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Susan Frank
Vice President and Chief Regulatory Officer
Regulatory Affairs

BY EMAIL

September 12, 2014

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
Suite 2700, 2300 Yonge Street
P.O. Box 2319
Toronto, ON, M4P 1E4

Dear Ms. Walli:

EB-2013-0416 Hydro One Networks' 2015 - 2019 Distribution Custom Rate Application – Undertaking Responses

Please find enclosed responses to undertakings provided at the September 12th Oral Hearing in the above-noted proceeding and electronic copies of the exhibits which were physically distributed during the hearing.

Sincerely,

ORIGINAL SIGNED BY SUSAN FRANK

Susan Frank

cc. Intervenors

Encls.

UNDERTAKING – J2.7

Undertaking

To file a written explanation of why the company does what it does, why it differs between the two accounts, the pension and the post-retirement, and the rationale for the company's position.

Response

Why the company does what it does

Hydro One adopted the accrual basis of accounting for Pension and other Post-retirement and post-employment benefits (OPEB) obligations under Canadian Generally Accepted Accounting Principles (CGAAP) when Handbook Section 3461 was adopted in fiscal year 2000.

At that time, the Hydro One pension plan was in a surplus, resulting in a contribution holiday. To pass on the benefit of the contribution holiday to ratepayers, the OEB ordered that pension costs were and continue to be recorded on a cash basis as employer contributions are paid to the pension fund in accordance with the Pension Benefits Act (Ontario). A pension cost variance account was established to track the difference between the actual pension expense incurred and estimated pension costs approved by the OEB. The balance in this regulatory deferral variance account reflected the excess of pension costs paid as compared to OEB-approved amounts.

The OPEBs have consistently been recorded for financial reporting purposes and included in rates on an accrual basis.

Why it differs between the two accounts, the pension and the post-retirement

Rate regulated accounting under United States Generally Accepted Accounting Principles (USGAAP) allows for a different treatment for pension and OPEB costs.

The accounting treatment for pensions and OPEBs under USGAAP for regulated operations is covered in the Financial Accounting Standards Board Accounting Standards Codification (ASC) 980-715 – Regulated Operations, Compensation – Retirement Benefits. Section 980 of the codification addresses specific accounting issues related to regulated operations, while Section 715-30 and Section 715-60 address Defined Benefit Plans—Pension and Defined Benefit Plans—Other Postretirement Benefits respectively.

In accordance with ASC 980-715-55-2 and 980-715-55-4, pension costs can be recovered under a cash basis for rate setting purposes with the difference between the cash and accrual expense being eligible to be set up as a regulatory asset or liability.

For OPEBs, ASC 980-715-25-4 states "For continuing postretirement benefit plans, a regulatory asset related to these costs shall not be recorded if the regulator continues to include other postretirement benefit costs in rates on a pay-as-you-go basis. The

application of this Topic requires that a rate-regulated entity's rates be designed to recover the specific entity's costs of providing the regulated service or product."

Rationale for the company's position

Based on our understanding and interpretation of the above USGAAP guidance, we believe OPEBs cannot be accounted on a cash basis.

The following best-efforts analysis has been prepared to illustrate the impact of OPEBs being recovered on a cash basis versus an accrual basis on revenue requirements:

In Millions $	OPEBs on:	2015	2016	2017	2018	2019
	Accrual Basis	37	36	33	35	35
	Cash Basis	31	34	36	38	39
	Difference	(6)	(2)	3	3	4

The above analysis is consistent with the underlying assumptions in the analysis previously submitted as Exhibit TCJ1.19. The underlying information for both the accrual and cash basis are the forecasted employer contributions for the relevant years as provided by our actuaries. This analysis has been prepared based on the following main assumptions:

Accrual basis:

- The total OPEB amount on an accrual basis includes a portion for amount recovered through OM&A and a portion recovered in revenue requirement from in-service capital. The portion for capital is calculated based on a forecasted and assumed recovery through depreciation on in-service capital for the 2015 to 2019 years.

Cash basis:

- The total OPEB amount on a cash basis includes only the forecasted actual cash to be paid out for the 2015 to 2019 years (the amount fully recovered through OM&A).

Other than the above difference on revenue requirements and impact of OPEBs being recovered on a cash basis versus an accrual basis, the following are key considerations in this analysis:

- We believe that using the accrual method results in the matching of the timing of the OPEB obligation with the timing of the underlying service rendered to Hydro One by its employees.

- The current treatment is also consistent with the principle of intergenerational equity and to do otherwise (i.e. record the OPEB obligation on a cash basis) may result in

one generation of rate payer bearing the cost and another generation receiving the benefits.

- If a departure from USGAAP is made for regulatory reporting purposes, a separate regulatory tracking account will have to be created to capture changes in OPEB amounts from those included in approved rates and a separate review and application for the disposition of this regulatory tracking account will have to be made in a timely fashion with the Board.

  The net impact of such an approach would be to increase the reporting burdens (both from a time and cost perspective) in trying to maintain two separate accounting records – one for regulatory purposes and one for external financial reporting purposes in accordance with USGAAP as the Board will require regulatory tracking account information for the recovery of prudent costs through customer rates, which will not be readily available or match the external financial reporting. This will ultimately be to the detriment of rate payers.

We would also further reiterate our support for a review being performed on a generic undertaking basis, rather than on a company-specific basis, as to the merits of revisiting the accounting and rate making implications for pensions and OPEBs.

UNDERTAKING – J3.1

Undertaking

To check the average growth rate of total cost figures.

Response

Hydro One can confirm that the numbers provided by Board Staff approximately represent the annual growth rate total cost provided in Exhibit I, Tab 3.1 Schedule 1 Staff 38 b). However, Hydro One has calculated that the average annual growth rate is 1.2% historically and 3.0% over the rate term compared to Board Staff's 1.1% and 3.0% results respectively.

UNDERTAKING – J3.3

Undertaking

To provide updated numbers of the smooth Dx rate increase contemplating 6.3 percent.

Response

Please see Attachment 1 for the updated Smoothed and Unsmoothed Dx rate increases.

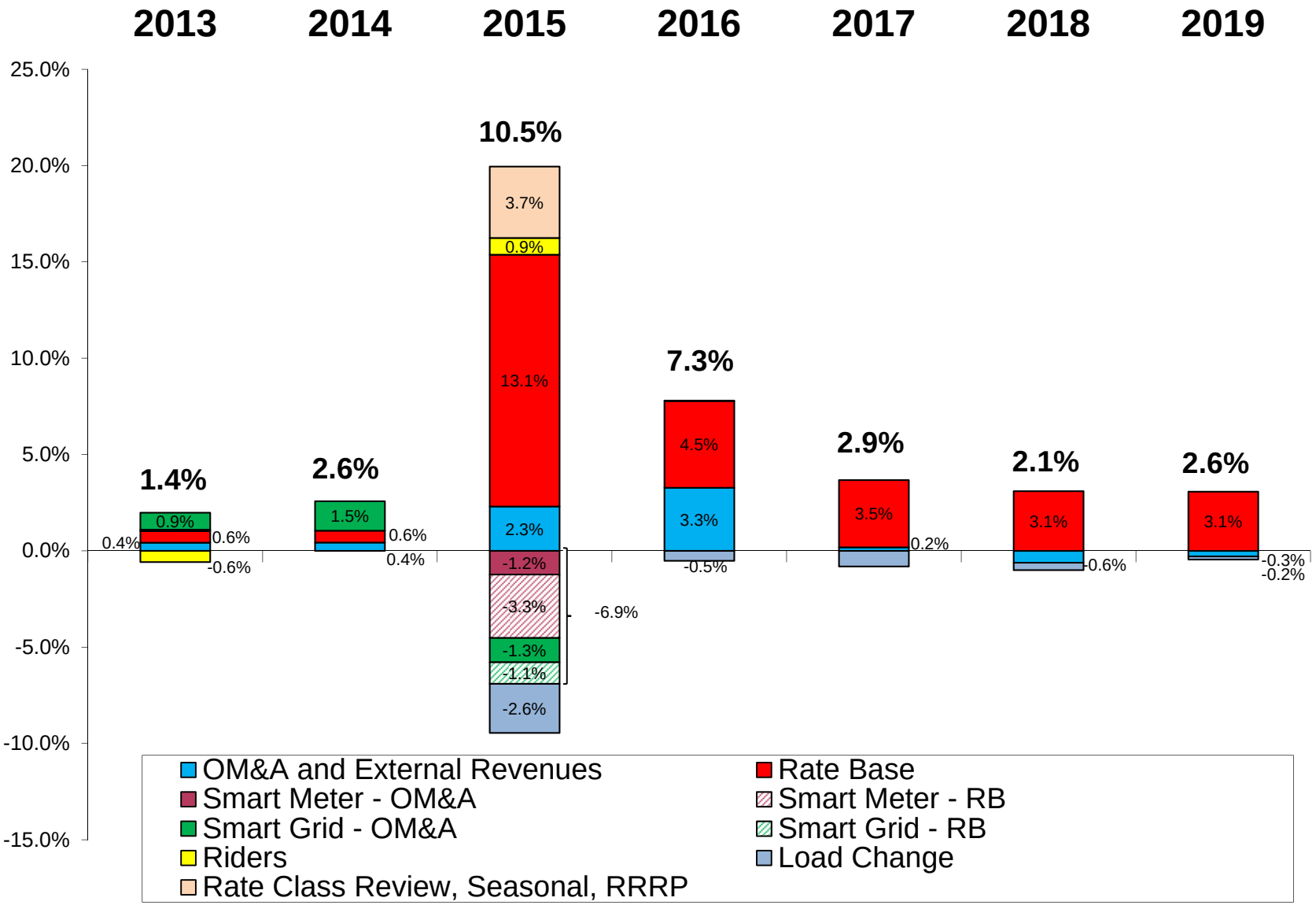
In addition, the tables below are being included to provide more clarity to the build-up of the Rates Revenue Requirement over the test periods.

Note: the 2014 Revenue Requirement less External Revenues and Riders of $1,254.0 million in the tables below represent the implied revenue requirement from the OEB-approved 2014 IRM application.

UNSMOOTHED	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
OM&A		564.3	610.2	614.0	603.9	600.0
Depreciation		355.4	374.9	390.2	402.9	413.6
Return on Debt		188.2	203.5	218.6	235.3	255.1
Return on Equity		254.5	273.5	292.3	308.0	321.4
Income Tax		52.5	60.5	63.0	65.4	69.5
Revenue Requirement		**1,414.9**	**1,522.6**	**1,578.0**	**1,615.4**	**1,659.7**
External Revenues		(47.9)	(48.9)	(49.9)	(49.2)	(49.9)
Revenue Requirement net of External Revenues		**1,367.0**	**1,473.7**	**1,528.1**	**1,566.1**	**1,609.9**
Smart Meters		0.8	0.8	0.8	0.8	0.8
Green		(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
Rate Smoothing Rider		-	-	-	-	-
Other Riders		4.0	4.0	4.0	4.0	4.0
Revenue Requirement net of External Revenues and Riders	**1,254.0**	**1,371.3**	**1,478.0**	**1,532.4**	**1,570.4**	**1,614.2**
Load impact		(32.0)	(6.8)	(11.4)	(5.8)	(2.6)
Rate Class Review		46.5	-	-	-	-
Rates Revenue Requirement		**1,385.8**	**1,471.2**	**1,521.0**	**1,564.6**	**1,611.5**
Unsmoothed Rate Increase		**10.5%**	**7.3%**	**2.9%**	**2.1%**	**2.6%**

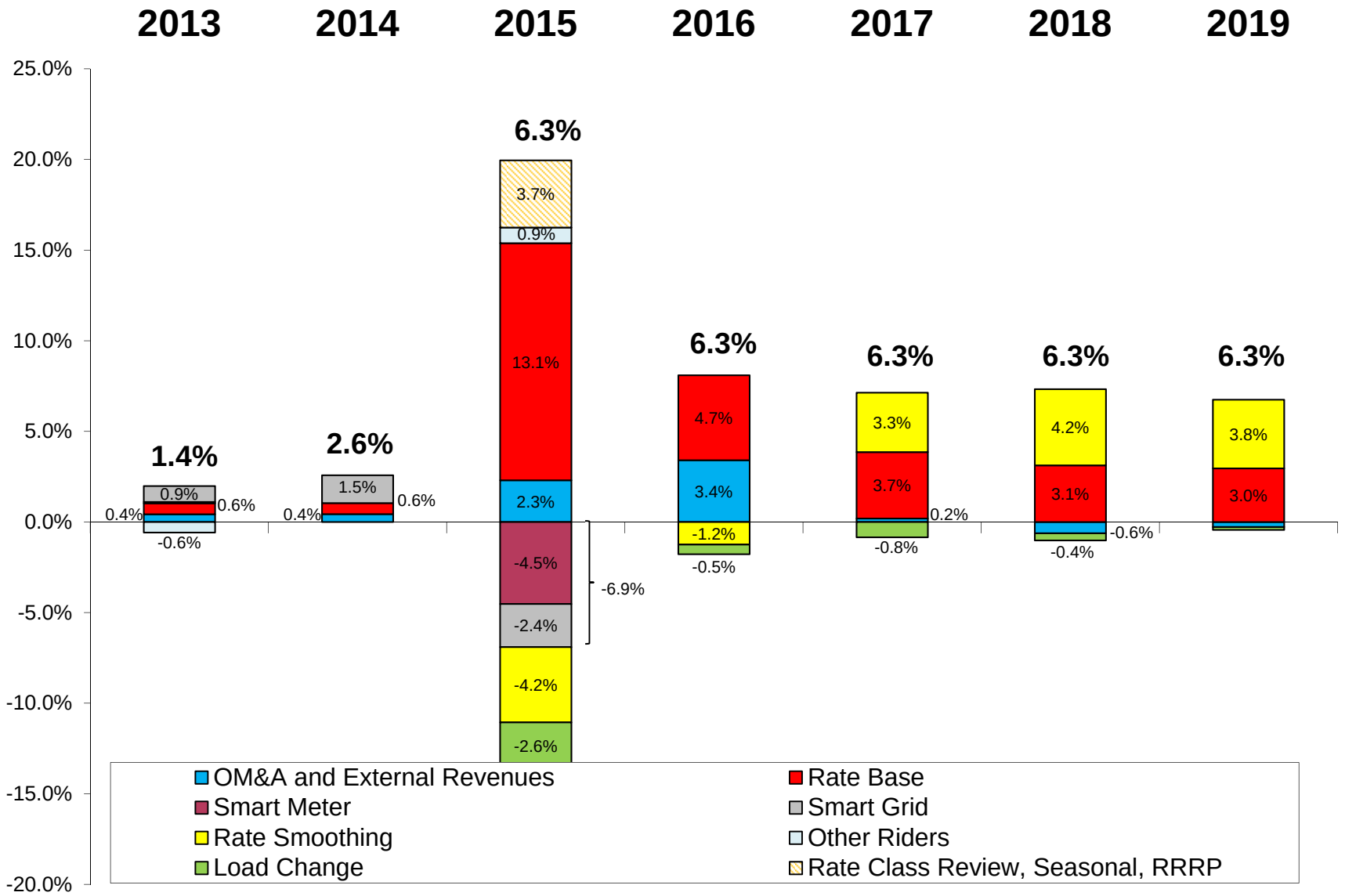
SMOOTHED	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
OM&A		564.3	610.2	614.0	603.9	600.0
Depreciation		355.4	374.9	390.2	402.9	413.6
Return on Debt		188.2	203.5	218.6	235.3	255.1
Return on Equity		254.5	273.5	292.3	308.0	321.4
Income Tax		52.5	60.5	63.0	65.4	69.5
Revenue Requirement		**1,414.9**	**1,522.6**	**1,578.0**	**1,615.4**	**1,659.7**
External Revenues		(47.9)	(48.9)	(49.9)	(49.2)	(49.9)
Revenue Requirement net of External Revenues		**1,367.0**	**1,473.7**	**1,528.1**	**1,566.1**	**1,609.9**
Smart Meters		0.8	0.8	0.8	0.8	0.8
Green		(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
Rate Smoothing Rider		(52.2)	(68.7)	(22.4)	41.1	102.1
Other Riders		4.0	4.0	4.0	4.0	4.0
Revenue Requirement net of External Revenues and Riders	**1,254.0**	**1,319.1**	**1,409.3**	**1,510.0**	**1,611.5**	**1,716.3**
Load impact		(32.0)	(6.8)	(11.4)	(5.8)	(2.6)
Rate Class Review		46.5	-	-	-	-
Rates Revenue Requirement		**1,333.6**	**1,402.5**	**1,498.6**	**1,605.7**	**1,713.6**
Rate Increase		**6.3%**	**6.3%**	**6.3%**	**6.3%**	**6.3%**

Distribution Rate Increase



- Rate adders and riders causes changes to rates as collections or refunds begin and end1
- Rate base component of rate change increases due mainly to in-servicing of capital projects

Smoothed Distribution Rate Increase



- Rate smoothing achieved by deferring Revenue Requirement over the 2015-19 period
- Net Revenue Requirement collected over the 2015-19 period is unchanged

UNDERTAKING – J3.4

Undertaking

To explain how the figure for back-office expenses was done, and to give a similar number for each of the different categories.

Response

The $109M number that was provided in Exhibit TCJ1.02 was the actual cost of the Inergi contract in 2013. This cost represented the total associated cost of the Back Office productivity category as the only initiatives in the category were related to that contract cost. The total cost of the Inergi contract would have been $135.7M if not for the initiatives in this category.

After an analysis related to undertaking J3.4, it has been determined that it is not possible to provide the associated budgets with the programs related to the productivity initiatives found in Table 2 of Exhibit A Tab 19 Schedule 1. This issue was previously responded to and explained in Exhibit I, Tab 2.3, Schedule 6 VECC 43. When the undertaking was agreed to, there was a misunderstanding as the question was believed to be asking Hydro One to sum the totals on the chart provided in Exhibit I, Tab 2.3, Schedule 6 VECC 42.

UNDERTAKING – J3.5

Undertaking

To provide more backup for the revenue requirement for 2014.

Response

As a follow up to Undertaking J1.02, the following table provides a breakdown of 2014 notional revenue requirement.

The OM&A forecast is consistent with the Q2 actuals provided in Undertaking TCJ1.13.

The Depreciation & amortization forecast is also consistent with the six-month ended June 30th, 2014 forecast.

Return on capital is calculated using the OEB-issued 2014 cost of capital parameters and the 2014 Notional Rate Base provided in Exhibit I, Tab 6.1, Schedule 14 AMPCO 36.

Notional Revenue Requirement	**2014 Forecast**
Operating, maintenance & administrative	656.7
Depreciation & amortization	342.6
Income taxes	18.5
Return on capital *	408.5
Total revenue requirement	**1,426.3**

* Consistent with OEB-issued 2014 cost of capital parameters (ROE = 9.36%; Return on long-term debt = 4.87%; Return on short-term debt = 2.08%)

UNDERTAKING – J3.7

Undertaking

TO PROVIDE THE RECONCILIATION OF THE TWO DOCUMENTS REFERENCED.

Response

Table 1 is the original table from interrogatory Exhbit I, Tab 4.2, Schedule 1 Staff 62 modified to include only Distribution savings related to Cornerstone (previously Tx and Dx were shown together) in order to show how the table reconciles to the answer provided in Exhibit I, Tab 2.3, Schedule 6 VECC 42. Table 2 shows the initiatives exactly as they are in Exhibit I, Tab 2.3, Schedule 6 VECC 42, with the next two tables showing the breakdown between OM&A and Capital. Please note the colour of the highlighted total lines between the four tables that show the connection between the tables.

Table 1

Distribution Only
CORNERSTONE Productivity Summary Savings
(for 2013-2019)

	2013 Actual	2014 Forecast	2015 Forecast	2016 Forecast	2017 Forecast	2018 Forecast	2019 Forecast
Phase 1 & 2							
OMA	10.9	11.5	11.7	11.9	12.1	12.3	12.5
CAPITAL	19.1	19.1	19.1	19.1	19.1	19.1	19.1
Total	**29.9**	**30.6**	**30.8**	**31.0**	**31.1**	**31.3**	**31.5**
Phase 3							
OMA	0.4	1.9	3.3	4.8	4.9	5.1	5.1
CAPITAL	0.0	1.5	2.2	2.3	2.4	2.5	2.5
Total	**0.4**	**3.3**	**5.5**	**7.1**	**7.3**	**7.6**	**7.6**
Phase 4							
OMA	0.0	10.3	19.8	19.8	19.8	19.8	19.8
CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.0**	**10.3**	**19.8**	**19.8**	**19.8**	**19.8**	**19.8**
TOTAL							
OMA	11.2	23.7	34.8	36.4	36.8	37.1	37.4
CAPITAL	19.1	20.5	21.3	21.4	21.5	21.6	21.6
Total	**30.3**	**44.2**	**56.1**	**57.8**	**58.3**	**58.7**	**59.0**

Notes: Due to the dependent and linked nature of the Cornerstone Phase 1 and 2 projects it is more appropriate to keep the two phases savings grouped together to more accurately reflect the causes of the savings.
Phase 1 includes: 50% of headcount reduction savings
Phase 2 includes: 50% of headcount reduction savings, IT application reduction savings
Phase 3 includes: E3, AIP, AA, WWF, HR Pay & BPC
Phase 4 includes: CIS

Table 2

Table from VECC 43 (Cornerstone 1 & 2 broken out)

Initiative Name	Dx	2013 Actual	2014 Forecast	2015 Forecast	2016 Forecast	2017 Forecast	2018 Forecast	2019 Forecast
Cornerstone Phase 1 & 2								
Head Count Reduction	52.1%	8,770,786	9,172,064	9,355,505	9,542,615	9,733,468	9,928,137	10,126,700
Application Rationalization	52.1%	2,084,560	2,345,130	2,345,130	2,345,130	2,345,130	2,345,130	2,345,130
Strategic Sourcing	52.1%	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277
Subtotal Phase 1 & 2		**29,917,623**	**30,579,471**	**30,762,912**	**30,950,022**	**31,140,874**	**31,335,544**	**31,534,106**
Cornerstone Phase 3								
Process Improvements & BPC	44.4%	213,120	213,120	217,382	221,730	226,165	230,688	235,302
AA - Asset Analytics	58%	-	2,634,745	3,918,248	4,093,431	4,327,007	4,502,190	4,502,190
E3 - Eng Design	0%	-	-	-	-	-	-	-
AIP - Asset Investment Planning	44.4%	170,496	173,160	177,689	182,246	185,500	188,784	191,654
Workflow of the Future	44.4%	-	-	-	1,320,811	1,347,227	1,374,172	1,401,655
HR Pay Project	44.4%	-	309,283	1,210,231	1,234,436	1,259,125	1,284,307	1,309,993
Subtotal Phase 3		**383,616**	**3,330,308**	**5,523,551**	**7,052,654**	**7,345,024**	**7,580,141**	**7,640,794**
Cornerstone Phase 4								
CIS	100%	-	10,300,000	19,785,000	19,785,000	19,785,000	19,785,000	19,785,000
Subtotal Phase 4		**-**	**10,300,000**	**19,785,000**	**19,785,000**	**19,785,000**	**19,785,000**	**19,785,000**
Total		**30,301,239**	**44,209,778**	**56,071,463**	**57,787,676**	**58,270,898**	**58,700,684**	**58,959,900**

Table 3

OM&A

Initiative Name	Dx	2013 Actual	2014 Forecast	2015 Forecast	2016 Forecast	2017 Forecast	2018 Forecast	2019 Forecast
Cornerstone Phase 1 & 2								
Head Count Reduction	52.1%	8,770,786	9,172,064	9,355,505	9,542,615	9,733,468	9,928,137	10,126,700
Application Rationalization	52.1%	2,084,560	2,345,130	2,345,130	2,345,130	2,345,130	2,345,130	2,345,130
Strategic Sourcing	52.1%	-	-	-	-	-	-	-
Subtotal Phase 1 & 2		**10,855,346**	**11,517,194**	**11,700,635**	**11,887,745**	**12,078,598**	**12,273,267**	**12,471,830**
Cornerstone Phase 3								
Process Improvements & BPC	44.4%	213,120	213,120	217,382	221,730	226,165	230,688	235,302
AA	58%	-	1,159,287.59	1,724,029	1,801,109	1,903,883.21	1,980,964	1,980,964
E3 - Eng Design	0%	-	-	-	-	-	-	-
AIP - Asset Investment Planning	44.4%	170,496	173,160	177,689	182,246	185,500	188,784	191,654
Workflow of the Future	44.4%	-	-	-	1,320,811	1,347,227	1,374,172	1,401,655
HR Pay Project	44.4%	-	309,283	1,210,231	1,234,436	1,259,125	1,284,307	1,309,993
Subtotal Phase 3		**383,616**	**1,854,851**	**3,329,332**	**4,760,333**	**4,921,900**	**5,058,914**	**5,119,568**
Cornerstone Phase 4								
CIS	100%	-	10,300,000	19,785,000	19,785,000	19,785,000	19,785,000	19,785,000
Subtotal Phase 4		**-**	**10,300,000**	**19,785,000**	**19,785,000**	**19,785,000**	**19,785,000**	**19,785,000**
OM&A Total		**11,238,962**	**23,672,045**	**34,814,967**	**36,433,078**	**36,785,498**	**37,117,182**	**37,376,398**

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Table 4

Capital

Initiative Name	Dx	2013 Actual	2014 Forecast	2015 Forecast	2016 Forecast	2017 Forecast	2018 Forecast	2019 Forecast
Cornerstone Phase 1 & 2								
Head Count Reduction	52.1%	-	-	-	-	-	-	-
Application Rationalization	52.1%	-	-	-	-	-	-	-
Strategic Sourcing	52.1%	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277	19,062,277
Subtotal Phase 1 & 2		**19,062,277**	**19,062,277**	**19,062,277**	**19,062,277**	**19,062,277**	**19,062,277**	**19,062,277**
Cornerstone Phase 3								
Process Improvements & BPC	44.4%							
AA	58%	-	1,475,456.93	2,194,219	2,292,321	2,423,124	2,521,226	2,521,226
E3 - Eng Design	0%	-	-	-	-	-	-	-
AIP - Asset Investment Planning	44.4%	-	-	-	-	-	-	-
Workflow of the Future	44.4%	-	-	-	-	-	-	-
HR Pay Project	44.4%	-	-	-	-	-	-	-
Subtotal Phase 3		**-**	**1,475,457**	**2,194,219**	**2,292,321**	**2,423,124**	**2,521,226**	**2,521,226**
Cornerstone Phase 4								
CIS	100%	-	-	-	-	-	-	-
Subtotal Phase 4		**-**	**-**	**-**	**-**	**-**	**-**	**-**
Capital Total		**19,062,277**	**20,537,734**	**21,256,496**	**21,354,598**	**21,485,401**	**21,583,503**	**21,583,503**

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UNDERTAKING – J3.8

Undertaking

To provide the profile of temporary staff in the month the data was pulled.

Response

The data used in the 2013 Mercer Compensation Study was a snapshot of July 1st, 2013 Hydro One staffing profile. Of the 746 Society staff in benchmarked positions, twenty-one (21) were temporary Society employees which is 2.8% of the total.

Exhibit C1, Tab 3, Schedule 2, attachment 2 shows 1260 regular Society employees and 46 temporary Society employees. Society temporary employees represent 3.5% of the total Society population.

UNDERTAKING – J3.9

Undertaking

To advise whether the temporary subset of the 746 professional workers at the time given affects the mercer study in a ratio perspective, and if so in what direction.

Response

The 0.7% difference identified in undertaking J3.8 would have no material impact effect on the Society's position in the study relative to the market median in either direction.

UNDERTAKING – J3.10

Undertaking

To discover whether the cnuc 2012 report was received and to produce it if found.

Response

Please find as Attachment 1:

Utility Vegetation Management Benchmark & Industry Intelligence:
2011-2012 Distribution CN Utility Benchmark Survey Analysis Preliminary Report

Utility Vegetation Management Benchmark & Industry Intelligence

2011-2012 Distribution CN Utility Benchmark Survey Analysis Preliminary Report

Prepared by
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4.10.12

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INTRODUCTION

ABOUT THIS PUBLICATION

Utility Vegetation Management (UVM) is best described as "the cost-effective and environmentally correct practices and efforts of a utility to prevent any vegetation from conflicting with the safe and efficient delivery of electricity." Trees and vegetation have a significant impact on all electric companies who have exposed overhead power systems. In many areas, trees represent the single largest threat to electric service reliability and resulting mitigation efforts representing one of the largest maintenance expenses incurred by electric utilities.

The people at CN Utility Consulting, Inc. (CNUC) are pleased to provide you with these benchmarking results in the hopes to improve or validate utility vegetation management activities.

This report represents the present "state of utility vegetation management" for distribution UVM of 22 companies in North America. Currently, CNUC is receiving data from additional companies and as more data is collected this report will be updated and distributed to you to reflect the changes. The survey is open to all electric distribution companies. CNUC believes that the information contained in this report will be helpful to all utility arborists interested in identifying trends, best practices and opportunities for improvement.

It should be noted, however, that benchmarking results are subject to interpretation and also influenced by local considerations. This is particularly true when it comes to utility vegetation managements programs. It is a fact that that each utility must deal with a litany of internal and external influences that each have a unique impact on operating procedures and statistical results. For example, utility companies in Oregon are now required to establish and maintain specific clearances between vegetation and conductors. This external mandate (promulgated by the Public Utility Commission) will obviously affect many indices, such as budget and scheduling methodologies. Bottom line, one shoe does not fit all when it comes to utility vegetation management programs. These differences should be taken into consideration when comparing your specific program with results presented in this report.

REPORT FORMAT

There are several unique features to this report. By understanding how this report is formatted, you will understand how to quickly navigate to the sections you are most interested in. You will also be able to verify that the correct information has been downloaded for your company. We

hope that these instructions will help you have a rewarding experience with this preliminary report.

1. **Table of Contents:** The *Table of Contents* is linked so that you can quickly get to page of interest. A ***Click*** is all that is required.
2. **Table of Figures:** The *Table of Figures* are also linked and navigation is the same as for *Table of Contents*.
3. **Glossary of Terms:** The *Glossary of Terms* appears at the end of the report. It is the same glossary as the one attached to the distribution survey.
4. **Report Organization:** The report has the same organization as the survey. Each chapter corresponds to a section of the survey and has the same title.
5. **Questions in Survey and Report:** The questions, quoted directly from the survey, are displayed immediately preceding the graph, table or figure. In some cases the question may be on one page and the figure on the next.
6. **Question Integration with Figures:** If a question yielded data that is displayed on several graphs, there is an **underlined hyper-link** in bold lettering above the graph that directs you to the question the data was collected from. Once again, simply ***Click*** on the hyper-link to see the wording of the question.
7. **Question Integration with Figures (more than one question):** Some figures were generated by integrating information from more than one question. Information as to which questions were used to calculate statistics will be indicated above the graph in hyper-link(s). A ***Click*** on the hyper-link(s) is all that is required.
8. **Code Numbers:** Charts that include company data are sorted in numerical order to aid in locating your company's data.
9. **Currency Conversions:** Conversions from Canadian dollars to USD were done by dividing Canadian dollars by exchange rates. The annual exchange rates were taken from the following site:
   http://www.irs.gov/businesses/small/international/article/0,,id=206089,00.html
   Annual Exchange rates used were: **2005**, 1.212; **2006**, 1.180; **2007**, 1.117; **2008**, 1.109; **2009**, 1.187; **2010**, 1.072; **2011**, 1.029
10. **Unit Conversions:** Kilometres and square kilometres have been converted to miles and square miles, respectively.
11. **Conversions to Metric:** If you would like to see any data represented in Canadian Dollars and/or kilometres, we will gladly convert desired graphs into that format.
12. **Unused Data:** If we were unable to interpret the data submitted, or if the data was presented in a way that was not comparable to other utilities, it was omitted.
13. **Data Changes:** Changes in numerical data was done by CNUC if there was an email interchange between CNUC and the benchmarking participant to clarify responses. Other instances that resulted in altering data were if the comments about numerical inputs indicated that the figures was derived in a manner different than required and a numerical increase or decrease was also indicated.

14. **Small Value Notations:** If a value was too small to register as a bar on a chart, the value itself is indicated in place of a bar.
15. **Respondent Commentaries**: Many of the survey questions and replies do not translate into data, because they are opinions. For that reason much of what you will read is actual commentary by participants. Comments have only been edited to remove references to the utility company or name of contractor. We have taken the liberty of eliminating redundant answers to aid in reading. If many textual answers are redundant, we have quantified the responses for you, sometimes in a graph. Spelling and punctuation have been corrected as needed.
16. **Square Brackets**: Square brackets found in commentary tables are editorial additions made by CN Utility Consulting.
17. **Question Numbers:** Questions are numbered as they appear in the survey #1 – 277.
18. **Your Responses:** You will be given a copy of your responses to compare with the graphs and tables. Questions and question numbers will be included with your responses.
19. **Accuracy Check:** Looking at graphs that have your company included will be a way to check the accuracy of the representation of your company. If the information on the graph seems questionable for your company, please email ncohn@cnutility.com or call 1-707-827-1397 and ask for Nina Cohn. We will gladly change any information that was incorrectly input into the survey or was downloaded incorrectly. Remember that all monetary information is reported in US Dollars. Canadian Dollars have been converted using annual exchange rates.
20. **Your Company Code:** To check your company's responses you will need your company code. This should be displayed on your responses.

COMPANY TYPE

The types of companies participating in the CNUC Benchmarking Study included State Owned, Municipality or Public Utility Districts, Utility Cooperatives and Investor Owned Utilities. At the point in time, only 22 companies have answered this question.

Question #2: Type of utility (Please check one)

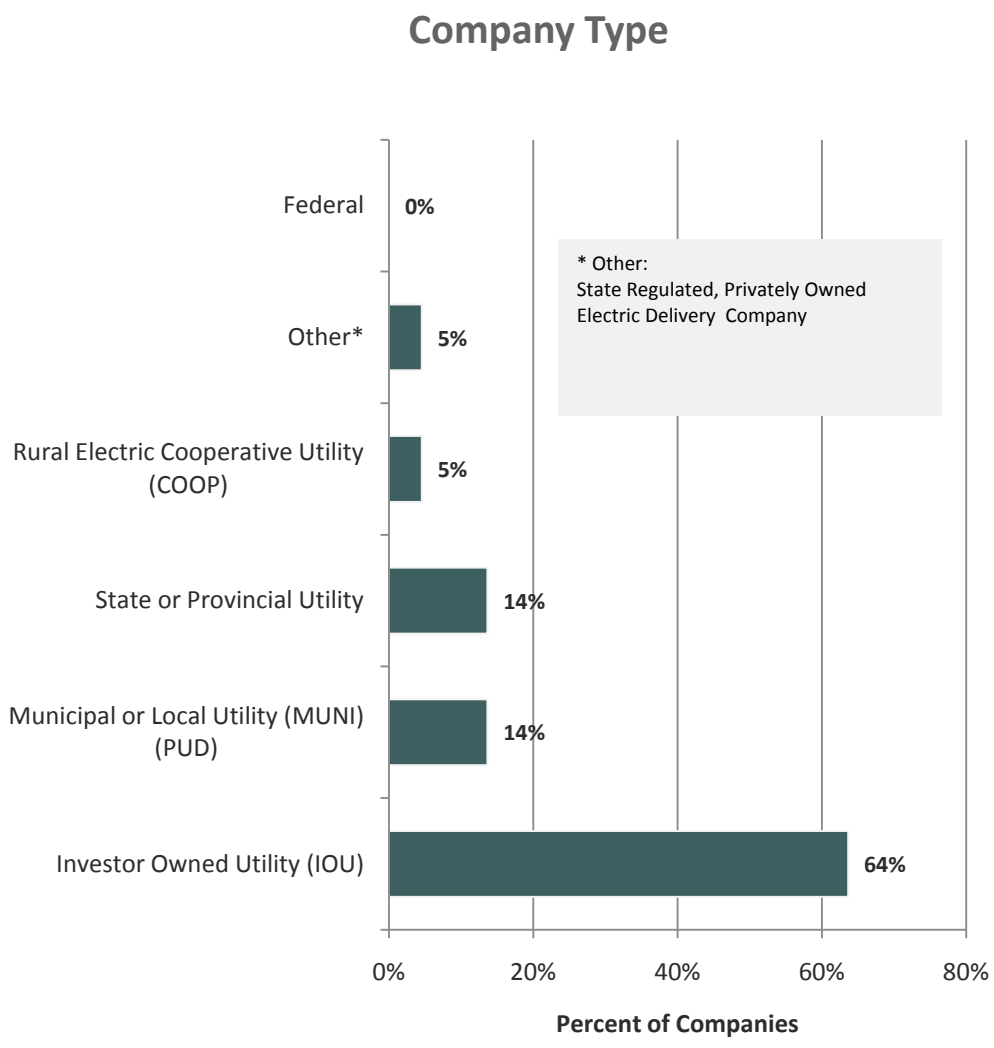


Figure 1: Company Type

UTILITY TYPE

The types of utilities participating in the CNUC Distribution Benchmarking Study are *Transmission & Distribution; Distribution Only; Transmission, Distribution and Generation* and *Transmission, Distribution & Generation* utilities. At this point in time, only 22 companies have answered this question.

Question #3: Is your utility a _____ (Please check one)

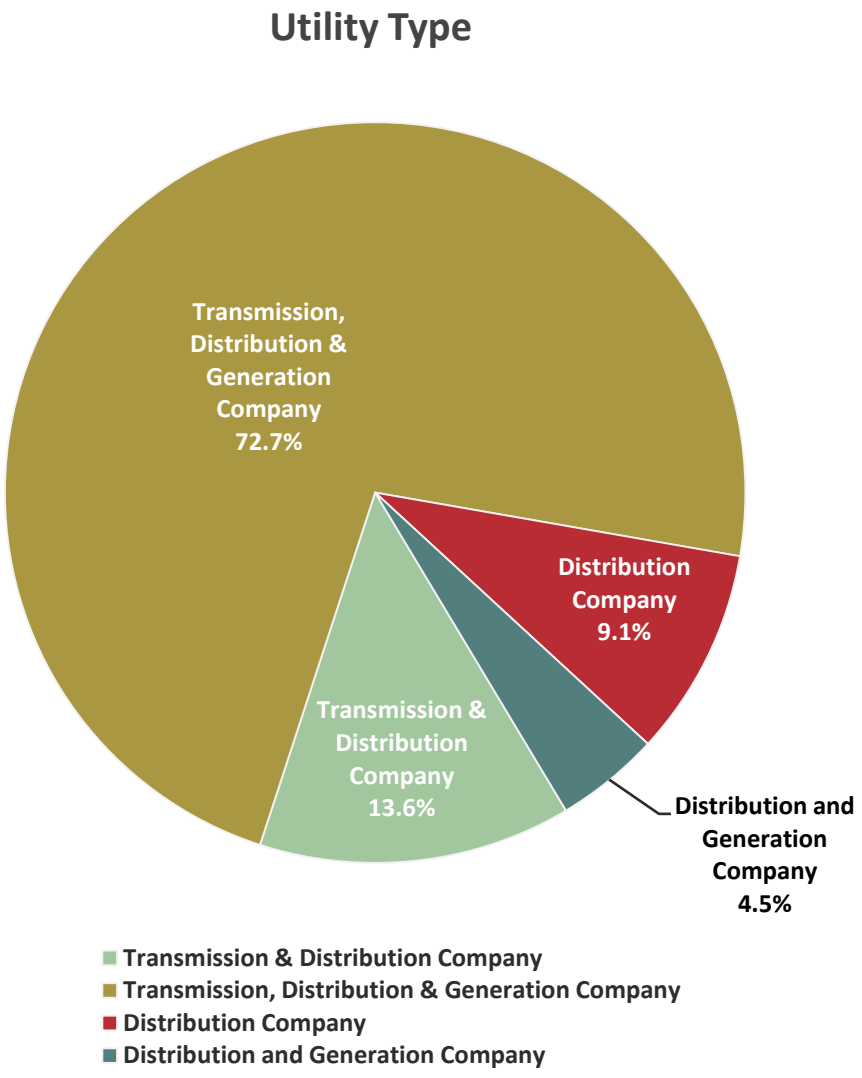


Figure 2: Utility Type

SERVICE TERRITORY

The following chart has been made to compare company service areas.

Question #5: What is the total area of your service territory?

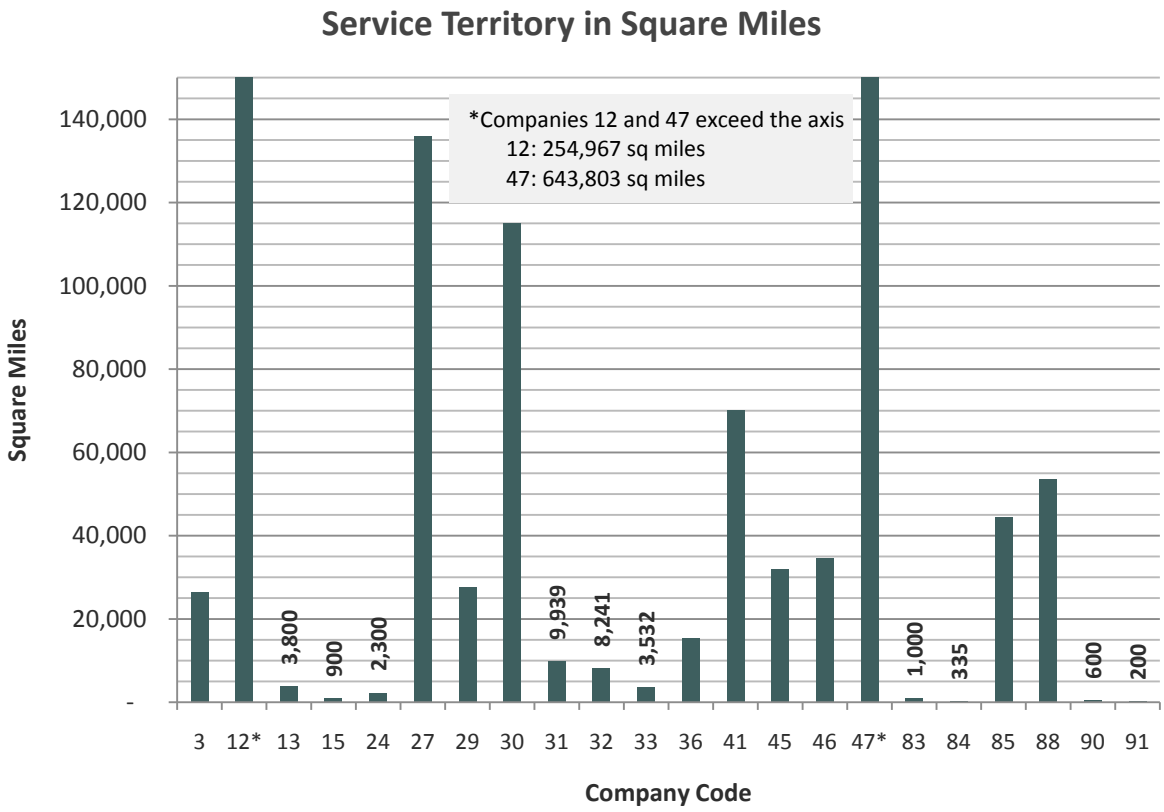


Figure 3: Service Territory Area

Service Territory Description

The following graph gives the service territory breakdown for each company (next page, Fig. 4)

Question #6: Description of service territory (Please *approximate* in percentages). NOTE: These percentages are only intended to categorize customer density and may not reflect your company's definition of Urban, Suburban, Rural and Remote.

Note: **Urban** areas are defined as "more than 50 customers per line mile," **suburban** areas are defined as "25 to 50 customers per line mile," **rural** areas are defined as "between 5 to 25 customers per line mile" and **remote** areas are defined as "less than 5 customers per line mile."

Averages for *urban, suburban, rural* and *remote* are similar to 2006 results.

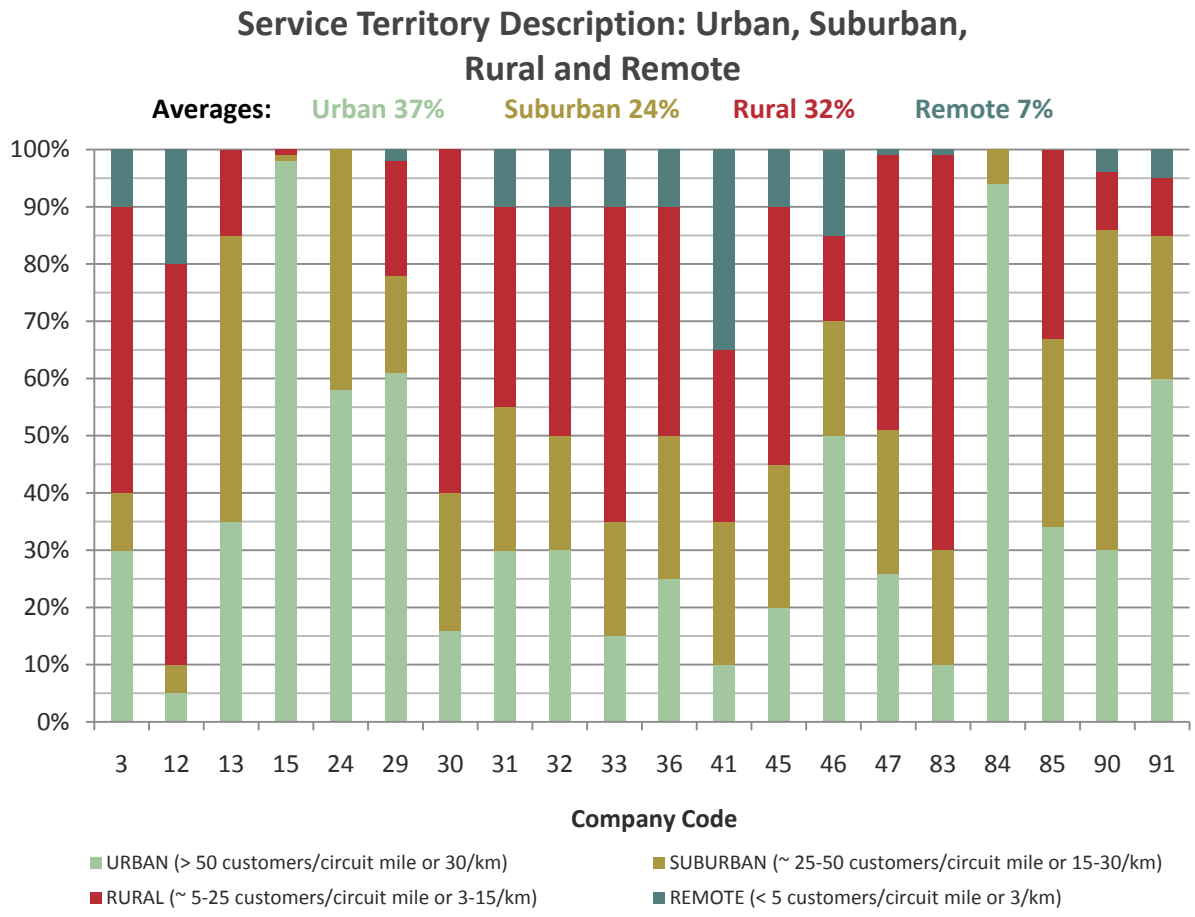


Figure 4: Service Territory Description by Population Density

ELECTRIC CUSTOMERS

Total Number of Electric Customers

Two charts have been used to depict these values. The first chart shows the total number of electric customers each company provides with electrical service. The second chart examines the composition of the electric customer base (residential, industrial, agricultural, or other). The comment table defines what constitutes "Other" electric customers.

Question #7: Please list the number of electric customers you serve by classification. NOTE: The sum of the first five responses should add to the total number of electric customers.

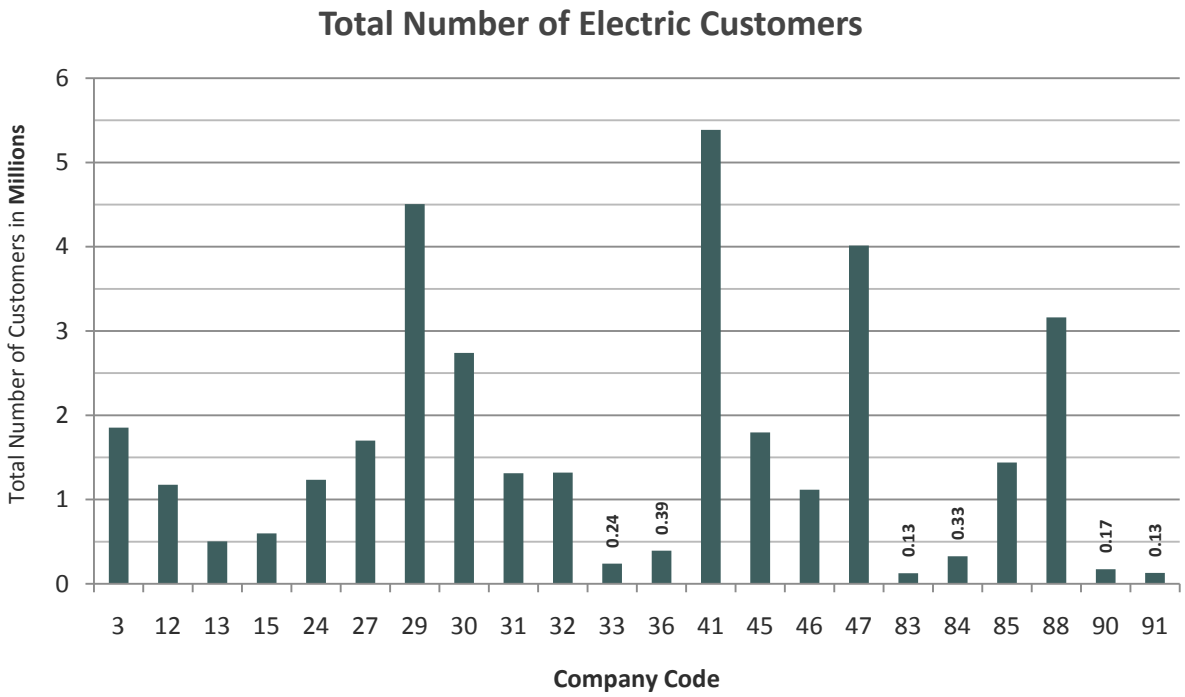


Figure 5: Total Number of Electric Customers

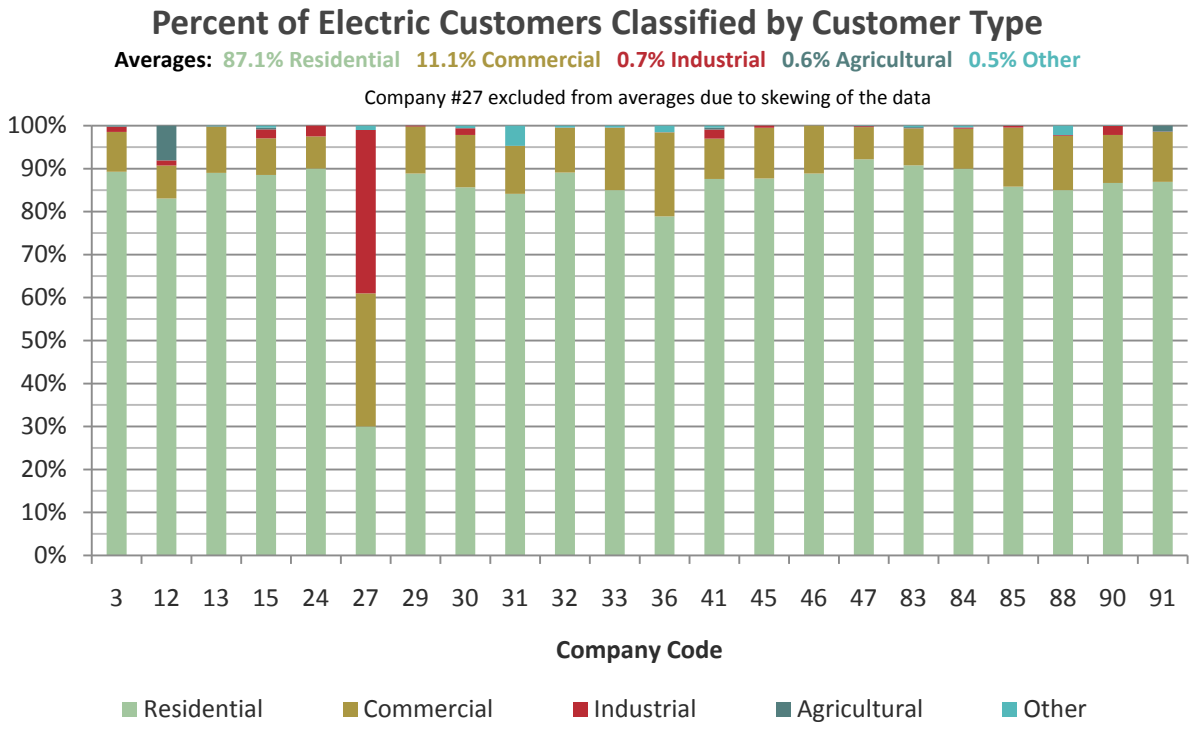


Figure 6: Percent of Electric Customers Classified by Customer Type

Other Classifications of Electrical Customers
Irrigation, street lighting, [utility's] own use
289-Other Public Authorities; 610-Streetlighting
Street & Traffic Light
Public lighting systems and municipal distribution systems.
Street lights, public authorities, sale for resale
Street Lighting
Governmental, Lighting and Signal
Outdoor Light

Figure 7: Other Classifications of Electrical Customers

Electric Customers Served by Overhead versus Underground Lines

Two charts have been used to depict these values. The first chart shows the total number of electric customers served by overhead lines versus underground lines. The second chart examines the percent of the electric customer base served by overhead lines and those served by underground lines.

Question #8: How many customers are served by overhead and how many are served by underground? NOTE: The sum of these two responses should add to your total number of electric customers supplied in the previous question.

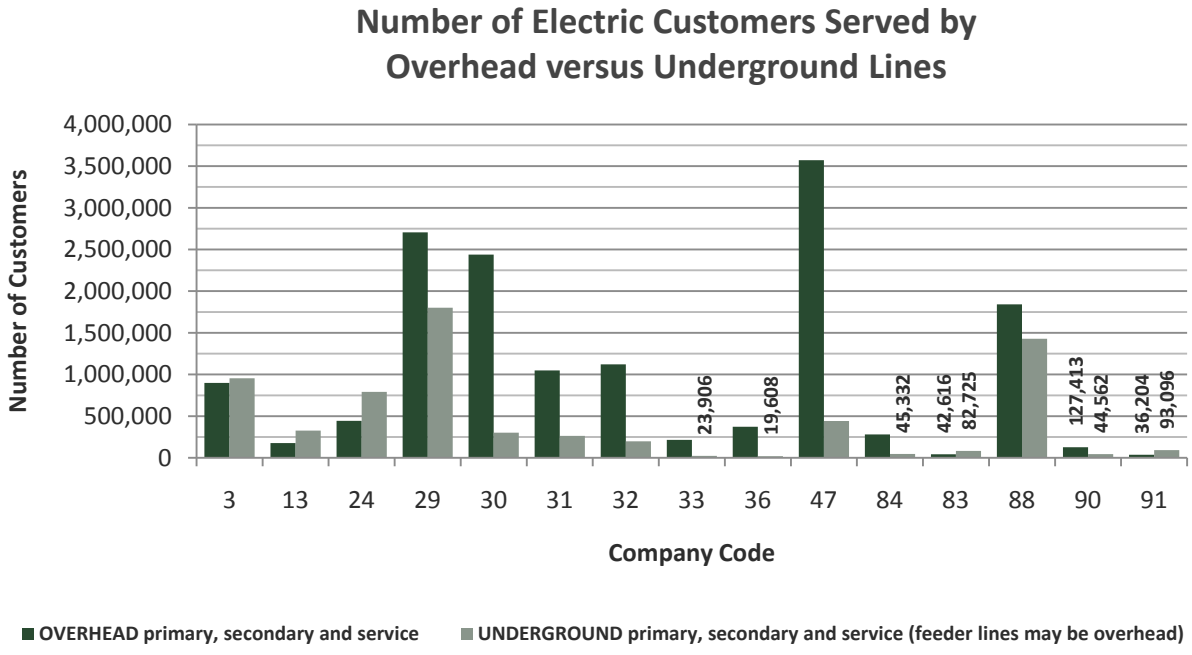


Figure 8: Number of Electric Customers Served by Overhead versus Underground Lines

Statistics calculated with data collected from **Question #8.**

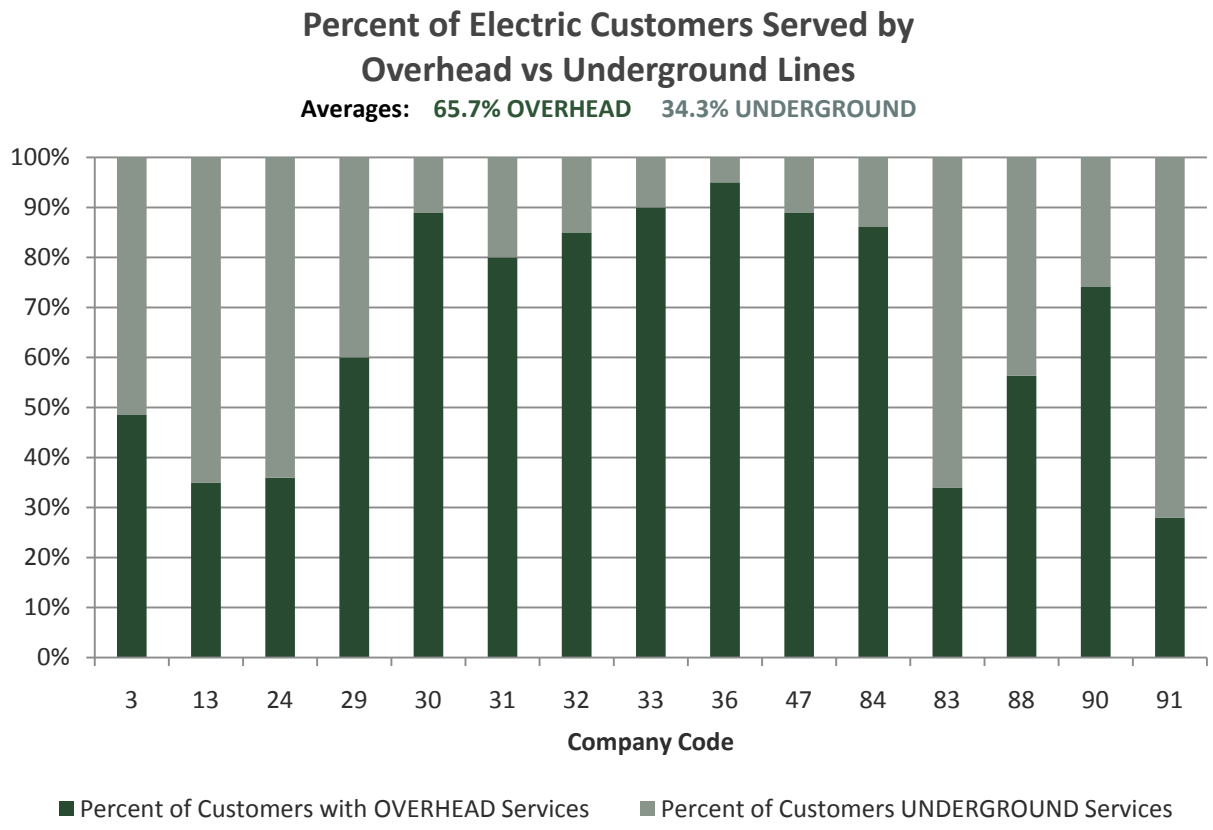


Figure 9: Percent of Electric Customers Served by Overhead versus Underground Lines

OFF-ROAD AND ON-ROAD ACCESS

Two charts have been used to depict these values. The first chart shows the percent of overhead lines that are off-road versus on-road. The second chart categorizes the percent of the off-road access into *Limited, Steep, Flat, Marshland* or *Other*.

Percent of Off-Road vs. On-Road Access

Question #10: What percent of OVERHEAD distribution pole km/mi are_____?
NOTE: Percents of off-road and on-road (two boxes below) should add to 100%

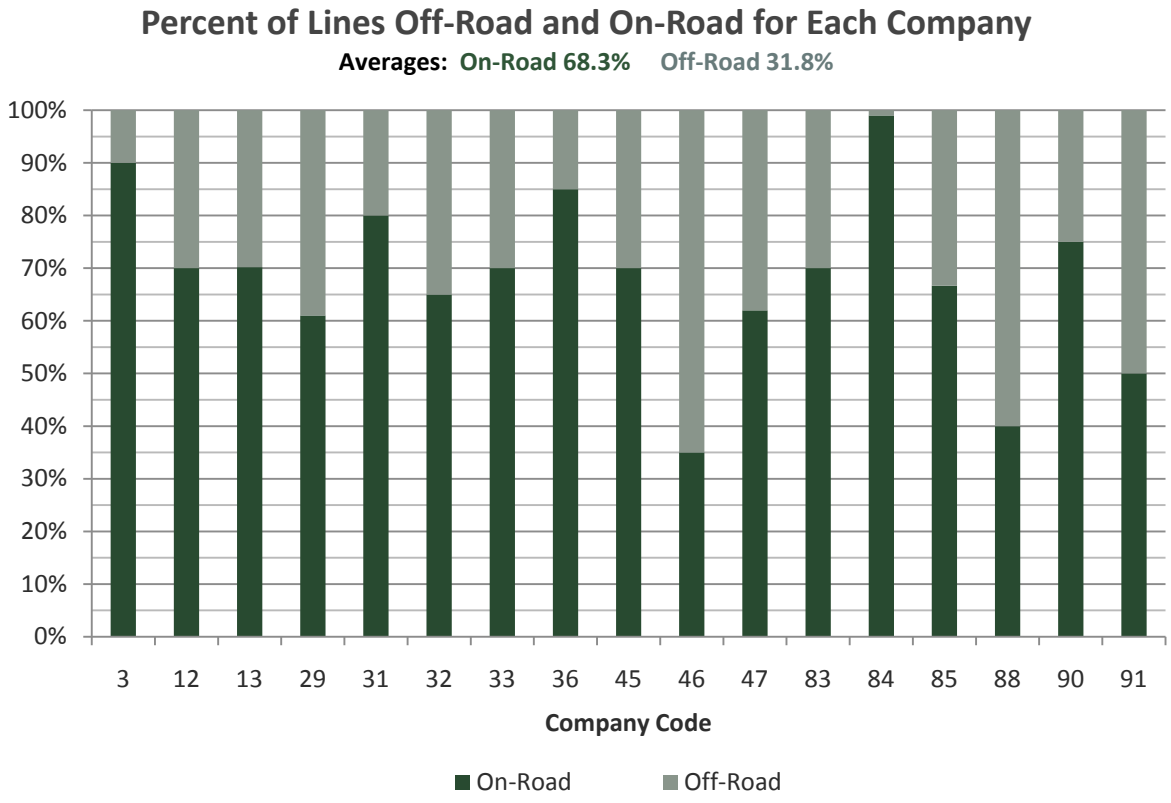


Figure 10: Percent of Lines Off-Road and On-Road for Each Company

Access to Off-Road Distribution Lines Categorized by Geographical Attributes

Question #11: By what percentages would you divide up your OFF-ROAD distribution pole km/mi according to geographical differences?

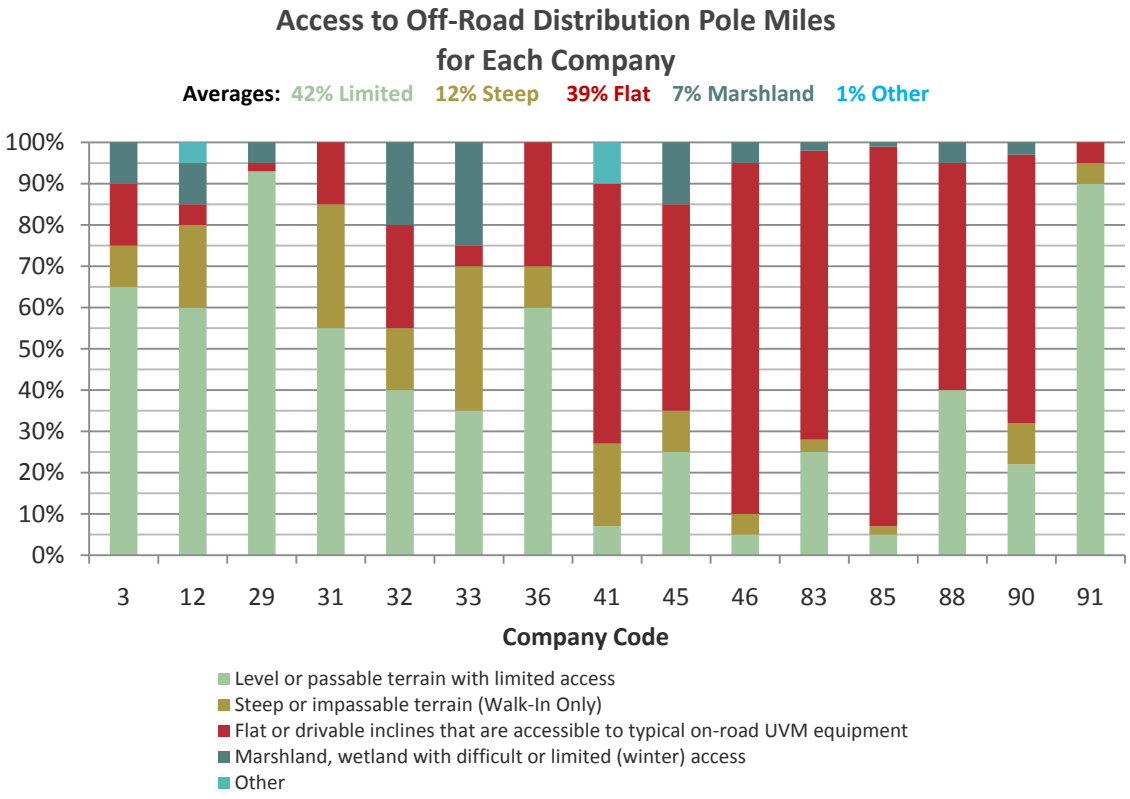


Figure 11: Access to Off-Road Distribution Pole Miles for Each Company

Comments on Access to Off-Road Distribution Pole Miles
Backyard Easements that must be accessed on foot.
Boat and helicopter access only

Figure 12: Comments on Access to Off-Road Distribution Pole Miles

PERCENT OF CUSTOMERS REQUIRING UVM ON THEIR PROPERTY

Two charts are given to depict this data. This question dealt not only with the number of customers impacted by UVM, but it also investigated the frequency that UVM was performed on their property.

Question #12 & 13: How many customers (or meters) on your distribution system require vegetation management on their property on a _____ basis? NOTE: Responses were either given as number of meters (exact) or as percentages (estimates).

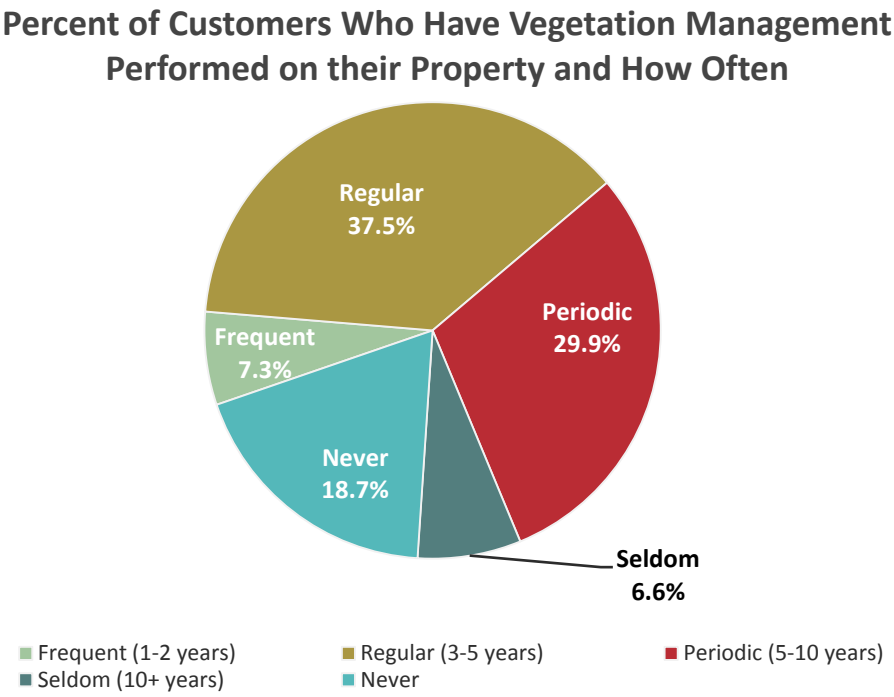


Figure 13: Percent of Customers Who Have VM Performed on their Property and How Often

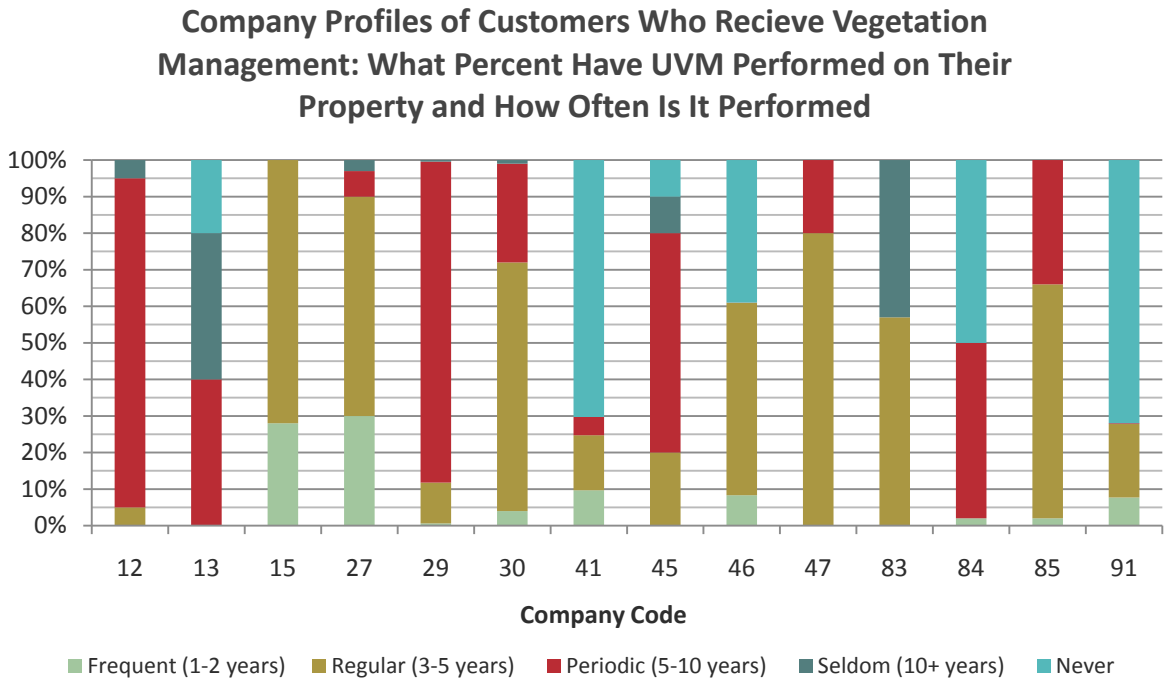


Figure 14: Company Profiles of Percent of Customers Who Have VM Performed on their Property and How Often

Data Discussion on Customers Requiring UVM on Their Property:

Several conclusions can be drawn from the analysis of the data:

- A majority (57% of companies) perceive their workload as 100% of their customers, even though a good percentage of their customers have underground services and many customers only have service wires on their property. Many utilities do not trim for service wires.
- Given the possibility that 100% of customers do require some UVM on their property, 55.2% of customers require work infrequently (the sum of the percentages of the *Periodic, Seldom* and *Never* categories). This leaves a reported **44.8% of the customer base on average requiring regular UVM performed on their property.**
- It is possible, even probable, that vegetation managers have not calculated their actual workload in terms of customer base and that the average percent of customers who require UVM is substantially less than 44.8%.

AVERAGE ANNUAL COST OF UVM PER CUSTOMER

Question #14: Do you know the average annual cost of UVM per customer (or meter)?

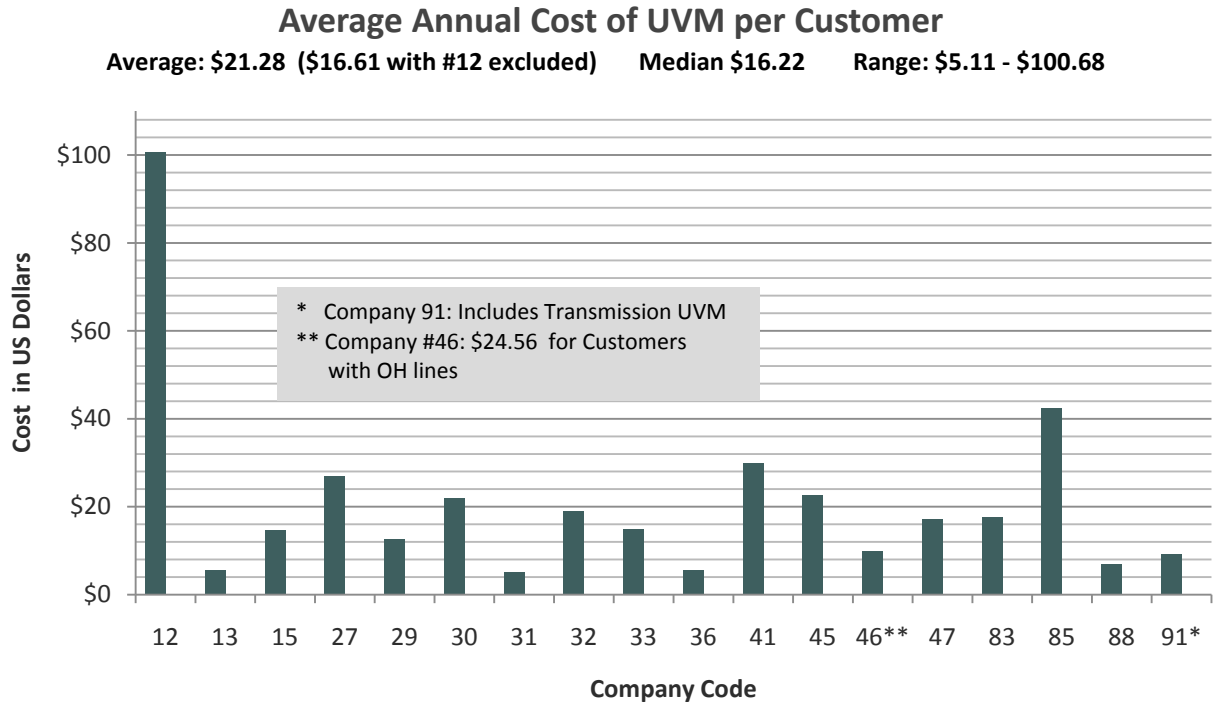


Figure 15: Average Annual Cost of UVM per Customer

DISTRIBUTION SYSTEM VOLTAGES

Each company gave the voltages present in their distribution system and the breakdown by company is on the following table (Fig. 16, below).

Question #15: List the various voltages found in your distribution system (0kV-59kV)

Voltage on Distribution Systems by Company

Company Code	0 - 250 Volts	250 - 999 Volts	1 kV - 5.99 kV	6 kV - 9.99 kV	10 kV - 19.99 kV	20 kV - 26.99 kV	30 kV - 39.99 kV	40 kV - 59 kV
3			4 kV		12 kV	25 kV	34 kV	
12			4.16 kV	8.32 kV	12.51 kV 13.8 kV	22.8 kV 25 kV 27.6 kV		44 kV
13			4.16 kV		12.47 kV			46 kV
15			4 kV		12 kV	21 kV		
24			4 kV		13 kV		34 kV	
29			4.16 kV		13.2 kV	22.9 kV		
30		2.4kV Delta	4.160 GrdY/ 2.4kV		12.47 GrdY /7.2kV; 13.2 GrdY /7.62kV; 13.8 GrdY /7.96kV; 13.86 GrdY /8 kV	22.86 GrdY/ 13.2kV; 23.9 GrdY/ 13.8kV; 24 GrdY/ 13.86kV	34.5 GrdY/ 19.92kV	
31			4 kV		13 kV	25 kV	34 kV	
32			4 kV		15kV		35 kV	
33			4 kV		12.5 kV	23.9 kV		
36			4 kV		13 kV	25 kV	34 kV	
41	120/ 240V	277/ 480V	4 kV		12 kV 17kV	21 kV	34 kV	
45			4.8kV	7.2kV	14.4 kV		46.0 kV	
46			5kV		15kV	25kV	35 kV	
47	120-240V	600V	4 kV		12 kV	25 kV	34 kV	44 kV
83			2.4 4 kV		12.47 kV			
84			4.2kV	6.9kV	13.8kV			
85					12 kV 13kV	23 kV 25kV	35 kV	
88			4 kV 3-phase	7.2 kV single phase 7.63 kV single phase	12.47 kV 3-phase 13.2 kV 3-phase	25 kV 3-phase 14.4 kV single phase	33 kV 3-phase	
90			4 KV		12KV			46KV
91	120V 208V 240V 277V 480V			7.2 kV	12.47 kV		34.5 kV	

Figure 16: Voltage on Distribution Systems by Company

CIRCUIT MILES

Total Circuit Miles

Question #16: Please list the number of CIRCUIT miles/kilometres, including UNDERGROUND AND OVERHEAD lines, for each voltage interval. NOTE: CIRCUIT miles/kms are all miles/kms of line. This is a count of conductor miles/kms. For example, one pole mile of double-hung circuit is equivalent to TWO CIRCUIT miles, but one pole/span mile.

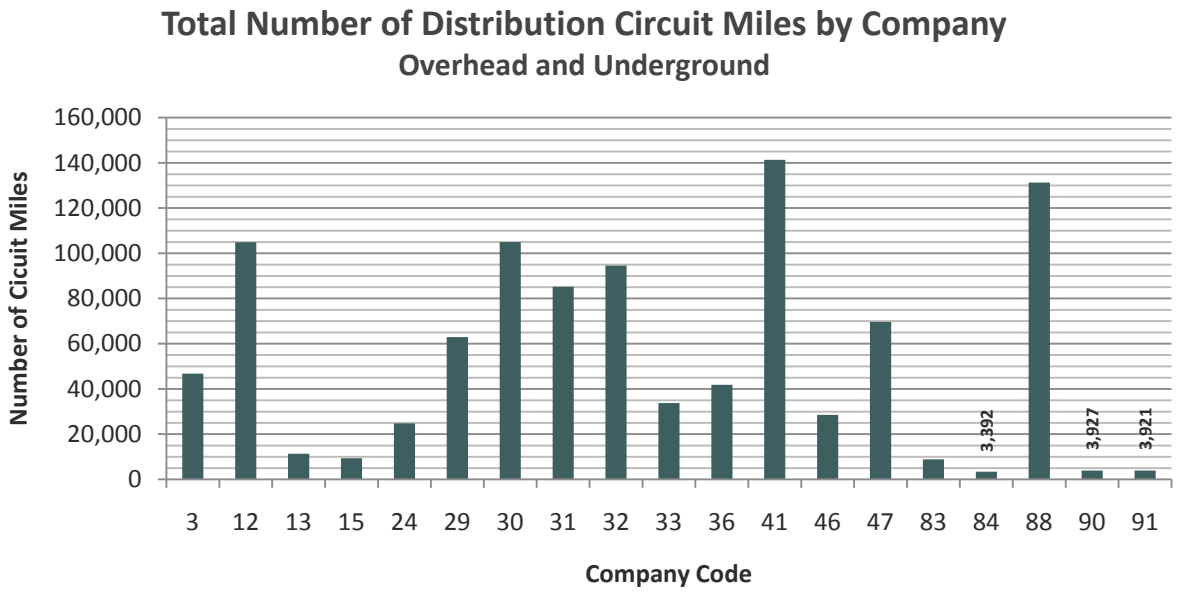


Figure 17: Total Number of Distribution Circuit Miles by Company

Percent of Total Circuit Miles at Each Voltage Class

The following graph (Figure 18, next page) calculated the *Percent of Distribution Circuits Miles at Different Voltage Classes* by adding up the total number of circuit miles in each voltage class for all companies and dividing by the total number of circuit miles reported by all the companies. Statistics were calculated using the data from **Question #16** (above).

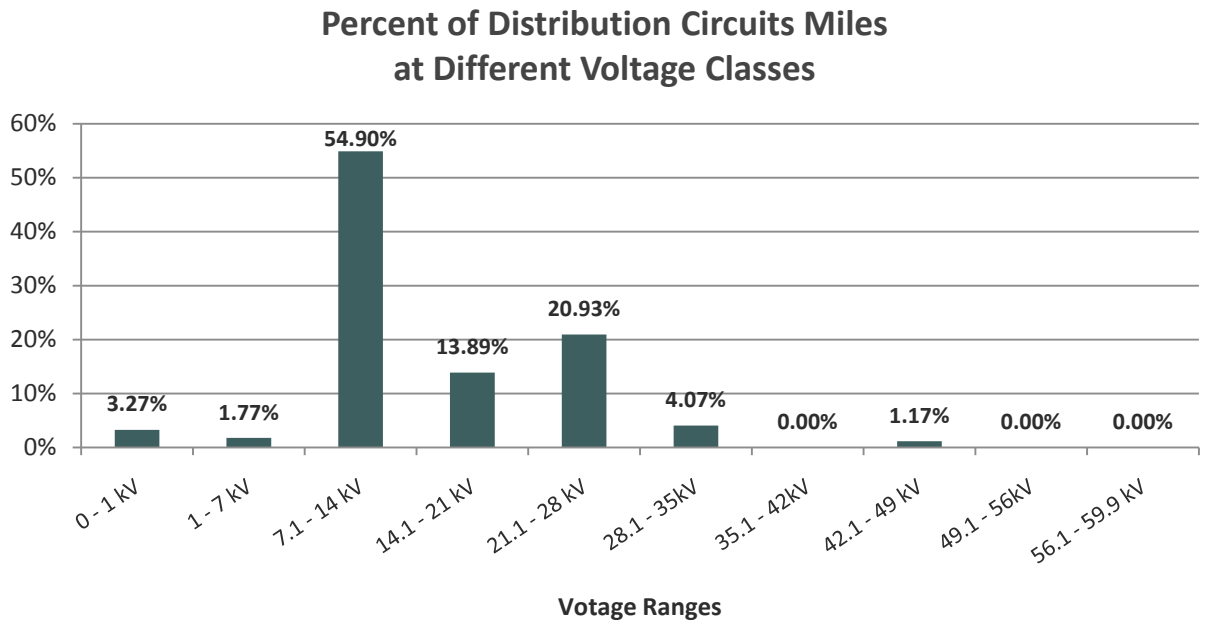


Figure 18: Percent of Distribution Circuits Miles at Different Voltage Classes

Overhead Circuit Miles

Question #18: Please list the number of OVERHEAD DISTRIBUTION CIRCUIT miles/kilometres for each voltage interval. NOTE: CIRCUIT miles/kms are all miles/kms of line. This is a count of conductor miles/kms. For example, one pole mile of double-hung circuit is equivalent to TWO CIRCUIT miles, but one pole/span mile.

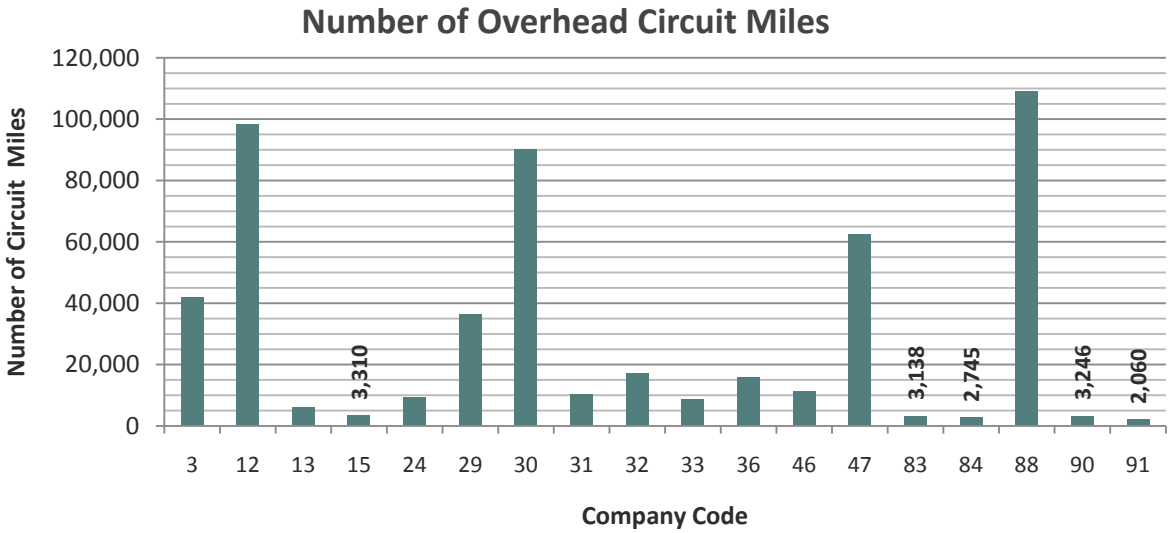


Figure 19: Number of Overhead Circuit Miles

Percent of Overhead vs. Underground Circuit Miles of Total Circuit Miles

Percent of Overhead was calculated statistic, using data from **Question #18** and **Question #16**.

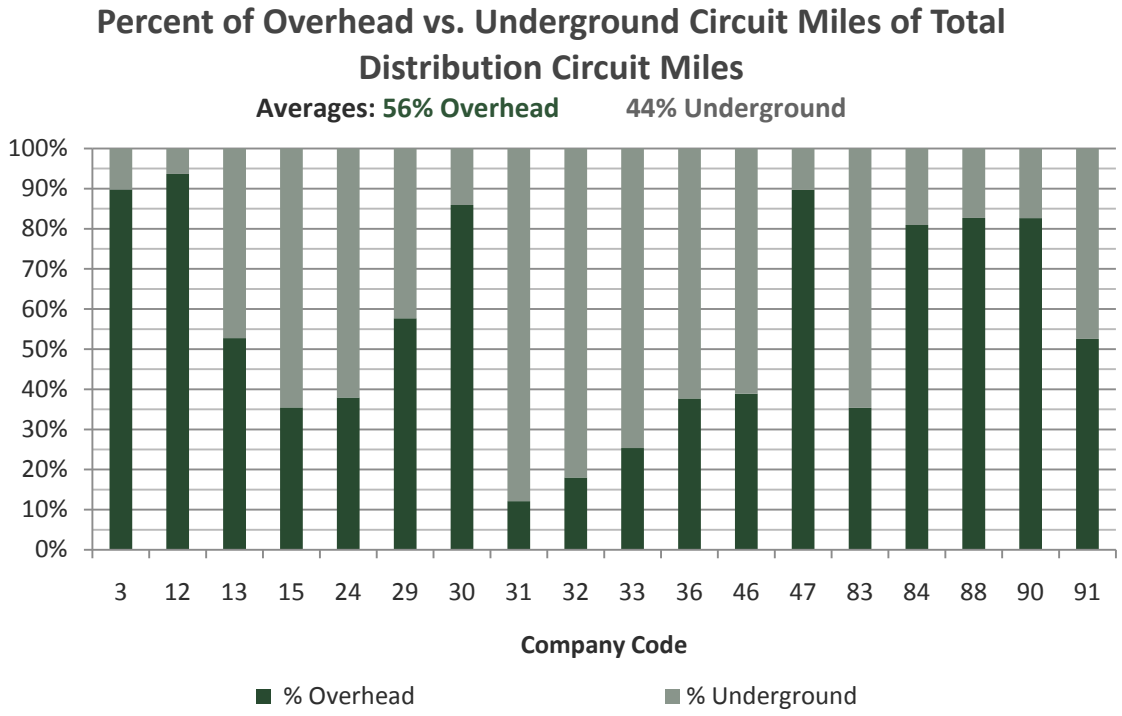


Figure 20: Percent of Overhead vs. Underground Circuit Miles of Total Distribution Circuit Miles

DISTRIBUTION SYSTEM POLE MILES

Question #20: Please list the number of DISTRIBUTION POLE/SPAN miles/kms of OVERHEAD lines for each voltage. All double and triple circuit miles and underbuilt pole/span miles should be represented with the highest distribution voltage on the pole. The following responses should represent all distribution pole/span miles.

NOTE: POLE/SPAN MILES (kms) are miles/kms from first to last pole. There could be more than one circuit on the pole, but it is only counted once. For example, one pole mile of double-hung circuit is equivalent to two circuit miles, but ONE POLE/SPAN mile.

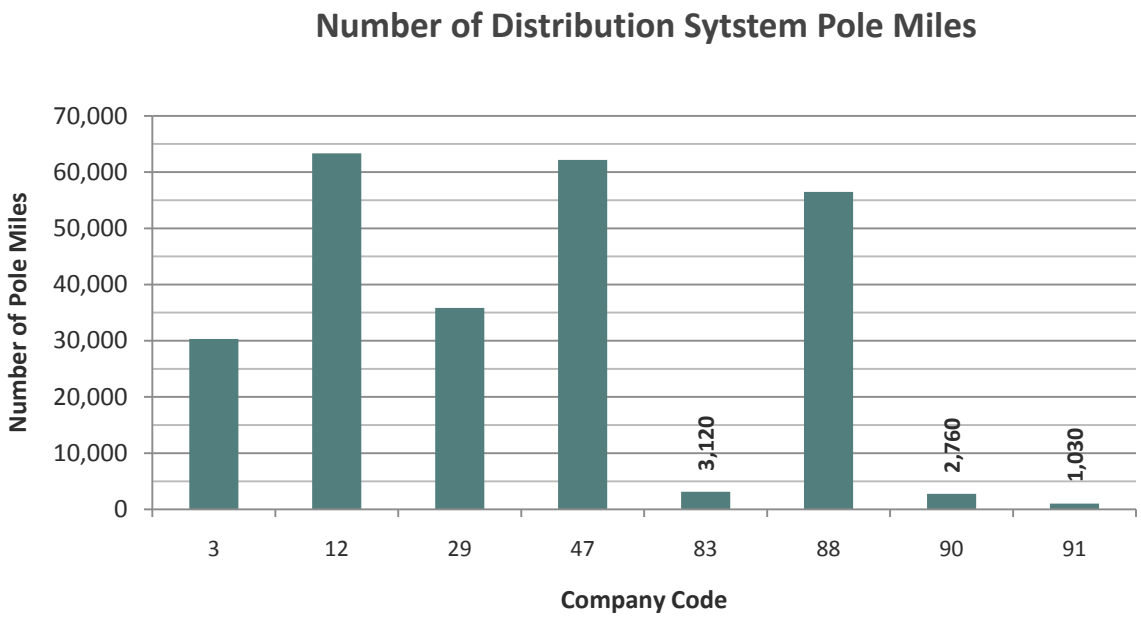


Figure 21: Number of Distribution System Pole Miles

ANNUAL DISTRIBUTION ELECTRIC SALES IN MWH

Question # 33: What is the annual average number of MWh sold and/or delivered by your company's ELECTRIC DISTRIBUTION system?

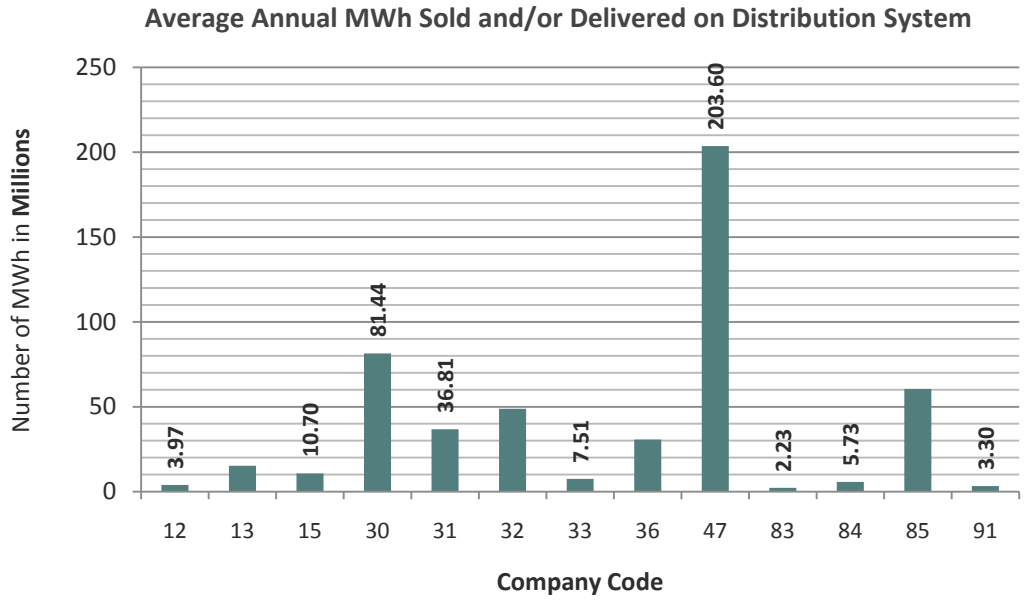


Figure 22: Average Annual MWh Sold and/or Delivered on Distribution System

Discussion of Understanding UVM Workload

There are several variables necessary for understanding UVM workload. Inaccurate information for any of these variables can impact your ability to analyze the efficacy of your program and predict future costs. Understanding UVM workload starts with knowing the dimensions of your electric system and information about the land it is constructed on. Thomas Edison, the founder of electrical distribution systems, said, "*There is no substitute for hard work."* W. Edward Deming, founder of the *Total Quality Management Movement*, modified this statement to, "*There is no substitute for knowledge.*" This statement emphasizes the need to know more about everything in the system. The following are a few examples where improvements in knowledge of utility distribution systems may improve quality of vegetation management.

- **Pole Miles versus Circuit Miles:** Fewer companies reported pole miles than reported circuit miles. *Pole miles are a more accurate representation of the vegetation management system than circuit miles.*
    1. The companies that reported pole miles also answered the question asking for how many double and triple hung pole miles and their associated voltages. The companies who did not report pole miles also did not report double and triple hung miles, excepting one company. *Knowledge of the electrical system enables knowledge of the vegetation management system.*
    2. Double and triple hung circuits do not represent a large percentage of the pole miles. In previous surveys, 5-10% of their pole miles were reported as multiple hung circuits. *In terms of budget, operations, reliability and quality assurance, 5-10% is significant.*
- **Feeder Lines versus Taps:** The risk, frequency and cost of vegetation management along feeder lines are potentially different than single-phase taps and secondaries. An accurate account of the various voltages and configurations would further inform managers of their workload.
- **Customers Requiring UVM on Their Property**: Another important variable that impacts UVM workload was addressed earlier in the discussion on percent of customers requiring UVM on their property. Recall that a majority (57% of companies) perceive their workload as 100% of their customers, even though chances are that a good percentage of their customers would never require any UVM on their properties. (See Data Discussion on Percent of Customers Requiring UVM on Their Property) *In terms of budget, customer relations and operations, the knowledge of how many customers require direct communication is essential.*
- **Tree Inventories:** Workload assessment, of course, requires knowledge of tree inventory. This data is found later in the report (See Tree Inventories) and only contains about 50% percent of respondents supplying number of trees managed. In the group of companies that supplied tree inventories, many of them were estimates or reports from contractors. *Tree Inventories supply UVM departments with information about tree*

densities and species, which aid in budgetary issues, operations, work schedules and reliability.

Conclusion: Building knowledge of your system is the first step to understanding your workload. The assumptions used to establish budgets, resources and methodology may be limited when important system information is missing.

DISTRIBUTION UVM PROGRAM ORGANIZATION

UTILITY PERSONNEL IN CHARGE OF DISTRIBUTION UVM PROGRAM

Three tables have been built from question #34 (below). Utilities vary tremendously in personnel that manage UVM. This variation may be dependent upon size of utility, size of territory and type of utility. Along with the title of the person in charge of distribution UVM, the average, median and range of the salaries for this position are included at the top of the first table. The second table supplies the name of the manager's department. The third supplies who this person reports to.

Question #34: The objective of this question is to discover the title of the person at your utility who is directly responsible for or has the most control over the distribution vegetation management program, the name of this person's department, who this person reports to, and his yearly salary.

What is the title of the person at your utility who is directly responsible for or has the most control over the distribution vegetation management program? **Salary: Average: $123,533.33 Median: $120,000 Range: $90,000 - $180,000**
Director Vegetation Management & Ancillary Programs
Vegetation Management Manager
Director Distribution Engineering & Mapping
Director of Vegetation Management
Senior Manager
Manager
Director
Lead Forester
Superintendant, Vegetation Management
Manager, System Forester
C&M [Construction and Management] Manager
PD [Procurement Department] Contract Services Manager
Section Leader
Line Clearance Arborist
Administrator of the Vegetation Management
Manager, T&D System Vegetation

Figure 23: Title of the Person at Utility Directly Responsible for Distribution VM Program and Salary Range

What is the name of this person's department?
Vegetation Management and Ancillary Programs (4 Programs)
Vegetation Management (5 Programs)
Distribution Engineering & Mapping
Project & Program Delivery
Forestry Services
Line Clearance
Distribution Services
Construction & Maintenance
System Maintenance
PD [Procurement Department] Contract Services
Asset Management

Figure 24: Name of UVM "Director's" Department

Who does this person report to? Title of the next level of management above the person in charge of distribution vegetation management
Director Transmission Field Operations (4 Programs)
Director of Distribution Services
Vice President of Engineering
Managing Director - T& D Support Services
VP for Project & Program Delivery
Vice President of Lines and Forestry
Utility Supervisor
Manager, T&D
Director, Technical Services & System Reliability
VP Electric Operations
PD [Procurement Department] Services Manager
System Maintenance Manager
Manager of Forestry and Special Programs
Management of Activities and Processes
Vice President, Asset Management

Figure 25: Who UVM "Director" Reports To

DUTIES OF UVM "DIRECTOR"

In 2002, only **7%** of the participants had Transmission and Distribution UVM separated with different "Directors." By 2006, **13%** of the programs were *Centralized by Program* (one person in charge of distribution and one person in charge of transmission UVM). In 2010 (as seen in the next chart), **25%** of the participants have a dedicated "Director" of distribution UVM. There is a definite (and significant) trend towards this separation in UVM programs, but it is still only in the minority of companies.

Question #35: What are the duties of the person at your utility who is responsible for the distribution vegetation management program?

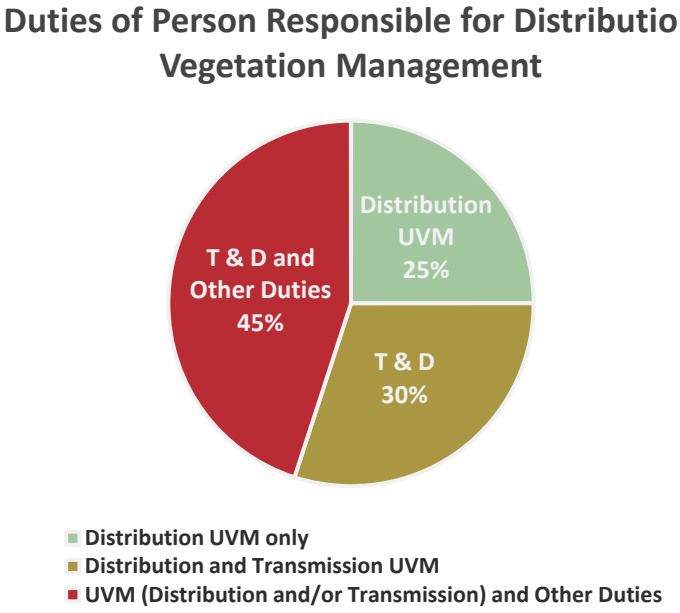


Figure 26: Duties of Person Responsible for Distribution Vegetation Management

"Director's" Other Responsibilities besides Distribution UVM
Wood pole maintenance program (4 programs) [T&D and Other Duties]
Electric engineering, maintenance & mapping [T&D and Other Duties]
Capital Programs where there is a vegetation component [T&D and Other Duties]
Substation Weed Control [T&D and Other Duties]
Construction overhead and underground [Answered Distribution Only]
Wildlife Protection [T&D and Other Duties]
Distribution and Sub-Transmission (46KV) [Answered Distribution Only]

Figure 27: "Director's" Other Responsibilities besides Distribution UVM

Question #36: How many people are performing planning, quality assurance and supervision duties for distribution vegetation management under the direction of the company person most responsible for or who has the most control over distribution vegetation management (person identified in Question #35 or UVM Director)? NOTE: This category does NOT include tree crews.

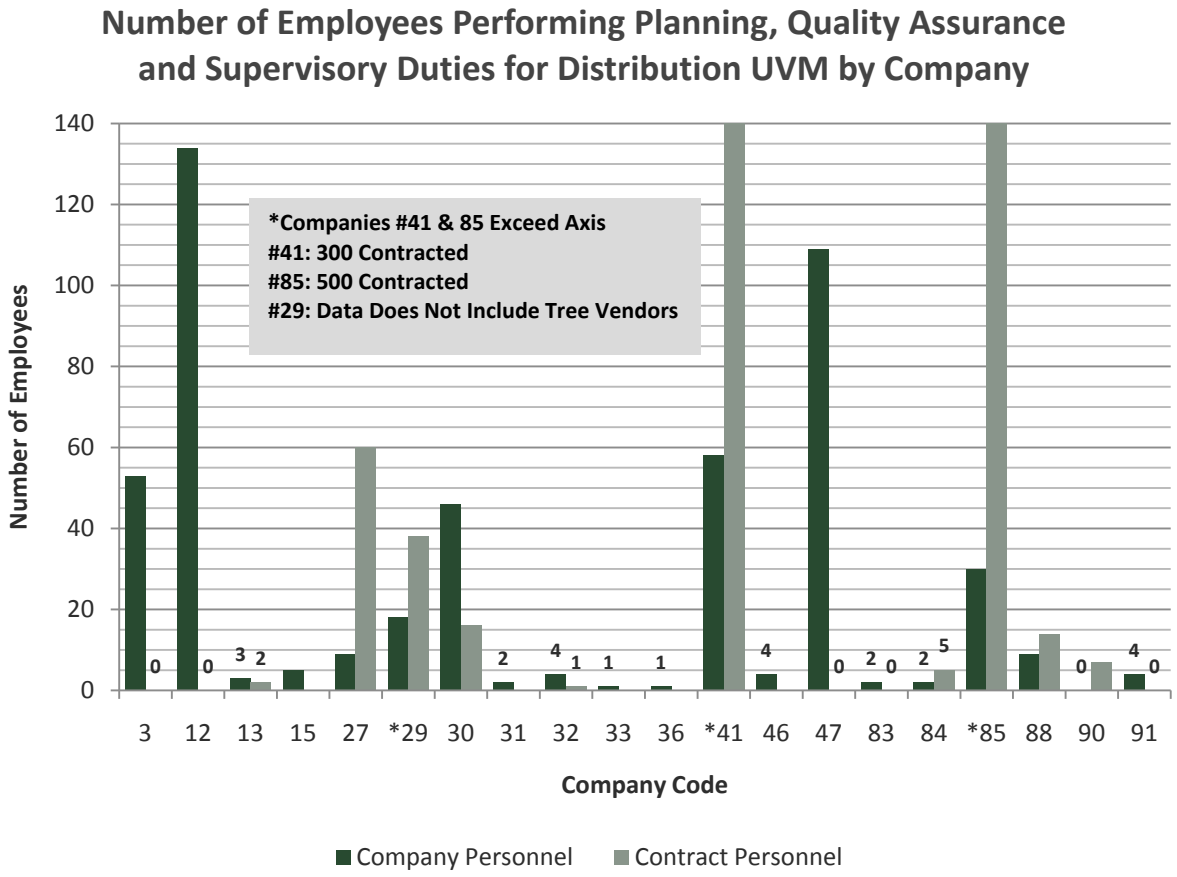


Figure 28: Number of Employees Performing UVM Planning, Quality Assurance and Supervisory Duties

Comments on Personnel Who Perform Planning, Quality Assurance and Supervisory Duties
In house crew supervisors who plan day-to-day work for in house crews and supervise crews are included above.

Figure 29: Comments on Personnel Who Perform UVM Planning, Quality Assurance and Supervisory Duties

Question #37: The objective to this question is to discover how many different MANAGEMENT AND SUPERVISORY positions are in your COMPANY that directly support the vegetation management program and what their duties are. Titles for the positions are not identified, since they vary between companies. Please check the principle responsibilities of each position (check all that apply). UVM Director is the person at your utility who is directly responsible for or has the most control over the distribution vegetation management program. NOTE: It is highly possible that your company is not organized such that Position #2 reports to the UVM Director and Position #3 reports to Position #2. Therefore, we would like you to describe various positions at your company and we will further clarify the chain of command in subsequent questions. We will be asking for the title of each position, who they report to and how many employees hold this position at your utility in the next question.

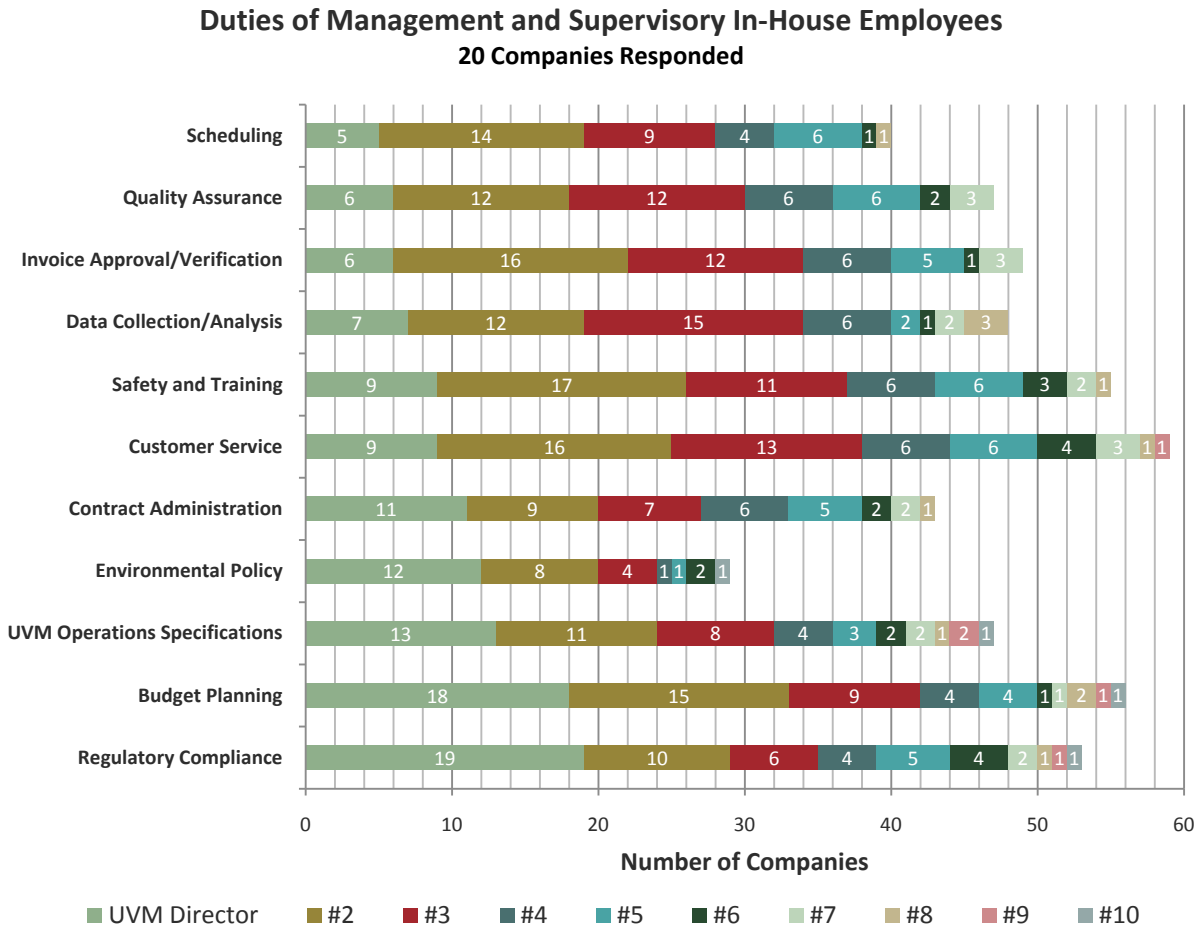


Figure 30: Duties of Management and Supervisory In-House Employees

Data collected from **Question #37**

Since some companies have ten distinct in-house management levels in terms of duties and some only have two levels, it is important to know what percent of companies have 1 – 10 levels of in-house management. The following chart shows the percent of companies that have these different levels. There are 20 companies that answered this question.

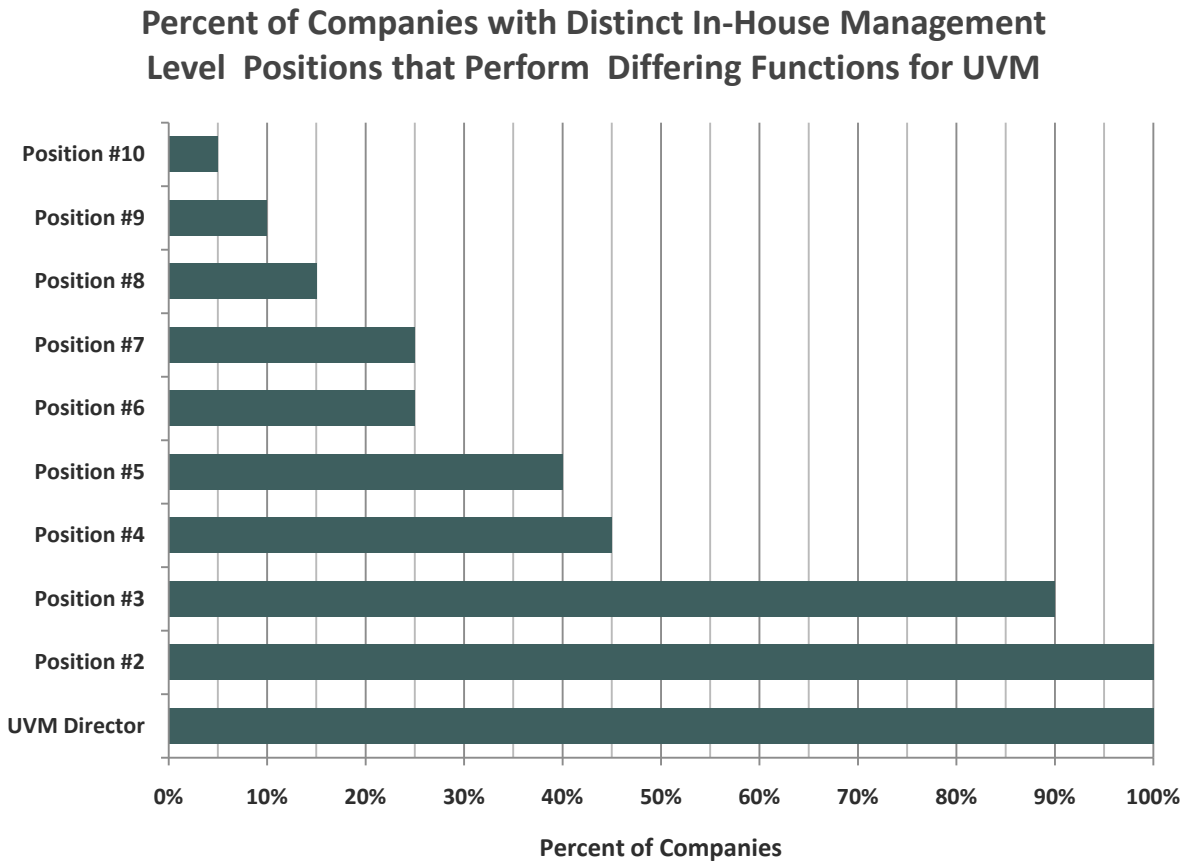


Figure 31: In-House Distinct Management Level Positions that Perform Differing Functions for UVM

Comments on In-House Management Positions
There seems to be a contract management focus in this question which doesn't apply to [our Utility]. Contract administration is comparable to our local leadership groups.
Position #2 is a Division Forester.

Figure 32: Comments on In-House Management Positions

Data collected from **Question #37**

20 Benchmark Participants answered this question. Note: Two categories were not listed for any position at several companies (15 companies listed *Environmental Policy* and 19 companies listed *UVM Operation Specifications* as UVM duties). Most of the eleven duties listed in Figure 30 are performed by more than one position "class" at a majority of utilities. These same duties are listed in the vertical axis of the next ten graphs and illustrate the range of activities as they are spread out over smaller and larger vegetation management departments. There may be more than one employee in each position "class." Bear in mind the company percentages represent position "classes" and not percent per employee.

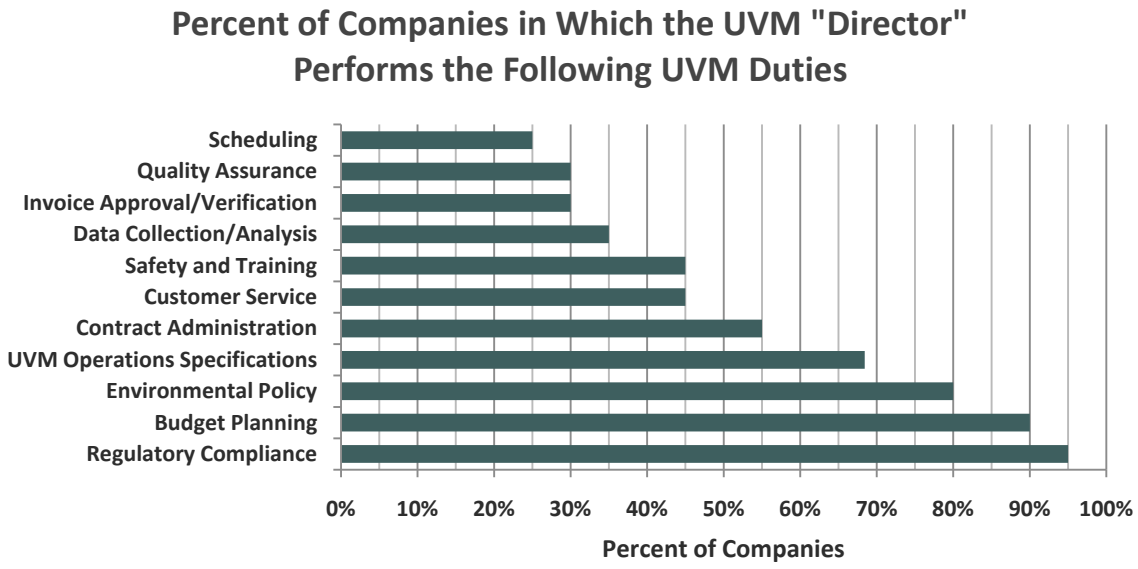


Figure 33: Percent of Companies in Which the UVM "Director" Performs the Following UVM Duties

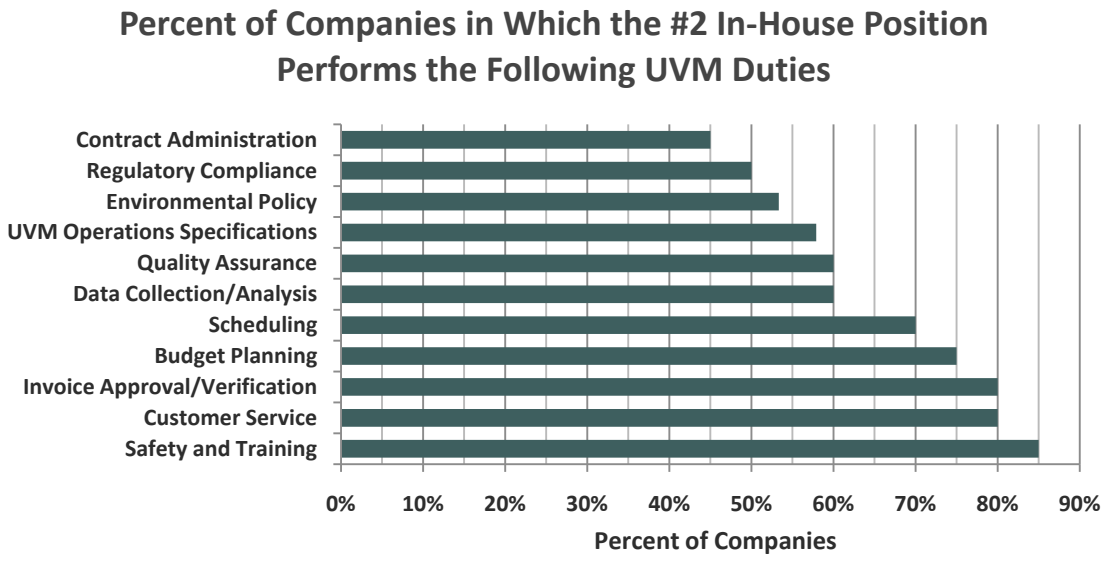


Figure 34: Percent of Companies in Which the #2 In-House Position Performs the Following UVM Duties

Data collected from **Question #37**

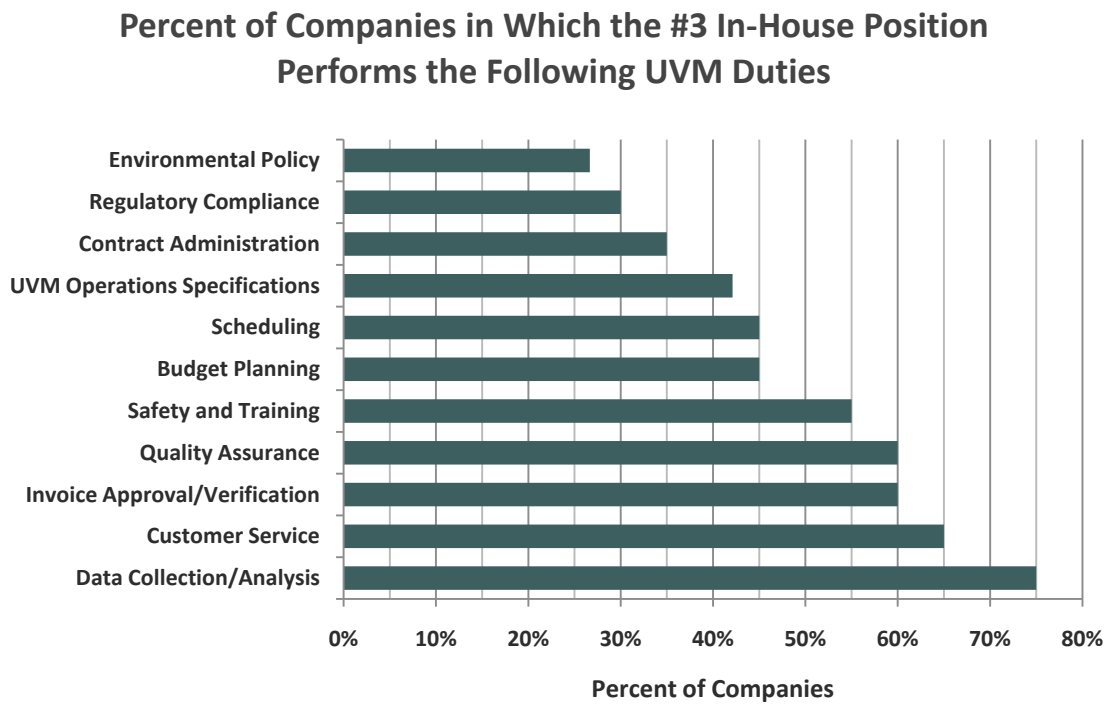


Figure 35: Percent of Companies in Which the #3 In-House Position Performs the Following UVM Duties

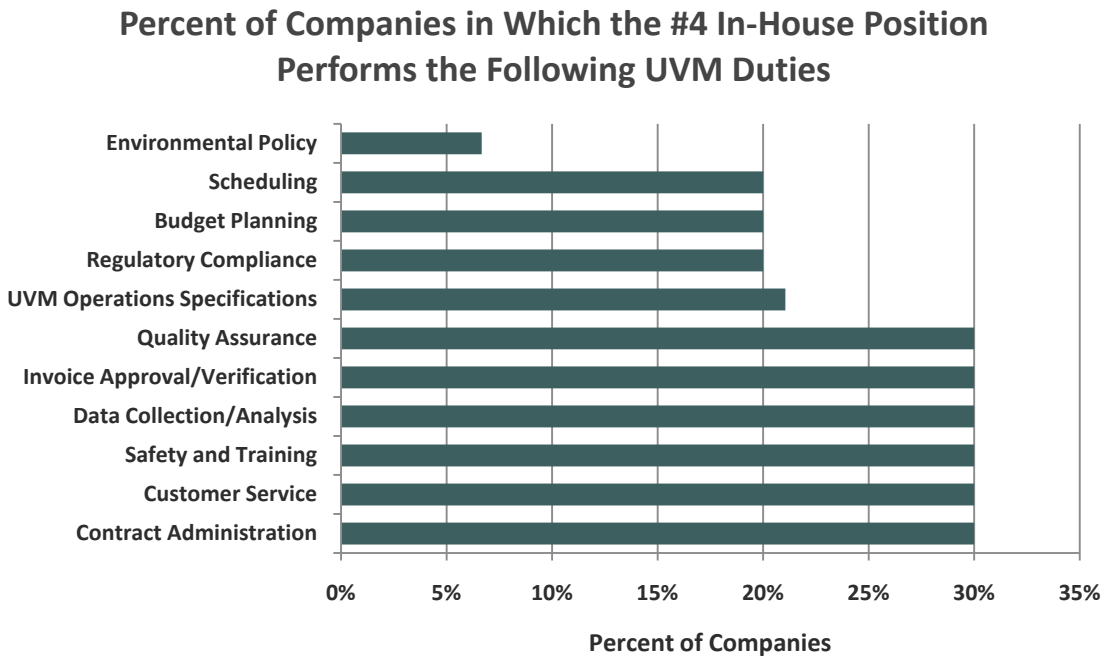


Figure 36: Percent of Companies in Which the #4 In-House Position Performs the Following UVM Duties

Data collected from **Question #37**

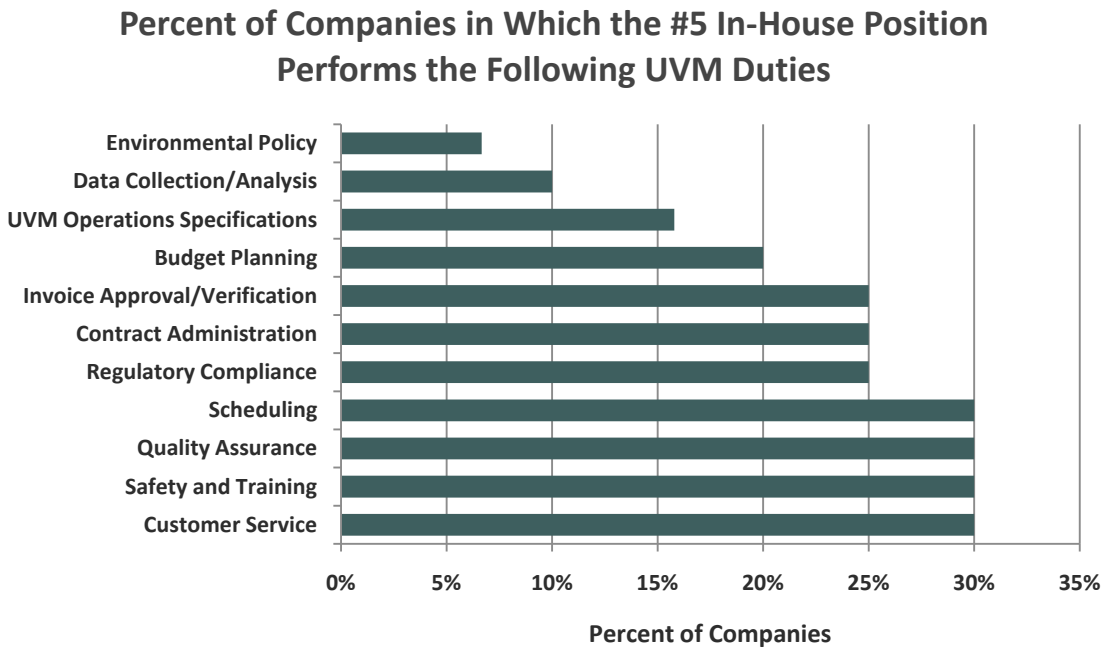


Figure 37: Percent of Companies in Which the #5 In-House Position Performs the Following UVM Duties

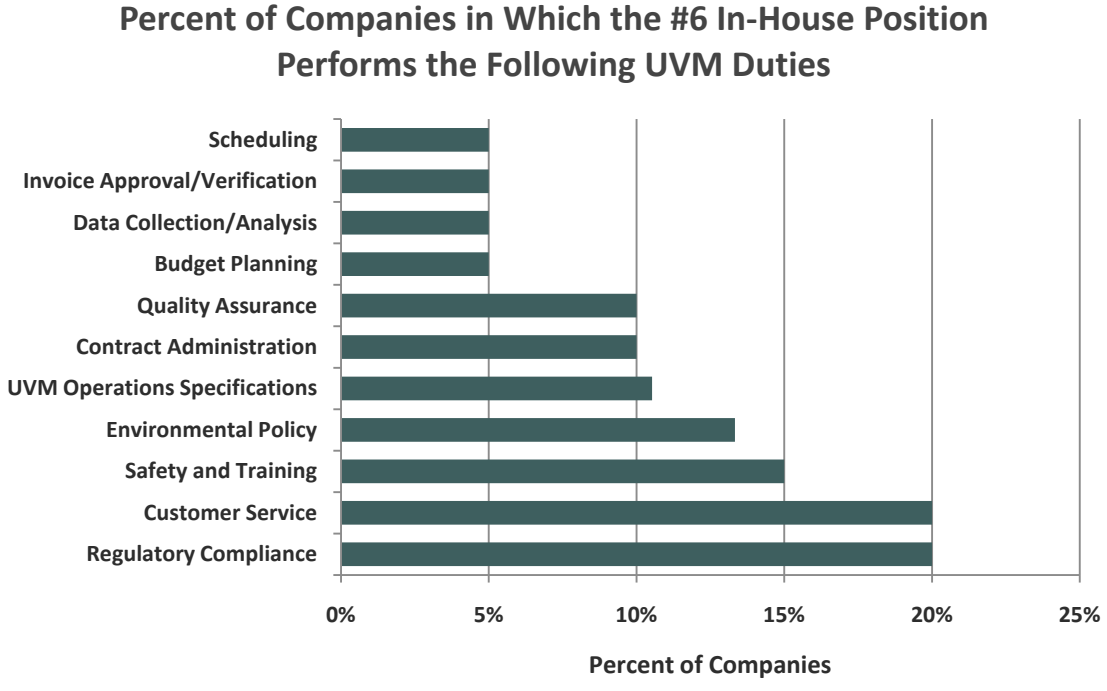


Figure 38: Percent of Companies in Which the #6 In-House Position Performs the Following UVM Duties

Data collected from **Question #37**

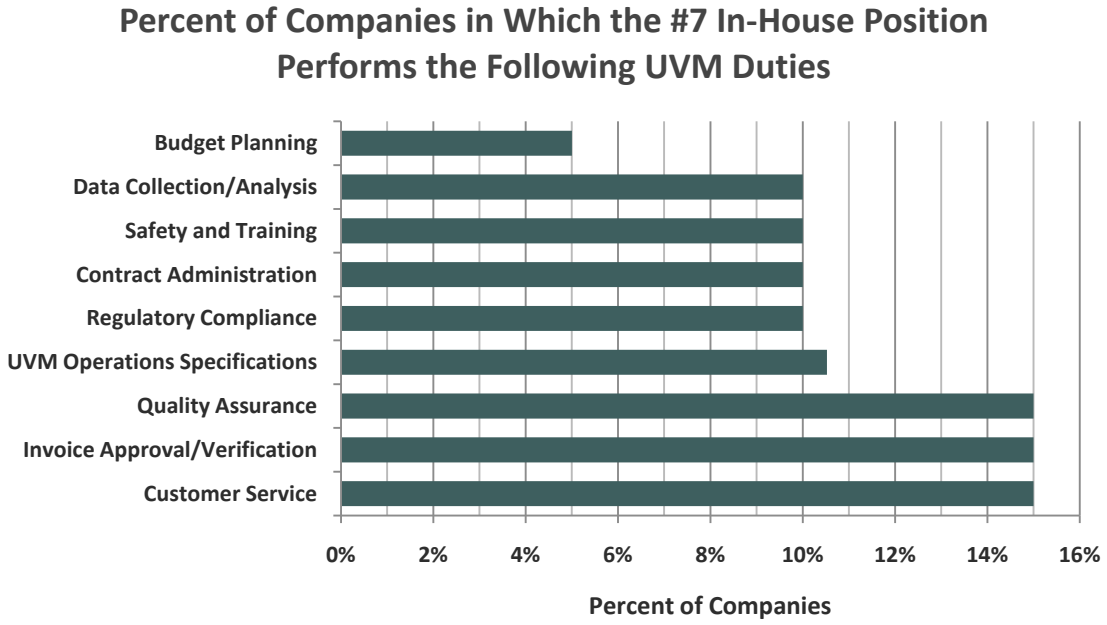


Figure 39: Percent of Companies in Which the #7 In-House Position Performs the Following UVM Duties

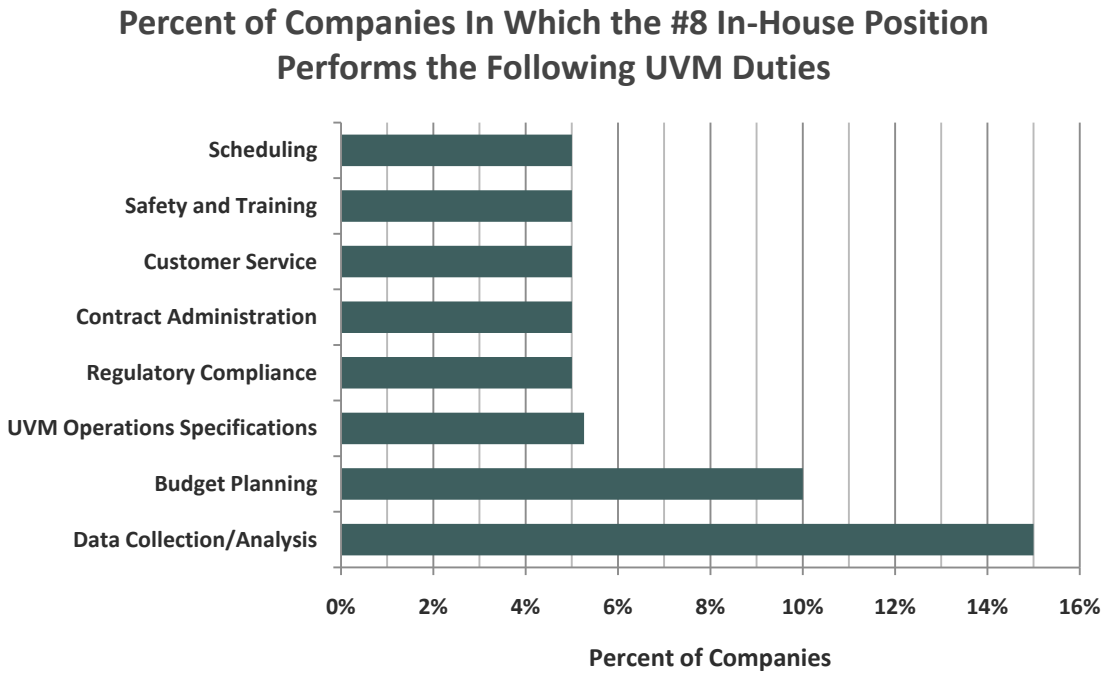


Figure 40: Percent of Companies in Which the #8 In-House Position Performs the Following UVM Duties

Data collected from **Question #37**

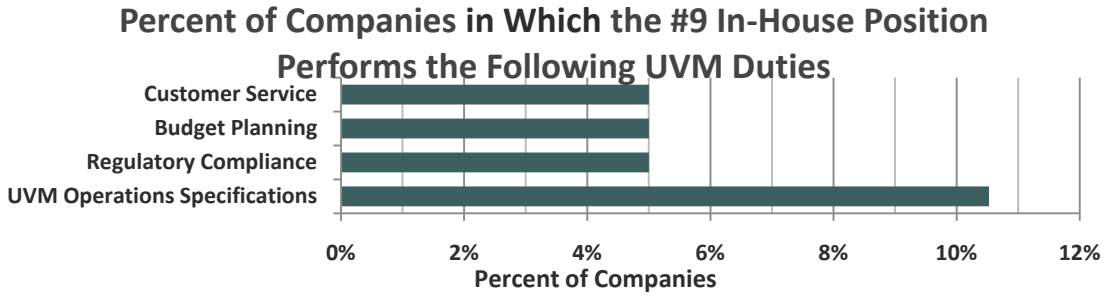


Figure 41: Percent of Companies in Which the #9 In-House Position Performs the Following UVM Duties

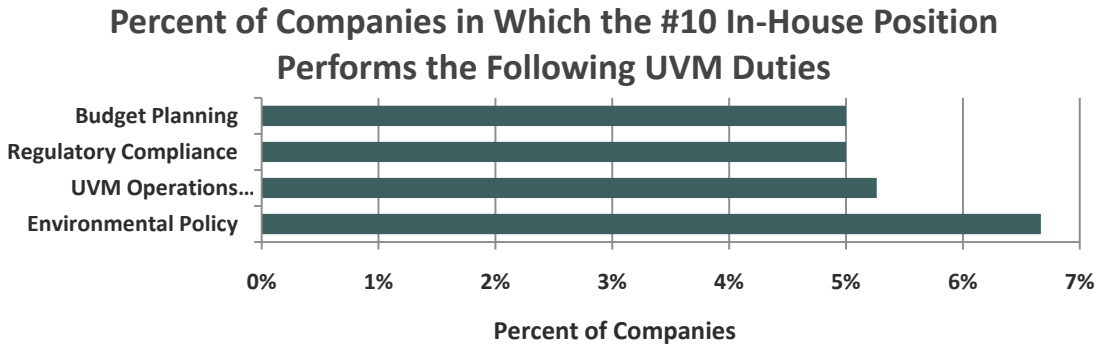


Figure 42: Percent of Companies in Which the #10 In-House Position Performs the Following UVM Duties

Data Discussion of Management and In-House Personnel Duties

While all eleven activities were responded to by most companies, it is apparent that some activities are more likely to be performed by the "Director" of UVM whereas other duties are relegated to other positions.

1. The preceding analysis can be used as an indicator of how to assign duties when building a new or reconstructing an existing UVM program.
2. **UVM "Director Activities:** *Regulatory Compliance* and *Budget Planning* are activities that universally performed by the UVM "Director." A study of the data shows that the UVM "Director" in a majority of companies is engaged in fewer of the listed activities than all the other positions. *This emphasizes the importance of compliance and budgets to the director and the UVM program.*
3. **Number of UVM Management Positions:** The responses show that all companies have at least two management position "classes" in the UVM department. A minority of companies have more than three management positions.

IN-HOUSE VERSUS CONTRACT EMPLOYEES

Question #41: The objective of this question is to characterize the personnel who manage the crews that perform line-clearance. You will be asked to supply the number of company and/or contract personnel in each position.

General Forepersons

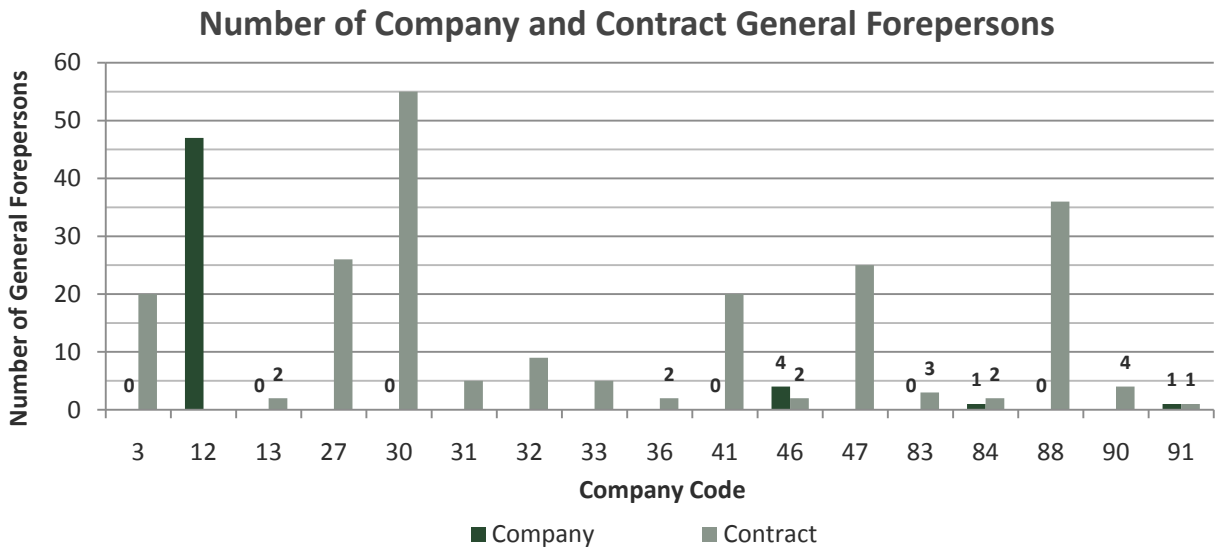


Figure 43: Number of Company and Contract General Forepersons

The following chart was created using calculated statistics from data derived from question #41.

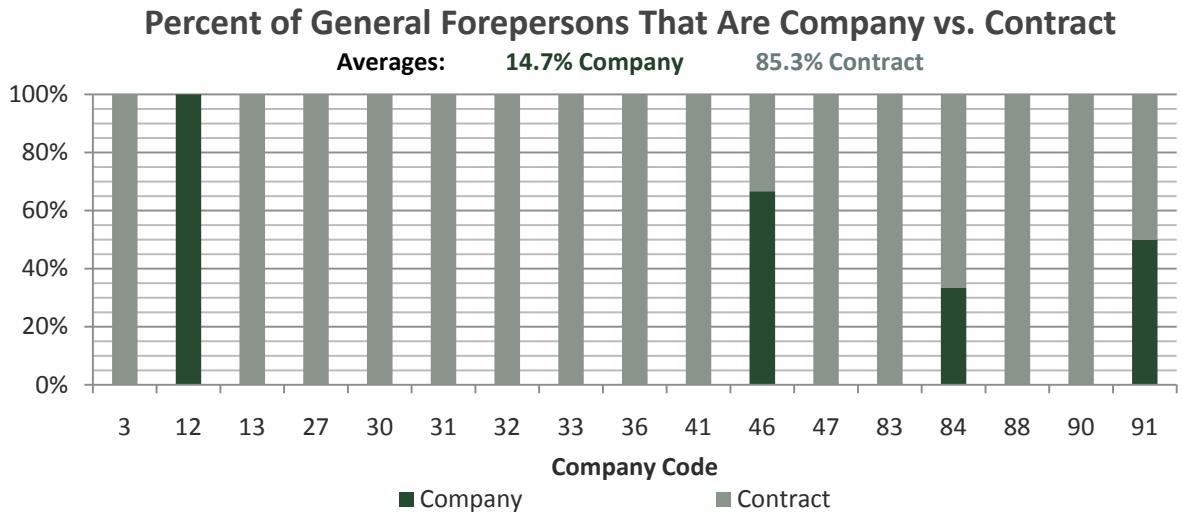


Figure 44: Percent of General Forepersons That Are Company vs. Contract

Crew Leaders

Data collected from **Question #41**

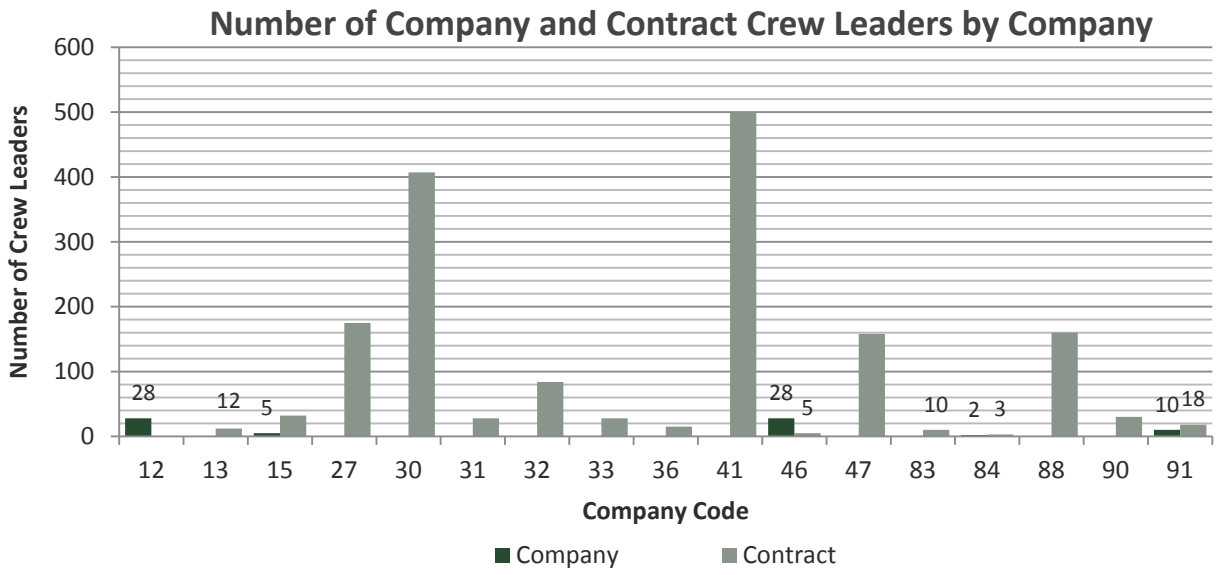


Figure 45: Number of Company and Contract Crew Leaders

The following chart was created using calculated statistics from data derived from question #41.

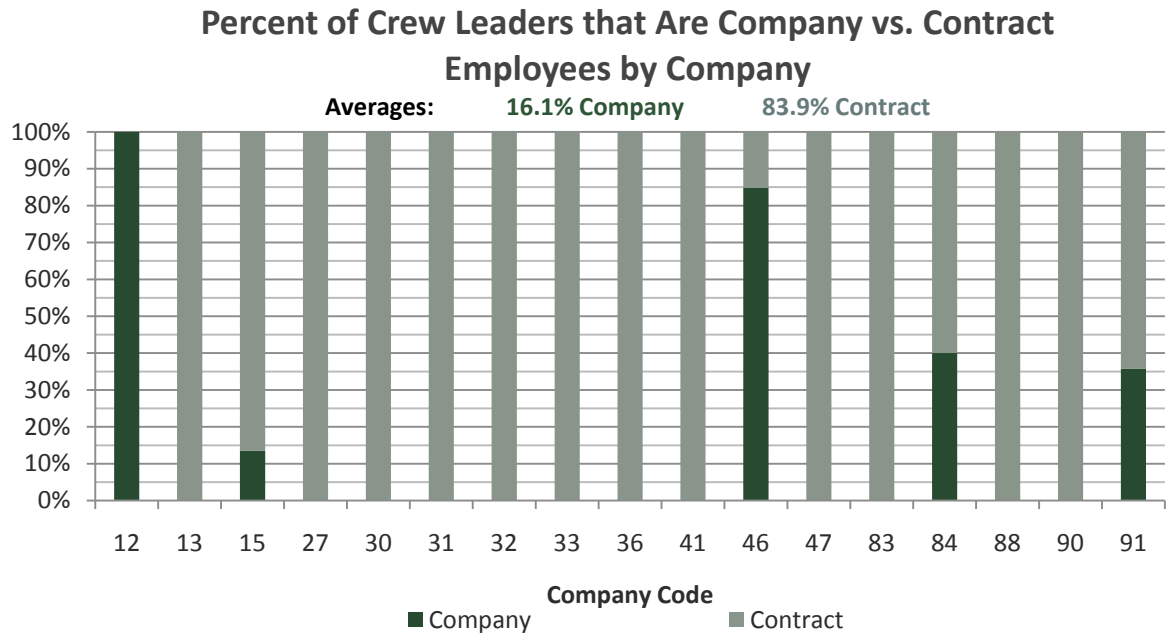


Figure 46: Percent of Crew Leaders That Are Company vs. Contract Employees

Qualified Line-Clearing Arborists

Data collected from **Question #41**

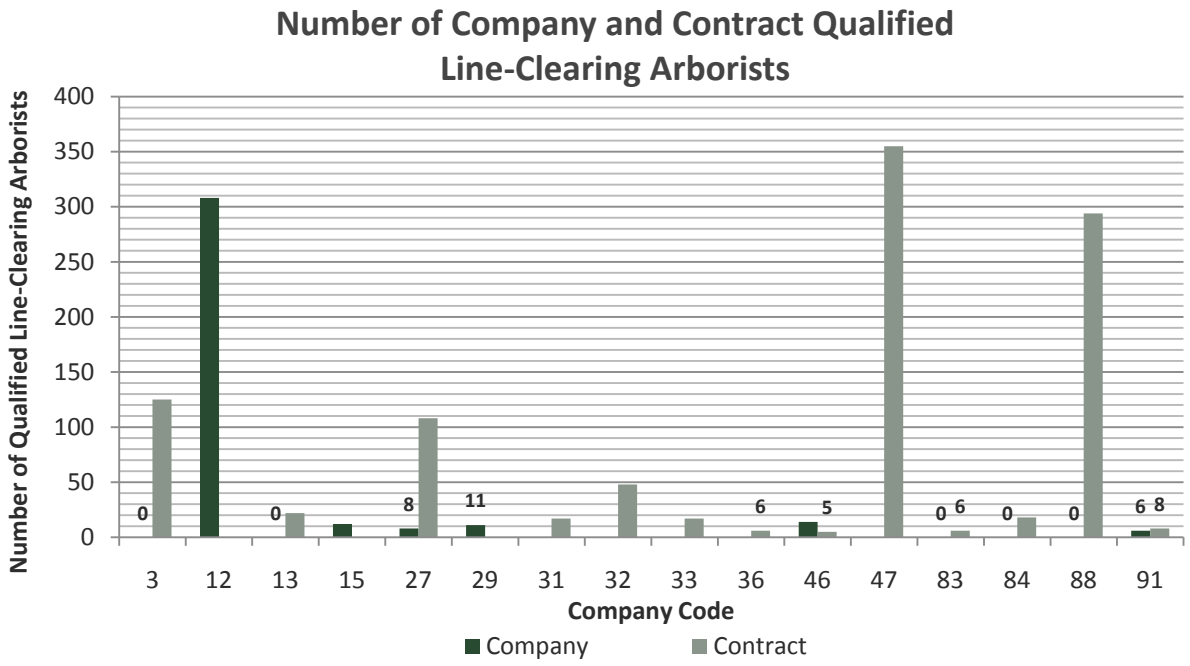


Figure 47: Number of Company and Contract Qualified Line-Clearing Arborists

The following chart was created using calculated statistics from data derived from question #41.

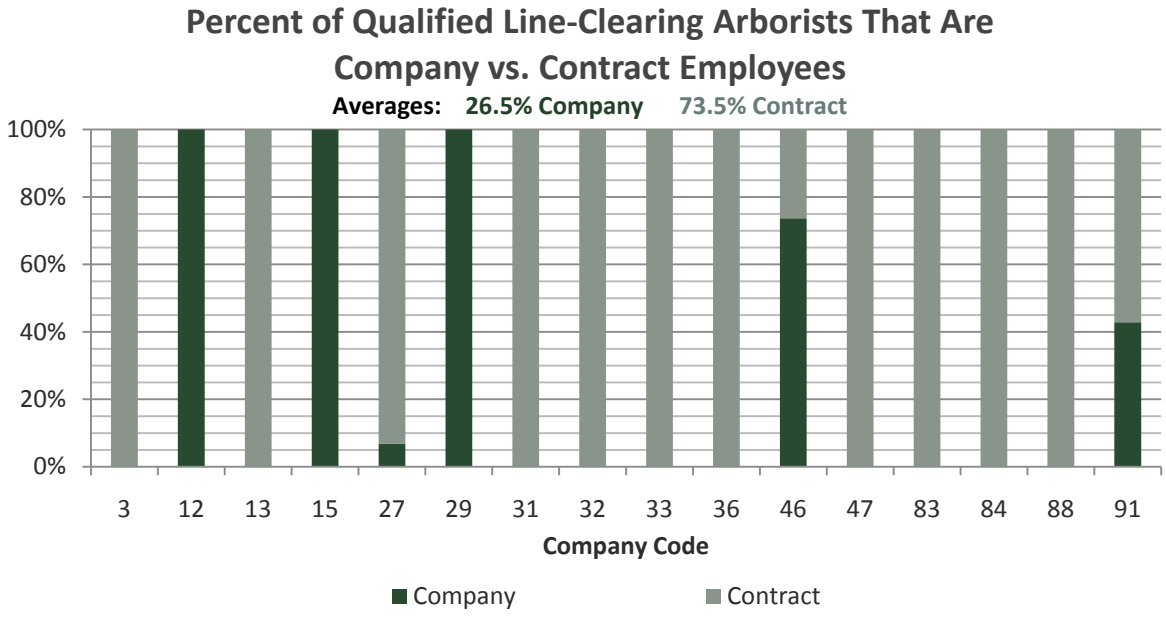


Figure 48: Percent of Qualified Line-Clearing Arborists That Are Company vs. Contract

Qualified Line-Clearing Arborist Trainees

Data collected from **Question #41**

Figure 49: Number of Company and Contract Qualified Line-Clearance Arborist Trainees

The following chart was created using calculated statistics from data derived from question #41.

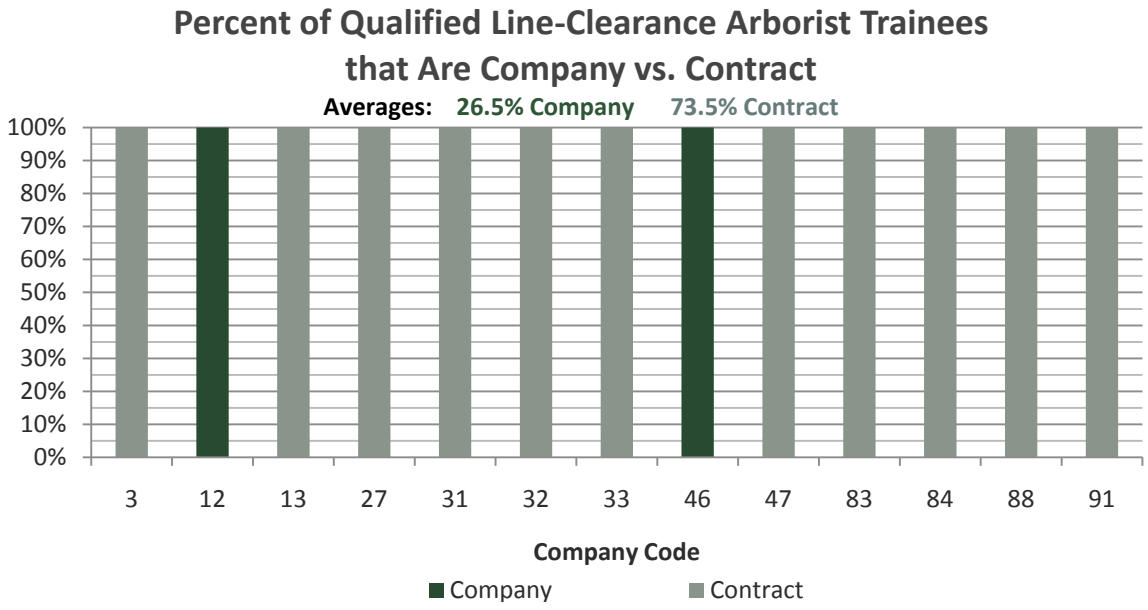


Figure 50: Percent of Qualified Line-Clearance Arborist Trainees That Are Company vs. Contract

Changes in Job Titles and Descriptions for UVM Personnel

Question #43: In the last five years, have you changed the title and job descriptions of the company personnel in your distribution UVM department?

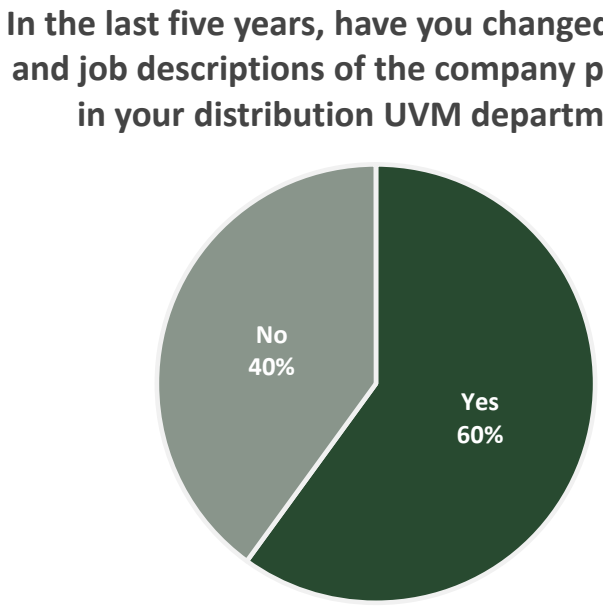


Figure 51: Changes in Job Titles and Descriptions for UVM Personnel

Comments on Changes in Job Titles and Descriptions for UVM Personnel
Field Coordinator title changed to Supervisor
Regional Foresters to Program Manager - Forester System wide & manage programs
System Forester is now Director of Vegetation Management. Foresters are now either Supervisors - Veg Mgmt or Arborist (Utility Forestry) depending on level of education.
Geographic and role alignment changed to clarify roles and focus responsibility.
Reworded job title and description to comply with regulations. MORE THAN ONCE!
Updated Supervisor position descriptions.
Updated descriptions and added title - Senior Forester.
Changed title of general foreman to job planner, because they are solely in charge of getting permission from land owners.
Our Company integrated Transmission & Distribution Vegetation last year. With this change some job titles and job descriptions were adjusted.

Figure 52: Comments on Changes in Job Titles and Descriptions for UVM Personnel

Changes in Utility Vegetation Management Programs

Question #44: In the last five years, have you rewritten or significantly revised your distribution UVM program?

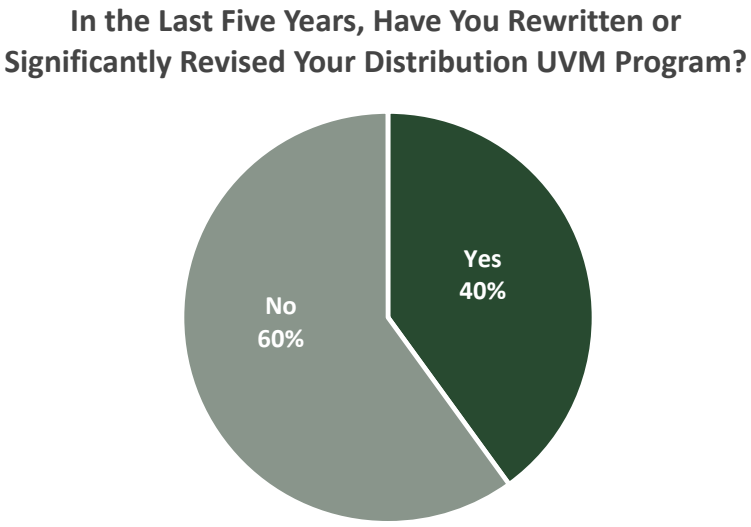


Figure 53: Changes in Distribution Program in Last Five Years: Yes or No

Comments on and Explanations of Changes in Distribution UVM in the Last Five Years
Changed from 10'4" to 7' on primary voltage pruning Tracking all reactive & restoration Change from [contractor 1] to [contractor 2] as primary (alliance) contractor. Added T&D Managers.
Moved from general specification to Site Specific prescriptive program based on cycle length. It is also managed in a GIS based computer program.
Rewritten to ensure compliance of NERC lines and Non NERC lines so that there is less confusion.
Significant changes in budget have caused program to be altered from proactive to strictly reactive.
We now trim by sub and circuit. We have identified our sub and circuits per customer density for scheduling purposes. Job planner(s) obtain permission for row work. Changed our herbicide treatment cycle from 3 to 4 years and expanded treatment area.
We asked the energy board regulator for a special budget for a cycle recovery.
We updated our Program Manual in 2007. Each year a few additional updates are added but these aren't as significant as our 2007 revision.
Defined line clearance specifications.

Figure 54: Comments on and Explanations of Changes to Distribution UVM in the Last Five Years

ANNUAL IN-HOUSE UVM DISTRIBUTION SYSTEM EXPENDITURES

Analysis in Progress: Many companies are still entering data and this analysis will appear in subsequent reports.

ANNUAL CONTRACTED UVM DISTRIBUTION SYSTEM EXPENDITURES

Analysis in Progress: Many companies are still entering data.

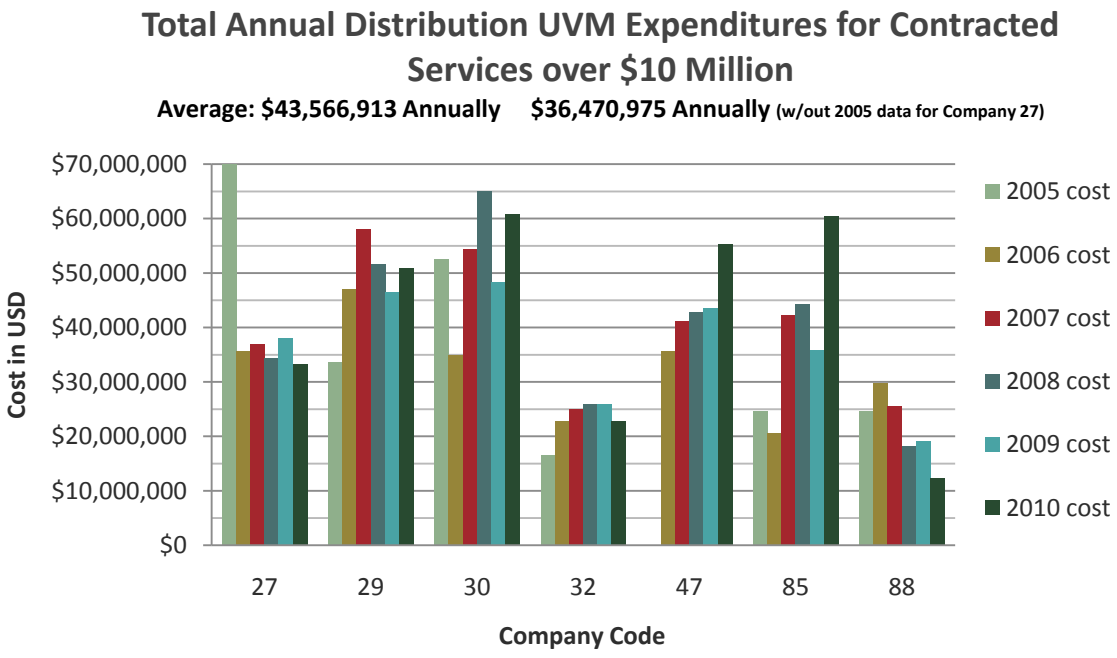
TOTAL EXPENDITURES FOR CONTRACTED DISTRIBUTION UVM SERVICES

Companies that spend with greater than $10 million annually have been represented separately from the companies that spend under $10 million annually.

Question #90: ENTER THE TOTAL COST, CONTRACTED LABOR HOURS, AND WORKED POLE/SPAN MILES FOR CONTRACTED DISTRIBUTION UVM SERVICES: This amount should be the total of all the questions asked under contract expenditures, **EXCLUDING storm work and new construction clearing.** For the annual mileage, please supply the POLE/SPAN miles or kilometers worked for ROUTINE MAINTENANCE, only.

Total Annual Costs for Contracted Services over $10 Million

Data Collected from **Question #90** above.



Company 27 Exceeds the Axis in 2005
2005: $333,675,412
2006: Data Given for 9 Months. A Linear Interpolation Was Used by CNUC to get 12 Month Value

Figure 55: Total Annual Distribution UVM Expenditures for Contracted Services over $10 Million

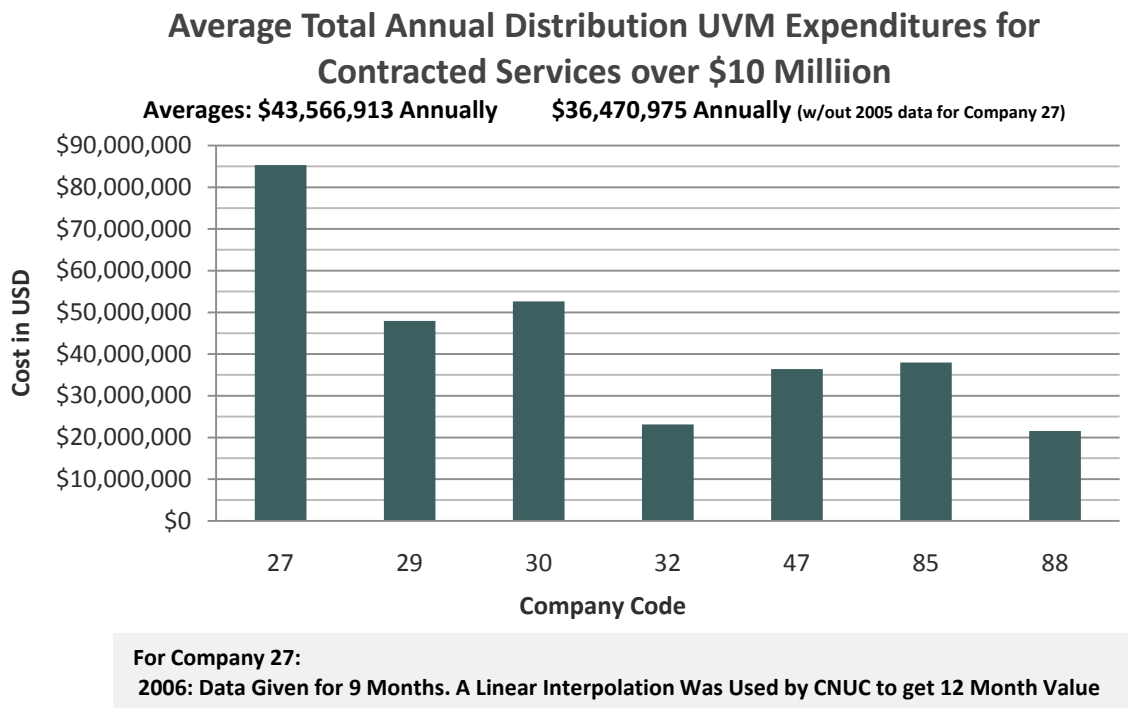


Figure 56: Average Total Annual Distribution UVM Expenditures for Contracted Services over $10 Million

Total Annual Costs for Contracted Services under $10 Million

Data collected from **Question #90**

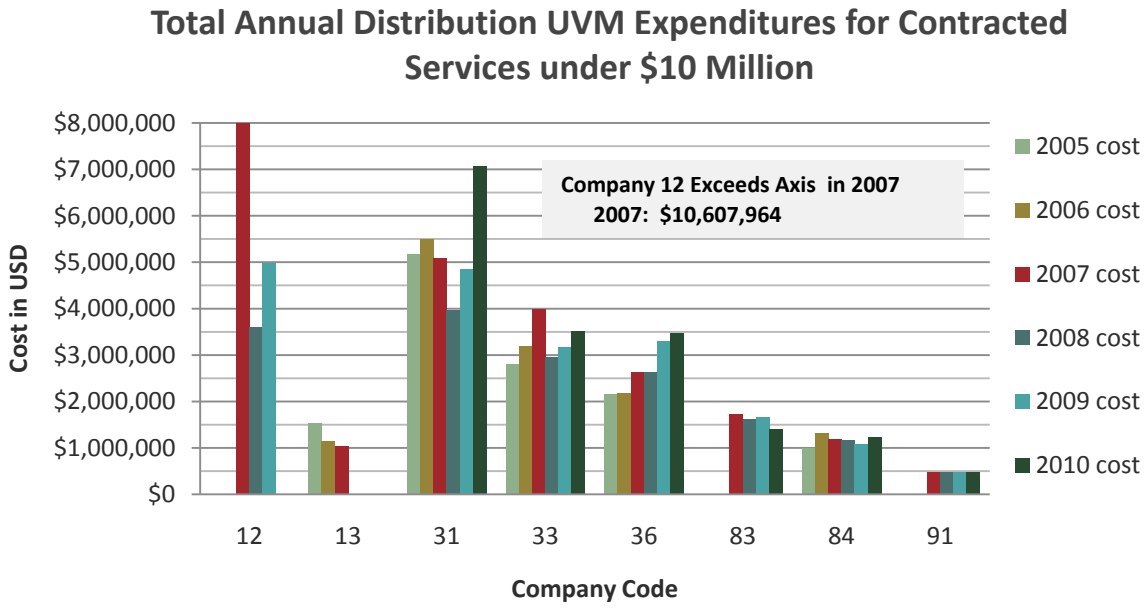


Figure 57: Total Annual Distribution UVM Expenditures for Contracted Services under $10 Million

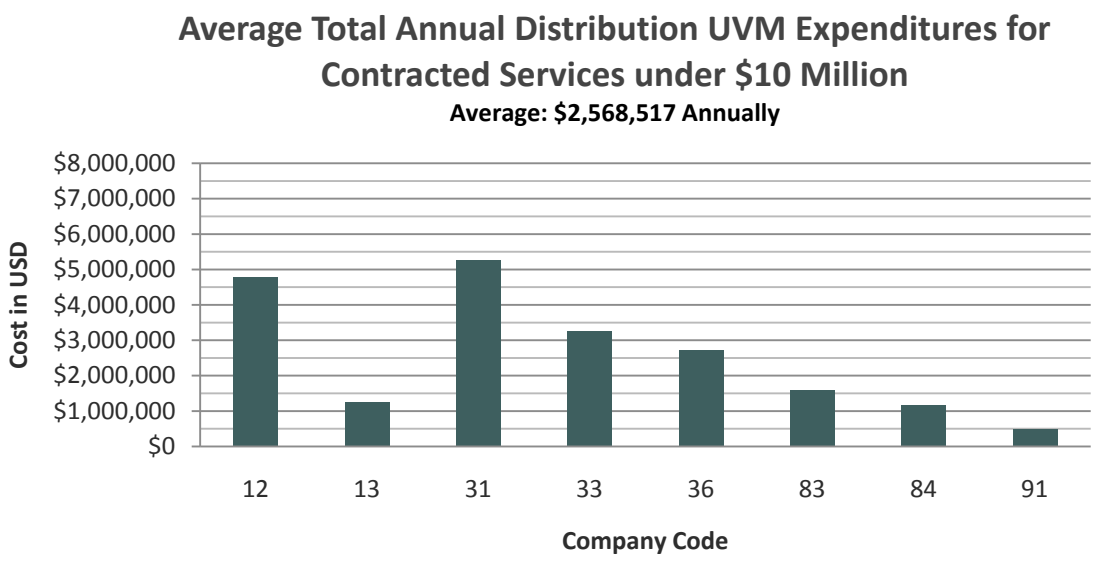


Figure 58: Average Total Annual Distribution UVM Expenditures for Contracted Services under $10 Million

Average Cost per Labor Hour for Distribution Contracted Services

Data collected from responses to **Question #90.** This is a calculated statistic from reported labor hours and reported expenditures for Distribution UVM contracted services.

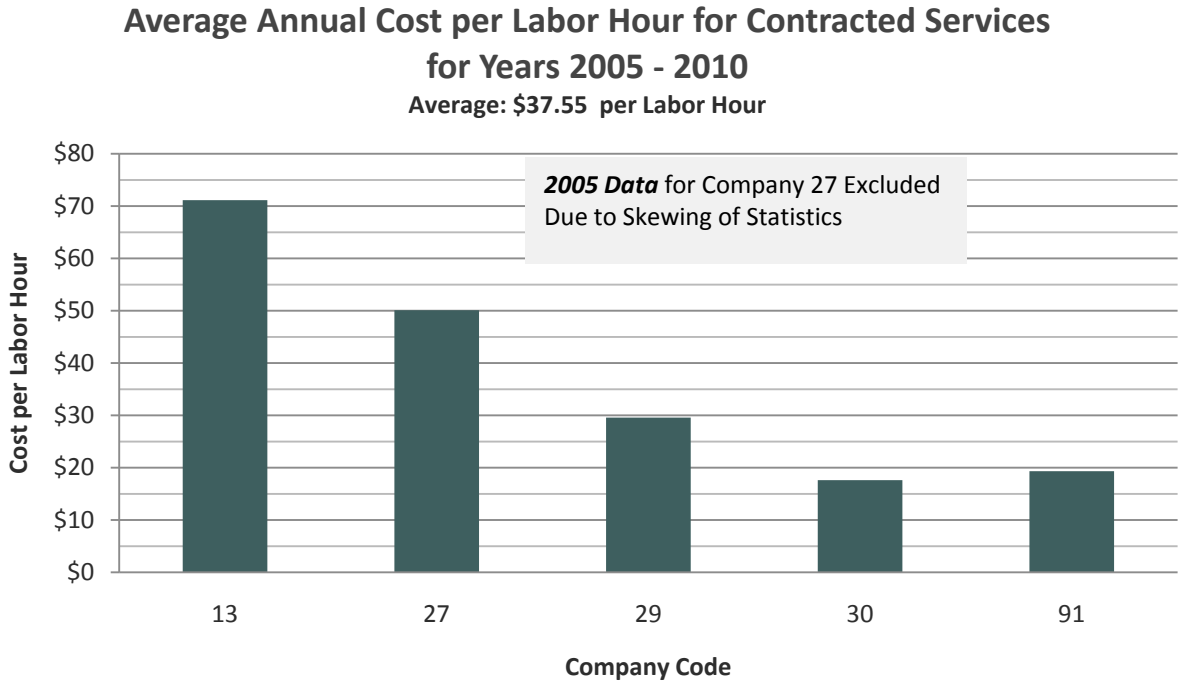


Figure 59: Average Annual Cost per Labor Hour for Contracted Services (2005 -2010)

Average Cost for Contracted Services per Managed Distribution Pole Mile

Data collected from responses to **Question #90.** This is a calculated statistic from reported labor hours and reported expenditures for Distribution UVM contracted services.

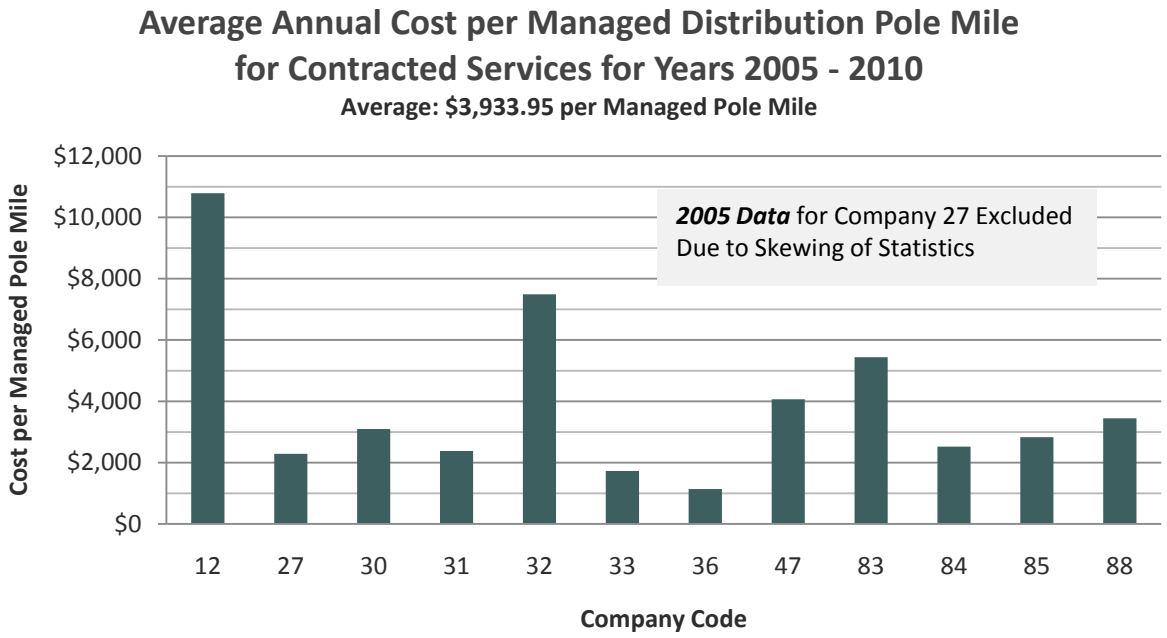


Figure 60: Average Annual Cost per Managed Distribution Pole Mile for Contracted Services (2005 – 2010)

COMMENTS ON CONTRACTED DISTRIBUTION UVM EXPENDITURES

Comments on Contracted Distribution UVM Expenditures
For [Utility], distribution expenditures for interventions following a customer request (phone or internet) are very important; 4 to 6 millions in recent years!

Figure 61: Comments on Contracted Distribution UVM Expenditures

ANNUAL EXPENDITURES FOR STORM RESPONSE, NEW CONSTRUCTION CLEARING AND REACTIVE UVM WORK

TOTAL ANNUAL DISTRIBUTION UVM EXPENDITURES

Question #96: TOTAL ANNUAL EXPENDITURES FOR DISTRIBUTION UVM FROM 2005 - 2010: Please supply the Total Expenditures for Distribution Utility Vegetation Management for the following years. NOTE: Include ALL known costs for vegetation management.

Companies that spend with greater than $10 million annually have been represented separately from the companies that spend under $10 million annually.

Total Annual Costs for Companies with UVM Budgets More Than $10 Million

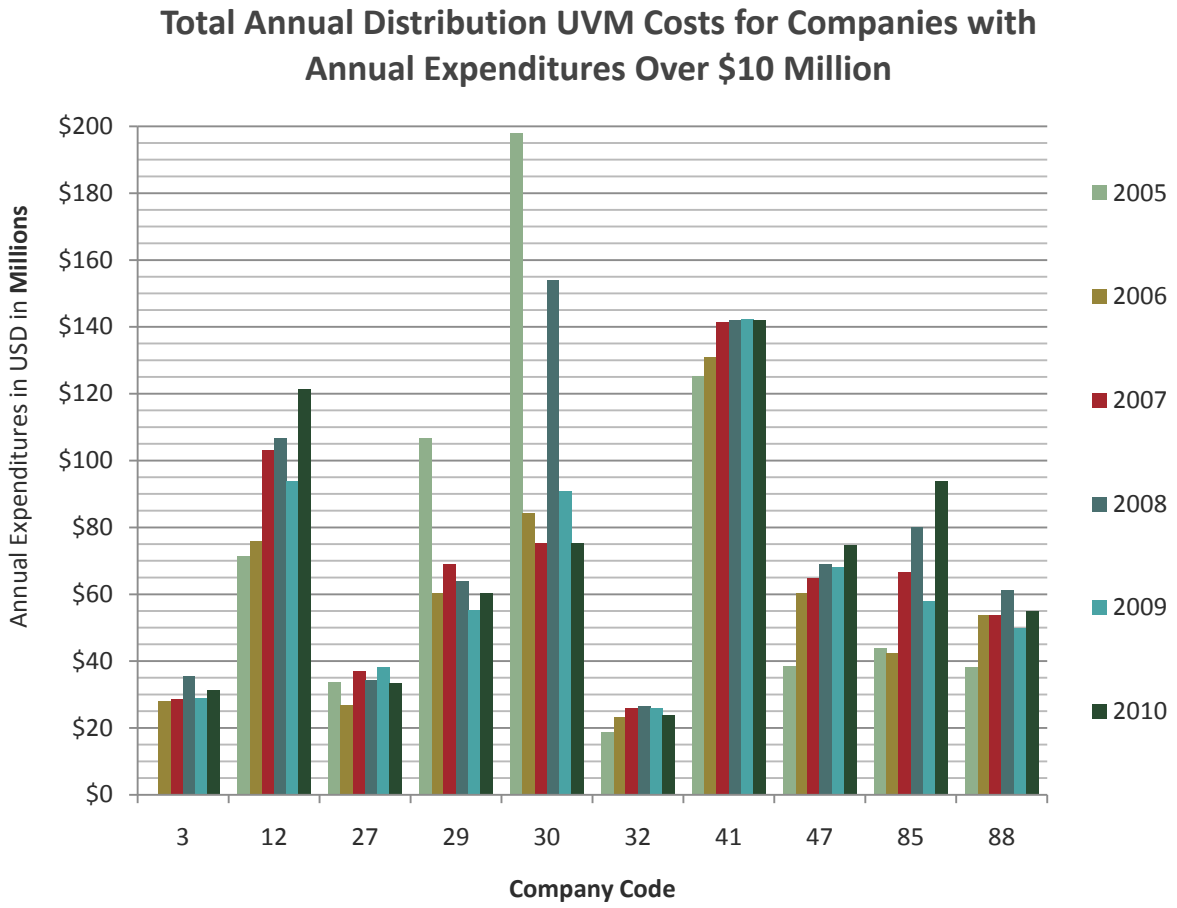


Figure 62: Total Annual UVM Costs for Companies with Annual Expenditures Over $10 Million

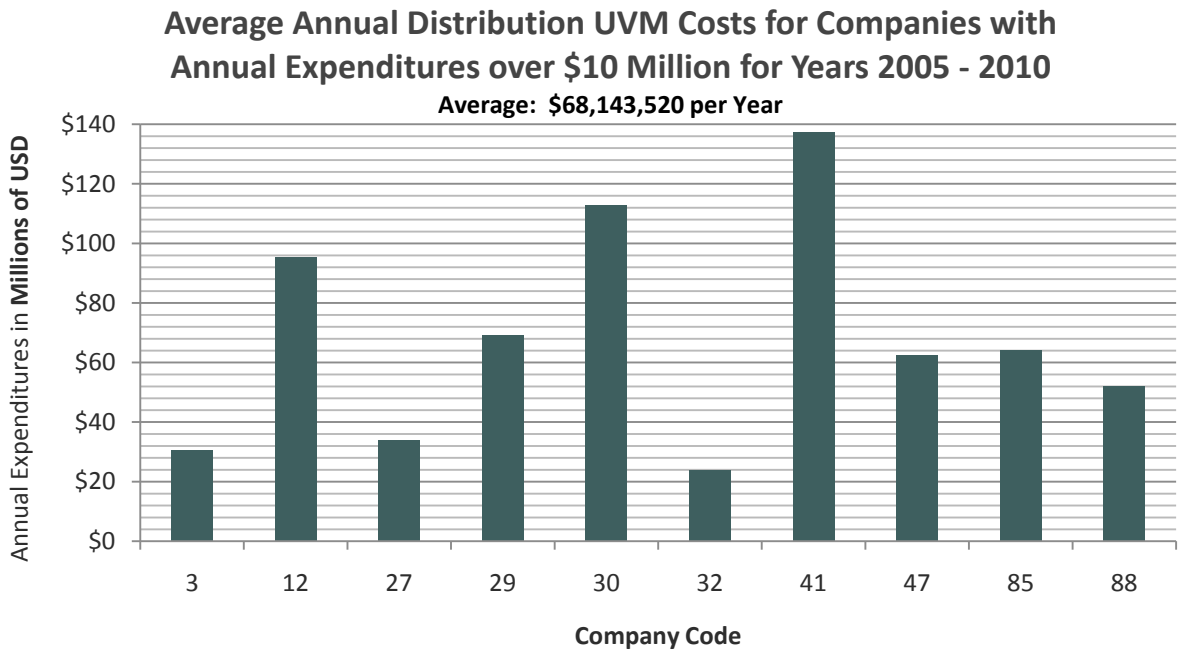


Figure 63: Average Annual UVM Costs for Companies with Costs over $10 Million for Years 2005 - 2010

Total Annual Costs for Companies with UVM Budgets Less Than $10 Million

Data collected from responses to **Question #96**

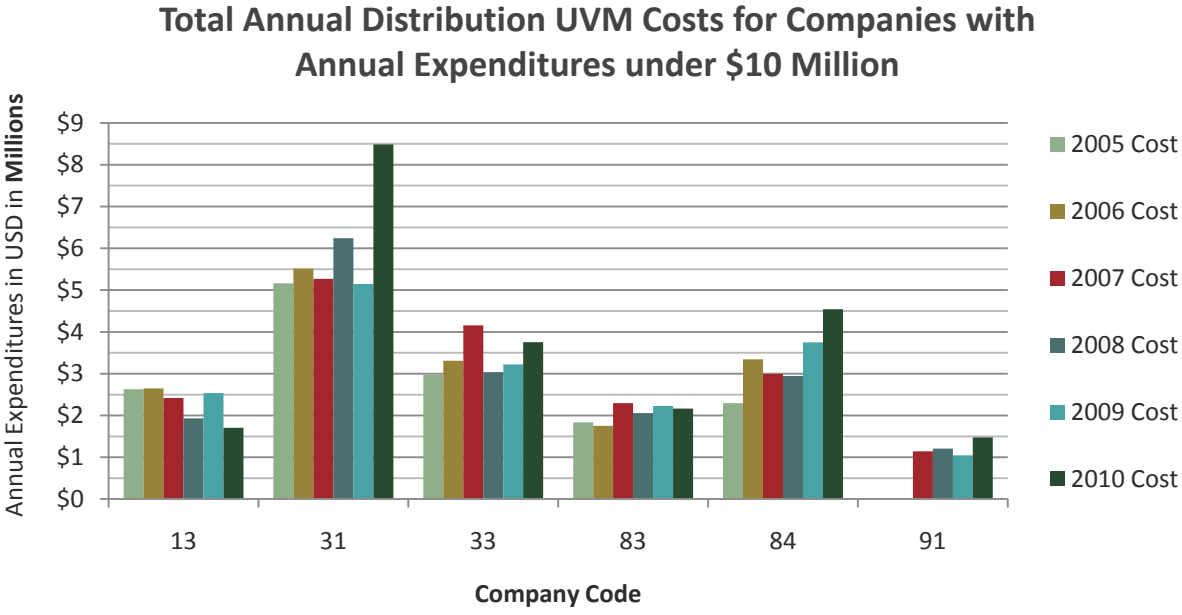


Figure 64: Total Annual UVM Costs for Companies with Annual Expenditures under $10 Million

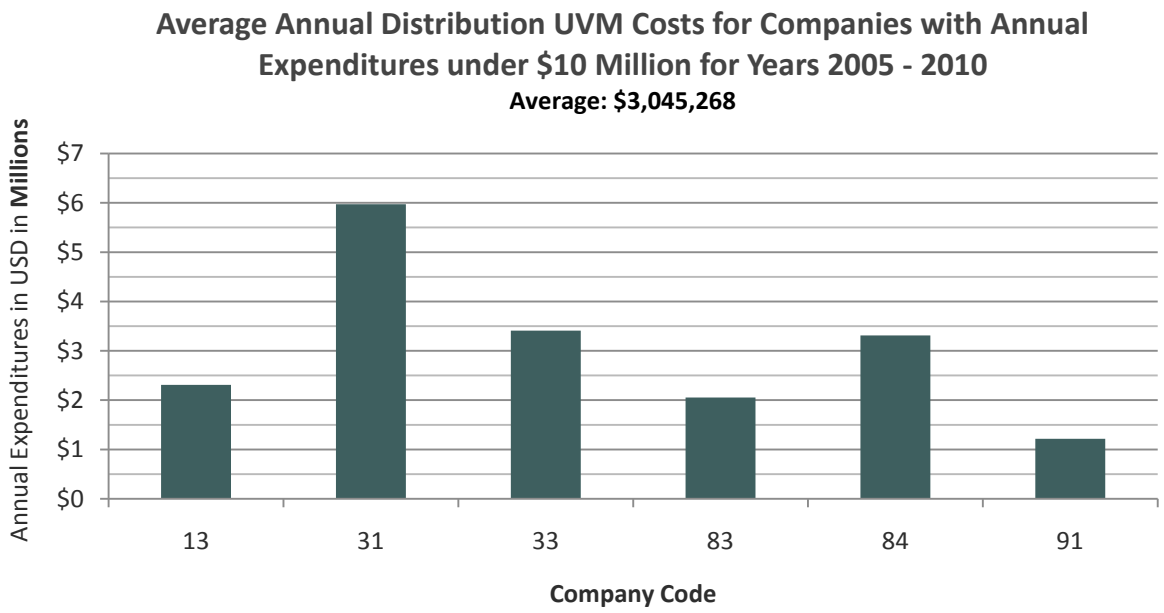


Figure 65: Average Annual UVM Costs for Companies with Costs under $10 Million for Years 2005 – 2010

SPECIAL TREE PROGRAMS: ROUTINE MAINTENANCE OR UNPLANNED

Question #98: ROUTINE MAINTENANCE VERSUS UNPLANNED WORK: This question is to help us understand what aspects of your distribution vegetation management program are considered routine and what are considered unplanned. NOTE: Please give one answer per row.

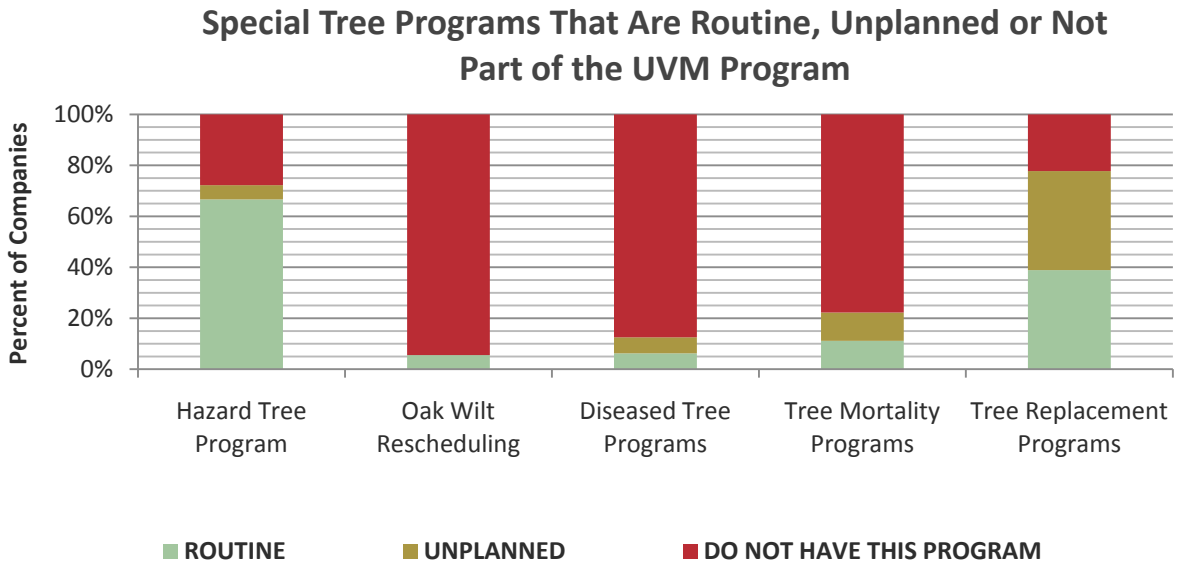


Figure 66: Special Tree Programs That Are Routine, Unplanned or Not Part of the UVM Program

Details from above graph are displayed on the table below:

PERCENT OF COMPANIES WITH SPECIAL TREE PROGRAMS THAT ARE ROUTINE, UNPLANNED OR NOT PART OF THE UVM PROGRAM

Work Scheduling	Hazard Tree Program	Oak Wilt Rescheduling	Diseased Tree Programs	Tree Mortality Programs	Tree Replacement Programs
Routine	67%	6%	6%	11%	39%
Unplanned	6%	0%	6%	11%	39%
Do Not Have This Program	28%	94%	88%	78%	22%

Figure 67: Table of Special Tree Programs That Are Routine, Unplanned or Not Part of the UVM Program

Comments and Descriptions of Special UVM Tree Programs
Maps with concentrations of oaks are scheduled for work outside the oak wilt season.
Annual Dead Tree Program in eastern service area.
Mountain Pine Beetle Program to deal with the MPB infestation
Palm Maintenance Program - Routine Vine Treatment Program - Routine Removal Program – Routine [Other Special Tree Program]
Hazard trees are identified and removed as a part of our routine vegetation management programs. Our tree replacement program is used as a negotiation tool with our customers during the notification/permissioning of our routine vegetation management programs.
Tree Line USA
Tree replacements are offered to landowners where tree removals are necessary.
Hazard Tree Program does include some dead or diseased tree. But the final decision is always based on risk for the system.

Figure 68: Comments and Descriptions of Special UVM Tree Programs

ROUTINE MAINTENANCE EXPENDITURES AND LABOR HOURS

Question #101: Distribution ROUTINE MAINTENANCE EXPENDITURES: This pertains to any UVM that is planned into the budget and performed on a regular basis to keep the distribution lines clear of vegetation. This does NOT include storm, clearing for new construction or unplanned work. Please enter the annual costs and labor hours expended for ROUTINE MAINTENANCE in the following years.

Distribution Routine Maintenance Expenditures

Companies that spend greater than $10 million annually have been represented separately from the companies that spend under $10 million annually.

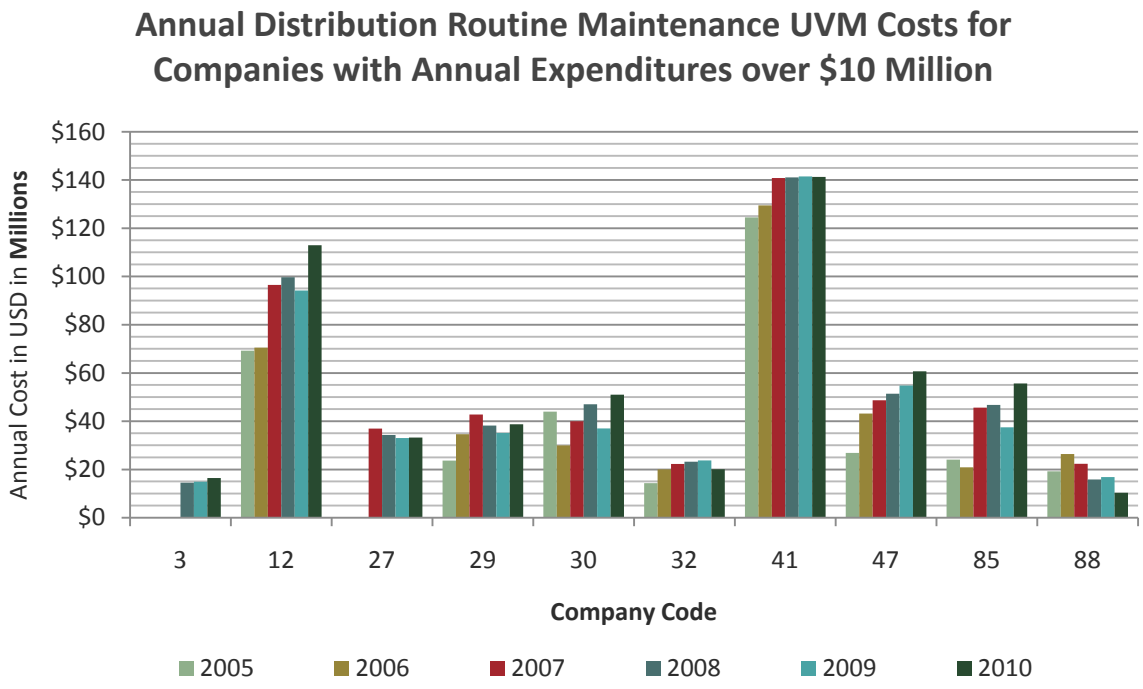


Figure 69: Annual Routine Maintenance UVM Costs for Companies with Annual Expenditures over $10 Million

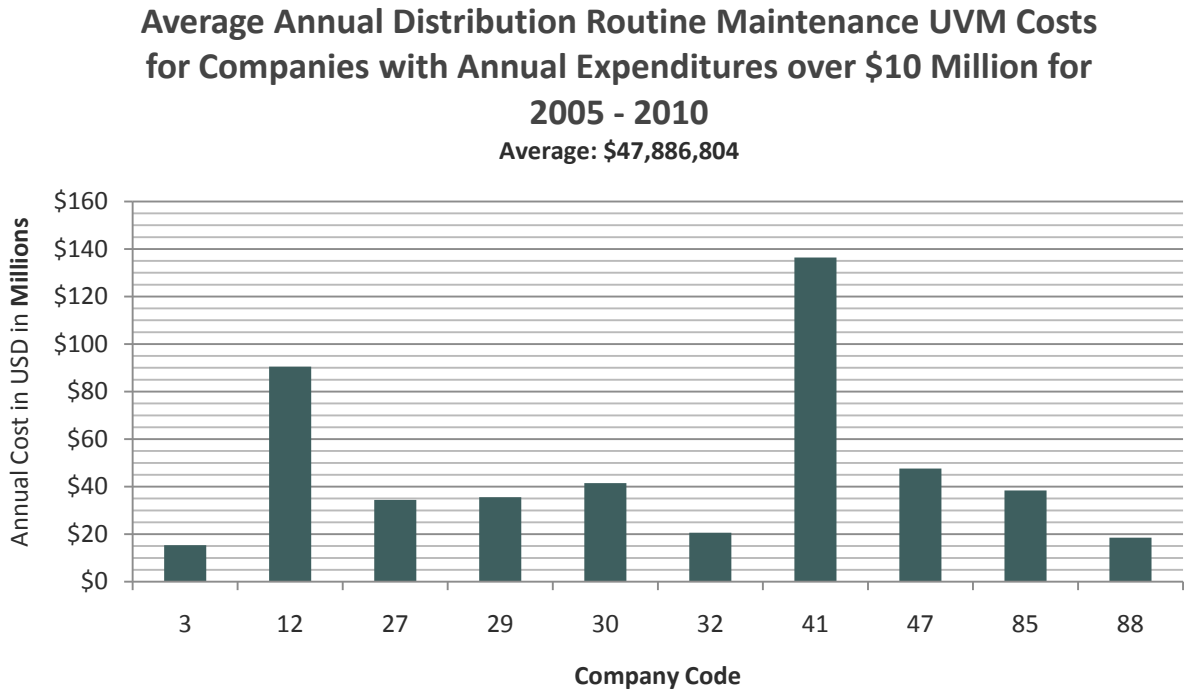


Figure 70: Average Annual Routine Maintenance Costs for Companies with Annual Expenditures over $10 Million

Data collected from responses to **Question #101**

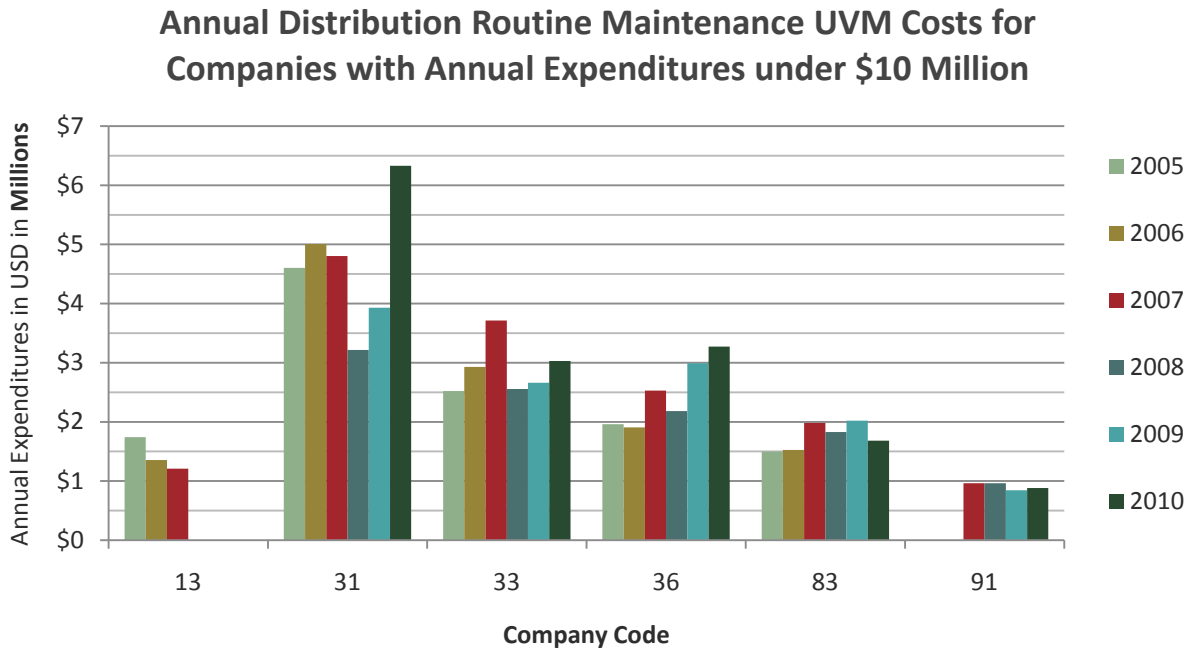


Figure 71: Annual Routine Maintenance UVM Costs for Companies with Annual Expenditures under $10 Million

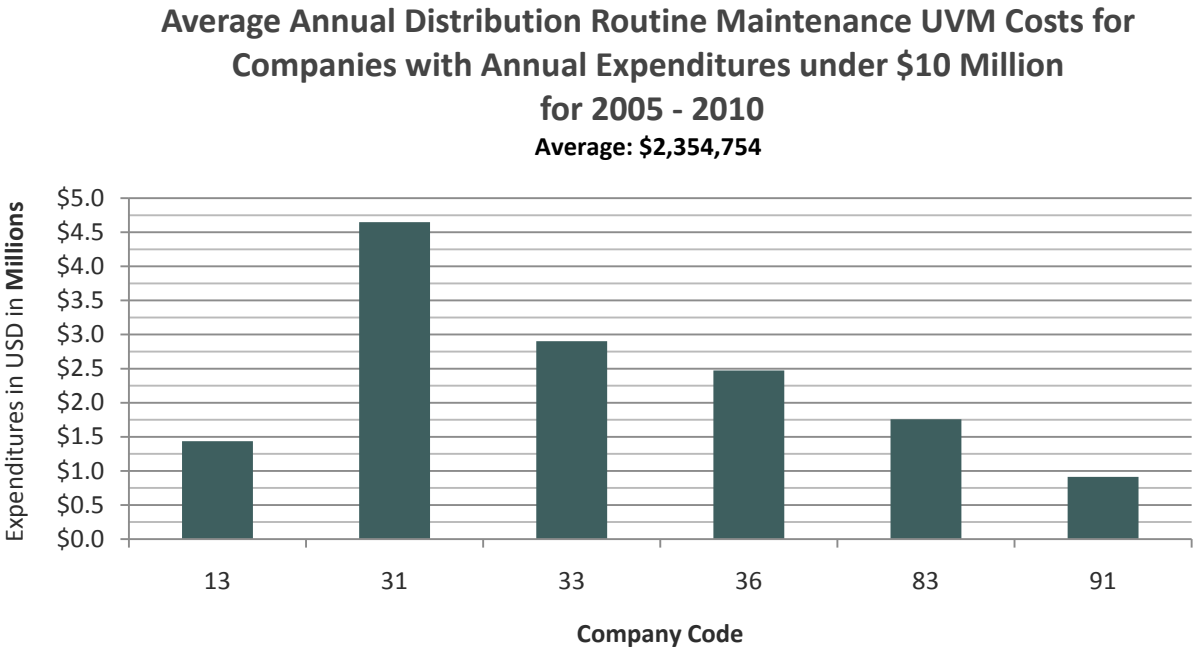


Figure 72: Average Annual Routine Maintenance UVM Costs for Companies with Annual Costs under $10 Million

Labor Hours Expended for Distribution UVM Routine Maintenance

Companies that expend greater than 200,000 hours annually have been represented separately from the companies that expend less than 200,000 hours annually.

Data collected from responses to **Question #101**

Labor Hours Expended for Routine Maintenance for Companies with Greater Than 200,000

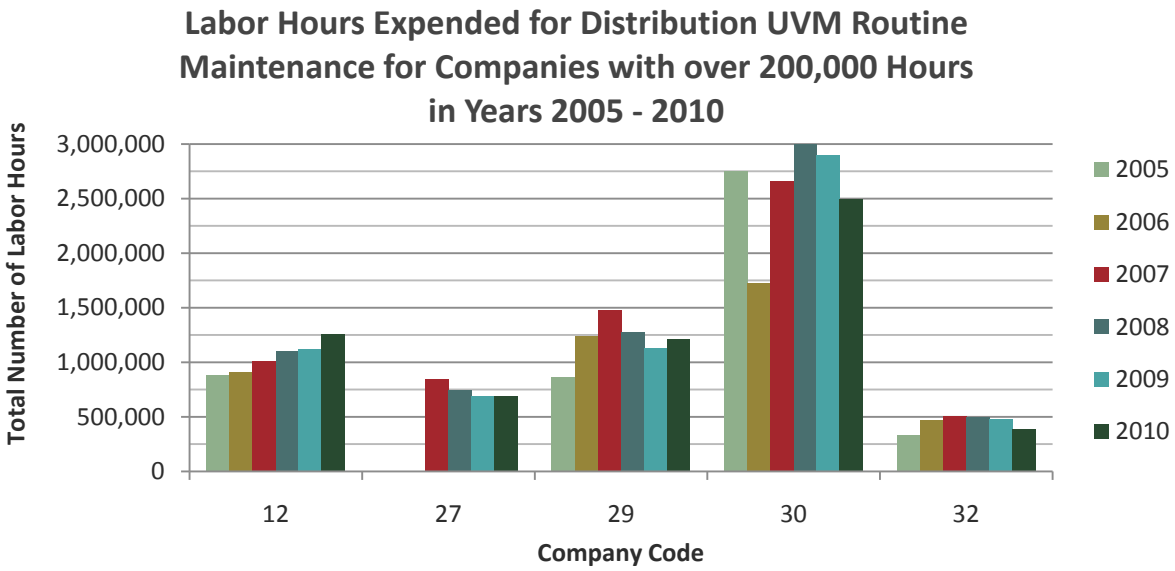


Figure 73: Labor Hours Expended for UVM Routine Maintenance for Companies with over 200,000 Hours

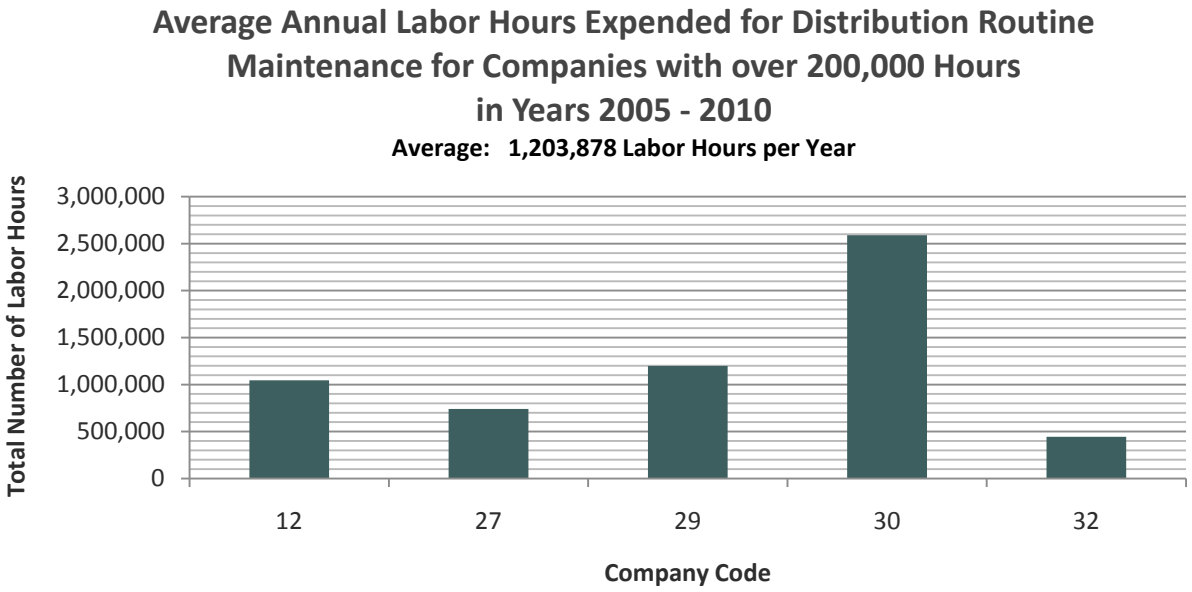


Figure 74: Average Annual Labor Hours Expended for Routine Maintenance for Companies with over 200,000 Hours

Data collected from responses to **Question #101**

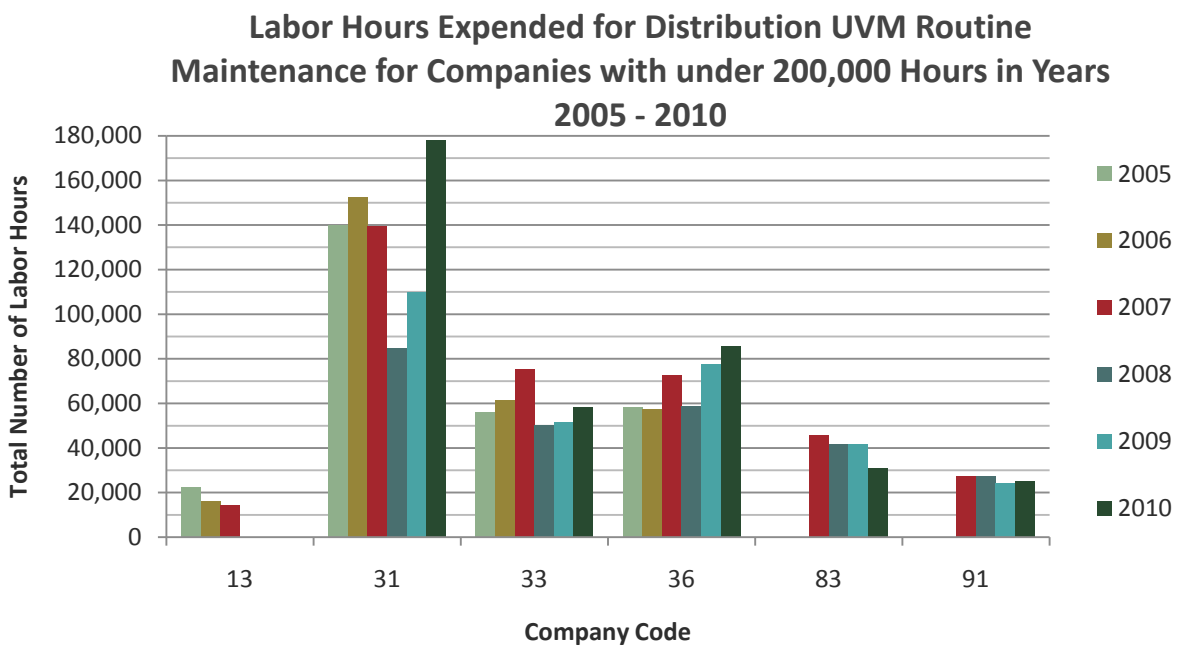


Figure 75: Labor Hours Expended for UVM Routine Maintenance for Companies with Fewer Than 200,000 Hours

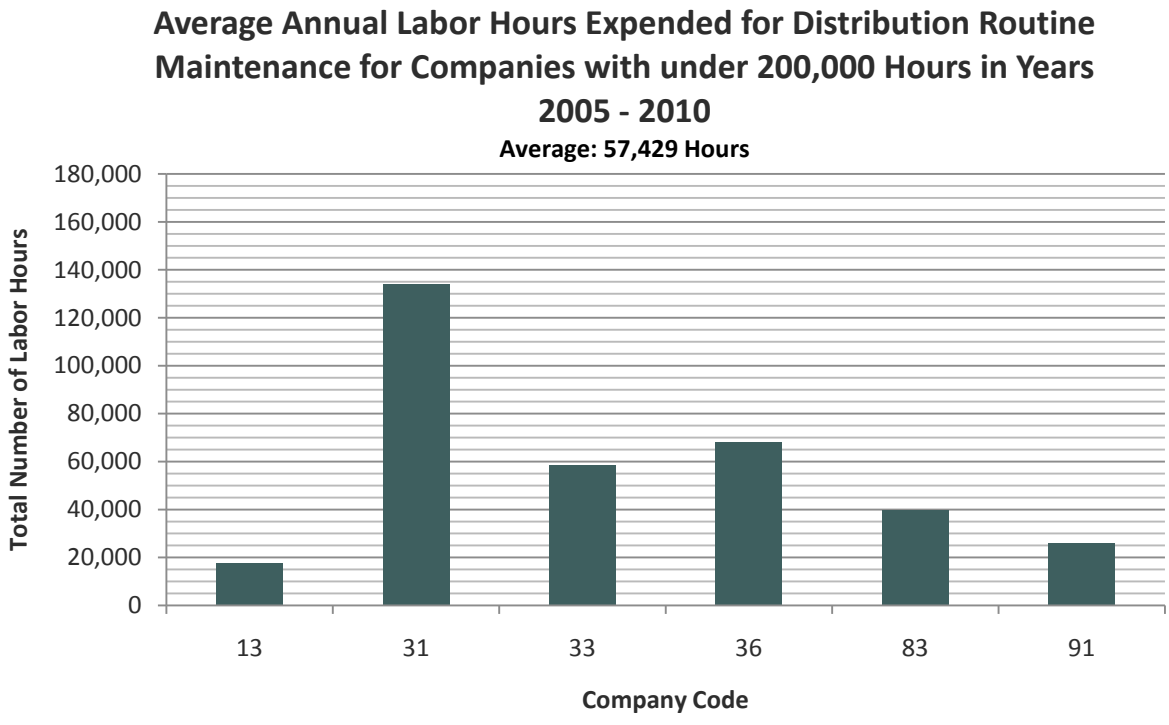


Figure 76: Labor Hours Expended for Routine Maintenance for Companies with Fewer Than 200,000 Hours in Years

Average Cost per Labor Hour for Distribution Routine Maintenance

Data collected from responses to **Question #101.** This is a calculated statistic from reported labor hours and reported expenditures (labor and equipment) for distribution routine maintenance.

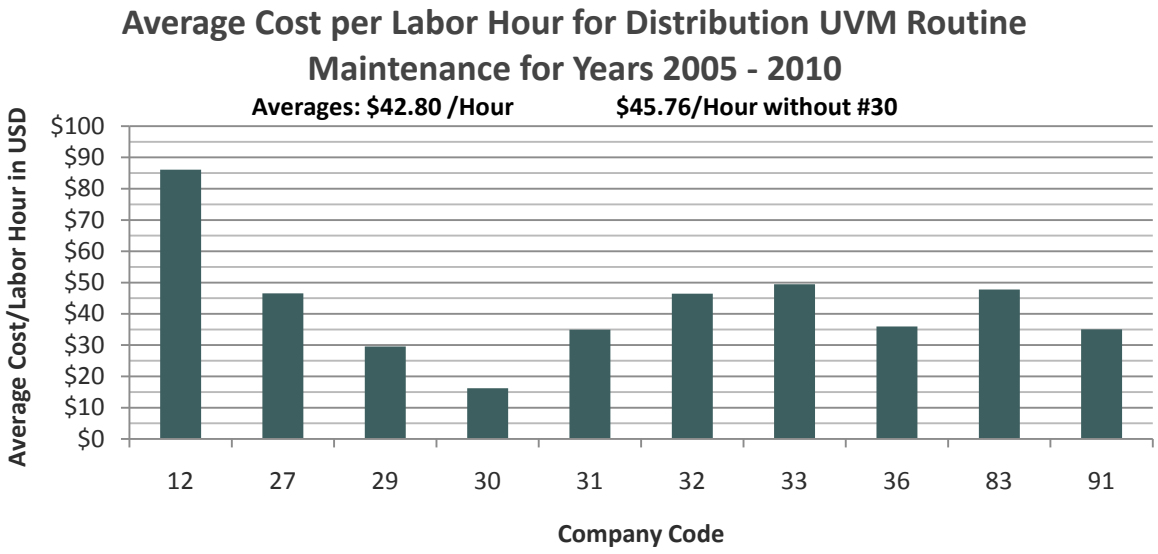


Figure 77: Average Cost per Labor Hour for UVM Routine Maintenance for Years 2005 – 2010

Percent of Total Distribution UVM Expenditures Spent on Routine Maintenance

Statistics calculated from data collected from responses to **Question #101** and **Question #96**. Two graphs follow.

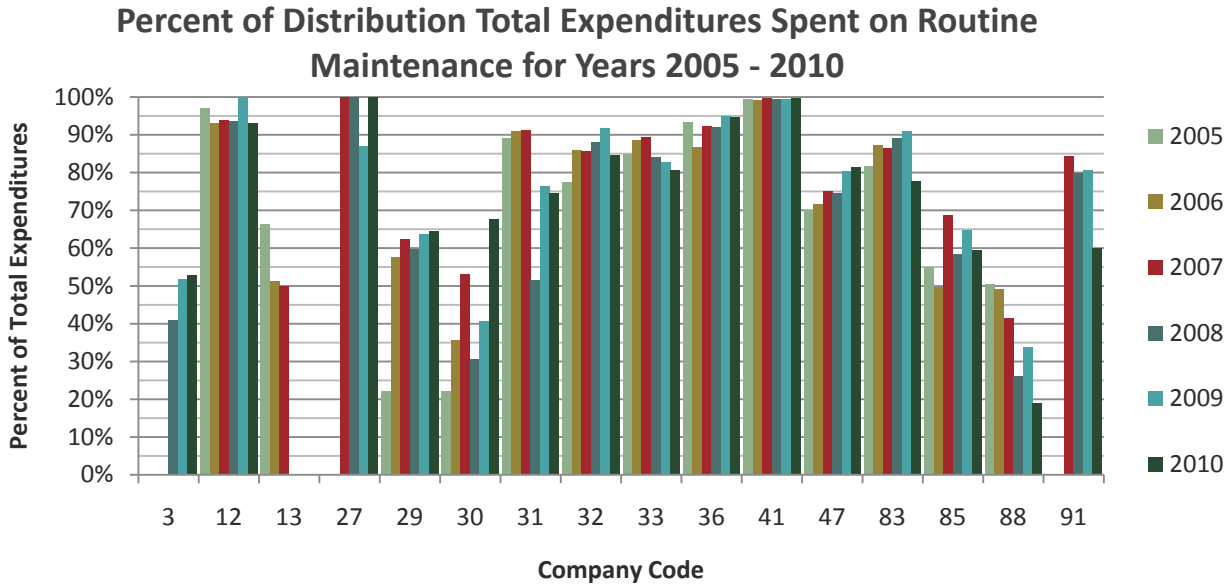


Figure 78: Percent of Total Expenditures Spent on UVM Routine Maintenance for Years 2005 - 2010

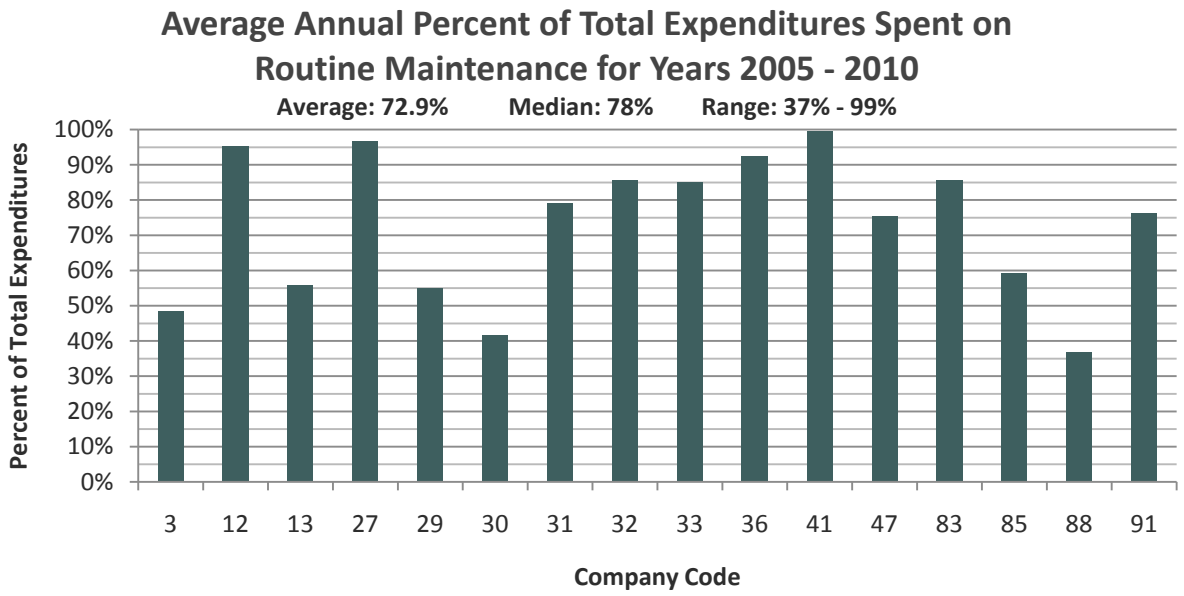


Figure 79: Average Annual Percent of Total Expenditures Spent on Routine Maintenance for Years 2005 - 2010

Data Discussion on Reported Routine Maintenance

A program which spends the majority of their budget on routine maintenance may indicate a more effective approach to preventative vegetation management.

UNPLANNED OR REACTIVE UVM WORK EXPENDITURES AND LABOR HOURS

Question #103: Distribution UNPLANNED or REACTIVE WORK EXPENDITURES: This pertains to all unplanned UVM activities and includes such items as off-cycle requests, reliability work, and outbreaks of tree mortality caused by insects, disease, winter kill, drought etc. This does not include routine clearing for new construction or storm work. Please enter the annual costs and labor hours expended for UNPLANNED WORK for the following years.

Unplanned Distribution UVM Expenditures

Annual Unplanned Expenditures for Utilities with Costs Greater Than $1 Million

Graphs are derived from information taken from **Question #103,** above. The graphs are separated into companies that spend more than one million dollars annually for reactive UVM and companies that spend less than one million dollars annually.

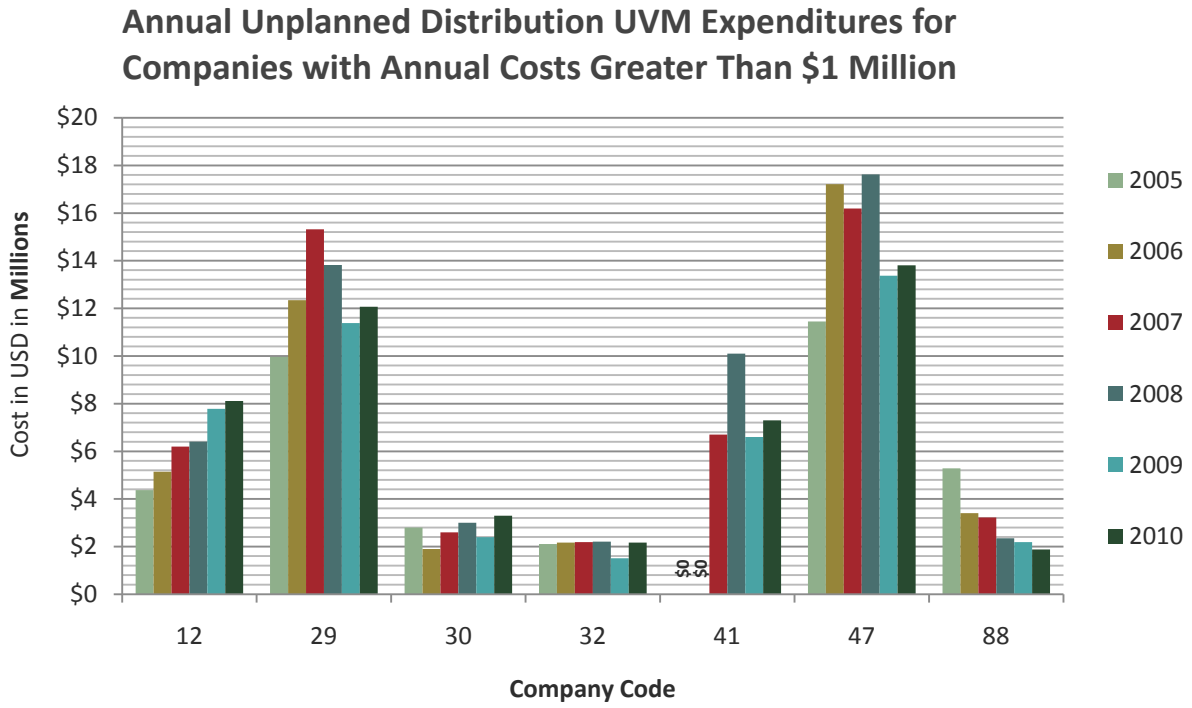


Figure 80: Annual Unplanned UVM Expenditures for Companies with Annual Costs Greater Than $1 Million

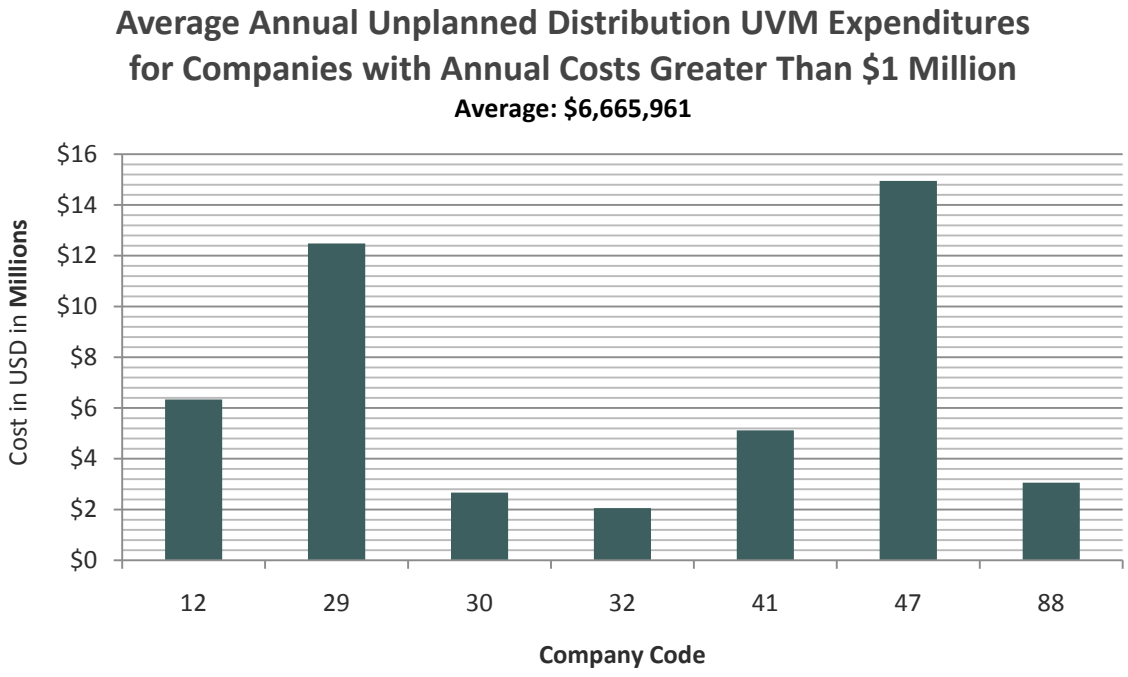


Figure 81: Average Annual Unplanned UVM Expenditures for Companies with Annual Costs Greater Than $1 Million

Annual Unplanned UVM Expenditures for Utilities with Costs Less Than $1 Million

Data Collected from responses to **Question #103**

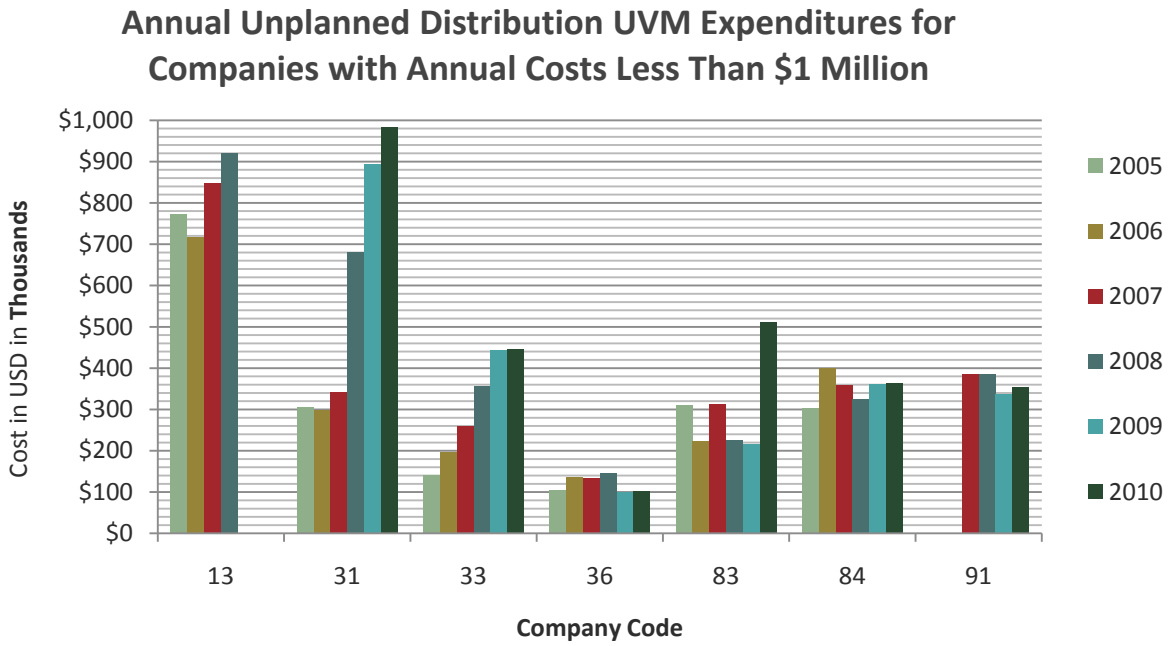


Figure 82: Annual Unplanned UVM Expenditures for Companies with Annual Costs Less Than $1 Million

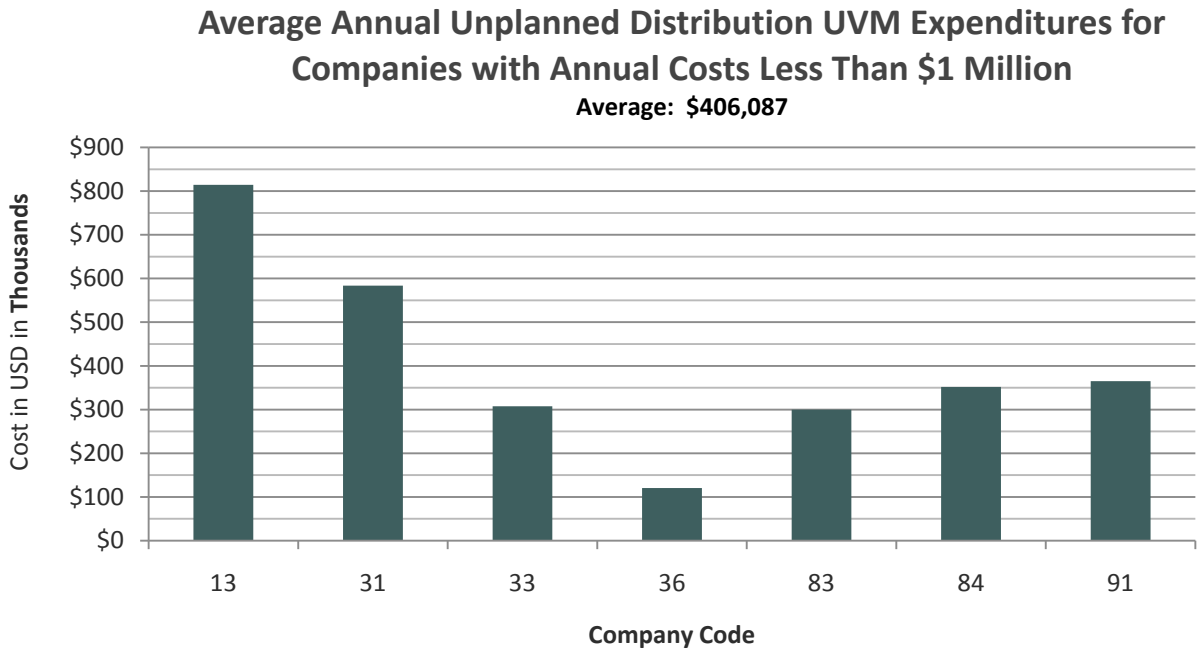


Figure 83: Average Annual Unplanned UVM Expenditures for Companies with Annual Costs Less Than $1 Million

Labor Hours Expended for Unplanned Distribution UVM

Companies that expend greater than 25,000 hours annually have been represented separately from the companies that expend less than 25,000 hours annually.

Data collected from responses to **Question #103**

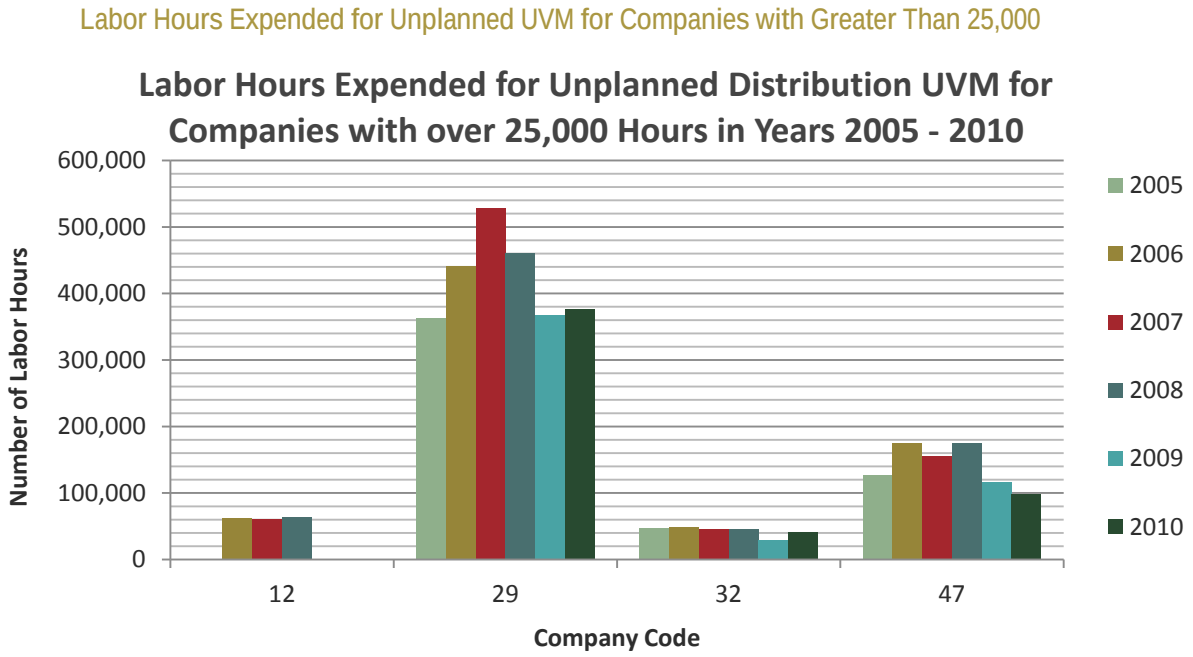


Figure 84: Labor Hours Expended for Unplanned UVM for Companies Greater Than 25,000 Hours

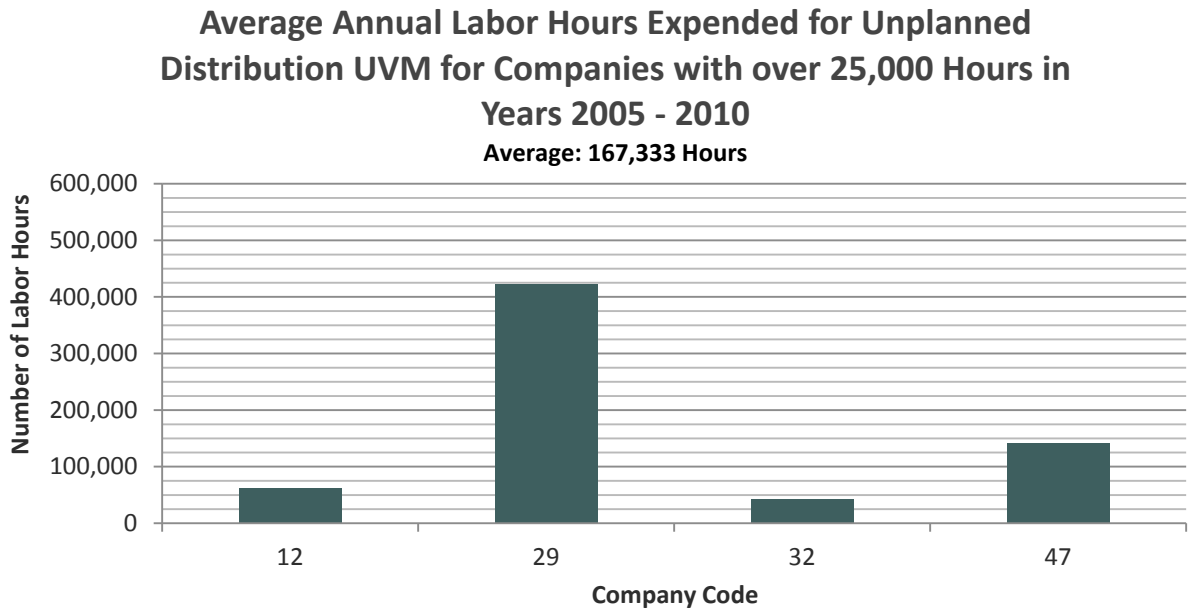


Figure 85: Average Annual Labor Hours Expended for Unplanned UVM for Companies Greater Than 25,000 Hours

Data collected from responses to **Question #103**

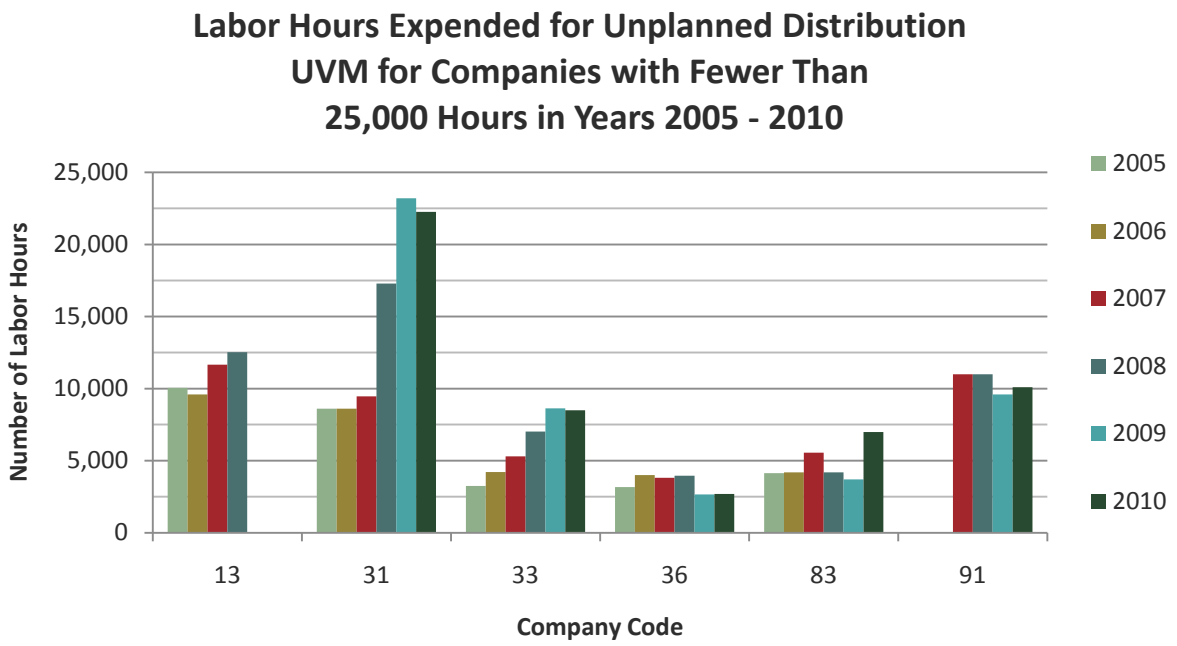


Figure 86: Labor Hours Expended for Unplanned UVM for Companies Fewer Than 25,000 Hours

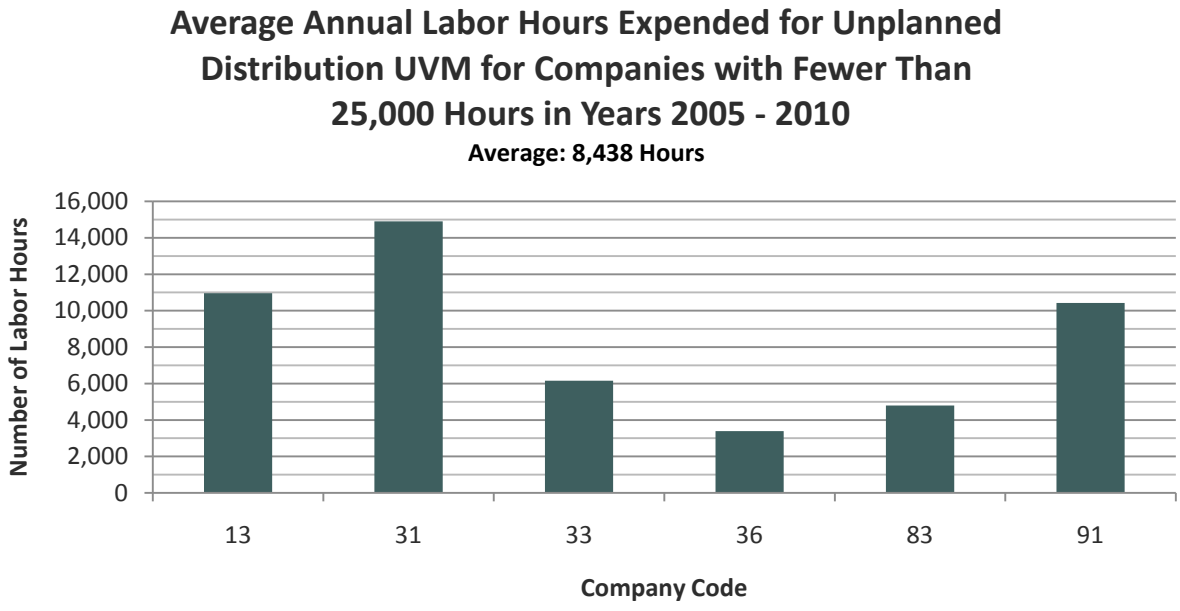


Figure 87: Average Annual Labor Hours Expended for Unplanned UVM for Companies Fewer Than 25,000 Hours

Average Cost per Labor Hour for Distribution UVM Reactive Work

Data collected from responses to **Question #103.** This is a calculated statistic from reported labor hours and reported expenditures for distribution UVM reactive work.

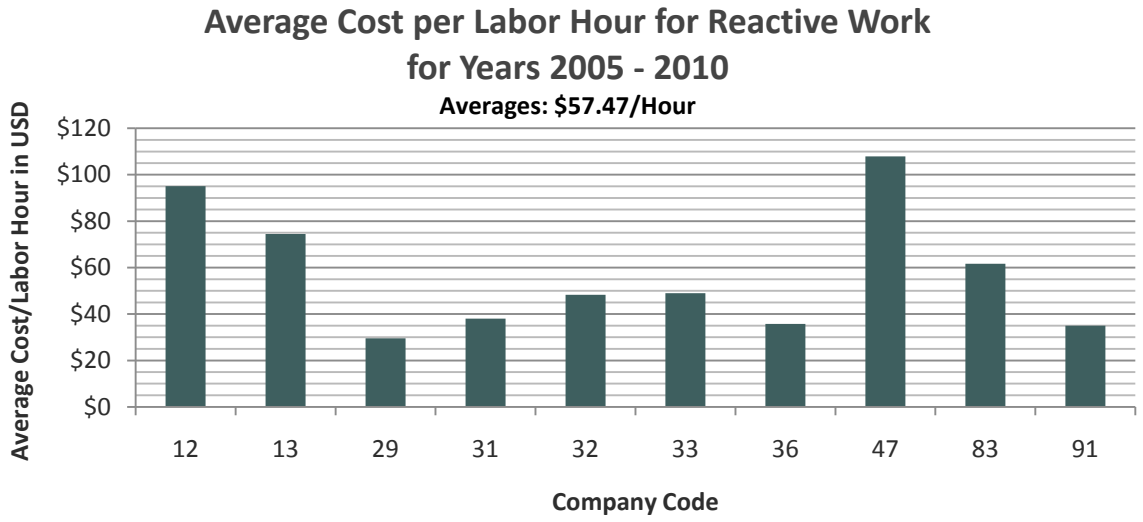


Figure 88: Average Cost per Labor Hour for UVM Reactive Work for Years 2005 - 2010

Percent of Total Distribution UVM Expenditures Spent on Reactive Work

Statistics calculated from data collected from responses to **Question #103** and **Question #96**. Two graphs follow.

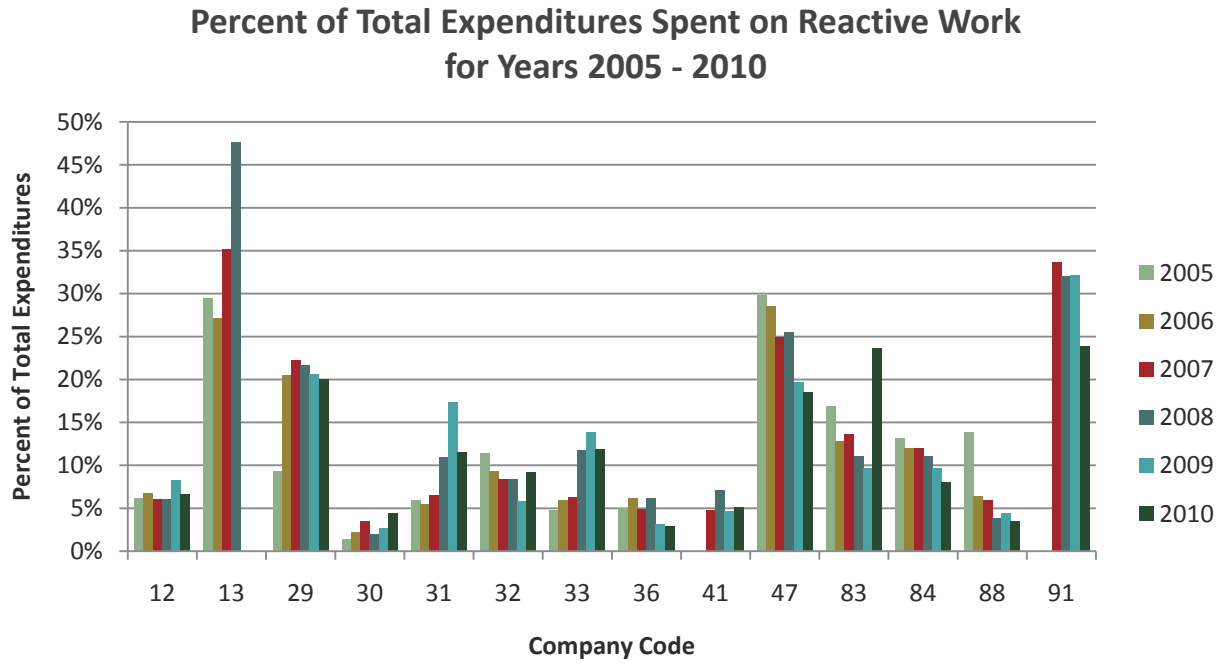


Figure 89: Percent of Total Expenditures Spent on UVM Reactive Work for Years 2005 - 2010

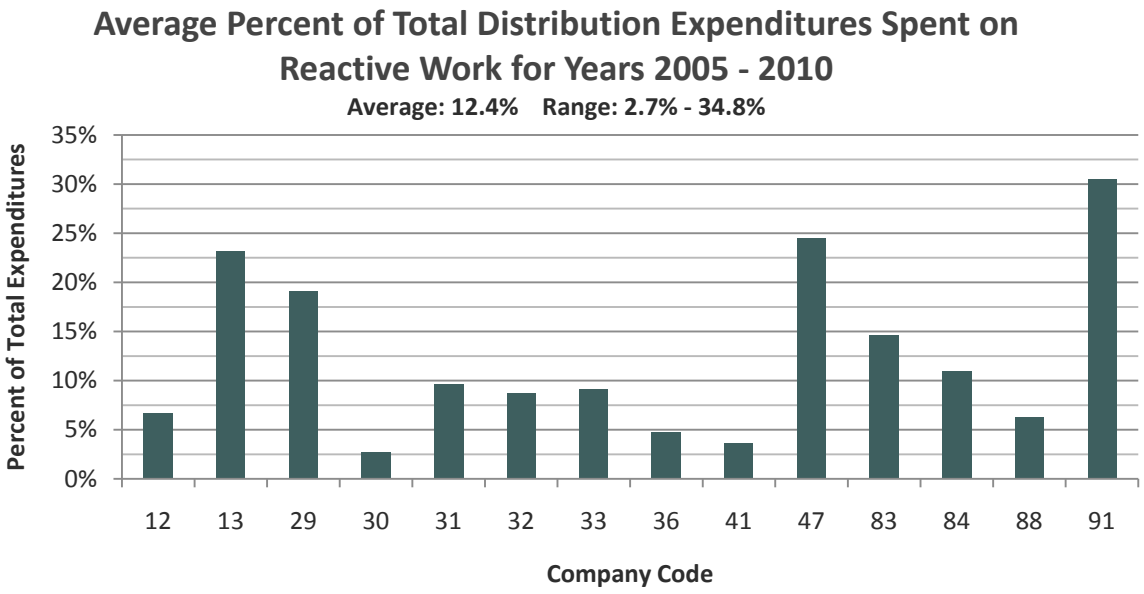


Figure 90: Average Percent of Total Expenditures Spent on UVM Reactive Work for Years 2005 - 2010

Comments on Unplanned Distribution UVM

Data collected from responses to **Question #103**

Comments on Unplanned UVM
Customer requests and reliability work
Reliability Improvement Program
Don't separate storm work from other unplanned or reactive work [Not represented in previous section's graphs]
No data
Includes Mid-Cycle
Nuisance calls are 40% of off cycle trimming and removals.
Those actual hours are entrepreneur's [contractor] hours only. 20,000 hours for each year, can be added, if you take in consideration the time of our forest technician to coordinate our entrepreneur on those jobs.

Figure 91: Comments on Unplanned UVM

EMERGENCY STORM RESPONSE UVM EXPENDITURES AND LABOR HOURS

Question #105: EMERGENCY STORM RESPONSE AND RESTORATION EXPENDITURES: This pertains to around the clock response to emergency conditions and includes additional forestry crews brought in for storm assistance. Please enter your annual costs and labor hours expended for DISTRIBUTION STORM RESPONSE for the following years.

Distribution Emergency Storm Response UVM Expenditures

Information is taken from **Question #105** above. The graphs are separated into companies that spend more than one million dollars annually for UVM emergency storm response and restoration and companies that spend less than one million dollars annually.

Annual Storm Expenditures for Utilities with Costs Greater Than $1 Million

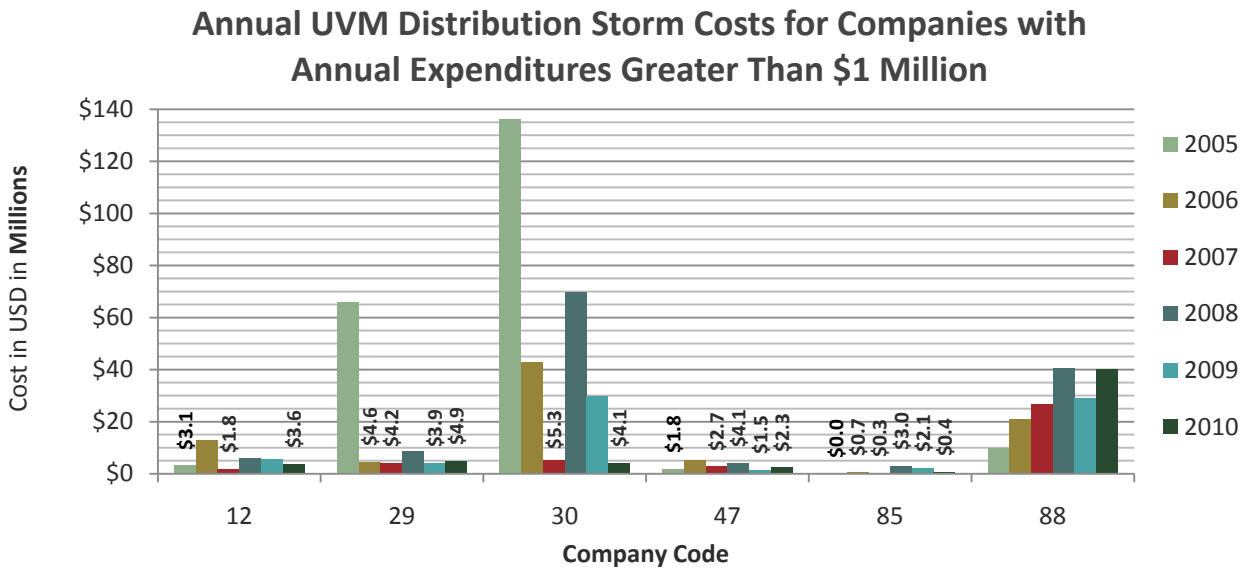


Figure 92: Annual UVM Storm Costs for Companies with Annual Expenditures Greater Than $1 Million

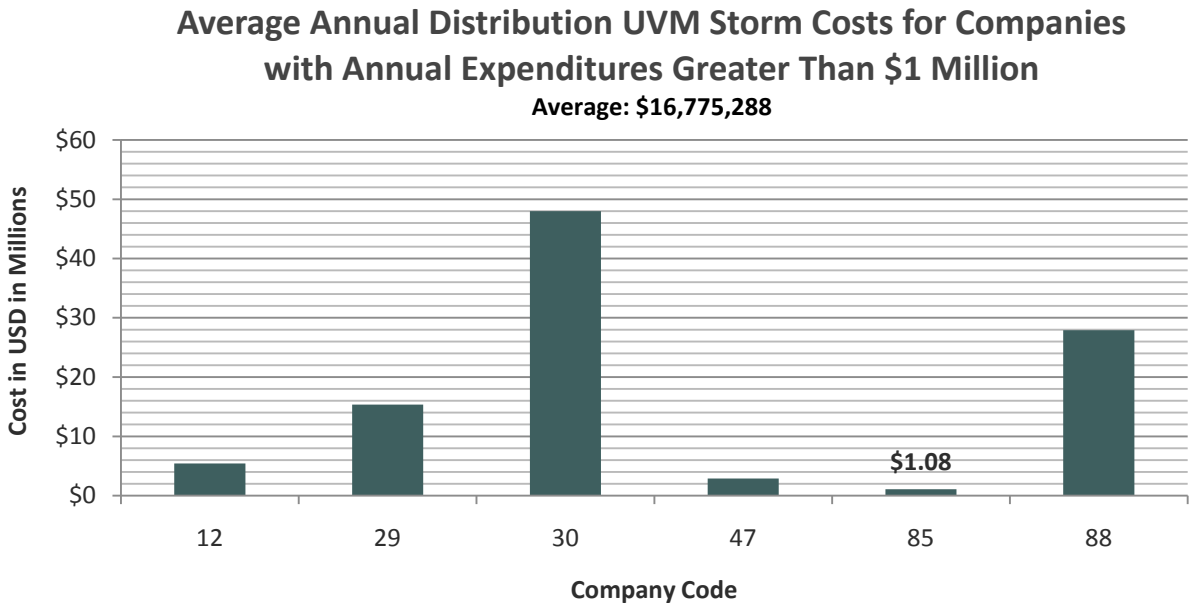


Figure 93: Average Annual UVM Storm Costs for Companies with Annual Expenditures Greater Than $1 Million

Annual Storm UVM Expenditures for Utilities with Costs Less Than $1 Million

Data Collected from responses to **Question #105**

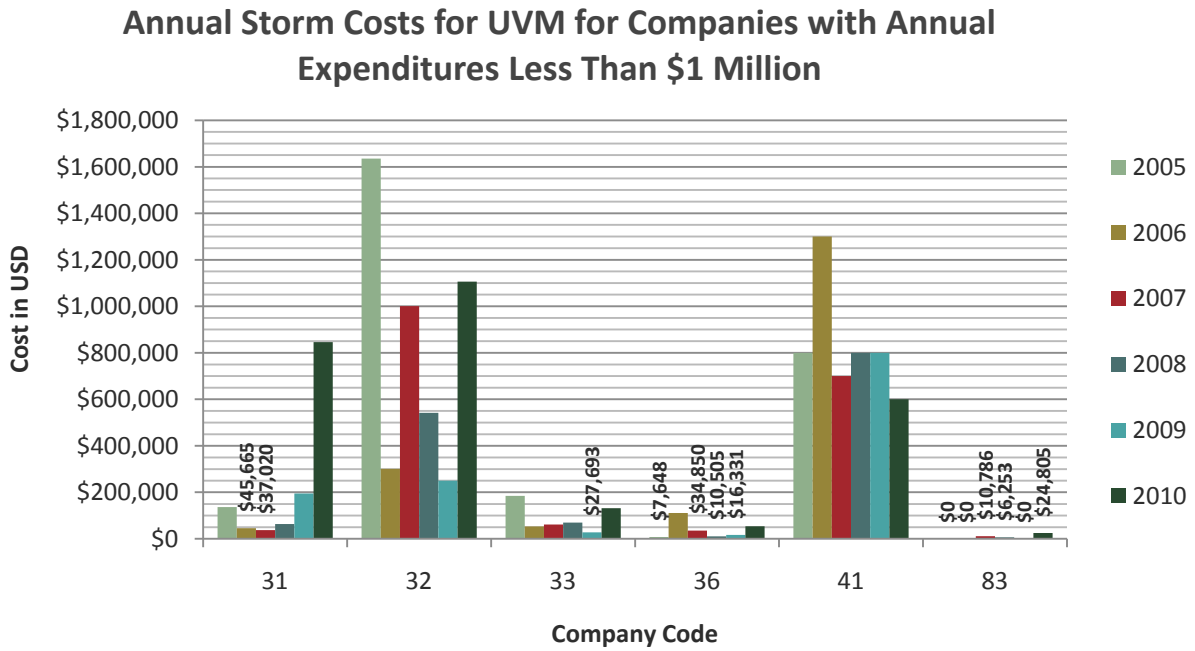


Figure 94: Annual Storm Costs for UVM for Companies with Annual Expenditures Less Than $1 Million

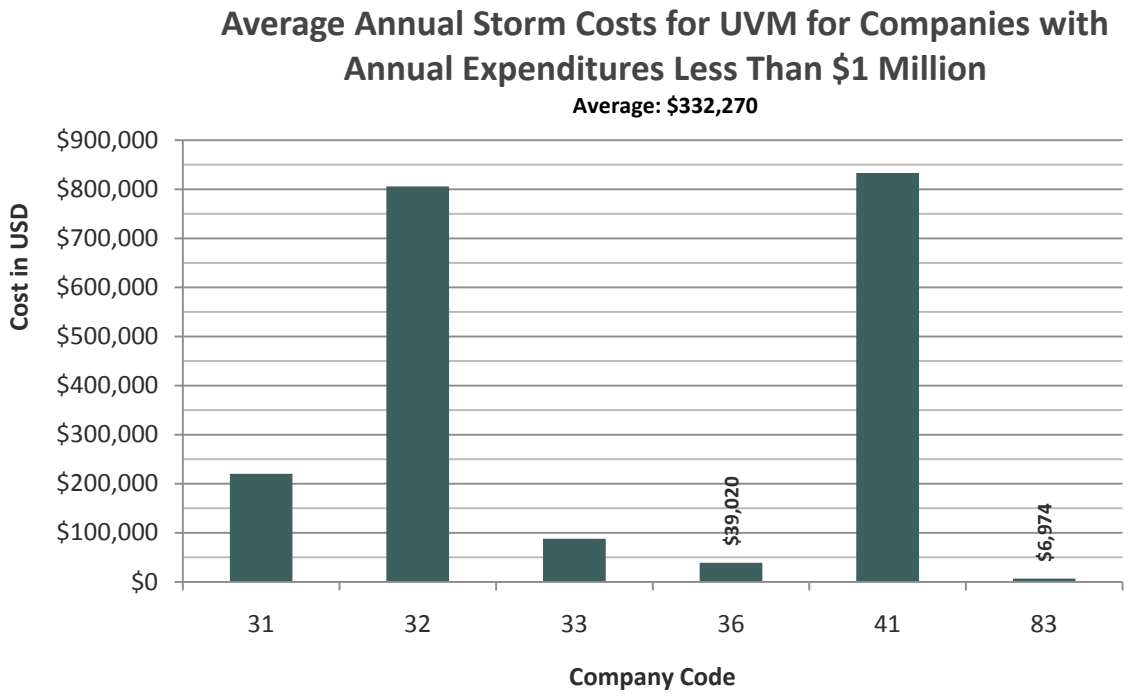


Figure 95: Average Annual Storm Costs for UVM for Companies with Annual Expenditures Less Than $1 Million

Labor Hours Expended for Emergency Storm Response UVM

Companies that expend greater than 10,000 hours annually have been represented separately from the companies that expend less than 10,000 hours annually.

Data Collected from responses to **Question #105**

Annual Storm Labor Hours Expended for Utilities with Greater Than 10,000 Hours

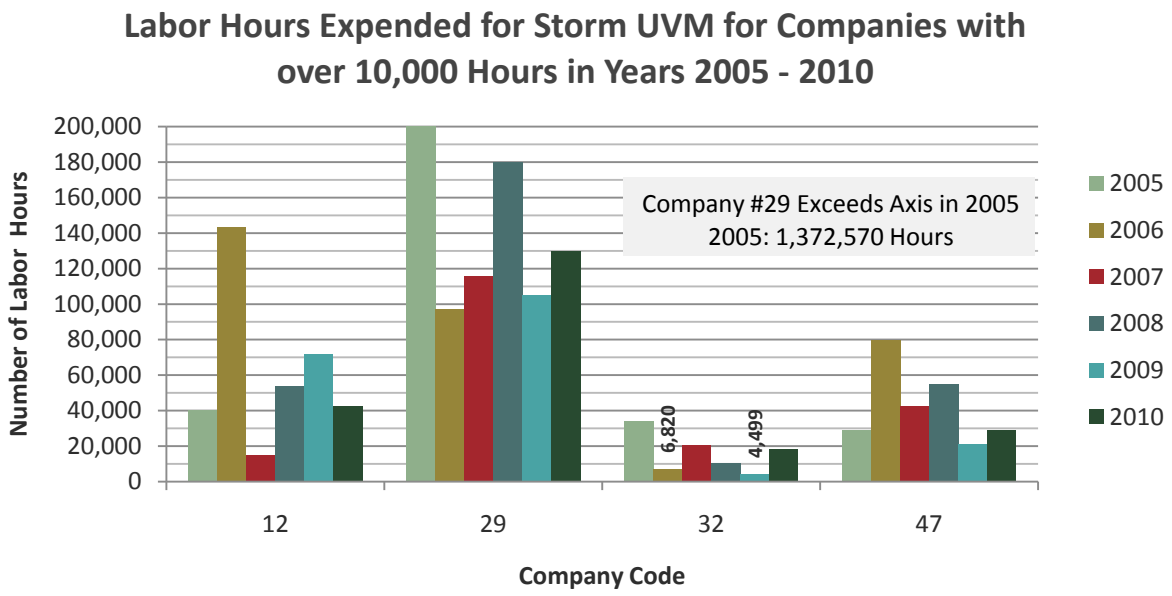


Figure 96: Labor Hours Expended for Storm UVM for Companies with over 10,000 Hours in Years 2005 - 2010

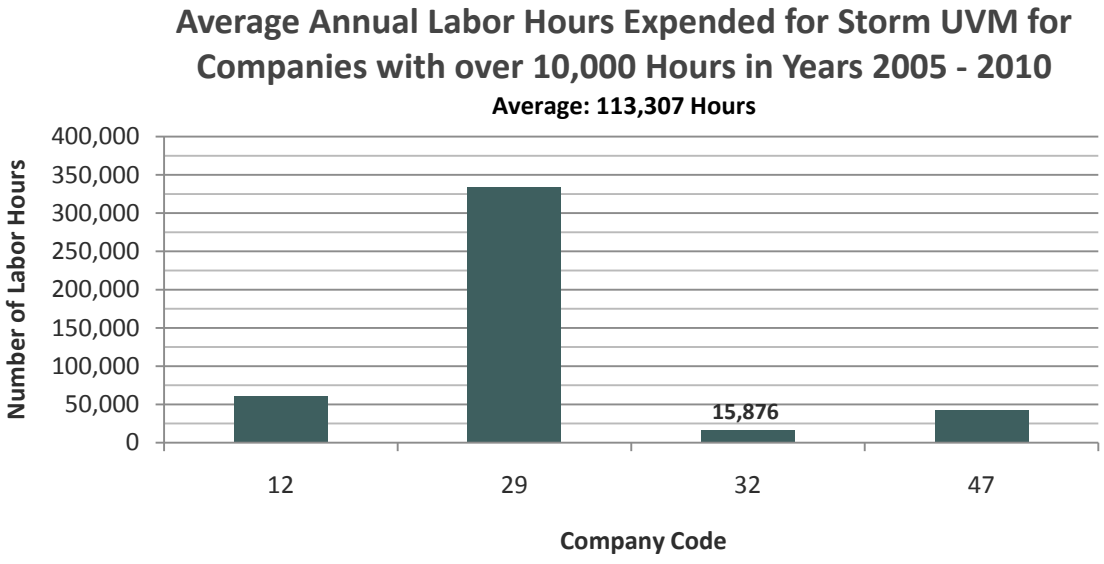


Figure 97: Average Annual Labor Hours Expended for Storm UVM for Companies with over 10,000 Hours

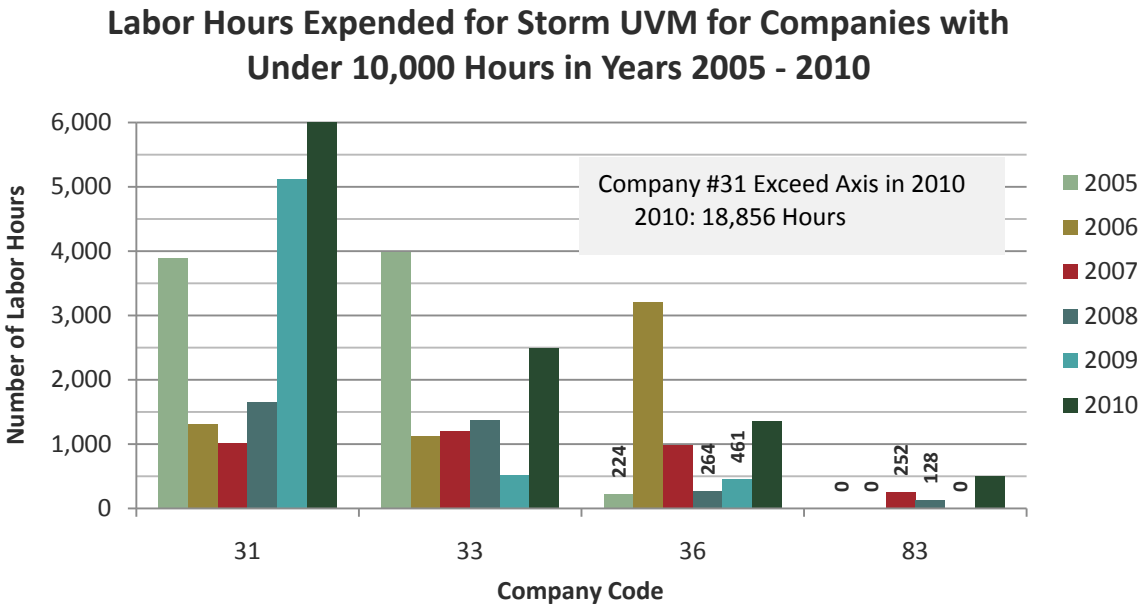


Figure 98: Labor Hours Expended for Storm UVM for Companies with Fewer Than 10,000 Hours

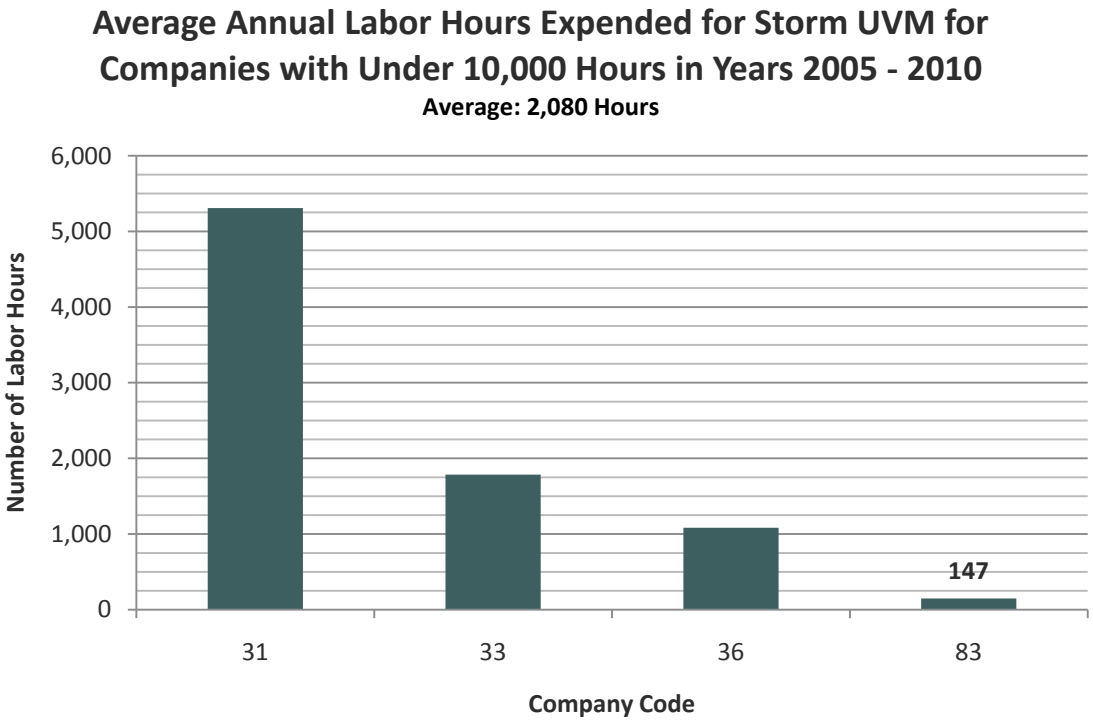


Figure 99: Average Annual Labor Hours Expended for Storm UVM for Companies with Fewer than 10,000 Hours

Average Cost per Labor Hour for Emergency Storm Response

Data collected from responses to **Question #105.** This is a calculated statistic from reported labor hours and reported expenditures for distribution UVM emergency storm response and restoration work.

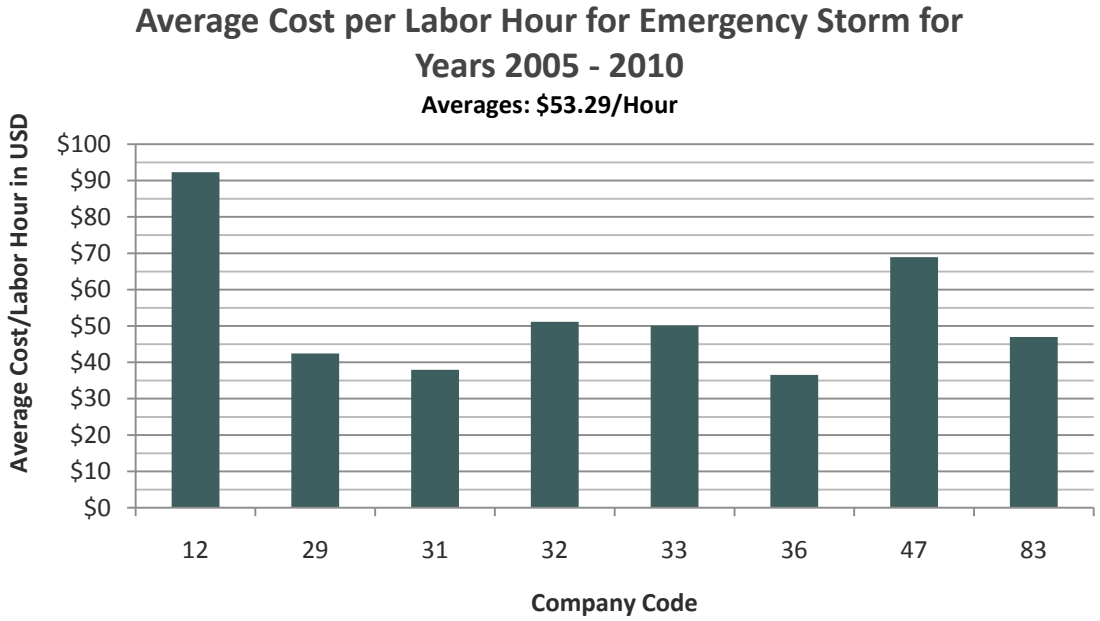


Figure 100: Average Cost per Labor Hour for Emergency Storm for Years 2005 - 2010

Percent of Total UVM Expenditures Spent on Emergency Storm Response

Statistics calculated from data collected from responses to **Question #105** and **Question #96**. Two graphs follow.

Note: Many utilities pay for UVM storm restoration from a separate budget. As one participant noted, "Storm cost was recoverable expense." Due to these variations, not all companies include storm costs with their total UVM expenditures. When viewing the following two graphs, keep this fact in mind.

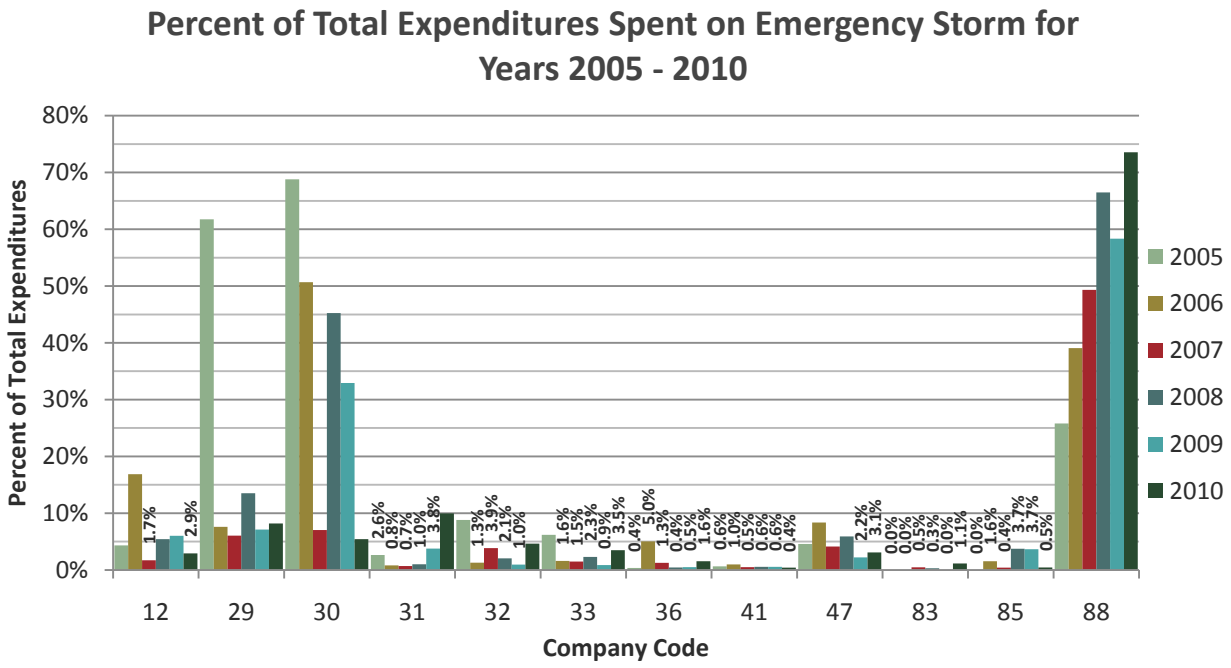


Figure 101: Percent of Total Expenditures Spent on Emergency Storm for Years 2005 - 2010

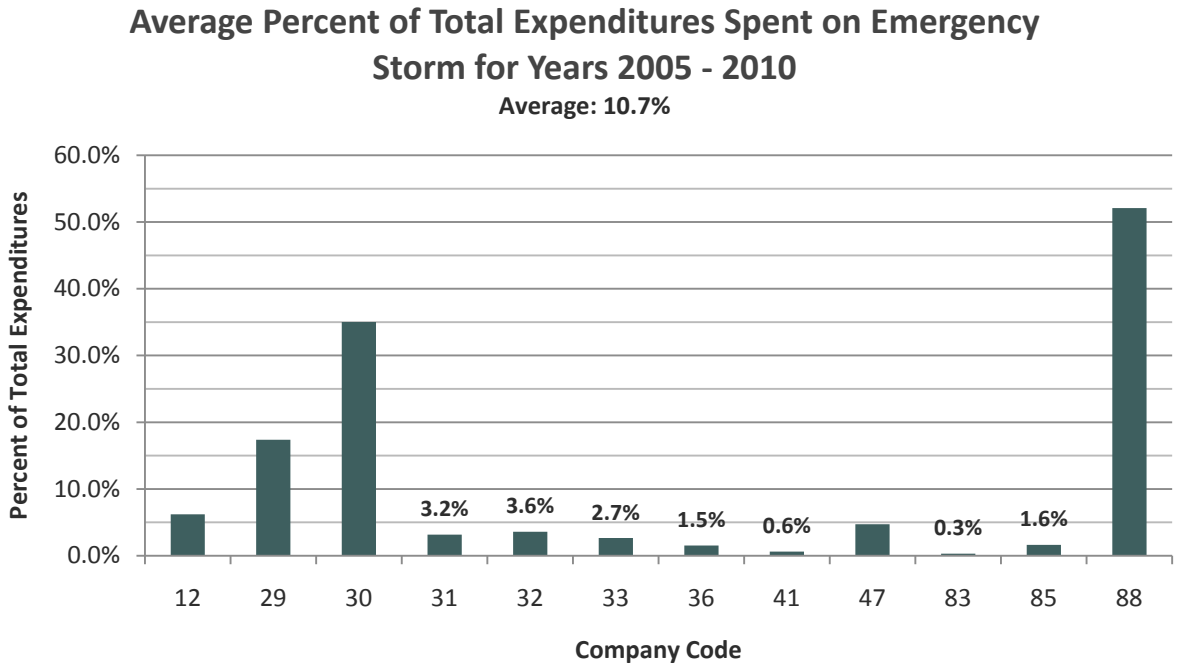


Figure 102: Average Percent of Total Expenditures Spent on Emergency Storm for Years 2005 – 2010

Comments on Emergency Storm Response UVM

Data Collected from responses to **Question #105**

Comments on UVM Emergency Storm Response and Restoration
Don't separate storm work and restoration work from other unplanned or reactive work
No data
Note: 2005 Storm cost was recoverable expense
No foreign crews brought in.
In-house Line crews and guest line crews during storm situations also do emergency tree work, but the cost is not captured.
Those actual hours are entrepreneur's hours only.
Costs estimated using average $/Hr from 2009 benchmarking results

Figure 103: Comments on UVM Emergency Storm Response and Restoration

Data Discussion on Emergency Storm Response UVM

Some observations about emergency storm response expenditures and labor hours expended:

1. It is apparent that some companies experience expenditure spikes due to extreme weather events.
2. It is noteworthy that some companies have consistently high costs for emergency response and other companies are consistently low. This could indicate differences in UVM programs and expenditure reporting, but it is likely a reflection of geographical storm tracks.

NEW CONSTRUCTION UVM EXPENDITURES AND LABOR HOURS

Question # 107: NEW CONSTRUCTION EXPENDITURES: This pertains to any vegetation management work done to clear for the construction of new distribution lines. Please enter your annual costs and labor hours expended on NEW CONSTRUCTION for the following years.

New Construction UVM Expenditures

The graphs are separated into companies that spend more than one million dollars annually and companies that spend less than one million dollars annually.

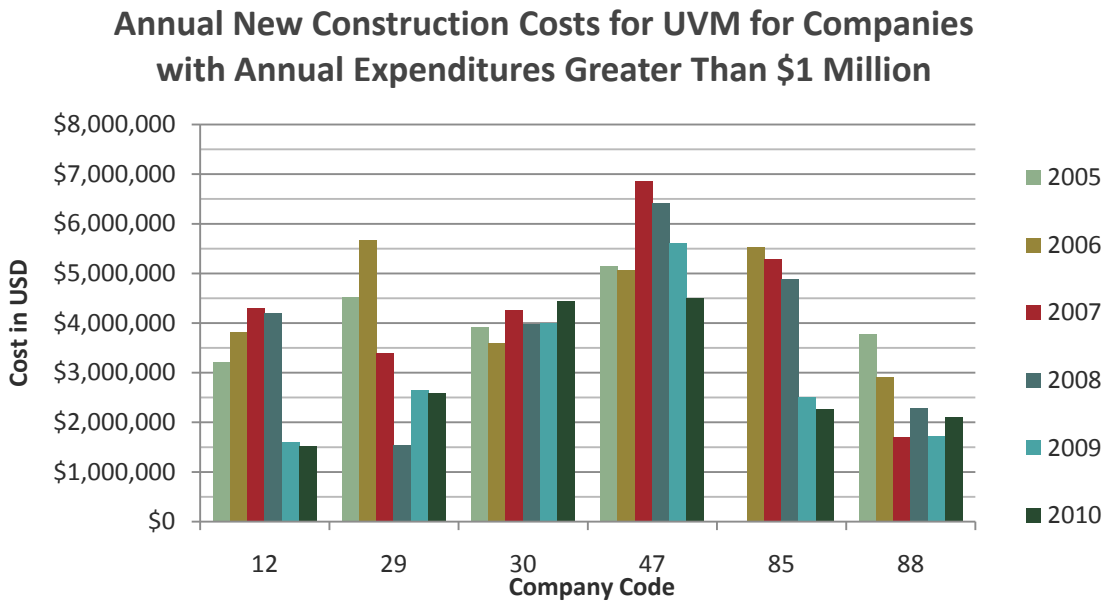


Figure 104: Annual New Construction UVM Costs for Companies with Annual Expenditures Greater Than $1 Million

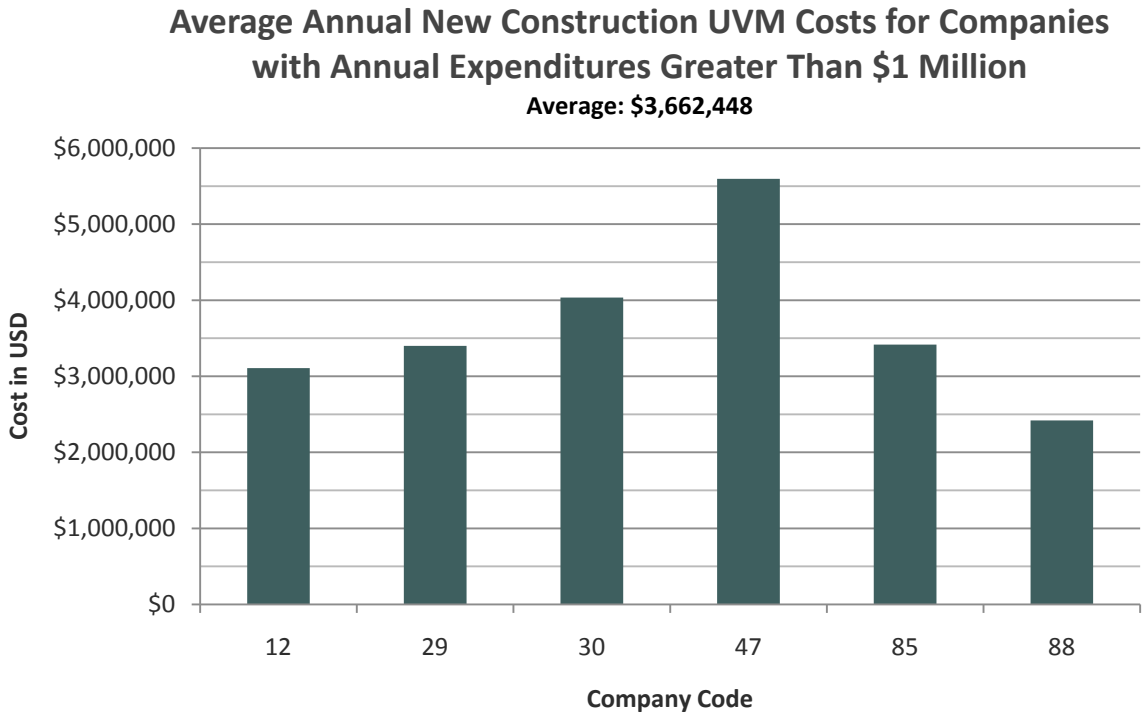


Figure 105: Average Annual New Construction UVM Costs for Companies with Expenditures Greater Than $1 Million

Data Collected from responses to **Question#107**

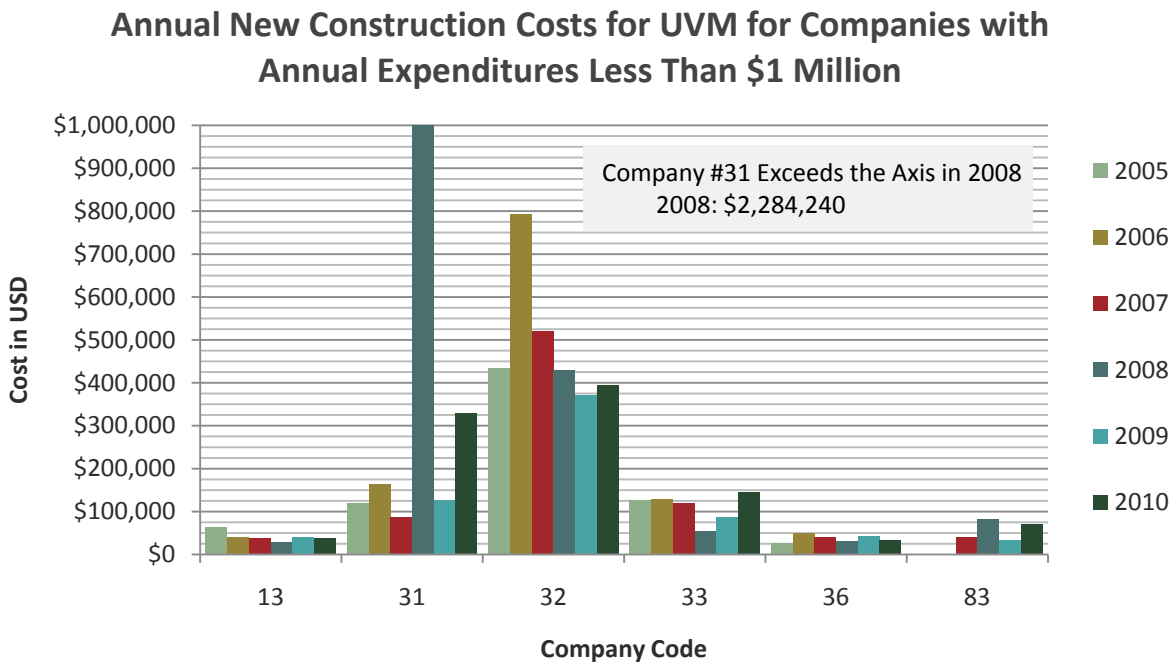


Figure 106: Annual New Construction Costs for UVM for Companies with Annual Expenditures Less Than $1 Million

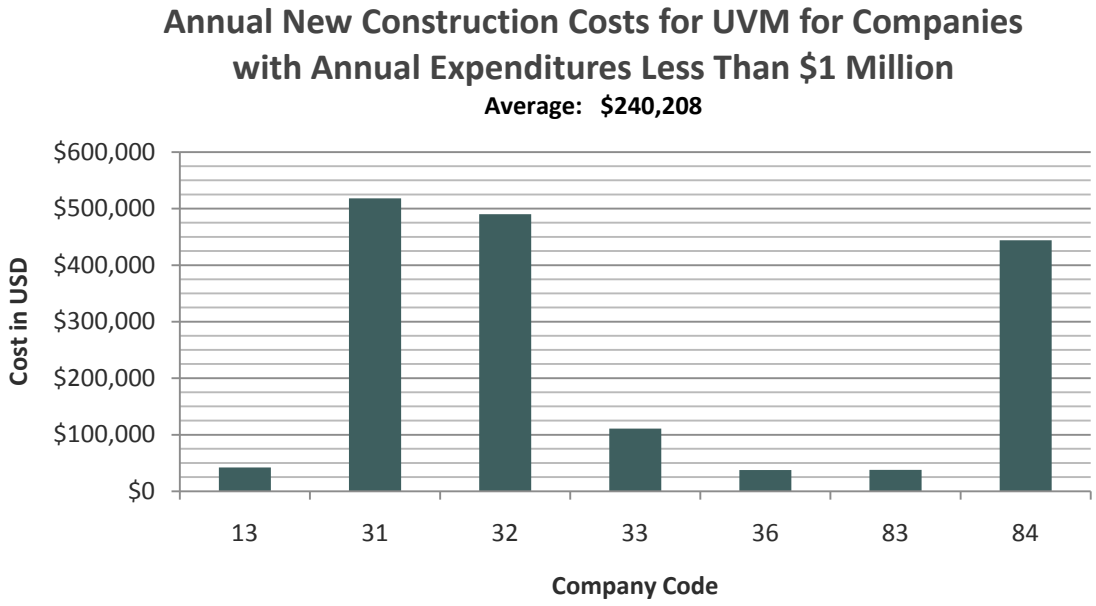


Figure 107: Annual New Construction Costs for UVM for Companies with Annual Expenditures Less Than $1 Million

Labor Hours Expended for New Construction UVM

Companies that expend greater than 20,000 hours annually have been represented separately from the companies that expend less than 20,000 hours annually.

Data Collected from responses to **Question#107**

Annual New Construction Labor Hours Expended for Utilities with Hours over 20,000

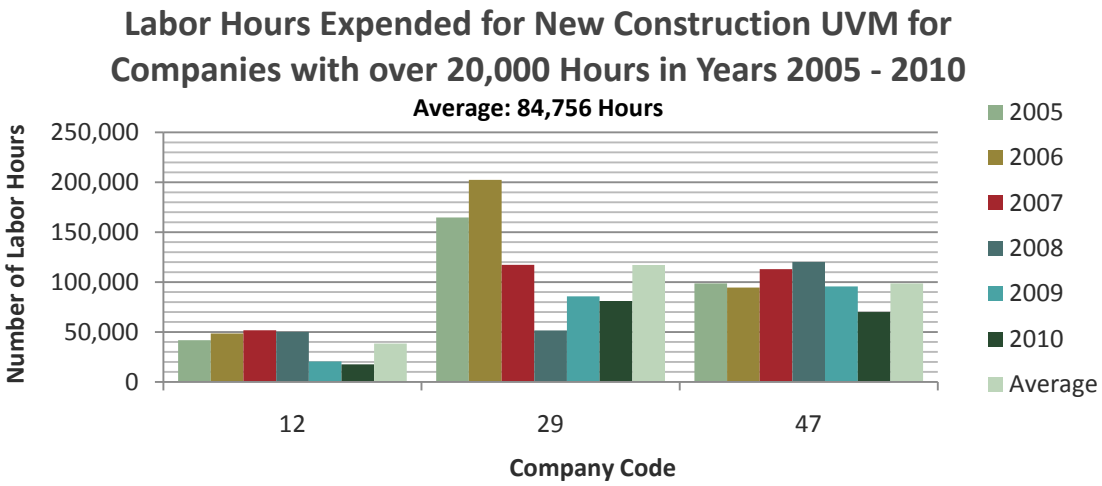


Figure 108: Labor Hours Expended for New Construction UVM for Companies with over 20,000 Hours

Annual New Construction UVM Labor Hours Expended for Utilities with Hours under 20,000

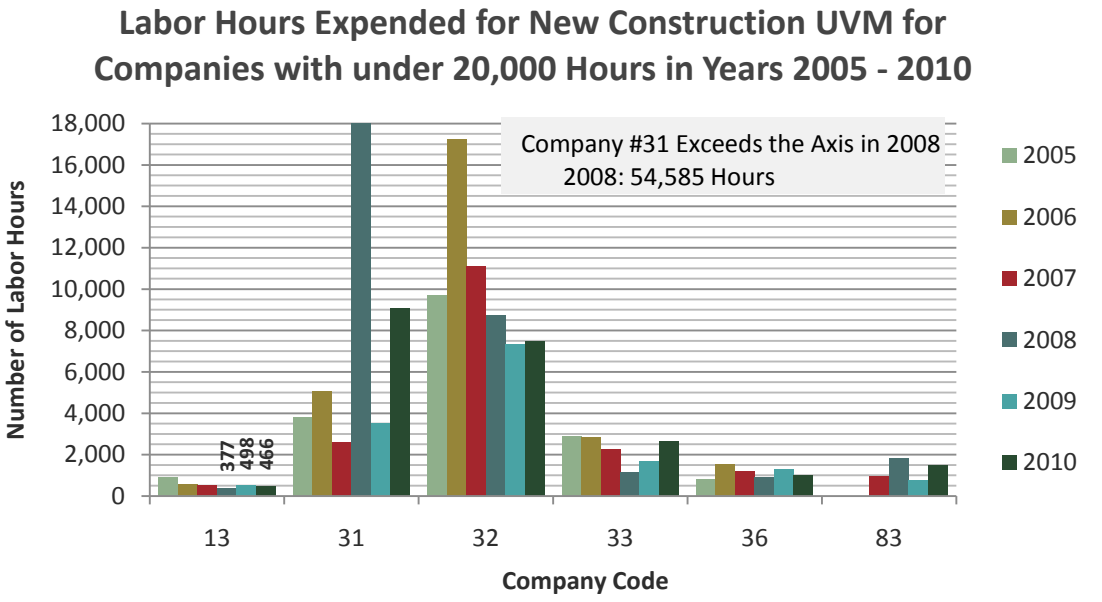


Figure 109: Labor Hours Expended for New Construction UVM for Companies with Less Than 20,000 Hours

Data Collected from responses to **Question#107**

Figure 110: Average Labor Hours Expended for New Construction UVM for Companies with Less Than 20,000 Hours

Average Cost per Labor Hour for New Construction UVM

Data collected from responses to **Question#107.** This is a calculated statistic from reported labor hours and reported expenditures for distribution new construction UVM.

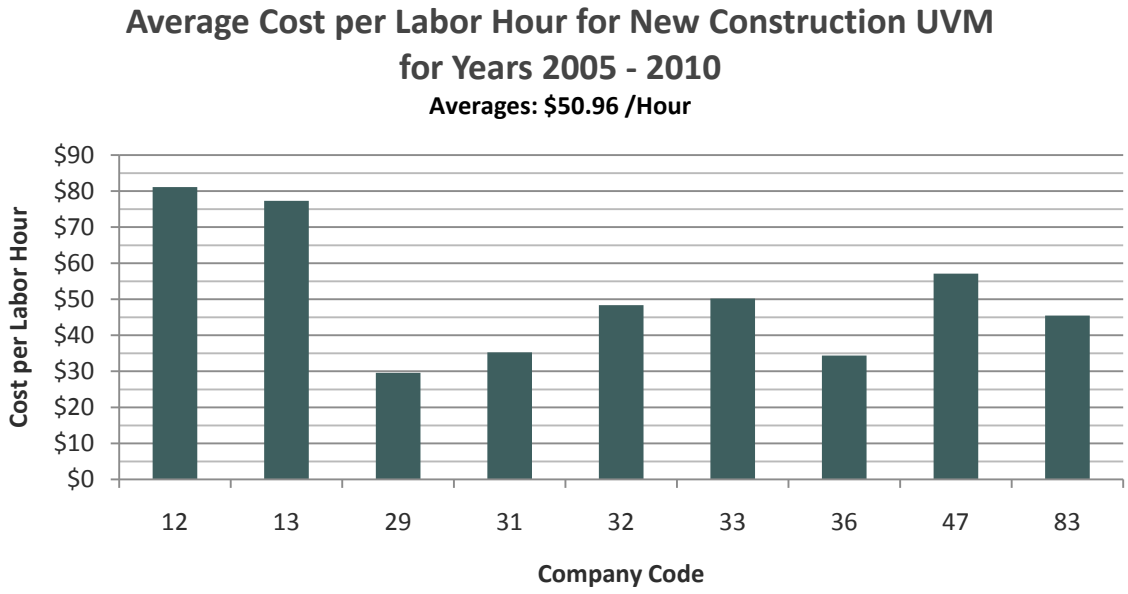


Figure 111: Average Cost per Labor Hour for New Construction UVM for Years 2005 - 2010

Percent of Total UVM Expenditures Spent on New Construction UVM

Statistics calculated from data collected from responses to **Question#107** and **Question #96**. Two graphs follow.

Note: Many utilities pay for UVM for new construction from a separate budget. As one participant noted, "These costs are not included in the vegetation budget." Due to these variations, not all companies include new construction with their total UVM expenditures. When viewing the following two graphs, keep this fact in mind.

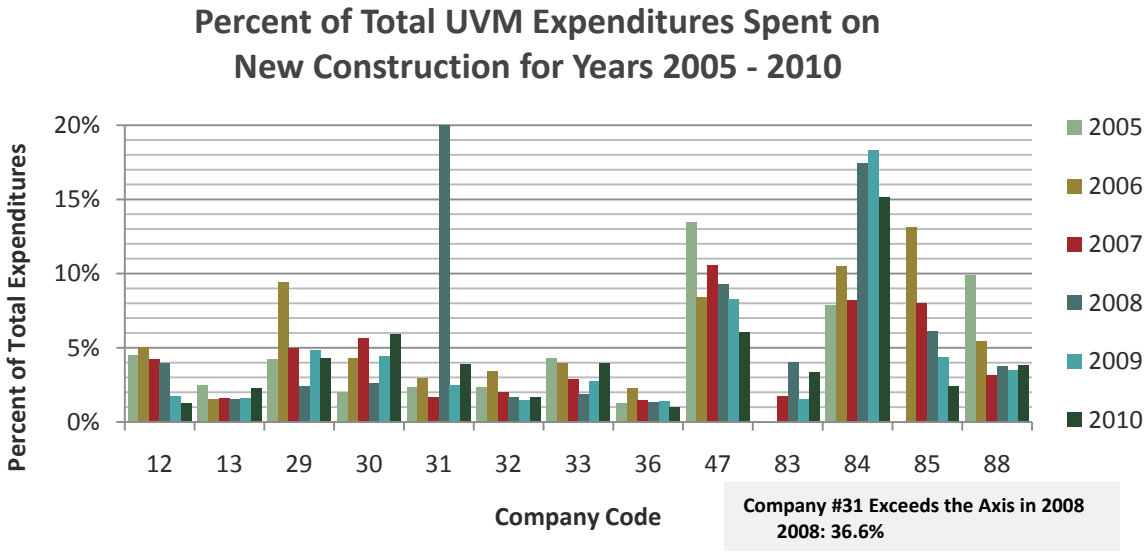


Figure 112: Percent of Total UVM Expenditures Spent on New Construction for Years 2005 - 2010

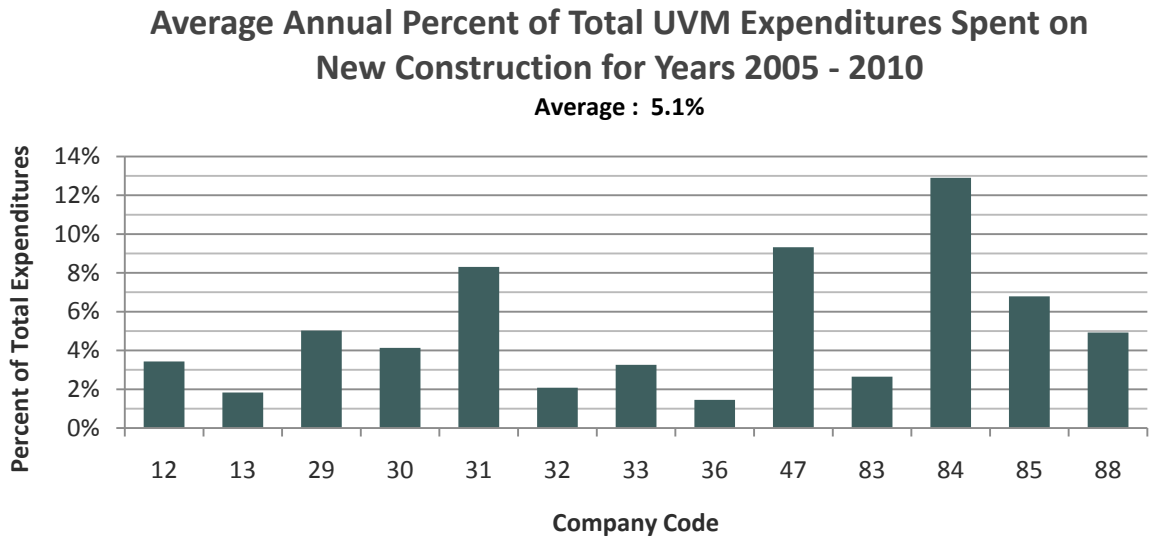


Figure 113: Average Annual Percent of Total UVM Expenditures Spent on New Construction for Years 2005 - 2010

Comments on New Construction UVM

Data Collected from responses to **Question#107**

Comments on New Construction UVM
These costs are not included in the vegetation budget.
Don't separate construction costs from storm work and unplanned or reactive work.
No Data
Those actual hours are entrepreneur's hours only.
No new construction of overhead lines

Figure 114: Comments on New Construction UVM

CAPITALIZATION OF NEW CONSTRUCTION PROJECTS

Question #109: Are your New Construction costs capitalized and funded under a different department than UVM?

100% of the respondents answered **YES**

Comments on Capitalization of New Construction Projects
The projects are budgeted by Professional Engineers
Vegetation management associated with new construction is justified using the business case to support the plant expansion, and vegetation activities are charged and capitalized as a part of that project.
Any rebuilds, which is not new construction, is capitalized including when UVM is required.
Monies are allocated through a blanket CR to designate where the dollars are charged. i.e. special projects to specific cr's.

Figure 115: Comments on Capitalization of New Construction Projects

DISTRIBUTION UVM PROGRAM ATTRIBUTES

UVM CYCLE DEFINITIONS

Question #111: Which of the following best describes your definition of your UVM CYCLE?
NOTE: These definitions are taken from industry standards and previous survey responses to this question.

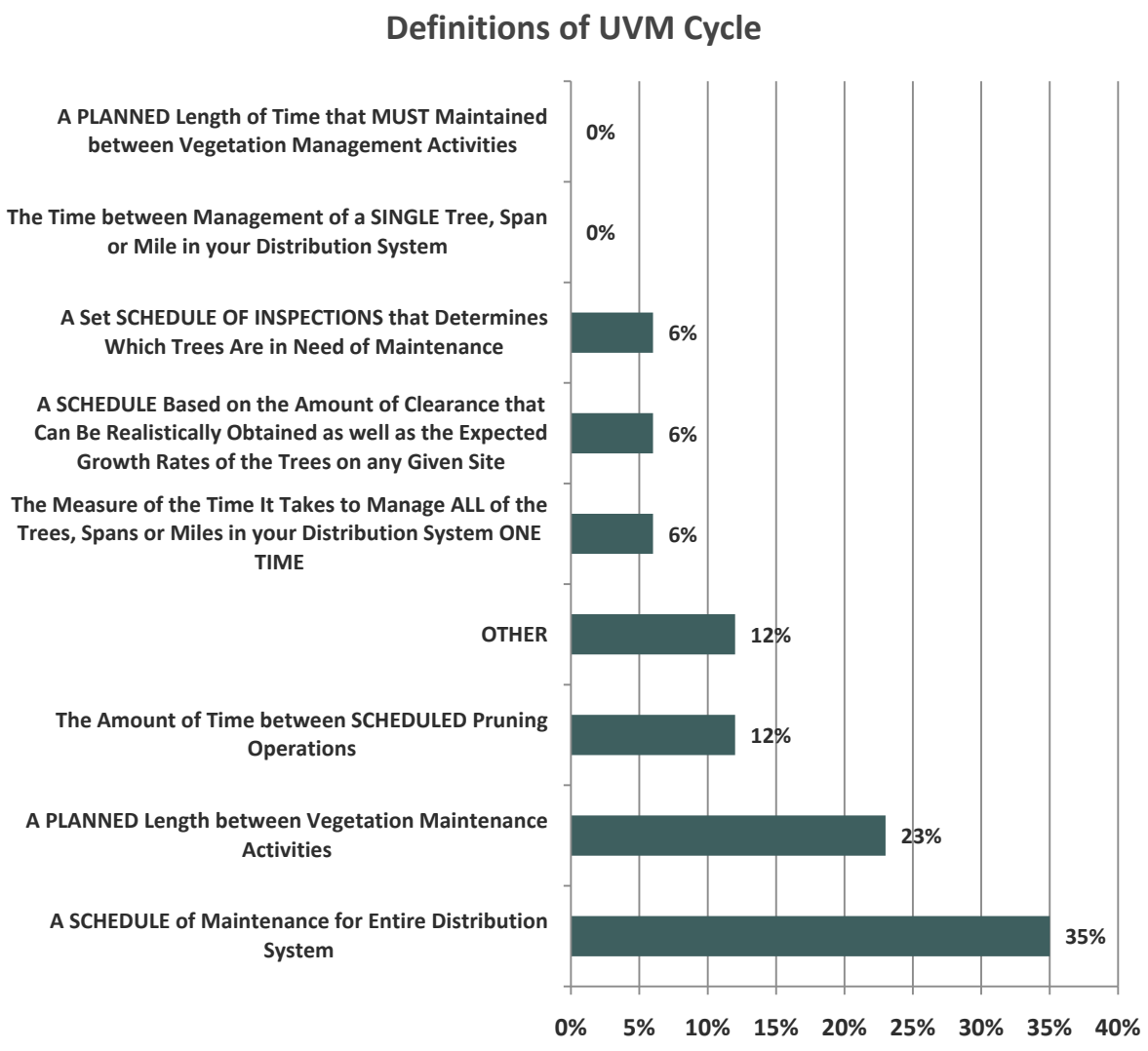


Figure 116: Definitions of UVM Cycle

Comments on and Explanations of "Other" Definitions of Cycle
Reliability Based Schedule.
We manage vegetation to a cycle
The time scheduled is not being met
Utility vegetation cycles are planned lengths of time attributed to every circuit of our system and are based on vegetation response to all factors influencing growth as well as customer density. These cycles should be maintained for each programmed interventions.

Figure 117: Comments and Explanations of "Other" Definitions of Cycle

USE OF CYCLES FOR DISTRIBUTION UVM SCHEDULING

Question #112:

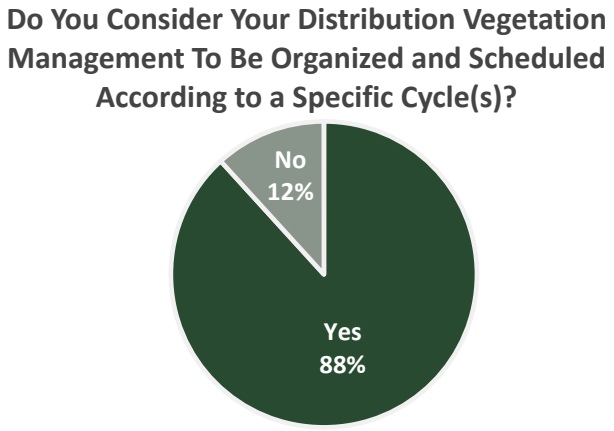


Figure 118: Use of Cycles for Organization and Scheduling

EFFECT OF BUDGET ON UVM PROGRAM SCHEDULING

Question #113:

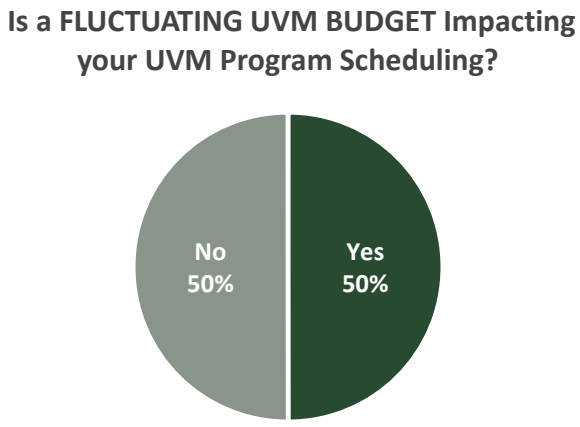


Figure 119: Fluctuating Budget Impacting Distribution UVM Program Scheduling

Comments on Budget Affecting UVM Scheduling
However, storm cost and low revenue years impact resources. [No]
The availability of both resources and budget are equal concerns.
No, because the budget does not fluctuate, it is either too small of a budget or the contract crews are too slow. We are behind the schedule due to this. [No]
Our cycles are based on vegetation response to all factors influencing growth as well as customer density. These cycles should be maintained for each programmed interventions. They can be considered as objectives. Availability of resources impacted directly our scheduling. [Yes]

Figure 120: Comments on Budget Affecting UVM Scheduling

CYCLE LENGTH REQUIRED BY PUBLIC UTILITY OR STATE BOARDS

Question #114:

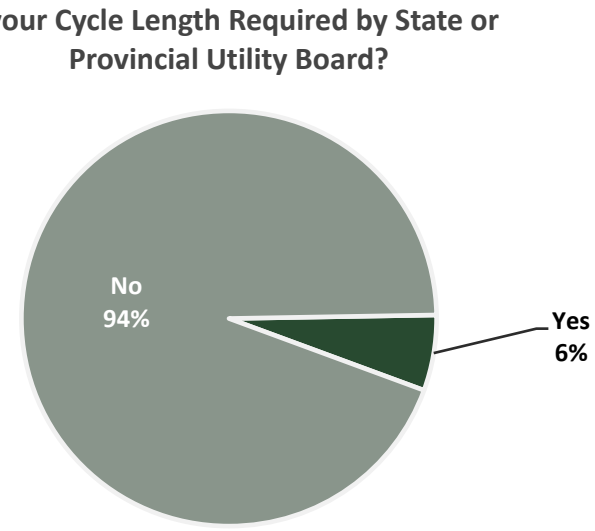


Figure 121: Cycle Length Required by PUC or State Board

Description of Rule Requiring Circuit Length and Comments
State PUC agreement requires 5 year minimum cycle.
But, we have to submit our needs in resources. Our UVM budget is authorized by our provincial energy board. (This utility responded to the question with "No")
No, for a majority of our service area, but some networks do fall under some City requirements such as the City of [ ]. (This utility responded to the question with "No")

Figure 122: Comments on and Description of Rule Requiring Circuit Length and Comments

Question #115: If you prescribe work by inspections, do your inspections determine your cycle length or does your scheduled maintenance cycle determine the time of inspections? NOTE: An example of INSPECTIONS DETERMINING CYCLE LENGTH would be if you frequently perform system-wide inspections that identify and prescribe work only for trees that will require maintenance before the next scheduled inspection. An example of SCHEDULED MAINTENANCE CYCLE DETERMINING THE TIME OF INSPECTIONS would be inspections performed on regularly scheduled maintenance to plan and prescribe the amount of work necessary to last until the next cycle of maintenance. Depending on the length of the cycle, this would include trees that do not currently require maintenance.

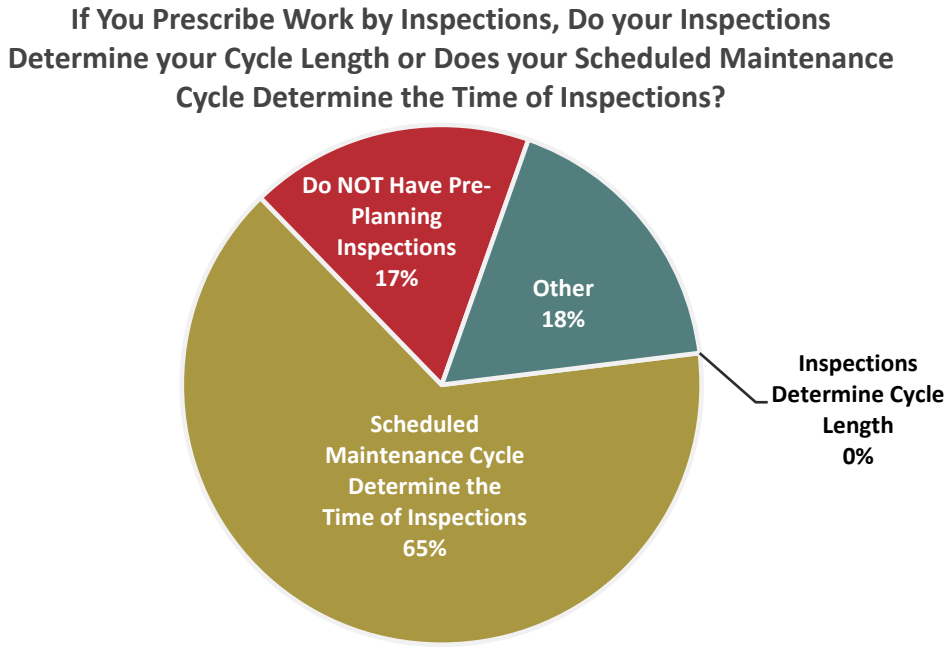


Figure 123: Do Pre-Inspections Determine Your Cycle Length?

Comments on Pre-Inspections Determining Cycle Length
Current cycle maintenance is not pre-planned; however, [Utility] has a Mid Cycle Program, where our 12-18 months maintenance cycle determines the time of inspections. [Utility] does have a Palm Cycle Program where inspections determine cycle for high risk, un-maintainable palm trees - this is 6 months or less. [Other]
Both, when feeders become due they are reviewed for needs and planned accordingly. Constant needs review are paramount to the success of our program. [Other]
...and those inspections are used to point and count spans that must be done and to qualify those due spans, ex.: on road, off-road and vegetation density. It's a work load inventory. [Scheduled Maintenance Cycle Determine the Time of Inspections]

Figure 124: Comments on Pre-Inspections Determining Cycle Length

Scheduling by Regions

Question #116:

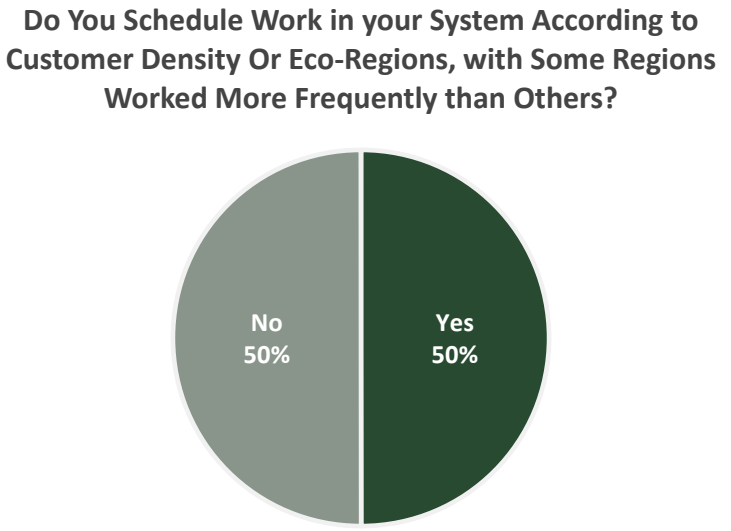


Figure 125: Scheduling According to Customer Density or Eco-Regions

List of Scheduling Regions and their Cycle Lengths
Higher tree density/high growth rates = 3 years. Lower tree density/slower growth rates = 4-5 years.
We have 4 separate Regions and they have all have a mix of cycle lengths from every 2 years to every 8 years.
Subtropical - Inspected for palms every 3 to 6 months. Everything else inspected yearly.
Northern [Region] - 8 year cycle Southern and Eastern [Region] - 6 year cycle Select urban areas - 4 year cycle.
All work is done by yearly cycles, not growth rates.
SUBURBAN: 5+ YEARS RURAL: 10+ YEARS
Suburban 42 - 48 months; urban 36 [months]
Yes, we schedule accordingly to customer density and eco-region. South-west (which includes metropolitan): 3 [years], Center: 4 [years] and East & North: 5 years.
Mountains: 4-7 years; Oak-Pine: 3-7 years; Suburban-urban: 2-5 years

Figure 126: List Scheduling Regions and their Cycle Lengths

Scheduling Influenced by Reliability Data

Question #117:

Is your Scheduling Influenced by Reliability Data Collected by the Distribution Operations Department?

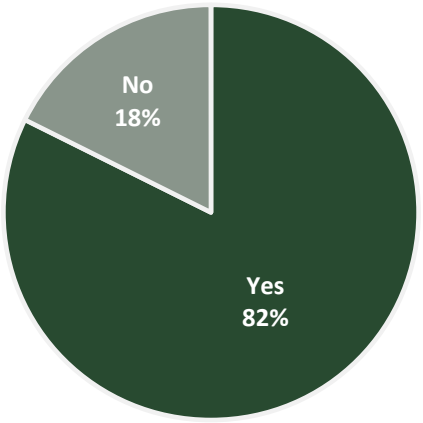


Figure 127: Is UVM Scheduling Influenced by Reliability Data?

Explanations How Reliability Measurements Influences UVM Scheduling
Circuits experiencing more frequent outages are prioritized ahead of others.
CAIDI per circuit, highest number get more VM.
If find worst performing feeders, will re-prioritize them into the schedule.
Lateral priority is determined by a 2 score, using metrics below: CI CEMI 3; CEMM 35; L-bar Momentaries. [Utility] is working to achieve a six year average cycle; however, based on performance, some circuits will be older and some will be younger.
Outage frequency, severity and trending are included in our prioritization model.
Some planned cycles are pushed back to get to areas that have a faster growth rate, or....customer complaints.
Tree Related SAIDI numbers are monitored monthly. It helps to determine where outages are occurring and, therefore, where work may be needed. Long term trends are analyzed in order to justify current funding levels.
If a section of line or circuit is experiencing an unacceptable amount of outages we will trim out area before the designated UVM cycle.
From reliability data and requests from engineering.
[Only] for the tree removal program.
All circuits/feeders reliability is monitored throughout the year for vegetation outages. Circuits with poor performing reliability #'s are inspected and if it determined by the Forester/OC that the circuit is performing badly due to grow-in type vegetation outages, then the circuit will be added to the trim list for that coming year.

Figure 128: Comments on and Explanations of How Reliability Measurements Influences UVM Scheduling

Regulatory Requirements for Addressing Worst Performing Circuits

Question #118:

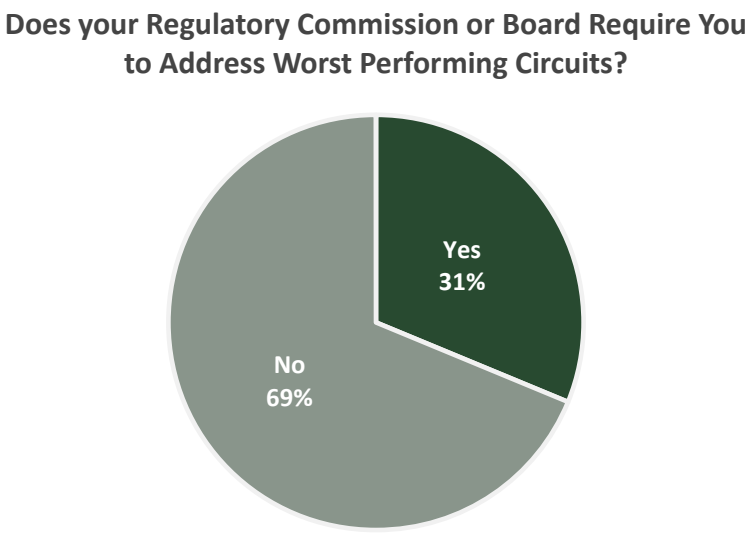


Figure 129: Regulatory Boards Requiring that Worst Performing Circuits Be Addressed

Comments on and Explanations of UVM Reliability Requirements
Top 10% of lowest performing circuits cannot appear in the top ten two years in a row. [Yes]
We have reliability targets that the Board expects to be achieved. [Yes]
Drive out circuit and trim out concerned areas. [Yes]
Each jurisdiction within our company does put out its Targeted Circuit lists yearly. If a circuit on the Targeted Circuit list is there due to vegetation concerns, then it is looked at and any work needed to mitigate the problems are remedied. This is accomplished by the first half of the year or by June 30th each year. [No]
Any key customer issues can require us to work that area out of our normal trim cycle. [Yes]

Figure 130: Comments on and Explanations of UVM Reliability Requirements

CLEARANCE REQUIREMENTS

UVM Program Clearance Requirements and Regulatory Oversight

Question #119: Does your Distribution UVM program have any of the following specific clearance requirements? NOTE: For each clearance situation (e.g. distance below primary, distance above primary, distance to side of primary), please describe the clearance requirement in inches or centimeters. The second column is clearance required at all times, 24 hours a day, 7 days a week.

UVM Program Clearance Distance Requirements

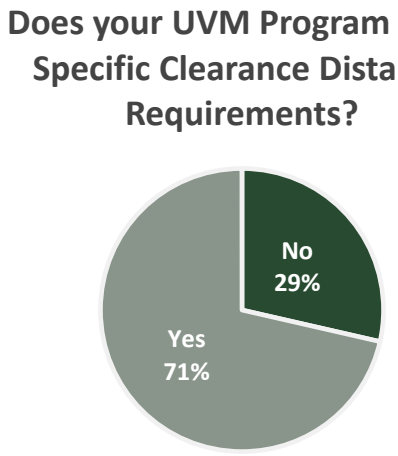


Figure 131: Does your UVM Program Have Specific Clearance Distance Requirements?

Clearance Distances Required at Time of Maintenance

Clearance Distance Required at Time of Maintenance in Inches			
Company Code	Distance Below Primary	Distance Above Primary	Distance to Side of Primary
3	Equal to the Ground	195	195 for Deciduous 120 for Conifer
27	168	120	144
29	120	180	120
30	180	240	180
41	48	48	48
47	138	120	195
88	84	84	84
90	120	120	120
91	72	72	36

Figure 132: Clearance Distance Required at Time of Maintenance in Inches

Clearance Distances Required at All Times

Data was collected from **Question #119**

Required Clearance Distance 24/7 in Inches			
Company Code	Distance Below Primary	Distance Above Primary	Distance to Side of Primary
12	12	12	12
27	18/48 Multiple State: Requirements Vary Fire Season Requirements	18/48 Multiple State: Requirements Vary Fire Season Requirements	18/48 Multiple State: Requirements Vary Fire Season Requirements
30	24	48	24
41	18/48 Two Different Requirements Fire Season Requirements	18/48 Two Different Requirements Fire Season Requirements	18/48 Two Different Requirements Fire Season Requirements

Figure 133: Required Clearance Distance 24/7 in Inches

Comments: Regulatory Influences on Clearance Distance Requirements

Are your clearance requirements influenced by regulatory requirements?
No. [Company has Clearance Requirements]
There are two laws governing tree clearances in [State]. Listed above is the year-round requirement issued by the [State] Public Utilities Commission. We also have regulations under the [State] Public Resources Code that requires 48 inches of 24/7 clearance during fire season.
Varies per state, per growth rate of vegetation and regional public resource codes and line configuration, voltage and during fire season. [States] - 18in - 4ft all (driven by local fire dept). [State] - Regular clearance 24/7.
Distance requirements at the time of maintenance based on cycle length and ecological factors. Specific distances vary from tree to tree and are at the discretion of our qualified utility arborists.
No, these are the desired results
The clearance required at time of maintenance is for three years of clearance dependent on species.
No requirements.
15 feet is our requirement.
Not at all. [Has clearance requirements]
Single phase requirements: 10 foot, 3-phase requires 15 foot and 46 kV sub-transmission requires 25 foot clearance.

Figure 134: Comments on "Are your clearance requirements influenced by regulatory requirements?"

Clearance Duration Requirements

Distribution UVM Program Clearance Duration Requirements at Present

Question #120: Does your Distribution UVM program require specific clearances to primary voltages that will last for a specified cycle length?

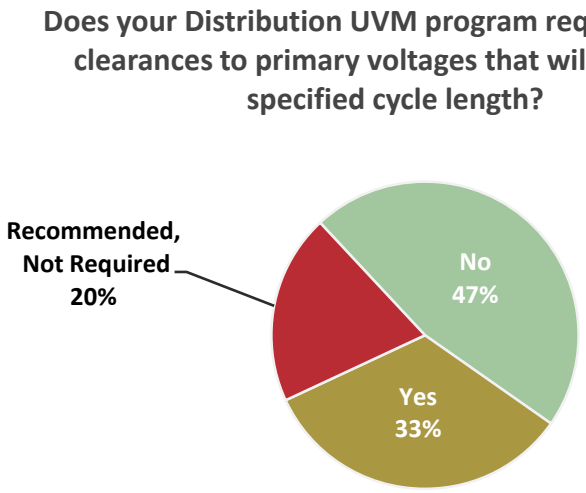


Figure 135: Does your Distribution UVM Program Have Clearance Duration Requirements?

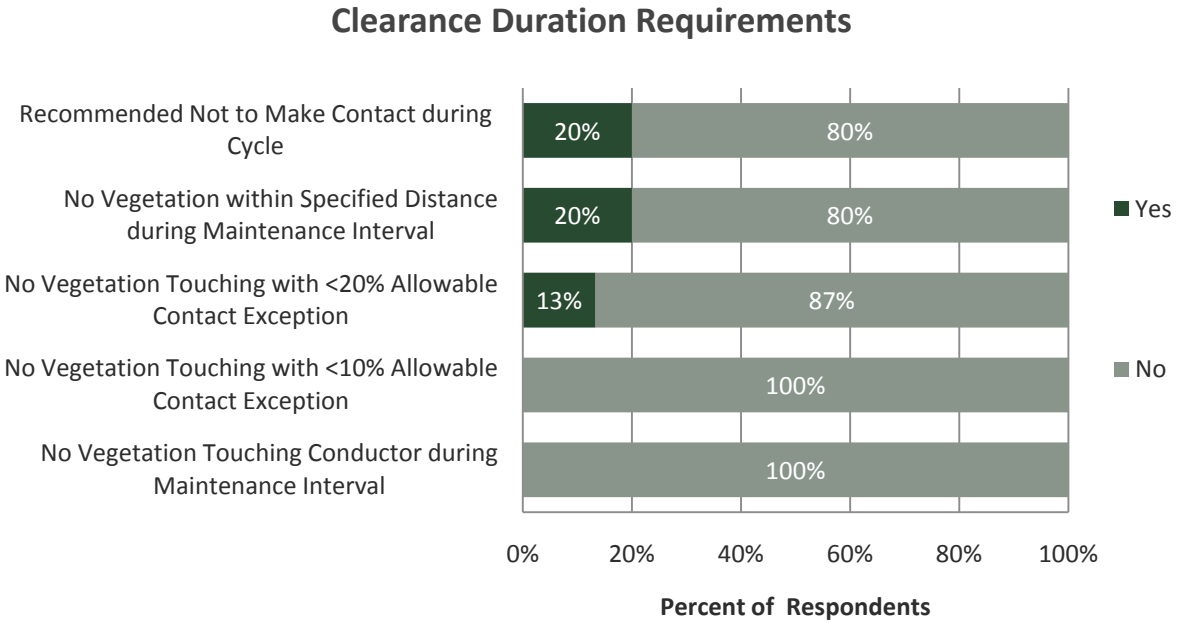


Figure 136: Clearance Duration Requirements

Comments on Clearance Duration Requirements

Data was collected from **Question #120**

Comments on Clearance Duration Requirements
Clearance depends on species growth rates and cycle length. Specific clearances are not dictated to the crews. [No]
No multiple cycle lengths. [Did not answer]
Our quality assurance program has verified that no trees are within the mandated clearances 99.79% of the time. [No]
[Utility] - no exceptions - must maintain clearance year around. Also, maintenance cycle length in years is 2-4 and inspection cycle is also 2-4 years. [Yes]
Our average cycle length on our system is 4 years. [Recommended]
Clearance holds expected duration 92% of the time. [Yes]
Although our cycle varies, due to funding and resource restrictions, we have found it challenging to meet our planned cycle targets. Our current target average cycle length is 8. [Yes]
We have a poor record of attaining 4 year cycle. [No]
We have 2- planned cycle lengths. 1-for suburban (5-years) and the other for rural (ten year cycle). [No]
Our expectations is that the clearance be 15 feet and last the cycle. [Recommended]
The 4 year cycle length is average for a very large territory. [Yes]
Trees shall be trimmed as to provide a maximum clearance from primary conductors. Unless otherwise indicated by a designated company representative, all trees at a minimum shall be trimmed back to the previous trim point (amount of clearance obtained during the last trim, including previous sky-trims) or as per our clearance table, whichever is greater. We do take into account seasonal growing patterns during wet seasons which would cause some circuits to reach the conductors quicker than anticipated. [Recommended]

Figure 137: Comments on Clearance Duration Requirements

Desired Clearance Duration Requirements

QUESTION #121: If you don't require sufficient clearance distance for a specific cycle length, but would like to, how would you apply it to your system, using the parameters provided?

NOTE: If you have another preferred method for specifying clearance duration, please express it in the comment field.

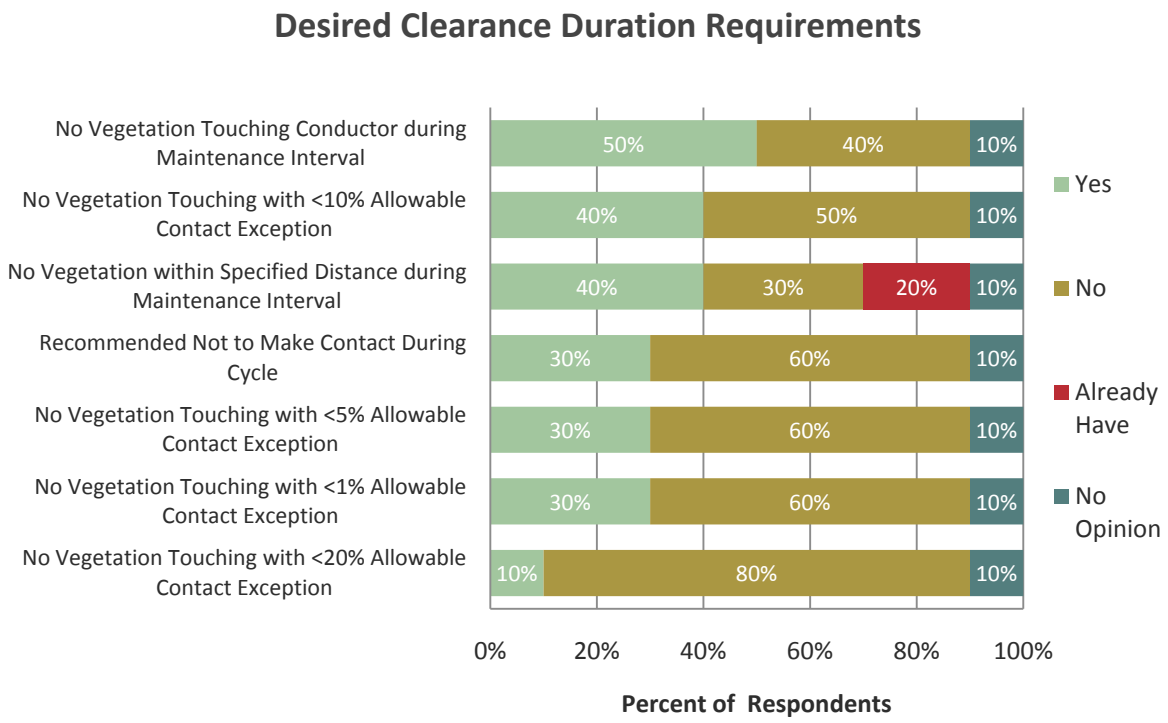


Figure 138: Desired Clearance Duration Requirement

Some companies gave several options for desired clearance duration requirements. The redundancy could have been due to different environmental regions requiring different handling of the vegetation or the attitude that several of the options would be desirable versus having no requirements or recommendations. The cycle for clearance duration ranged from 1 – 6 years, with two and four year durations being the predominant target length.

Data was collected from **Question #121**

Comments on Desired Clearance Duration Requirements
No proposed minimum separation.
We estimate our average tree is pruned every 4-5 years but every tree location is unique, fast growing vs. slow growing; heritage tree vs. weed; environmentally sensitive area vs. non-environmental area, customer issues, etc.... If you set a duration requirement you ignore these other constraints. In my view this is an impossible dream. On average one can achieve a cycle length that is meaningful but it is difficult to achieve on a tree by tree basis.
All things considered, if we could maintain a target of zero vegetation within 12 inches of the conductor with a 10% allowable contact exception, we would be in a good place.
Do not have a 4 year cycle and trees are burning regularly in all levels of the distribution circuits from secondary to 12 kV.
Cycles based on individual feeders and range from 3 - 5 years depending on location, vegetation, last time trimmed, etc.
One size does not fit the biological conditions of our system.
The ideal situation for us with regards to the "desired clearance requirements" is to have absolutely no trees around or under the feeder. The "property owner" should not have the right to have trees which can impact our distribution network. As a . . . Distribution Utility we- in essence - send $ 70 million annually to the "chippers", enough money to refurbish all of our high schools.
This concept would be unfair to most tree trimming contractors on our Utility since our contracts only run 2 years. Many times during the contract process new contractors are awarded this work and weren't responsible for the last trim cycle which would make this concept hard to police.
We have a two year cycle and try to maintain that clearance when trimming.

Figure 139: Comments on Desired Clearance Duration Requirements

Clearance Duration Requirements and Over-all Program Safety

Question #122:

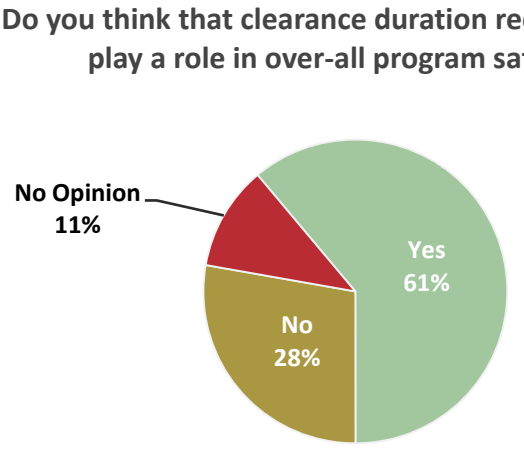


Figure 140: Clearance Requirements and Over-all Program Safety

Data was collected from **Question #122**

Comments on Clearance Requirements' Role in Program Safety
If limbs are allowed to make contact, each of those trees is now considered "energized" by OSHA. [Yes]
On single phase, we assess each tree for the likelihood of it causing an outage. Therefore some tree-to-conductor clearances are closer to the energized conductor. [Yes]
Potential for violating minimum approach distance. [Yes]
We maintain clearance from vegetation to conductors primarily for public and worker safety. [Yes]
Due to the organic nature of vegetation a time based requirement adds a lot of ambiguity and uncertainty into the maintenance standards. If over-all program safety is the goal, a distance based requirement would serve the purpose more effectively. [No]
In the presence of clearance duration requirements, an argument can be made that safety will be enhanced because clearance will be maintained for certain lengths of time. Providing assurance of certain levels of clearance means safer work environment for workers and the general public. [Yes]
It's too dependent on time and not growing conditions through cycle. [No]
We are not familiar with that kind of requirement. [No Opinion]

Figure 141: Comments on Clearance Requirements' Role in Program Safety

DISTRIBUTION UVM SCHEDULING CYCLES

System-Wide Standard Cycle Lengths

Meeting Targets for System-Wide Standard Cycle Length

Question #123:

If your distribution system is on a standard cycle length system-wide, can you say that you are consistently meeting that target system-wide?

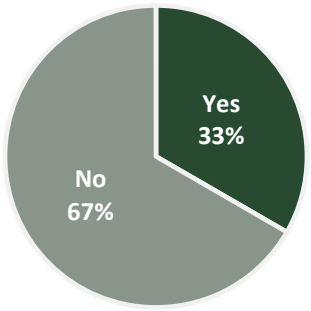


Figure 142: Percent of Companies Meeting Targets for System-Wide Standard Cycle Length

Data was collected from **Question #123**

Comments on Not Meeting Targets for System-Wide Standard Cycle Length
Seeking to designate more resources to get back on cycle.
Not on standard cycle system wide.
Due to budget and issues with compliance to standards, we do have an accumulated backlog of work.
For Feeders only. [Utility] is working toward a 6 year average Lateral cycle.
We currently have about 25% of our system as overdue maintenance according to our cycle length target. As we continue to build a stronger rate case to secure more vegetation management funding, we are trying to mitigate risk through improved program planning and development. This includes investing in advanced analytics to help prioritize and focus of VM funding and the implementation of new programs focused on addressing incremental risk caused by overdue maintenance.
Not a chance.
Because we do not know the vegetation density of each span and the type of work is required, our miles of line fluctuate. Our budget does not reflect the work load. We bring in specialized equipment to reduce our labor cost so to increase line mileage completed.
Clearances obtained, rights, growth and weather.
But it is an objective. We ask our energy board for more resources. We try to prescribe clearing instead of trimming.
This has happened twice in the past 6 years where cycle targets were not met due to budget reductions. We still target the worst performing feeders and the goal is the better performing feeders next trim cycle can be extended a year or two to make up for this.

Figure 143: Comments on Not Meeting Targets for System-Wide Standard Cycle Length

Reasons for Not Meeting Target Cycle Lengths

Question #124: When you are NOT meeting your target cycle length, it is due to:

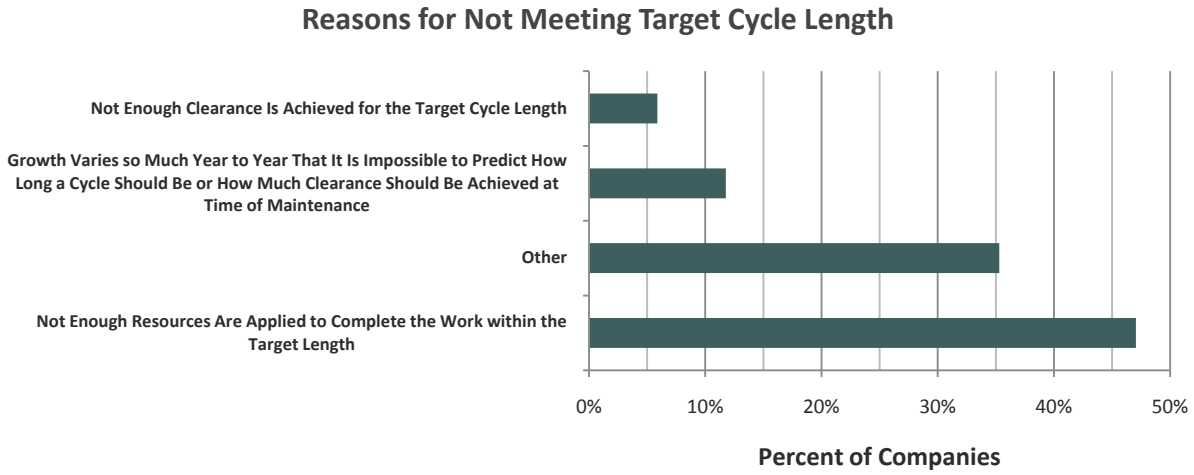


Figure 144: Reasons for Not Meeting Target Cycle Length

Data was collected from **Question #124**

Comments on Reasons for Not Meeting Target Cycle Length
No cycle. [Answered, "Other"]
Also when inadequate funding is available. [Answered, "Growth Varies"]
Due to palms and fast growing species for which we are unable to obtain proper clearance. [Answered, "Not enough clearance"]
Not enough resources and the resources that we have are not productive enough. [Answered, "Other"]
Budget inadequate. [Answered, Not enough funds'']
Budgets. [Answered, "Other"]
We recently obtained new resources to do more work, and we are on the way to meet our target cycle. [Answered, "Other"]
Budget Dollar allocation for Vegetation O&M work is the biggest factor. We have conducted growth studies and our preferred cycle targets are known for all our areas. If we are allocated adequate budget dollars then, in most cases, preferred cycle targets are achieved. But if budget cuts are made, we normally do not meet our cycle target. [Answered, "Other"]
Cycle length is met. [Answered, "Other"]

Figure 145: Comments on Reasons for Not Meeting Target Cycle Length

DEFINITIONS OF UNITS OF WORK

Definition of a Tree

Question #130: How do you define the following units of work?

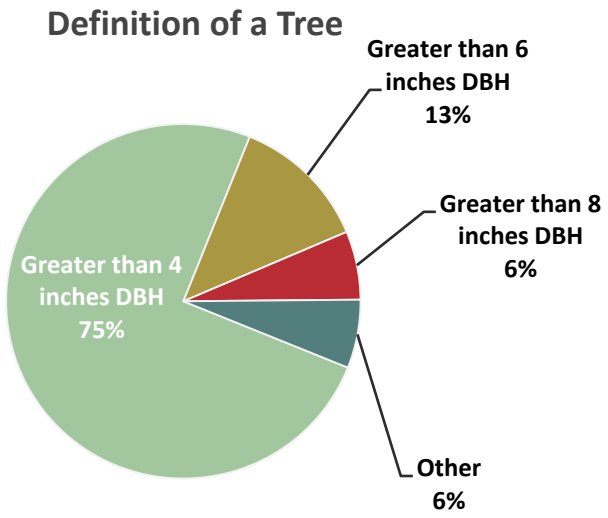


Figure 146: Definition of a Tree

Other Definitions for Trees
Do not define dbh, because we are not on cycle the pruning may include all of the above.
None
We are prescriptive about each work site so the DBH may vary.

Figure 147: Other Definitions for Trees

Note: For the companies using metric vs. English measurements (cm vs. inches), the choices were 10cm, 15cm or 20cm (these closely approximate the 4, 6 or 8 inches in the English measurements).

In 2006, **65%** of utilities defined trees as greater than 4 inches.

Definition of a Brush Unit

The responses for this graph were also taken from **Question #130**.

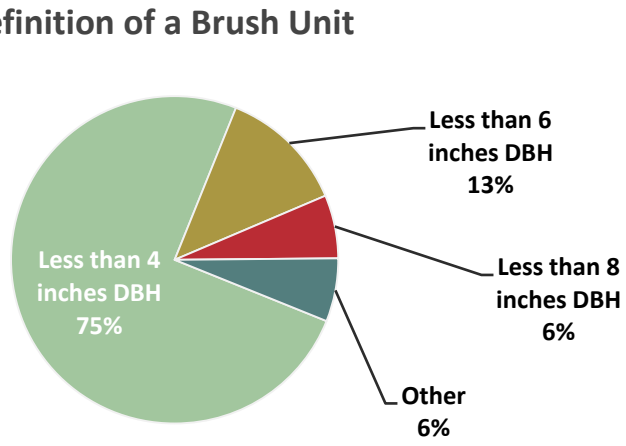


Figure 148: Definition of a Brush Unit

Other Definitions for Brush
Do not define dbh, because we are not on cycle the pruning may include all of the above.
None
We are prescriptive about each work site so the DBH may vary.

Figure 149: Other Definitions for Brush

Note: For the companies using metric vs. English measurements (cm vs. inches), the choices were 10cm, 15cm or 20cm (these closely approximate the 4, 6 or 8 inches in the English measurements).

In 2006, **62.5%** of utilities defined trees as greater than 4 inches.

TREE INVENTORIES

Tree Populations

For the purposes of this study the WORKLOAD INVENTORY is defined as the number of trees worked or managed during a complete cycle of your distribution system.

Question #131: Do you know how many trees you manage on your distribution system? NOTE: If you have counted trees for more than one complete cycle, then your workload inventory is the average number of trees worked during a complete cycle.

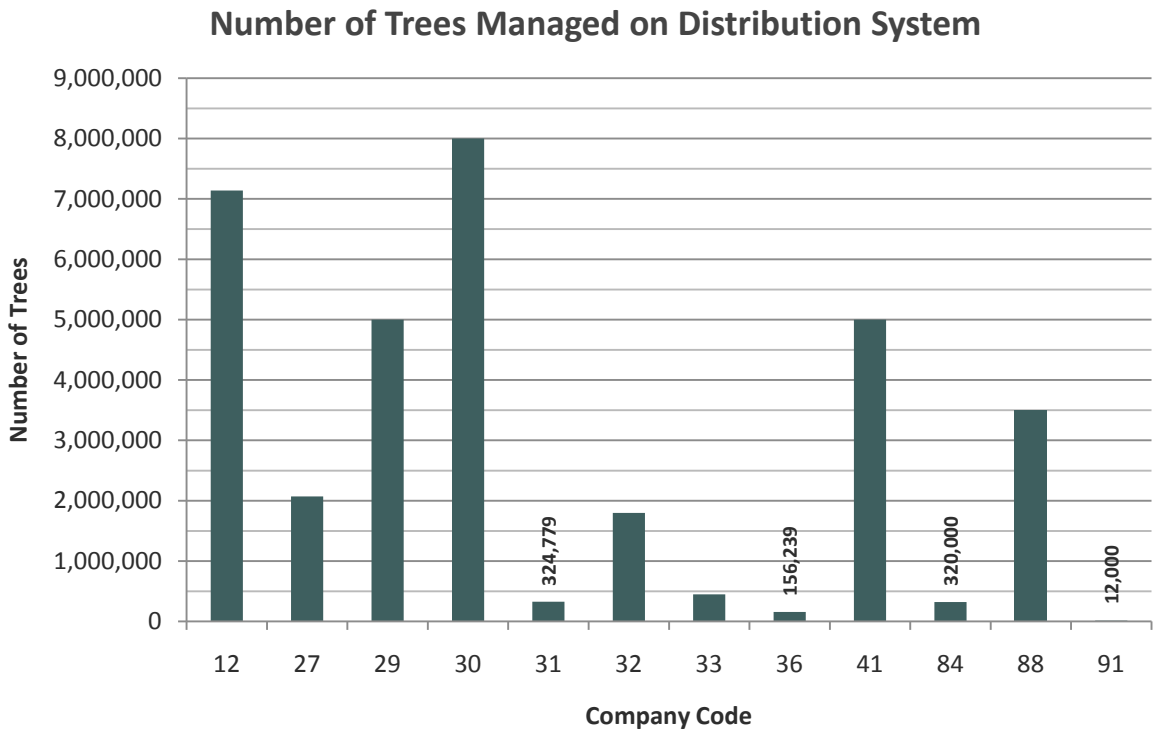


Figure 150: Number of Trees Managed for Distribution UVM

How Tree Inventories Are Determined

Question #132: Your workload inventory was determined by:

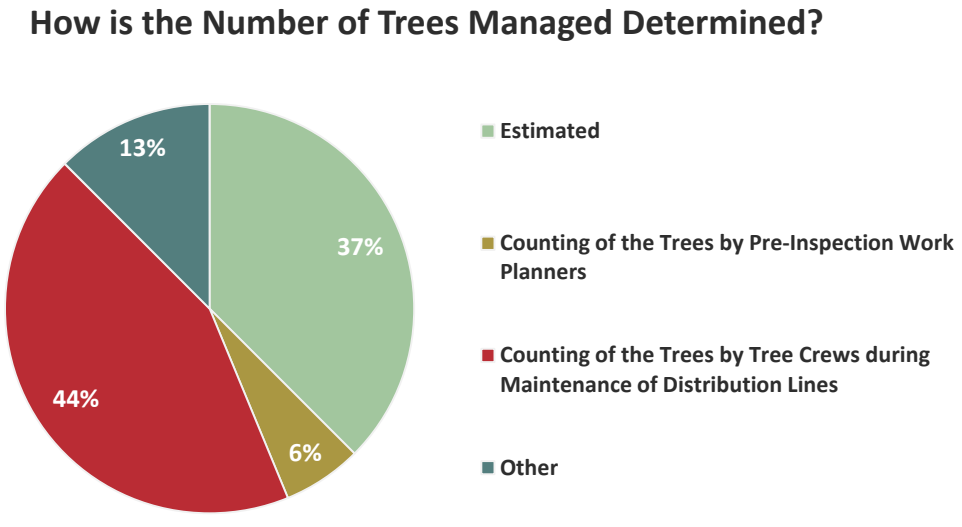


Figure 151: How is Tree Inventory Determined?

Descriptions of How Tree Inventories Are Determined
Consultant reviewed D system, sampled sections in urban, suburban, rural areas - extrapolated. [Answered: Estimated]
From [Tree Contractor] extrapolation. [Answered: Estimated]
Sample survey done by 3rd Party Vendor [Answered: Estimated]
Using our average trees treated per miles for 2009 and 2010 multiplied by our ROW miles. [Answered: Estimated]
We are now counting pruned trees and removed trees. Have not completed any cycle using this measure. [Answered: "…Counting Trees by Tree Crews ..."]
Feeders are reviewed through inspection and work estimated by reviewer. [Answered: Estimated]
For trimming or brush cutting we do count spans. For us spans are the base units for work load evaluation and entrepreneur remuneration. [Answered: Other]
A tree count study was conducted years ago and no updated tree count study has been performed since, so we still use this estimation number of [ ] trees that we manage along our ROW's. [Answered: Estimated]
N/A [Do not have a tree inventory]

Figure 152: Descriptions of How Tree Inventories Are Determined

TREE TYPES

Question #133: What percent of your total managed trees in your service territory is deciduous, coniferous, palm or other?

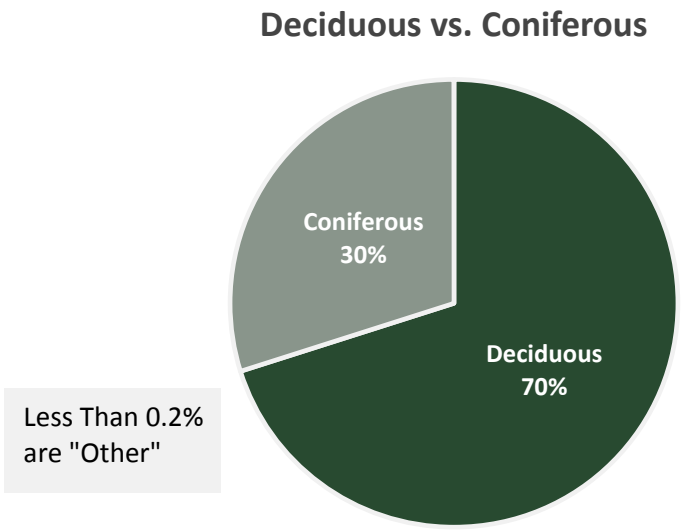


Figure 153: Deciduous vs. Coniferous

NUMBER OF NON-ROUTINE TREES TREATED ANNUALLY

Question #134: If you track the number of trees treated that are NOT routine work, such as customer requests, ticket or tag work, please supply the number treated annually?
NOTE: 'Treated' is defined as the combination of trees pruned and removed.
Number of Trees Treated = Number of Trees Removed + Number of Trees Pruned

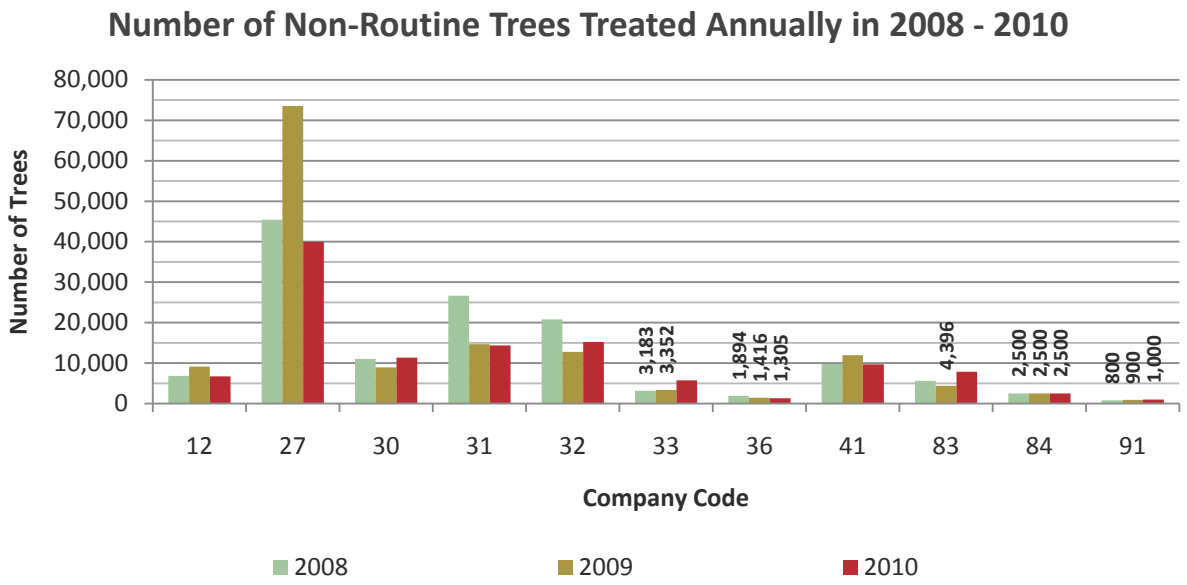


Figure 154: Number of Non-Routine Trees Treated Annually in 2008 - 2010

Statistics in following graph calculated from data collected for **Question #131** and **Question #134.**

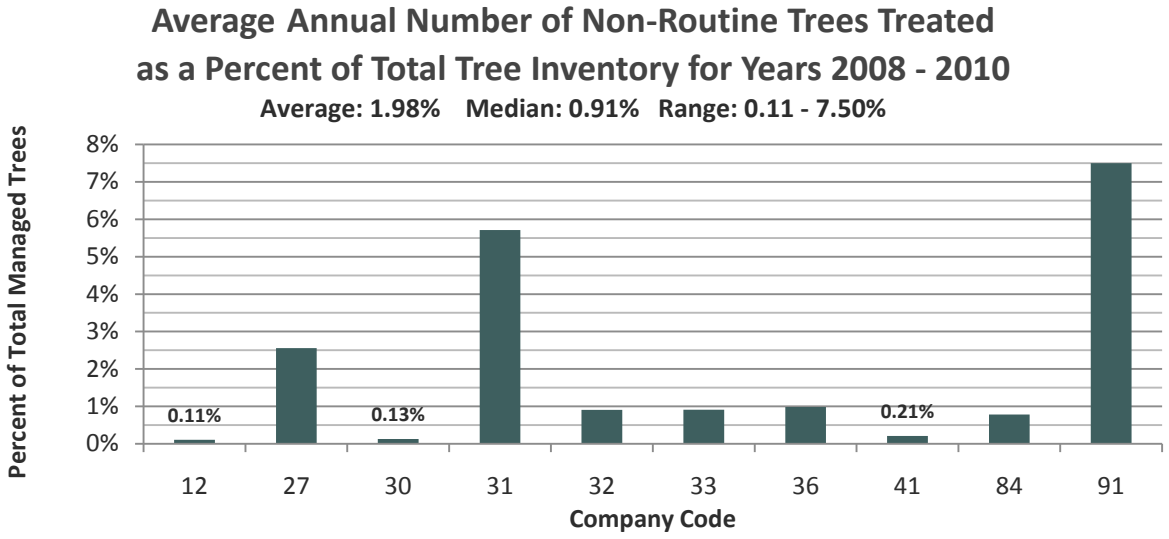


Figure 155: Average Annual Number of Non-Routine Trees Treated as a Percent of Total Tree Inventory

Note: Above graph's numbers were calculated from the average annual number of trees treated that were non-routine divided by the reported total number of managed trees on the distribution system.

CONTRACT STRUCTURES FOR DIFFERENT CATEGORIES OF WORK

Question #135: What percent in each category of work is completed under each costing structure?

The graphs for the next four categories were derived from data supplied in question #135 (above).

Contract Structure for Routine Maintenance

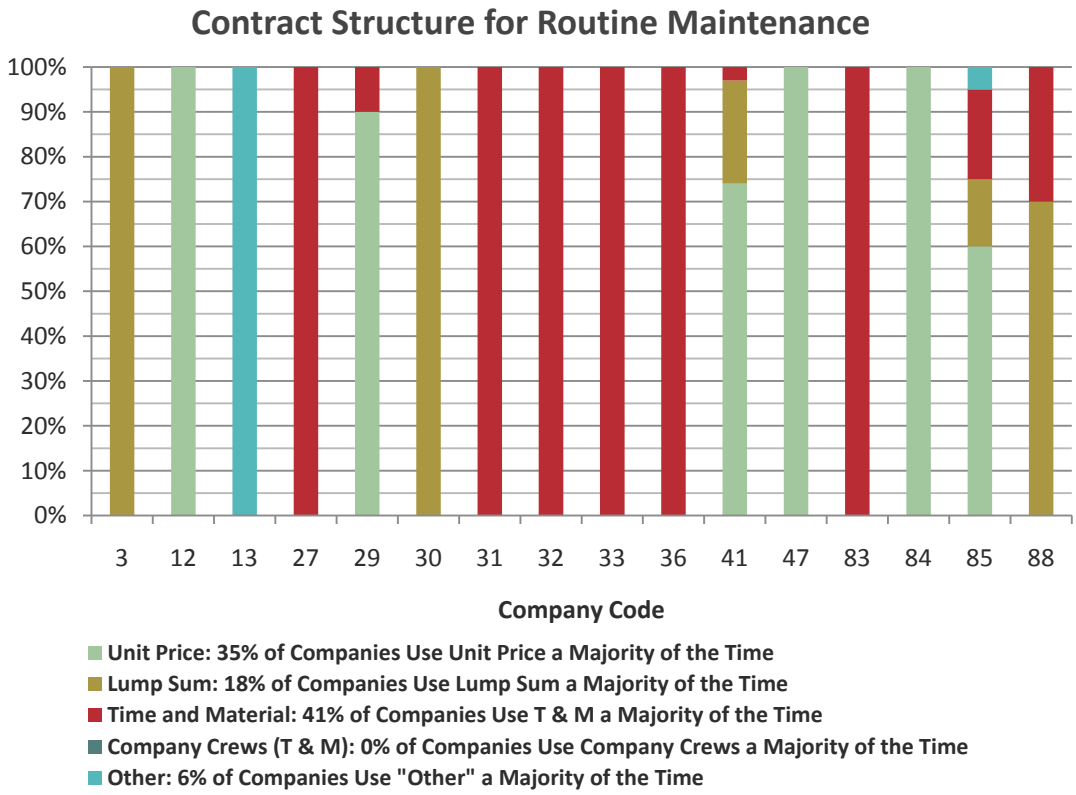


Figure 156: Contract Structure for Routine Maintenance

NOTE: The graph (above) has the percent of companies that use each contract structure a majority of the time located in the legend.

Comments on Contract Structures Used for all Tree Maintenance Categories
Other = Hourly
Our routine maintenance is completed by company crews and is planned and evaluated using a targeted unit price.
We are in a reactive mode, not a cycle mode.
For routine maintenance only, we have a bonus/penalty system that is used to incentivize/penalize contractors for their work. It is based on their cost per mile bid vs. actuals.

Figure 157: Comments on Contract Structures Used for all Tree Maintenance Categories

Contract Structure for Unplanned (Reactive) Work

Please see **Question #135** above.

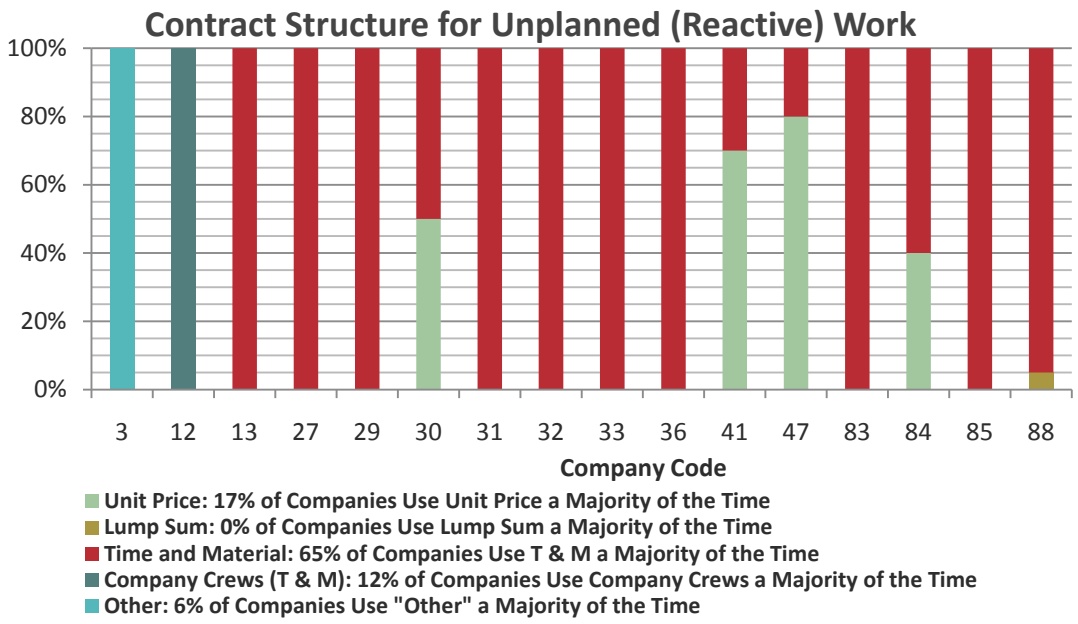


Figure 158: Contract Structure for Unplanned (Reactive) Work

NOTE: The graph (above) has the percent of companies that use each contract structure a majority of the time located in the legend.

Data collected from **Question #135** above. **NOTE:** The graphs below have the percent of companies that use each contract structure a majority of the time. The graphs also have the percent of companies that use each contract structure a majority of the time located in the legend.

Contract Structure for Emergency Work

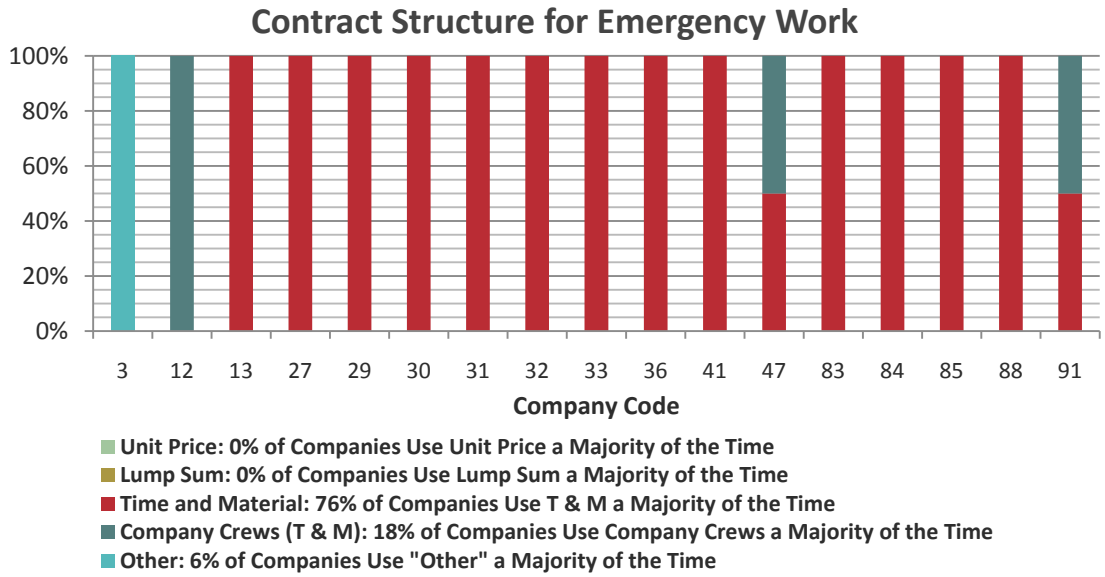


Figure 159: Contract Structure for Emergency Work

Contract Structure for Capitalized Work

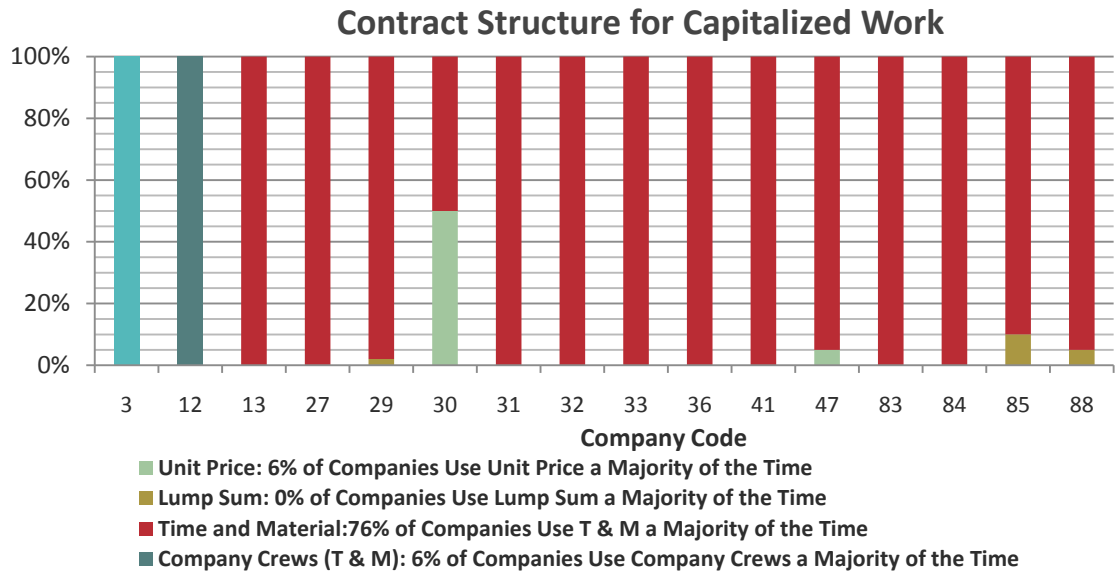


Figure 160: Contract Structure for Capitalized Work

TRACKING OF INVENTORY METRICS

Question #136: Do you track the following metrics?

NOTE: 'Treated' is defined as the combination of trees pruned and removed.

Number of Trees Treated = Number of Trees Removed + Number of Trees Pruned

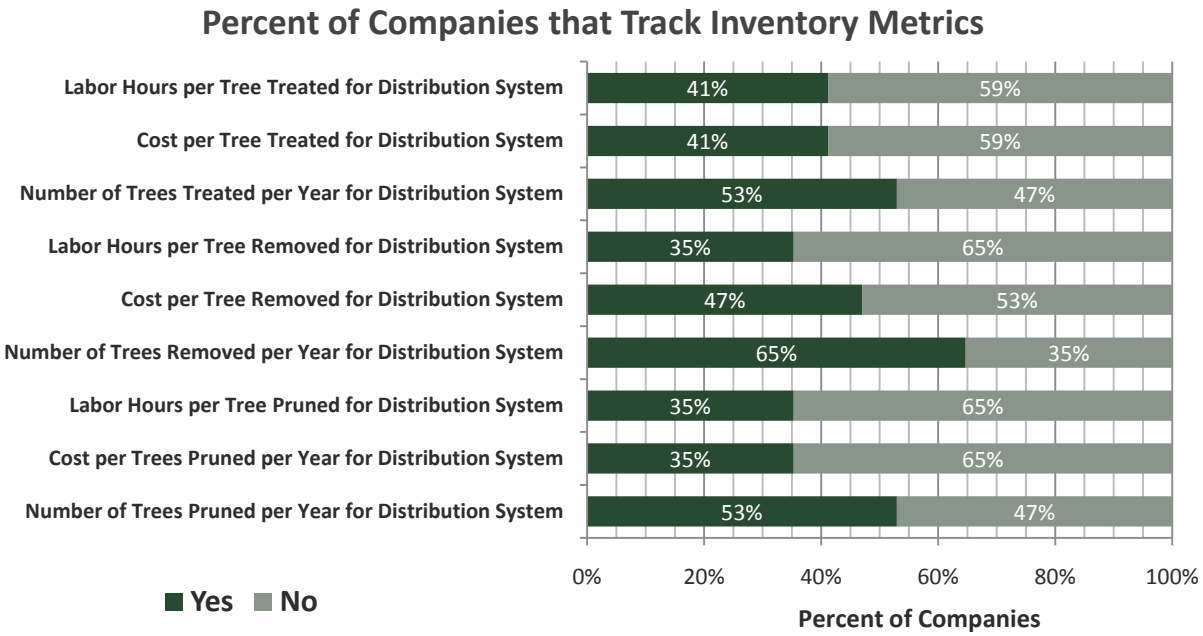


Figure 161: Percent of Companies that Track the Following Inventory Metrics

NUMBER OF TREES TREATED

Question #137: If you answered YES to any choice in the last question, provide the annual number of trees pruned, removed and treated and the corresponding cost per tree and labor hours expended per tree in the following years.

NOTE: 'Treated' is defined as the combination of trees pruned and removed.

Number of Trees Treated = Number of Trees Removed + Number of Trees Pruned

Number of Trees Pruned

Data was collected from **Question #137**

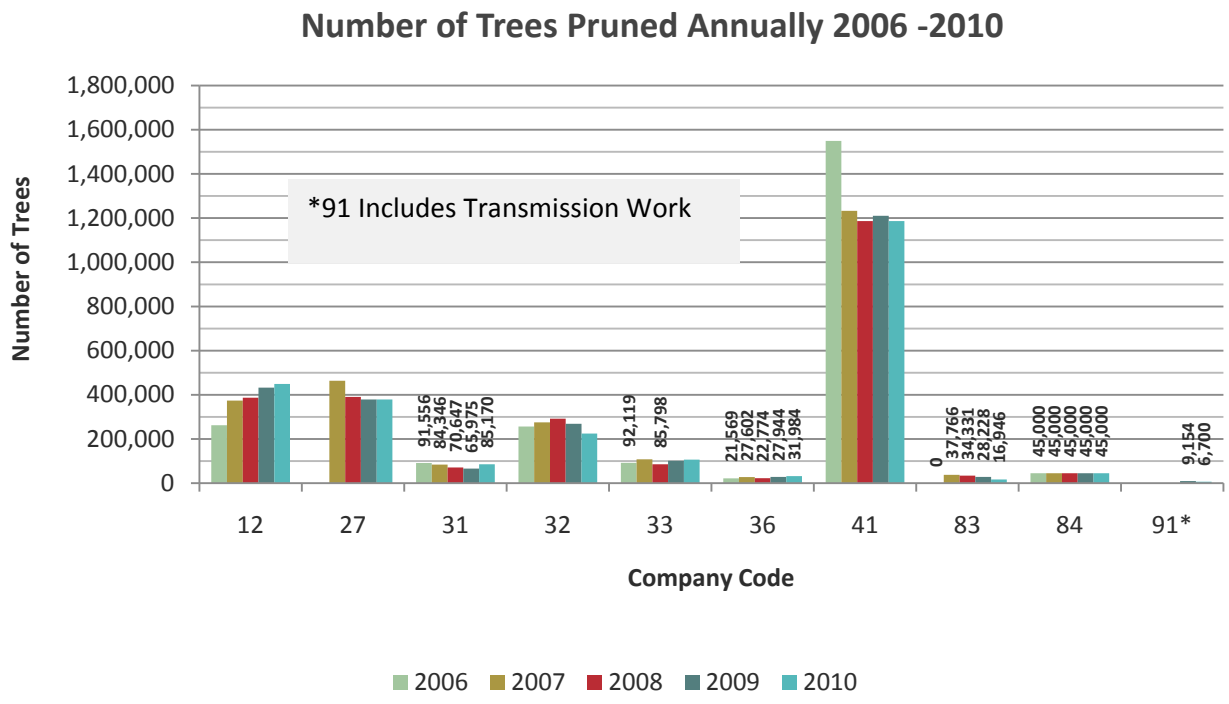


Figure 162: Number of Trees Pruned Annually 2006 -2010

Number of Trees Removed

Data was collected from **Question #137**

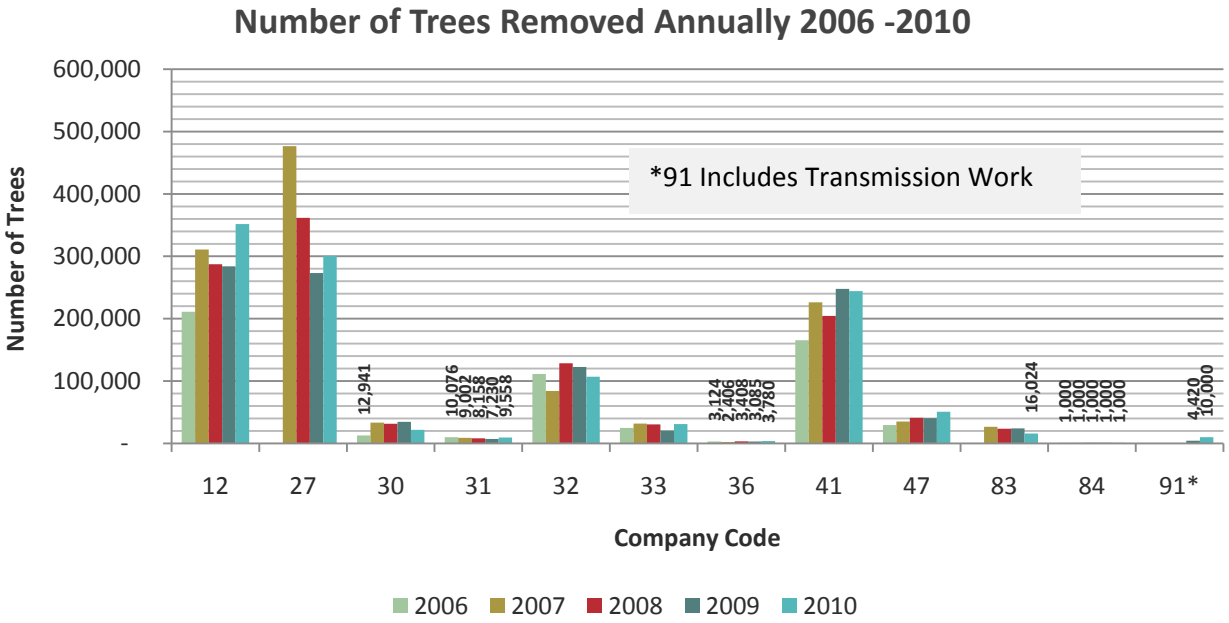


Figure 163: Number of Trees Removed Annually 2006 -2010

Number of Trees Treated

Data was collected from **Question #137**

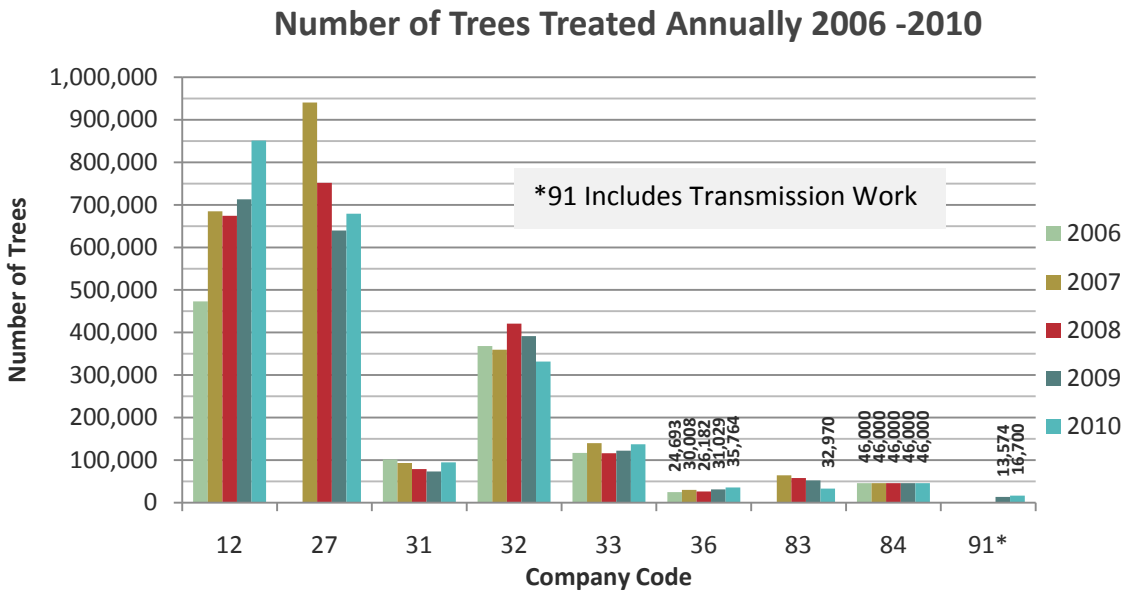


Figure 164: Number of Trees Treated Annually 2006 -2010

COST OF TREES TREATED

Cost of Trees Pruned

Data was collected from **Question #137**

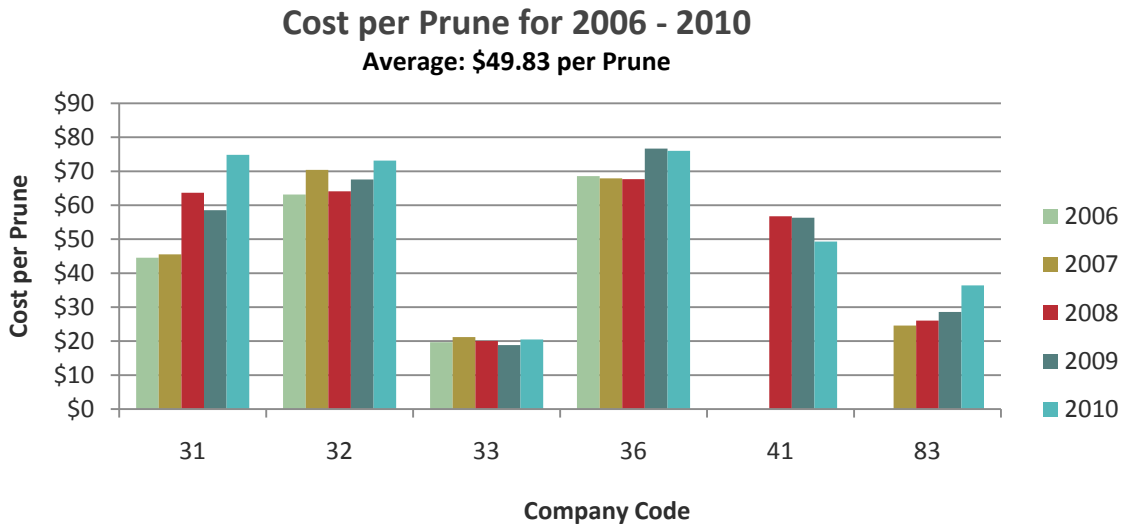


Figure 165: Cost per Tree Pruned for 2006 - 2010

Cost of Trees Removed

Data was collected from **Question #137**

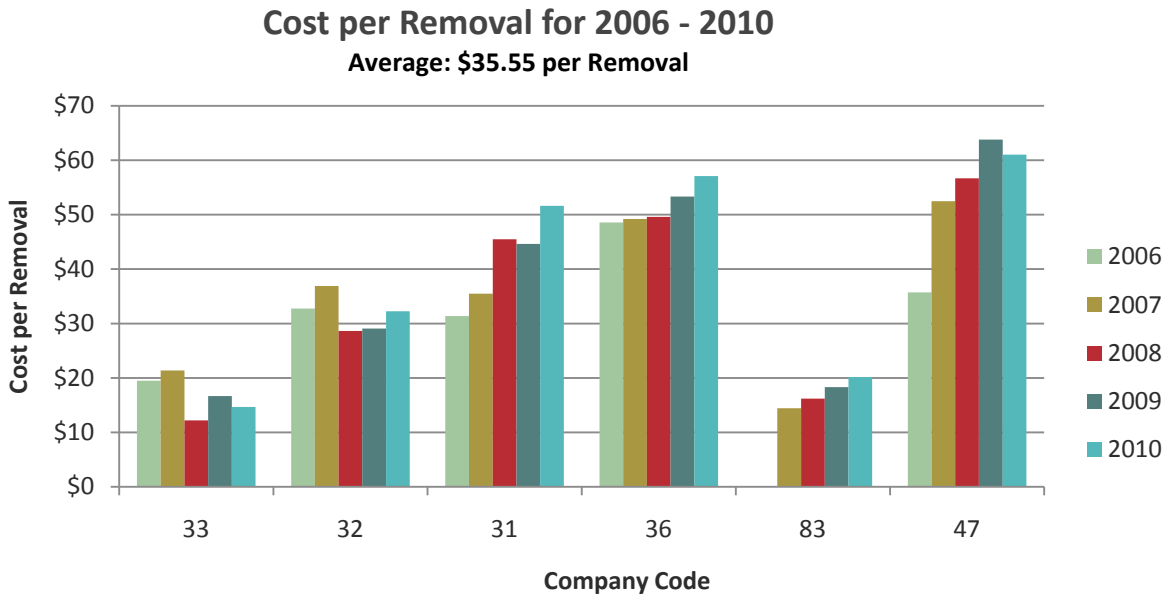


Figure 166: Cost per Tree Removed for 2006 - 2010

Cost of Trees Treated

Data was collected from **Question #137**

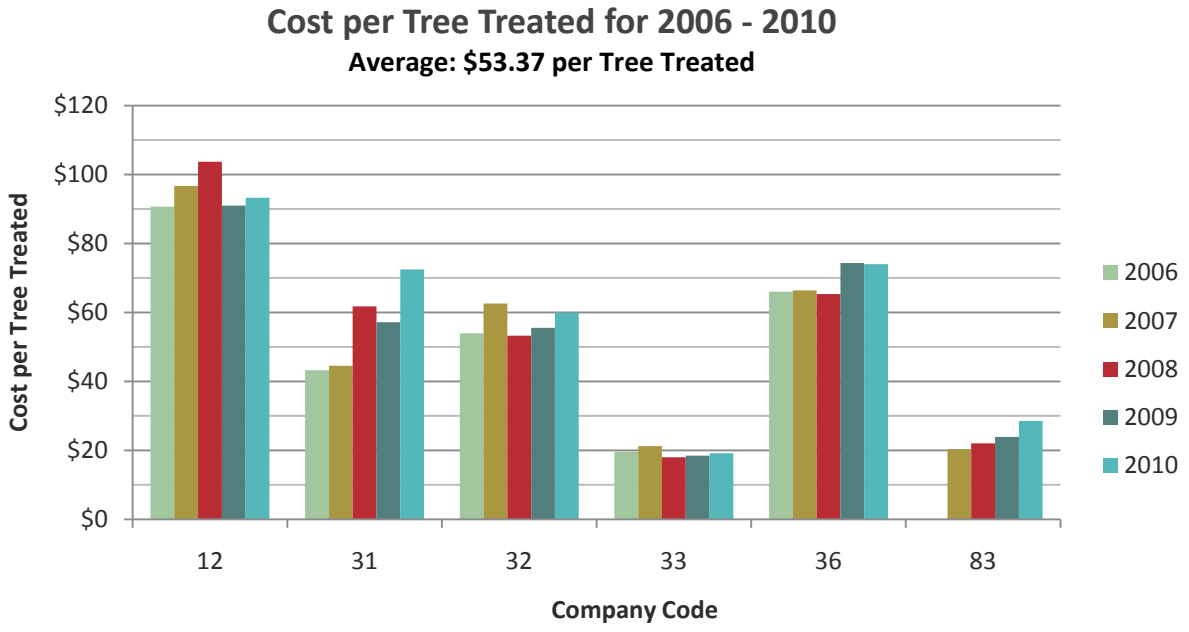


Figure 167: Cost per Tree Treated for 2006 - 2010

LABOR HOURS PER TREE TREATED

Labor Hours per Tree Pruned

Data was collected from **Question #137**

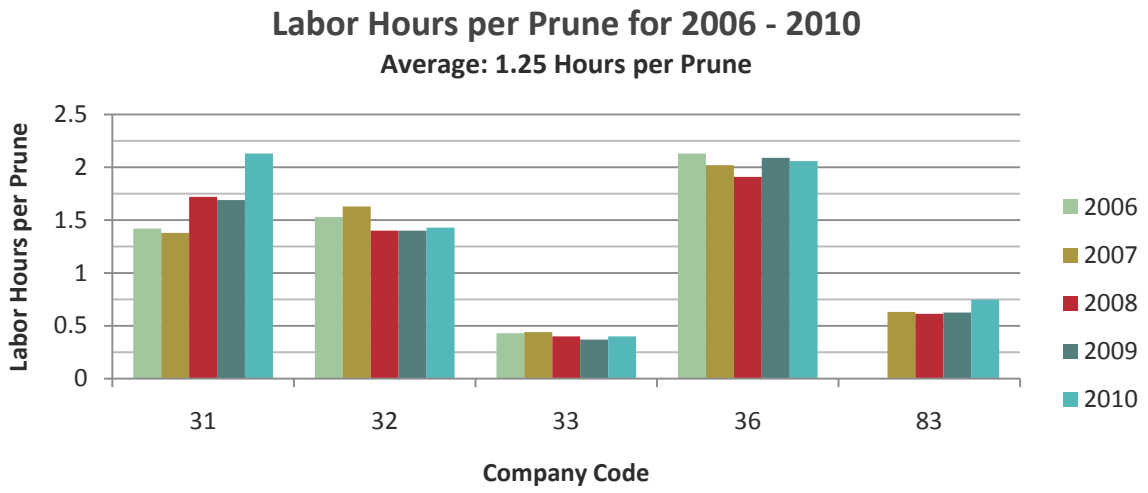


Figure 168: Labor Hours per Tree Pruned for 2006 – 2010

Labor Hours per Tree Removed

Data was collected from **Question #137**

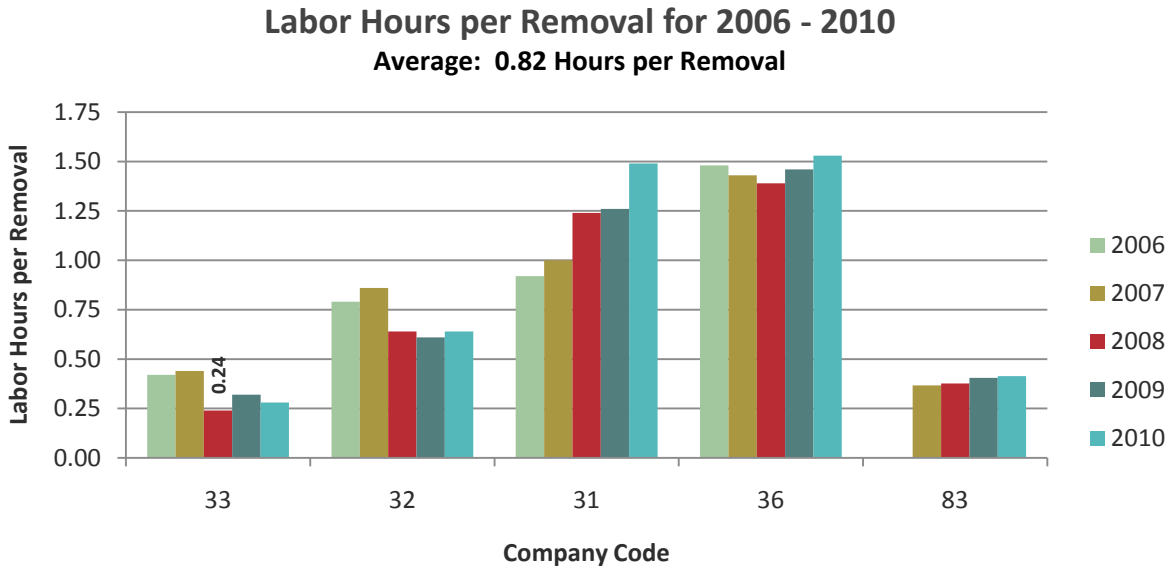


Figure 169: Labor Hours per Tree Removed for 2006 - 2010

Labor Hours per Tree Treated

Data was collected from **Question #137**

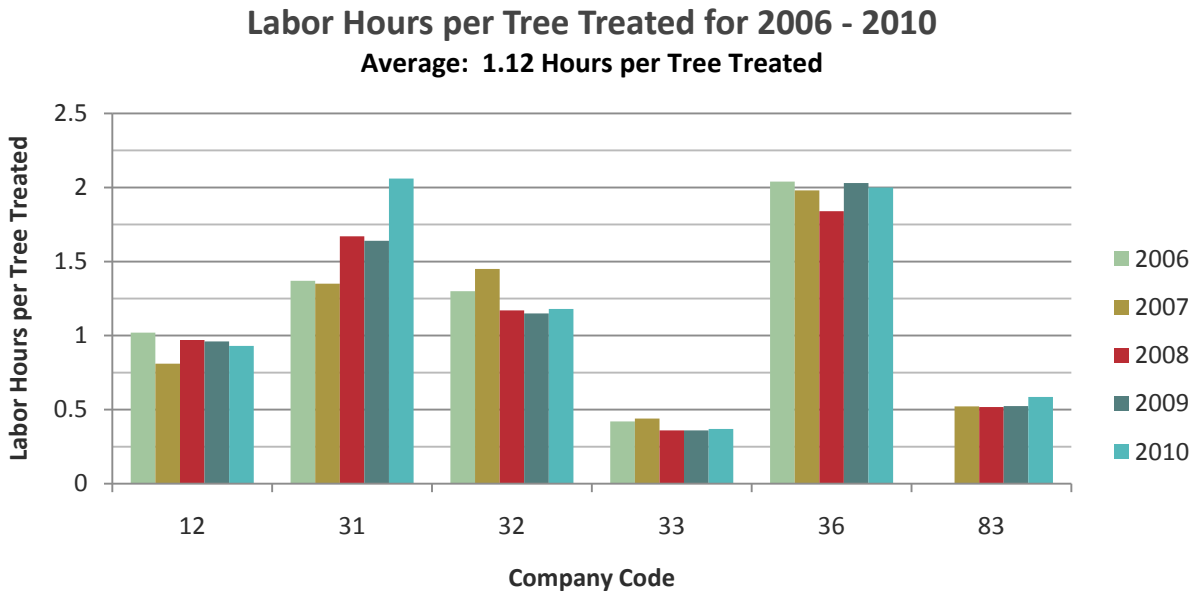


Figure 170: Labor Hours per Tree Treated for 2006 – 2010

PERCENT OF TREES PRUNED VS. REMOVED

Calculated statistic was derived from data collected in **Question #137**

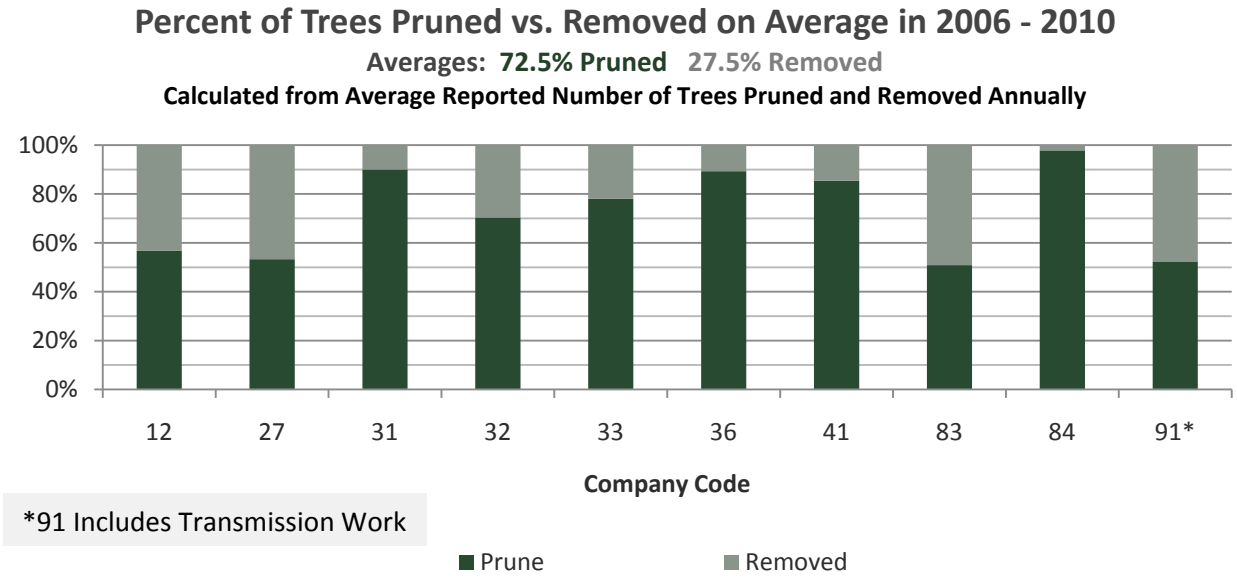


Figure 171: Percent of Trees Pruned vs. Removed on Average in 2006 – 2010

CALCULATION OF PRODUCTION STATISTICS

How Data Is Collected for Production Statistics

Question #138: The answers to the previous question **(#137**) are derived [using one or more of the following categories]: Check all that apply.

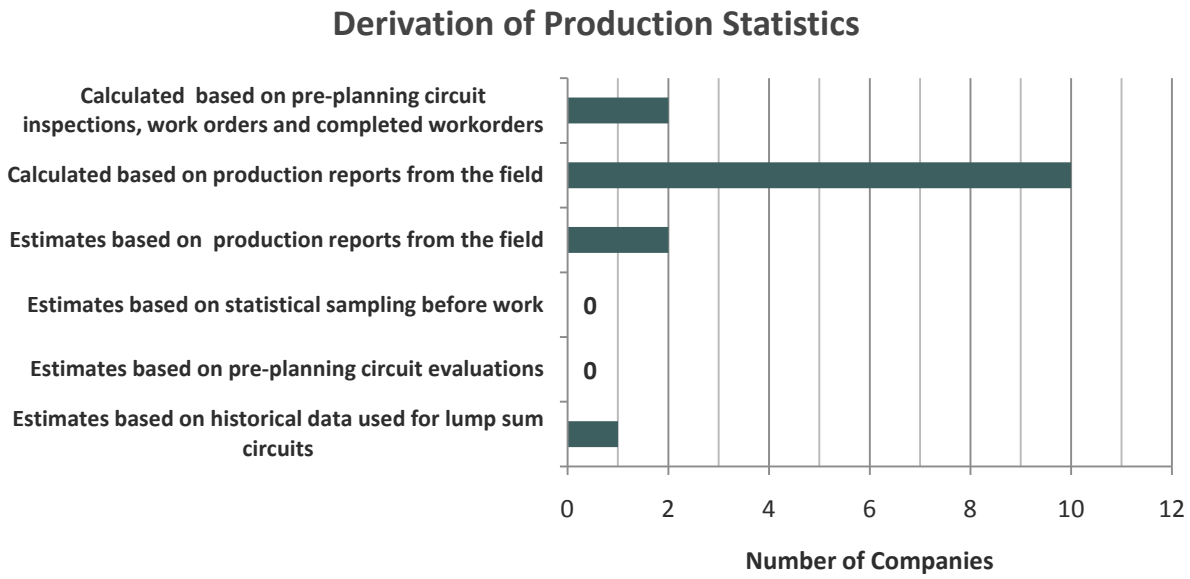


Figure 172: Derivation of Production Statistics

Comments on How Production Statistics Are Collected
About 90% of our treatable tree species that are removed are treated.
These trims and removals include transmission work. We did a great amount of removals in 2009 and 2010 on NERC ROW's. We do not remove a great deal of trees on distribution circuit trimming. We are trying to get the costs of all of the above and will have it by next year's benchmark study.
Not Tracked.
We run the [Contractor Software Name] software, all time and cost is for trimming or removing trees only. Cost do not include any travel time or support.

Figure 173: Comments on How Production Statistics Are Collected

What Activities Are Included in Production Statistics

OBJECTIVE: Between utility companies there are variations in data collection, contract structures and tree crew responsibilities. The objective of this question is to understand how you derive "Cost and labor per prune, removal or treated", since these are NOT standardized.

Question #139: Do your reported calculations "Cost per Tree" and "Labor Hours per Tree" in **Question #137** include the following?

At this point in time, a majority of the companies that supplied production statistics in **Question #137** (Cost per Prune, Cost per Removal, Labor Hours per Prune, etc.) include support activities in their calculations, making the comparisons seen on the graphs generated from this question valid. Of course, these comparisons are not taking into account the economic differences between geographical regions, the kinds of species, and the accessibility to trees, etc. All of these factors would produce differences in cost per unit and labor hours per unit. Also keep in mind that different companies appear on each graph associated with **Question #137** (Figures 162 – 170), so that the comparison of averages would not be valid. The following is a table of comments related to what activities are included in calculations of production statistics.

Comments on and Explanation of 'Other' for What Activities Are Included in Production Statistic Calculations
N/A - all not tracked (3 Companies)
Not tracked this way.
Equipment
Inspecting and laying out work
Next year we will not have any of the subjects costed out, only the total per tree cost.
We run the [Contractor Software Name] software and the activities listed above are all itemized. All activities are added together at the end to determine our cost per line mile.
Unfortunately, our work unit is span, so we cannot answer for pruning data.

Figure 174: Comments on and Explanation of 'Other' for What Activities Are Included in Production Statistic Calculations

PERCENT OF IN-GROWTH OF TOTAL TREES MANAGED

OBJECTIVE: DISCOVER IN-GROWTH PERCENT: In-growth is defined as the number of trees that periodically grow into the smallest inventoried diameter class.

Question #143: Do you know or can you estimate what percent of your tree inventory is in-growth? For the purposes of the benchmark this would be the percent of your total tree inventory, trees that meet your defined minimum DBH, that enter your workload each year.

This question presented a challenge to our benchmark participants. Very few felt confident enough to even attempt a rough estimate. Three companies gave us their best estimates, but none of them had made any measurements to determine this percentage. The three estimates were **two at 10% and one at 5%**.

The company that estimated 5% in-growth made the following comment: "Our brush control program removes ROW floor to the ground. Estimated in-growth is an estimate of the % of trees on the ROW floor that grow to 4+in DBH." This particular company has based their estimate on some empirical evidence.

Use of Unit Prices in Contract Structures

Question #144: Instead of paying for UVM services by time units, do you pay for some or all UVM services by physical units, such as trees pruned, trees removed, spans mowed, miles treated, brush units cut, etc?

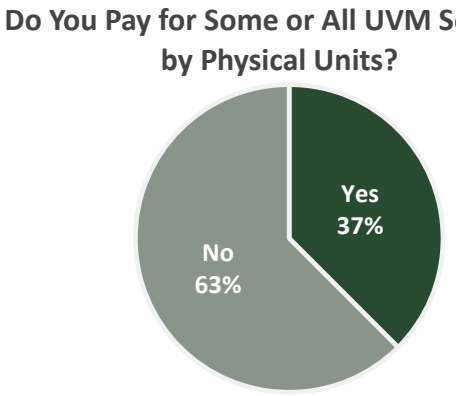


Figure 175: Do You Pay for Some or All UVM Services by Physical Units?

In 2002 and 2006 participants were asked "How are your tree pruning and removal contracts structured?"

In **2002,** only **14%** responded *Unit Price*. In **2006 22%** responded *Unit Price*.

Although the question asked in 2002 and 2006 was slightly different, it is possible to say that the percent of companies using unit prices as a component of their contract bidding structure is increasing.

Definitions of Units Used for Pricing

Pruning Units ("Tree Unit Type")

Question #145: If the cost of your program or parts of your program is measured and paid for according to specific tree units, please list the units you use to quantify trees prunes, such as top prune, side prune, v-prune and overhang prunes. Please provide the name of the unit and a brief explanation or definition.

Pruning Unit Types
Tree Trimmed: For tree trimming purposes, a tree qualifying for "tree trimmed" status shall be defined as being a plant with a central trunk that is four (4) inches or larger DBH and where final are cuts are made above four and one-half feet (4.5) from the ground. Any plant less than four (4) inches DBH shall be reported as brush. TT [Tree trimming] work where final cuts are made at or below four and one-half feet (4.5) from the ground is considered a removal. Multiple stems originating from the same common root crown shall be considered as one (1) tree.
8-11.9in, 12-15.9in, 16-19.9in, 20-23.9in, 24-28in, and >28in DBH additional overhang (5 types)
Cost per tree trimmed based on DBH size class

Figure 176: Pruning Unit Types

Brush Units ("Tree Unit Type")

Question #149: If the cost of your program or parts of your program is measured and paid for according to specific "tree" units, please list the units you use to quantify brush units, such as square feet/meters, acres/hectares, etc. Please provide the name of the unit and a brief explanation or definition.

Brush Unit Types
Brush Cut/Trim: Any plant or group of plants that do not qualify as a tree trimmed or removed as defined above, shall be reported as units of brush. The portion of plant material to be removed shall qualify as contributing to a unit. One (1) unit of brush shall be defined as ten (10) cubic yards (270 cubic feet, i.e., a space represented by a cube which is 6.5 feet in all dimensions) of standing plant material. For reporting purposes, units shall be identified in increments of 1/10th.
Kms of brush completed (1 km is roughly 1 ha)
BRUSH REMOVAL (PER LINEAR FT, Hand-cutting)
Single-phase half-span, single phase span, triple-phase half-span, and triple-phase span (4 types)
High - >30 stems per span; Medium - 15 - 30 stems per span; Low <15 stems per span.

Figure 177: Brush Unit Types

Question #147: If the cost of your program or parts of your program is measured and paid for according to specific tree units, please list the units you use to quantify trees removals, such as 4-12" DBH, 12-24" DBH, etc. Please provide the name of the unit and a brief explanation or definition.

Removal Unit Types
Tree Removed - Category 1: For tree removal purposes, a tree qualifying for "tree removed-Category 1" status shall be defined as being a plant with a central trunk that is at least four (4) inches in diameter and less than twelve (12) inches DBH and where final are cuts are made at or below four and one-half feet (4.5) from the ground. Any plant less than four (4) inches DBH shall be reported as brush. Multiple stems at least four (4) inches DBH originating from the same common root crown shall each be considered as one (1) tree. Multiple stems less than four (4) inches DBH shall be considered brush.
Tree Removed - Category 2: For tree removal purposes, a tree qualifying for "tree removed-Category 2" status shall be defined as being a plant with a central trunk that is at least twelve (12) inches and less than twenty-four (24) inches DBH and where final are cuts are made at or below four and one-half feet (4.5) from the ground. Multiple stems at least twelve (12) inches DBH originating from the same common root crown shall each be considered as one (1) tree.
Tree Removed - Category 3: For tree removal purposes, a tree qualifying for "tree removed-Category 3" status shall be defined as being a plant with a central trunk that is at least twenty-four (24) inches and less than thirty-six (36) inches DBH and where final are cuts are made at or below four and one-half feet (4.5) from the ground. Multiple stems at least twenty-four (24) inches DBH originating from the same common root crown shall each be considered as one (1) tree.
Tree Removed - Category 4: Trees thirty-six (36) inches or larger DBH where final are cuts are made at or below four and one-half feet (4.5) from the ground.
1-4 in, 4.1 – 12 in, 12.1 – 24 in, 24.1 – 36 in, >36 in DBH (5 types)
8 – 11.9 in, 12 – 15.9 in, 16 – 19.9 in, 20 -23.9 in, 24 – 27.9 in, 28 – 31.9 in, 32 – 35.9 in, 36 – 40 in DBH, CUT AND LEAVE, >40" DBH CUT AND LEAVE (NEGOTIABLE) (9 types) Within these DBH size classes we have (3) different costs associated with them based on what is specified by the forester. These (3) are classified as: Cut-n-Leave, Cut-n-Chip, & Cut-n-Haul. Each has a different cost associated with them.
Vine Removal Unit, 0-12" DBH, 12-20" DBH, 20-28" DBH, 28-36" DBH, > 36" DBH. Each can be broken into A, B, or C category. C = All debris stays – Make safe; B = Remove to ground and remove all debris, brush, and wood; A = Remove to ground - chip brush - wood stays.

Figure 178: Removal Unit Types

Questions #152 and #154: If the cost of your program or parts of your program is measured and paid for according to larger aggregate units such as span or miles/kms, please list the units you use to quantify your work, such as 1/4 spans, 1/2 spans, 3/4 spans, whole spans, manual spans, mechanical spans, herbicide spans, mowing spans, etc., or mile/km of mechanical, mile/km of manual crew, mile/km of herbicide, mile/km of mowing, etc. Please provide the name of the unit and a brief explanation or definition.

Aggregate Unit Definitions
All cycle maintenance priced and paid by mile. Mile of overhead conductor (open wire). Mile of overhead conductor ONLY.
[Units based on] Km completed. [Unit Types:] $/Km Line Clearing; $/Km Brush Control; $/Km Customer Notification
[Unit Types:] 1) Single phase half span cleared (brush) off road and on-road; 2) Single phase span cleared (brush) off road and on-road; 3) Triple phase half span cleared (brush) off road and on-road; 4) Triple phase span cleared (brush) off road and on-road; 5) Half span pruned on-road; 6) Half span pruned off-road; 6) Span pruned on-road; 7) Span pruned off-road
[Unit Types Measured in] Miles/Acres. Trimming is based more on Line Miles where as individual tree removals have an agreed upon cost associated based on contract agreement. Herbicide measurement is based on acres and in some cases spans or line miles.
[Unit Types:] 1) Rate per feeder mile - cost to clear one mile to specs per area; 2) Rate per lateral mile - cost to clear one mile to specs per area. Distribution territory divided into 16 areas - each with a feeder and lateral cost per mile

Figure 179: Aggregate Unit Definitions

Unit Prices per Unit

Reported *Unit Prices* are displayed on the next three tables. To maintain confidentiality, companies are not identified by company code, but rather by region of the continent that they are located in. *Unit Prices* are the average of all their units (described in the above tables of definitions).

Benchmark participants are from Canada and the US. The location of the company is shown on the left. Canadian companies all would have "North" or "Northern" in their location and the northern states in the US would also have "North" or "Northern" in their location titles. To further maintain confidentiality, a company will not be identified as to their national affiliation. All costs have been converted to US dollars.

Average Unit Prices and Labor Hours for "Tree" Unit Types

OBJECTIVE: To compare the resources used to perform units under a unit price program to the same units of work under an in-house, time and material, and lump sum programs.

Question #151: Based on the on the various individual pruning, removal and brush units you have used over the past three years (2008-2010), please enter the AVERAGE amount of labor hours and/or cost for each of the following basic units you measure under a unit priced program.

AVERAGE COSTS AND LABOR HOURS PER UNIT TYPE

Company Location	Average Labor Hours per Prune	Average Cost per Prune	Average Labor hours per Removal	Average Cost per Removal	Average Labor Hours per Brush Unit	Average Cost per Brush Unit	Average Labor Hours per Herbicide Unit	Average Cost per Herbicide Unit
North Central					33.61	$2,718.38 Per 2.5 acres		
South East				$250.00		4 (Per Linear FT, Hand-cutting)		
Western	1.87	$66.43	1.34	$47.59	0.0258	$0.96	0.0260	$2.73
North Central	1.41	$67.87	0.63	$29.87	0.0186	$0.90	0.0028	$0.15
North Central	0.39	$19.79	0.28	$14.26	0.0046	$0.26	0.0018	$0.09
South and South Western	2.03	$73.95	1.46	$53.47	0.0180	$0.67	0.0114	$344.00
North Eastern		$246.98 per span*		$59.80		$273.67 per span	No Herbicides	
North Central	0.8	$35.94	0.45	$26.91				
Averages	**1.3**	**$52.80**	**0.832**	**$68.84**				
Range Maximum	**2.03**	**$73.95**	**1.46**	**$250.00**				
Range Minimum	**0.39**	**$19.79**	**0.28**	**$14.26**				

Figure 180: Average Costs and Labor Hours per Unit Type by Region and Company

* This value was excluded from the average for prunes, since unit was defined as a span for this company.

Averages and ranges are included for the *Prune Units* and *Removal Units* in the last three rows of the chart. Brush and Herbicide Unit averages are not included, because the definition of unit for these activities varied greatly. The definition for a tree, the unit used for prunes and removals, also varies between companies, but not to as great of an extent. Some of the companies on this chart did not define their brush unit. All costs have been converted to US dollars.

Unit Pricing vs. Other Contract Structure Costs for "Tree" Unit Types

A comparison can be drawn between unit pricing and other contract structures. The averages from **Question #151** (above table) and **Question #137** are compared on the following graph.

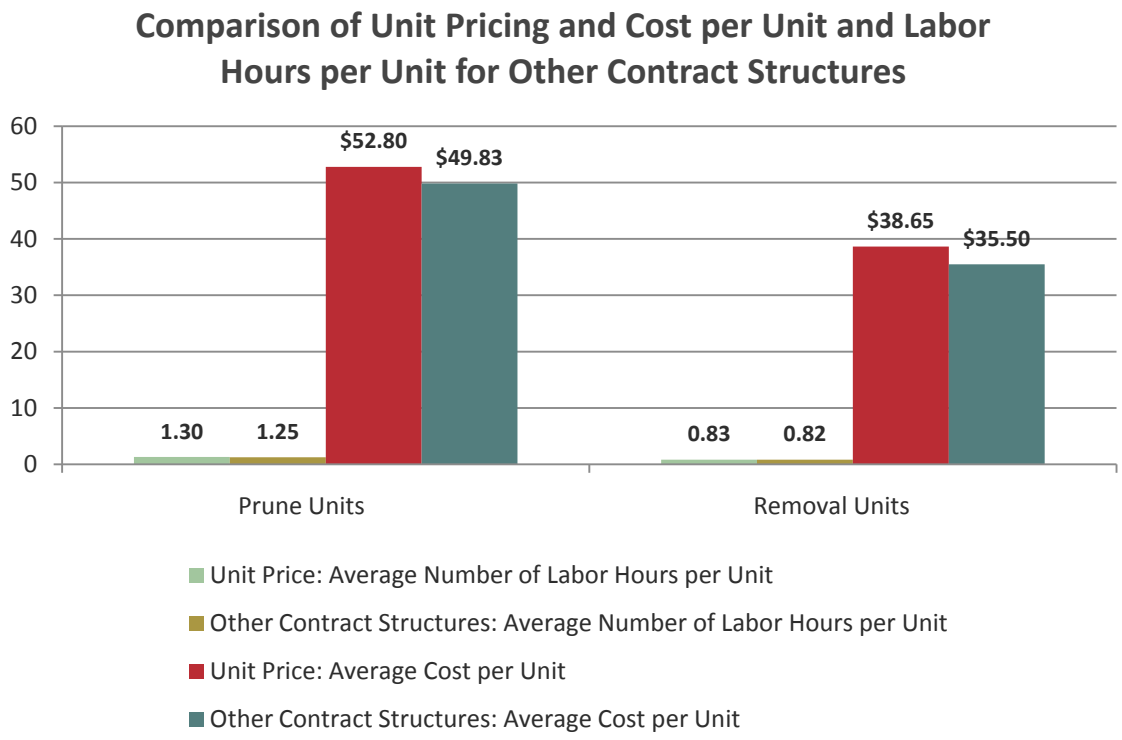


Figure 181: Comparison of Unit Pricing and Cost per Unit and Labor Hours per Unit for Other Contract Structures

It should be noted that *Unit Prices* include all costs (supervision, overheads, clean-up, etc.), while cost per prune and cost per removal (question #137) may not include all costs associated with the work. Activities included in reported calculations of cost per prune or removal are referred to in table for question #139.

AVERAGE UNIT PRICES FOR SPANS AS UNIT TYPE

Company Location	Average Labor Hours per Span	Average Cost per Span	Average Cost per Span Manually Cleared	Average Cost per Span Mechanically Pruned	Average Cost per Span Mowed	Average Cost per Span Herbicide Treated	Comments
North Central	15.78	$792	$359	$441	$72.19	$6.24	The average cost to trim or manually clear does not include management or support cost.
North Eastern		$250.57	$273.66 (manual, mechanical or mow, no distinction)	$246.98			These numbers are balanced averages based on more than half a million spans pruned or cleared in the 3 last years.

Figure 182: Average Unit Prices for Spans as Unit Type

The table above and the one on the next page represent costs associated with units defined as spans or partial span lengths and for units defined as miles for 2011. Some of the participants that answered these questions used the information gleaned from T & M operations. Once again, these companies are from Canada and the US. The location of the company is shown on the left. Canadian companies all would have "North" or "Northern" in their location and the northern states in the US would also have "North" or "Northern" in their titles. To maintain confidentiality, a company will not be identified as to their national affiliation. Costs and metric measurements have been converted to US dollars and miles.

AVERAGE UNIT PRICES FOR MILES AS UNIT TYPE

Company Location	Average Labor hours per Mile	Average Cost per Mile	Average Cost per Mile Manually Cleared	Average Cost per Mile Mowed	Average Cost per Mile Herbicide Treated	Comments and Clarification
Southeast	150.65	$5,101.38				Distribution territory divided into 16 areas - each with a feeder and lateral cost per mile. Rate per feeder mile or per lateral mile - cost to clear one mile to specs per area.
North Central	164.22	$17,386.99				$/Mile Line Clearing, Brush Control and Customer Notification
North Central		$7,453.00		$1,340.00	$109.00	All work is done on a TM basis
North Central		$3,968.00	$11,159.00	$0.00	$263.00	Miles as shown on the feeder map
Northeast		$4,016.23 for every mile affected by vegetation			No Herbicide	We prune a lot more than we clear. We clear span where we can (we clear a span only if it eliminates pruning the year after), in the same mile we prune the year after.
Southeast		$2,660.00				Mile for Mechanical Trimmers. Cost per mile for Pro-active Maintenance trimming

Figure 183: Average Unit Prices for Miles as Unit Type

UVM PROGRAM OBJECTIVES

Question #156: Please rank the following in order of importance regarding your utility vegetation management program: NOTE: Use each rating category only once. In other words, only one objective can be ranked most important and only one objective can be ranked 2nd, etc.

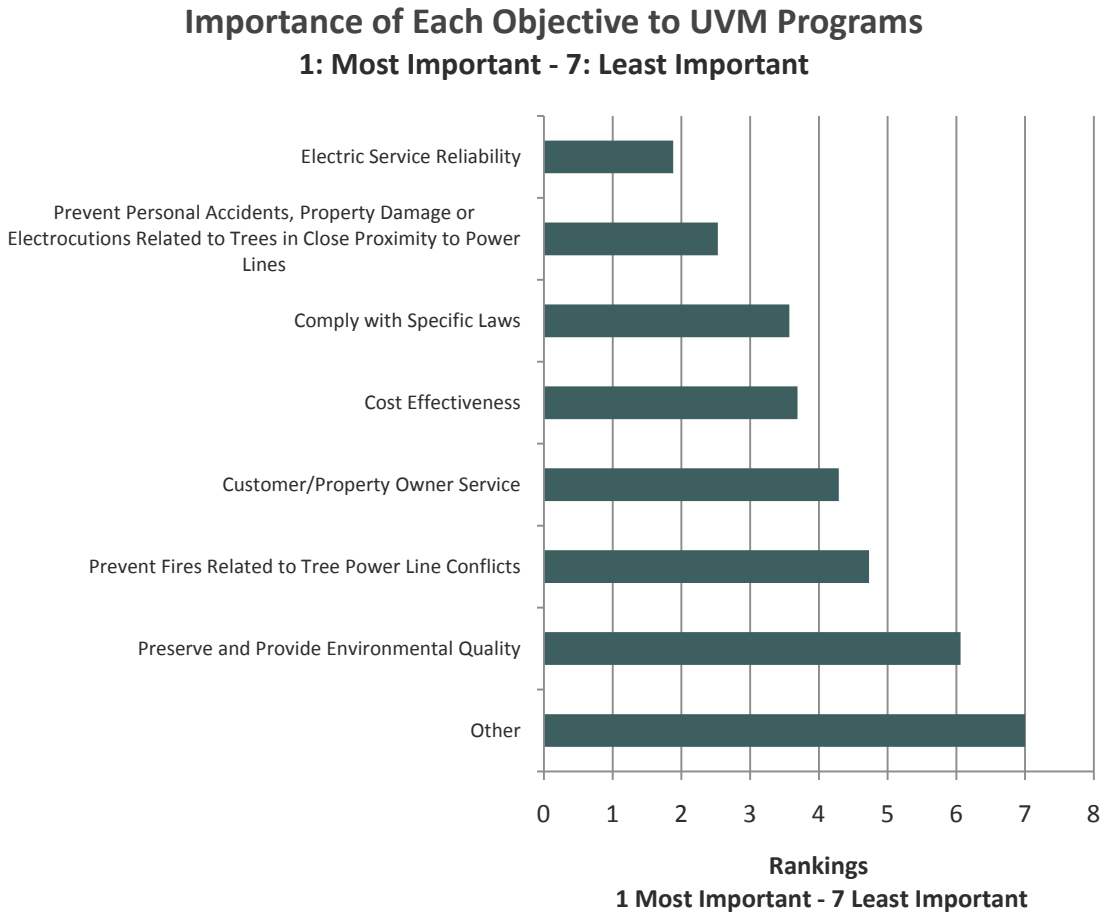


Figure 184: Importance of Each Objective to UVM Programs

Electric Service Reliability has the smallest weighted ranking (Most Important) followed closely by *Prevent Personal Accidents, Property Damage or Electrocutions Related to Trees in Close Proximity to Power Lines*. The most important driver is at the top of the graph and they decrease in importance as you move down.

A second graph (below) using the same data gives a more detailed understanding of the importance of each program driver to benchmark participants.

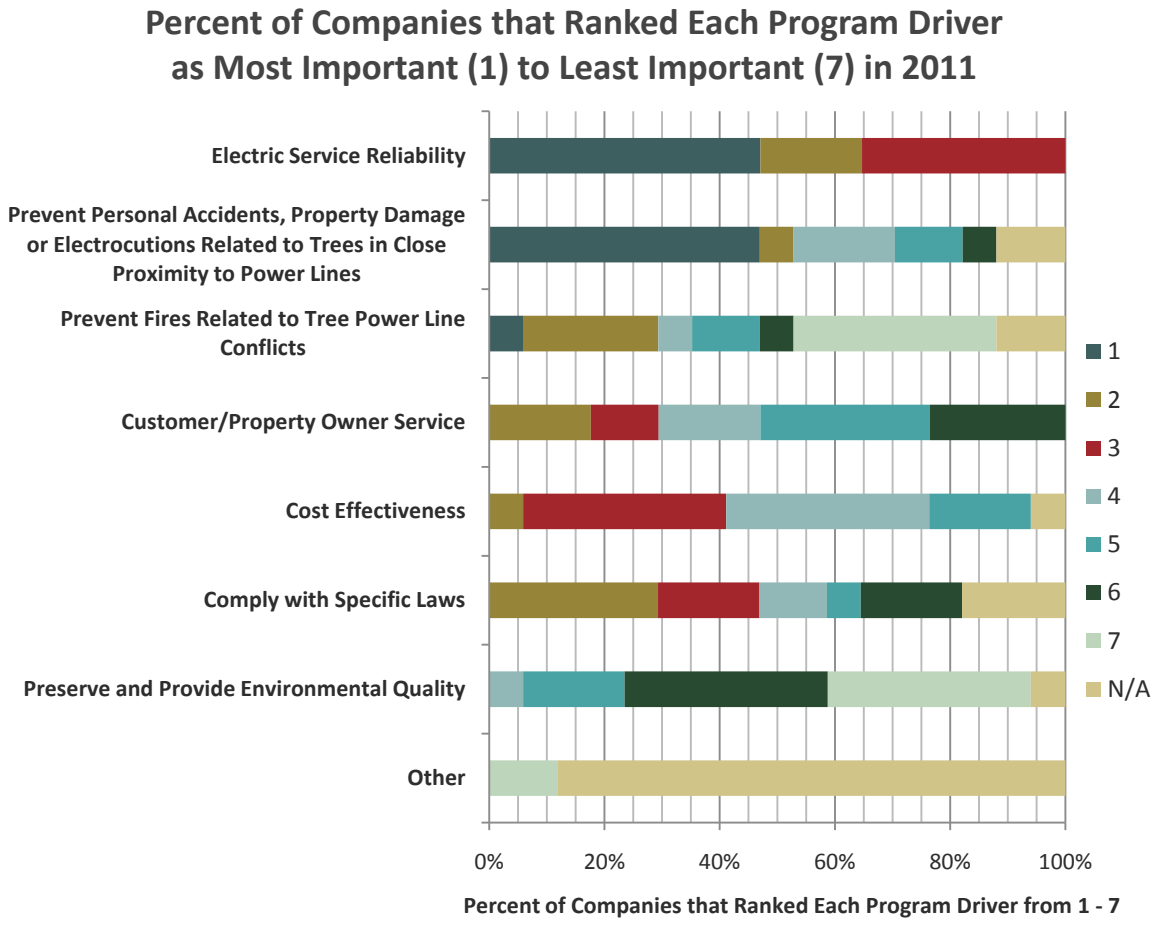


Figure 185: Percent of Companies that Ranked Each Program Driver as Most Important to Least Important in 2011

Comments on the Ranking of the Importance of Program Drivers
All of the 7 items you have listed above are very important to our company. At a given site, the ranking could easily change but overall I would rank them as shown above.

Figure 186: Comments on the Ranking of the Importance of Program Drivers

Data Discussion about UVM Program Drivers

The most important program driver is on the top of the charts (Figures 184 & 185). It should be noted that in the overall rankings *Prevent Fires Related to Tree Power Line Conflicts* placed 6th in the weighted rankings (*Importance of Each Objective to UVM Programs*, above), which means that it was a low priority for most utilities. Yet, the graph (Figure 185) above shows that almost 30% of the respondents ranked it as the most or the second most important objective. It is obvious that this objective is a regional one and over 10% of companies do not even rank it as an objective (N/A). Other areas of note is the ranking of *Electric Service Reliability* and *Prevent Personal Accidents, Property Damage or Electrocutions Related to Trees in Close Proximity to Power Lines,* which were both ranked 1st by 47% of the companies that responded. It was in the number of companies that ranked "Safety" 2nd that placed *Electric Reliability* as the number one driver in the previous graph (*Importance of Each Objective to UVM Programs*, above). In the **2006** Benchmark Survey, *Prevent Personal Accidents, Property Damage or Electrocutions Related to Trees in Close Proximity to Power Lines* was the number one program driver. In 2006, almost **70%** of companies ranked this driver as most important. We are definitely seeing a trend toward electric reliability being more important than in the past. In all likelihood this is driven from outside the UVM department.

LAWS AND REGULATIONS

Utilities Subject to Regulations by State and/or Public Utility Commission

Question #157:

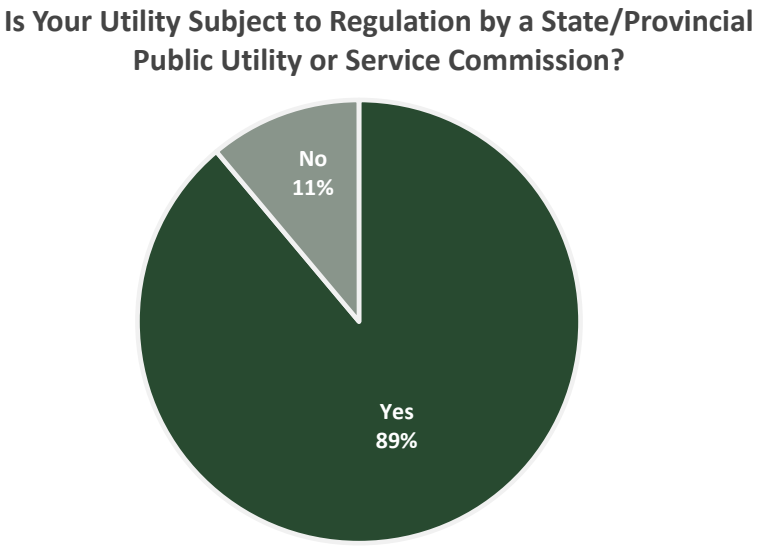


Figure 187: Percent of Utilities Subject to Regulations by State and/or Public Utility Commission

Percent of Companies to Which Specific Laws and Regulations Apply

Question #158: Which of the Following Laws or Regulations Apply to Your Operations?

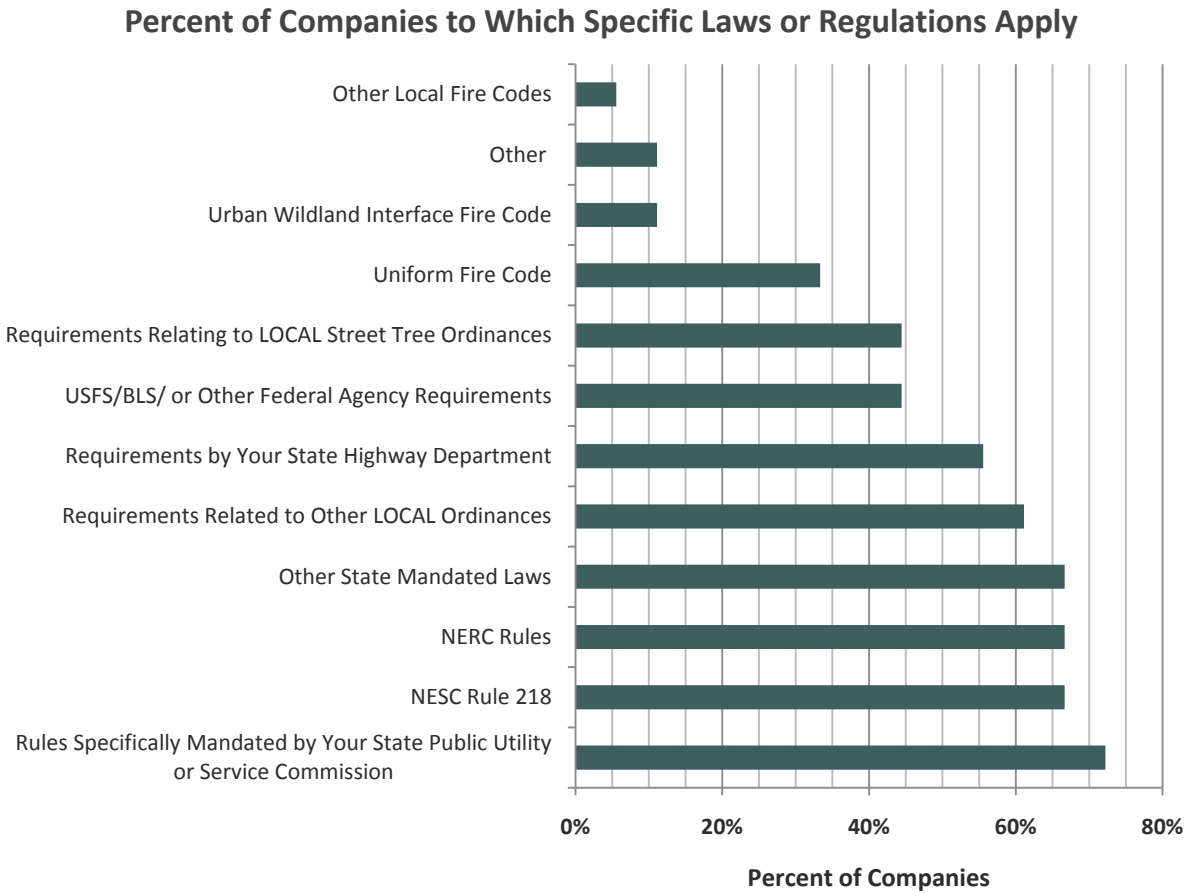


Figure 188: Percent of Companies to Which Specific Laws or Regulations Apply

Activities Regulated by Public Utility Commission Rules or State Laws

Question #159: Which of the following UVM activities are subject to Public Utility Commission (PUC) rules or state laws? Check all that apply.

Benchmark Participants were able to indicate all activities that applied to their UVM program. The activities that had the most percent of companies subject to regulation by PUC or state regulations appear at the bottom of the graph, decreasing as you read up.

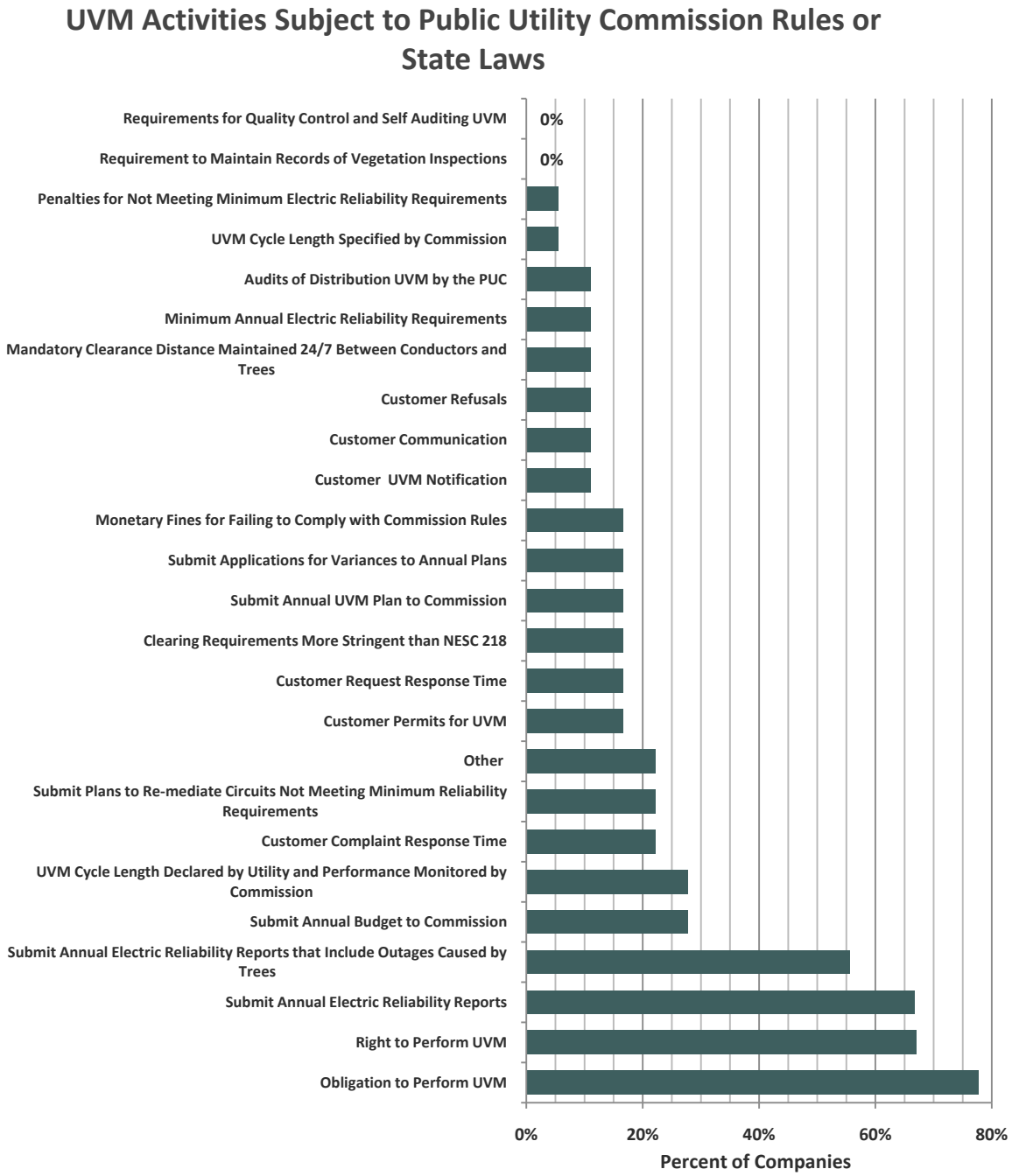


Figure 189: Activities Subject to Public Utility Commission Rules or State Laws

Other Activities Subject to PUC Rules and State Laws
Required to report major incidents.
The more stringent requirements come from Oregon and California only.
None of the above.
We are a Co-op and are regulated by the Board of Directors which help create and approve of our bylaws.

Figure 190: Comments and Other Activities Subject to PUC Rules and State Laws

Mandatory Clearance Requirement Laws and Regulations

Question #160: If you answered that you do have mandatory clearance requirements, please describe the requirement here and include the name/number of the rule(s), standard(s) or law(s).

Description of Mandatory Clearance Requirements
California Public Utilities Commission General Order 95, Rules 35 & 37 California Public Resources Code 4293
OR Administration Rule 860-024-[00]16; Cal Resource Code 4292, 4293; Cal Public Utility Co General Order 95, Rule 35

Figure 191: Description of Mandatory Clearance Requirements

Specific Cycle Length Requirement Laws and Regulations

Question #161: If you answered that you have a rule requiring a specific cycle length or another aspect of cycle management, please describe the rule(s) here, including the name/number of the rule(s).

No Comments Yet

Minimum Reliability Requirement Laws and Regulations

Question #162: If you answered that you have minimum reliability requirements, please describe the requirements and how the measurements are made.

Description of Minimum Reliability Requirement
[State] PUC Substantive Rule 25.52: SAIDI less than or equal to 101.55. No specific penalty in rule.

Figure 192: Description o f Minimum Reliability Requirements

Mandatory Clearance Requirements

The following questions involved attitudes and expense associated with mandatory clearance requirements.

Attitudes towards Mandatory Clearance Requirements

Question #163: Do you think mandatory clearance requirements are _____?

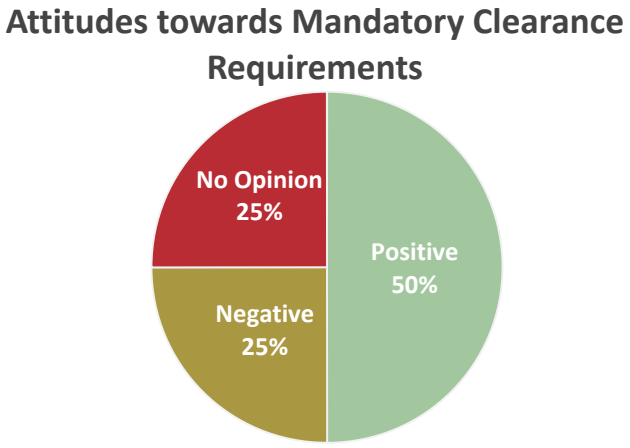


Figure 193: Attitudes towards Mandatory Clearance Requirements

The next graph shows the changes in attitudes towards mandatory clearance requirements over time. The data indicates a marked increase in positive attitudes towards these requirements. The positive attitude was a **34% increase** with an equal decrease in negative attitudes. Companies with no opinion remained relatively static.

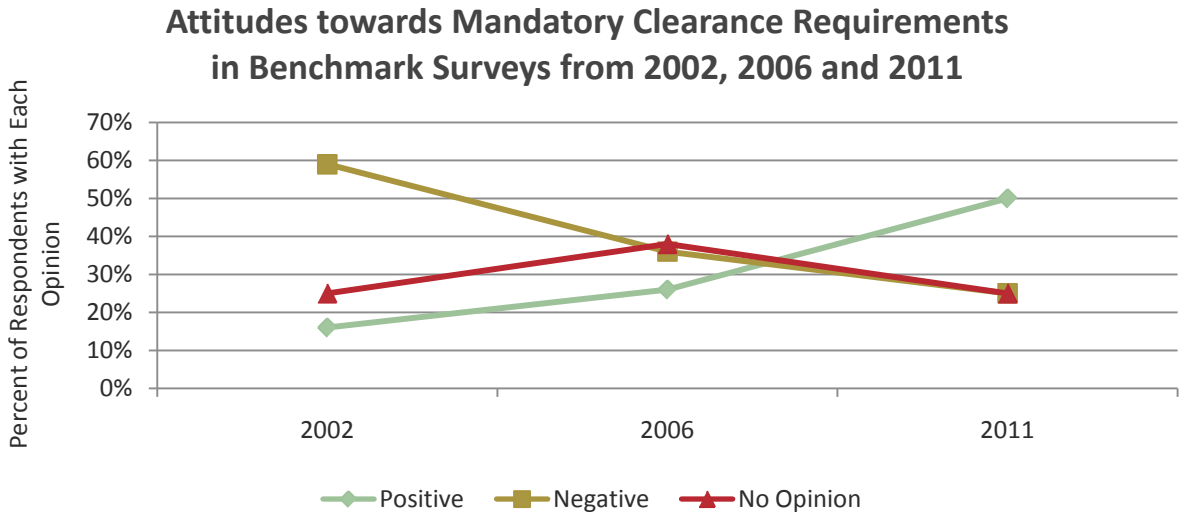


Figure 194: Attitudes towards Mandatory Clearance Requirements in 2002, 2006 and 2011

Comments collected from **Question #163**

Explanations of Attitudes Towards Mandatory Clearance Requirements
Positive: Outside agency would be dictating what needed to be done and that would help with customer agreements. (3 companies responded this way) [Responded with **Positive** Feelings]
Costs. We would like mandatory clearance at time of pruning for more strength. Will not work for all species of tree. [Responded with **Negative** Feelings]
Helps to prevent fires and outages. [Responded with **Positive** Feelings]
Helps to defend budgets and justify spending. [Responded with **Positive** Feelings]
Our required clearances are defined by cycle length. Clearances can vary from species to species depending on the length of the cycle. [Responded with **Negative** Feelings]
Mandatory 24/7 clearance requirements would provide clear expectations and provide tangible action thresholds to use in an integrated management approach. That being said, a mandatory clearance requirement at time of trimming would be a negative requirement as it will likely impose unreasonable expectations in some situations. Although in theory mandatory clearance requirements would be positive, operationally they would be very difficult to meet and depending on penalties may do more harm than good. [Responded with **Positive** Feelings]
We might be able to get on a cycle if it was mandated and better serve the customers through reliability. [Responded with **Positive** Feelings]
Both positive and negative. Positive for UVM programs looking for consistent levels of funding. Negative to Utilities because there is a loss of flexibility on how to expend their resources. Negative to Utilities when penalties are attached to these requirements. [Responded with **No Opinion**]
A mandate has ability to have a negative impact to your business and your customers. [Responded with **No Opinion**]
It belongs to us to define the best strategy to maintain a security clearance for a reasonable cost. [Responded with **Negative** Feelings]

Figure 195: Explanations of Attitudes towards Mandatory Clearance Requirements

Question #164:

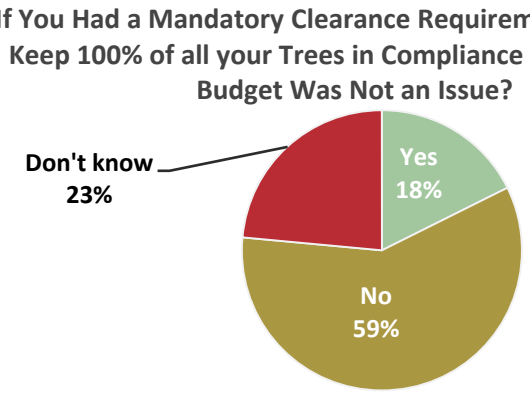


Figure 196: Compliance Capabilities to Meet Mandatory Clearance Requirements

Compliance Capabilities to Meet Mandatory Clearance Requirements
There is no guarantee that [the budget] would be adequate. (4 Companies) [Answered: No]
It would take more crews/contractors than are available. Competition for available resources (between utilities) would drive costs up. [Answered: No]
We do have mandatory clearance requirements and our non-contact compliance is 99.76% (182 non-compliant [trees]/76,151 of trees statistically sampled) but that is not 100%. To eliminate that last increment would be astronomically costly. [Answered: No]
Preposterous question - if we could hire one person per tree we could meet this requirement. [Answered: Yes]
Palm trees cannot be properly maintained and require customer permission to remove. [Answered: No]
Using a planned cyclical maintenance program on a short cycle in combination with frequent inspections and corrective action programs, maintaining clearances should be achievable. [Answered: Yes]
Budget will always be an issue. It may require coming back every year rather than letting it go until we get back on the circuit for a cycle trim. [Answered: Don't Know]
Not possible to know what every tree on your system is doing at any point in time. [Answered: No]
Storms, natural causes [would make compliance with mandatory clearances unattainable]. Also distribution lines have very weak easement rights; they would need to be strengthened in order to be in compliance. [Answered: No]
You will always have some individual [trees] nearby the wires. Growing rates are too variable, even for the same species. [Answered: No]
With all the different timber types and terrain changes within our service territory, we do not believe that we could keep 100% compliance, regardless if budget was not an issue. With over 90,000 overhead line miles to manage, the costs associated with 100% compliance at all times would not be feasible. [Answered: Don't Know]
Budgets are always an issue. [Answered: Yes]

Figure 197: Compliance Capabilities to Meet Mandatory Clearance Requirements

Data Discussion of Mandatory Clearance Compliance Capabilities

Even the company that has requirements and tracks their compliance by statistical surveys believed 100% compliance was not economically possible. As one participant comments, "… if we could hire one person per tree we could meet this requirement." Perhaps the question here is ***not*** whether 100% compliance is possible, but whether greater than 99% compliance can be achieved (as seen in the comment, "…compliance is 99.76%.").

Mandatory Clearance Requirements Projected Impact on UVM Budgets

Question #165: How much would you have to increase your budget in order to comply with a 100% Mandatory Clearance Law?

Mandatory Clearance Requirements Projected Impact on UVM Budgets
Unknown (3 companies)
Triple (depending on clearance)
Unknown - I estimate as least double.
Another ridiculous question - see above - millions
Almost double
Triple (2 Companies)
At least triple, probably more.
6x
Nearby double
100% mandatory clearance would cause a substantial increase to our budget.

Figure 198: Mandatory Clearance Requirements Projected Impact on UVM Budgets

GOVERNMENT AGENCY COMPLAINTS

Tracking Government Agency Complaints

Question #166:

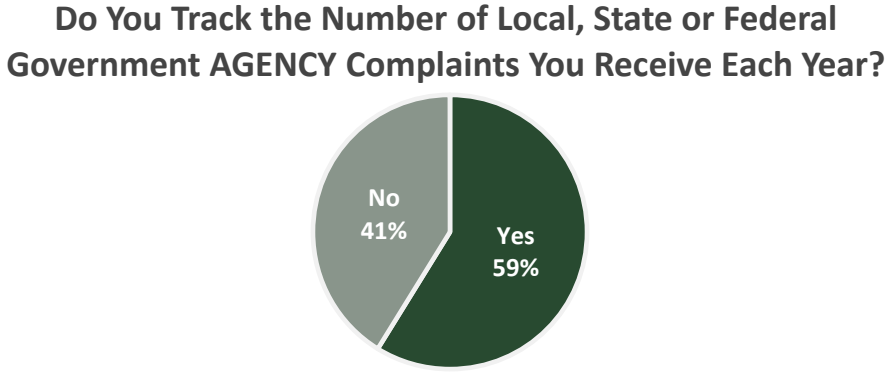


Figure 199: Percent of Companies that Track Number of Agency Complaints Received Annually

Number of Annual Government Agency Complaints

Question #167: If yes [to question #166], how many AGENCY complaints do you receive a year regarding your activities on your distribution lines?

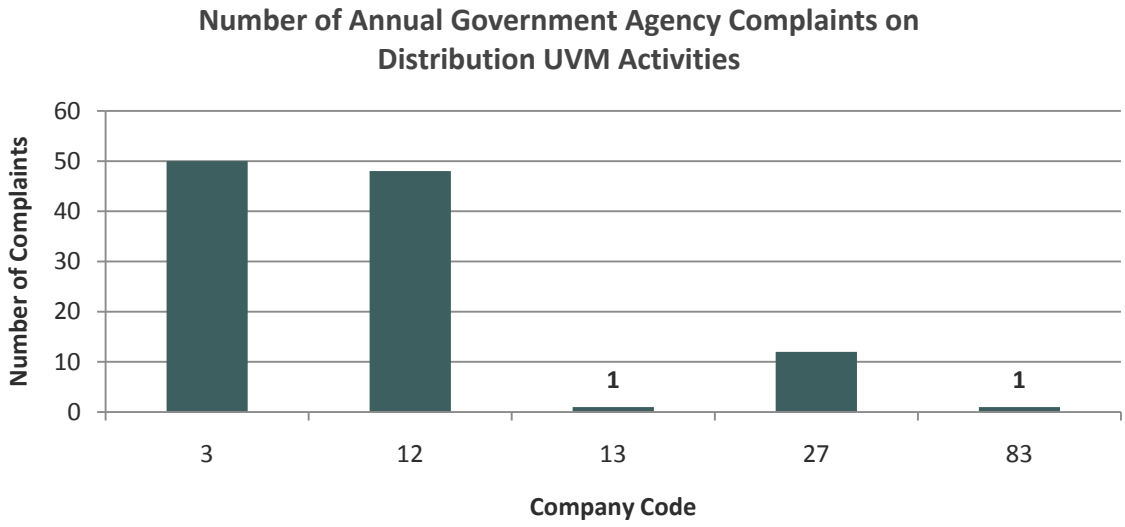


Figure 200: Number of Annual Government Agency Complaints on Distribution UVM Activities

Types of Complaints Received by Government Agencies

Question #168: Please identify the typical types of complaints you receive from local, state or federal Government AGENCIES. Please check all that apply.

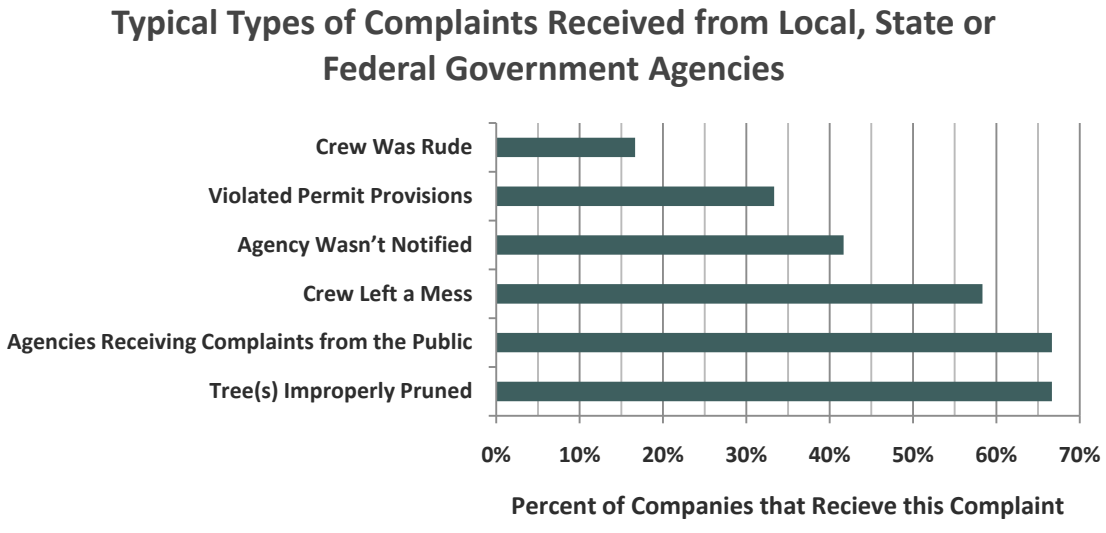


Figure 201: Typical Types of Complaints Received from Local, State or Federal Government Agencies

Relationship with Government Agencies

Question #169: Overall, how would you characterize your relationship with the majority of local, state or federal Government agencies you work with?

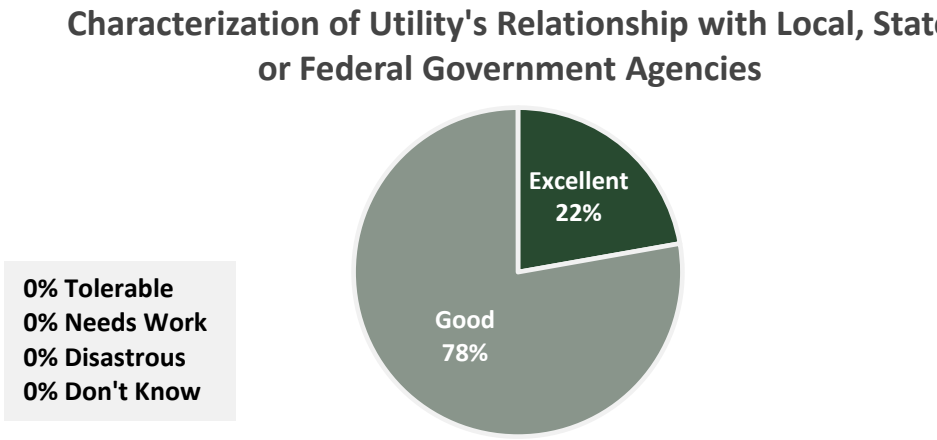


Figure 202: Characterization of Utility's Relationship with Local, State or Federal Government Agencies

Comments on Relationships with Government Agencies
Environmental agencies are particularly difficult to deal with.
Nearby excellent

Figure 203: Comments on Relationships with Government Agencies

Government Agencies Actively Involved in Distribution UVM

Question #170: Which Agencies do you actively work with regarding your vegetation management programs? Please check all that apply.

Comments and Other Government Agencies Actively Involved with UVM
[State] Coastal Commission; [State] Farm Bureau; Firesafe Councils; Numerous local community groups.
Tribal entities.

Figure 204: Comments and Other Government Agencies Actively Involved with UVM

Refer to graph on next page.

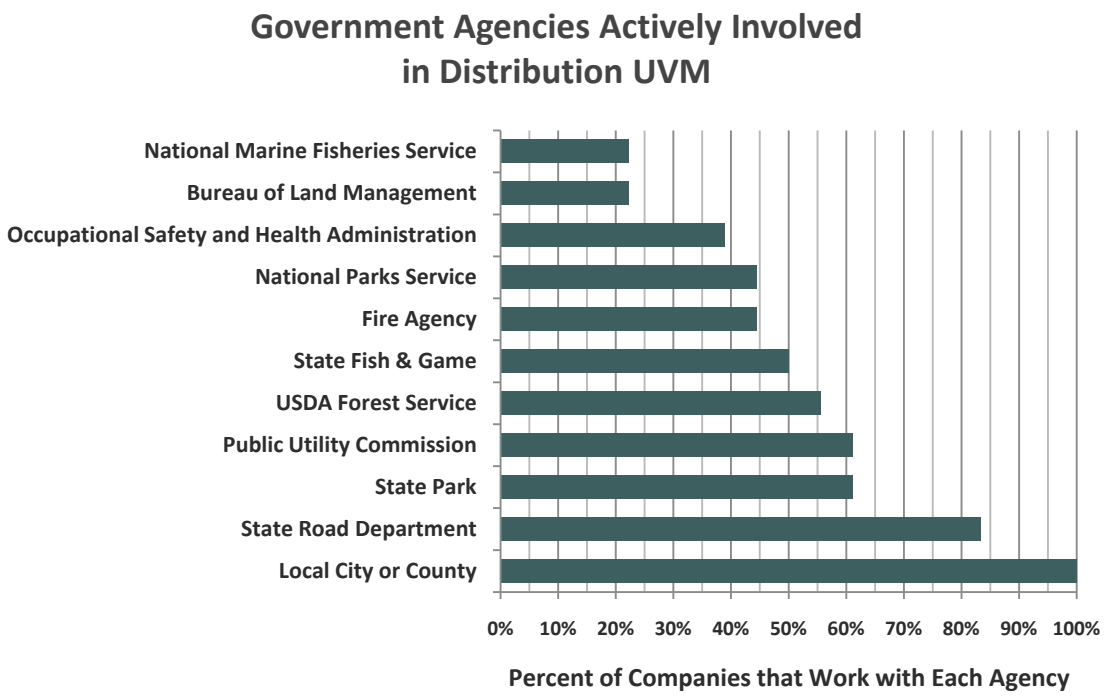


Figure 205: Government Agencies Actively Involved in Distribution UVM

Problematic Government Agencies

Question #171: Who is your MOST difficult local, state or federal Government agency to work with? Please check one only.

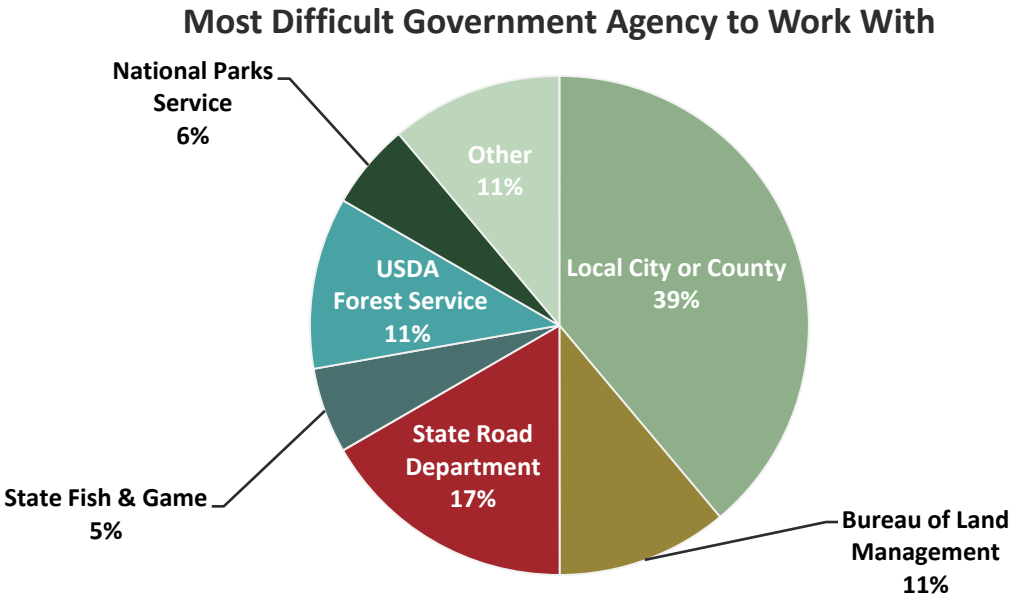


Figure 206: Most Difficult Government Agency to Work With

Comments and Other Agencies that are the MOST Difficult to Work With
None are difficult to work with. We just do what they tell us if we have any interaction with them at all.
Ministry of natural resources. Most difficult but not extremely difficult.

Figure 207: Comments and Other Agencies that are the MOST Difficult to Work With

ESTABLISHMENT OF 'RIGHT TREE-RIGHT PLACE" INTO EXISTING CODES

Question #172:

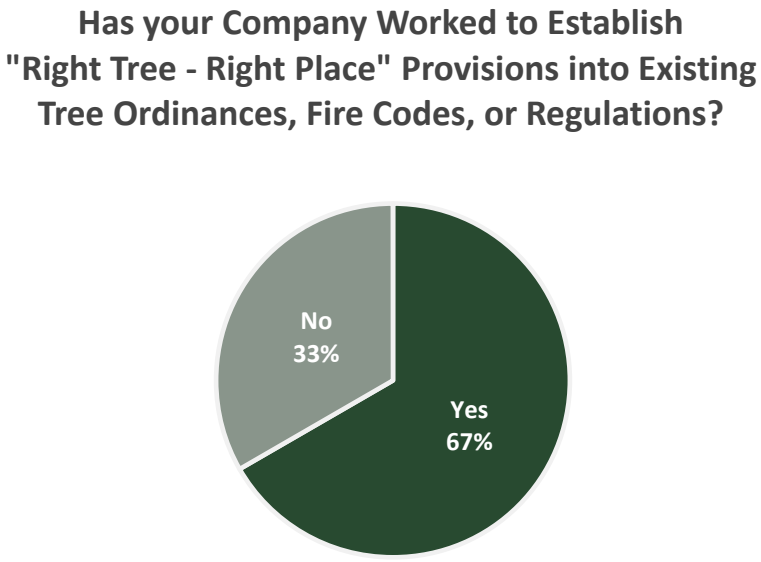


Figure 208: Establishment of 'Right Tree-Right Place" into Existing codes

Comments on "Right Tree- Right Place" Provisions
We work with cities concerning tree ordinances. "Know before you grow" program. [Answered: **Yes**]
Not always well received. Often local politicians have other agendas. [Answered: **Yes**]
No tree ordinances, fire codes, etc. [Answered: **No**]
However, the Ordinances are weakly worded and limited to ROW. [Answered: **Yes**]
It is an important program for us. It's more oriented toward municipality or customers. We've tried to have that program integrated in tree ordinances, but do not succeed. [Answered: **Yes**]

Figure 209: Comments on "Right Tree- Right Place" Provisions

UTILITY TRACKING OF PROPOSED UVM-RELATED LEGISLATION

Question #173:

Does your Company Routinely Track New or Proposed Legislation that Could Impact your Utility Vegetation Management Program?

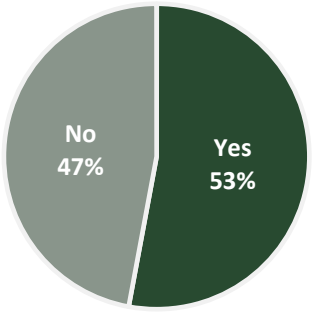


Figure 210: Utility Tracking of Proposed UVM-Related Legislation

Comments on New Legislation Impacting Distribution UVM
Pending [Answered: **No**]
Municipal Biomass (Tree/Vegetation) Retention Bylaws [Answered: **Yes**]
Mandatory regulatory and executive management[Answered: **No**]
We have a department specializing in government relations. [This department] follows any new law or legislation that could affect our business. UVM is only one of the different topics involved. [Answered: **Yes**]

Figure 211: Comments on New Legislation Impacting Distribution UVM

PARTICIPANT DESIRED STANDARDS REGARDING UVM

Question #174:

Do You Think There Should Be New Laws or Regulations that Could Assist The Utility Arborist in Any Aspect of UVM Operations?

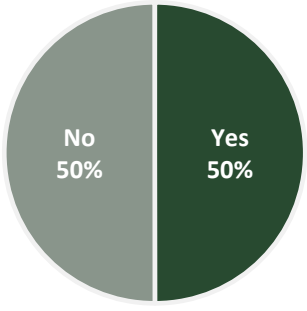


Figure 212: Participant Desired Regulations Regarding UVM

Question #174 (continued): If yes, what should the standard say and is there a current standard, such as ANSI Z133.1 or ANSI A300 that it should fall under?

Participant Desired Standards Regarding UVM
Create a "Public Utility Specialist" license - a sub-category for State Arborist license. Allowing person to declare a utility veg. emergency condition - mitigate as necessary with tree owner notification.
Legislation supporting utilities and criminal offense for stopping line clearance work.
OPUC should adopt language similar, major woody stem exemption. CPUC – Major Woody Stem exemption [Language in place already].
Regulations should ascribe more responsibility and ownership to property owners for the maintenance of their trees and the impact to the company for allowing these conditions to persist.
If a law or regulation could clarify and strengthen our role and rights to conduct vegetation management on a land owner's property we could better control our non-compliant vegetation.
Mandates tend leave little room for common sense
That standard must say that tree owners should be responsible of their trees. If a utility has to work on their tree they should be billed for that. It's about public interest.
It should fall under ANSI Z133.1 or ANZI A300 because these are already established and known throughout the utility industry.

Figure 213: Participant Desired Standards Regarding UVM

UVM FUNDING

DESCRIPTION OF UVM BUDGET DERIVATIONS

Question #175: Describe the process used to derive a budget for vegetation management for the distribution system.

Description of UVM Budget Derivations
Annual work types (miles, units, MHs, etc) are tracked. Coming budget based on 2 or 3 year historical average.
An annual list of circuits is assembled based on scheduled maintenance cycle, reliability performance, work logistics. An estimate is derived for each circuit from: 1) Previous cycle cost, 2) Predicted workload increase/decrease (tree in-growth, circuit on or off cycle, previous cycle removal rate), 3) Contractor rate increases since previous cycle.
Start with what we think it would cost to get on a four year cycle. Start with backbone circuits and try to work in multiphase laterals.
Our budget is created by the [State] Public Utilities Commission in what's called a "rate case". Every 3 or 4 years the Commission determines the funding level for our vegetation management program and this amount is fixed for the term of the rate case (either 3 or 4 years, typically 3 years). Any under spent funds are refunded to our customers, over-spending is charged to [Utility's] shareholders.
We make calculations on our cost [per] mile and base our budget request on those figures.
Workload inventories are gathered and a budget is determined. This is typically for a multi-year (2-3) budget submission.
Budget is derived by determining what feeders and laterals are due on cycle and requested funding to address. Other activities are based on 3 year average cost. VM also requests funding on special projects outside of established programs. This funding is on a per program basis by weighing cost/reliability impact.
This is an annual business planning process: 1) Analysis is conducted to define the vegetation management needs for the next 5 years; 2) A maintenance program is developed to satisfy the UVM needs; 3) A high level estimate is generated to price the annual programs; 4) The plan is stakeholdered internally with senior management and our internal service provider; 5) Final budget is derived through a compromise between UVM needs, resourceability and budget restraints.
We try to give the budget personnel the goals that are not being met, including reliability and safety, and then try to set a dollar amount that we need to achieve the goals. It has not worked real well in the past.
Budget is allocated based on overall Corporate earnings target for the year. Depends heavily on company's financial performance at any given time.
The budget is proposed to the VP management and is approved by the board
We deposited a file argument which includes in our global tariff cause at [Government] Energy Board. We estimated our workload accordingly to the cycle we want to reach and maintain.
We submit what our target budget should be to cover all danger tree programs/Skylining Projects (Capital Budget) as well as our needs to cover pro-active line maintenance and reactive programs (O&M budget) to maintain reliability and cycle targets.

Figure 214: Description of UVM Budget Derivations

VARIABLES THAT EFFECT ANNUAL DISTRIBUTION BUDGET

Question #176: The annual budget for distribution vegetation management is primarily influenced by the following variables. Rank the importance of each of these influences on the budget by selecting one of the four categories for each variable. One answer per row

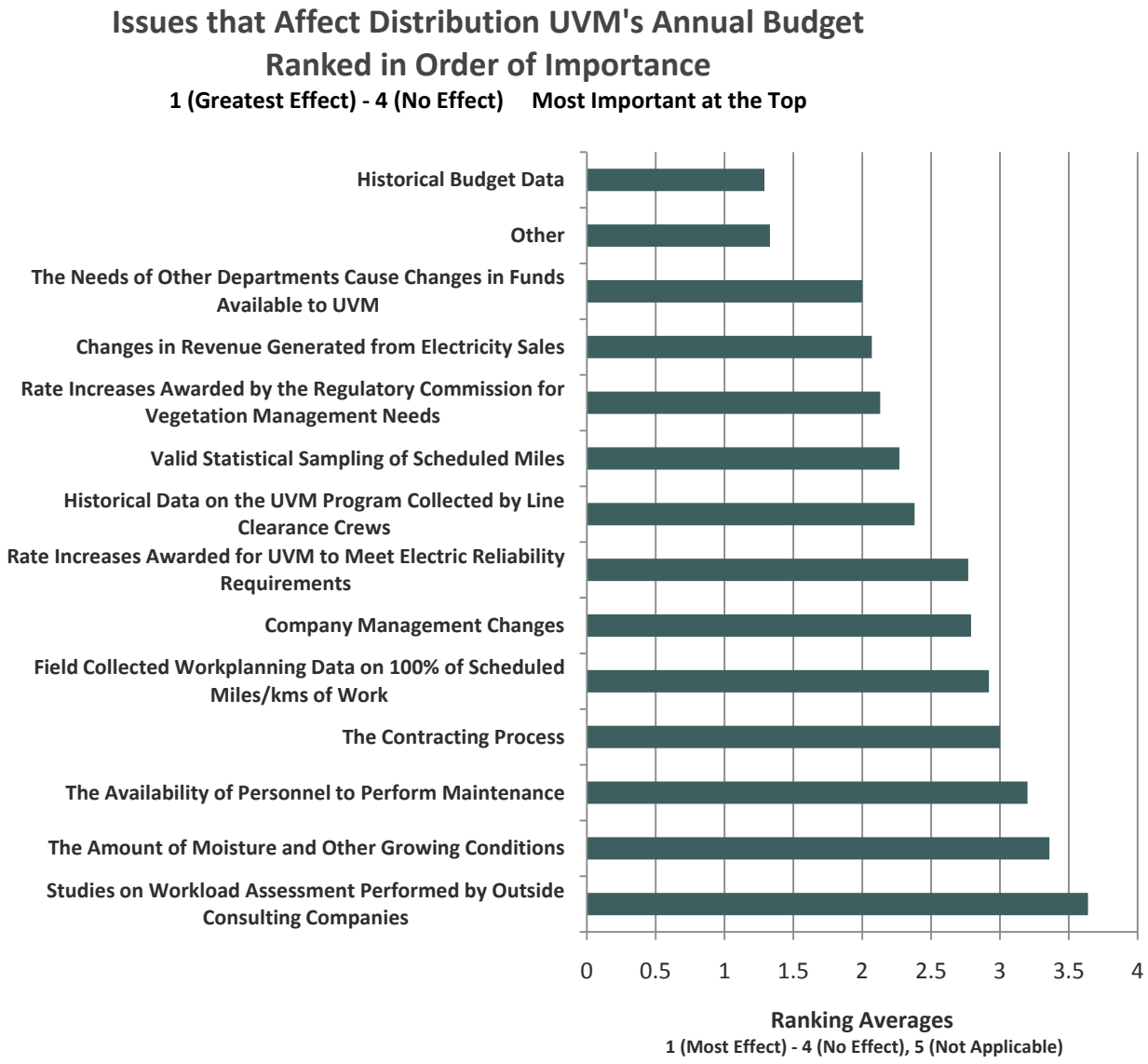


Figure 215: Issues that Affect Distribution UVM's Annual Budget Ranked in Order of Importance

Other Issues Affecting Annual Distribution UVM Budgets
SAIDI and SAIFI
Pruning and brush cutting history
Utility Commission rulings

Figure 216: Other Issues Affecting Annual UVM Budgets

ADEQUACY OF DISTRIBUTION UVM BUDGET TO MEET OBJECTIVES

Adequacy of Budget in the Last Five Years

Question #177: The following statement best describes my budgets of the past 5 years. One answer only.

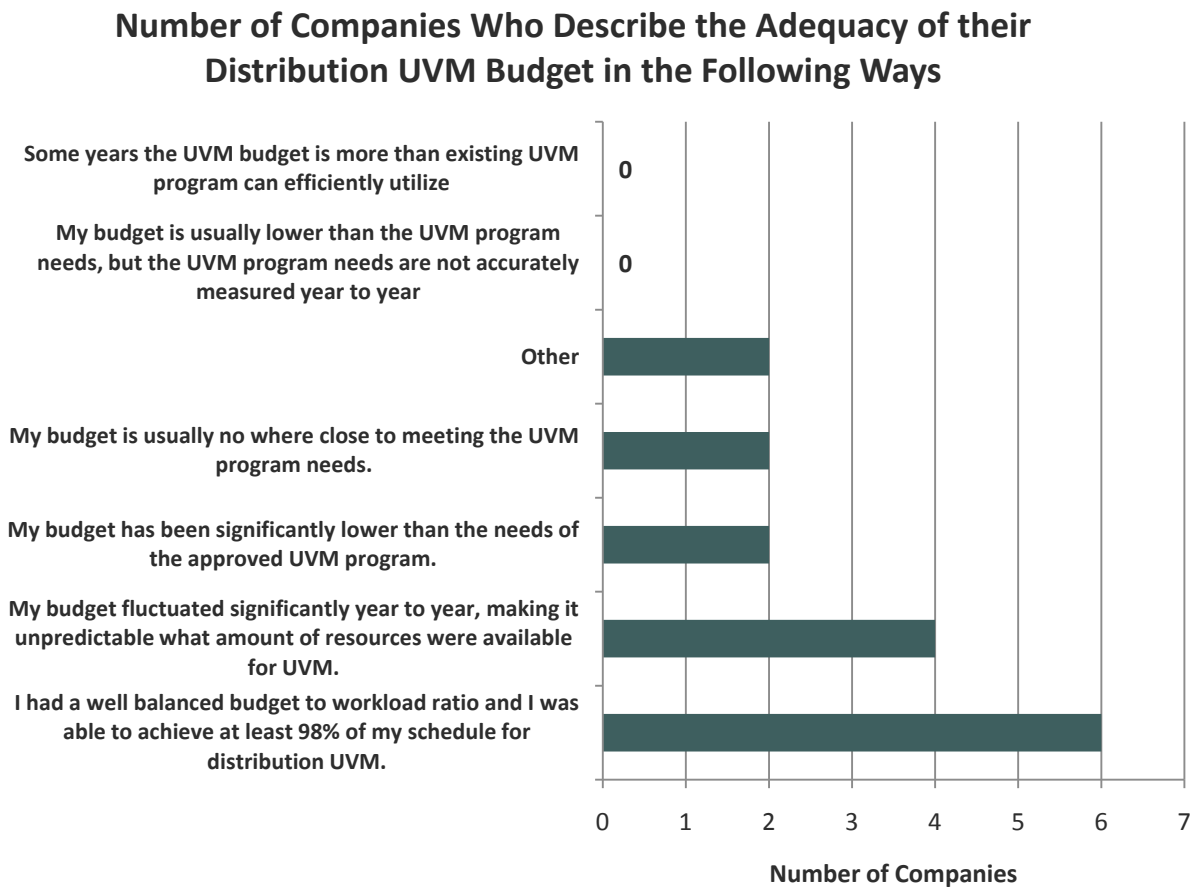


Figure 217: Number of Companies Who Describe the Adequacy of their Distribution UVM Budget in the Following Ways

Comments on Adequacy of the UVM Budget
The budget has been fairly static the past few years but allows at least 90% of schedule.
Our budget has been about 85 - 90% of what is required. We have received budget approval to address acquired backlog.

Figure 218: Comments on Adequacy of the UVM Budget

The following graph derived from data from previous question (**Question #177**)

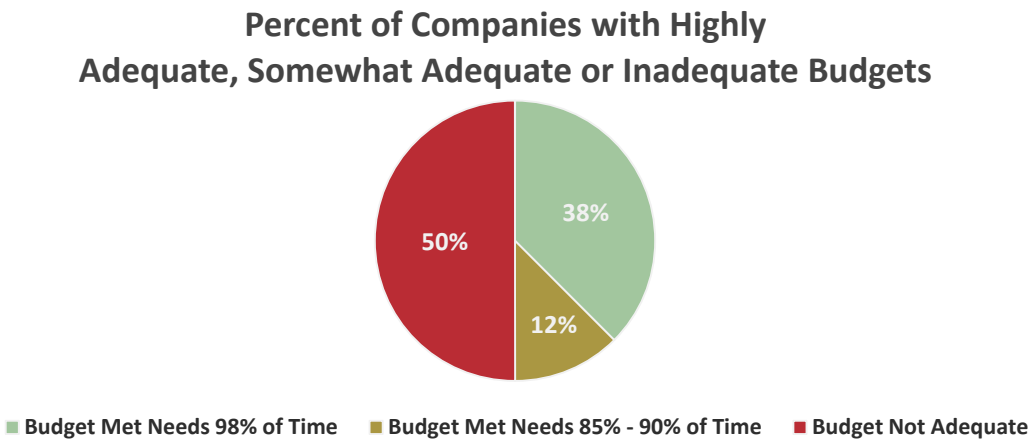


Figure 219: Percent of Companies with Highly Adequate, Somewhat Adequate or Inadequate Budgets

CAPITALIZATION OF UTILITY VEGETATION MAINTENANCE

Possible ways to increase the ability of funding to meet workload would be capitalization of work.

Capitalized Projects

In previous benchmarks we learned that utilities vary in how some work types are included in the UVM budget and others are covered under different budgets and possibly capitalized.

Question #178: Please match the following work types to the type of funding that pays for the work. If there are other UVM work types funded outside the annual UVM budget, please explain in the comments. NOTE: Check all responses that apply to each UVM activity.

Data Discussion of Capitalization of UVM Activities

Funding for UVM Projects (next page) breaks down the sources of UVM funding. Percent of respondents that capitalized a given project (teal and gold on the graph) is greatest for new construction. It can be noted that for the nine categories with any capitalization (bottom nine categories shown on graph, next page); the majority of them are internal company projects or UVM reliability projects (e.g. bottom 5 categories are all internal projects). It is interesting that some projects are not capitalized by any utilities, such *as Hauling Chips and Wood for Bio-Products and Generation, City Tree Programs* and *Tree Planting Projects*. These areas include possible assets to the UVM program, but are not being utilized for alleviating the constraints of UVM budgets. The only program that has any funding from grants is *Smart Grid Projects*. The fact that many activities are paid for by other departments and/or UVM resources are used to perform non-routine activities may add to the previously identified problem of shortfalls in UVM budgets/resources.

Data collected from **Question #178** See ***Data Discussion of Capitalization of UVM Activities*** for analysis of following graph (Figure 220).

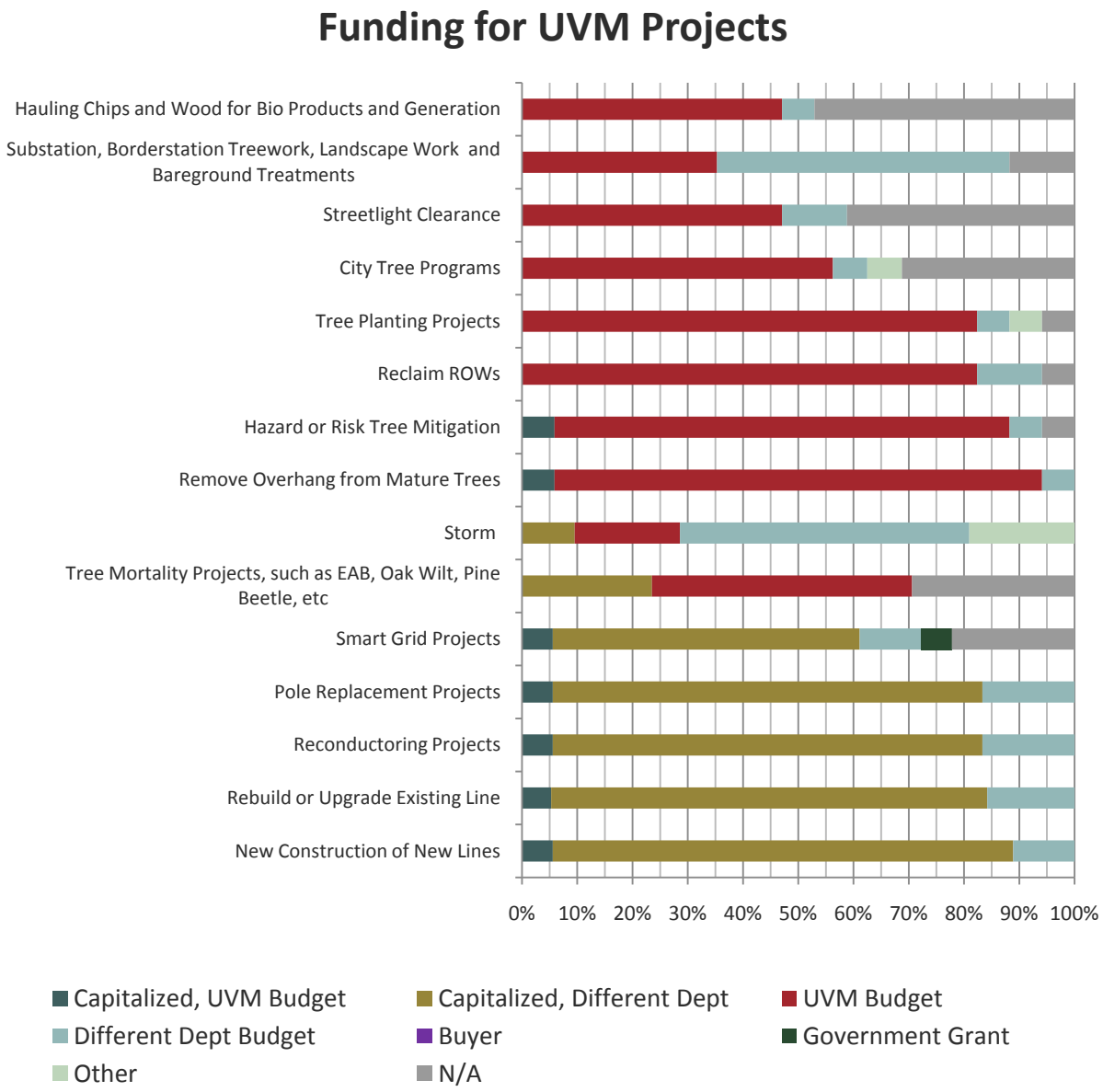


Figure 220: Funding for UVM Projects

"Other" Funding Sources on *Funding Sources for UVM Budgets* Graph
If a storm is formally declared a disaster area by officials, [Utility] is allowed to recover these costs through a special application to the Public Utilities Commission.
Specified Storm account
Same Dept different budget [for storm]

Figure 221: "Other" Funding Sources on *Funding Sources for UVM Budgets* Graph

THE EFFECTS OF RELIABILITY MEASUREMENTS ON UVM

COLLECTION OF RELIABILITY METRICS

Before making comparisons of tree-related reliability metrics (SAIDI, SAIFI, CAIDI, etc.) between utilities, CN Utility Consulting would like to look at the tracking procedures used by the benchmark participants that reported these metrics. When compiling the data for the graphs that follow, it was discovered that there are differences in the ways companies define sustained outages and major events. Since data collection is inconsistent between companies, it is important to note that comparisons are questionable. Unfortunately, it is impossible to normalize the data, since the assumptions for reliability are completely different between companies (i.e. the application of IEEE 1366-2003 is at best only applied in more recent years and at worst not used according to all of its rules. Plus IEEE-1366-2003 has its own problems with capturing an accurate picture of reliability for UVM).

Question #179:

Does your company follow the IEEE-1366-2003 recommendations for measuring the reliability of your electric DISTRIBUTION SYSTEM?

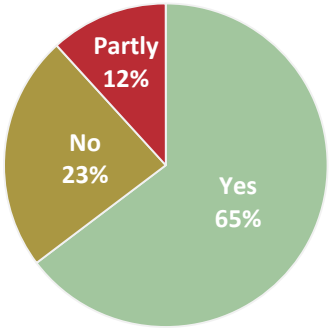


Figure 222: Reliability Metrics Collected by Using IEEE-1366-2003

Comments on Definitions Used for the Collection of Reliability Metrics
We use the IEEE-1366-2003 recommendations when participating in the IEEE Survey. [ANS: "Partly"]
Outage > 1 minute [ANS: "No"]
We have our own standard that we use. We compare ours to IEEE 1336-2003 for validation of our results. We measure "All Events" and "Normalized (excluding major events)" [ANS: "Partly"]
We use [State] Public Service Commission ("FPSC" Hence Forth) Guidelines [ANS: "No"]
Please see paper "Investigation of the 2.5 Beta Methodology" at http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5762382 and paper "Major Event Day Segmentation" **http://ieeexplore.ieee.org/application/enterprise/entconfirmation.jsp?arnumber=1664988** [ANS: "No"]
The previous IEEE standard is used (10% of customers affected, storm duration > 24 hours) [ANS: "No"]

Figure 223: Comments on Definitions Used for the Collection of Reliability Metrics

RELIABILITY METRICS USED BY INDUSTRY

Question #180: Which of the following measurements does your company use to understand and report on reliability? Which are used to evaluate the UVM program? Check all that apply.

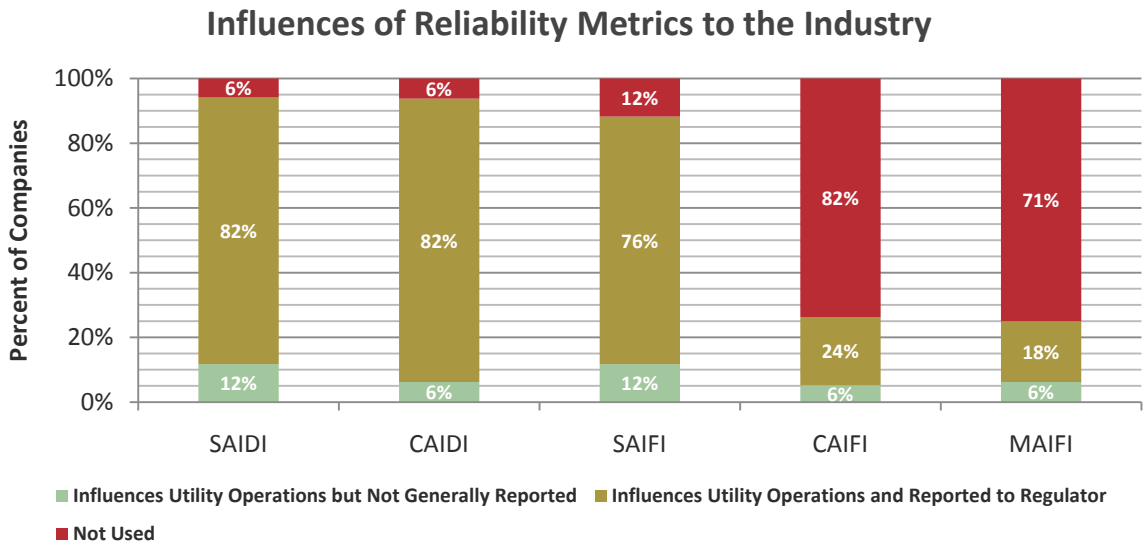


Figure 224: Influences of Reliability Metrics to the Industry

The graph above has the most influential reliability metric (SAIDI) on the left of the chart and the influence decreases as you move right. In contrast, the graph below shows that SAIFI rather than SAIDI is used for UVM by the majority companies responding. The difference between how many companies use SAIFI compared to SAIDI is 18%. It should be noted that many companies use more than one metric for UVM.

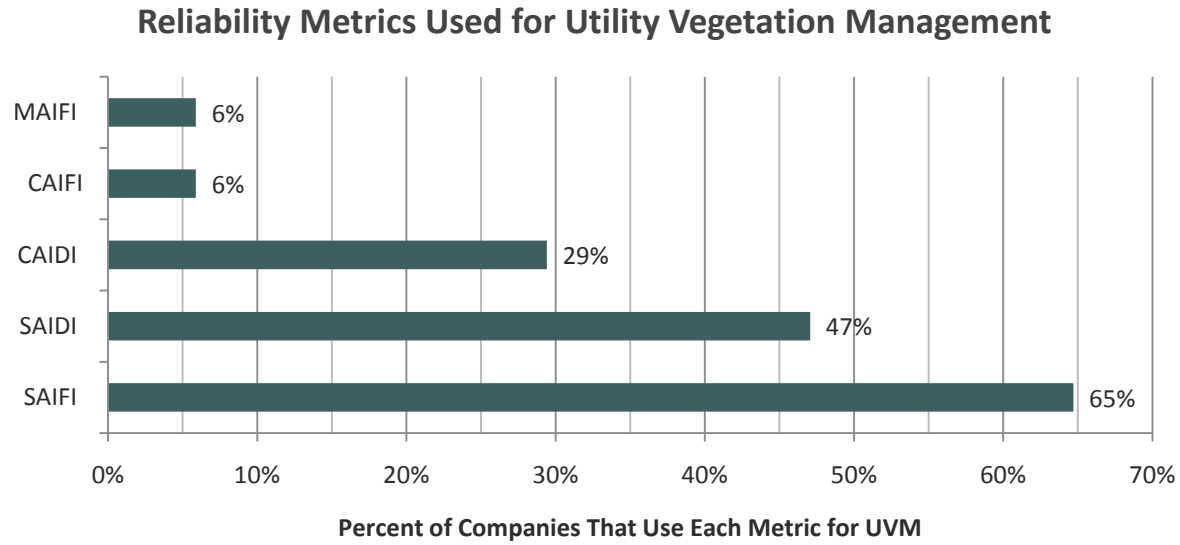


Figure 225: Reliability Metrics Used for Utility Vegetation Management

DEFINING MAJOR EVENTS

Question #181:

Does your company use the IEEE 1366-2003 guidelines for defining and separating major event days?

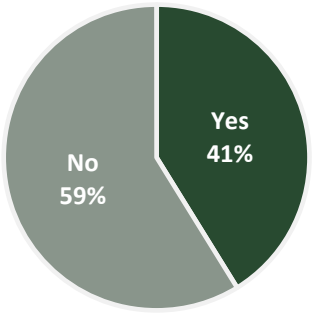


Figure 226: Defining Major Events

T-Meds from Respondents That Use IEE 1366-2003 Guidelines for Major Event
[T-Med is] 4.32 [Note: This is less than 5 minutes. > 5 minutes is the defined length of time for a sustained outage according to IEEE 1366-2003][1]
[T-Med is] 2.5 Beta Method
For 2010 [T-Med] was 4.12 minutes [Note: This is less than 5 minutes. > 5 minutes is the defined length of time for a sustained outage according to IEEE 1366-2003][2]
[T-Med is] 6.8

Figure 227: Comments from Respondents That Use IEE 1366-2003 Guidelines for Major Event

When just looking at the companies that are using IEEE 1366-2003 (Comment Table above), one can note that the *complete* adoption of the guidelines is not being followed. For example, two of the companies are not defining momentary and sustained outages as prescribed by IEEE 1366-2003. This is obvious by looking at their T-Meds. Since less than 5 minutes is the duration for a momentary outage as defined by IEEE 1366-2003[3] and these two companies have thresholds less than 5 minutes, then they are not actually completely adopting these guidelines. It should also be noted that these guidelines require five year averages. It is questionable whether companies have five years of data that fit the 1366-2003 measurement. Sustained outages have been defined as more than one minute by many or most of the industry. Past measurements used to calculate current T-med may be based on older definitions for sustained outages and major events. It is possible that data collection was done with an older definition of a sustained outage or they have maintained their old definitions while using these guidelines for separating major events.[4]

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[1] Richard E. Brown, *Electric Power Distribution Reliability,* p. 50.

[2] Ibid

[3] Ibid

[4] To complicate this further it should be noted here that 1366-2003 has been revised and a new version was released by IEEE called "P1366/D6 November 2011- Draft."

Question # 182: If you answered "NO" to [using IEEE 1366-2003 Guideline for Major event Days], can you please state how your company defines “storm” event when tracking outages?

Comments from Respondents That Do NOT Use IEEE 1366-2003 Guidelines for Major Events
A major storm is declared when the number of restoration steps exceeds the 98.5 percentile of all days in the most recent four calendar years. All reliability data associated with interruptions beginning on that qualifying day would be considered major storm even if the interruptions extend into subsequent days.
Storm exclusion is set by [if] O&M $ to repair [storm damage] exceeds a pre-set threshold and % of customers outaged for over 24 hours [exceeds pre-set threshold].
We define it as a "Major Event" A Major Event is defined as an uncontrollable event (e.g. windstorm, earthquake, forest fire, flood, lightning etc.) that causes an outage resulting in more than 70,000 customer-hours lost or if customer-hours lost is >=1% of annual customer-hours lost for the distribution system, whichever is less. The definition excludes controllable causes such as equipment failure or human error at the distribution, substation or transmission level.
We use [State] Guidelines Major Event Days are classified as Named Storms, Tornados, ice on lines, or extreme weather or fire, causing Emergency Operations Center ("EOC" Hence Forth) to be opened.
[Utility] Distribution deems a "Major Event' to have occurred when 10% or more of [Utility’s] customers have been interrupted by an event. An event may be a storm (usually the case), the August 14, 2003 blackout or any other problems that interrupt 10% or more customers and cause a change in the normal restoration business processes. All [Utility] Distribution customers interrupted throughout the duration of the event while normal restoration business processes are suspended are counted in the determination of the numerator of the percent interrupted. The denominator is the total number of customers served at the end of the month when the force majeure occurred.
Over the years a wide range of methods have been proposed to define major events. One approach that has been provided by the IEEE is the IEEE Standard 1366-2003—2.5 Beta Methodology. According to this methodology, it is only valid if a utility’s reliability data completely follows the log-normal distribution, particularly with respect to the tails of the distribution. It has been shown that this is not the case for interruptions in all utilities. Issues arise when the right tail of a utility data set does not fit the log-normal distribution. Also the threshold defined by the IEEE 1366-2003—2.5 Beta Methodology varies since it is dependent on a utility’s reliability data from the previous five years. As a result, major events, reflected by a large daily SAIDI value, may cause an unsuitable increase in the threshold for future years and lead to inconsistent segmentation of data. Please see paper "Investigation of the 2.5 Beta Methodology" at http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5762382 and paper "Major Event Day Segmentation" at http://ieeexplore.ieee.org/application/enterprise/entconfirmation.jsp?arnumber=1664988
Normally it has to meet certain thresholds to be considered a major event. Our service territory is broken up by regions or networks and if a certain region has 10% or more of its customer base without lights for longer than a 24 hour period, it can be considered a major event. There are some variances that can take place to this formula but normally that is the criteria to be considered a Major event.
After each month is concluded, our performance management group will look at all outage data and determine which events it can classify as "Storm" event based on Customer Interruptions and Customer Minutes. To do so, the "Storm" event will have to meet certain thresholds.
Calculated by each individual REGION and rolled up together.
Number of events per day, by region

Figure 228: Comments from Respondents That Do NOT Use IEE 1366-2003 Guidelines for Major Events

Question #184: If you do NOT follow the IEEE 1366-2003 method for determining Major Events, please describe what outages are EXCLUDED from your company's calculation of SAIDI, SAIFI, CAIDI (e.g. momentary outages, storm etc.).

Comments on Outages Excluded as "Major Events" from Calculations of Reliability Metrics
Major storms are defined in #182, planned and customer caused outages are excluded.
Number of events per day, rather than SAIDI per day (4 companies)
We calculate two sets: with storm, and without storm. All calculations do **not** include outages less than or equal to one minute, planned outages, customer equipment outages that only effect that customer, single customer requested outages, under frequency events, and load shedding events.
Momentary outages (< 1 min.) are excluded.
Major Event Days as stated by the [State PUC], including Named Storms, Tornados, ice on lines, or extreme weather or fire, causing EOC [Emergency Operations Centers] to be opened.
[Utility] included all sustained outages in our system. [Utility] is able to calculate SAIDI/SAIFI/CAIDI by having the data segregated and filtered according to various requirements.

Figure 229: Comments on Outages Excluded as "Major Events" from Calculations of Reliability Metrics

TRACKING RELIABILITY METRICS

Tree-Related Outages

Tracking Tree-Related Outages

Question #185: Do you track tree-related outages?

YES for 100% of respondents

Calculating Tree-Related Reliability Statistics

Question #186:

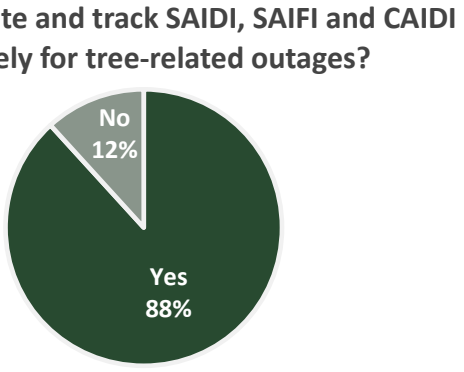


Figure 230: Do You Calculate Tree-Related Reliability Statistics?

Question #187:

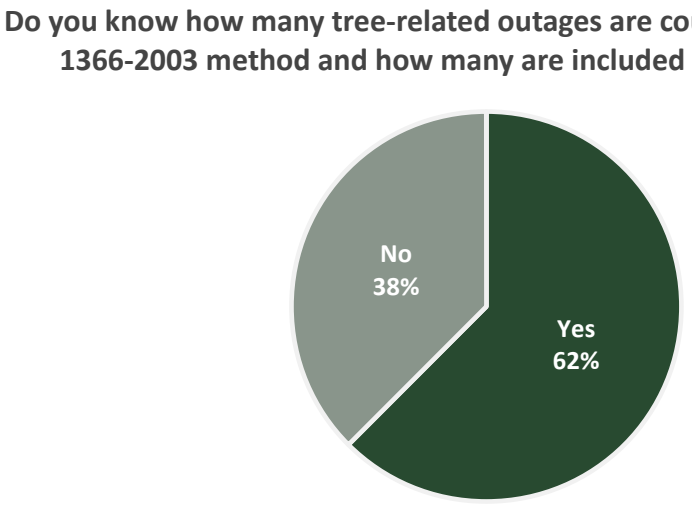


Figure 231: Do You Count Tree-Related Outages Using IEEE 1366-2003 Method?

If you answered "NO", please comment on your methodology
A major storm is declared when the number of restoration steps exceeds the 98.5 percentile of all days in the most recent four calendar years. All reliability data associated with interruptions beginning on that qualifying day would be considered major storm even if the interruptions extend into subsequent days.
The company keeps some of this data but would not provide the resources to pull any reliability data for this survey.
Tree outages are calculated under [State] Guidelines where 1 minute is an interruption; therefore, any tree related interruption >1 minute is counted. We know how many tree outages are counted under [State] Guidelines, and how many are included in Major Events as classified by the [State].
[Utility] included all sustained outages in our system. [Utility] is able to calculate SAIDI/SAIFI/CAIDI by having the data segregated and filtered according to various requirements.
I am not familiar with this.

Figure 232: Comments on Counting Tree-Related Outages

TREE-RELATED OUTAGES

The graphs in this section all were generated using the data collected in question #188 (below).

Question #188: Please provide the NUMBER of UNPLANNED sustained outages your company experienced in the following years on your distribution system CAUSED BY TREES during 'Major Events' and 'Non-Major Events', as defined by IEEE 1366-2003. Also include the total customer minutes lost each year in each category.

NOTE: If you do NOT use IEEE 1366-2003 to define major events, answer the question using your definition of storm event (supplied in question #182).

Non-Major Unplanned Tree-Related Outages

Graphs from data collected in **Question #188**

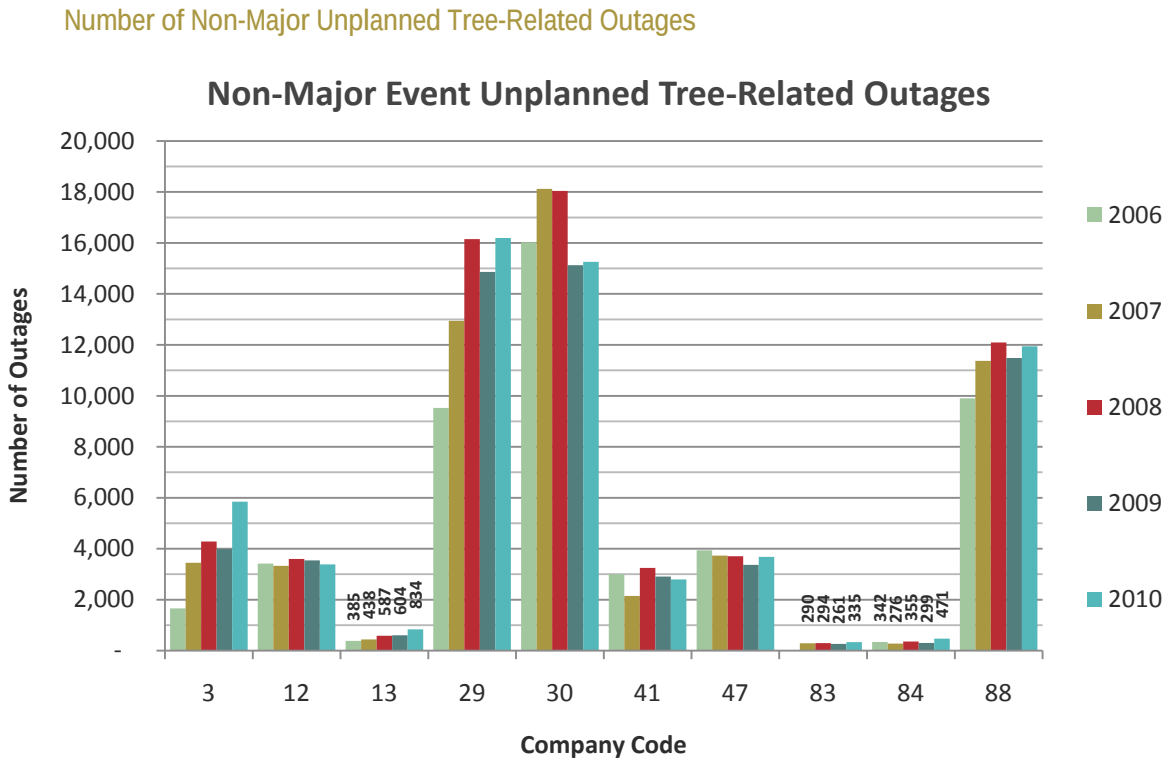


Figure 233: Non-Major Event Unplanned Tree-Related Outages for Years 2006 - 2010

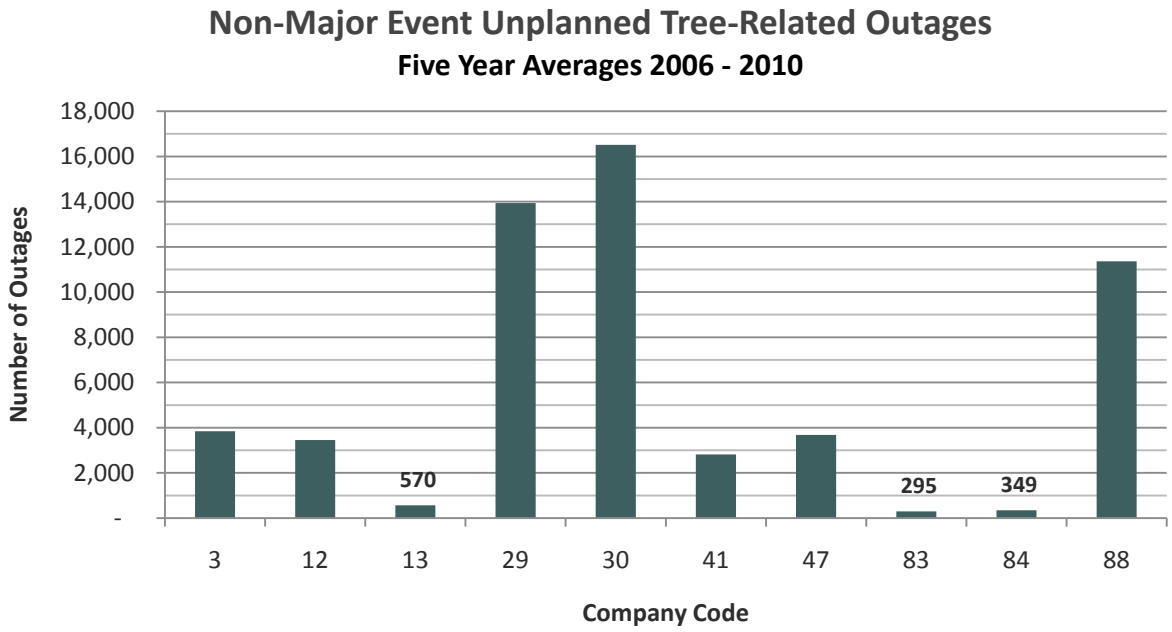


Figure 234: Non-Major Event Unplanned Tree-Related Outages Five Year Averages (2006 – 2010)

Graphs from data collected in **Question #188**

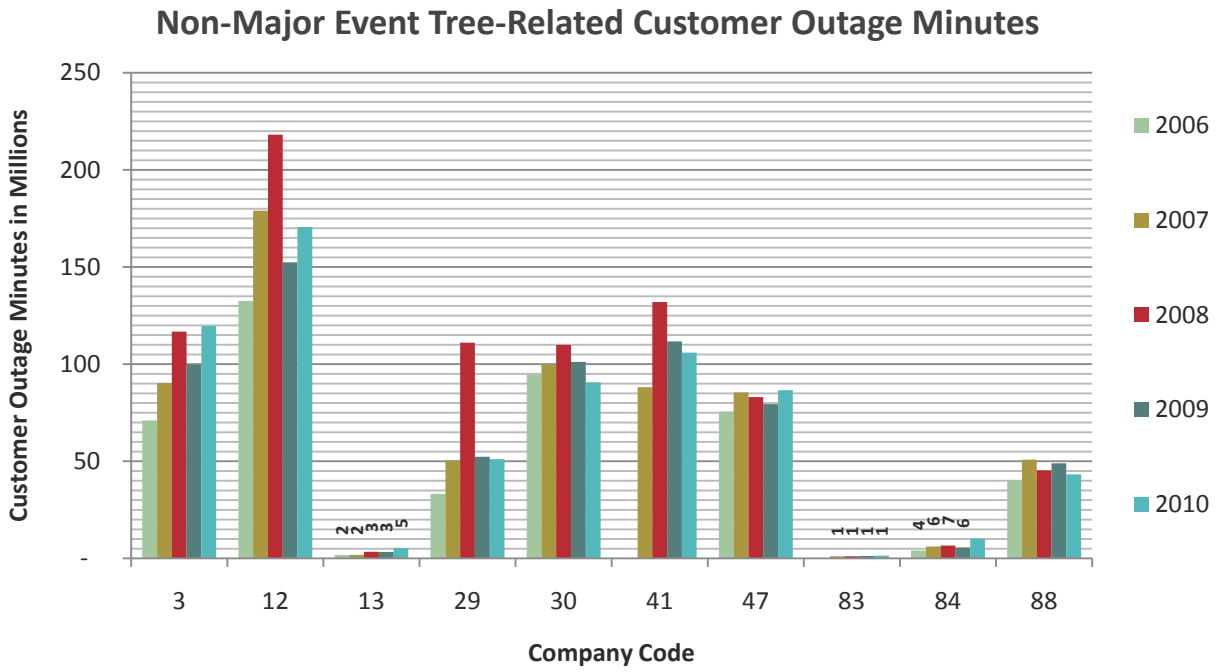


Figure 235: Non-Major Event Tree-Related Customer Outage Minutes for Years 2006 - 2010

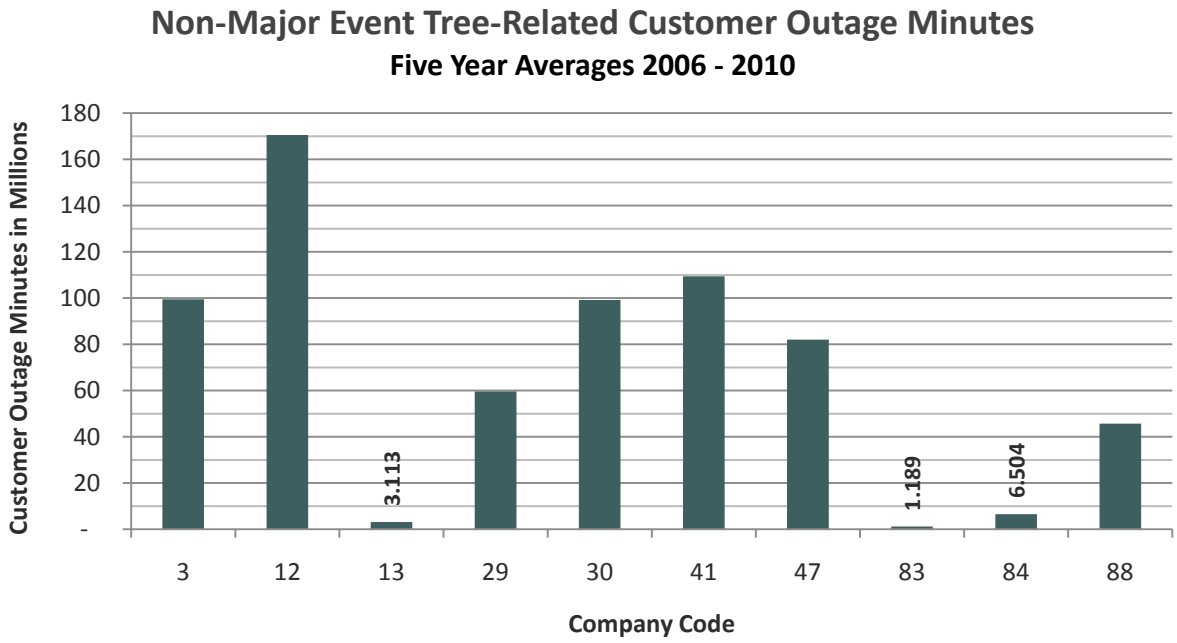


Figure 236: Non-Major Event Tree-Related Customer Outage Minutes Five Year Averages (2006 -2010)

Major Event Tree-Related Outages

Graphs from data collected in **Question #188**

Number of Major Event Unplanned Tree-Related Outages

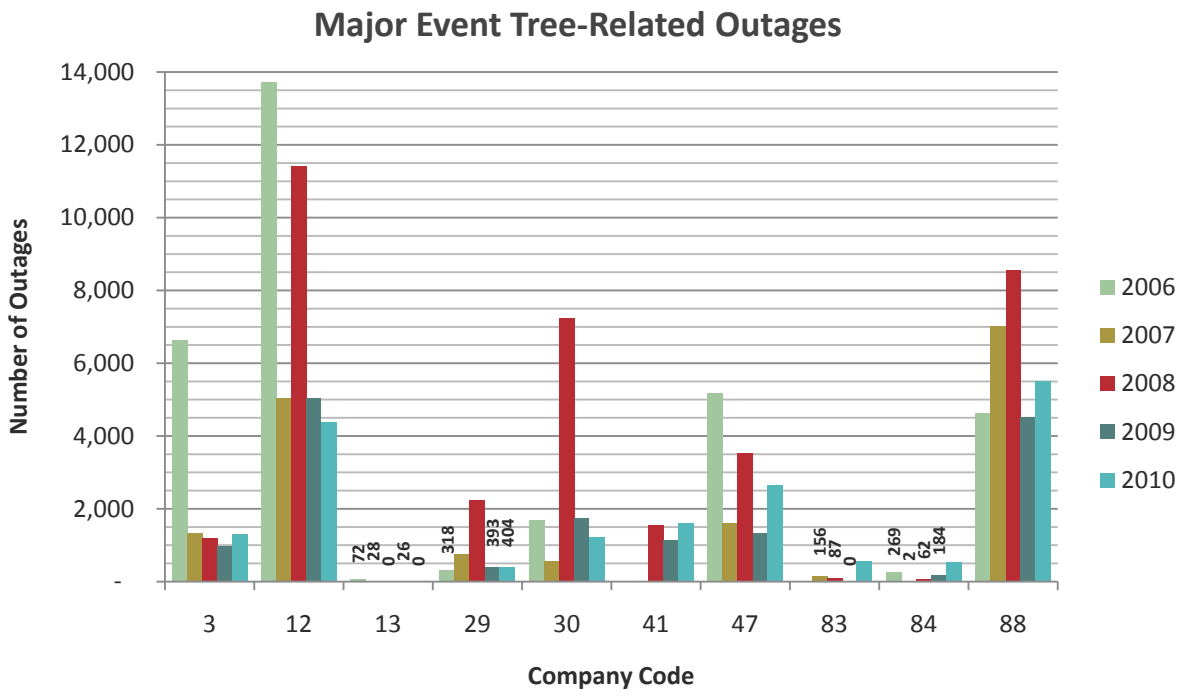


Figure 237: Major Event Tree-Related Outages for Years 2006 - 2010

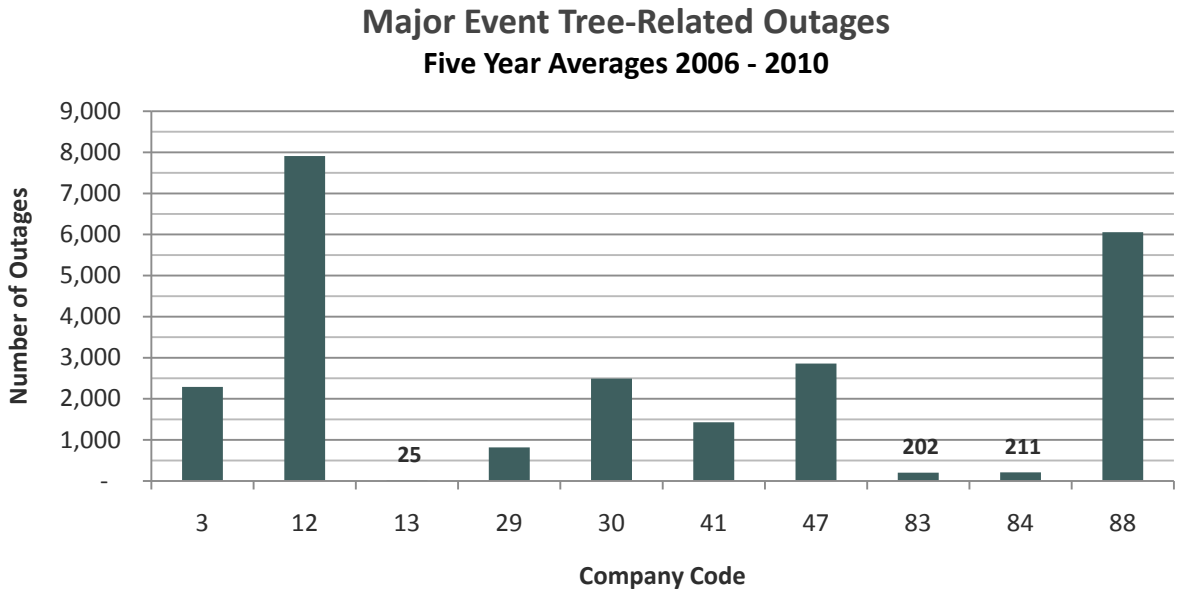


Figure 238: Major Event Tree-Related Outages Five Year Averages (2006 -2010)

Graphs from data collected in **Question #188**

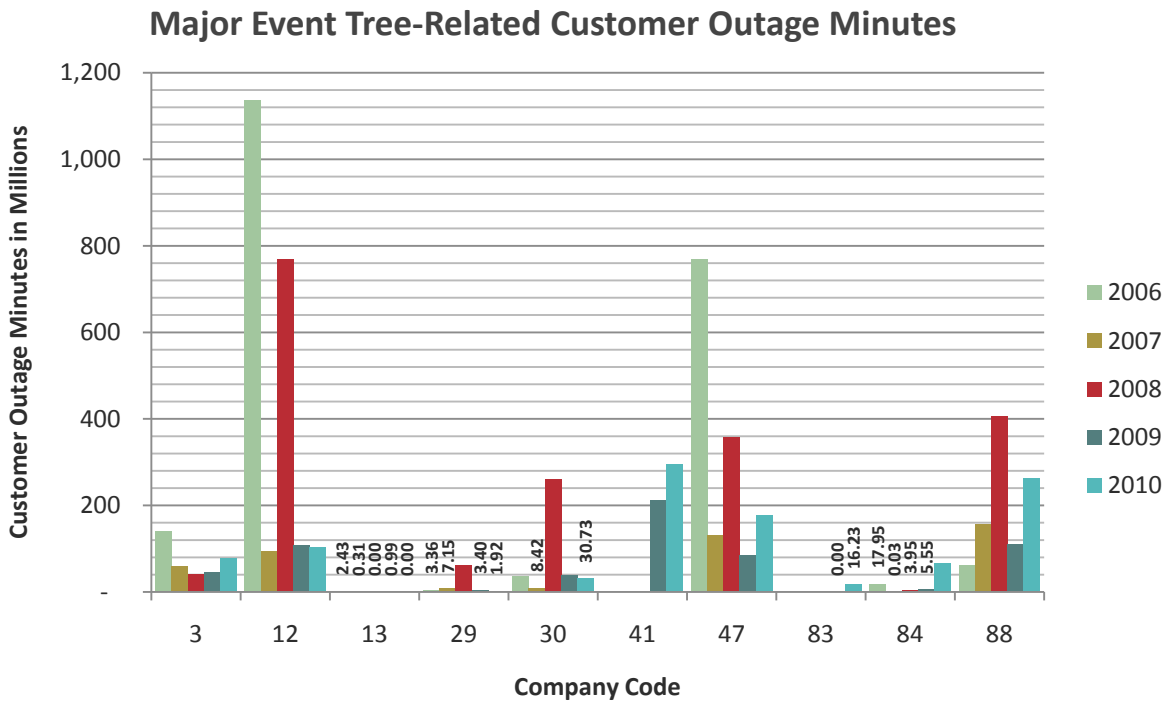


Figure 239: Major Event Tree-Related Total Customer Outage Minutes for Years 2006 - 2010

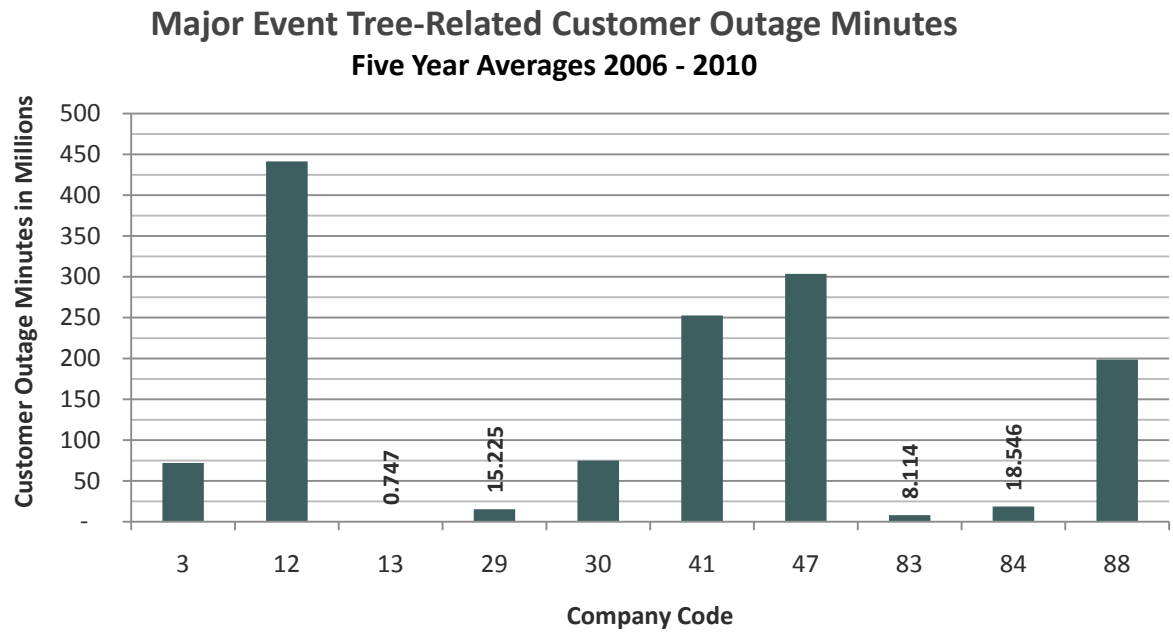


Figure 240: Major Event Tree-Related Customer Outage Minutes Five Year Averages (2006 -2010)

System-Wide Non-Major Event SAIDI

Question # 189: What was your company's TOTAL DISTRIBUTION SYSTEM AVERAGE INTERRUPTION INDEX (SAIDI) for IEEE 1366-2003 defined outages for the following years and what is the TOTAL SAIDI FOR MAJOR EVENT/STORM only?
NOTE: If you do not use IEEE 1366-2003 to define major events, answer the question using your definition of storm event (supplied in question #182).

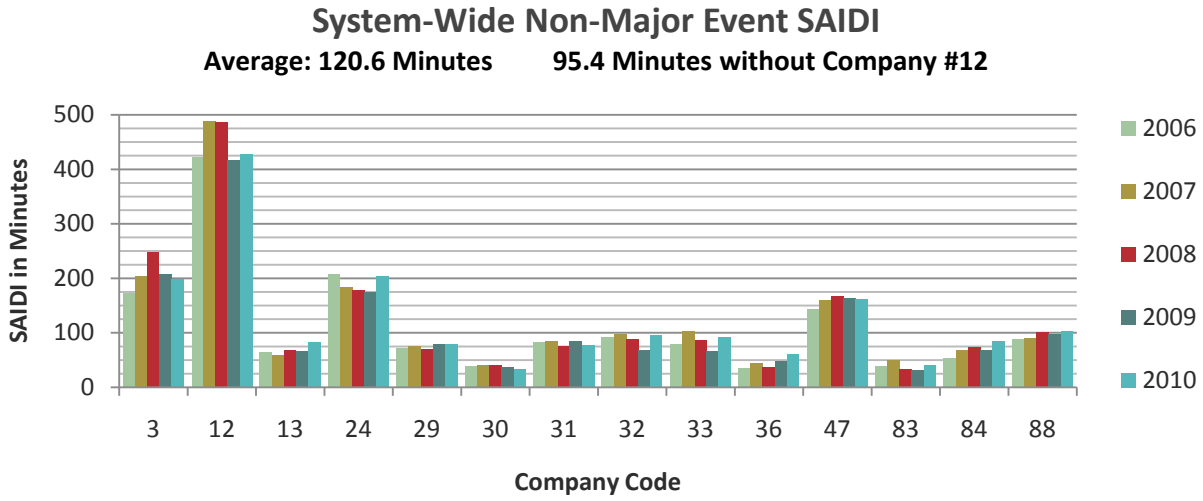


Figure 241: System-Wide Non-Major Event SAIDI for Years 2006 - 2010

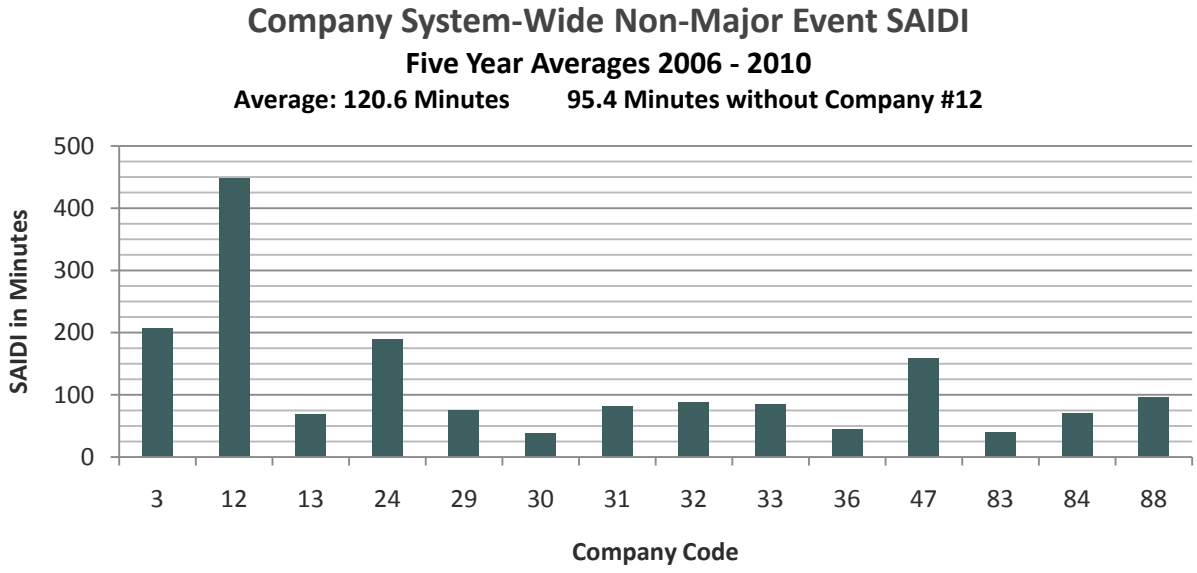


Figure 242: System-Wide Non-Major Event SAIDI Five Year Averages (2006 -2010)

System-Wide Major Event SAIDI

Graphs from data collected in **Question #189**

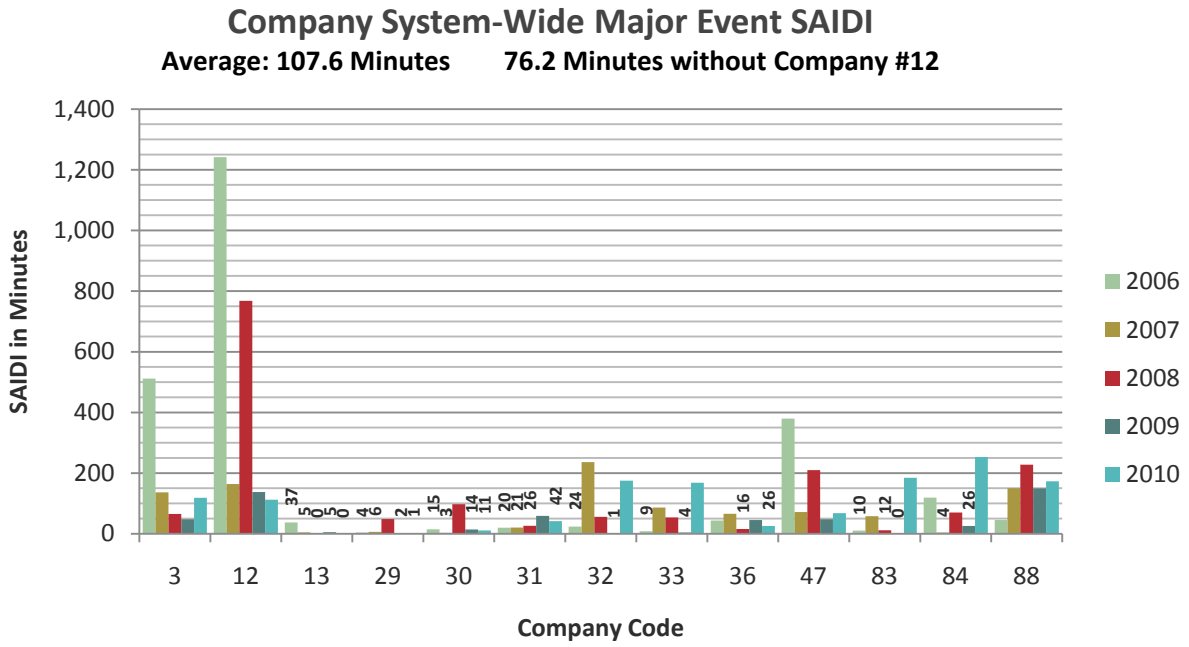


Figure 243: Company System-Wide Major Event SAIDI for Years 2006 - 2010

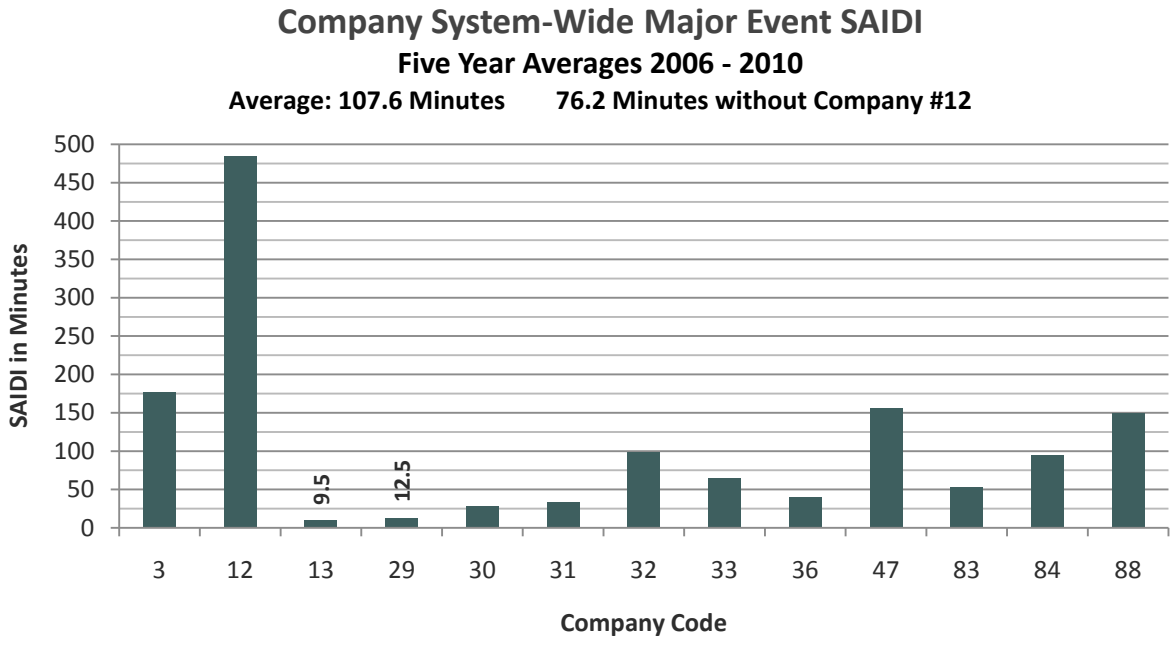


Figure 244: Company System-Wide Major Event SAIDI Five Year Averages (2006 -2010)

System-Wide Non-Major Event SAIFI

Question #190: What was your company's DISTRIBUTION SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIFI) for IEEE 1366-2003 defined outages for the following years and what is the TOTAL SAIFI FOR MAJOR EVENT/STORM only?
NOTE: If you do not use IEEE 1366-2003 to define major events, answer the question using your definition of storm event (supplied in question #182).

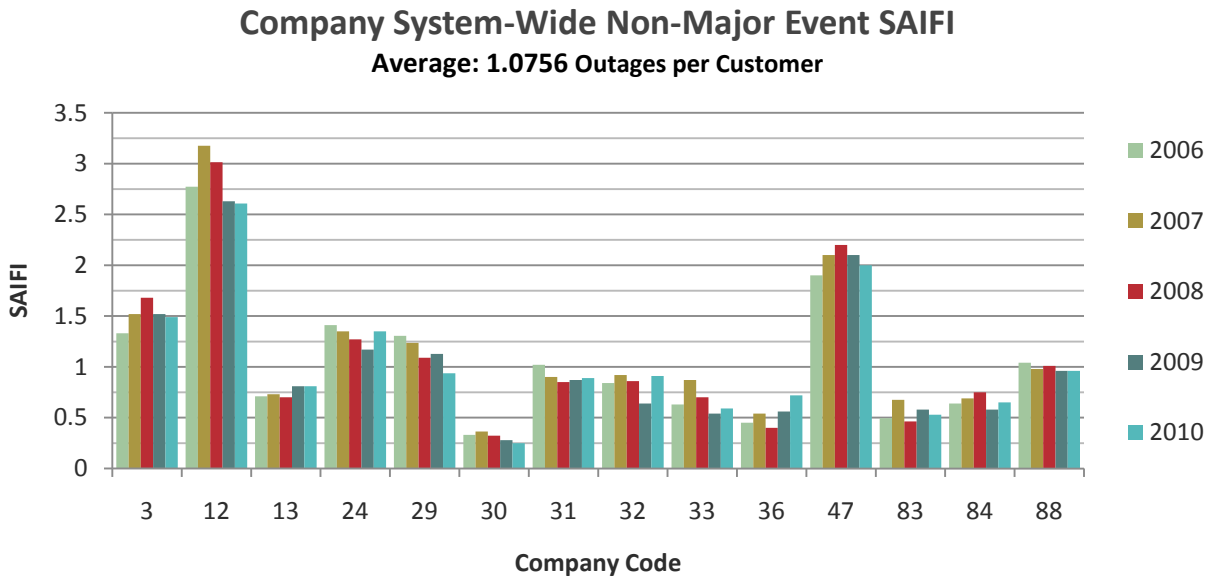


Figure 245: Company System-Wide Non-Major Event SAIFI for Years 2006 - 2010

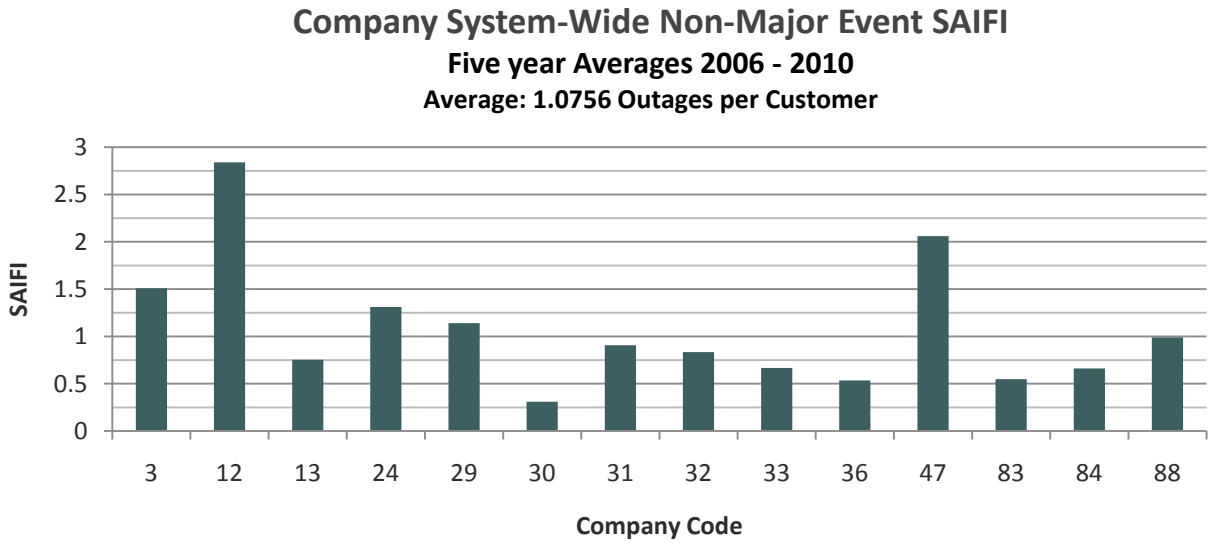


Figure 246: Company System-Wide Non-Major Event SAIFI Five Year Averages (2006 -2010)

System-Wide Major Event SAIFI

Graphs from data collected in **Question #190**

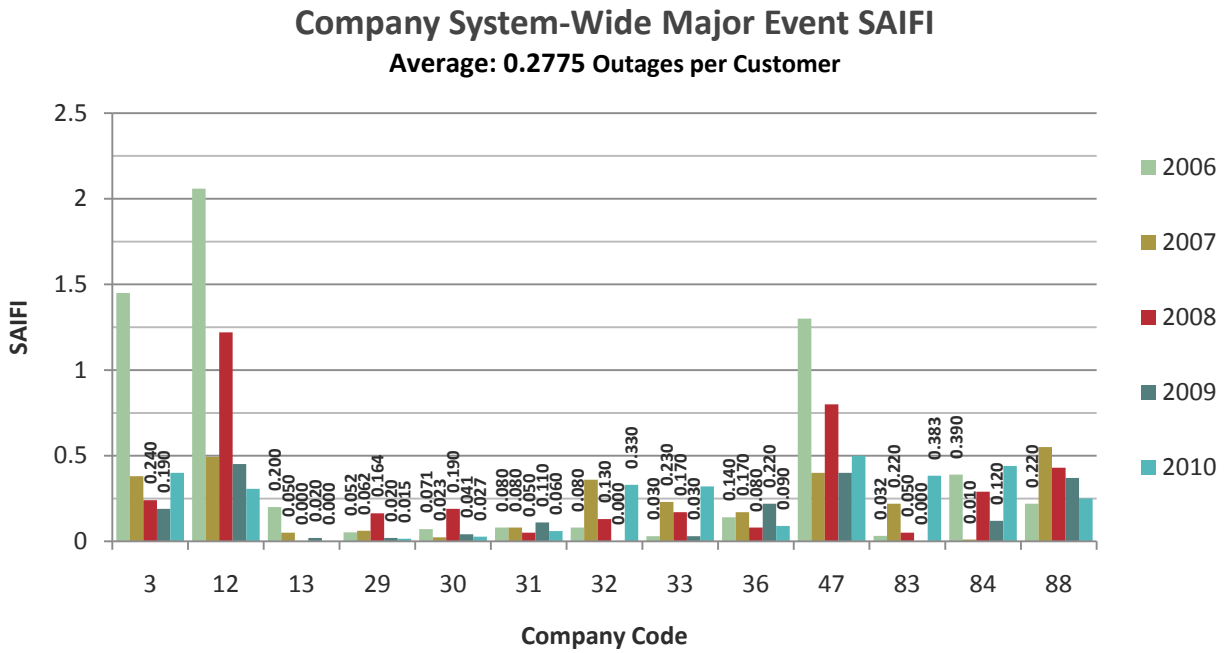


Figure 247: Company System-Wide Major Event SAIFI for Years 2006 – 2010

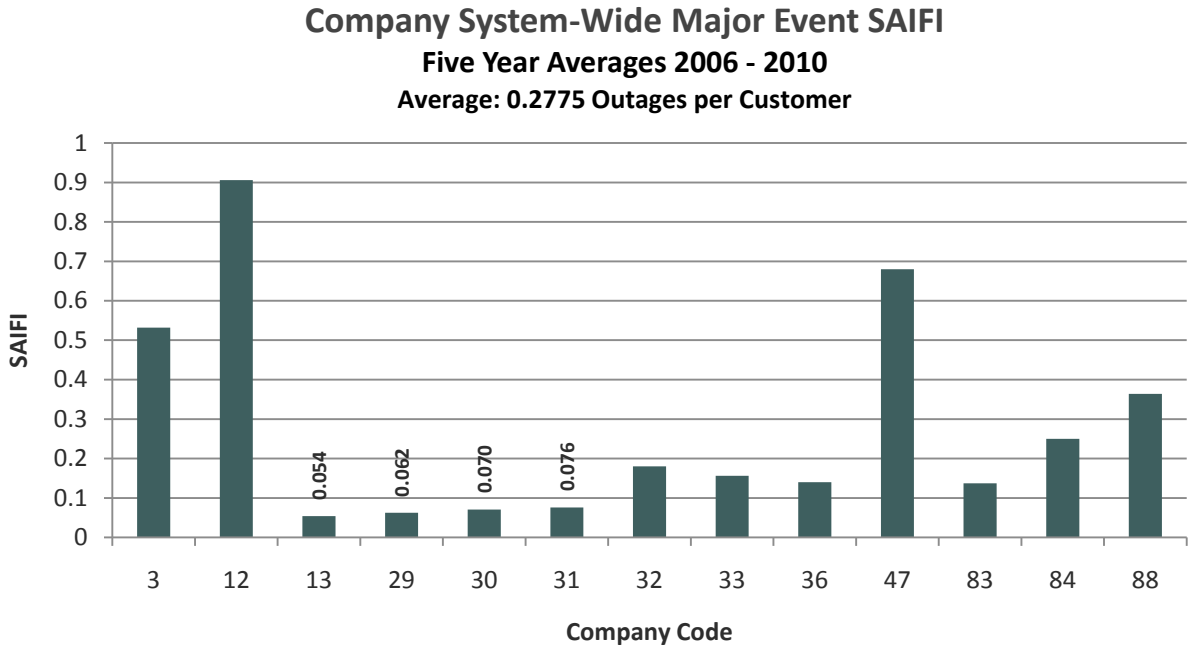


Figure 248: Company System-Wide Major Event SAIFI Five Year Averages (2006 -2010)

System-Wide Non-Major Event CAIDI

Question #191: What was your company's TOTAL DISTRIBUTION CUSTOMER AVERAGE INTERRUPTION DURATION INDEX (CAIDI) for IEEE 1366-2003 defined outages for the following years and what is the TOTAL FOR MAJOR EVENT/STORM only?
NOTE: If you do not use IEEE 1366-2003 to define major events, answer the question using your definition of storm event (supplied in question #182).

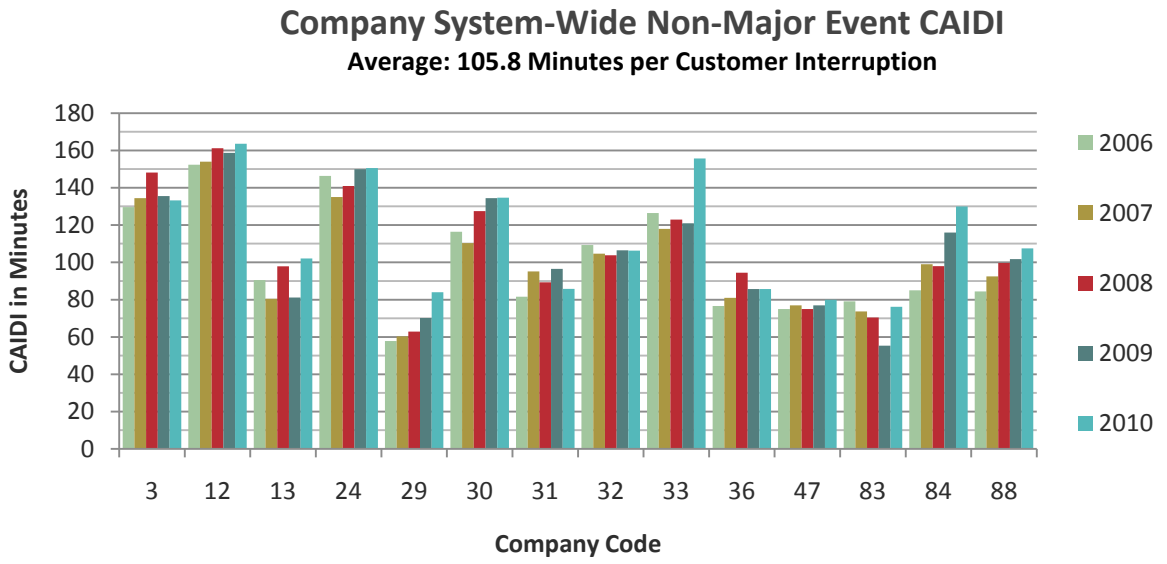


Figure 249: Company System-Wide Non-Major Event CAIDI for Years 2006 – 2010

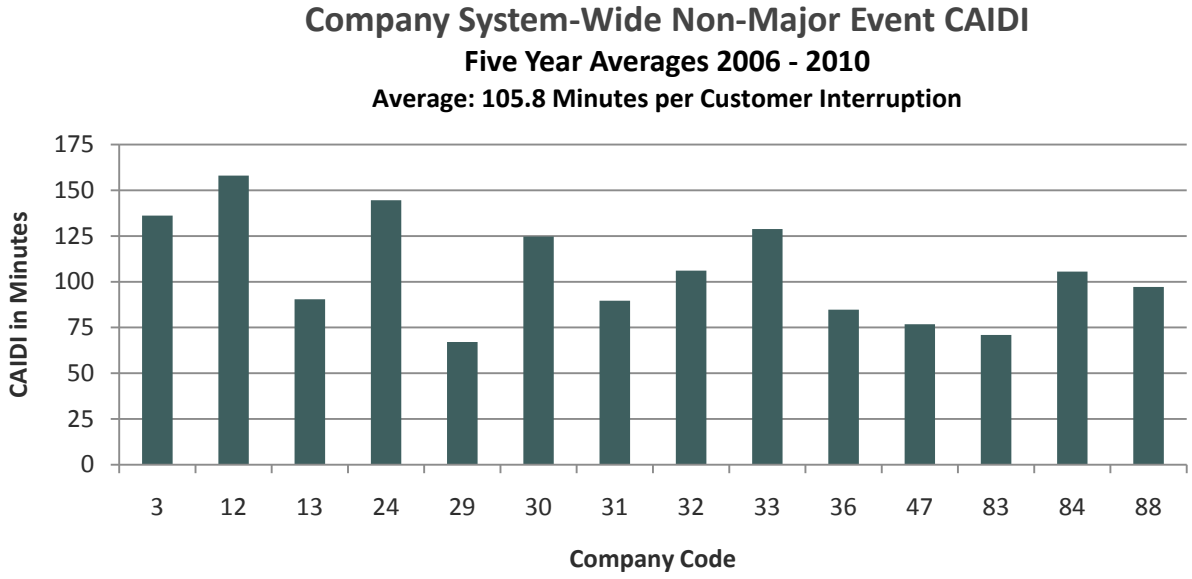


Figure 250: Company System-Wide Non-Major Event CAIDI Five Year Averages (2006 -2010)

System-Wide Major Event CAIDI

Graphs from data collected in **Question #191**

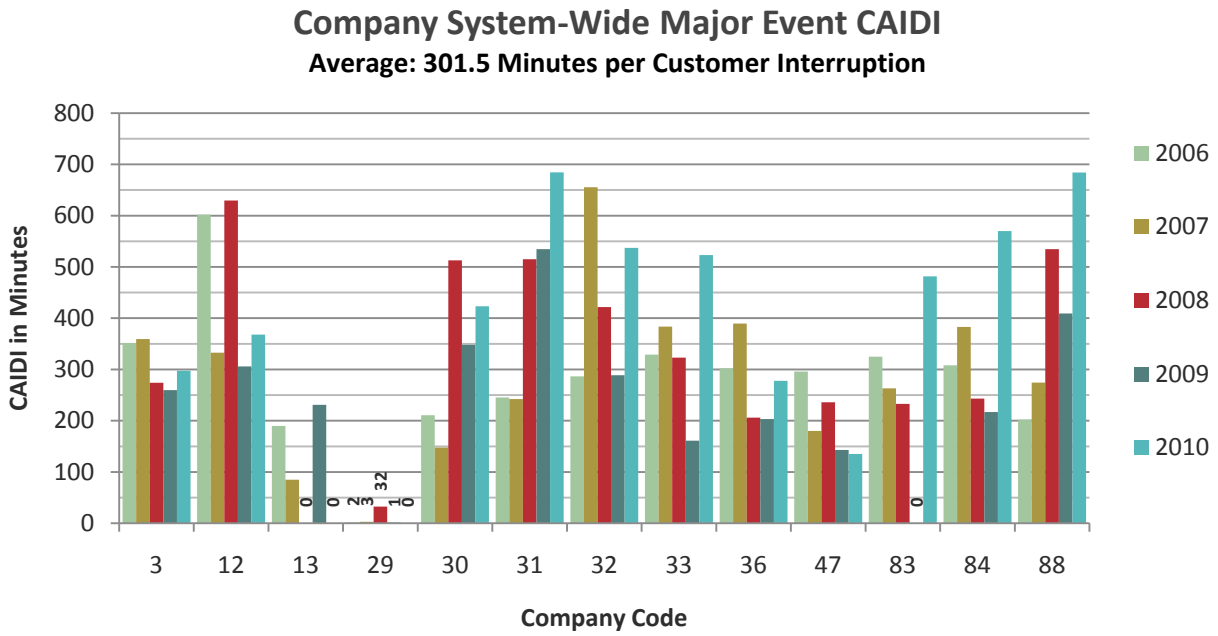


Figure 251: Company System-Wide Major Event CAIDI for Years 2006 – 2010

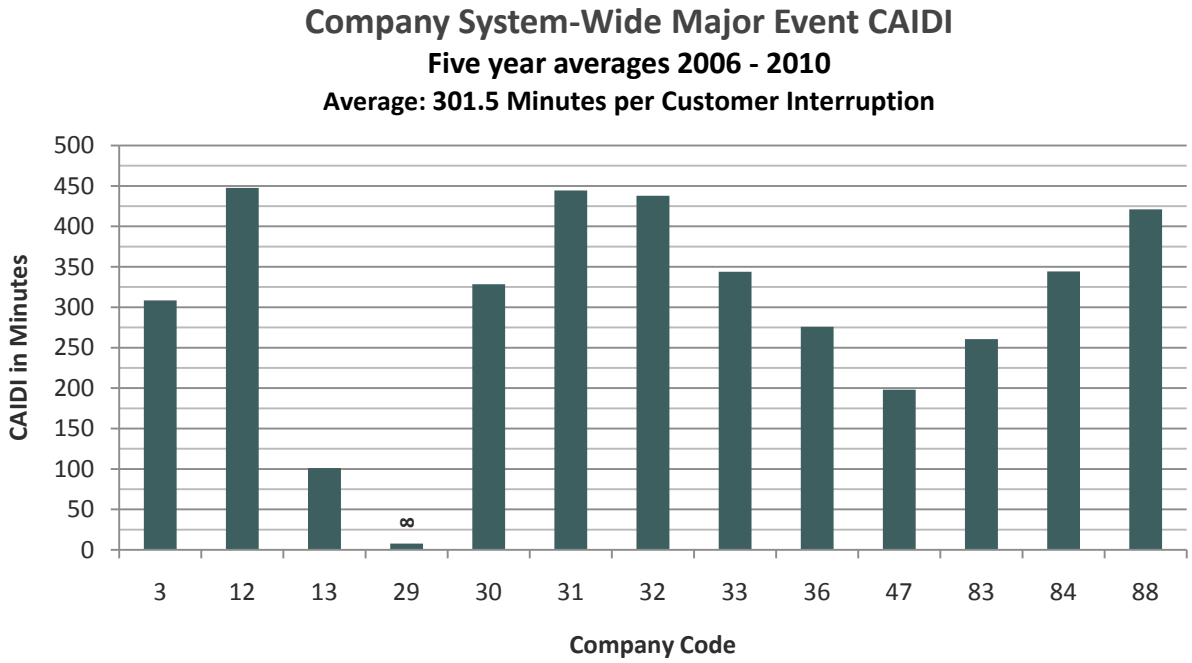


Figure 252: Company System-Wide Major Event CAIDI Five Year Averages (2006 -2010)

TREE-RELATED RELIABILITY METRICS

The graphs in this section all were generated using the data collected in question #192 (below).

Question #192: Please provide your TOTAL TREE-RELATED DISTRIBUTION SAIDI/SAIFI/CAIDI numbers for the following years AND the TOTAL SAIDI/SAIFI/CAIDI FOR TREE-RELATED MAJOR EVENT/STORM only.
NOTE: If you do not use IEEE 1366-2003 to define major events, answer the question using your definition of storm event (supplied in question #182).

Tree-Related SAIDI

Non-Major Event Tree-Related SAIDI

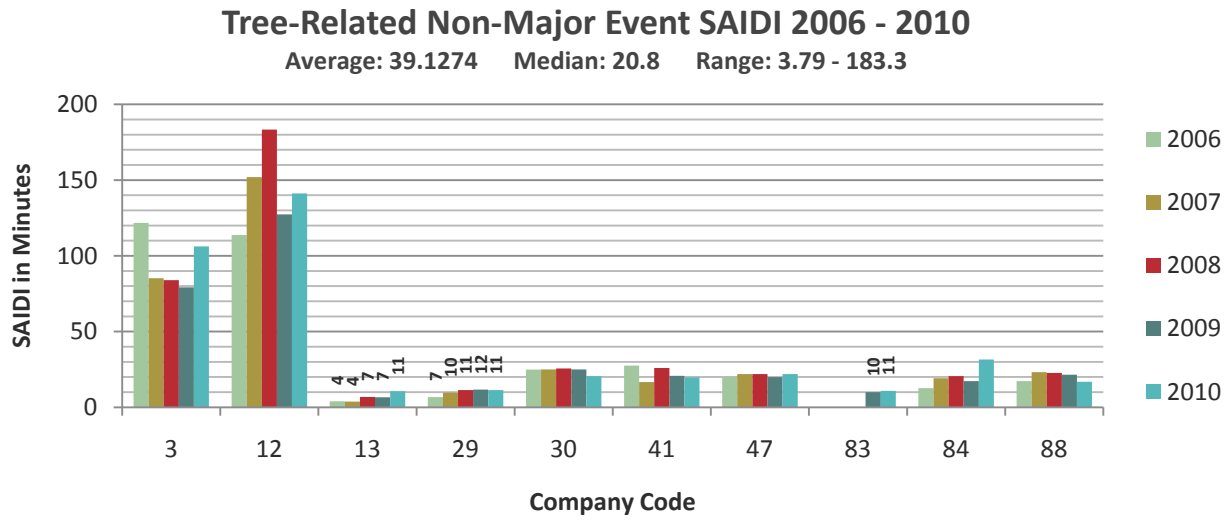


Figure 253: Tree-Related Non-Major Event SAIDI for Years 2006 - 2010

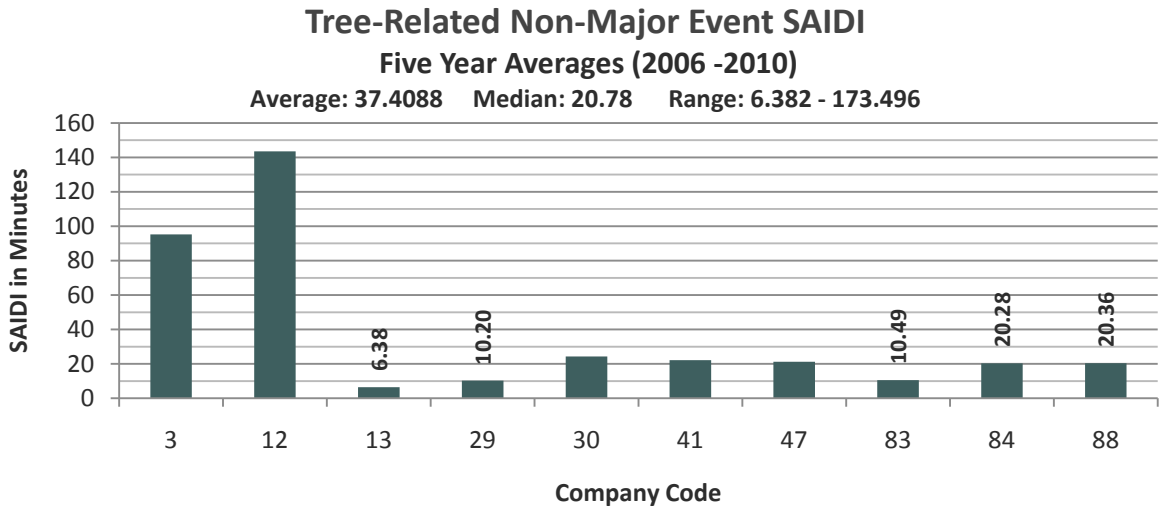


Figure 254: Tree-Related Non-Major Event SAIDI Five Year Averages (2006 -2010)

Graphs from data collected in **Question #192**

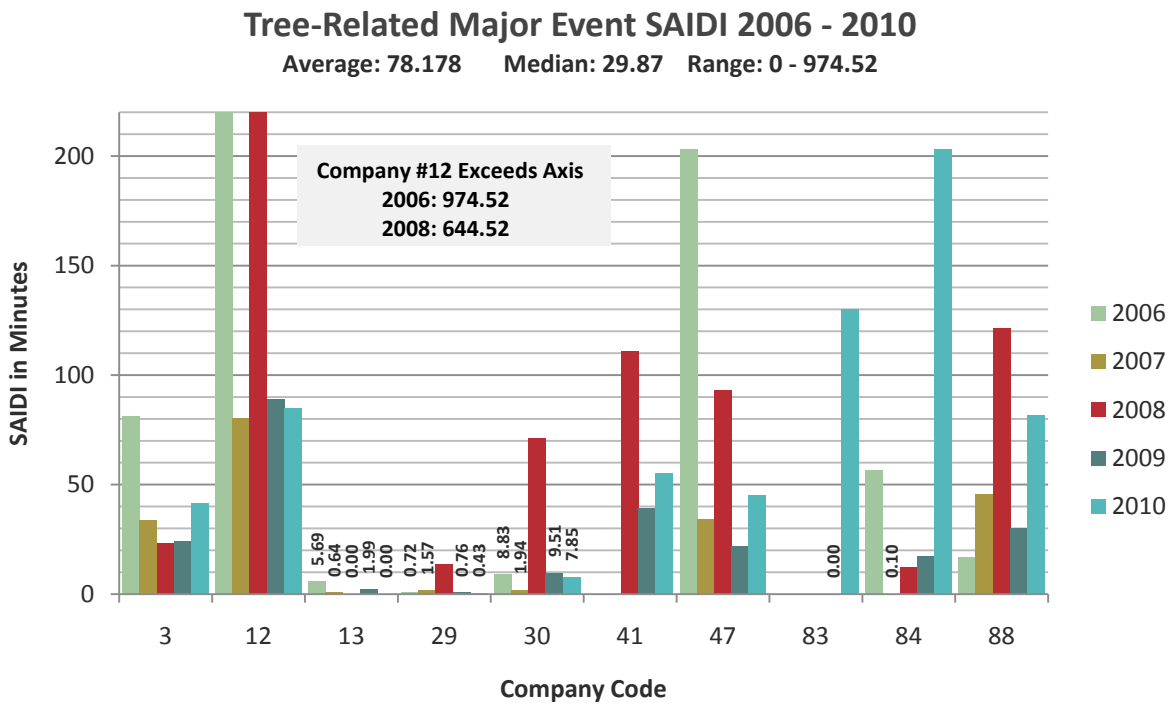


Figure 255: Tree-Related Major Event SAIDI for Years 2006 – 2010

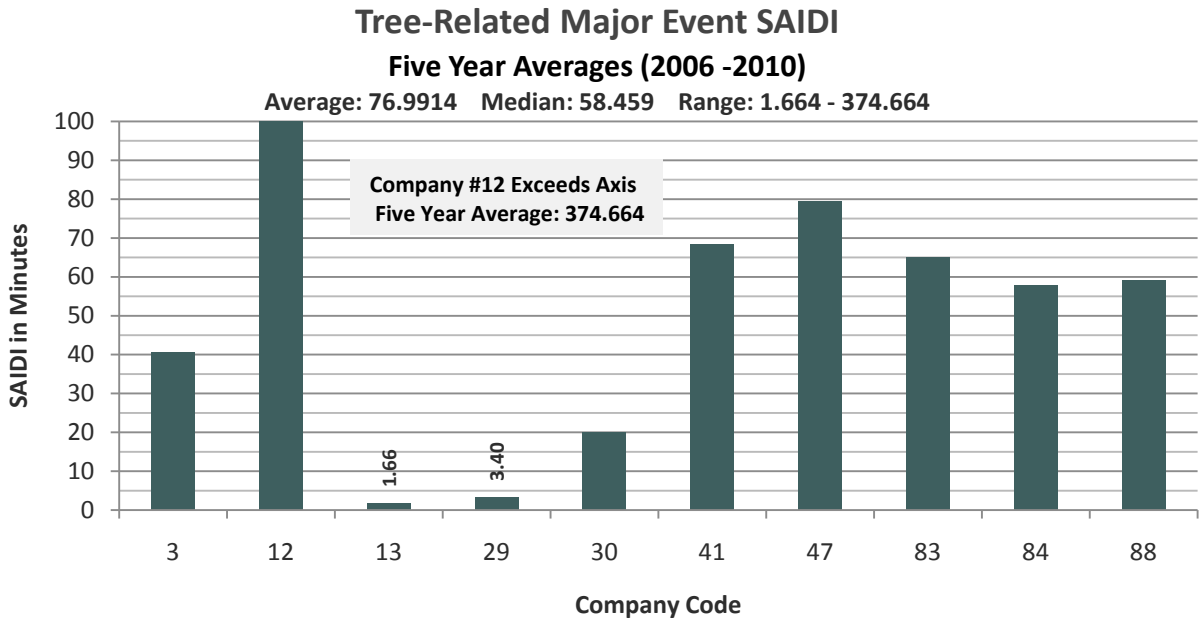


Figure 256: Tree-Related Major Event SAIDI Five Year Averages (2006 -2010)

Tree-Related SAIFI

Non-Major Event Tree-Related SAIFI

Graphs from data collected in **Question #192**

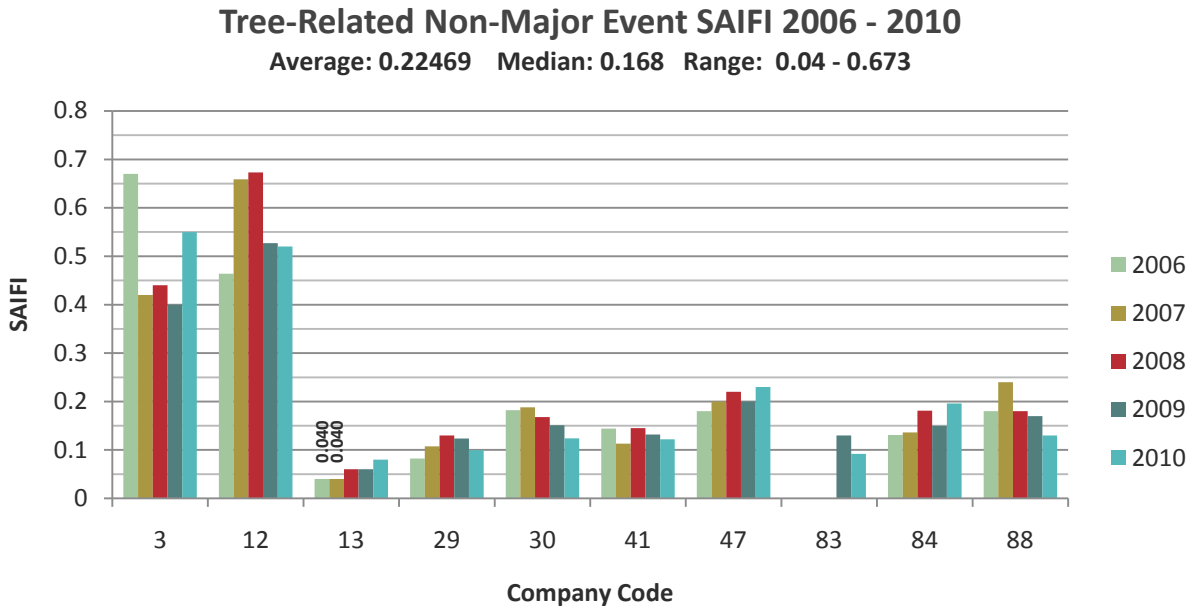


Figure 257: Tree-Related Non-Major Event SAIFI for Years 2006 - 2010

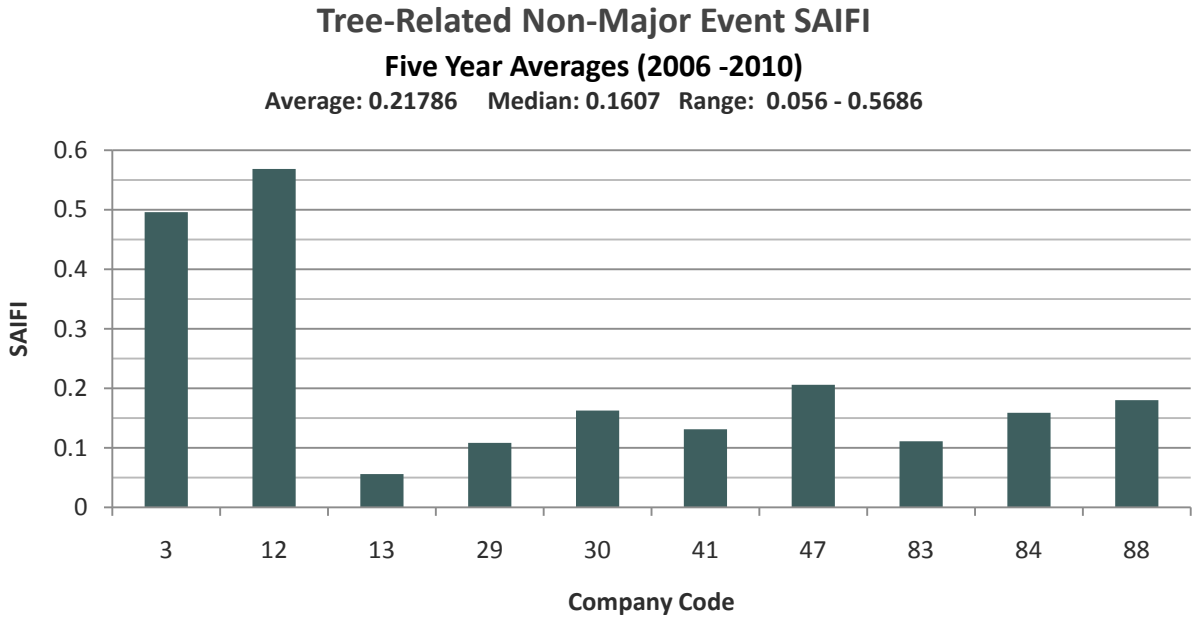


Figure 258: Tree-Related Non-Major Event SAIFI Five Year Averages (2006 -2010)

Graphs from data collected in **Question #192**

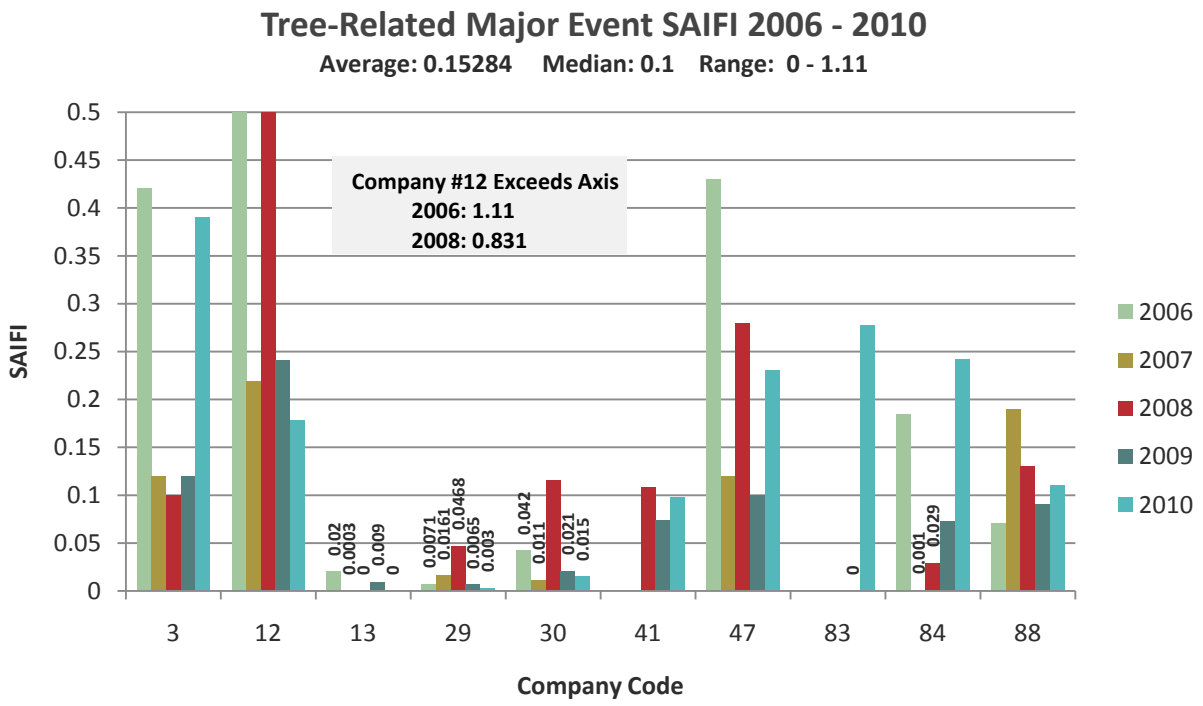


Figure 259: Tree-Related Major Event SAIFI for Years 2006 - 2010

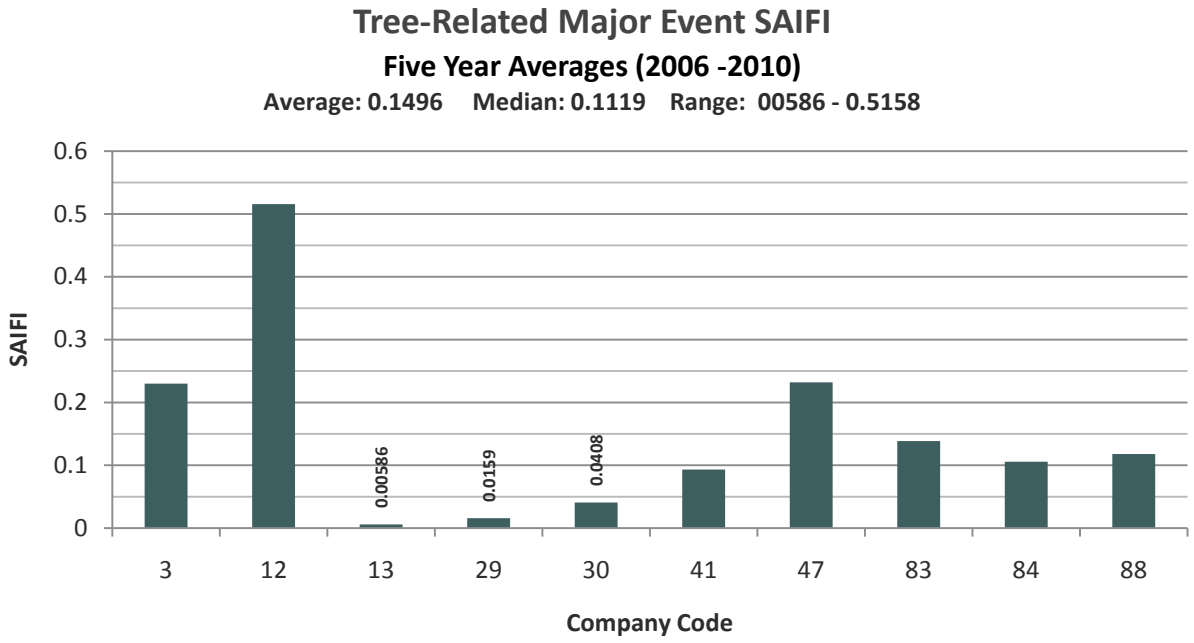


Figure 260: Tree-Related Major Event SAIFI Five Year Averages (2006 -2010)

Tree-Related CAIDI

Graphs from data collected in **Question #192**

Non-Major Event Tree-Related CAIDI

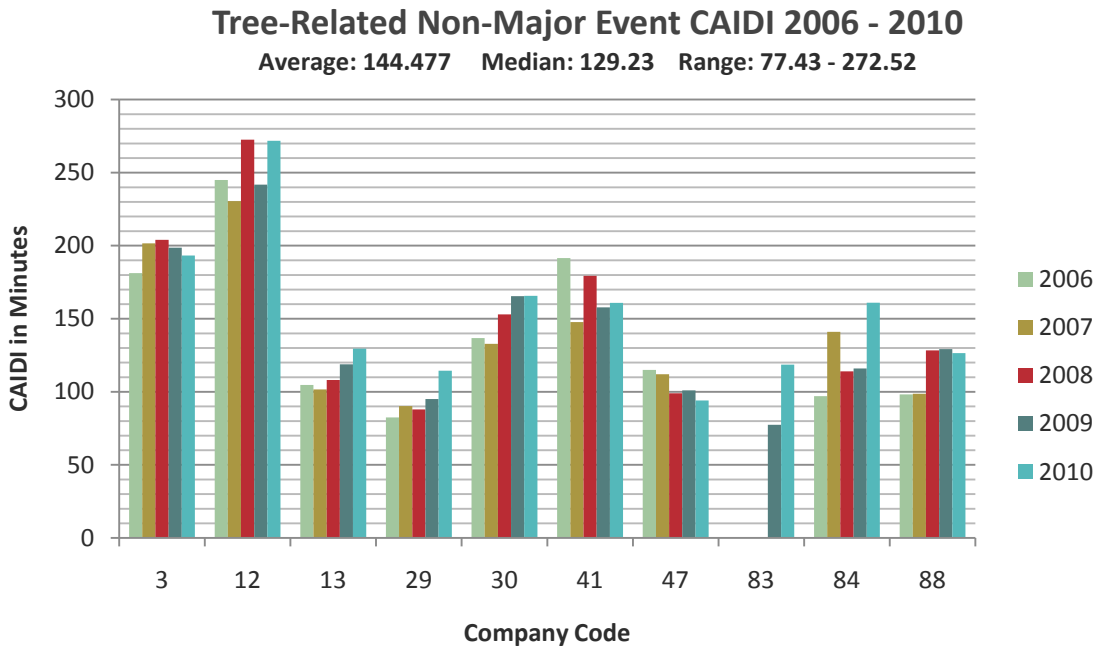


Figure 261: Tree-Related Non-Major Event CAIDI for Years 2006 - 2010

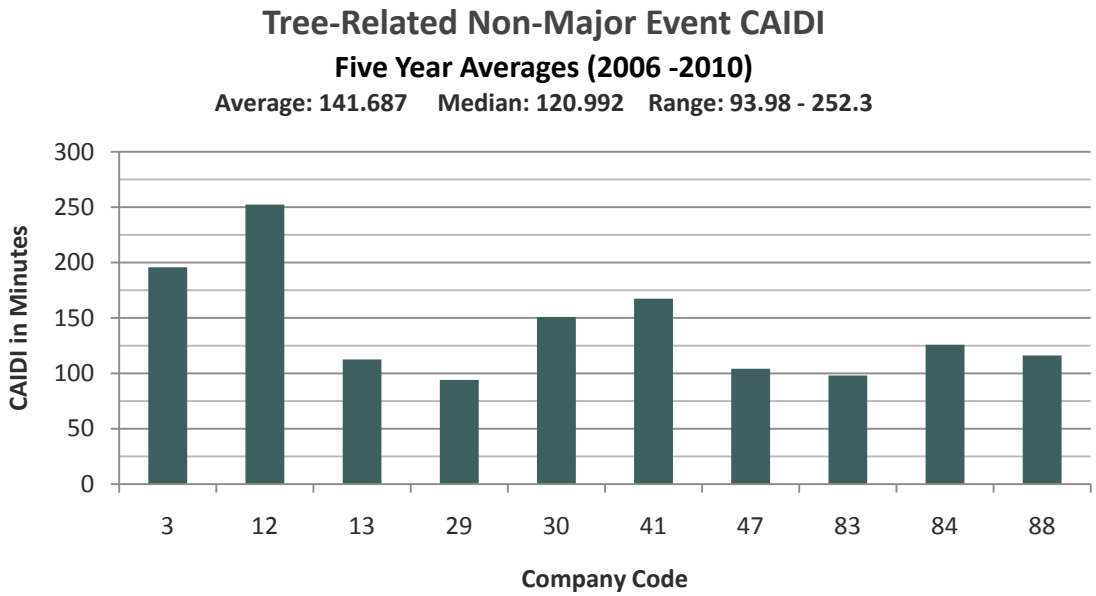


Figure 262: Tree-Related Non-Major Event CAIDI Five Year Averages (2006 -2010)

Major Event Tree-Related CAIDI

Graphs from data collected in **Question #192**

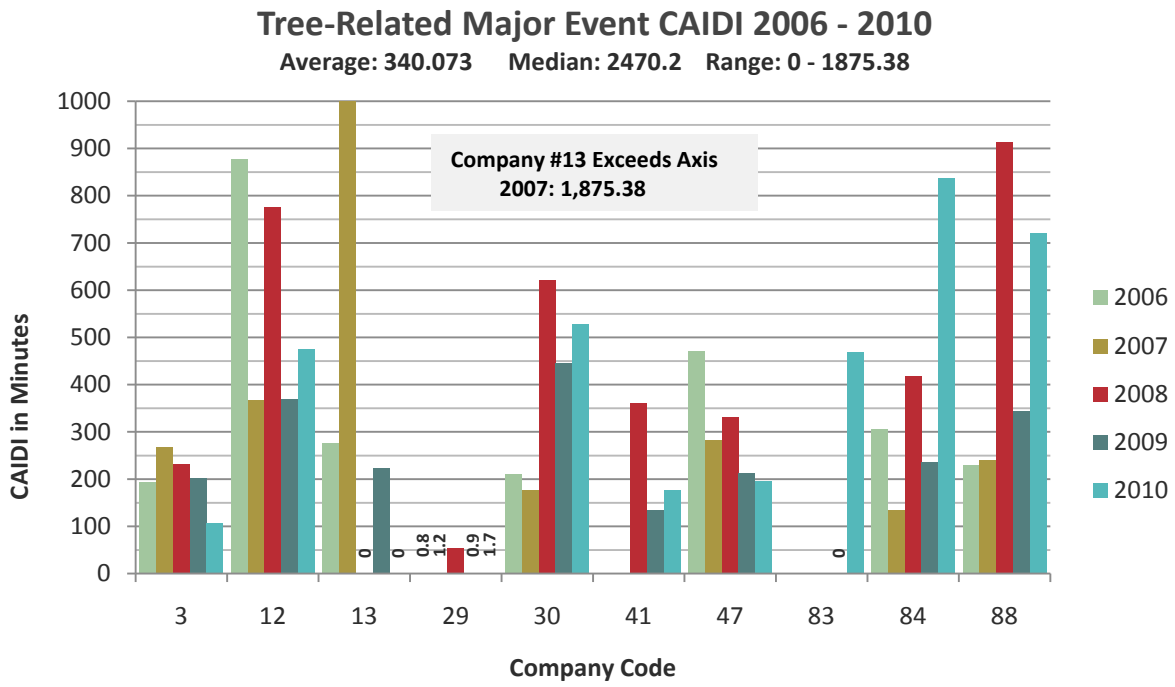


Figure 263: Tree-Related Major Event CAIDI for Years 2006 - 2010

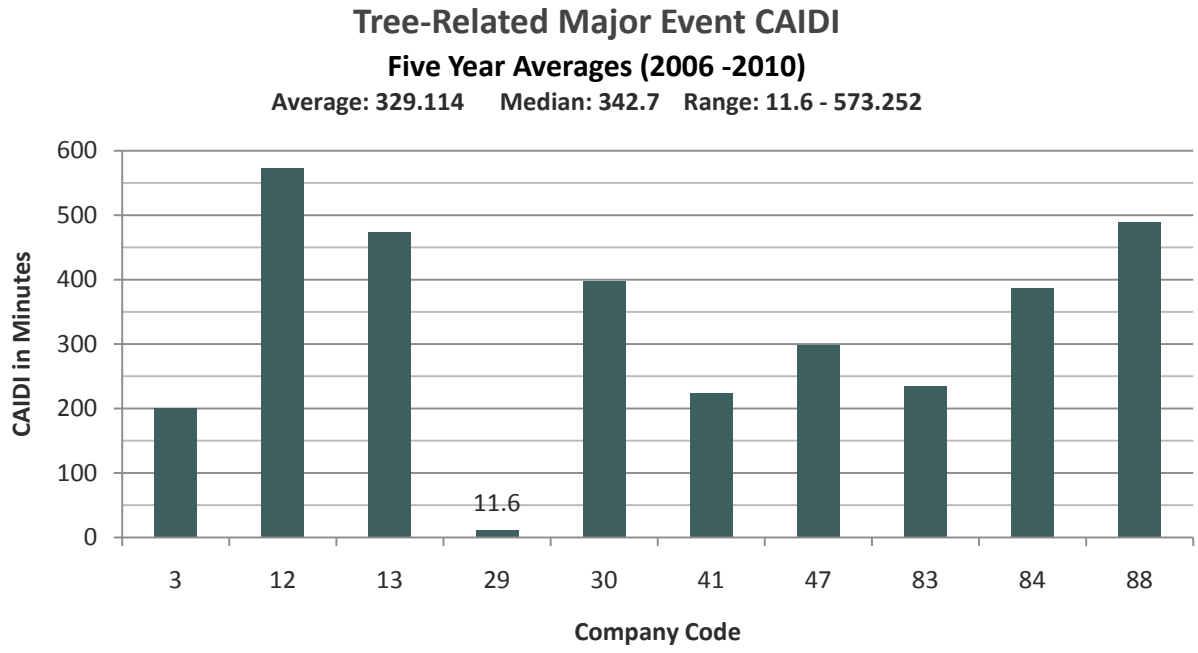


Figure 264: Tree-Related Major Event CAIDI Five Year Averages (2006 -2010)

TREE-RELATED OUTAGES DUE TO GROW-INS

Question #193: Please provide the NUMBER of SUSTAINED TREE-RELATED OUTAGES your company experienced in the following years for your DISTRIBUTION system caused by TREES GROWING INTO DISTRIBUTION LINES.

Number of Tree-Related Outages Due to Grow-Ins

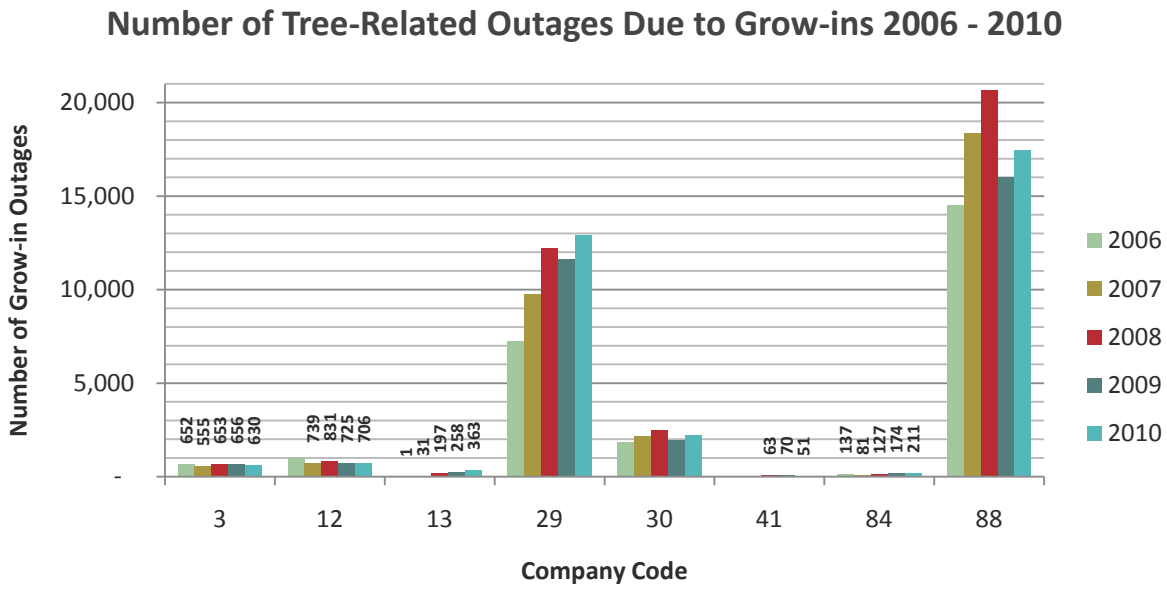


Figure 265: Number of Tree-Related Outages Due to Grow-ins 2006 - 20010

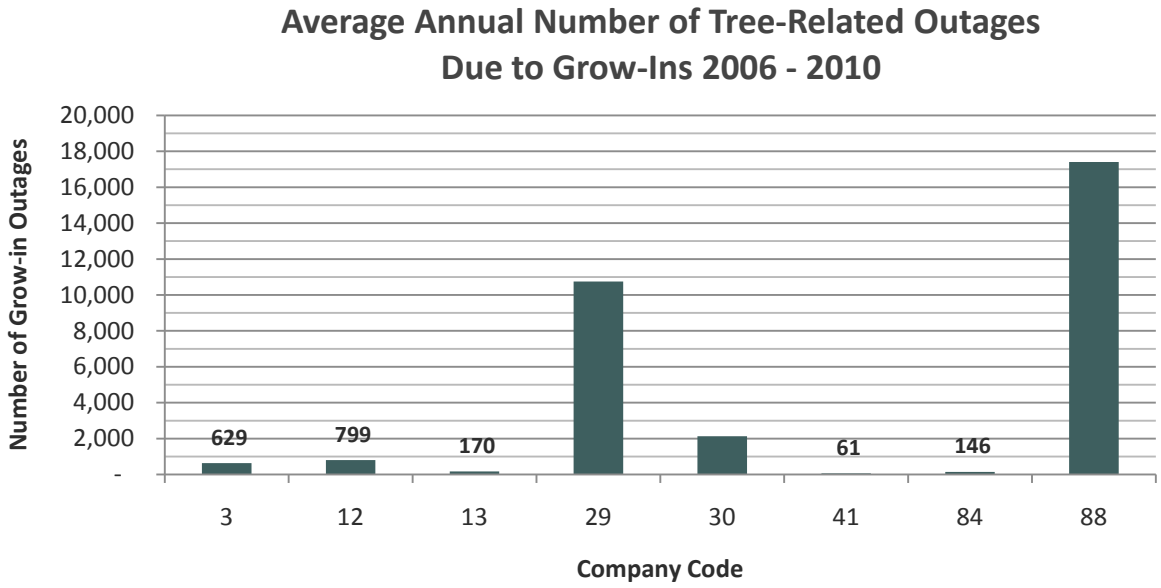


Figure 266: Average Annual Number of Tree-Related Outages Due to Grow-Ins 2006 - 2010

Percent of Tree-Related Outages Due to Grow-Ins as Calculated

Statistics calculated from data collected in **Question #193** and **Question #188**

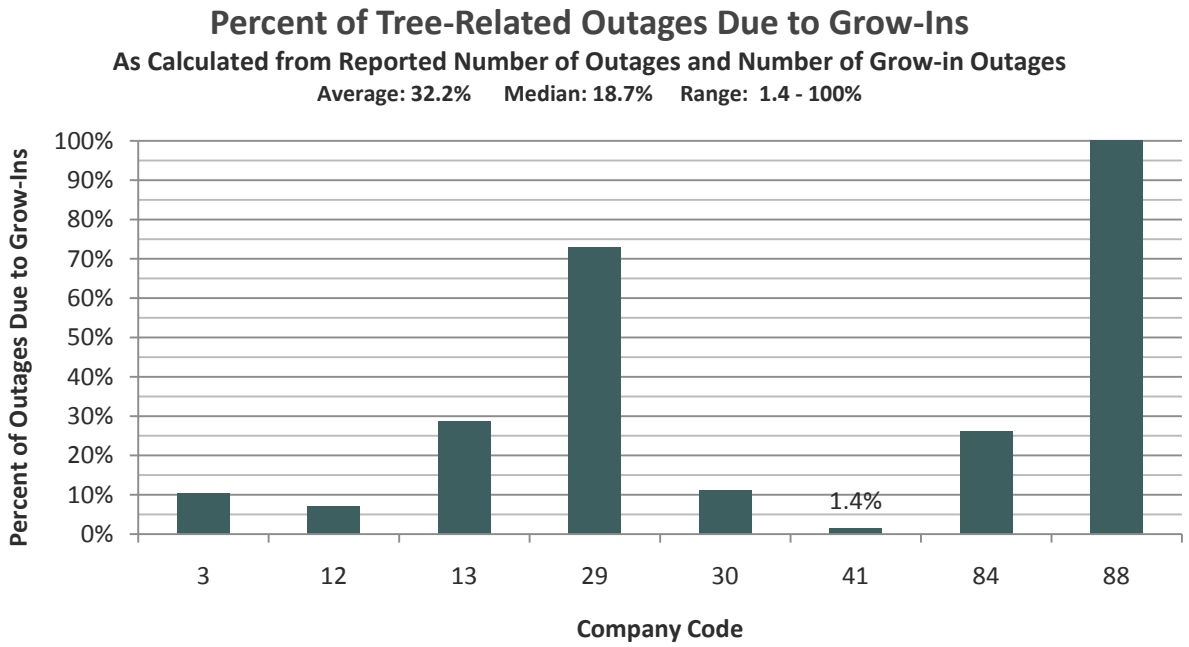


Figure 267: Percent of Tree-Related Outages Due to Grow-Ins as Calculated

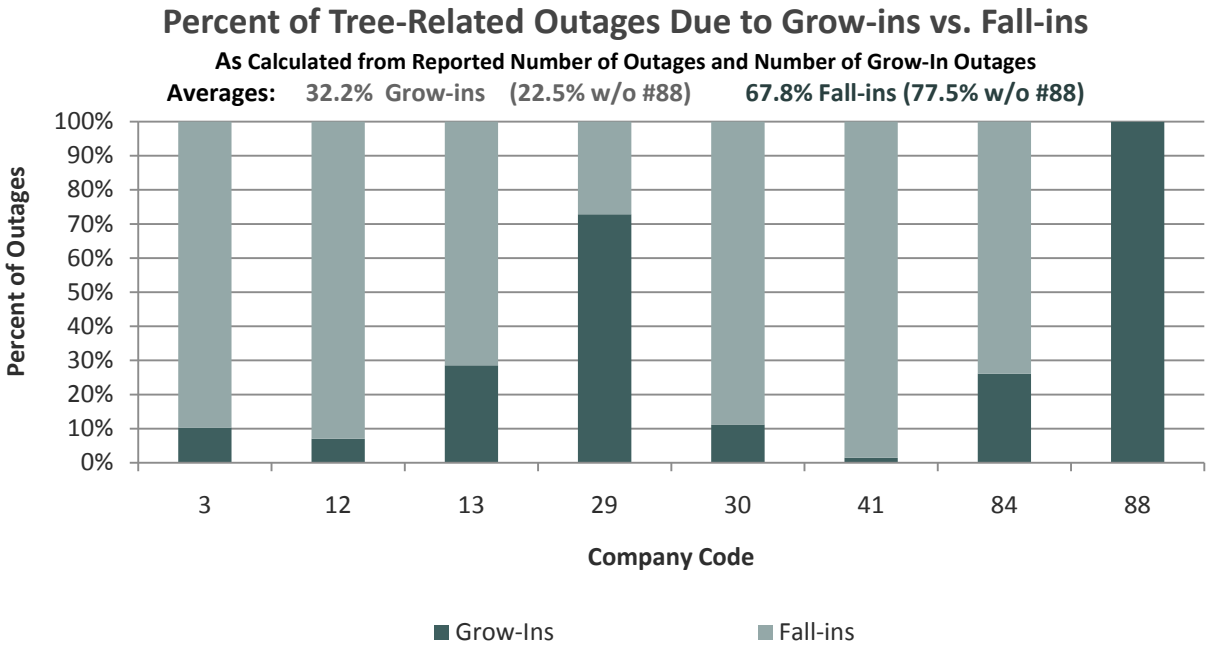


Figure 268: Percent of Tree-Related Outages Due to Grow-ins vs. Fall-ins as Calculated

Percent of Tree-Related Outages Due to Grow-Ins as Reported

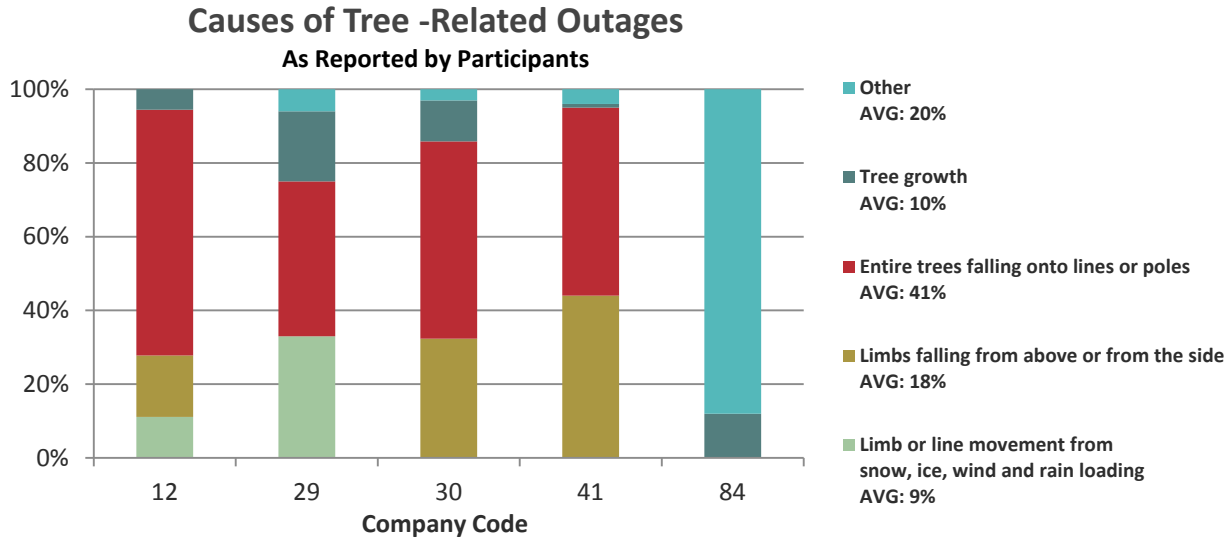


Figure 269: Causes of Tree -Related Outages As Reported by Participants

Other Causes of Tree-Related Outages
Other includes breakage or entire trees falling onto lines or poles. [Fall-In Categories Combined]
Tree Cutting Our Contractor and ground vegetation < 1% Tree Cutting 3rd party = 3%
For feeder backbone only.
Vine Outages

Figure 270: Other Causes of Tree-Related Outages

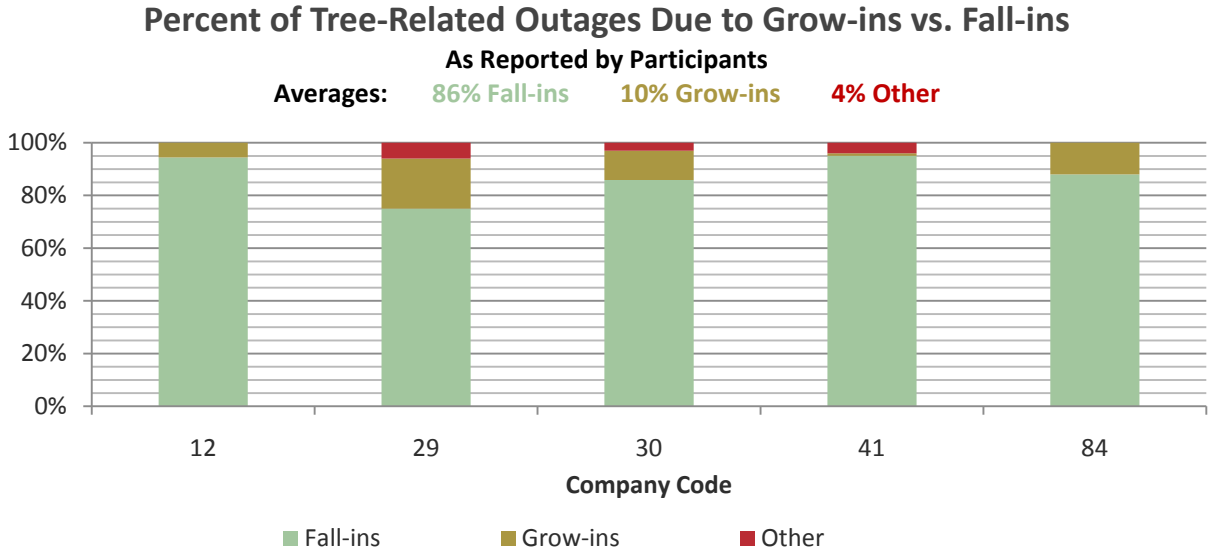


Figure 271: Percent of Tree-Related Outages Due to Grow-ins vs. Fall-ins as Reported by Participants

Data Discussion on the Causes of Tree-Related Outages

The following conclusions can be inferred from the comparison of graphs related to *Causes of Tree-Related Outages:*

1. Three of the companies that reported reasons for outages in percents show a high correlation with the calculated statistics (See Figures 268 and 271). This implies that these companies have submitted reliability data to the survey that is consistent with the data they used to calculate reliability statistics. This is important because it verifies there are no data entry errors or inconsistencies in their reliability metrics.
2. A majority of the participants do *not* track the causes for tree-related outages routinely within the UVM program. If they are tracked, this statistic is not readily available to the UVM department. This can be inferred from the low response rate of companies reporting the percent of tree-related outage causality.
3. Since reliability is one of the main objectives of a UVM program, the tracking of the *causes* for tree-related outages should be a high priority.
4. A UVM program would derive benefits from having a database that tracks causes of tree-related outages. Without knowing the cause of tree-related outages, it is hard to improve reliability.
5. A UVM program would also derive benefits from routinely investigating how the cause of an outage is determined. The following are some examples of challenges for understanding UVM efficacy and tree-related outages in the context of reliability measurements:
    a. Multiple tree events may contribute to a single outage if a feeder is out and taps are also damaged. In this case, the extent to which this affects SAIFI or number of tree-related outages may not be recognized.
    b. A tree growing into and arcing to a conductor or falling onto a conductor but not interrupting power may not be interpreted as a reliability issue because no outage was caused.
    c. Reliability metrics are an on-off measurement that may be overshadowing other potential measurements of the resiliency of the system. Non-major event days may not be a good indicator of the reliability of the system in terms of predicting what will likely happen if there is a major event. This may be an area where reliability metrics are disguising the effectiveness of a UVM program.

WORKPLANNING, INSPECTIONS, AUDITS, RISK TREE PROGRAMS AND UVM DATA MANAGEMENT

UVM DATA MANAGEMENT

Data Systems Employed for UVM

Question #216: Please briefly describe the electronic system or systems that you employ for workplanning, inspections, dispatching and documenting UVM work activities and verifying work has been performed according to specification.

Data Systems Employed for Utility Vegetation Management
Excel and Access programs in-house.
An in-house SQL based database housing customer requests and contractor work history.
Work is assigned to contractor. When completed, we will perform 100% field audit on all planned work.
Planning - by circuit a database tracks inspection and trimming start and completion dates Inspections - contract inspectors carry hand-held devices that link to maps and our company's GIS mapping system. The system records customer, tree, location and alert information. It also includes reference & procedural documents. Customer Notification - Besides face-to-face customer contract by our inspectors, an automated system is used to call customers before tree work starts (can also be used prior to inspection patrols)
Crew audits, random samples, Powell work tablet, in-house database, spreadsheets, Microsoft project, access, sequel server, SAP Cognos.
We use an in-house GIS based work management system called VegSMART
- ArcGIS/Clearion application used to plan work, currently used for palm management and expanding to other work types. - Work Management System (WMS) Houses maintenance and corrective work tickets, tracks schedule, progress and completion - SAP Payment System - VMTVS (Timesheet Validation System) Upload and validate T&M data from vendor - TCMS (Trouble Call Management System) Manage restoration tickets and in-service trouble work
SAP - Work order generation and management. We are in the process of migrating data and processes into this system GIS - Spatial integration with GIS for asset mapping, data collection and program planning. Forestry Management System (FMS) - A custom built web based work reporting system which interfaces with our customer data. Used to plan, manage and execute the vegetation management program. This includes a mobile component.
Weekly inspections of completed work, done by hand and recorded/stored by Word program. Nothing special. Hours recorded and tracked in SAP
Clearion - GIS-based software solution that operates within ESRI ArcGIS framework. This software has been established for vegetation management mapping and service process. It is used to map the vegetation GIS layer and provide information regarding work performed in the field. It is fully integrated with company's work management system and customer service system.
We use the TRES software for data collection and everything else is done manually
Access programs that hold historical information and schedules on a five year rotating basis.

Figure 272: Data Systems Employed for Utility Vegetation Management

Data Systems Employed for Utility Vegetation Management (Continued)
Up to December 2011, MS Access (inspection, billing control, work assessment) many data base, not consolidated MS Excel (planning, dash board), SAP R/3 (customer inquiries, new work, billing process) Smallworld (mapping) Beginning January 2012, CLEARION/ESRI (inspection, billing control, work assessment, planning, dash board, mapping) one and only data base consolidated. SAP R/3 via CLEARION/ESRI interface (Customer inquiries, new work, billing process).
Vegetation Outage data is achieved on a Company software program. We can go back many years to find any vegetation outage data. All other items such as workplanning, inspections, and all other pertinent UVM data is stored on a secure server and only employees with permission have access to view or work in the files.

Figure 273: Data Systems Employed for Utility Vegetation Management (Continued)

Types of Data Management Systems Used for UVM

Objective: The objective of this question is to discover what data management systems are being used.

Question #217: What data systems do you use for different aspects of your Vegetation Management System?

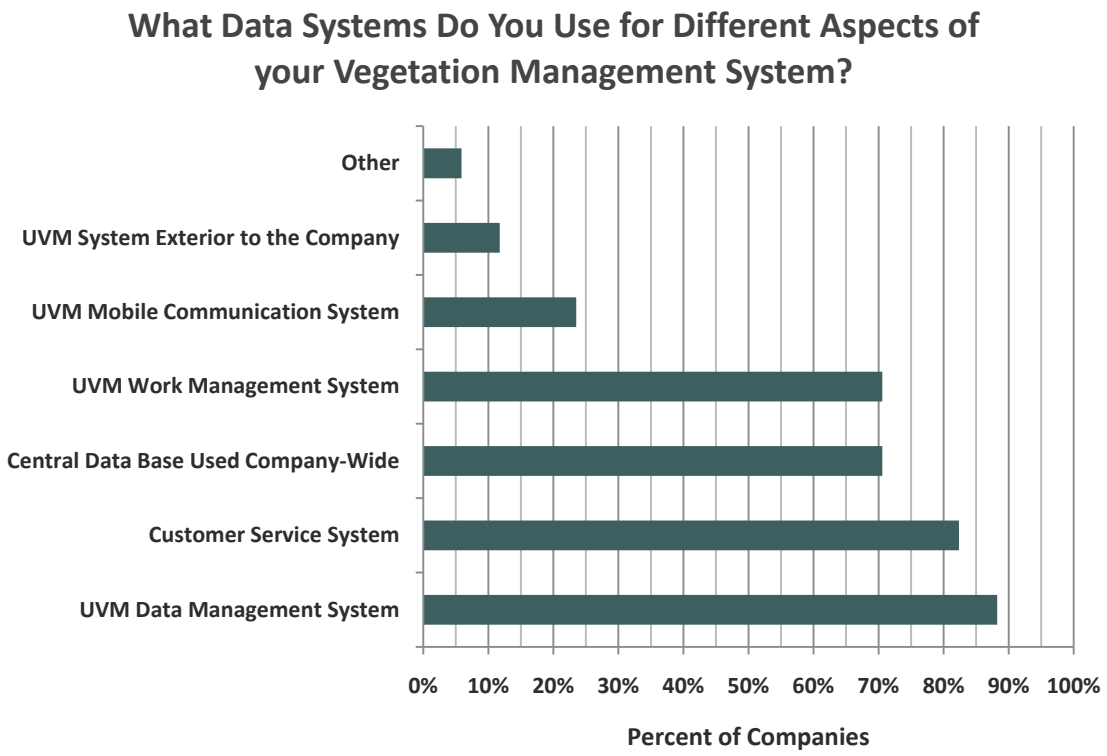


Figure 274: Aspects of UVM Supported by Electronic Data Systems

More data from this question will be available next report.

Data Collection Formats

Objective: The objective of this question is to determine how vegetation management data is collected, stored, transmitted and used.

Question #218: The following is a list of typical activities in a utility vegetation management program. Check all the formats in which each of these activities can be found. Check all that applies for each activity.

Note: Sample set was 17 participants.

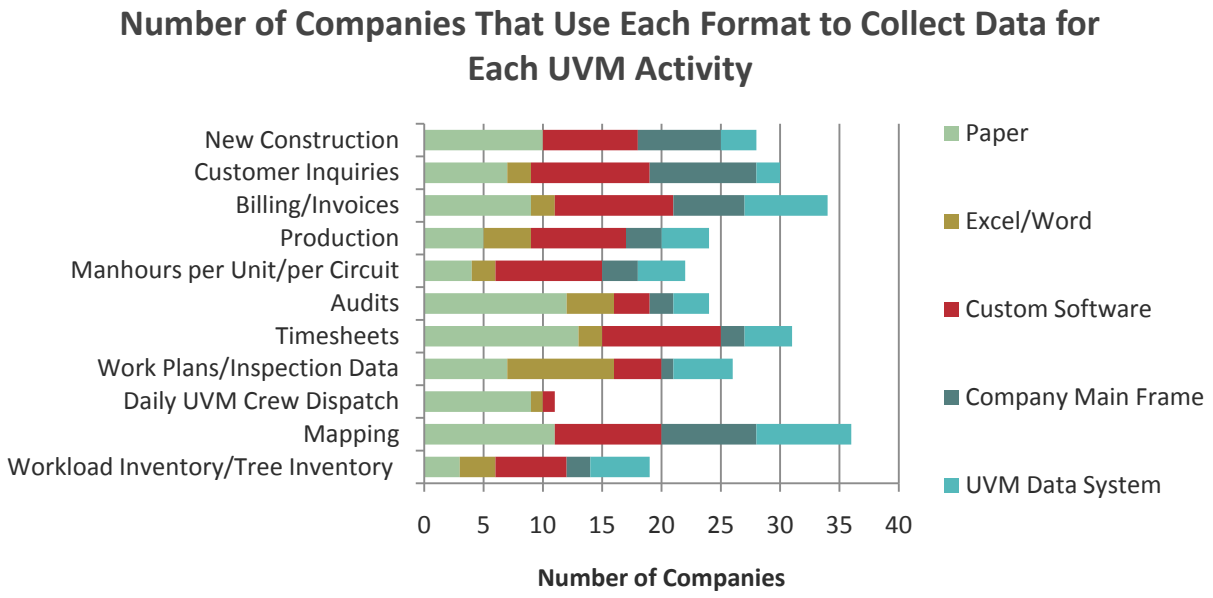


Figure 275: Number of Companies That Use Each Format to Collect Data for Each UVM Activity

Comments on Data Collection Formats
All of the paper collection is later stored electronically.
Take note that both system before and after January 2012 are considered in the answer.

Figure 276: Comments on Data Collection Formats

Discussion on Data Collection Formats:

This question had a dense amount of data associated with it. Further investigation into some of the details given in the responses will provide insight into data collection formats in UVM departments and how the UVM department interfaces with other departments in the company.

A cursory analysis of the data indicates the following:

1. Paper is still the predominate method of recording, storing and transmitting data to and from the field, as well as internally.
2. Many companies use more than one format for data collection and storing, thus, most likely, indicating some duplication of efforts. Of note is the comment on the table above, "All of the paper collection is later stored electronically." Although this participant was the only one that mentioned this issue, a thorough look at the data indicates that many companies have two or three data collection and storage formats used for the same task.
3. There is a significant increase in the use of customized software for many of the UVM tasks since the 2009 Benchmark Survey. Only **47%** of the companies in the **2009** CNUC Benchmark Survey utilized customized software somewhere in the UVM department as opposed to **88%** of the companies in **2011**.

WORK PLANNING AND UTILITY VEGETATION MANAGEMENT

Influence of Work Planning on UVM

Objective: Determine the extent to which line clearance work is influenced by field inspection and planning.

Question #219: Please rate the following work-planning activities according to the how much they were used to plan line clearance work over the last five years.

Since specific descriptors were used in place of rankings in this question, the following type of data representation (Figure 278, next page) was found to be the most appropriate.

NOTE: All work types listed below on graph (Fig. 278) had 16 companies supply the percent of time that field inspection and planning was used, EXCEPT the top category had 17 companies.

It is interesting to note that 59% of companies responding are utilizing field inspection planning for the majority of their work.

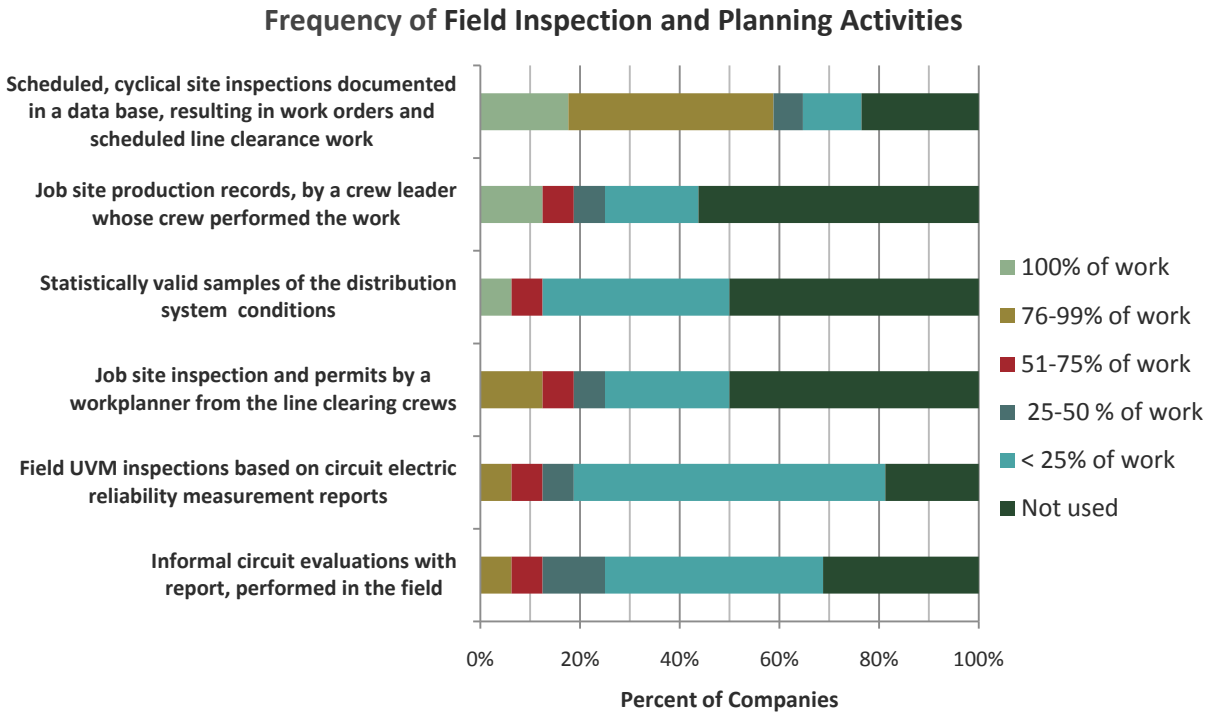


Figure 277: Frequency and Type of UVM Work Where Field Inspection and Planning Is Utilized

Comments on Influence of Field Inspections and Planning on UVM
By cycle
Field UVM inspections based on circuit electric reliability measurement reports for tree removal planning only. [Other Work Type]
Estimates

Figure 278: Comments on Influence of Field Inspections and Planning on UVM

Question #220: If you have a work-planning program, please choose the option that best describes your program.

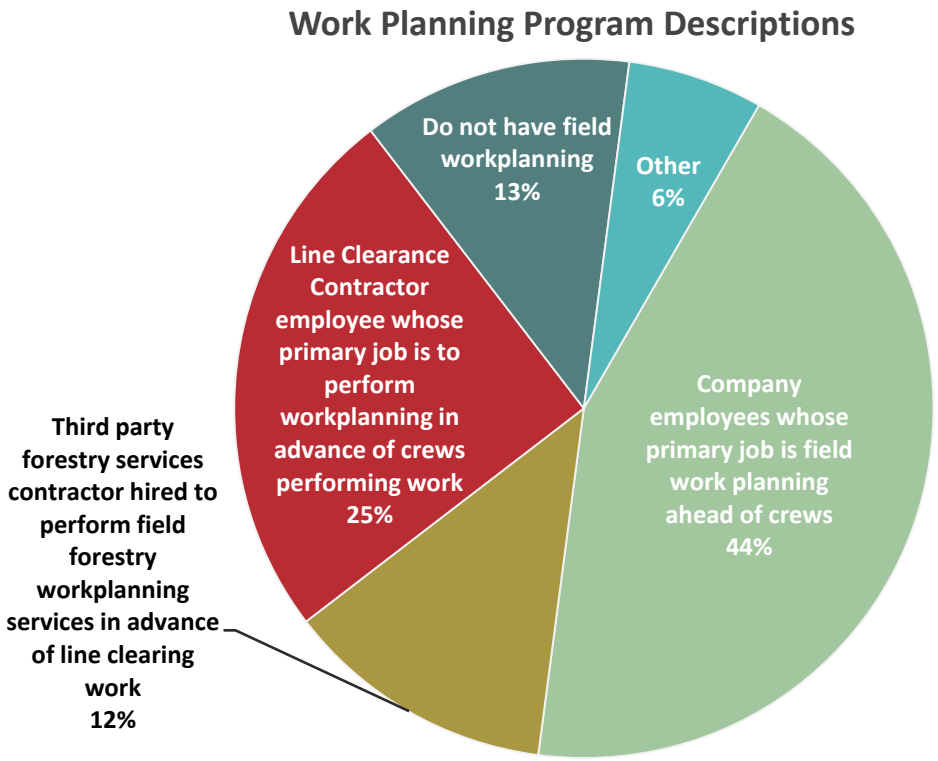


Figure 279: Work Planning Program Descriptions

Other UVM Work-Planning Program Descriptions
Tree removal and brush clearing: Company employees whose primary job is field work planning ahead of crews. Pruning: both contractor and company are doing their own workload assessment and get a financial agreement before work. After that work is done based on clearance rules.

Figure 280: Other UVM Work-Planning Program Descriptions

Work Planning Scheduled in Advance of Line Clearing

Question #221: If you employ work planning services, how much in advance of the line clearance crews is the work planned, on average?

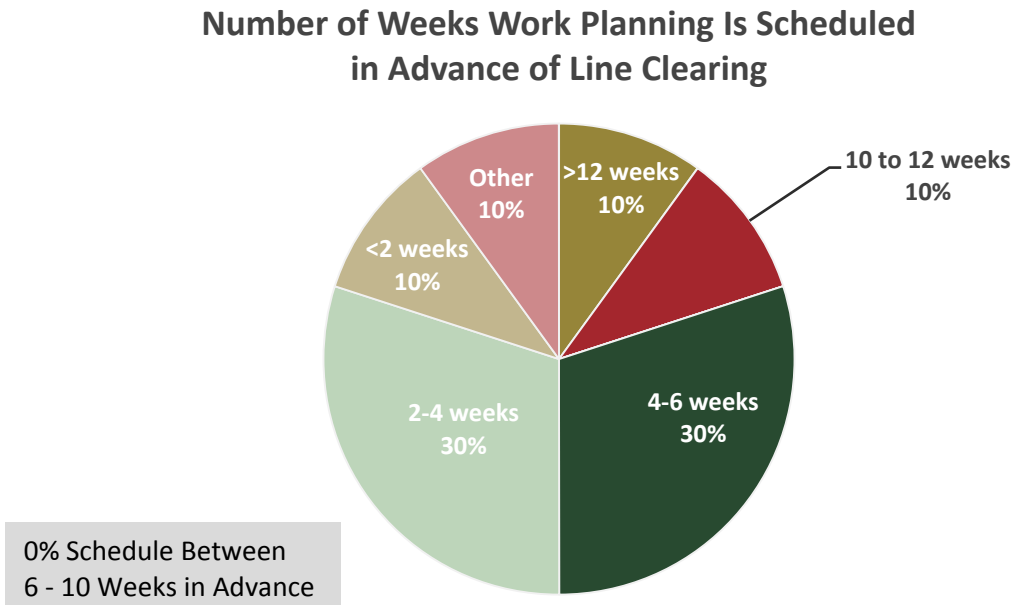


Figure 281: Number of Weeks Work Planning Is Scheduled in Advance of Line Clearing

Comments on Work Planning Scheduled in Advance of Line Clearing
For pruning: inventories must be completed at the latest 1 month before the execution of the works, and as soon as possible after the end of the season of growth preceding the works. For removals and brush clearing more than 12 weeks
The general foreman/job planner obtains all permission for their crews, 2- weeks in advance

Figure 282: Comments on Work Planning Scheduled in Advance of Line Clearing

Titles and Positions of Work-Planning Personnel

Question #222: If your UVM program has a field work-planning component, which of the following positions do you employ? Check all that apply.

Note: Graph follows comments.

Comments on Titles Positions of Work-Planning Personnel
This is one position who does it all depending on the area worked.
We employ forestry technicians which complete the entire work planning/notification programs.
The general foreman/ job planner for each UVM contractor that works for us does the notifying

Figure 283: Comments on Titles of Work-Planning Personnel

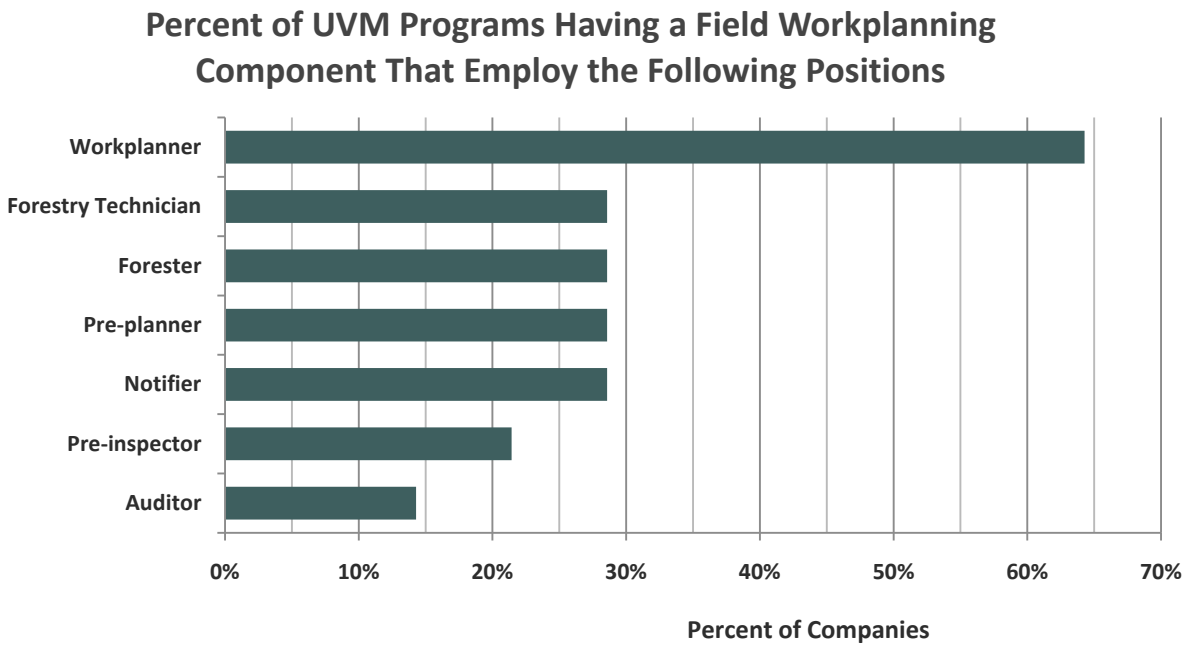


Figure 284: Percent of UVM Programs Having a Field Workplanning Component That Employ the Following Positions

Work-Planning and the UVM Interface between the Utility and the Customer

Objective: To understand the UVM planning interface between the Utility and the Customer.

Question #223: If you have foresters, preplanners, workplanners, notifiers or auditors included in your distribution UVM program, please chose from the following list the types of customer communications that these individuals perform as parts of their routine work.

Note: Graph follows comments.

Comments on UVM Interface between the Utility and the Customer
Notifiers are same person as work planners.
Other refers to external UVM Contractors.
General Foreman or Foreman
Our Forestry Technicians complete this role.
Other equals contractor General Foreman or Foreman.
Other= General foreman for contractor
Others who are helping us in communication are members of our public communication teams.

Figure 285: Comments on UVM Interface between the Utility and the Customer

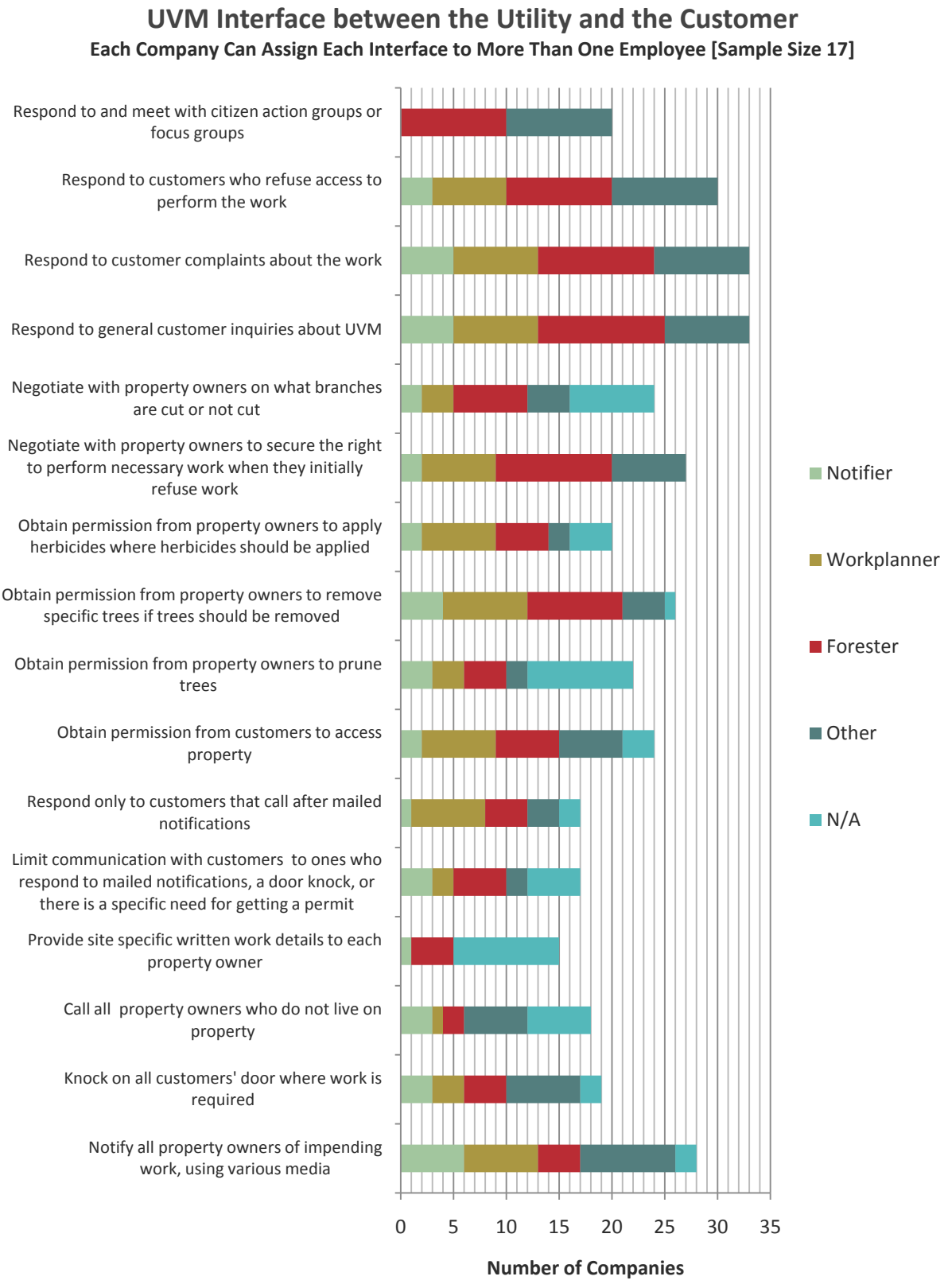


Figure 286: UVM Interface between the Utility and the Customer

Planning Work for Line Clearance Crews

Objective: To discover how work is planned in the field and the duties of various positions assigned to perform field planning work.

Question #224: Which of the following activities are performed routinely by notifiers, preplanners, forester, etc., who provide field workplanning for the company and for the crews who perform the work.

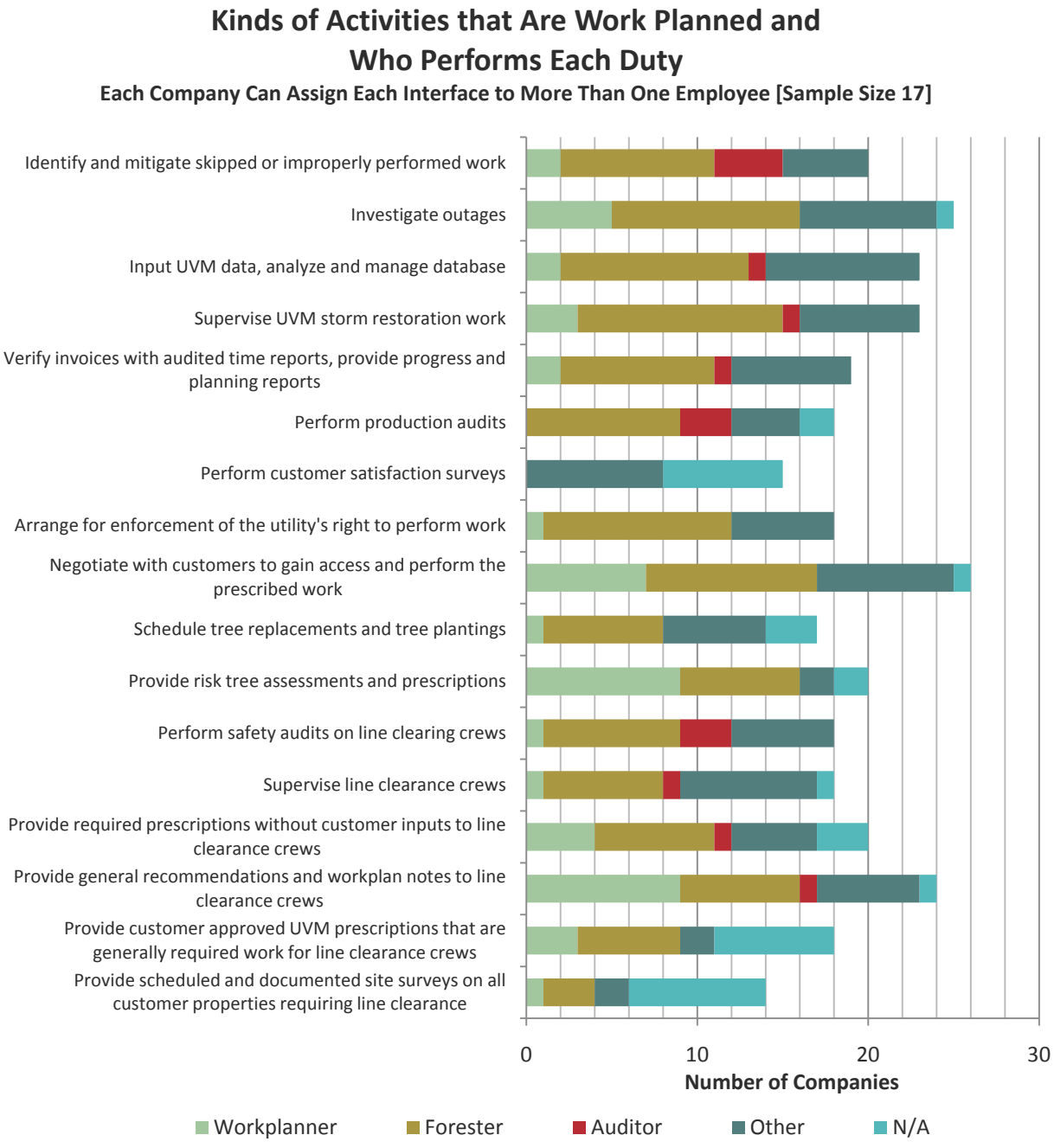


Figure 287: Kinds of Activities that Are Work Planned and Who Performs Each Duty

Comments on and Explanation of Other Kinds of Activities that Are Work Planned and Who Performs Each Duty
Our customer service department randomly picks customers to provide feedback on satisfaction surveys. The vegetation analyst does most of the data analyzing but our field foresters do quite a bit of data entry as well as analyze the data the analyst supplies.
Marketing and Communications Group
Other refers to external UVM Contractors.
Other equals Contractor General Foreman or Foreman.
Other = general foreman contractor management at utility
Operational productivity and safety audits are conducted by our field forestry supervisors and managers. Work planning and customer contact are conducted by our Forestry Technicians.

Figure 288: Comments on Kinds of Activities that Are Work Planned and Who Performs Each Duty

Customer Communication with Work-Planning Personnel

The next two tables contain reported data on communication between customers and work-planning personnel. The first table (below, this page) includes the comments that each company made about their data. The second table (next page) reports the recoded data.

Objective: Determine the extent which customers communicate with work-planning personnel.

Question #225: Please enter the AVERAGE ANNUAL NUMBER OF CUSTOMERS for each category. NOTE: In the comment box, please indicate if these numbers are estimates or calculated.

Comments on Customer Communications with The Utility	
3	Estimated
29	Above data is from Phone Board. Doesn't include direct calls to UVM personnel to their office or cell phone.
30	We communicate with many customers but it is not tracked in terms of giving a good estimated number for many of the above questions.
47	No Comment
83	No Comment
84	Estimated
91	We require 100% of tree removal forms.

Figure 289: Comments on Customer Communications with the Utility

Question #225: Please enter the AVERAGE ANNUAL NUMBER OF CUSTOMERS for each category.

Customer Communications with The Utility						
Company Code	**3**	**29**	**47**	**83**	**84**	**91**
Customers who sign permission to access their property to perform work	0	0	N/A	99%	13,000	0
Customers who sign permission when pruning is prescribed	0	0	N/A	90%	13,000	0
Customers who sign permission when herbicide work is prescribed	0	0	N/A	70%	N/A	0
Customers who sign permissions when removals are prescribed	95	7,000	DK	99%	1,500	6,000
Customers who call back when door hangers are left	15	N/A	DK	35%	5,000	10
Customers who respond to mailed notifications	0	N/A	DK	70%	N/A	5
Customers who respond to work-planner's knock on door	0	N/A	DK	2%	5,000	5
Customers who say no to performing any work	2	50	less than 10 per year	1%	40	2
Customers who say no to portions of work	2	N/A	82	2%	200	82
Customers who email their concerns	1	N/A		2%		4,300
Customers who compliment the work planning	2	N/A		20%		DK
Customers who complain about work planning	5	N/A		1%		DK
Customers who complain about tree work	5	350		5%		240
Customers who compliment tree work	1	N/A		2%		DK
Customers who request special work	0	3,300		10%		25,000
Customers who ask for and receive loads of woodchips	1	160		1%		DK

Figure 290: Customer Communications with the Utility

Objective: To determine the detail required for inspections and prescriptions.

Question #226: From the following list choose the items that your planners are documenting in their inspections and whether the planning is completed on paper, electronically or both. Check all that apply.

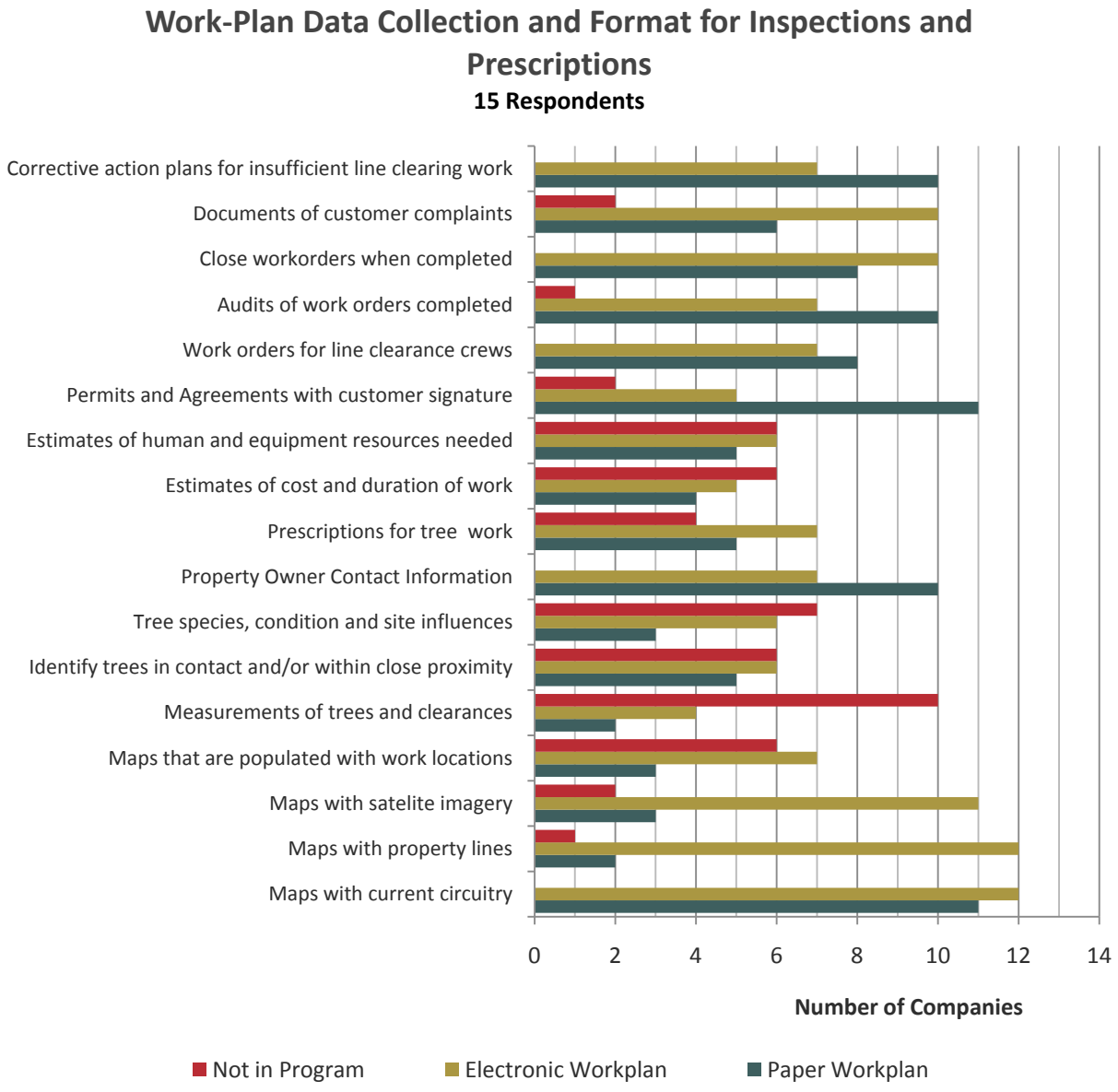


Figure 291: Work-Plan Data Collection and Format for Inspections and Prescriptions

Data Discussion of Work Planning Data Collected and Format of Documentation:

15 Companies responded to **Question #226**. The graph above reveals several things about workplan data capture.

1. All respondents use maps for current circuitry and most of those companies are using maps in both paper and electronic form (Category at bottom of graph). There was only one company using paper only and three using electronic only.
2. Less than half of the respondents have work locations on work order maps.
3. The most prevalent use of workplan documentation is a signed work agreement.
4. A majority of respondents do have tree prescriptions included in work-plans.
5. Work Orders are supplied to line clearance crews for most of the companies.

Conclusion: Work-plans often lack detail, such as tree species, clearance specifications, conditions, etc. Paper is still used most of the time as part of or as the only workplanning/inspection documentation.

HAZARD TREE PROGRAMS

For questions relating to hazard tree assessments and programs, RISK TREE and HAZARD TREE are used interchangeably. For the purpose of this benchmark this survey uses the following DEFINITION for hazard or risk tree. HAZARD or RISK TREES: Trees are hazardous and involve risks when the failure of one or more of their parts could result in property damage, personal injury and/or impacts to electrical lines.

Percent of Companies with a Hazard Tree Program

Question #227:

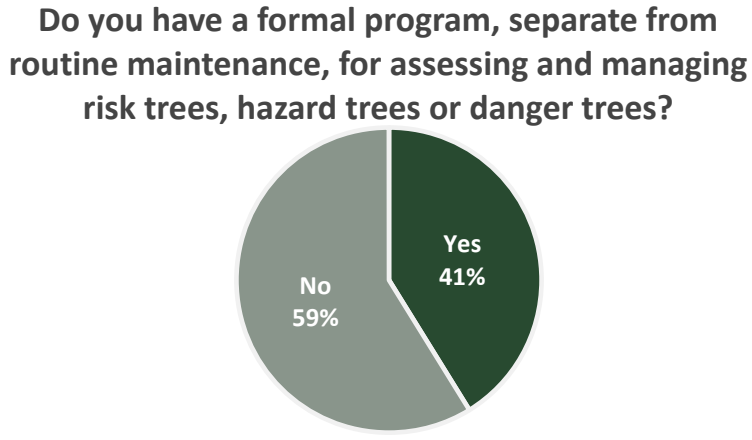


Figure 292: Percent of Companies with a Hazard Tree Program

This is a **10% increase** from 2006 data.

Descriptions of Hazard Tree Programs

Question #228: Please provide your definitions for the following three terms: Hazard Tree, Risk Tree and Danger Tree

Descriptions of Hazard Tree Programs
Danger Tree: Dead, diseased, decayed, declining, tree that has a target - property, public, or Distribution System. **Hazard Tree:** Same as Danger Tree definition but more imminent in nature.
Hazard Tree: A hazard tree is a danger tree that has an unacceptable risk of failing before the next maintenance cycle.
Dead tree program for pines.
Hazard tree assessment is done during our routine patrols.
Hazard Tree is a tree with a flaw and a target (power line). **Danger Tree** is a tree that has a target (power line). We don't use the term "Risk Tree."
Hazard tree - Any dead/declining/damaged or excessively leaning tree that has the potential to contact the primary when it falls and cause a reliability issue and/or facility damage within the trim cycle. **Risk tree** - Critical removal profiles A. Directly affecting or evidence of affecting 2 or more phases B. Overhang or offset with potential of blow-in or dropping frond on 2 or more phases C. Directly affecting or evidence of affecting 1 phase
We use the ANSI 300, Part 7 definitions of hazard and danger tree and do not use the term risk tree.
Nothing in writing for distribution.
A tree - living or dead - in which its condition, its health, its species, the quality of its root system, its orientation and/or degree of inclination of certain portions, presents a risk of being uprooted or being susceptible to other damage that can compromise the reliability of the distribution network.
We follow the definition used ANSI A300, Part 7 Standard for **Hazard Tree** and **Danger Tree**. **Risk trees** in terms of rank of severity fall behind Hazard and Danger Trees. It is not used regularly and as the term reflects, it's a risk but not as likely to fail in the short term as a Hazard Tree or Danger tree.

Figure 293: Descriptions of Hazard Tree Programs

Hazard Tree Assessments

The next four questions probe the nature of tree assessments performed to identify trees as *Hazard or Risk Trees.* Specifically:

1. Are Trees outside of Easements Assessed for Hazard Conditions?
2. Are Trees outside Easement Assessed During Routine Inspections?
3. Are Inspections Performed by Walking 360 Degrees around Trees?
4. Do Work Planning Inspections on Hazard Trees Routinely Involve Special Tools?

Question #229:

Figure 294: Are Trees outside of Easements Assessed for Hazard Conditions?

Comments on Assessments of Trees Outside of Wire Zone for Hazard Conditions
They are not directed to, but they might see it. [Other]
Yes, but not typically, majority is on wire side. [Other]

Figure 295: Comments on Assessments of Trees Outside of Wire Zone for Hazard Conditions

Question #230:

Figure 296: Are Trees outside Easement Assessed During Routine Inspections?

Comments on Whether Trees outside Easement Are Assessed During Routine Inspections
Both with normal workplanning inspections, as well as specifically to the Hazard Tree Program (separate from maintenance). [Other]
Limited rights to remove means limited observance of hazard trees outside of easement. [Other]

Figure 297: Comments on Whether Trees outside Easement Are Assessed During Routine Inspections

Question #231:

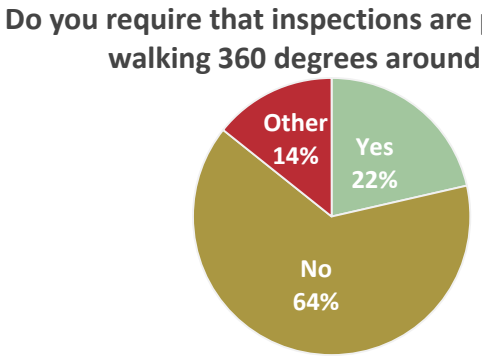


Figure 298: Are Inspections Performed by Walking Completely around Trees?

Comments on Inspecting Trees by Walking completely Around Them
This is the only thorough way for accurate inspection. [Yes]
Only dead trees. [Other]
If a defect is noted then that is a reason to do a 360 degree. [Other]
Most inspections are visual and viewed from a distance, but if it is determined that something is wrong with the tree based on appearance, then a more formal 360 degree inspection is sometimes conducted to diagnose the problem and see if tree removal is necessary to lessen the likelihood of the tree failing and making contact with our lines. We do realize that a 360 degree walk around is the best way to get a total view of the tree and find any potential disease, wounds, root rot, etc but with size of our system, this is not always feasible so we do not require this on inspections. [No]

Figure 299: Comments on Inspecting Trees by Walking completely Around Them

Question #232:

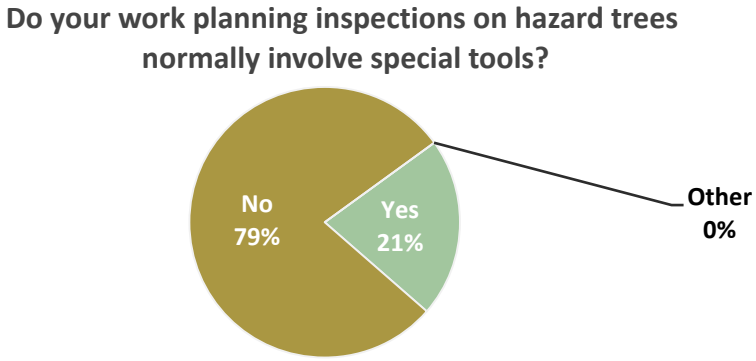


Figure 300: Are Special Tools Routinely Used to Assess Hazard Trees?

Descriptions of Special Tools Used for Risk Assessment for Trees
Our contractors utilize a hazard tree assessment tool that helps to rank the relative risk the tree presents.
Tomograph, Hammers
Tree hammer to check density

Figure 301: Descriptions of Special Tools Used for Risk Assessment for Trees

Miles of Line Inspected Specifically for Hazard Trees Annually

Question #233: If you perform hazard tree assessments separate from your regular workplanning or inspection program, what percent of your miles/km of line are inspected specifically for hazard trees each year?

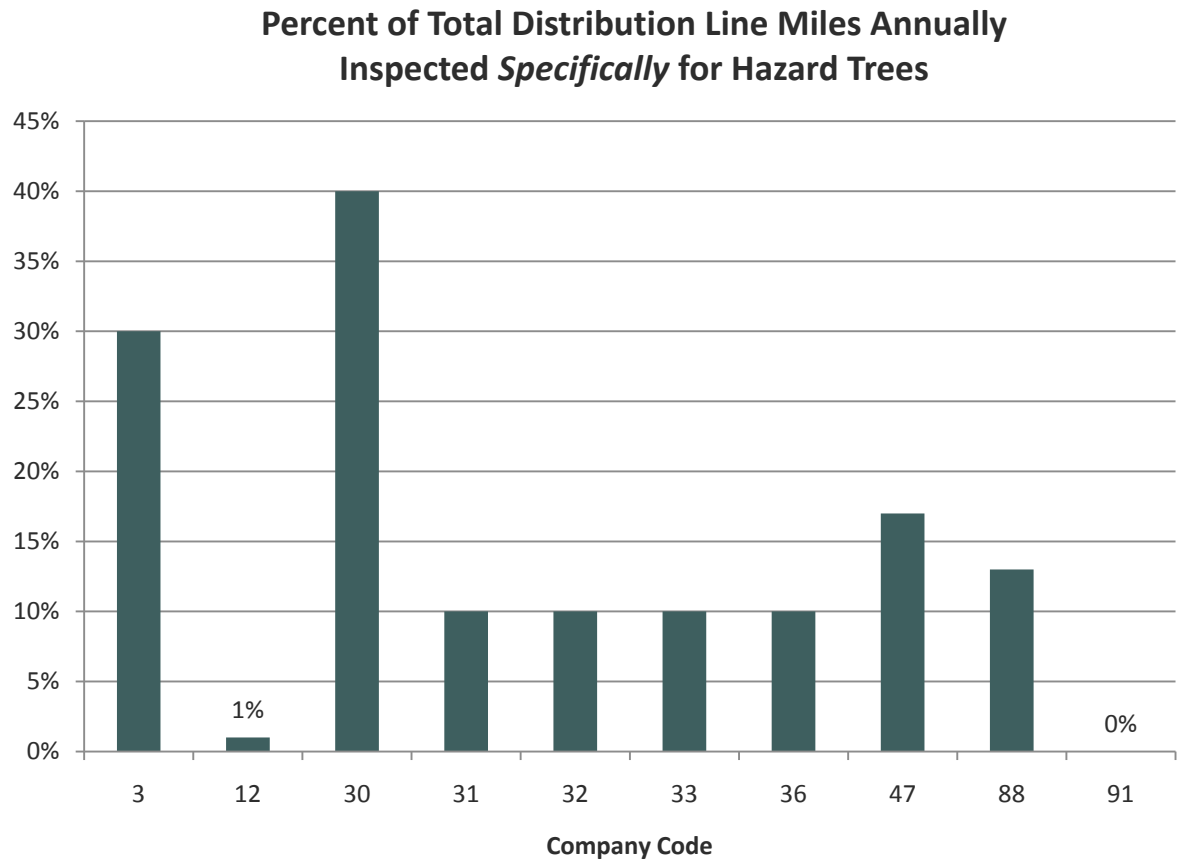


Figure 302: Percent of Total Distribution Line Miles Annually Inspected *Specifically* for Hazard Trees

Comments on Miles of Lines Inspected Annually for Hazard Trees
We base our HT Program on a "Worst Performing Circuit list". The number of circuits and line miles vary from year to year based on inventories.
Our independent hazard tree program is a new program that we are currently piloting and plan to ramp up in the coming years.
Mid-cycle inspection of mainlines only.
We remove dangerous trees accordingly to a choice of circuits identified for their bad continuity of service.

Figure 303: Comments on Miles of Lines Inspected Annually for Hazard Trees

Assessments for Other Targets besides Powerlines

Question #234:

When trees are evaluated for hazards, are more targets considered than the powerlines, such as the frequency of traffic, pedestrians, playgrounds, and backyards where children are present?

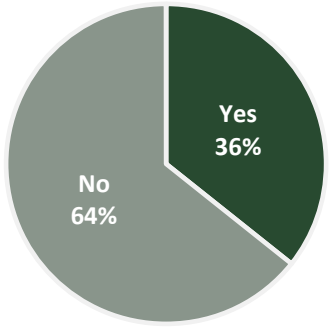


Figure 304: Assessments for Other Targets besides Powerlines

Targeting Trees in Good Health but a Threat by Proximity

Question #235:

Do your hazard tree inspectors pursue removal permits on large trees that are in good health but could impact an important feeder line if they failed in a storm?

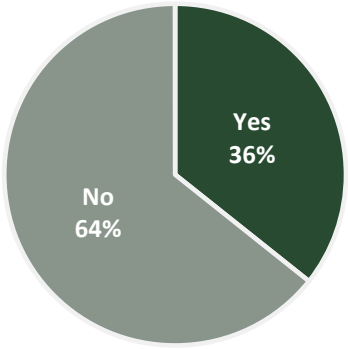


Figure 305: Targeting Trees in Good Health but a Threat by Proximity

Average Annual Number of Trees Removed to Storm Harden Distribution System
Very difficult to have a number but a lot of them are in very good health, but mechanically fragile due to their nature (species).
Estimate that around 2,000 trees a year fit into this category

Figure 306: Average Annual Number of Trees Removed to Storm Harden Distribution System

Tracking of Tree Species and Failure Type of Tree-Related Outages

A study of failed trees in northern California found approximately one third of urban tree failures are branches, one third are trunks and one third are roots.

Question #236:

Do you track the type of tree failures and tree species that cause outages and facility damages?

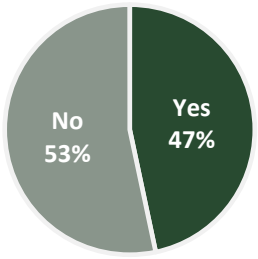


Figure 307: Tracking of Tree Species and Failure Type of Tree-Related Outages

Comments on Tracking Causes of Tree-Related Outages
We are going to start to do this. We would like to contribute to the Tree Failure data base. We are somewhat restricted by available resources to accomplish this. We currently have an increased focus on reliability, so we believe we need to put more of an emphasis on this part of the process. [No]
Only on feeders. [No]
We will start in 2012. [No]
We have studied some of the trees to obtain a representative sample. [Yes}

Figure 308: Comments on Tracking Causes of Tree-Related Outages

Evaluation of Hazard Trees to Establish Priority of Action

Question #240:

Do you have a visual tree assessment (VTA) checklist, a Risk evaluation form used to score hazard trees for priority of action?

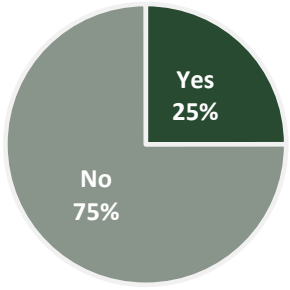


Figure 309: Evaluation of Hazard Trees to Establish Priority of Action

Description of your Hazard Tree Risk Evaluation Form
Our contractors utilize a hazard tree assessment tool that helps to rank the relative risk the tree presents.
It's part of the electronic program. It uses species, target and flaw as the criteria. Evaluation results in a numerical score.
Form captures risk profile and recommended countermeasures.
No hazard tree program.
But it's exceptional and only for exceptional trees.

Figure 310: Description of Hazard Risk Evaluation Form

Evaluating Healthy Trees as Hazards if Multiple Leaders Have Included Bark

Question #241:

Do you remove trees that have multiple leaders with included bark, that are otherwise healthy but pose a risk of failure during a wind event?

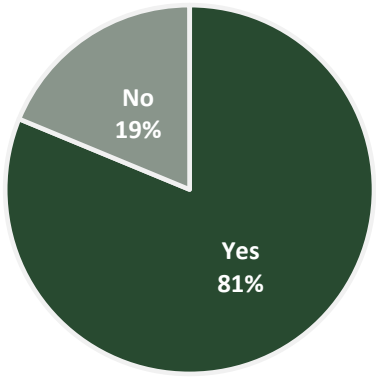


Figure 311: Evaluating Healthy Trees as Hazards if Multiple Leaders Included in Bark

Comments on Evaluating Healthy Trees as Hazards if Multiple Leaders Included in Bark
Co-Dom. Stemmed pines, maples, oaks are all hazard tree candidates.
Depends on situation.
We remove those trees or we remove overhanging branches of those trees.

Figure 312: Comments on Evaluating Healthy Trees as Hazards if Multiple Leaders Included in Bark

Increasing Clearance Distances for Trees with a lot of Overhang

Question #242:

As part of your HAZARD TREE PROGRAM, do you target trees with a lot of overhang that are above your clearance standard?

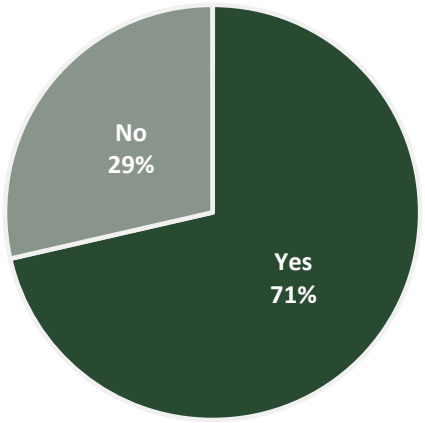


Figure 313: Increasing Clearance Distances for Trees with a lot of Overhang

Descriptions of your Approach to Managing Hazardous Overhang
Trees with overhang have the highest probability of contacting conductors and causing outages, therefore, if defined as hazardous tree, they are candidates for removal under Hazardous Tree Program.
We target removal of all hazardous overhang.
If the overhanging branches are dead or dying they would be removed during our routine annual patrols. Reliability projects that target specific circuit protection zones essentially remove all overhangs, including green healthy branches.
Depending on the circumstance. We may also look for engineered solutions such as Hendrix cable, line relocation or undergrounding
As part of specially funded ROW reclamation projects.
Yes, in those cases we often remove only overhanging branches.
If we deem the overhang to be a hazard to the line, then we may schedule some Skylining on that circuit to remove all the overhang that could fail and make contact with our lines.

Figure 314: Descriptions of your Approach to Managing Hazardous Overhang

Use of Ladder or Aerial Lifts during Assessments of Hazard Trees

Question #243:

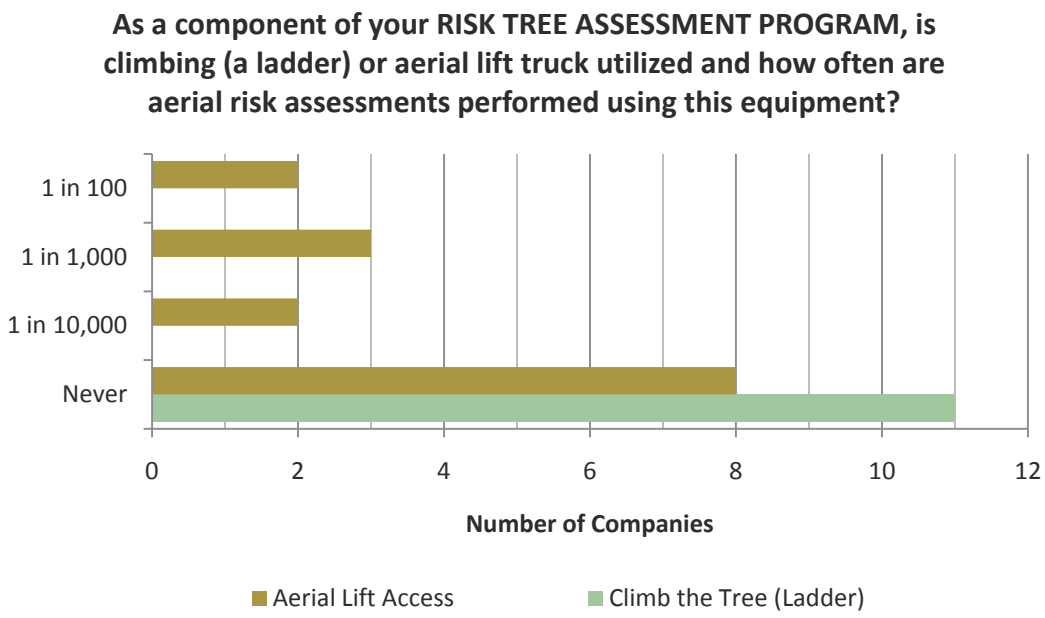


Figure 315: Use of Ladder or Aerial Lifts during Assessments of Hazard Trees

Fire Potential Tree Assessments

Question #244:

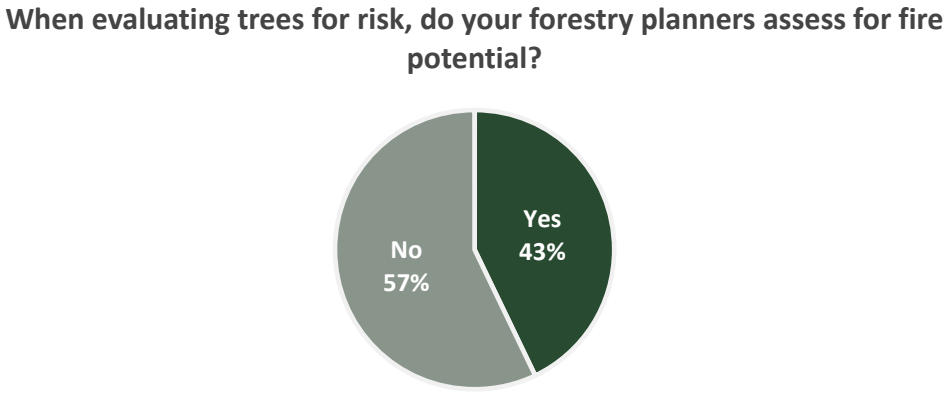


Figure 316: Fire Potential Tree Assessments

Descriptions of Fire Risk Assessment Process
Remediate the fuel within a 10 foot radius of the distribution pole.
Specific to geographic area.

Figure 317: Descriptions of Fire Risk Assessment Process

Confirmed Tree-Wire Conflicts Resulting in Wildfires

Question #245:

Has confirmed *tree-wire contact-caused wildfires* occurred in your distribution system in the last decade?

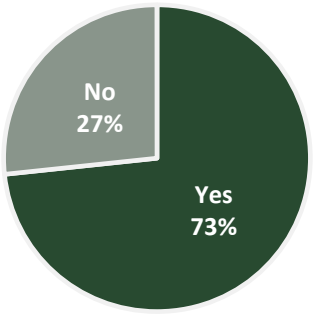


Figure 318: Confirmed Tree-Wire Conflicts Resulting in Wildfires

Descriptions of Wildfire Occurrences in the Last Five Years
Between 50-100 per year.
Numbers are confidential
Don't have the information
We have 6 incidents reported in the media between 2005 and 2010. There were trees falling into the powerlines causing small fires, usually only a few trees large.
There was one at a utility 150 miles from [City Name].
Various small fires have started because of trees/line contact in the last few years. Size has been limited to less than 50 acres.
We have had 2 larger fires in the last 10 years. Otherwise we have around 8-15 fire calls a year on the most part small fires (tree limbs burning in power line).
Some wildfires did occur in the last decades, but essentially caused by trees who fell on our conductors, very rarely by overgrowing contact. Occurrence is in the range of 10 per year. Over the last decade only one fire caused damage to buildings.
We do not track this data, but fires are started throughout our service area when tree wire contact has occurred.

Figure 319: Descriptions of Wildfire Occurrences in the Last Five Years

CUSTOMER SERVICE OBJECTIVES

Question #246: Rank the following CUSTOMER SERVICE OBJECTIVES by importance. 1 is the MOST IMPORTANT and 6 is the LEAST IMPORTANT. Only one choice per ROW

Two graphs have been made to display this data. One graph uses weighted averages with the most important on the top, decreasing in importance as you move down. The second graph is ordered in the same way, but it shows the percentage of companies that ranked each objective as 1, 2, etc.

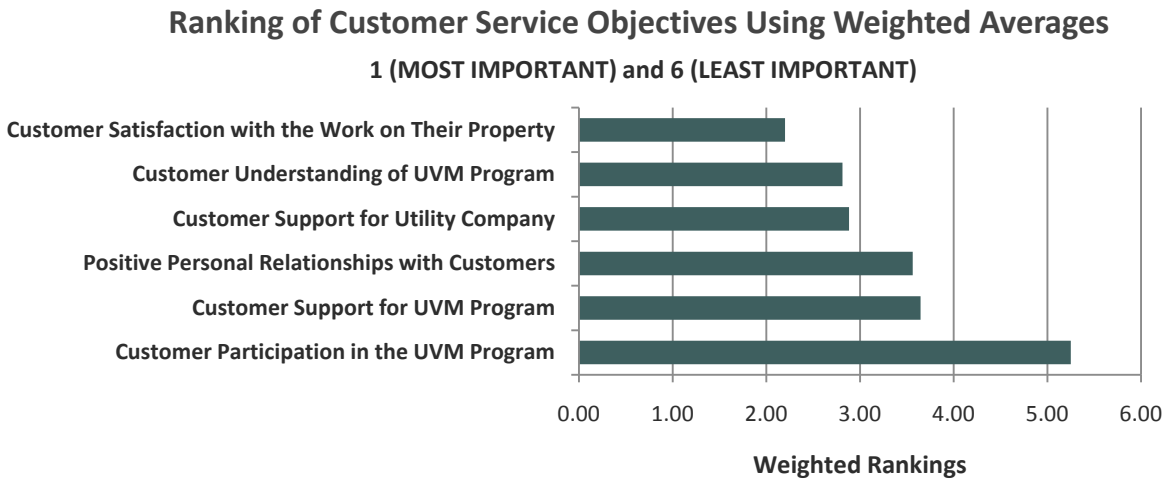


Figure 320: Ranking of Customer Service Objectives Using Weighted Averages

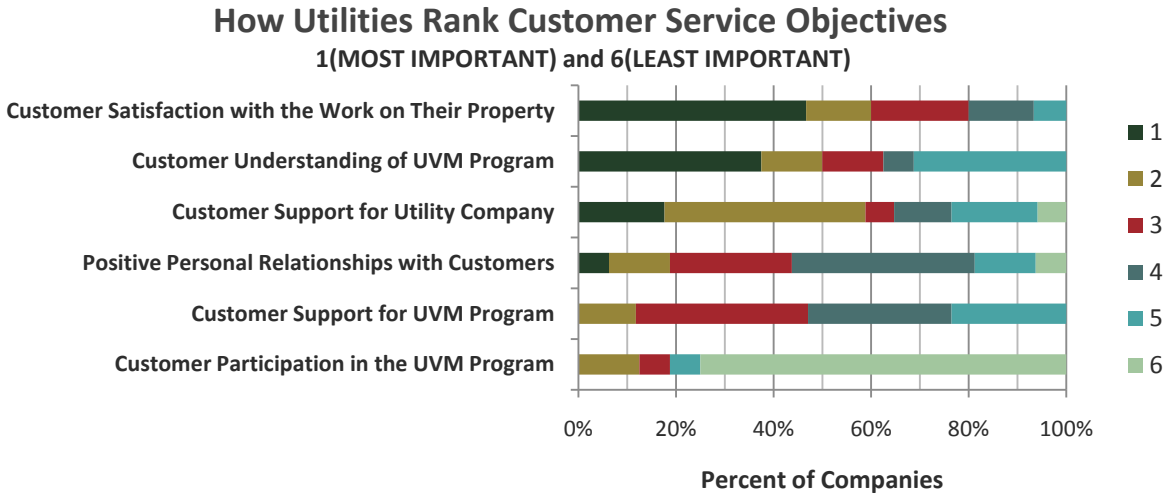


Figure 321: How Utilities Rank Customer Service Objectives

INITIATION OF ROUTINE WORK FOR DISTRIBUTION UVM

Question #247: Which of the following statements best describes how you normally initiate routine UVM work on property that is not owned by your utility company? Provide only one response.

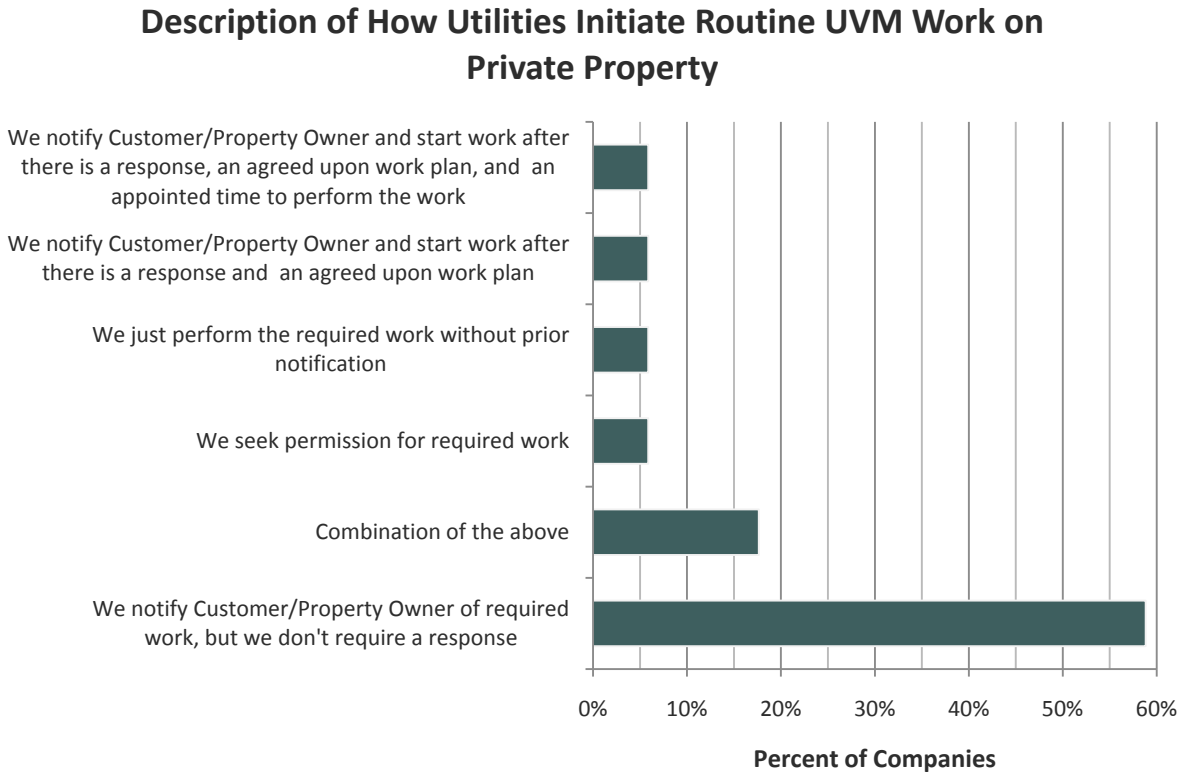


Figure 322: Description of How Utilities Initiate Routine UVM Work on Private Property

Comments on Initiating Routine UVM Work on Private Property
We notify for planned work. [Answer Given: *We notify Customer/Property Owner of required work, but we don't require a response*]
We give no appointed time, usually framed around the next year or so. Legislated requirement for permission to apply herbicides on private property. [Answer Given: *We notify Customer/Property Owner and start work after there is a response and an agreed upon work plan*]
We notify but do not require response for routine work. All removals and greater than normal clearance to be obtained should be agreed upon with customer. [Answer Given: *Combination of the above*]
We inform (ads in newspaper) for pruning; we seek permission for tree removal and brush cutting. [Answer Given: *Combination of the above*]
Notify first, seek permission, and then go ahead if contact cannot be made. [Answer Given: *Combination of the above*]
We require permission if tree removal is planned. [Answer Given: *We notify Customer/Property Owner of required work, but we don't require a response*]

Figure 323: Comments on Initiating Routine UVM Work on Private Property

Methods Used to Notify Customers of Impending UVM

The objective of this question is to discover how utility companies are notifying their customers of upcoming work. The Industry has identified 'touch points' that utility companies use to communicate with the customer on UVM activities. Notification has been the most common method. It is applied in a variety of ways.

Question #248: Which of the following notification methods do you employ, what are their efficacies, and how much in advance of work being performed are customers notified?

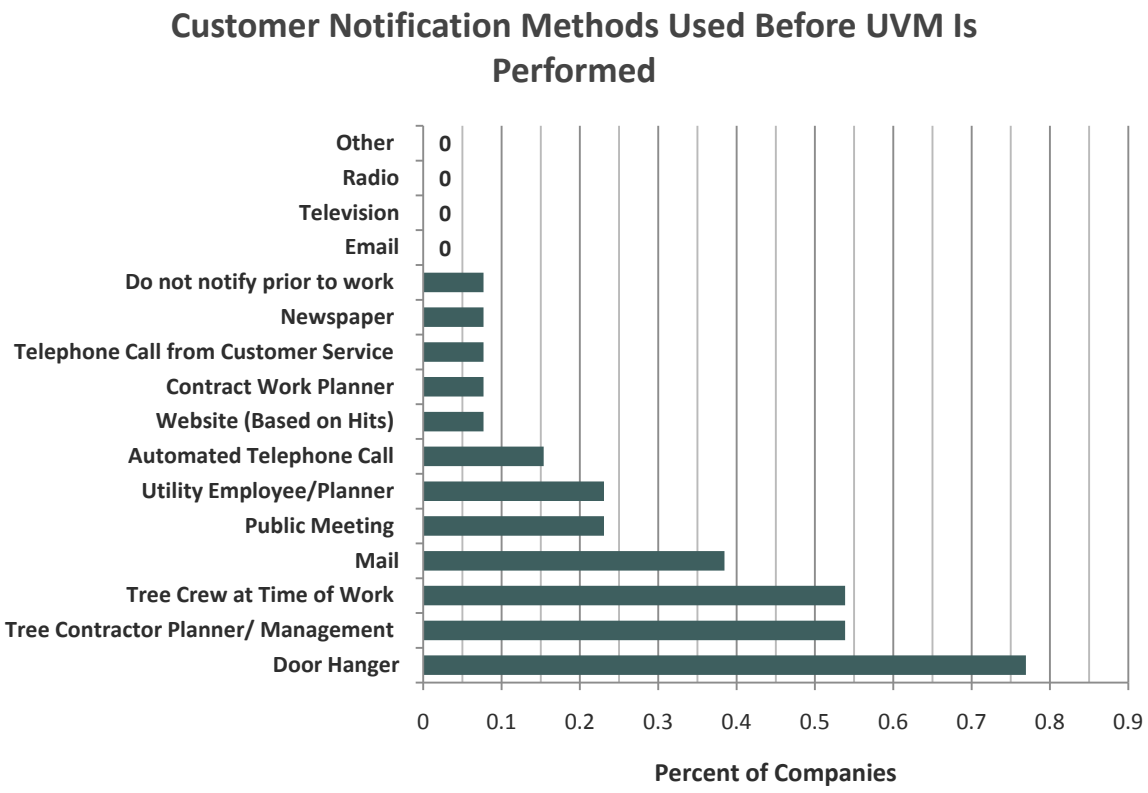


Figure 324: Customer Notification Methods Used Before UVM Is Performed

Comments on Notification Methods
We use door hangers for all planned activity.
Tree contractor leaves door cards generally.
Notification is not conducted during storm response.
Door hanger less than 1 % (max.: 19,000 per year). When we meet public, we try to meet municipal employees, professional in the "green business" but less than 1%.

Figure 325: Comments on Notification Methods

Efficacy of Customer Notification Methods

In **Question #248**, each participant was also asked to supply the *Impact of Notification on Customer Perception* (4 rating categories and one category of DO NOT KNOW were supplied). The results are displayed on the next two graphs.

The first is a bar graph of weighted averages with the highest (most successful) methods at the top and the second shows how many companies rated each method in each ranking category.

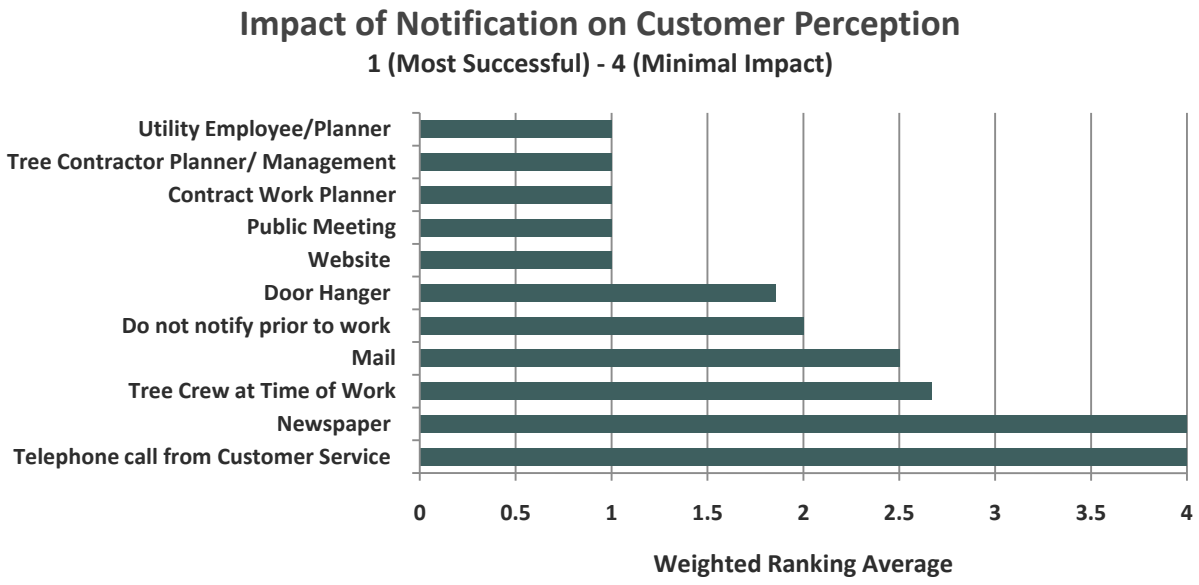


Figure 326: Impact of Notification on Customer Perception

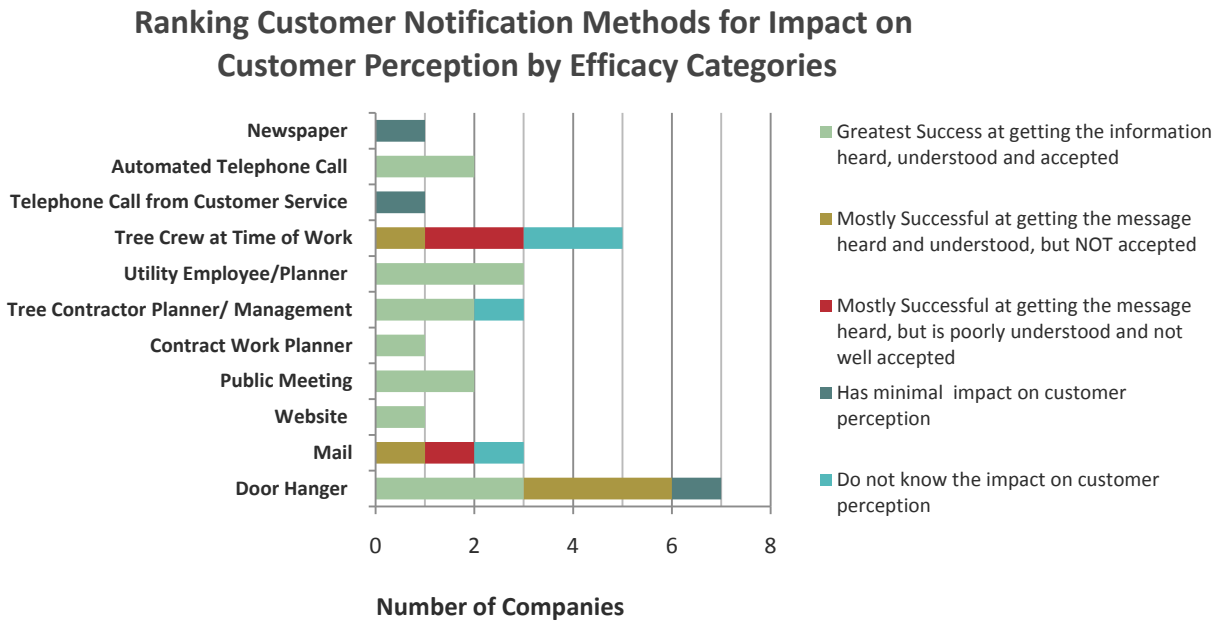
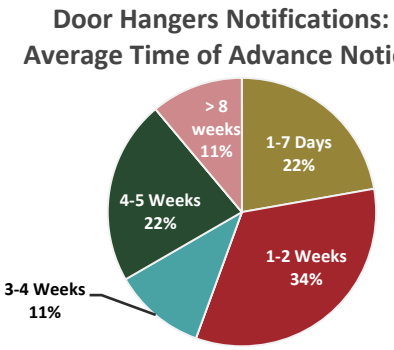


Figure 327: Ranking of Customer Notification Methods by Number of Companies

Average of Advance Notice for Each Notification Method Used

In **Question #248**, each participant was also asked to supply the *Average time of advance notice.* The results are displayed on the next ten graphs.



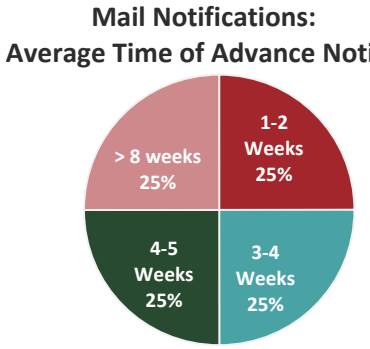
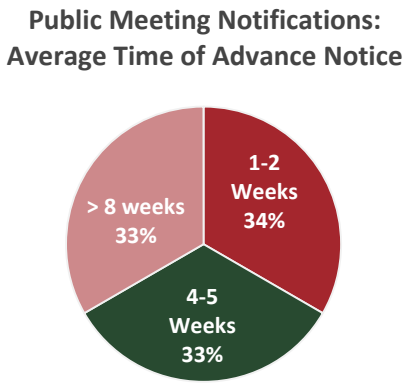


Figure 328: Door Hangers Notifications and Mail Notifications: Average Advance Time



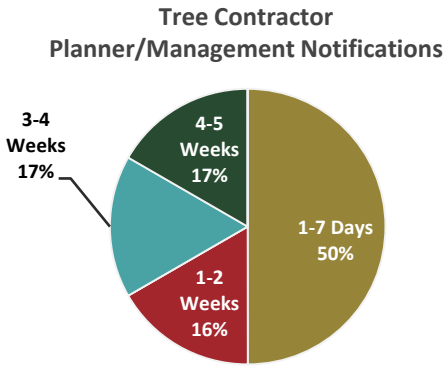


Figure 329: Public Meeting Notifications and Tree Contractor Planner/Management Notifications: Advance Time

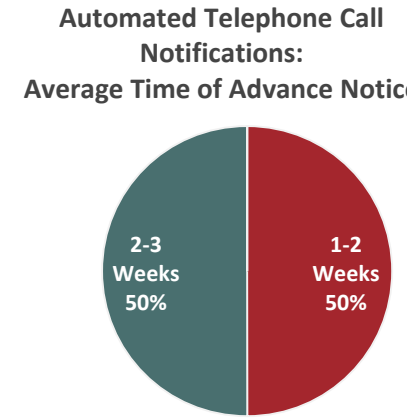
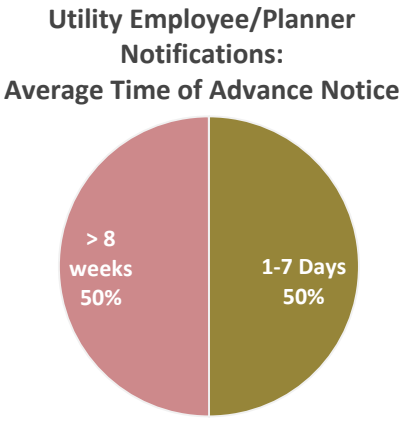


Figure 330: Contract Work Planners Notifications and Automated Telephone Call Notifications: Advance Time



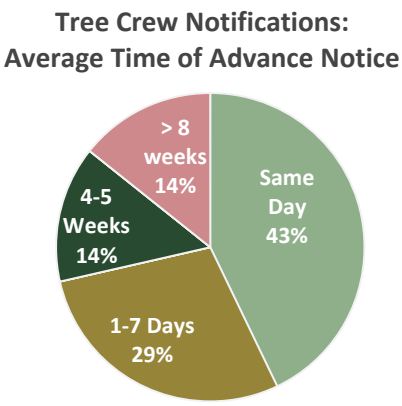
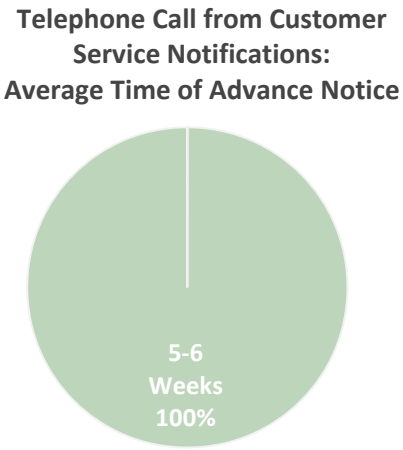


Figure 331: Utility Employee Planner Notifications and Tree Crew Notifications: Average Advance Time



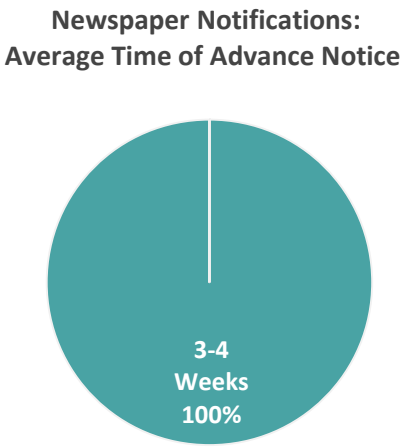


Figure 332: Telephone Call from Customer Service Notifications and Newspaper Notifications: Advance Time

Customers Notified by Each Method

In **Question #248**, each participant was also asked to supply the *Percent of Customers Notified by this Method.* The results are displayed on the next graph. The methods that notify the greatest number of customers are on the bottom of the graph decreasing as you move up.

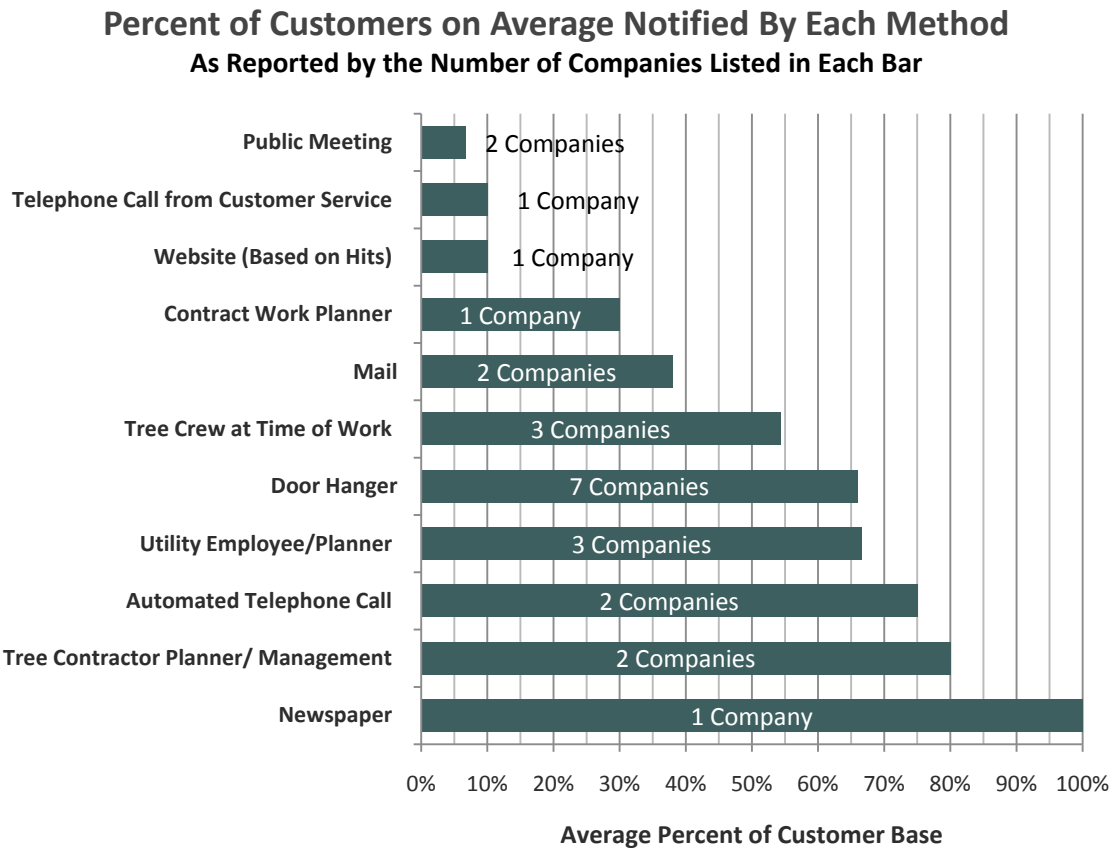


Figure 333: Percent of Customers on Average Notified By Each Method

REFUSALS TO ALLOW UVM TO BE PERFORMED

Tracking the Number of Refusals to Allow UVM to Be Performed

Question #251:

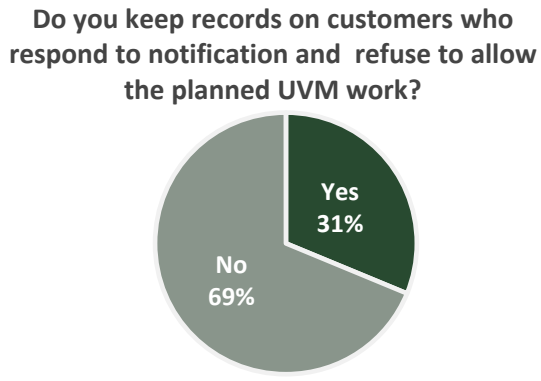


Figure 334: Track Number of Refusals to Have UVM Performed

Comments on Tracking Refusals
Most refusals are resolved after an explanation to the customer.
Not tracked.
The refusal numbers in the previous question are "escalated" issues to VM Department. The contract crews do not track "common" refusals.
We do not track to this level of detail.
Our customer refusals are not tracked in a way that makes answering this question possible.
Refusals on distribution are very rare.
No idea but estimates are <1% and very few are not worked out with customer.
We do track some of the refusals but it is very informal.

Figure 335: Comments on Tracking Refusals

Resolution of Refusals

Question #254: What percent of your refusals are resolved during the following stages of UVM?

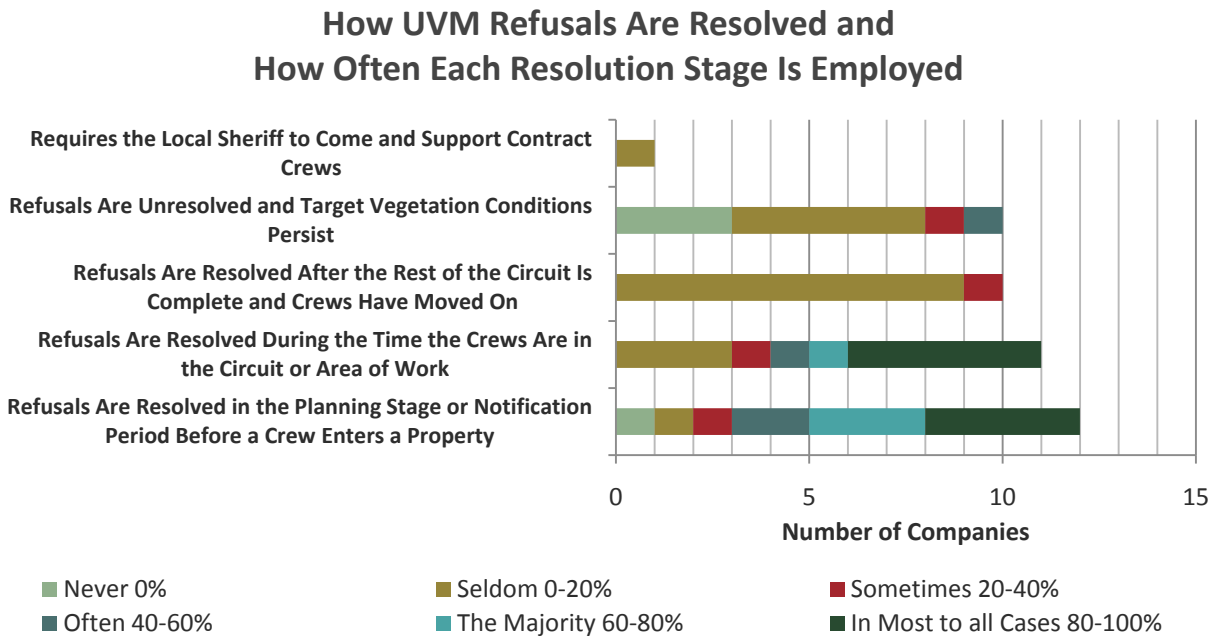


Figure 336: How UVM Refusals Are Resolved and How Often Each Resolution Stage Is Employed

Comments on Refusal Resolutions
Work is only completed without consent when efforts to contact the landowner have failed, usually absent landowners.

Figure 337: Comments on Refusal Resolutions

Responsibility of Refusals Resolutions

Question #256: What percent of your refusals are resolved by the following positions or entities? NOTE: One response per row.

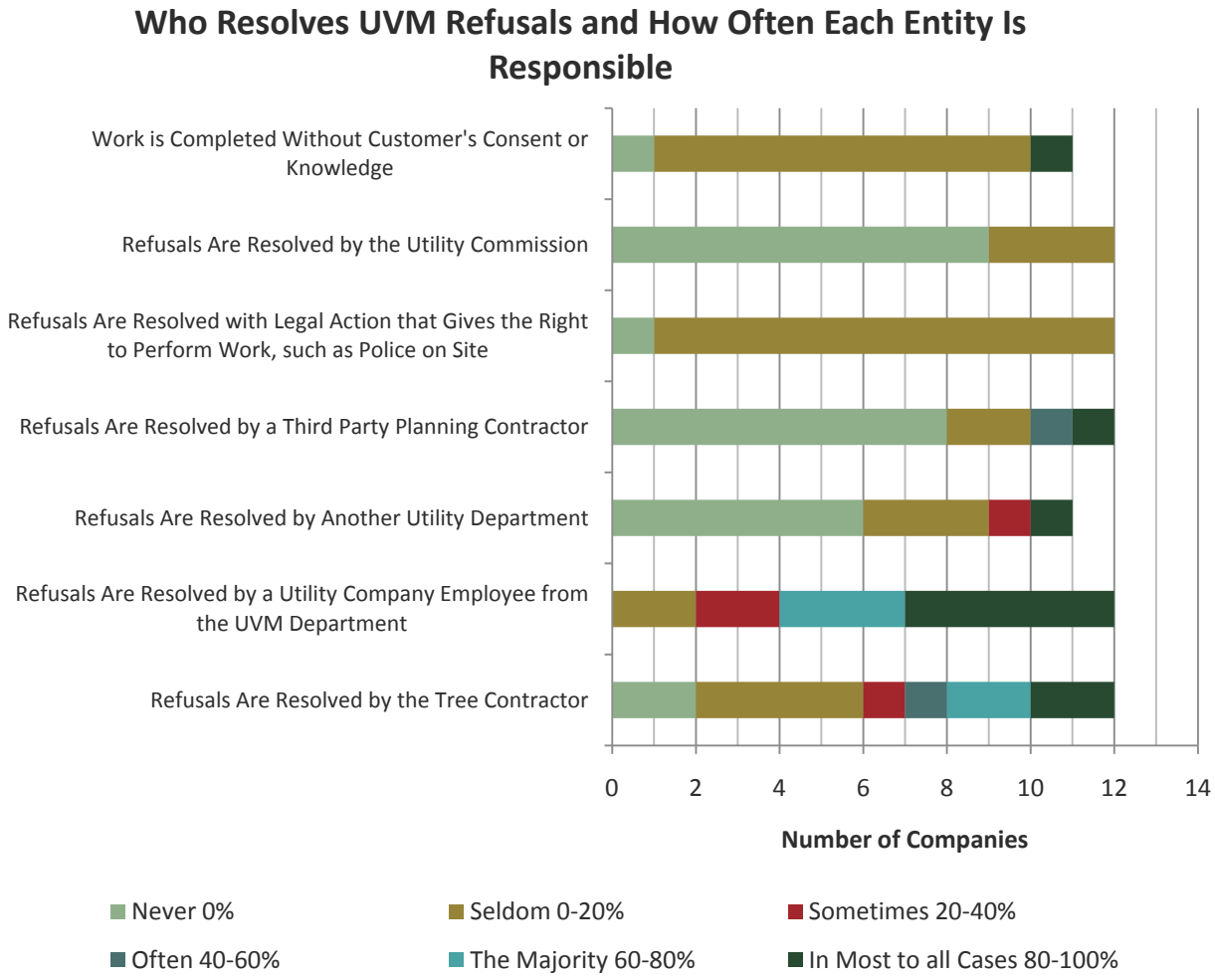


Figure 338: Who Resolves UVM Refusals and How Often Each Entity Is Responsible

Comments on Responsibilities for Refusal Resolution
Work is only completed without consent when efforts to contact the landowner have failed, usually absent landowners.

Figure 339: Comments on Responsibilities for Refusal Resolution

Reasons Customers Respond to Notifications

Question #257: For what reasons, besides refusals, do customers respond to notifications?

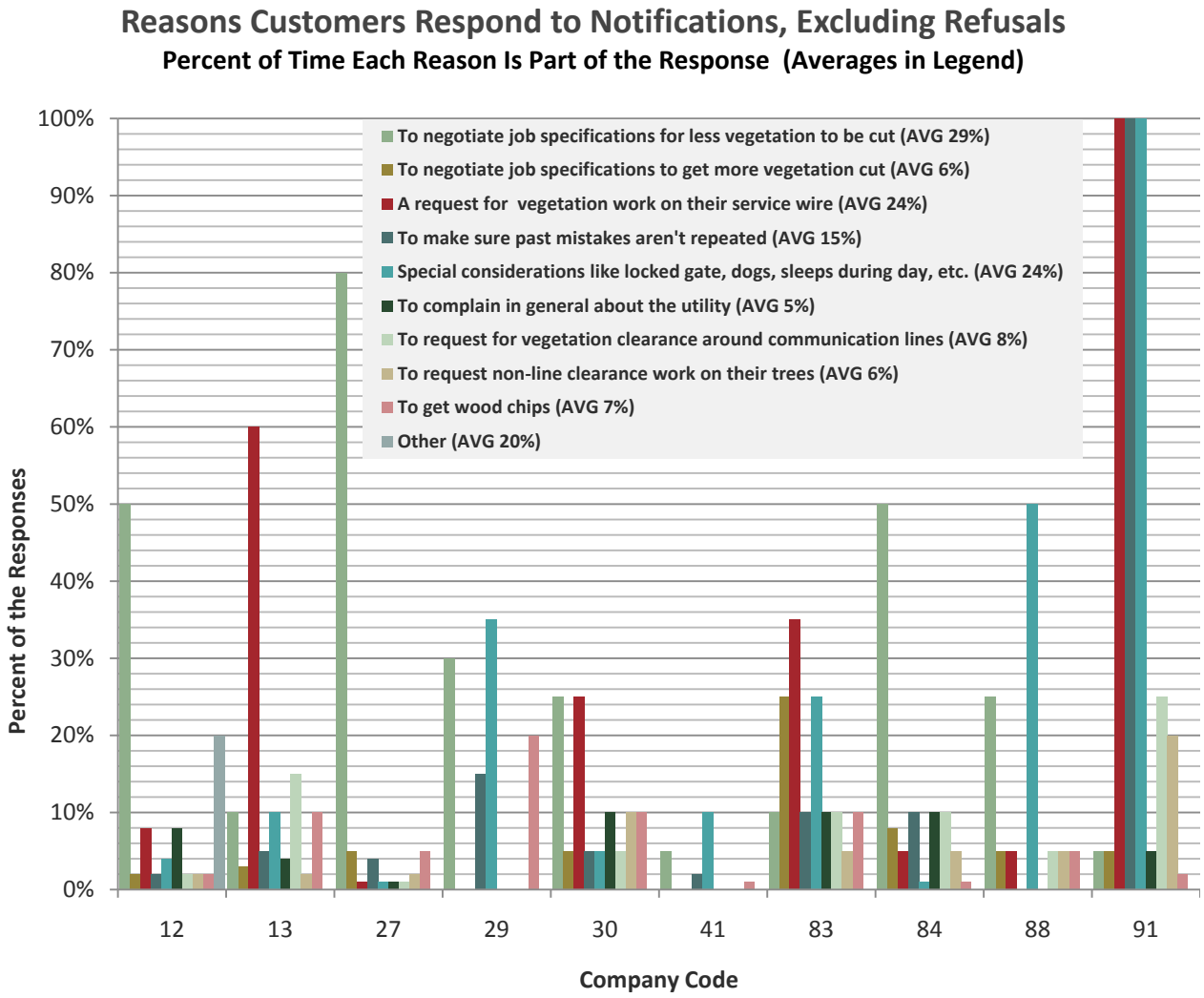


Figure 340: Reasons Customers Respond to Notifications, Excluding Refusals

Other Reasons Customers Respond to Notifications
Herbicide related refusals ~20%

Figure 341: Other Reasons Customers Respond to Notifications

Percent of Customer Base that Refuses to Allow UVM

Question #258: What percent of your total customer base, in your estimation, refuse initially to allow specified work?

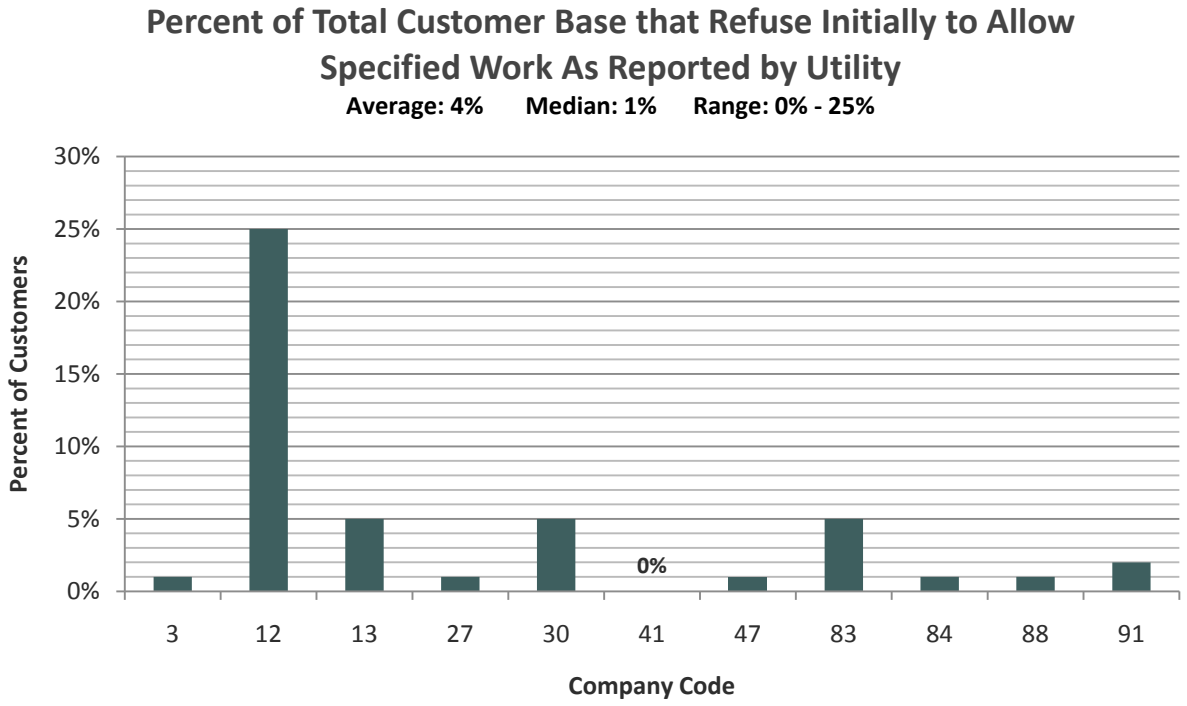


Figure 342: Percent of Total Customer Base that Refuse Initially to Allow Specified Work As Reported by Utility

RELATIONSHIP WITH CUSTOMERS

Question #259:

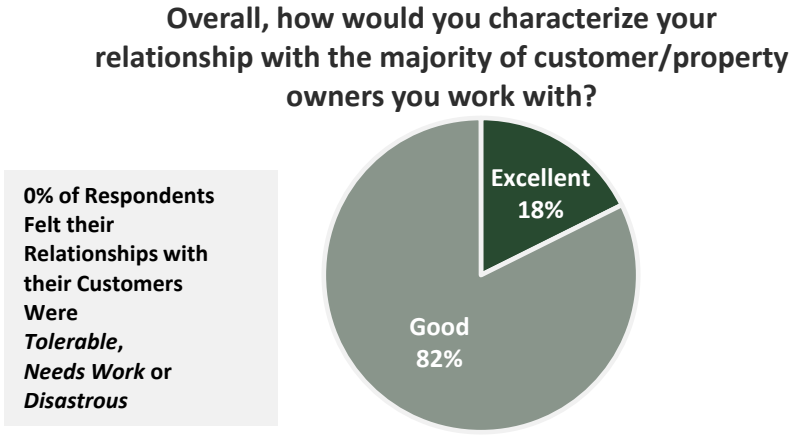


Figure 343: Characterization of Relationship with Customers

COMMUNICATIONS BETWEEN TREE WORKERS AND CUSTOMERS

Question #260:

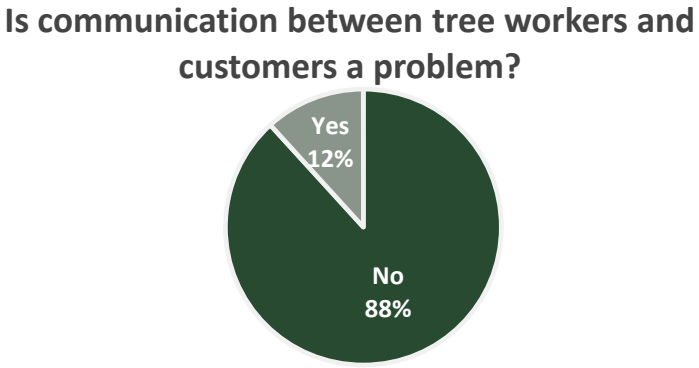


Figure 344: Communication between Tree Workers and Customers

Comments on "What are the communication issues and what are your best remedies?"
We have a program where company employees covertly ask crew question pertaining to line clearance operations.
Non-English speaking workers. Tree contractor is required to have a crew member or foreman that is English speaking.
Often crews speak a different language or do not have training or skills in speaking with customers.
Our notifiers are not the same people as the tree crew and this sometimes results in a difference in expectations. Tree workers are encouraged to contact the notifier to seek clarification on the work package.
Occasionally language barriers.
Some crews have English speaking limitations, but we are working to ensure that every crew has one well spoken English crew member.

Figure 345: Comments on "What are the communication issues and what are your best remedies?"

PUBLIC UNDERSTANDING OF INDUSTRY STANDARDS

Question #261: Do you think there is a "disconnect" (lack of understanding) between industry standards and what your customers/property owners and local agencies require you to do when performing UVM?

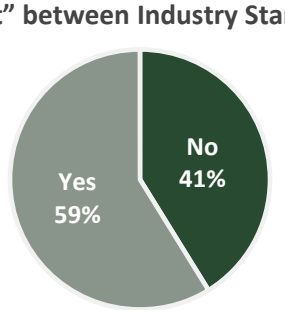


Figure 346: Is There a "Disconnect" between Industry Standards and the Public?

Public perception has improved slightly since 2002 for Distribution UVM. In 2002 **72%** of utilities felt there was a "disconnect" with the public. In 2006 this decreased to **67%.** Today, in 2011, it has decreased further to **59%.** This is a 13% reduction.

Comments on the Nature of the "Disconnect" with Public
Customers seldom understand the "V" trees and would rather see them "topped".
Do not think customers understand we have an obligation to provide reliable service and trees can interrupt that service.
Ownership of trees, hazard and reliability issues, lack of understanding of preventative maintenance.
Resistance to proper pruning techniques as opposed to improper techniques such as shearing tipping and topping.
Customers often think a tree has to be touching the conductor to be a problem; they don't understand concepts around minimal clearances by voltage and line configuration and cycle length. Customers are happy to see us removing vegetation following storms to restore service but often refuse even basic clearing of trees and brush as a preventative measure. Maintenance cycle - customers often ask - why not just take off a few branches and come back next year? Customers don't understand arboricultural target pruning, drop crotch pruning for tree health and feel more is taken than necessary when it is taken for tree structure strength and health.
Why wasn't I told you had these ROW rights before I bought the house? Local agencies are still trotting out Shigo tree trimming practices and Tree species to be planted under power line like it is the 70's and we cannot trim for the health of a tree when trimming for the health of the tree needed to start 20 years prior.
Clearance issues and types of cuts...
The amount of clearance needed for a primary line vs. a triplex service line and the removal of fast growing trees under the higher voltage power lines.
It's getting better and better, but in general: Our pruning cycle is often perceived too long, and the result of the activity, too intense. We can also report that our various clienteles grant to trees a very different importance accordingly to their origin, or their culture. As an example: the urbans are more sensitive to the tree than the countryman; the English speaking are more sensitive than French speaking. And urban moved in the countryside wishes a quality of service as impeccable as in the city, while keeping the forest character of his new environment. Quality of the electric service: the complaints of this nature are among the most numerous but the subject is not carried in the media. Quality of the work done: the aestheticism of the pruning is the object of less numerous complaints but more frequently carried in the media; Also forgetting collection of debris is the object of complaints.
They do not always understand why we must trim certain trees as we do. Especially the u or v shape cuts made for trees directly under the line.

Figure 347: Comments on the Nature of the "Disconnect" with Public

ANNUAL UTILITY VEGETATION MANAGEMENT INQUIRIES

The next four questions will involve the number of CUSTOMER SERVICE CALLS RECEIVED by your utility on an annual basis. Specifically, you will be asked to supply amounts for the years 2008, 2009 and 2010. Customer Service Calls will be separated into the following categories: Total calls, UVM related calls, UVM calls related to notification of work to be performed, and complaints.

Question #262 asked for the number of annual customer service calls. Very few participants provided an answer.

Question #263: How many of these annual customer service calls are Customer/Property Owner inquiries regarding trees and power-lines (UVM related calls)? This would include such things as requests to inspect trees, or other general inquiries related to your activities.

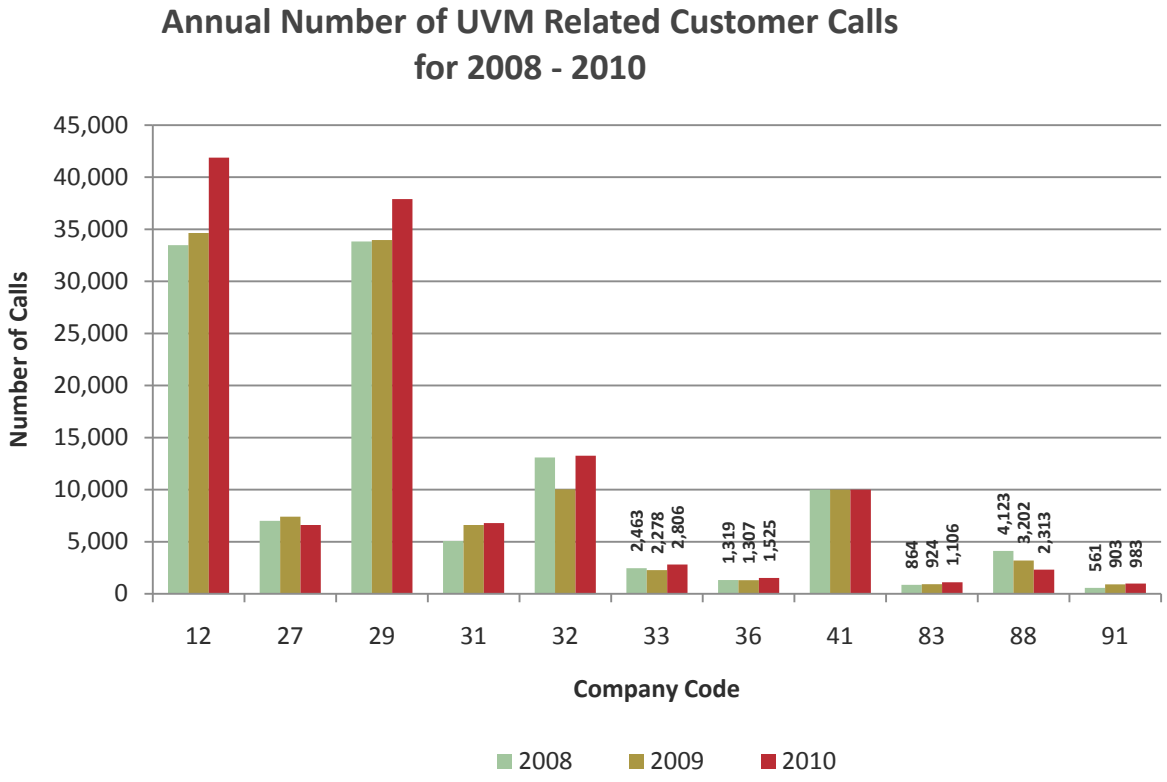


Figure 348: Annual Number of UVM Related Customer Calls for 2008 – 2010

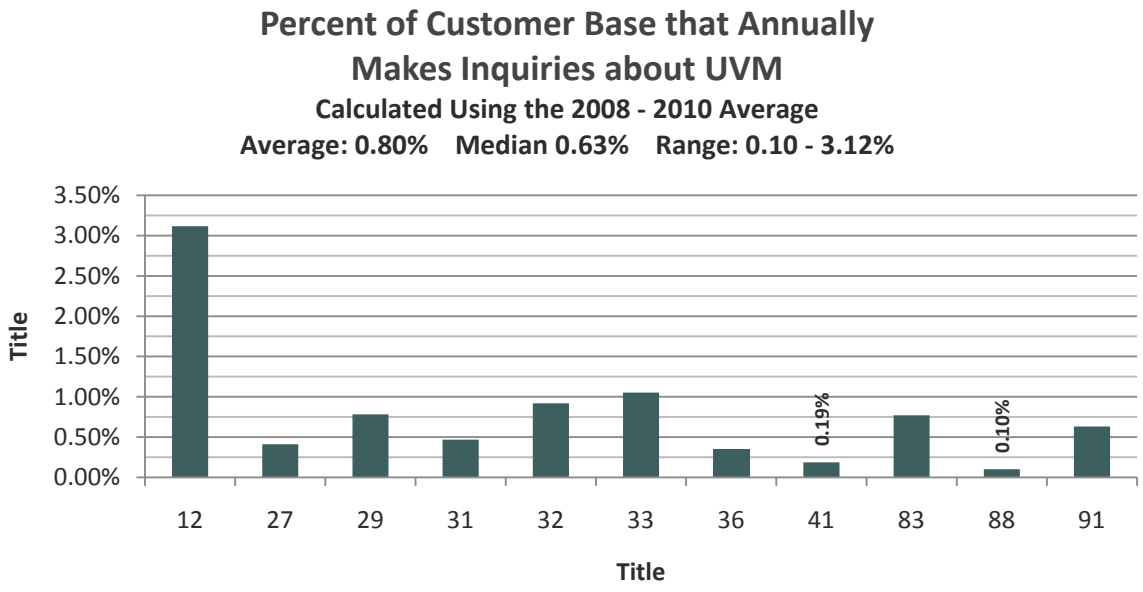


Figure 349: Percent of Customer Base that Annually Makes Inquiries about UVM

ANNUNAL UVM RELATED COMPLAINTS

Question #265: How many the Customer Service UVM Related calls are complaints?

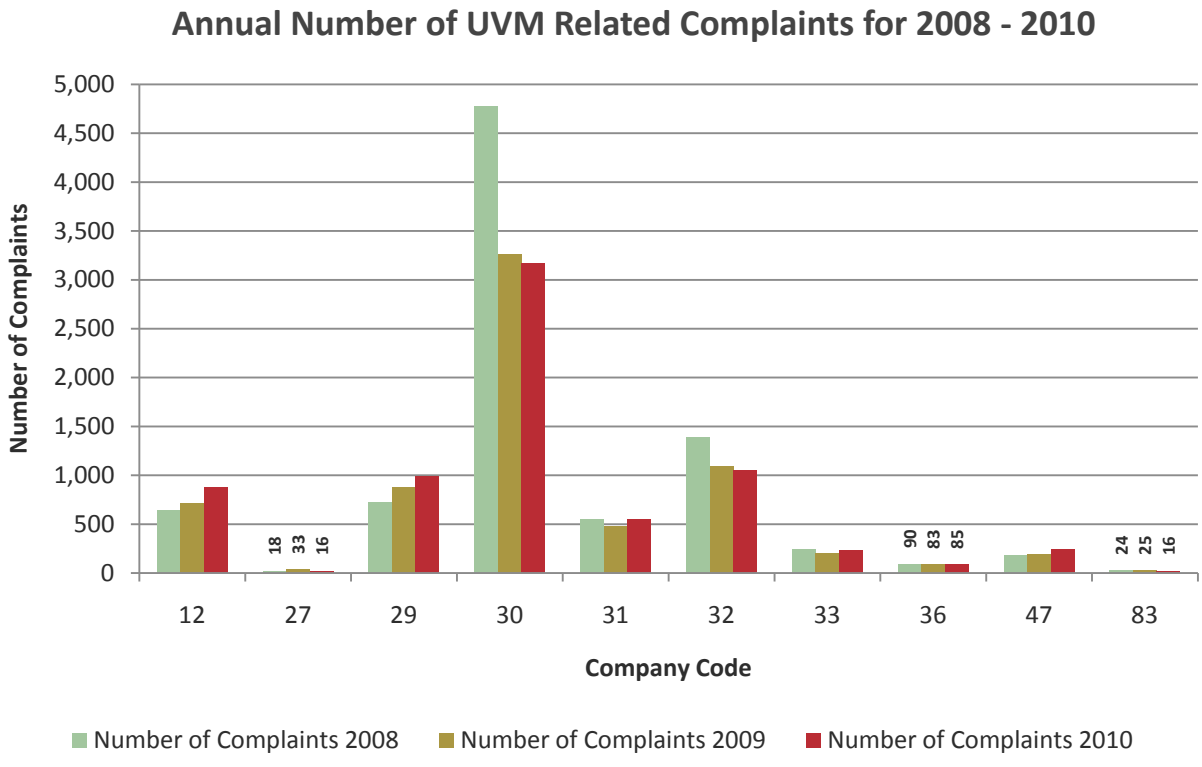


Figure 350: Annual Number of UVM Related Complaints for 2008 - 2010

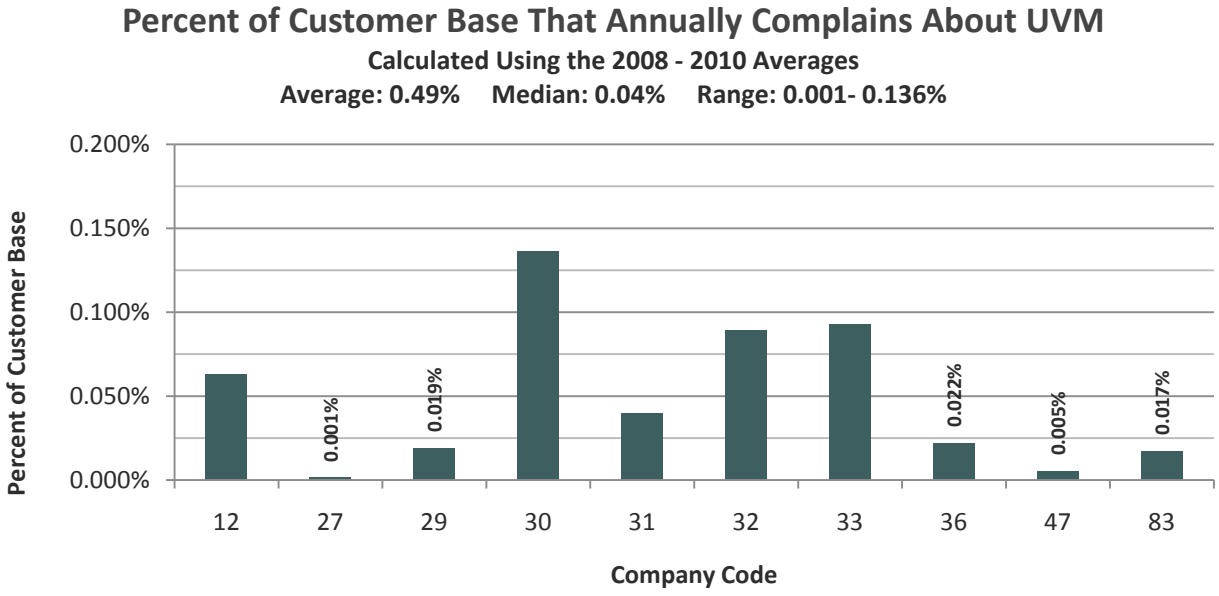


Figure 351: Percent of Customer Base That Annually Complains About UVM

RESPONSE TIME FOR UVM RELATED CALLS

Question #266: In a given time frame, what percent of Customer UVM related inquiries do you respond to by going to the address/problem location and inspecting the vegetation/problem? For example: We respond on location to 50% of our customer service requests within 24 hours. NOTE: The sum of all the answers should equal 100%.

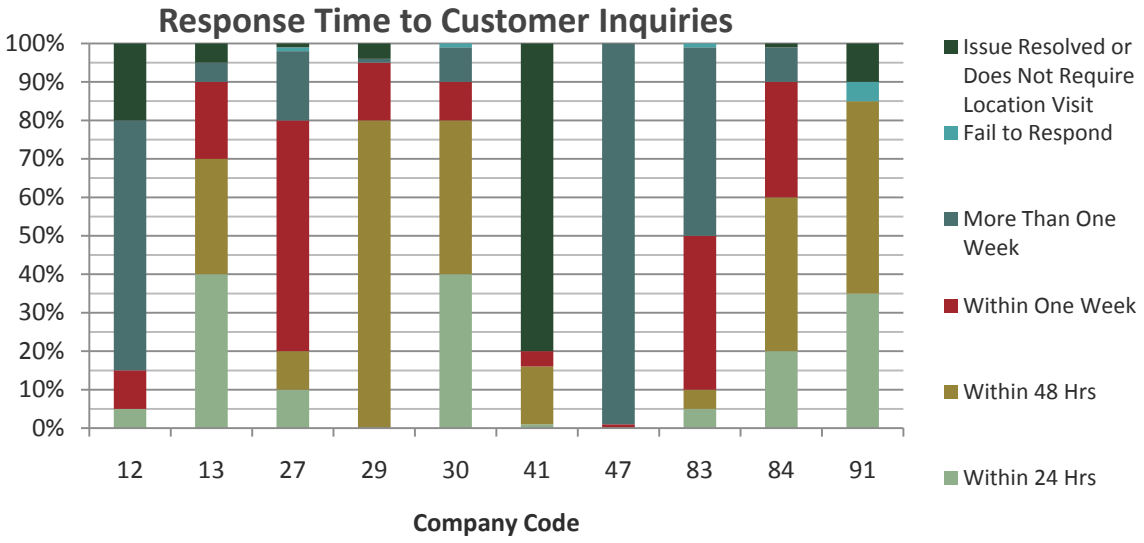


Figure 352: Response Time to Customer Inquiries

Comments on Response Time to UVM Related Customer Inquiries
Do not track in this manner.
Our goal is contact customers within 10 working days. We keep monthly aging records and find only .07% are 30 days old.
We don't keep records for this.
Estimated (2 responses)
We do not track anything with a zero response above. It is not like we do not have any.
No idea.
Globally the objective is 20 open days to go to the address/problem location and another 20 open days for the intervention to be done if the problem is real.

Figure 353: Comments on Response Time to UVM Related Customer Inquiries

CUSTOMER SERVICE REQUESTS

Person Responsible for Service Call Request Investigations

The objective of this question is to discover how customer requests are responded to by the utility.

Question #267: QUESTION: After information has been recorded from a telephone call, who goes to the location and evaluates the request?

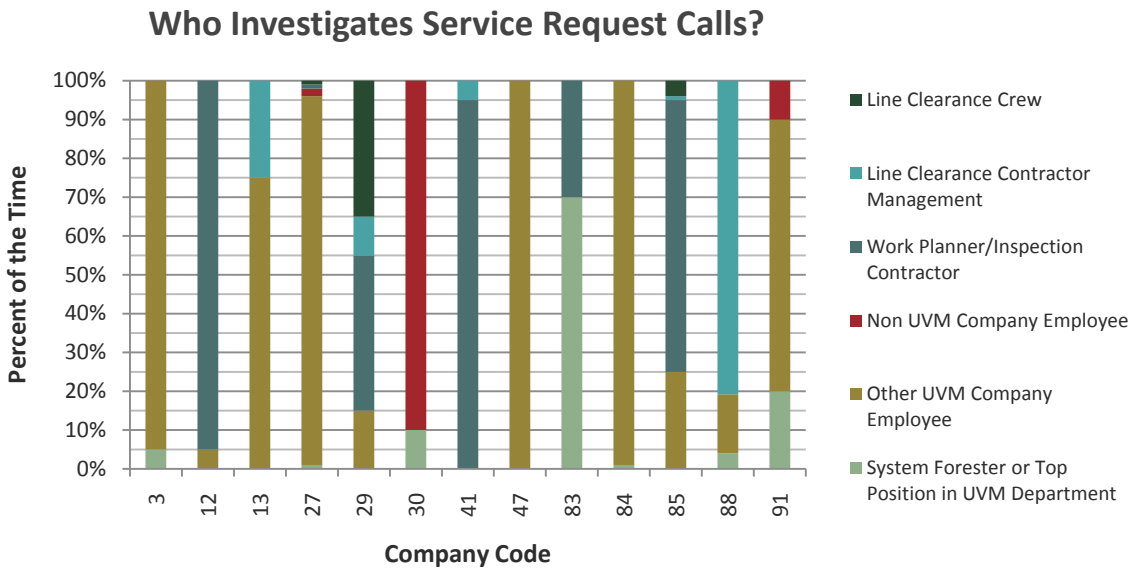


Figure 354: Who Investigates Service Request Calls?

Description of Other UVM Company Employees Who Investigates Service Request Calls
Forestry Technicians make the first field visit.
Forest technician who is a UVM company employee.

Figure 355: Description of Other UVM Company Employees Who Investigates Service Request Calls

Cost of Customer Service Requests

Question #268: Please enter the dollar amount and/or percent of total UVM expenditures that was spent on Customer/Property Owner requests.

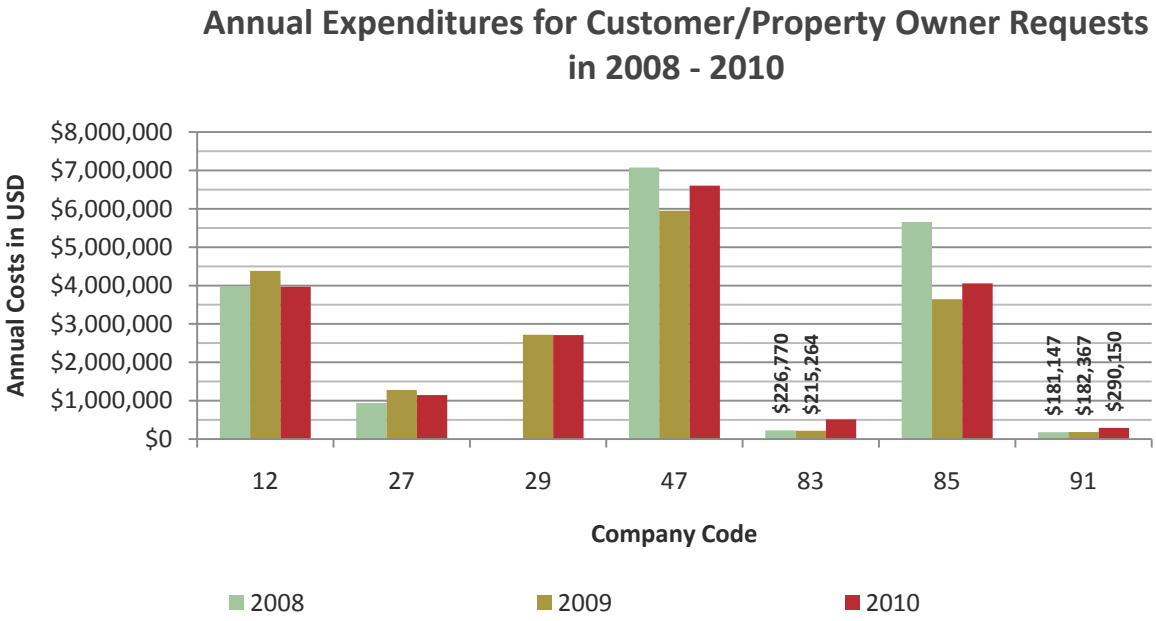


Figure 356: Annual Expenditures for Customer/Property Owner Requests in 2008 - 2010

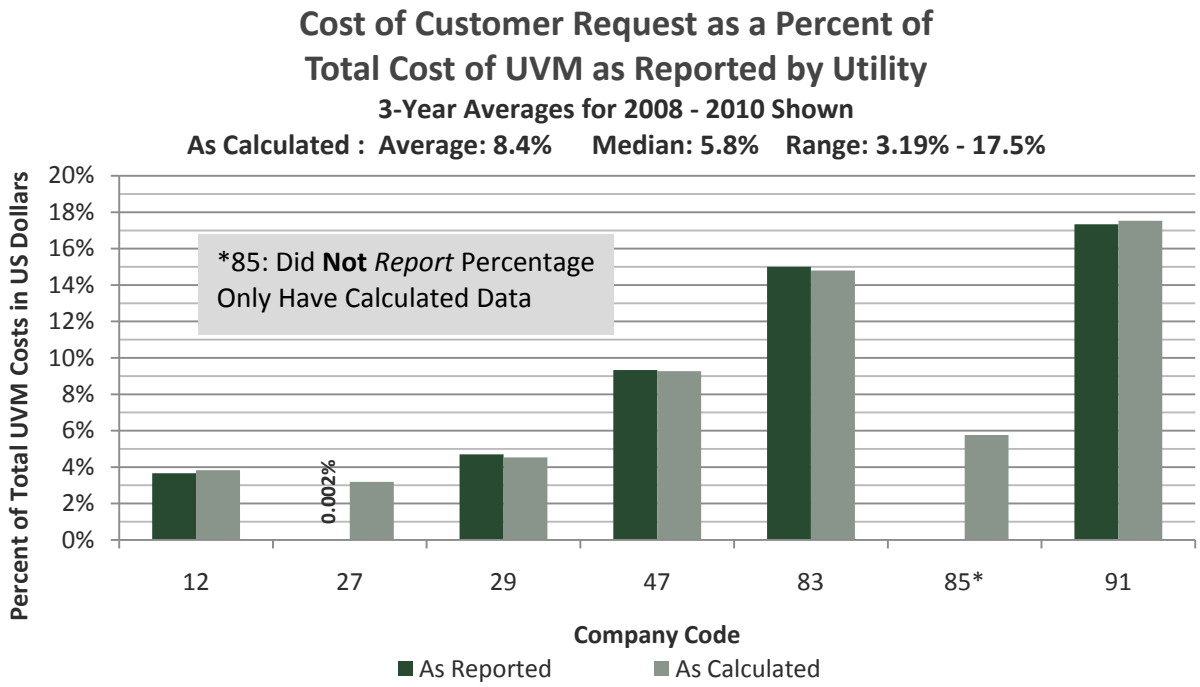


Figure 357: Cost of Customer Request as a Percent of Total Cost of UVM as Reported by Utility

State Regulations of Customer Issues

Question #269:

Does your company follow any state regulations regarding customer notifications or other customer issues related to UVM?

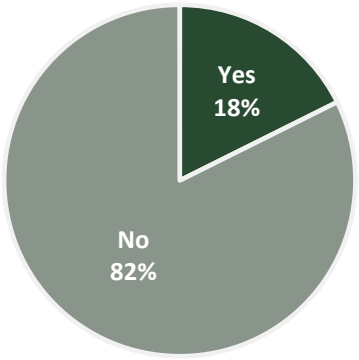


Figure 358: Do Companies Have State Regulations Regarding Customer Notifications and Customer UVM Issues?

Regulations that Apply to UVM Customer Issues
Service regulation #6
None
[State] Statue 163.3209 Part C. Before conducting routine scheduled vegetation maintenance within an established right of way, the utility must provide the official designated by the local government with a minimum of five (5) business days notice unless the maintenance is: 1. Required to restore electric service; or 2. Necessary to avoid an eminent vegetation-caused outage; or 3. Done at the request of the property owner adjacent to the right of way so long as the owner has approval of the local government, if needed.
Pesticides Act requires property owner permission for herbicide application. Federal, Provincial and Municipal require notification for affected areas.

Figure 359: Comments on Regulations that Apply to UVM Customer Issues

Legal Right vs. Legal Obligation to Perform UVM

Percent of Companies with Legal Right vs. Legal Obligation to Perform UVM

Question #270:

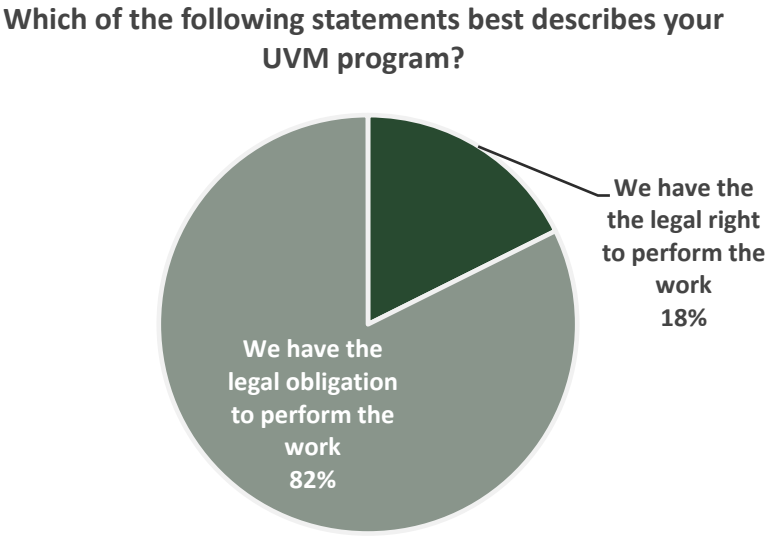


Figure 360: Legal Right vs. Legal Obligation to Perform UVM Work

Comments on Legal Right vs. Legal Obligation to Perform UVM Work
I would like to check both boxes in [this] answer.

Figure 361: Comments on Legal Right vs. Legal Obligation to Perform UVM Work

Conditions Regulating Utilities' Legal Right to Perform UVM

Participants were given several conditions and asked if these conditions were a part of their legal right to perform UVM work on customer's properties. The following graph has the condition that the most utilities included in their legal right to perform UVM at the bottom of the graph and decreasing as you move up the graph.

Question #271: True or false was entered for all categories.

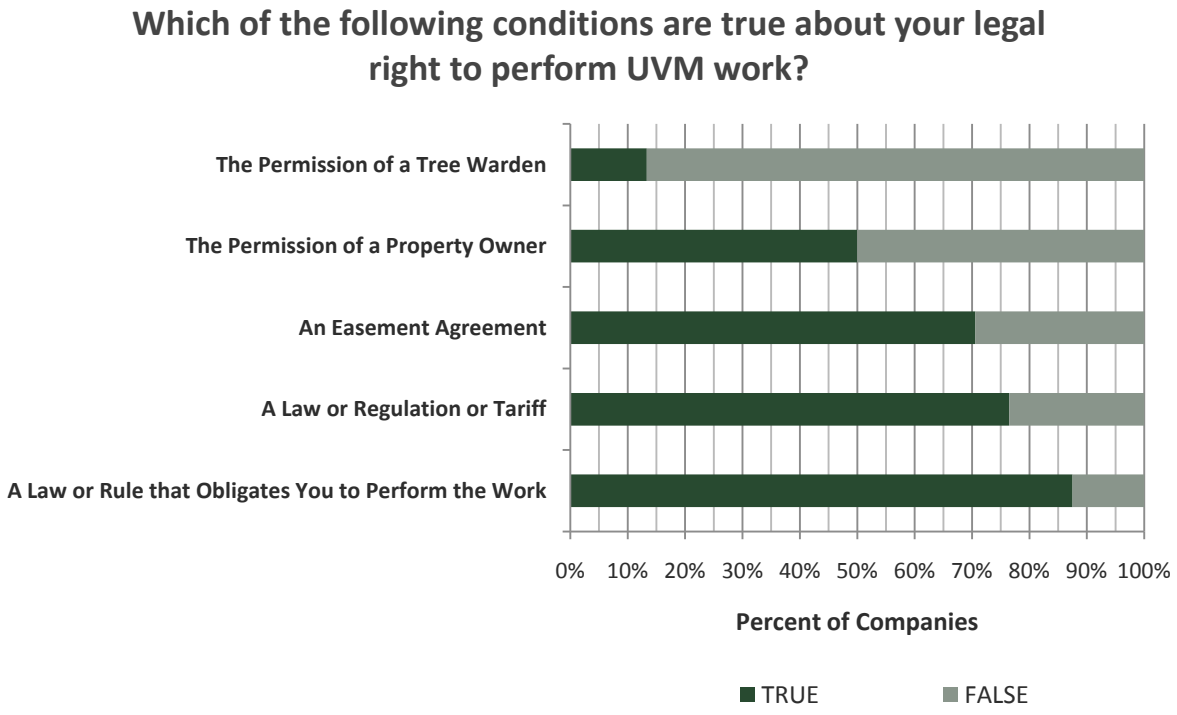


Figure 362: Conditions Regulating the Legal Right to Perform UVM Work

What Other Conditions Affect your Legal Right to Perform UVM?
Franchise agreement with city or county
Environmental, government, land agencies permits, forest service, bureau of land mgmt, tribal lands, and water shed.
Property owner permission for herbicide application.
State and Federal Agencies. Also as a Public Utility we bow to the wishes of the Politicians.
Very few easement agreements.
Court Case Judgments
UVM is a duty by a federal rule and our customer/owner has the right to claim, if we do not get his authorization first.

Figure 363: What other conditions affect your legal right to perform UVM? [Comment Table]

CUSTOMER SERVICE TRAINING

Question #272: Do you provide or require specific CUSTOMER SERVICE TRAINING for each of the following categories of UVM personnel? Check all that apply. Please describe your customer service training in the comment box.

Two graphs were made from this data. The first graph uses the data to understand how different employee types receive their customer service training. Only 12 companies answered this question, so it can be deduced from the top graph that *Notification/Workplanner Contract Employees* (Bottom of the chart) have the most extensive training. They are trained by more than one method (often more than two). The second graph looks at the same data to discover which training technique is the most predominant between companies. The most often used is at the bottom of the chart, decreasing in use as you move up.

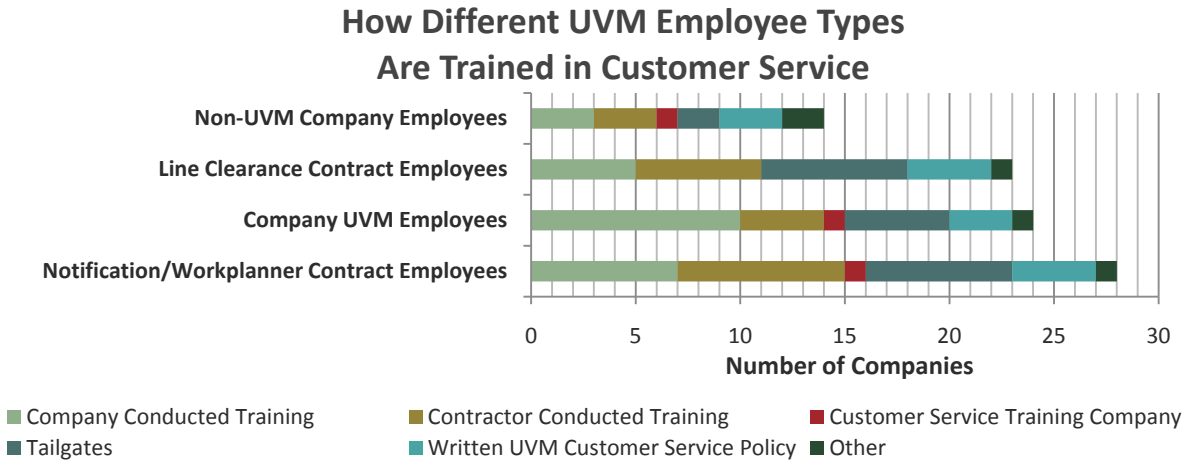


Figure 364: How Different UVM Employee Types Are Trained in Customer Service

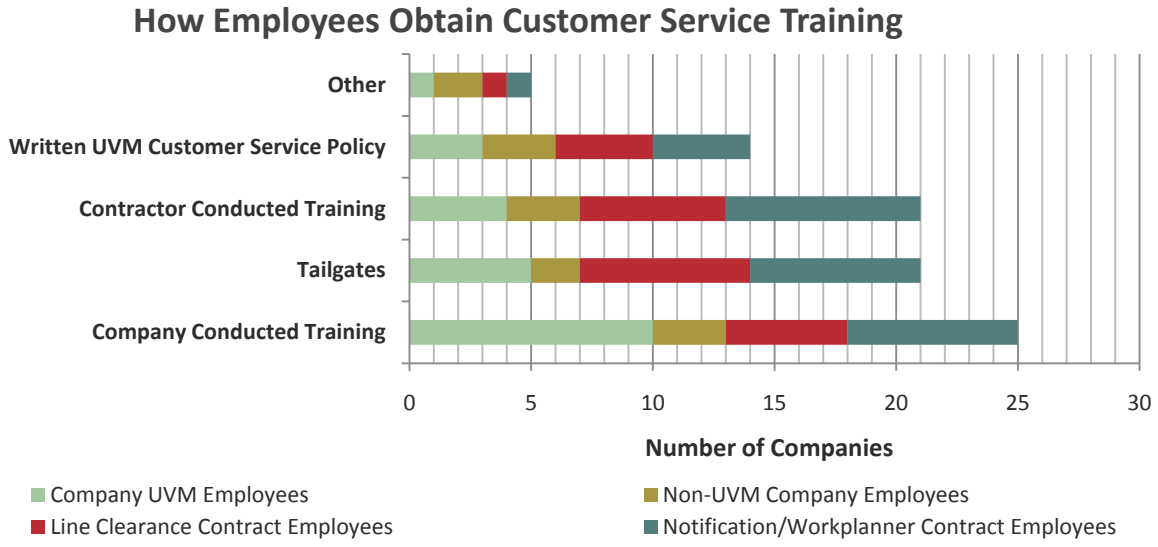


Figure 365: How Employees Obtain Customer Service Training

Descriptions of Customer Service Training Programs
Primarily tailgating and coaching/training on an on-going continual basis. Customer Service guidelines are also within the Trim Specifications and provided to all employees.
ISA, Utility Arborist Program, forester presentations, Treeline USA presentations
Public Relations programs such as "Dealing With Difficult Customers". Internal Conflict Resolution courses.
No customer service training is given to contractors. When they are used however, language in the contract specifies courteous customer service.
No specific customer service training.
It's been 15 years, we have not done such training.

Figure 366: Descriptions of Customer Service Training Programs [Comment Table]

PUBLIC EDUCATION PROGRAMS

Public Education Program Types Employed

Question #273: Do you have a public education program for UVM? From the following list please identify the programs that you currently employ to educate your customers and the general public on issues that relate to UVM. Check all that apply.

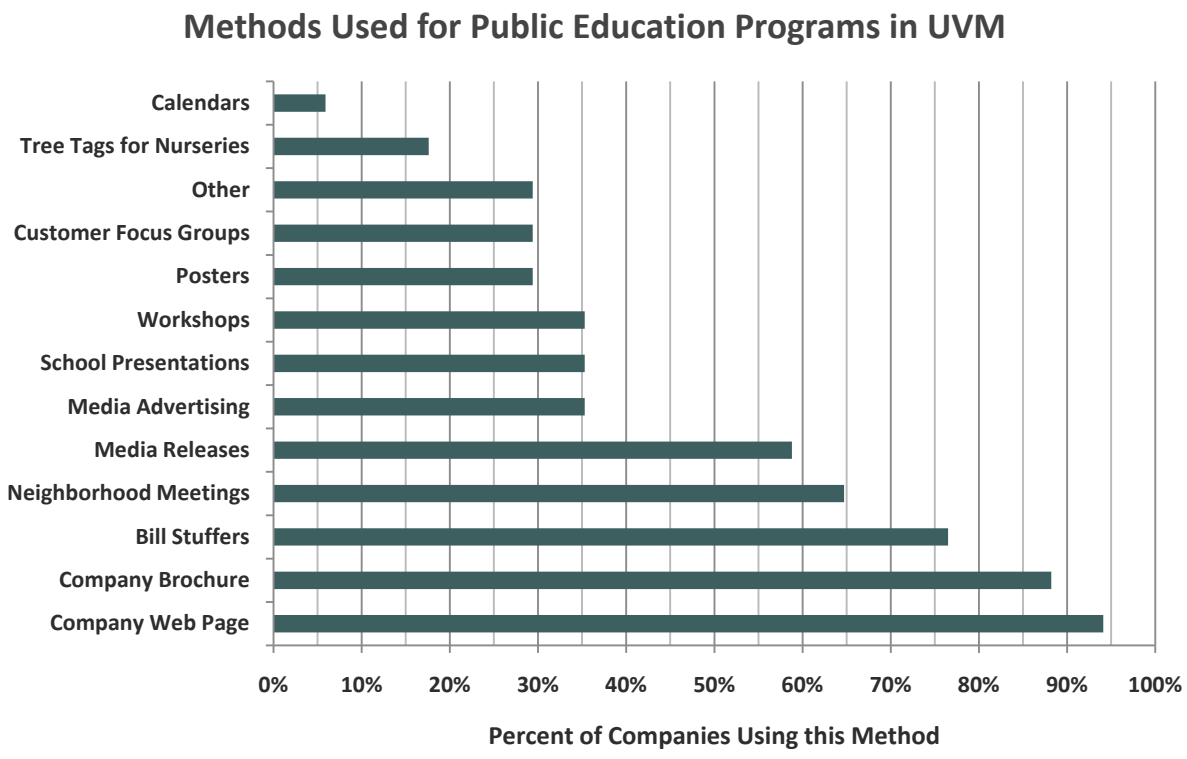


Figure 367: Methods Used for Public Education Programs in UVM

Other Public Education Forums
Know before you grow. Plan before you plant. [Other]
Booths at fairs, fund raisers, donations to firesafe councils, membership in community organizations, presentations at events and industry workshops... [Other]
Treeline USA presentations, City councils, scouts, youth, and special interest groups. [Other]
Farm and cottage shows and our right-tree-right-place program. [Other]
Door cards. [Other]
Our own newsletter. [Other]
Workshops with horticulture specialists. [Explanation of Workshops]

Figure 368: Other Public Education Forums [Comment Table]

Efficacy of Public Education Programs in Changing Customer Attitudes

Question #274: How successful are each of these educational approaches in changing customer attitudes towards UVM activities?

In the following graph, the most successful methodology would be the method with the lowest weighted average (top of the graph). The methods described as "Other" are in the comment table above (Figure 368). In fact, for the companies using methods described above, there was a belief that these were highly successful. Neighborhood meetings rated second most effective. It should be noted that none of the methods received an overall rating below *Somewhat Successful (2).*

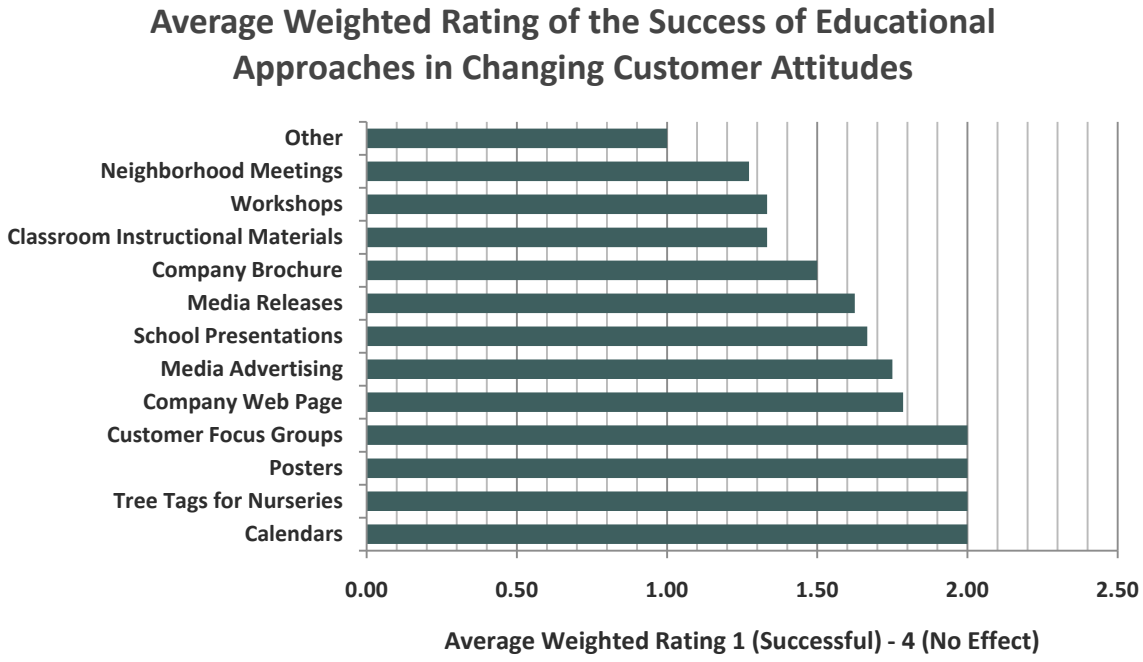


Figure 369: Average Weighted Rating of the Success of Educational Approaches in Changing Customer Attitudes

To get a better understanding of how companies rate the success of each methodology in changing customer attitudes towards UVM, the data is shown again in the following graph. One thing to note is there was not one company that rated any of the methods as having no effect. The only methods that were rated as having little effect were *Customer Focus Groups, School Presentations, Posters, Company Web Page, and Company Brochure.* It should also be noted that every method had at least one participant respond with *Do Not Know,* although some methods had several companies respond with this answer.

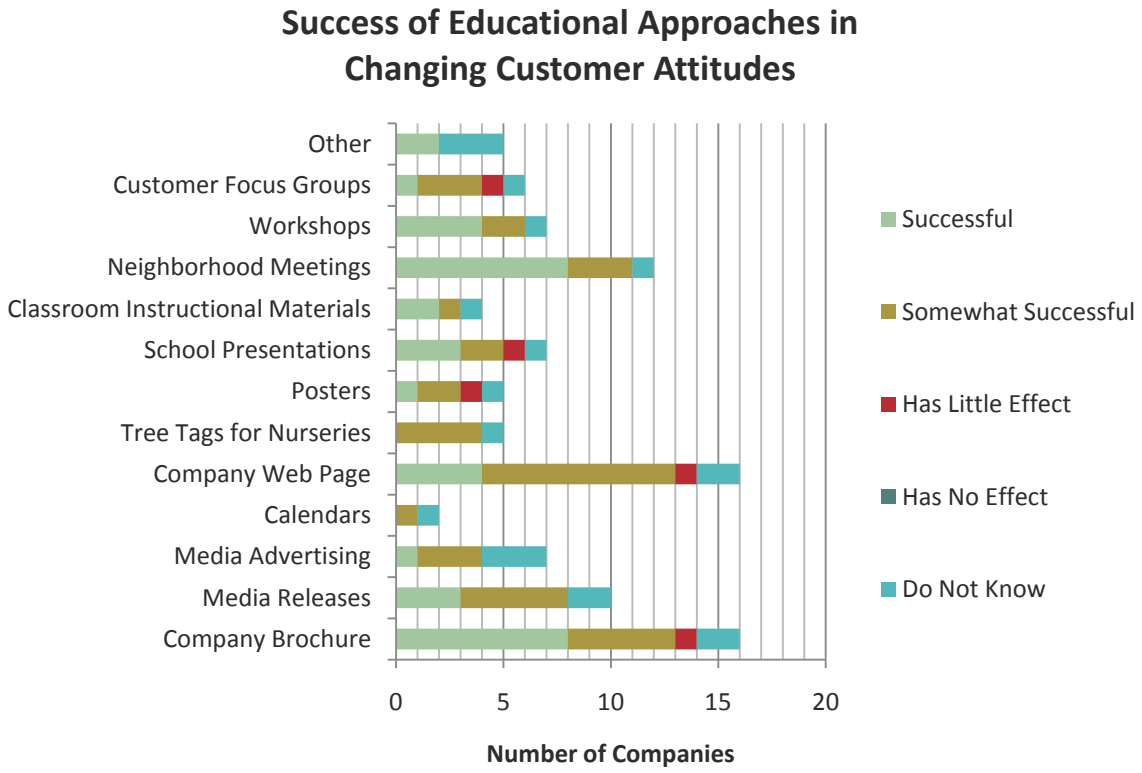


Figure 370: Success of Educational Approaches in Changing Customer Attitudes

Methods for Evaluating Public Education Programs for UVM

Question #275: Which of the following methods do you use to evaluate the effectiveness of your public and customer education programs? Check all that apply.

The responses to this question generated two graphs. The first graph shows how many companies have a way to evaluate the effectiveness of public education programs. The second graph only includes companies that do have methods for evaluating the effectiveness of customer education programs. The second graph displays the percent of companies that use each method of evaluation (some companies use more than one method).

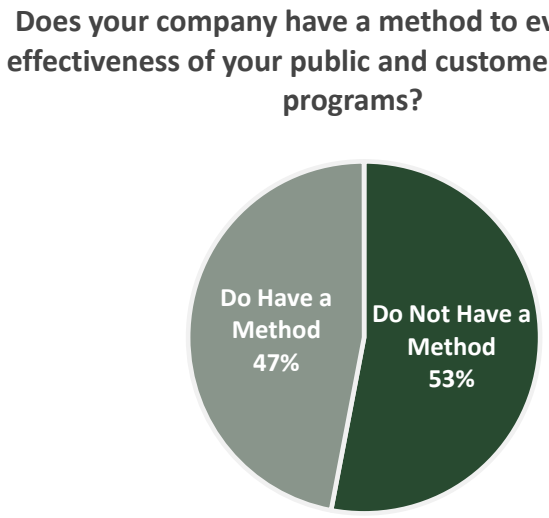


Figure 371: Percent of Companies that Have a Method for Evaluating Public Education Programs for UVM

The second graph only includes companies that have methods for evaluating public education programs. The responses in the following graph only pertain to 47% of the participants.

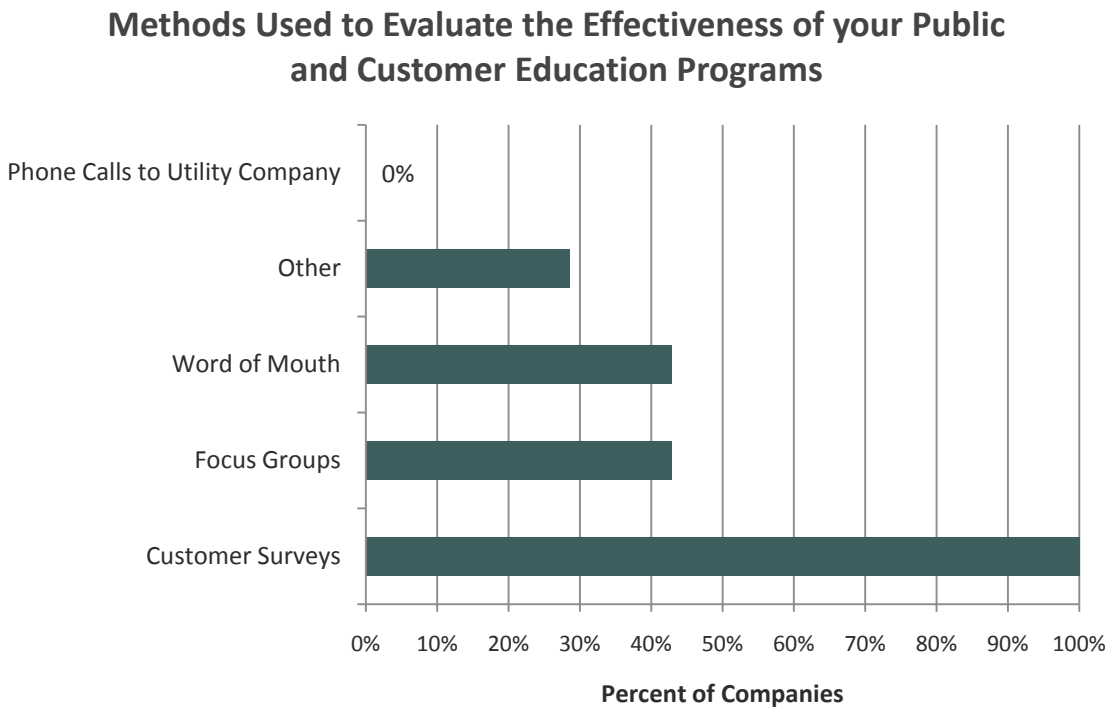


Figure 372: Methods Used to Evaluate the Effectiveness of your Public and Customer Education Programs

Other Evaluation Methods of Public Education Program Effectiveness
Feedback from presentations
Website touch points

Figure 373: Other Evaluation Methods of Public Education Program Effectiveness

Customer Service Surveys

Question #276: How do you conduct a customer service survey? Check all that apply.

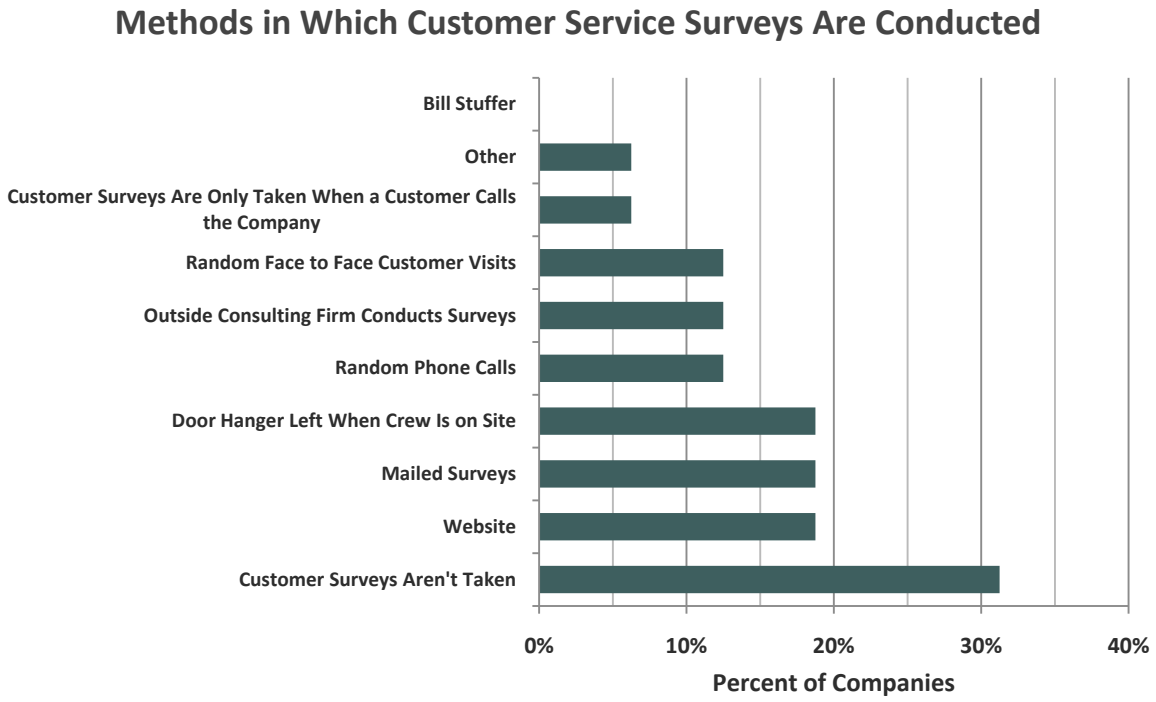


Figure 374: Methods in Which Customer Service Surveys Are Conducted

Comments on and 'Other' Methods Used for Conducting Customer Service Surveys
Vegetation only
Website email, face to face (forester, auditor, crew supervisors or manager). crew work - survey cards
We don't conduct surveys
The consulting firm calls after a job is completed. The survey is restricted to the work request that was routed through customer service.

Figure 375: Comments on and 'Other' Methods Used for Conducting Customer Service Surveys

Question #277:

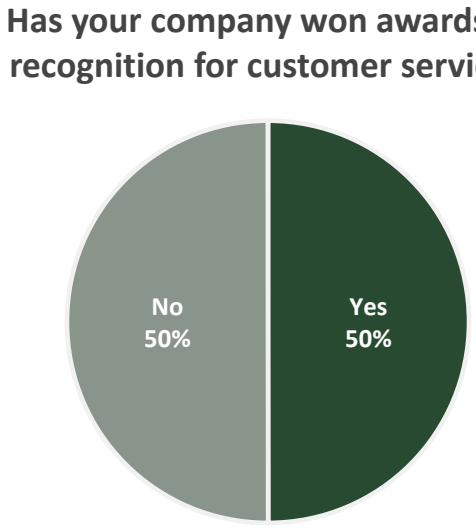


Figure 376: Company Customer Service Awards

GLOSSARY OF TERMS

AGGREGATE UNITS: Units based on larger groupings of trees or brush, such as partial spans, spans or miles/kilometers.

AUDITOR: Provides quality assurance and quality control services.

CAIDI: Customer Average Interruption Duration Index

CIRCUIT MILES: All miles of line. This includes multiple circuits on the same poles, as well as underground and overhead.

CREW LEADER: A qualified line-clearance arborist responsible for managing a crew of arborists.

DISTRIBUTION VOLTAGES: 1kV to 59kV

EMERGENCY STORM RESPONSE: This pertains to around the clock response to emergency conditions and includes additional forestry crews brought in for storm assistance.

FEEDER LINES: A primary line that distributes from a substation to the surrounding area. Feeder lines connect to primary voltage taps.

FISCAL YEARS: Fiscal years that end before June 29th should be listed as the preceding year. For example if the fiscal year ends on March 31, 2010, then include that fiscal year as 2009.

FORESTER: Performs a variety of duties necessary for managing the implementation of a UVM program.

GENERAL FOREPERSON: Supervises the management of several tree crews.

HAZARD OR RISK TREE: Trees are hazardous when the failure of one or more of their parts could result in property damage, personal injury and/or impacts to electrical lines.

INDIVIDUAL UNITS: Units based on individual trees OR small groupings of brush, under a quarter of a span or measured in square feet/square meters.

IN-GROWTH: the number of trees that periodically grow into the smallest inventoried diameter class of defined trees.

MAJOR EVENT (IEEE 1336-2003): Major Event represents those events of such a reliability magnitude that a crisis mode of operation is required to adequately respond. A T-med is mathematically derived to separate major events from non-major event. IEEE 1336-2003 major events are a standardized approach to defining STORM EVENTS.

NEW CONSTRUCTION: This pertains to any vegetation management work done to clear for the construction of new distribution lines.

NON-MAJOR EVENT (IEEE 1336-2003): Non-Major represents the reliability impact of those events that a company has built the system to withstand and staffed to respond to in a manner that does not require a crisis mode of operation (day-to-day operation). All outages that are not included in major event(storm) outages.

NOTIFIER/PERMITTER: Provides customer contact services.

OPEN WIRE SECONDARY EXTENSIONS: Separated three or two wire secondary voltage (<1kV) lines that extend beyond the range of primary voltage. This includes only pole to pole spans of secondary that do not also have primary voltage above.

POLE/SPAN MILES: Miles from first to last pole. There could be more than one circuit on the pole.

PRIMARY TAPS: Primary lines that are often single phase and run from the feeder line to transformers, secondaries and service lines serving homes and businesses.

QUALIFIED LINE CLEARING ARBORIST TRAINEE: An individual undergoing line clearance training under the direct supervision of a qualified line-clearance arborist. In the course of such training, the trainee becomes familiar with the equipment and hazards in line clearance and demonstrates ability in the performance of the special techniques involved.

QUALIFIED LINE CLEARING ARBORIST: An individual who, through related training and on-the-job experience, is familiar with the equipment and hazards in line clearance and has demonstrated the ability to perform the special techniques involved.

REACTIVE OR UNPLANNED WORK: This pertains to all unplanned UVM activities and includes such items as off-cycle requests, reliability work, and outbreaks of tree mortality caused by insects, disease, winter kill, drought etc.

ROUTINE MAINTENANCE: This pertains to any UVM that is planned into the budget and performed on a regular basis to keep the distribution lines clear of vegetation.

RURAL: Approximately 5-25 customers per circuit mile or 3-15 per km.

SAIDI: System Average Interruption Duration Index

SAIFI: System Average Interruption Frequency Index

SECONDARY TRIPLEX EXTENSIONS: Insulated and spun secondary voltage (<1kv) lines that extend beyond the range of primary voltage lines. This includes only pole to pole spans of secondary that do not also have primary voltage above.

SUB-TRANSMISSION VOLTAGES: 60kV to 199kV

SUBURBAN: Approximately 25-50 customers per circuit mile or 15-30 per km.

TRANSMISSION VOLTAGES: 200kV and above

TREE TREATED: 'Treated' is defined as the combination of trees pruned and removed. Number of Trees Treated = Number of Trees Removed + Number of Trees Pruned

URBAN: More than 50 customers per circuit mile or 30 per km.

UVM DIRECTOR: The person at your utility who is directly responsible for or has the most control over the distribution vegetation management program.

WORK PLANNER/INSPECTOR: Provides pre-inspection and field planning services. This position may include customer notification, scheduling, work prescriptions and audit services.

WORKLOAD INVENTORY: The number of trees worked or managed during a complete cycle.

UNDERTAKING – J3.11

Undertaking

To provide things the company can point to that differentiate the 2009 report from the 2013 report.

Response

In 2006, the Board had directed Hydro One to conduct a compensation study that would produce analytical data that would be free from debate as much as possible on what the results mean.

Hydro One held a stakeholder session to garner Intervenor input for the first study in 2008. The 2008 compensation cost benchmarking included a productivity component that provided empirical evidence that revealed the relative productivity of Hydro One's workforce in comparison to other utilities. The productivity component of the study identified that there were currently no standard industrywide measures for workforce productivity in the electric industry nor a standard way of collecting and reporting information throughout Canadian utilities. The compensation component of the Mercer study produced results to satisfy the purpose of the Board's Directive, however the productivity component did not. The productivity component was subsequently dropped from future compensation studies.

In 2010, the Board directed Hydro One to update and improve on the 2008 study. Hydro One was requested to use reliable data to show how Hydro One's total compensation compared to other North American utilities.

In response to the Board's direction, the 2011 Mercer Compensation Study:

- increased the participant group to include Altalink, Canadian Utilities, Powerstream and Sask Power;
- the average total compensation was added as opposed to the median as was suggested by stakeholders; and
- new PWU positions were added to better reflect the organization by using highly populated jobs.

In 2013, the study was further improved by including Enersource and Horizon Utilities.

The studies have been improved by increasing the size of the benchmarking participant group and adjusting some of the benchmark jobs to get a better assessment of Hydro One's total compensation. The basic methodology has been kept the same to show trends in Hydro One's progress to move closer to the total compensation median.