ESFi
Electrical Safety Foundation International

Copper Theft Baseline Survey of Utilities in the United States

January 2009

Copper Theft Baseline Survey of Utilities

The demand and price of copper has skyrocketed over the last decade bringing with them a dramatic rise in utility copper thefts

Prior to the recent major economic downturn, worldwide economic growth over the last few years has sent the demand, and consequentially the price, of copper skyrocketing. This, in turn, seemed to ignite a problem that had been simmering for decades – utility copper theft. As metal prices rose higher, utilities across the country faced the daunting task of taking new steps to safeguard their equipment and employees from the dangers posed by these brazen thefts.

For the last 15 years, the Electrical Safety Foundation International (ESFI) has been a leading advocate of electrical safety both at home and in the workplace. As the number of copper thefts continued to rise, it emerged for ESFI as one of the leading issues that impacted not only the utility industry, which was forced to repair and replace damaged or stolen equipment, but also the general public who suffered property damage and power outages from these thefts. Unfortunately, while there was plenty of anecdotal evidence detailing the nature of this problem in various regions, very little information was available which described the impact utility copper theft was having nationally and which could be effectively used to examine trends in these thefts in the years to come.

In cooperation with the Edison Electric Institute (EEI), the National Rural Electric Cooperative Association (NRECA), and the American Public Power Association (APPA), ESFI developed a survey instrument which was distributed to individual utilities whose responses were then collectively analyzed. The purpose of this survey was not to comprehensively quantify the magnitude of utility copper wire thefts in the United States. Rather, its purpose was to begin to measure how this problem is perceived and what steps are being taken to combat copper theft by major utility stakeholders across the country. This survey will serve as a baseline from which future survey instruments can be measured against and from which trends can be detected.

Survey Design and Sample

The invitation to participate in this survey was sent to approximately 3100 electric utility companies in the United States, drawn from different segments of the electric utility industry: EEI, APPA, and NRECA. From that sample, we received 618 completed surveys for a response rate of 20 percent. Although some bias may exist due to a degree of self-selection, a sample of 618 on a population of 3100 results in a 95 percent confidence level with ± 3.5 percent sampling margin of error.

With the survey questionnaire we solicited information regarding the respondents' experiences related to copper materials stolen from them; the effect such thefts had —in terms of injuries and fatalities, economic harm, and lost service time; and the means by which utilities are addressing the problem. Additionally, we asked for certain corporate demographic information such as number of meters serviced, number of full-time employees, and the square miles of service territory covered. Some of these data were used to weight individual responses before aggregating them, as well as to serve as the basis for extrapolating the sample responses to provide national level estimates.

An additional note about the survey sample regards the different populations served by the organizations that partnered in undertaking it. We noticed that, not surprisingly, larger utilities were more likely to have experienced copper thefts. A somewhat discernable breakpoint occurred at the 10,000 meter level. Those utilities serving fewer than 10,000 meters were less likely to have experienced copper thefts than those serving more than that number. This is an important consideration when reviewing the weighted results (see explanation, below) versus the raw percentages.

Weighting and Extrapolation

Although we reported the raw percentages of responses on each question, we also provided, as appropriate, weighted percentages or an estimated value for the entire United States. Weighting was largely based on the relative number of meters serviced by each respondent company, although in some cases where those data were not available we used employee data as a proxy. We calculated the weight of each individual response by dividing the number of meters for a given company by the total number of meters for all respondents. These individual weights are grouped according to the response selection for a particular question and added together, then divided by the total weights for all responses to give a percentage breakdown. For example, all individual weights for those responding "Yes" to Question 2 are summed together and divided by the total weight for all responses to the same question, resulting in a weighted percentage of those responding "Yes." The way to read the weighted results is, "electric utilities representing X percent of the customer base responded ____." Using Question 1 as an example, one would say, "electric utilities representing 81 percent of the customer base responded that they were 'extremely concerned' about copper theft."

By contrast, when reviewing the unweighted response percentages, one must bear in mind that the response of each reporting entity carries the same weight as every other entity, regardless of whether it serves 500 meters or 500,000. In the spirit of the previous section on weighted data, the way to read the raw response results is, "X percent of utilities responded _____."

Finally, certain responses were extrapolated to national estimates based on the share of the domestic electricity market as calculated using the data reported on this survey as compared against data provided by the Energy Information Agency (EIA) on its summary report of F861 filings. We used the resulting estimate that respondents to this survey represent 36.6 percent of the total market as a scalar adjustment for estimating such things as number of incidences, dollar values, etc. at the national level.

Copper Theft Survey

Survey findings are reported below. As appropriate, weighted percentages determined by number of meters and/or number of employees are also reported. Additionally, certain responses were extrapolated to national estimates based on the participating utilities' share of the domestic electricity market. Please see the About the Survey section for more details.

1. How concerned is your utility about copper theft? (N=618)

	Count	Percentage	Weighted
Not at all	2	0.3%	0.0%
Not very	25	4.0%	0.2%
Neutral	24	3.9%	0.4%
Somewhat	297	48.1%	17.9%
Extremely	270	43.7%	81.4%

2. Has your utility experienced incidences of copper theft in the past 12 months? (N=618)

	Count	Percentage	Weighted
Yes	424	68.6%	95.1%
No	187	30.3%	4.8%
Don't know	7	1.1%	0.1%

3. Does your utility have a process in place to officially track the incidences of copper theft it has experienced? (N=530)

	Count	Percentage	Weighted
Yes	253	47.7%	86.6%
No	273	51.5%	13.1%
Don't know	4	0.8%	0.2%

4. Approximately how many incidences of copper theft has your utility experienced in the past 12 months? (N=404)

Minimum number	0	25th percentile	2
Maximum number	10,000	75th percentile	10
Median	4		
Total reported number of thefts reported			18,400
Estimated number of copper thefts nationwide			**50,193**

5. Estimate the number of these incidences that have involved energized equipment (N=401)

Minimum number	0	25th percentile	0
Maximum number	281	75th percentile	3
Total reported number of ENERGIZED copper thefts			2,903
Estimated number of ENERGIZED copper thefts nationwide			**7,919**

6. Estimate in U.S. dollars the value of copper material stolen in the past 12 months (N=391)

Minimum number	$0	25th percentile	$800
Maximum number	$1,000,000	75th percentile	$8,000
Mean	$18,908		
Total reported value of copper stolen			$7,393,193
Estimated value of copper stolen from utilities nationwide			**$20,167,738**

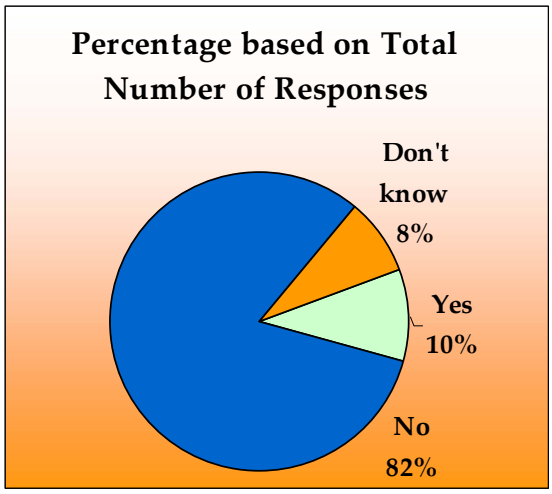
7. Including the value of copper material, estimate in U.S. dollars the additional impact these thefts have had upon your utility in the past 12 months (N=389)

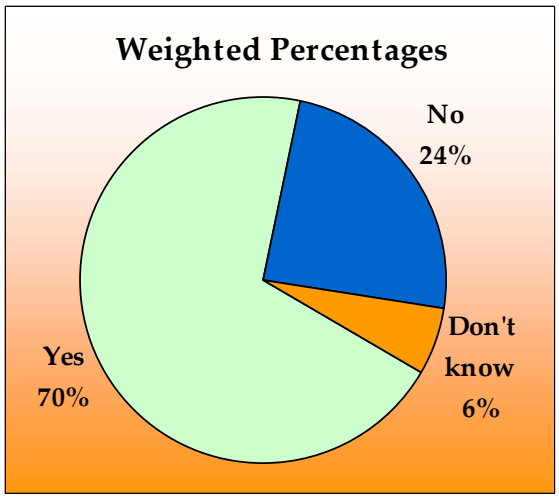
Minimum number	$0	25th percentile	$1,500
Maximum number	$2,000,000	75th percentile	$20,000
Mean	$56,917		
Total reported impact of copper thefts			$22,140,782
Estimated impact of copper thefts from utilities nationwide			**$60,397,818**

8. Estimate the number of minutes of outage in your service these copper theft incidents have been responsible for in the past 12 months (N=387)

Minimum number	0
Maximum number	100,000
Mean	432
Total reported minutes of outage	167,239
Estimated minutes of outage experienced by utilities nationwide	**456,210**

9. To your knowledge, have any of these copper theft incidences resulted in injuries or fatalities in the past 12 months? (N=530)





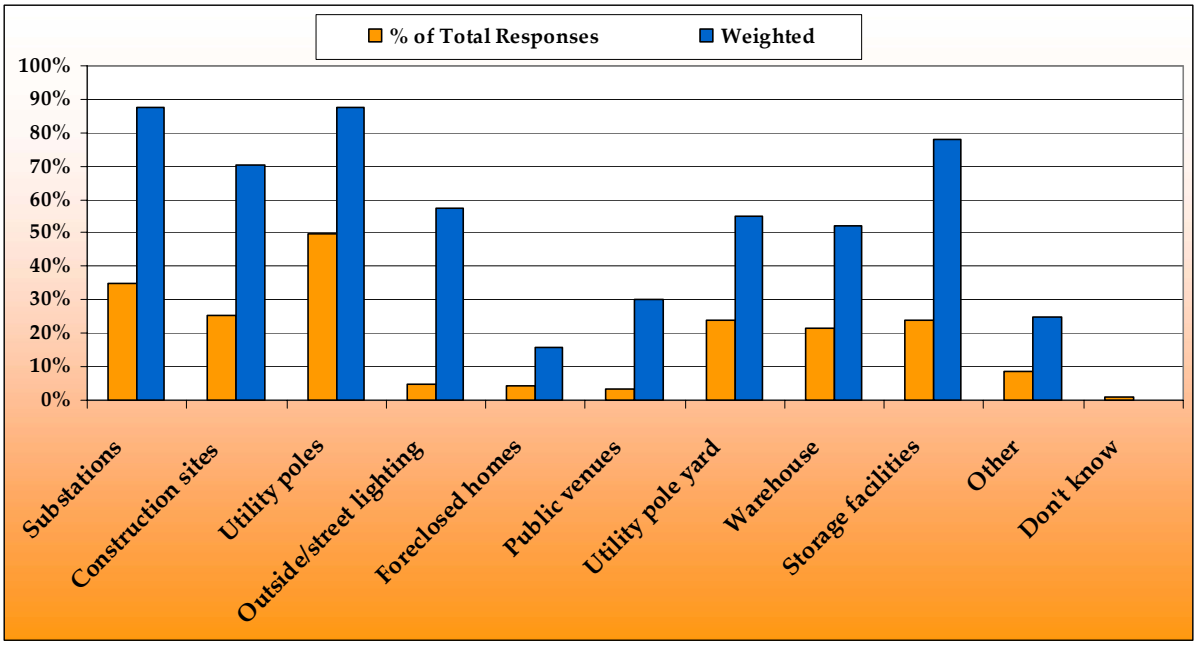
10. List the number of reported injuries that have resulted from these copper theft incidences in the past 12 months (N=13)

Minimum number	1
Maximum number	14
Total reported number of injuries	19
Estimated number of copper theft injuries nationwide	**52**

11. List the number of reported fatalities that have resulted from these copper theft incidences in the past 12 months (N=10)

Minimum number	1
Maximum number	2
Total reported number of fatalities	13
Estimated number of copper theft fatalities nationwide	**35**

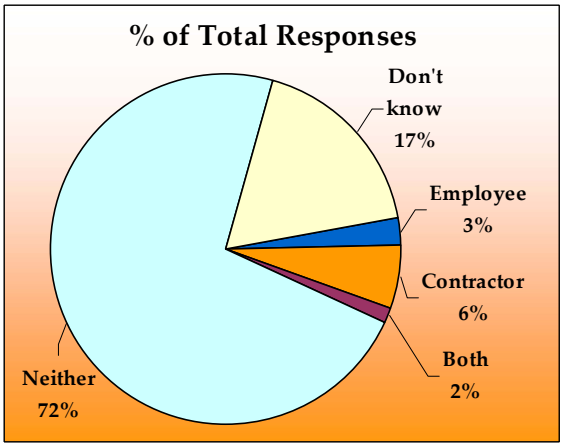
12. Indicate the location(s) of where your utility's copper theft incidences have occurred in the past 12 months (N=530)

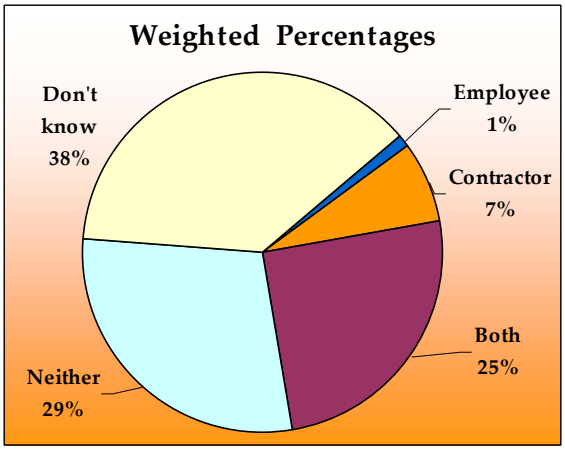


13. To the best of your knowledge, please rank in order (with 1 being more likely and 3 being less likely) the types of equipment or materials that are most likely stolen from your utility for copper content? (N=530)

	Average Rank	Weighted
Overhead conductor	2.35	1.99
Underground cable	2.12	2.51
Other	2.20	2.62
Transformers/voltage regulators	2.92	2.80

14. Have any of these copper theft incidences been perpetrated by an employee or contractor from your utility in the past 12 months? (N=396)





15. Within the last 5 years, has your utility changed any of your storage or security procedures in order to try and prevent copper theft? (N=572)

	Count	Percentage	Weighted
Yes	434	75.9%	94.3%
No	132	23.1%	5.6%
Don't know	6	1.0%	0.1%

Examples of Changes to Storage and Security Procedures Utilities Indicated They Have Made in the Last 5 Years:

- Security cameras & fake cameras
- Fencing (double fencing, barbed wire, etc.)
- Additional signage (No Trespassing, Area Under Video Surveillance, etc.)
- Alarm systems
- Moved copper to indoor storage areas
- Locked storage buildings and bins
- Reels of wire stored in locked facility until day of installation
- Marked copper/painted copper grounds
- Improved lighting
- Cleared nearby trees or brush to improve visibility
- Increased utility security and law enforcement patrol of storage facilities
- Contractors must take all equipment to secured facilities at end of each day
- Reduced amount of copper inventory
- Copper removed from service taken to scrap yard/secure facility immediately
- Used Copperweld for grounds
- Transformers no longer stored at substations

16. Has your utility spent any money to directly address the copper theft issue in the past 5 years? (N=573)

	Count	Percentage	Weighted
Yes	266	46.4%	86.6%
No	303	52.9%	13.3%
Don't know	4	0.7%	0.0%

17. If yes, estimate in U.S. dollars how much money your utility has spent to directly address the copper theft issue in the past 12 months (N=233)

25th percentile	$2,500	75th percentile	$20,000
Total dollars reported spent to address copper theft			$9,816,398
Estimated dollars spent to address copper theft nationwide			**$26,778,143**

18. Has your utility communicated directly with the general public about the dangers of copper theft in the past 12 months? (N=572)

	Count	Percentage	Weighted
Yes	240	42.0%	82.8%
No	313	54.7%	14.7%
Don't know	19	3.3%	2.4%

Types of Communications Utilities Indicated They Have Used to Reach Out to the General Public:

- Radio (warning ads, rewards for information)
- Local television (interviews, warning ads & asking for identification of suspects, etc.)
- Local magazines and newspapers (articles & ads)
- Newsletters
- Bill stuffers
- Websites
- Word of mouth
- School class demonstrations and other public safety outreach
- Joint press conferences with civic and law enforcement officials
- City council & Fire Department meetings
- Letters to scrap dealers and law enforcement

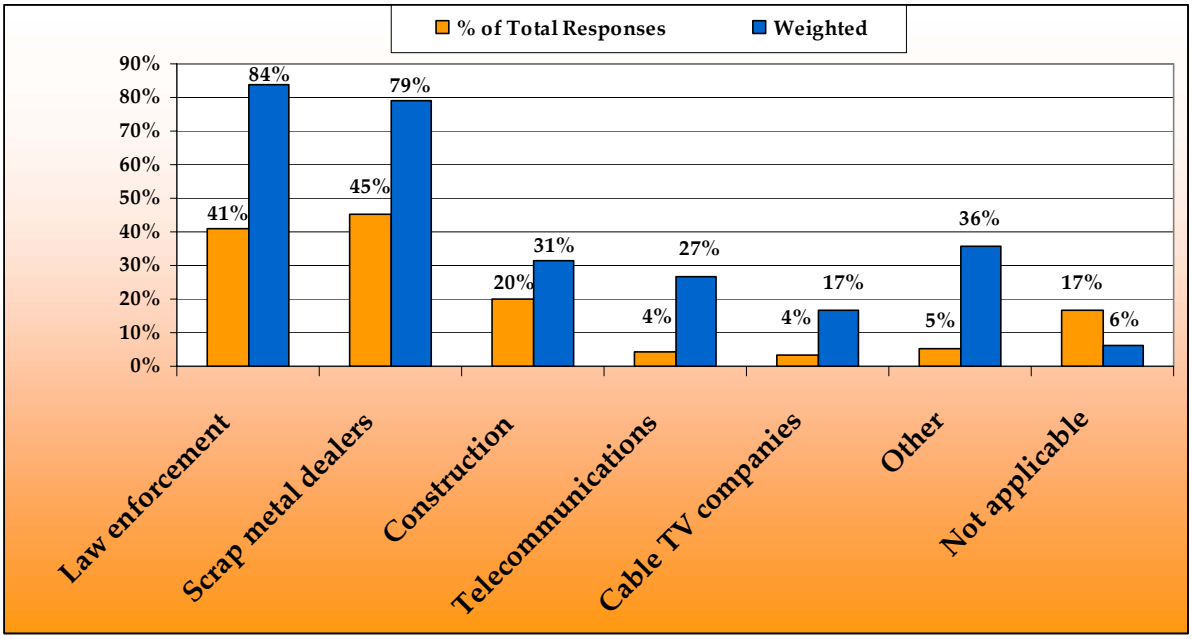
19. Has your utility communicated directly with employees about the impact of copper theft in the past 12 months? (N=571)

	Count	Percentage	Weighted
Yes	446	78.1%	93.2%
No	118	20.7%	6.6%
Don't know	7	1.2%	0.2%

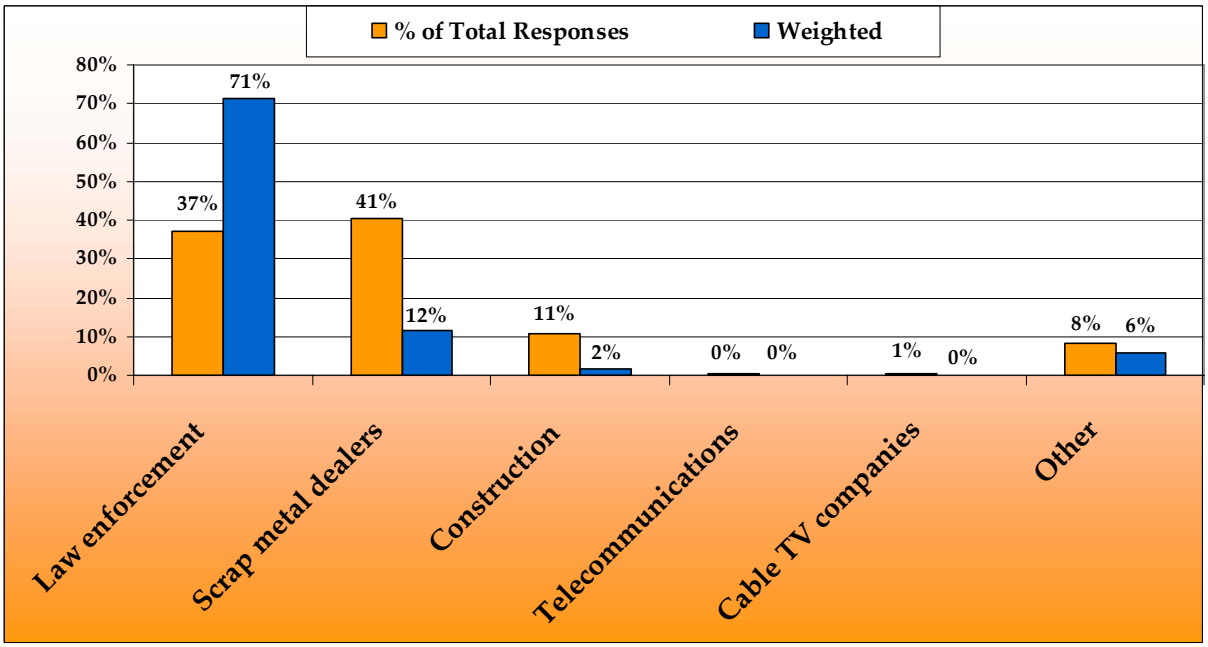
20. In the past 12 months, at what level of government has your utility actively advocated for local, State or federal legislation that would have an impact on copper theft incidences? (N=618)

	Count	Percentage	Weighted
Local	103	16.7%	21.3%
State	192	31.1%	78.3%
Federal	23	3.7%	15.5%
Not applicable	297	48.1%	17.3%

21. Indicate any of the sectors or agencies your utility has partnered with in the past 12 months in an effort to reduce copper theft (N=618)



22. Which partnerships have been most effective in helping you reduce copper theft? (N=358)



Demographics

The following demographic data was collected from utilities responding to the survey

Number of electric meters served by utilities participating in survey (N=552)

Minimum number	0	25th percentile	5,000
Maximum number	6,000,000	75th percentile	24,396
Mean	94,764		

Total reported number of meters 52,309,685

Number of utility full-time employees (N=564)

Minimum number	0	Standard deviation	2,100
Maximum number	23,000	Mean	401

Total reported number of full-time employees 226,176

Number of utility part-time employees (N=553)

Minimum number	0	Standard deviation	185
Maximum number	3,000	Mean	20

Total reported number of part-time employees 10,994

Average number of contract employees in the past 12 months (N=554)

Minimum number	0	Standard deviation	464
Maximum number	10,000	Mean	52

Total reported number of contract employees 28,972

Square miles in service territory (N=484)

Minimum number	0	Standard deviation	41,819
Maximum number	897,328	Mean	4,994

Total number of square miles in reported service territories 2,417,084