PV)	\$12,307	\$ available for alternatives	
Cost of Alternative	\$18,330	Total cost of implementing alternative	
Net Present Value	-\$6,023		© ECOSYNC 2003 Resale and redistribution is prohibited. Serial Number: 00001
Discounted Payback	#N/A	Years	
Internal Rate of Return	-9.97%		

The tree replacement option has a negative Net Present Value. In other words, it's more cost effective to continue pruning every two years. However, due to safety and reliability concerns you were thinking you probably should prune annually. Let's go back to the Avoided-Cost-of-Pruning Model and change the Trim Cycle to 1 year.

FINANCIAL ASSESSMENT OF ALTERNATIVES TO PRUNING BASED ON PRESENT VALUE OF AVOIDED COST OF PRUNING

Pruning Cost	\$35.00	Per Unit	Landowner/Location Information
Units to Prune	78	Number	
Trim Cycle	1	1 - 10 (Years)	
Tree Ownership	p	(P for private; M for municipality)	
Term	15	Years	
Discount Rate	10.00%	Based on required rate of return or opportunity cost	
Avoided Cost (PV)	\$23,495	\$ available for alternatives	
Cost of Alternative	\$18,330	Total cost of implementing alternative	
Net Present Value	\$5,165		© ECOSYNC 2003 Resale and redistribution is prohibited. Serial Number: 00001
Discounted Payback	9	Years	
Internal Rate of Return	4.10%		

As the tree replacement alternative now has a positive Net Present Value with an Internal Rate of Return of 4.1%, you can conclude the tree replacement is a more cost effective alternative than implementing an annual pruning cycle. At this point the tree replacement is your number one choice.

That's what you can do from within the vegetation management group. But what about engineering approaches that could resolve the safety/reliability concerns? There's a number of them:

- Underground the two spans
- Move the line across the road
- Install shielded conductor
- Increase the line height

Let's assume that in discussing these options with the engineering group you arrive at the conclusion that two of these possibilities are not permanent solutions. Increasing the line height would serve for a time but you would still need to prune and there is a risk that the landowner would continue to restrict what you do, essentially returning you to square one after the added clearance is usurped by tree growth. Engineering also points out that while installing shielded cable would resolve the safety/reliability issue, if the landowner, recognizing the safety concern has been removed, becomes more resistant to pruning the trees then there might be significant abrasion and a future need to re-string. Engineering agrees to provide you with a cost to move the line and to underground the section.

The engineering group will have a process to determine the cost of moving the line or switching to underground. While the specifics may vary from one utility to another, the approach may be that the new installation will be capitalized so the cost of moving the line is equivalent to the early retirement cost of the existing facility less any salvage. For undergrounding, costs incremental to an overhead system serving the same function would need to be considered. Let's assume that engineering examines the site and reports back costs of \$6,900 for moving the line and \$30,900 for undergrounding.

Clearly the undergrounding option is more expensive and need not be further considered. But we do want to run the Avoided-Cost-of-Pruning Model, using the cost of moving the line, \$6,900, as the Cost of Alternative. We find that the Net Present Value for a 1-year pruning cycle is positive and the Internal Rate of Return is 30.4%.

Moving the line has a substantially higher rate of return than the tree replacement option, which in turn was superior to shifting to an annual pruning cycle.

There's one more step we might want to consider. How does moving the line compare to the status quo... that is, continuing with the current 2-year pruning cycle and accepting the associated safety/reliability risks?

We need simply to re-set the Trim Cycle in the Avoided-Cost-of-Pruning Model to 2 and instantly we find that moving the line has a rate of return of 20.2% compared to the current program of pruning every two years. The conclusion is that this engineering solution is more cost effective than any of the alternatives available to the vegetation management group.

FINANCIAL ASSESSMENT OF ALTERNATIVES TO PRUNING BASED ON PRESENT VALUE OF AVOIDED COST OF PRUNING

Pruning Cost	\$35.00	Per Unit	Landowner/Location Information	
Units to Prune	78	Number		
Trim Cycle	2	1 - 10 (Years)		
Tree Ownership	p	(P for private; M for municipality)		
Term	15	Years		
Discount Rate	10.00%	Based on required rate of return or opportunity cost		
Avoided Cost (PV)	\$12,307	\$ available for alternatives		
Cost of Alternative	\$6,900	Total cost of implementing alternative		
Net Present Value	\$5,407	© ECOSYNC 2003 Resale and redistribution is prohibited. Serial Number: 00001		
Discounted Payback	6			Years
Internal Rate of Return	20.24%			

Implementing this line move requires a \$6,900 investment. Why would the engineers agree to this investment if you cannot demonstrate the return to the company for doing so? It's only when you quantify the present value of the avoided pruning that the benefits come into focus. And at this point the question becomes, why would the engineers refuse to move the line when the benefit of doing so is a positive rate of return roughly 100% greater than the regulator approved rate of return?

The Avoided-Cost-of-Pruning Model is not the only path to financial assessments of alternatives to pruning but it is the quickest, easiest and cheapest way. If you followed along you saw how, in a flash, the Avoided-Cost-of-Pruning Model provided financial information that would take you hours to calculate from scratch.

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