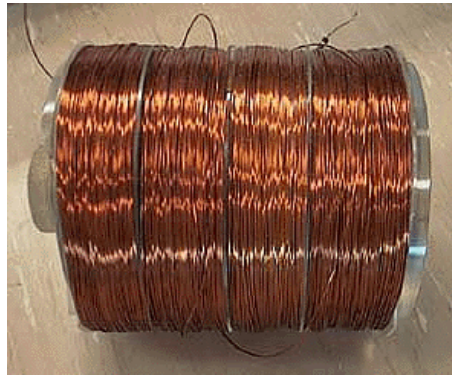


# An Assessment of Copper Wire Thefts from Electric Utilities



Copper Wire Spool



Copper Wire Windings on Transformers



Copper Wire Cut



Copper Wire Scrap

**Infrastructure Security and Energy Restoration  
Office of Electricity Delivery and Energy Reliability  
U.S. Department of Energy**



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## For Further Information

This report was prepared by the Office of Electricity Delivery and Energy Reliability under the direction of Kevin Kolevar ([kevin.kolevar@hq.doe.gov](mailto:kevin.kolevar@hq.doe.gov)), Office Director.

Specific questions about information in this report may be directed to Alice Lippert ([alice.lippert@hq.doe.gov](mailto:alice.lippert@hq.doe.gov)).

Contributors include John T. Ostrich, Jr., Mindi Farber-DeAnda, and Tiffany Y Choi.

Sources of cover photos:

Copper Wire Spool: <http://www.ga.gov.au/education/minerals/copuse.html>

Copper Wire Windings on transformers: ELSCO Transformers,  
<http://www.electricservice.com/dry-type-transformers.html>

Cut wire on pole -- WBIR, July 6, 2006, Jerry Owens, Photographer,  
<http://www.wbir.com/printfullstory.aspx?storyid=35839>

Copper Wire Scrap: [http://www.thehawaiiichannel.com/2006/0513/9210071\\_240X180.jpg](http://www.thehawaiiichannel.com/2006/0513/9210071_240X180.jpg)

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## Executive Summary

Fueled by economic growth, worldwide demand for copper has risen over the past several years. Supply has been unable to keep pace, pushing prices dramatically upward, particularly from 2003 through 2006 when the price per pound of copper rose from around \$0.70 to as high as \$4.00 by mid-2006. The price then steadily declined until stabilizing at about \$2.60 per pound in early 2007. Copper appears to be on the way up again in March 2007, exceeding \$3.00 per pound by the middle of the month. Prices continued to climb in April 2007, averaging \$3.50 per pound. Tight supplies have led to an increase in copper recycling, which, in turn, has created a market for used copper and made the material a more attractive target for theft. In fact, thefts of copper wire have been on the rise across the United States, with no apparent geographic pattern and all sectors that use the material, including electric utilities, are being targeted.

Thefts of copper wire from utilities occur primarily at substation transformers, from utility poles, or from the back of service trucks. The thefts have several adverse consequences, including the obvious economic impact, service disruptions, and possibly personal injury or death for persons involved in the theft or subsequent recovery efforts. Utilities across the Nation are paying increasing attention to this growing problem and have begun to investigate and implement measures for deterring thefts, protecting facilities, and quickly recovering from any consequences.

There are a wide variety of countermeasures that can be taken by electric utilities, working closely with scrap metal dealers and law enforcement officials. Countermeasures include communication and coordination with law enforcement and between utilities; fencing, signs, warnings, lighting, patrolling, and intrusion detection for deterrence; wire and equipment protection to make thefts more difficult; alternate equipment and wire devaluation to make the material less attractive; and rewards, watch programs, and resale waiting periods to make the sale of potentially stolen copper easier to detect. In addition, scrap metal dealers have instituted a Scrap Theft Alert System and state legislators are actively drafting legislation addressing copper wire theft. During the first three months of 2007, 21 states have proposed bills raising the fines and penalties for stealing or dealing stolen copper as well as tightening the record-keeping and licensing requirements for scrap metal dealers. Reducing and ultimately eliminating copper wire theft requires a collaborative effort by electric utilities, scrap metal dealers, law enforcement officials, and state regulators and legislators.

## Background

Since 2005, media coverage of copper wire thefts from utilities has increased. In mid-2006, members of the National Association of Regulatory Utility Commissioners (NARUC) notified the U.S. Department of Energy (DOE) that these thefts were becoming an issue of concern, and DOE's Office of Electricity Delivery and Energy Reliability (OE) initiated this effort to study the trend in more detail. NARUC Commissioners and individual utilities are also examining how to address the thefts.

The Office monitors energy events and problems of the U.S. energy infrastructure on a daily basis. OE staff prepare, for wide dissemination, a daily report that summarizes these changes to domestic energy infrastructure and the Internet source of the news in the *Energy Assurance Daily*. As part of this routine monitoring, OE staff noticed an increase in press reports of copper theft at electric utilities over the past couple of years. State energy officials confirmed that copper wire thefts have been increasing in many States.

In September 2006, OE staff performed an extensive search of open source references, identifying relevant 2006 news articles and press releases that served as the bibliographic basis for the analysis presented in the initial version of this study. Searches performed in April 2007 updated the information in this report through the end of March 2007. State legislative and attorney general activity and electric utility web sites and press releases provided additional references. OE staff also interviewed a few scrap dealers, law enforcement, and security professionals to obtain a first-hand understanding of the problem and the possible solutions.

This study investigates the causes and significance of the problem, focusing on copper prices, utility use of copper wire, crime patterns, public education, and regulatory and state legislative activities. The study also summarizes utility efforts to enact countermeasures to deter or prevent thefts and mitigate or eliminate the adverse consequences of copper wire theft.

The study makes no claim or attempt to be comprehensive in its coverage of all copper wire thefts at electric utility facilities. Its purpose is to call the problem to the attention of a variety of interested stakeholders and to identify solutions pursued by electric utilities, police departments, scrap metal dealers, and state regulators and legislators.

## Worldwide Copper Demand is Increasing

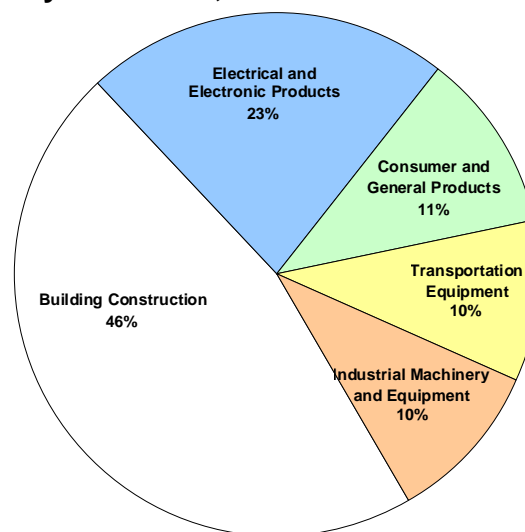
Rising demand is the primary driver for the marked increase in the cost of copper over the past several years. The metal is used primarily in manufacturing of consumer goods, and the construction, electric utility, and telecommunications industries. Worldwide economic growth, particularly in fast-growing China and the United States, requires copper. International copper-producing companies have not been able to increase production to meet demand, pushing prices higher. A market for used or recycled copper has blossomed, making theft of copper an increasingly attractive enterprise.

## Electric Utilities are a Major Copper Consumer

Building construction is the largest end user of copper in the United States, followed by electrical and electronic products (see **Figure 1**). Much of the copper used in the building industry is for electrical wiring. According to the Copper Development Association, *“Electrical uses of copper, including power transmission and generation, wires for building purposes, telecommunication, and electrical and electronic products, account for about three quarters of total copper use...Because of its properties of high ductility, malleability, and electrical conductivity, it has become the benchmark for almost all types of wiring.”*<sup>1</sup>

In addition to the above-mentioned qualities, copper is particularly attractive to the electric utility industry because it is an excellent conductor of electricity, it resists corrosion, and in spite of recent price increases, it is inexpensive relative to alternate metals over time. Tons of copper are used in each electric utility substation, mostly in transformers. A large (150-400 Megavolt) transformer can weigh 200 to 250 tons, with most of that weight being copper.<sup>2</sup> Utilities also maintain large concentrations of copper wire at utility construction sites and storage yards, in the back of utility trucks, and in transmission and distribution lines. An average single-family home contains about 440 pounds of copper,<sup>3</sup> but most of that is not easily accessible except when the home is under construction.

**Figure 1. U.S. Copper and Copper Alloy End Uses, 2002**



Source: Copper Development Association, Inc.

## Copper Wire Theft is on the Rise

Theft of copper is on the rise all over the world. While this report focuses on the theft of copper wire from electric utilities in the United States, copper is increasingly being stolen from everywhere that it is readily available: construction sites, telecommunications towers, and even individual homes are all being targeted. Lumber, copper pipe and wiring, and other materials left unsecured at building sites are all attractive targets and construction sites have been plagued by materials theft for years.<sup>4</sup> Large concentrations of copper in one place make a lucrative target for theft.

A number of factors contribute to the increase in copper wire theft. Worldwide demand for copper has significantly increased over the past few years, driven in particular, by the

<sup>1</sup> [http://www.copper.org/copperhome/Electrical/wiring\\_home.html](http://www.copper.org/copperhome/Electrical/wiring_home.html).

<sup>2</sup> <http://www.copper.org>.

<sup>3</sup> Ibid.

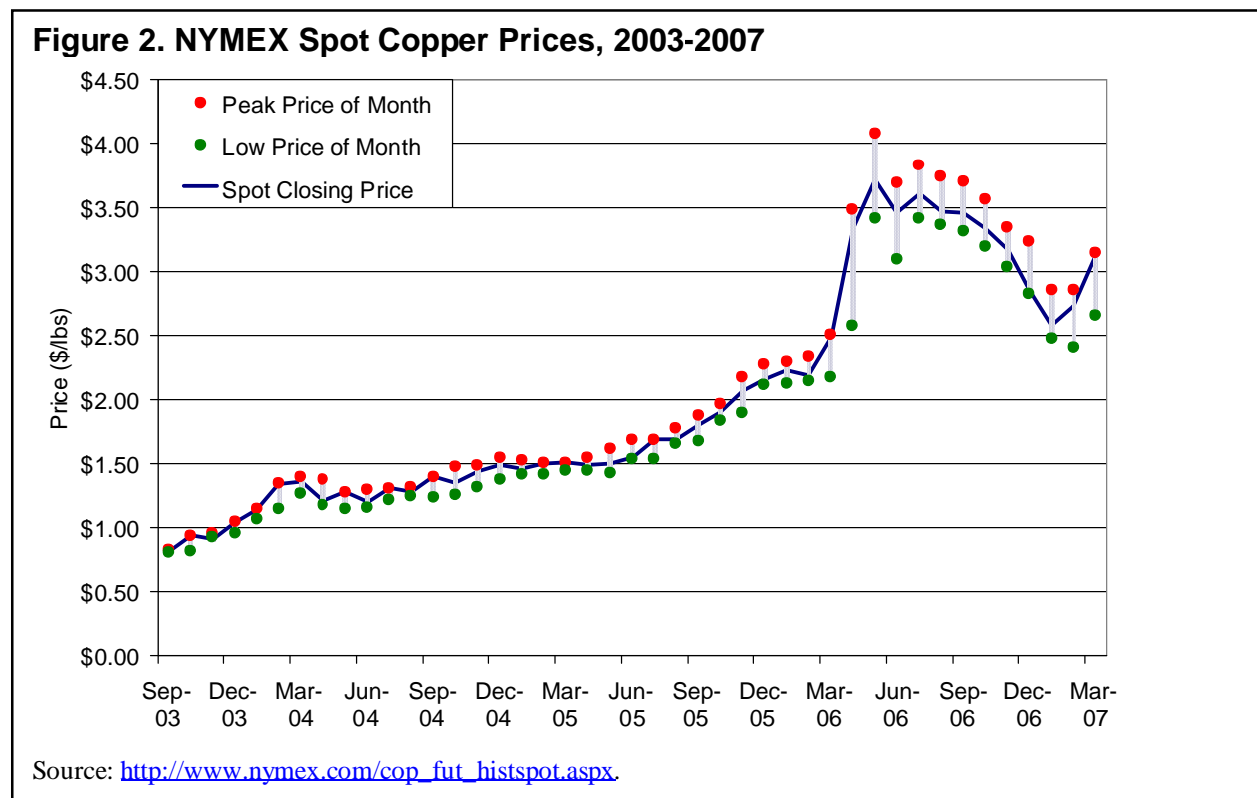
<sup>4</sup> “Margins in Profit,” Construction Theft: A Lost Cause, by Sarah Loehndorf, <http://www.buildernewsmag.com/viewnews.pl?id=291>.

construction and telecommunications industries. Other factors contributing to the increase in copper wire theft include:

- Top dollar paid by scrap dealers for copper
- The ease by which copper can typically be stolen
- Likelihood that perpetrators will not be arrested
- Miniscule number of convictions for those arrested
- Relatively low fines and short prison stays for the few who are convicted

## The Price of Copper Has Increased Dramatically

Dramatic increases in the price of a commodity, such as those experienced by copper particularly in the past three years (see **Figure 2**), make that commodity an increasingly attractive target for theft. The marker used by the copper industry to track price is the New York Mercantile Exchange (NYMEX) closing spot price, which reflects the end-of-day value of copper as determined by market trades on the Exchange.<sup>5</sup>



After remaining in the 60-75¢/pound range for years, the NYMEX spot price for copper broke the 80¢/pound barrier in July 2003, where it stayed until beginning its first spectacular price spike, climbing to \$1.34/pound by the end of February 2004. The price held relatively steady over the next year, increasing only to \$1.55/pound by June 2005. Copper then experienced its second price surge, increasing over 145% in one year, peaking above \$4.00/pound for a few days and ending May 2006 above the \$3.72/pound mark. The spot price eased back to and just dipped

<sup>5</sup> NYMEX daily spot settlement price, [http://www.nymex.com/cop\\_fut\\_spot.aspx](http://www.nymex.com/cop_fut_spot.aspx).

below \$3.00/pound in December 2006, as reports of increased world copper production were being released.<sup>6</sup> The price stabilized at about \$2.60 per pound in January and February 2007, but began to rise again in March. The average price of copper in April 2007 was \$3.50 per pound, the highest since August 2006.

## The Number of Copper Thefts from Electric Utilities

The actual number of copper wire thefts from electric utilities cannot be calculated, as the sources are often anecdotal and include all varieties of scrap metal stolen from all sites (not just electric utilities) in their reports. Among electric utility site, substations are where most copper wire thefts are reported. Detroit Edison, for example, dealt with 100 copper thefts in one month (October 2006).<sup>7</sup> One substation was broken into 38 times last year until new security systems were installed at the plant at a very high cost.<sup>8</sup> Nevada Power reported that 43 of its substations were broken into during September-October 2006.<sup>9</sup>

Likewise, the value in damages and revenue losses suffered by electric utilities as a result of copper wire theft cannot be calculated. Pacific Gas and Electric *estimates* about \$1,000,000 in damages from copper theft.<sup>10</sup> The Oklahoma Association of Electric Cooperatives *estimates* that its members lost about \$500,000 from damage due to copper theft in just three months last year.<sup>11</sup> **Table 1** summarizes the number of thefts and dollar value of losses reported to selected police departments. Note that this table presents information on thefts from construction sites, telecommunications facilities, and electric utilities for only ten of the over 5,000 police departments in the United States.

Based on Table 1, there has been approximately one copper theft per year for every 1,000 residents in an area. The value of the damage per incident varies, but the average seems to be about \$3,000 per incident. A conservative estimate of the total value of damages from copper wire theft across impacted industries in the United States would be \$900,000,000.<sup>12</sup> Electric utility losses are also in the hundreds of millions dollars per year range because damage to substations, utility poles, and transformers is usually valued significantly more than the average copper theft incident. Bonneville Power Authority, for example, estimates its \$1,000,000 in losses from 50 thefts at its facilities in 2006 to average \$20,000 in repair and materials costs.<sup>13</sup>

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<sup>6</sup> For example, the International Copper Study Group said on Dec. 18, 2006 that world copper production exceeded consumption by 81,000 tons in the first nine months of 2006. <http://www.dailyfutures.com/metals/>.

<sup>7</sup> Laura Mandaro, "As Scrap Prices Rise, Copper Thefts Abound," MarketWatch, in *Charleston Gazette*, November 10, 2006.

<sup>8</sup> [http://www.csoonline.com/read/020107/fea\\_metal.html](http://www.csoonline.com/read/020107/fea_metal.html)

<sup>9</sup> <http://www.kvbc.com/global/story.asp?s=5627669&ClientType=Printable>

<sup>10</sup> [http://www.kcoy.com/news/local/story.aspx?content\\_id=c6d7934e-1fa1-4d61-b0df-b24f435288f1&rss=143](http://www.kcoy.com/news/local/story.aspx?content_id=c6d7934e-1fa1-4d61-b0df-b24f435288f1&rss=143)

<sup>11</sup> Brian Sargent, "Attorney General's Office Targets Copper Thefts," *The Daily Oklahoman*, September 2, 2006.

<sup>12</sup> Calculated from 300,000,000 population divided by 1,000 population per theft, multiplied by \$3,000 per theft.

<sup>13</sup> <http://www.appanet.org/newsletters/ppmagazinedetail.cfm?ItemNumber=18905&sn.ItemNumber=2108>



**Table 1. Copper Thefts and Losses Reported to Selected Police Depts.**

Police Dept.	Period	Product Stolen	# Thefts	Losses
Phoenix, AZ (Maricopa County),	12 months	Copper	207	\$871,151
Pinal County, AZ	12 months	Copper	21+	\$10,000,000
Ontario, CA	12 months	Copper	170	\$450,000
Polk County, FL	9 months	Copper Wire	268	
Wichita, KS	12 months	Metal		\$700,000
Greensboro, NC	12 months	Copper	100+	
Youngstown, OH	6 months	Copper	35 arrests	
Bryan, TX	2 months	Copper	27	
Dallas, TX	7.5 months	Metal	1,504	
Fort Worth, TX	1 month	Copper	78	
Yakima County, WA	12 months	Metal		\$50,000

Source: News reports and press releases, January 2006 – March 2007.

### **Copper Theft Rarely Results in Jail Time**

The increase in thefts is related to the price of copper and the fact that stolen copper can easily be turned into cash. The fact that only a very small percentage of people who steal copper are caught also leads to continued copper theft. The Police Chief of Tempe, Arizona, for example, reported 207 copper thefts in the Phoenix area between January and June of 2006 and only one person was arrested as a suspect for any of these crimes.<sup>14</sup> Of the few who are arrested for suspected copper theft, only a small percentage is convicted of the crime. The convicted are usually placed on probation and serve no jail time for the first offense. Since the crime is typically a misdemeanor, even those convicted pay very small fines and/or spend little time in jail. In Pinal County, Arizona, where \$10 million worth of damage was reported in 2006 due to copper wire theft, fewer than 20 cases of copper theft were referred to the Pinal County Attorney's Office, and most received probation.<sup>15</sup>

Efforts that lead to more arrests, more convictions, and stiffer penalties may reduce repeat offenders. However, these efforts will not reduce the crimes committed by methamphetamine addicts. Law enforcement officials believe that reducing the ability of these addicts to successfully steal and sell copper will probably be more effective than any additional deterrents put in place.

### **Stolen Copper is Easily Turned into Cash**

More copper consumed in the United States is supplied by recycling than from domestic production,<sup>16</sup> making copper recycling a major industry in the U.S. Significant demand for recycled copper means that any copper delivered to a scrap dealer will quickly be turned into cash. Depending on demand in the area, a scrap dealer may pay near-market prices for pure copper, i.e., copper wire stripped of all insulation. A dealer may pay up to 85% of the retail price for recycled or stolen copper wire.

<sup>14</sup> <http://www.azcentral.com/community/pinal/articles/0308st-copper03.html>

<sup>15</sup> Ibid.

<sup>16</sup> Annual Data 2006: Copper, Brass, Bronze. Copper Supply and Consumption 1985-2005, Copper Development Association, Incorporated, [http://www.copper.org/resources/market\\_data/pdfs/annual\\_data.pdf](http://www.copper.org/resources/market_data/pdfs/annual_data.pdf).

Many U.S. copper recycling firms receive large amounts of scrap copper from regular industrial and commercial customers operating legitimate businesses. The amount of copper wire delivered to a scrap dealer after a theft is typically much smaller than that delivered by regular customers. Sometimes it may be several hundred pounds, but often it is less than 100 pounds.

Some jurisdictions require scrap dealers to report purchases of a large amount of copper, but many do not. “Large amounts” are defined differently depending on the locality. Scrap dealers are not supposed to buy goods such as copper wire that they know or suspect is stolen. However, until scrap dealers are required to take measures to check on copper material and seller legitimacy (e.g., waiting periods, proof of ownership, verification of identity, filing reports, or entries in national databases), there are limited incentives to question persons offering suspicious copper wire for sale.

### **Patterns in U.S. Copper Theft**

Two patterns of copper wire theft from electric utilities can be identified:

- It is a nationwide problem; and
- It has grown dramatically since the price broke \$2.00 a pound in late 2005.

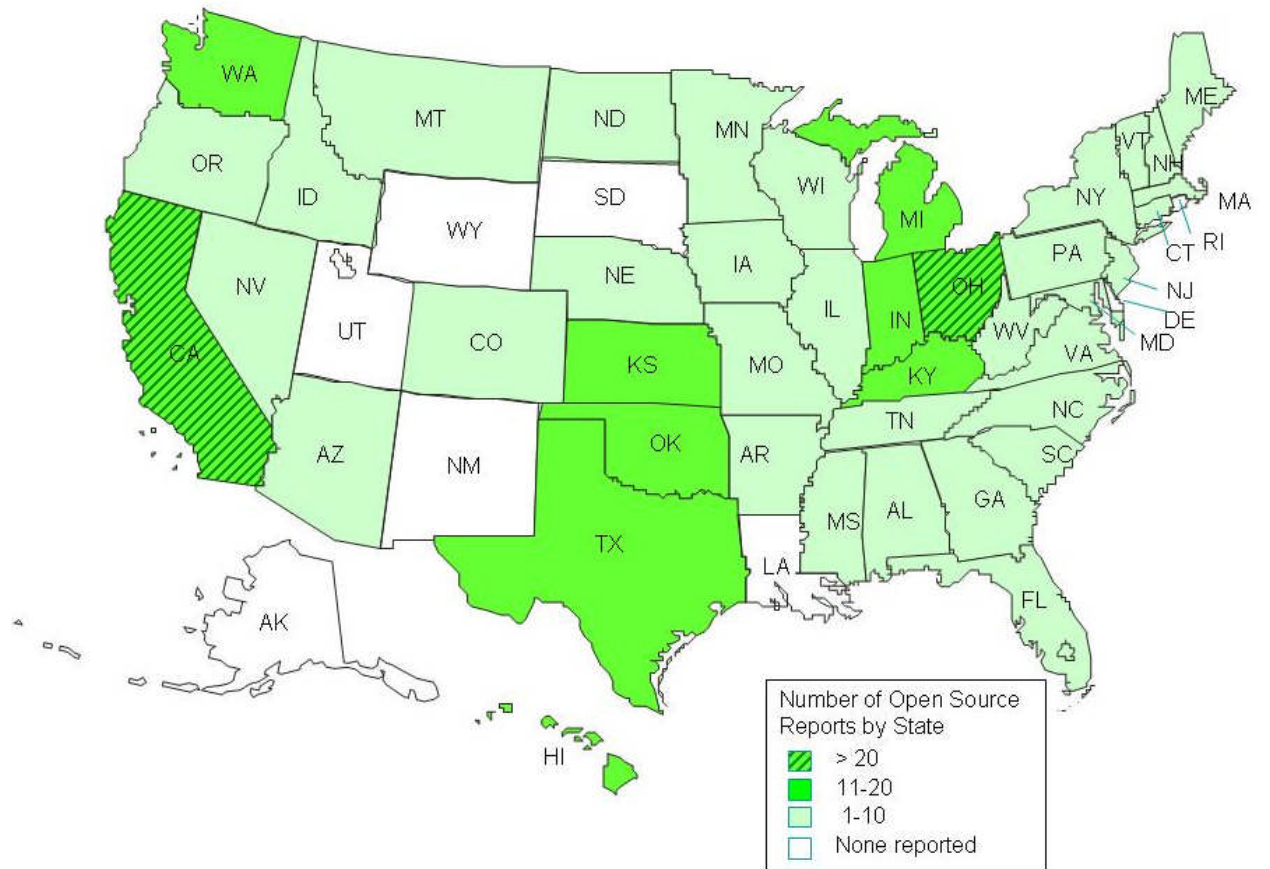
OE conducted an open source review of copper wire thefts across the country. According to open source press reports, copper wire thefts were reported in the press for 42 states between January 2006 and March 2007 (see **Figure 3** and **Table A1** in the Appendix). It is likely that every state has been affected; however, the vast majority of these crimes reported by police departments and utilities do not appear in the press. For example, in the aftermath of Hurricane Katrina, there were tons of scrap copper available from damaged facilities and power lines that simply vanished in Louisiana and other surrounding states. The press did not report on these potential crimes since they were more focused on other pressing issues.

No geographic pattern appears in the reported thefts, but there is a strong correlation between crystal methamphetamine drug abuse and reported metal thefts.<sup>17</sup> Many different police departments have confirmed that the typical copper thief is a methamphetamine drug abuser who is stealing for drug money. The worst areas for methamphetamine abuse and copper theft are Hawaii, Arizona, California, Oregon, and increasingly the rural Midwest and South. OE’s analysis indicates that copper wire theft is probably less prevalent in areas without nearby scrap dealers. A petty thief is less likely to steal a small amount of copper wire if the nearest scrap dealer is relatively far away. As a result, copper wire theft is more likely to target utilities in cities or suburbs than rural areas.

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<sup>17</sup>According to an extensive study sponsored by the Chief Security Officer web site ([www.csoonline.org](http://www.csoonline.org)) – Scott Berinato, “Copper Theft: The Metal Theft Epidemic,” February 1, 2007, [http://www.csoonline.com/read/020107/fea\\_metal.html](http://www.csoonline.com/read/020107/fea_metal.html).

**Figure 3. Open Source Reports of Copper Thefts at Electric Utilities**  
**January 2006 to March 2007**



Source: News reports and press releases dated January 2006 to March 2007, summarized by state in Table A1.

The data collected for 2006 and early 2007 show that when copper wire theft occurs at electric utilities, the primary targets, in order of number of incidents reported in the press, are:

1. substations and their transformers;
2. utility lines and their transformers;
3. spools of wire in the back of utility trucks or at utility construction sites; and
4. spools of wire at utility storage yards.

There have also been reports of wind generators being stripped of wire.

The most dangerous places to steal copper wire are from substations and from utility poles. To steal a large amount of copper quickly and safely, spools on the back of trucks and storage yards would seem to be a more lucrative target. In fact, the larger hauls of copper wire theft have been from trucks, storage yards and from construction sites. Why then are most thefts occurring at substations and utility poles? It appears this is related to the large number of methamphetamine users who are stealing copper wire. Medical studies have shown that this drug reduces the ability of the brain to assess risk before taking action; hence users of this drug are not concerned about the risks involved in stealing wire from high voltage substations, utility wires, and

transformers. The people who risk their life to steal copper wire from a substation typically only receive a few hundred dollars from the sale of the stolen wire, sufficient for the next drug fix.. Thefts from storage sites and trucks are most likely done by professional criminals and not the drug abusers. Storage sites and trucks are also more difficult to break into than an unguarded substation or utility pole.

*It is important to understand that Figure 3 does not show the number of reported copper wire thefts per State. There are too many incidents that are not reported to the press. This figure only shows the level of press coverage of these types of incidents by State. Each press report of a particular type of incident in a State is counted once, regardless of the number of incidents in the article. For example, if a press report states that utility Y had 40 incidents of copper wire theft at substations in State X, this counts as one press report. Press reports identifying the same incident were eliminated as duplicates.*

The extent to which thefts of copper from electric utilities were increasing between 2005 and 2006 is evident in **Table 2**. The open source reports examined for this study indicated only a few copper thefts in the United States involving thousands of pounds of copper wire in one operation. The norm is a much smaller amount in each incident. In some warmer, urban locations such as Tampa, Florida and San Diego, California, law enforcement officials believe that most thefts of copper wire are small-scale and are perpetrated by transients without vehicles.

**Table 2. Relative Growth in Electric Utility Copper Theft Since 2005**

State	Entity Reporting	Change from 2005
AZ	Arizona Public Service	Increased
CA	San Bernardino County	Increased
GA	Georgia Electric Membership Coop	Increased
IA	Major Utilities	Increased
KY	Eastern Kentucky Power/Duke Energy	Increased; more than doubled
ME	Utilities	Increased
MI	Consumers Energy/Detroit Edison	Increased
MO	Kansas City Power & Light/Aquila	Increased
MS	Entergy	Increased
OH	AEP – Ohio	Increased
OK	AEP/Public Service of Oklahoma	Increased; tripled
TX	Dallas Police	Increased; more than doubled
VA	Lee County	Increased

Sources: Utility web sites and news reports and press releases, January 2006 – March 2007.

## Consequences of Copper Wire Theft from Utilities

Perhaps the most obvious consequence of copper wire theft from electric utilities is the economic impact. The targeted utility will need to replace any missing copper and repair any equipment damaged either during the theft itself or as a result of operating the system in the absence of stolen wires. Another consequence may be a power outage, which at best inconveniences customers but may result in economic losses to some customers and always results in loss of sales revenue to the utility. Overall grid reliability is also reduced by a power outage, which can lead the utility to increase expenditures on security, reliability or redundancy of their system. Customers, sensing a less reliable grid, may also invest in backup power generation. Physical injury or death is another possible consequence, not only for the perpetrator, but also for the

utility worker who must repair the damage. There are safety issues for children who may venture into a damaged facility from a broken lock or hole in a fence.

## Valuing the Consequences

It is possible to put an economic value on the direct labor and material costs of a particular incident of copper theft from a utility, which tends to be thousands of dollars and at some utilities tens of thousands of dollars. It is much more difficult to quantify the consequence of a power outage or the loss of reliability, redundancy, security, or safety.

***Cost in Labor and Materials.*** The first impact is the cost in labor and materials to replace the copper wire that has been stolen and to replace or repair any other parts of the facility that have been damaged as a result of the theft, including fences and locks that may have been cut. The facility must also be inspected ensure that all damage has been identified. Undetected and unrepaired damage can lead to further damage to the specific facility and the electric grid as a whole, as well as dangerous working conditions for utility employees. Simple thefts of \$100 in copper wire can cost the utility \$5,000 or more to repair.

***Damage from a Power Outage.*** If the stolen copper wire is system critical and the in-place workarounds cannot compensate quickly, the theft can result in power outages and revenue losses. An unexpected power outage can also damage other equipment within the utility and at customer facilities (especially high-tech industries with sensitive loads). Officials with Georgia Power said if the thieves go after the wrong metal, they could shut-down power to the city of Atlanta.<sup>18</sup>

***Power Outages and Reliability of the Electric Grid.*** If only ground wires are stolen and no active wires are cut, electricity may continue to be provided. When distribution or transmission lines are removed or when copper wire is removed from transformers on poles or at substations, however, these facilities often fail to operate. Such failure reduces the reliability and redundancy of the electric grid, even if power outages do not ensue from the damage. Unexpected loss of this infrastructure will usually cause at least a minor disruption in the delivery of electricity to customers.

***Injury to Utility Workers or Citizens.*** Another adverse impact of copper wire theft from utility facilities, particularly substations, transformers, or from utility lines, is that utility workers can be injured or killed when touching wires or equipment energized due to the theft. If holes are cut in fences or gates, or if locks or utility lines are left down, curious citizens, particularly children, could be injured or killed if they access the site and encounter dangerous high-voltage wires or equipment. In 2006, for example, 21 suspected thieves died of electrocution while apparently attempting to steal copper wire from electric utilities.<sup>19</sup> Fifteen people were found

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<sup>18</sup> <http://www.myfoxatlanta.com/myfox/pages/News/Detail/PrintFriendly?contentId=2625898&version=3&locale=EN-US&layoutCode=VSTY&pageId=3.2.1&siteParams=1012&print=true&detailAction=/News/Detail&portletLogoDisplayed=1>

<sup>19</sup> Calculated from news stories published January 2006 – March 2007: 21 killed by electrocution in 2006 alone – Alabama, (1), Colorado (1), Kentucky (3), Michigan (2), Nebraska (1), North Carolina (2), Ohio (3), South Carolina (1), Texas (2), Virginia (2), and West Virginia (3).

dead in substations and six were found dead beside utility poles. Countless others have been injured in an attempt to steal copper wire from electric utilities.<sup>20</sup>

## **Recommended Countermeasures to Copper Theft**

There are a wide variety of countermeasures that can be implemented by electric utilities, scrap metal dealers, law enforcement officials, state regulators and legislators to reduce and possibly eliminate copper wire theft. In designing copper theft countermeasures, it can be instructive to review how previous thefts have been avoided or prosecuted. Although some thefts are avoided or identified due to the death or injury of the perpetrator, most are identified as the result of alert citizens who notice and report suspicious activity around a utility site, scrap dealers who notice and report suspicious copper offered for sale, or utility employees who notice a suspicious change in operations such as a power surge or outage.

### **Electric Utility Countermeasures to Copper Theft**

Electric utilities have undertaken a number of efforts to deter, prevent, and prosecute copper wire theft. A review of the web sites of the hundred largest utilities revealed 14 who were active in these efforts. Efforts ranged from issuing press releases to setting up toll-free hotlines and offering rewards for information leading to the arrests of perpetrators for specific crimes. The largest reward identified was up to \$25,000 from the Bonneville Power Administration for information leading to the arrest and conviction of any individuals burglarizing its facilities.<sup>21</sup> The typical reward offered by utilities and cooperatives is up to \$1,000.<sup>22</sup>

Appalachian Power offered rewards of up to \$2,500 in October 2006 to report thefts and vandalism. The AEP affiliate encourages anyone who sees suspicious activity near a utility pole, substation or other power company facility to call its Corporate toll-free telephone number dedicated to security issues 1-866-747-5845. In July 2006, Appalachian Power launched a special effort to curb copper wire thefts through:<sup>23</sup>

- Launching a media and a radio advertising campaign;
- Teaching scrap dealers to identify metal that may have been stolen from electrical facilities;
- Building a closer relationship with law enforcement;
- Increasing security around company substations and other facilities; and
- Educating employees on identifying risk from tampered equipment.

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<sup>20</sup> A study performed by a coroner's office in Alabama determined that most of the seven people that they examined who were electrocuted from 1981 to 2001 while trying to steal copper wire (and in one case electricity) were on drugs, alcohol, or both at the time of the fatal attempts.

<sup>21</sup> <http://www.ruralite.org/news/story.php?ID=48>.

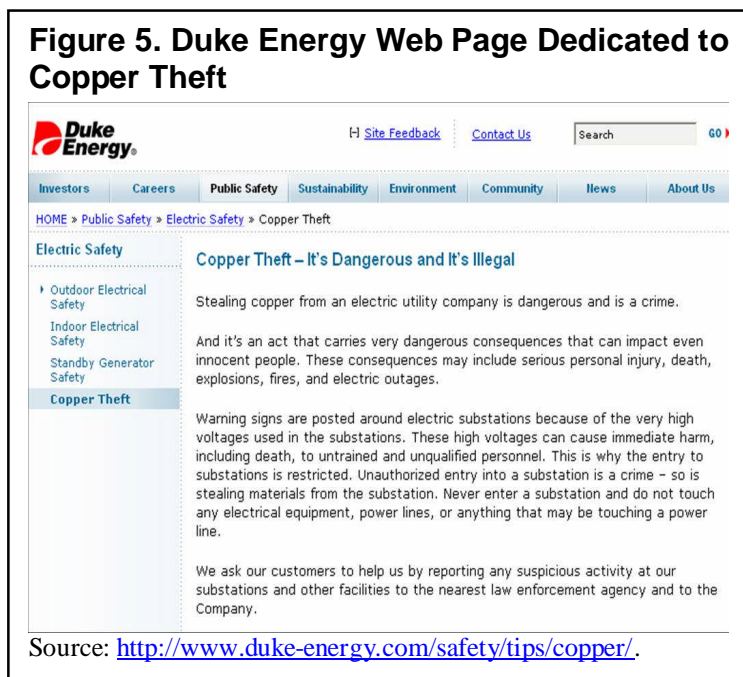
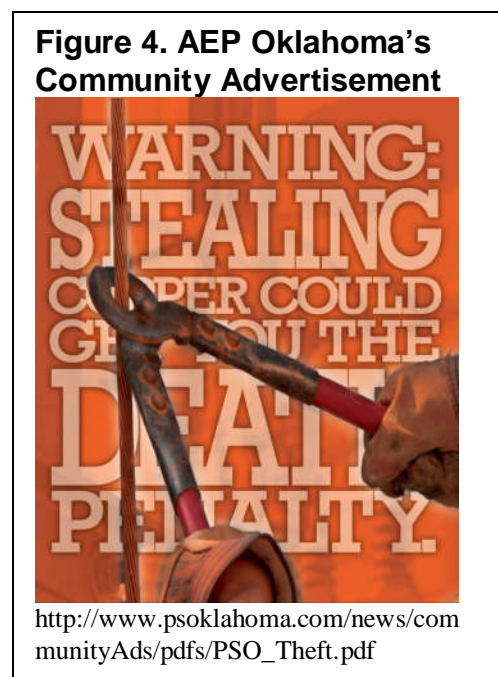
<sup>22</sup> [http://www.countrylines.com/rss/?rss\\_id=2](http://www.countrylines.com/rss/?rss_id=2); [http://www.csoonline.com/read/020107/fea\\_metal-6.htm](http://www.csoonline.com/read/020107/fea_metal-6.htm)  
<http://www.consumersenergy.com/welcome.htm?./Newsroom/NewsArticle.asp?ID=1389;1>; Consumers Energy and Detroit Edison are two cases in point.

<sup>23</sup> AEP Press Release, "Electrical Equipment Theft Increasing, Thieves Putting Safety and Reliability at Risk," 7/6/06, <http://www.appalachianpower.com/news/releases/print.asp?releaseID=303>.



Recently Appalachia Power and some other utilities have moved away from pure copper wire to copperweld, which is a much cheaper material with little value to thieves. Unfortunately thieves cannot tell it is copperweld when they steal it, so it may not deter crime in the short term.<sup>24</sup>

Another AEP affiliate, Public Service Oklahoma, started a public campaign in 2006, complete with links on the utility’s home page to community advertising warning against the dangers of stealing metals from substations, electric lines, or other electrical equipment (see **Figure 4**). Other AEP affiliates in Indiana, Michigan, Ohio, and Texas offer rewards, advertise the AEP Corporate toll-free number, and work with State legislators for tougher laws and harsher penalties.<sup>25</sup> Consumers Energy in Michigan and Entergy in Mississippi both advertise their toll-free numbers to the public while Detroit Edison advises likely informants to call their local security department. Duke Energy maintains a page on their web site dedicated to educating the public about copper theft (see **Figure 5**).



Regularly targeted utilities have developed a number of countermeasures to prevent copper theft at their facilities. **Table 3** lists the most significant countermeasures recommended by four large investor-owned utilities. While further research is needed to quantify the cost of each countermeasure, many are relatively inexpensive to implement and there are obvious economies of scale in bundling complementary measures.

Actually defending “point” facilities at individual sites such as substations and storage yards is relatively easy, but at a significant security cost if preventing damage to the facility is the primary objective. Defending “line” targets such as power poles and lines is much more difficult

<sup>24</sup> <http://www.dailymail.com/story/News/+2007032828/Company+foils+copper+th>

<sup>25</sup> <http://www.indianamichiganpower.com/news/theftDangers/default.asp>.

<http://www.aepohio.com/communities/community/default.asp>.

<http://www.aepohio.com/news/releases/print.asp?releaseID=297>.

<http://www.aeptexas.com/news/releases/print.asp?releaseID=374>.

because of the amount of real estate that must be covered. A company must determine, as part of its risk assessment and mitigation strategy, which measures to institute and which facilities need the most protection. Detroit Edison, for example, had a substation that was frequently vandalized. It spent four times what a normal fence would cost to install new fencing with barbed wire on top and added other security measures. The facility is no longer a “problem” facility requiring constant repairs; it remains an expensive facility to operate though, due to increased security costs.<sup>26</sup>

**Table 3. Electric Utility Countermeasures to Copper Thefts**

Utility	Selected Countermeasures
Alliant Energy	<ul style="list-style-type: none"> <li>• Redesign substation grounding straps, reducing exposure height/length or copper</li> <li>• Develop a new style locking hardware to replace old chain lock</li> <li>• Distribute and install new hardened padlocks</li> <li>• Review perimeter fencing and replace with cut-resistant fencing at substations</li> <li>• Secure equipment/material/keys from parked vehicles at night/weekends</li> <li>• Coordinate with local law enforcement</li> <li>• Install new or upgraded security systems (motion detection/cameras)</li> </ul>
Baltimore Gas & Electric Co.	<ul style="list-style-type: none"> <li>• Perform threat/risk analysis of 203 substations</li> <li>• Install new protection system at high risk substations to detect and assess intruders, with camera and infrared lighting (for night imaging)</li> <li>• Link 24/7 customer service center to surveillance sites with real-time generated observation, ability to control alarm, and communicate with interactive intercom</li> </ul>
MidAmerican Energy Co.	<ul style="list-style-type: none"> <li>• Add appropriate lighting</li> <li>• Install high security (cut resistant) fencing and security cameras</li> <li>• Require gates to remain closed to unauthorized personnel where appropriate</li> <li>• Add roving security patrols at larger service centers after business hours</li> <li>• Work with county law enforcement agencies</li> <li>• Implement effective state-wide regulations</li> </ul>
TXU Electric Delivery's Dallas District	<ul style="list-style-type: none"> <li>• Use angle iron guards and flexible steel conduit</li> <li>• Place protective guards at the station structures encapsulating the ground wires</li> <li>• Use contact GS (concrete) to cover wire connects to station-grounding wire</li> <li>• Use copper weld instead of copper cable as a ground conductor</li> <li>• Stamp identifying label or symbol on wire</li> <li>• Improve station lighting, perimeter fencing, intrusion alarms, security cameras, and vegetation management</li> </ul>

Sources: “Copper/Material Thefts – Alliant Energy; Primary Focus – IP&L,” Internal IUB Report 9/21/06; BG&E: <http://www.securitymanagement.com/library/000487.html>; “MidAmerican Copper Thefts,” Internal IUB Report 9/21/06; TXU: [http://tdworld.com/overhead\\_distribution/materials/power\\_wire\\_theft\\_impacts/](http://tdworld.com/overhead_distribution/materials/power_wire_theft_impacts/).

From the public outreach efforts, protective measures undertaken by regularly targeted utilities, and industry discussions, **Table 4** is provided as a compendium of available countermeasures for electric utilities.

<sup>26</sup>[http://www.csoonline.com/read/020107/fea\\_metal.html](http://www.csoonline.com/read/020107/fea_metal.html)



**Table 4. Protective Measures Considered by Electric Utilities**

Categories	Protective Measures
Communication & Coordination	Share ideas with other utilities Coordinate with law enforcement Communicate with State and county Attorney Generals
Signs & Warnings	Post signs Use recorded warnings over intercoms Use dogs at selected sites Intrusion Detection Systems
Lighting & Intrusion Detection	Install/enhance lighting Add infrared lighting Manage vegetation
Fencing	Install fencing around perimeter Install better fencing that is difficult to defeat Replace cheap locks and chains that can be cut Install an interior, electrified fence
Wire Protection	Add protective pole guards Protect ground wire
Wire Devaluation	Mark wire, perhaps with company logo, or an invisible identifier
Alternate Equipment	Deploy steel utility poles Replace copper wire with copperweld or copper-covered steel
Equipment Protection	Block valuable equipment (in yard, on truck) Leave no equipment or valuable materials unprotected at any time
Rewards	Issue rewards for information leading to arrests Encourage scrap dealers to identify potential stolen copper wire
Resale Waiting Periods	Legislate to require resale documentation and waiting periods
Suspicious Behavior & Stings	Alert Neighborhood Watch Programs about suspicious behavior Establish toll-free hotlines Run stings or stakeouts at substations and/or scrap dealers Report all crimes to police
Patrols & Guards	Train and post security guards Step up police patrols
Prosecute Crimes	Do not accept plea bargains which allow alleged criminals to strike again

### Scrap Metal Dealer Countermeasures to Copper Theft

The Institute of Scrap Recycling Industry (ISRI) is assisting the scrap metal industry in identifying stolen material through its Scrap Theft Alert system.<sup>27</sup> Whenever ISRI learns of a major scrap theft, it sends an e-mail notice to scrap recyclers in the state where the theft occurred as well as in surrounding states. The alerts include a description of the stolen material, serial numbers and photos of the material (when available), and contact information for local and/or state law enforcement officials. ISRI has also established recommended practices and procedures for minimizing the risks of purchasing stolen scrap metal.<sup>28</sup>

1. Outreach – Develop working relationships with local law enforcement, utility industry, and municipalities

<sup>27</sup> ISRI, “Combating Scrap Theft: Scrap Dealers Don’t Want It and They’re Doing Something About It,” Press Release 6/7/06, <http://www.isri.org/AM/Template.cfm?Section=Home&Template=/CM/ContentDisplay.cfm&ContentFileID=3521>; the Scrap Theft Alert System is at [http://www.isri.org/AM/Template.cfm?Section=Scrap\\_Theft\\_Alert2&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=127&ContentID=7671](http://www.isri.org/AM/Template.cfm?Section=Scrap_Theft_Alert2&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=127&ContentID=7671).

<sup>28</sup> ISRI, “Recommended Practices and Procedures for Minimizing the Risks of Purchasing Stolen Scrap Materials,” <http://www.isri.org/AM/Template.cfm?Section=Home1&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=9603>.

2. Identify Sellers – Collect information on sellers, e.g., driver’s license or ID, vehicle license plate, unique identification number for each customer, and seller’s signature
3. Track Transactions (Financial) – Consider payment by check, ATM with vendor’s name, and receipts on cash transactions
4. Track Transactions (Video) – Add an additional camera at the scale or cashier
5. Prohibited Materials – Refuse purchasing certain types of materials without letter of authorization, e.g., high voltage cables or reported stolen materials
6. Training – Develop a program for scale operators and receiving personnel to identify suspicious materials

## Legislative Countermeasures to Copper Theft

State legislatures and attorneys generals have been addressing the problem of copper wire theft. In 2006, bills were introduced (and on occasion signed into law) in six states that were aimed at reducing copper wire theft by making the penalties more stringent. Most of these bills were focused on scrap metal dealers and the perpetrators of the copper wire thefts. In early 2007, 21 State legislatures introduced 46 bills aimed at curbing copper theft (see **Figure 6** and **Table A2** in the Appendix). Virtually all of these bills contain provisions for increasing:

- Record keeping for buyers of scrap copper and/or
- Penalties for copper theft or for scrap dealers who disregard rules on purchasing such metal.

Most of the states have at least two bills proposed, as both the State Senate and House of Representatives are likely to propose companion bills. One state, Hawaii, is overwhelmingly focused on the issue, with four House bills and five Senate bills proposed in the first three months of 2007.

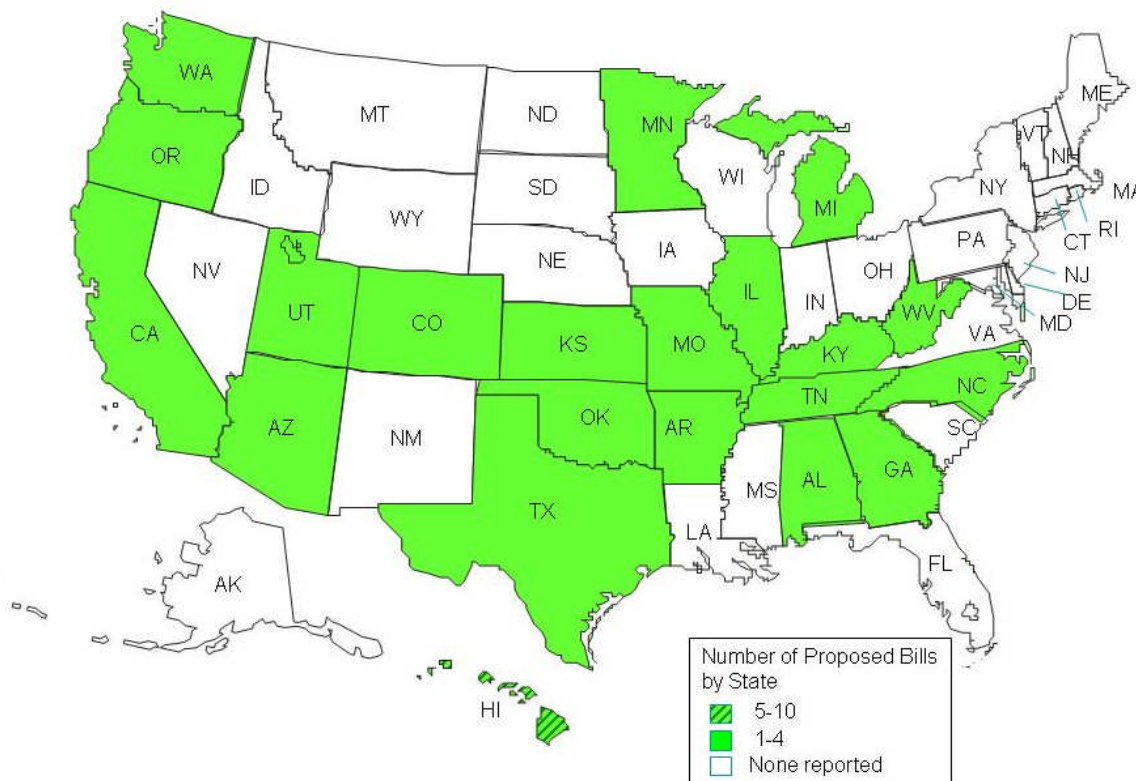
Few of these bills require any holding periods before payment is made, which is necessary for law enforcement to determine if the material offered for sale is stolen. The reason for lack of this type of legislation is strong opposition by scrap dealers who argue that holding periods would require larger storage yards and greatly reduce cash flow. None of the proposed legislation requires proof of ownership of copper offered for sale as scrap, which would make it extremely difficult to sell stolen copper. Scrap dealers are opposed to this type of legislation because it would virtually eliminate all small-scale recycling and result in business closings. Scrap dealers contend that most legitimate owners of scrap material would not be able to prove they own or have a right to possess such material.

Local governments have also passed legislation to curb copper theft. One successful measure that passed in Macon, Georgia, does not allow scrap dealers to buy from someone who has been convicted of theft. After the “Do Not Buy” legislation went into affect last year, copper thefts reported to the Macon Police Department dropped 42%.<sup>29</sup> Another successful piece of legislation passed in South Bend, Indiana, in mid-2006, required scrap yards to check and record proper identification of sellers of copper and to make a copy of their thumbprints. Copper theft in South Bend declined after this legislation went into effect.<sup>30</sup>

<sup>29</sup> [http://www.13wmaz.com/news/local\\_story.aspx?storyid=35303](http://www.13wmaz.com/news/local_story.aspx?storyid=35303)

<sup>30</sup> <http://www.southbendtribune.com/apps/pbcs.dll/article?AID=/20070112/News01/701120319>

**Figure 6. New State Legislation Against Copper Theft**  
**Introduced January – March 2007**



Source: Lexis search and news reports summarized in Table A2.

## Other Suggested Countermeasures to Copper Theft

Information sharing among stakeholders has been occurring over the past year. Working groups, committees and meetings have been held in various localities with government, industry (electric utilities, telecommunications, and construction), law enforcement, and scrap dealers. The National Crime Prevention Council, for example, is coordinating efforts by local law enforcement and activist neighborhoods to identify and combat scrap metal theft. New organizations have been formed as well to combat this problem, such as the Arizona Copper Theft Committee, which brings together local residents to work with local and state law enforcement officials.

## Conclusion

Copper wire theft has become a growing problem for electric utilities over the past three years, particularly during periods of skyrocketing copper prices. More than a minor economic irritant, copper wire theft is an issue of electricity delivery, reliability, and safety. OE recommends that the electric utility industry work with law enforcement, security officials, and other industries such as scrap metal dealers, construction, and telecommunications, to better identify the extent of the problem and to develop a comprehensive list of security practices to protect against the

growing threat of copper wire theft. OE is willing to work with the electric utility industry to develop the tools to permit individual utilities to perform cost-benefit analyses to best determine which measures should be implemented and at which sites. The Office of Electricity Delivery and Energy Reliability will continue to monitor the situation and work with stakeholders to address this issue.

## Appendix A Detailed Data

**Table A1. Copper Thefts at Electric Utility Facilities, Open Source References by State and Target, January 2006 to March 2007**

State	Sub-station	Truck/Storage	Pole	Work Site	Transformer	Wind Generator	Other	TOTALS
AK								0
AL	5		3	1				9
AR			4					4
AZ	2	2	2					6
CA	3	6	6	4	4	2		25
CO	3	1	1		1		3	9
CT			1					1
DE								0
DC								0
FL	5	1		2				8
GA	4							4
HI			4					4
IA	1	1	1	1			1	5
ID	1							1
IL	1		1					2
IN	6		2				2	10
KS	5	1	4					10
KY	4		9	1			2	16
LA								0
MA	2	1		1		1		5
MD	1							1
ME	3	1					3	7
MI	3	2	3				3	11
MN	1			1				2
MO	2	1						3
MS	4		1					5
MT	1							1
NC	1	2						3
ND	1							1
NE	2							2
NH		1						1
NJ	1	2						3
NM								0
NV	3							3

State	Sub-station	Truck/Storage	Pole	Work Site	Transformer	Wind Generator	Other	TOTALS
NY	2	1	1					4
OH	13	2	4	1			2	22
OK	11	2						13
OR	4		1				1	6
PA	2		3					5
RI								0
SC	4		2	1				7
SD								0
TN	4	1						5
TX	7		5				3	15
UT								0
VA	2		2				1	5
VT	3							3
WA	5	2	3	1				11
WI	2	2	1	1				6
WV	3		2				1	6
WY								0
<b>TOTAL</b>	<b>127</b>	<b>32</b>	<b>66</b>	<b>15</b>	<b>5</b>	<b>3</b>	<b>22</b>	<b>270</b>

Sources: Open source news reports available on the Internet from January 2006 – March 2007 and electric utility press releases issued in 2006 and 2007. Duplicate articles were eliminated from the counts.

**Table A2. New Anti-Theft State Legislation Introduced in First Quarter of 2007**

State	Act	Description
AL	HB94	Requires secondary metal recyclers to maintain a record of purchases; provides a procedure by which records are maintained and inspected; authorizes a hold by law enforcement on certain sales of metals by secondary metal recyclers; provides exemptions; provides criminal penalties. (introduced 03/02/07)
AR	HB2337	Creates the offense of theft of scrap metal; requires scrap metal dealers to maintain records at business locations. (introduced 03/02/07)
	HB2443	Creates streamline and strengthen nonferrous scrap metal recordkeeping requirements and to assist law enforcement in investigating thefts. (introduced 03/05/07)
AZ	SB1530	Makes an appropriation in the amount of \$174,600 to the office of the attorney general for investigations of copper wire theft. (introduced 01/29/07)
	HB2314	Requires scrap metal dealers to maintain record of all transactions involving receipt of copper.
CA	AB1372	Adds theft of copper materials as a type of theft punishable as grand theft. (introduced 02/23/07)
	SB447	Requires scrap metal and junk dealers to report all receipts or purchases including seller identification to local sheriffs departments within one working day.
CO	HB1141	Imposes felony charges on scrap recyclers who buy more than 25 pounds without properly recording a seller's driver's license, other ID, vehicle plate or fingerprint.
GA	SB203	Provides for increased penalties for certain crimes involving public utility property; changes certain provisions relating to inspection by law enforcement officers and actions to recover property. (introduced 02/22/2007)
HI	HB1246; SB1332	Establishes the offense of theft of copper; adds special requirements for the purchase of copper by scrap dealers and to hold scrap dealers accountable for violations. (introduced 01/22/07 in House & Senate)
	HB1515	Establishes a preference under the Public Procurement Code for stamped copper wiring that is within the lowest 3 bids submitted where the price of the wiring exceeds a certain amount per foot (introduced 01/23/07)
	HB800	Increases the severity of the consequences to deter the theft of copper wires and other valuable resources. (introduced 01/18/07)
	HB373	Requires dealers to photograph the copper they take in. It also makes dealers verify the seller's ID. It requires sellers to have bill of sales for copper worth more than \$50. The dealer then needs to keep records up to three years. The bill would also increase fines for dealers who break the law, and repeat offenders could get their license taken away.
	SB34	Increases the reporting requirements for sales of scrap to scrap dealers; increases the criminal penalties for failing to comply with these requirements; relates to scrap dealers. (introduced 01/17/07)
	SB142	Established state-run copper recycling clearinghouses that will eradicate copper recycling as a quick, anonymous source of criminal income to deter copper theft. (introduced 01/19/07)
	SB998	Requires scrap dealers to retain a photocopy of the seller's valid identification and by prohibiting cash payments for used or salvaged copper. (introduced 01/19/07)
	SB1229	Requires scrap dealers to include a thumbprint in the required identification statement of all persons redeeming copper and to establish a copper redemption database. (introduced 01/22/07)
IL	SB 69	Requires scrap metal dealers and recyclers to get information from sellers before handing over cash. This would include a copy of the seller's driver's license, photos of their vehicle, license plate and the metal being sold. (introduced 01/31/07)
KS	HB2035	Amends K.S.A. 50-619 to 50-622 to change certain languages relating to the theft of certain metals; Requires that scrap dealers check seller's ID in transactions greater than \$50 and sales records be kept for two years. Metal for purchase must be held for 15-30 days before seller is paid. (introduced 01/09/07)

State	Act	Description
KY	HB82	Requires junkyards and other purchasers of used ferrous and nonferrous metals to keep a register of sellers and make the information available to law enforcement agencies. Also increases penalties for sellers and buyers of stolen metal. (introduced 01/02/07; 03/12/07 to Governor)
MI	HB6599	Requires licensure for scrap metal processors as secondhand or junk dealer; revises provisions governing record keeping by such licensees. (introduced 11/09/06; signed into law 01/08/07)
	HB6630	Enacts sentencing guidelines for crime of buying and selling stolen scrap metal, and the buying and selling of stolen scrap metal removed from a utility pole, telecommunications company property, government property, or utility property or jobsite. (introduced 11/14/06; signed into law 01/03/07)
MN	HB457	Expands an existing law enforcement tool regarding record keeping of purchases by scrap metal dealers; requires registration; provides penalties; appropriates money. (introduced 01/29/07)
	SB1955	Relates to public safety; increases penalties for metal theft. (introduced 03/19/07)
MO	HB490	Requires sellers of scrap metal to provide photo identification to purchasers of the scrap metal; requires purchasers to maintain records of all sales of scrap metal. (introduced 01/18/07)
	HB547	Provides for the registration of copper and aluminum from any person who obtains the copper or aluminum from a purchase or trade. Requires id on person and vehicle, thumbprint from seller, and tag and 15 day hold requirement for buyer before payment made. (introduced 01/23/07)
	SB683	Creates certain record-keeping requirements for purchasers of scrap metal. (introduced 03/01/07)
NC	HB 2748	Increases fines, threatens business licenses and imposes prison terms for repeat offenders when purchasers fail to heed its provisions. The bill requires scrap metal buyers to collect more details about sellers, their vehicles and the metal they're offering. Buyers must also demand a photo identification and then keep a copy for their records. (passed House 02/07)
OK	HB1440	Requires report on buy transactions; modifies reports of theft of precious metal; authorizes an administration and law enforcement to examine certain records of dealer; prescribes penalty for dealer that fails or refuses to comply with examination. (introduced 01/19/07)
	HB1568	Relates to crimes and punishments of copper theft; modifies Section 1727 by increasing penalties. (introduced 01/19/07)
	SB795	Increases penalties and record keeping requirements relating to copper theft. (introduced 01/22/07)
OR	HB2984	Creates crime of encouraging metal theft; punishes by maximum of one year's imprisonment, \$ 6,250 fine, or both. (introduced 03/05/07)
	HB3096	Modifies crime of failing to maintain metal purchase record; increases punishment to maximum of five years' imprisonment, \$ 125,000 fine, or both; imposes presumptive prison sentence under specified circumstances; expands theft in first degree to include theft of metals under certain circumstances. (introduced 03/05/07)
TN	HB902	Requires that scrap metal dealers be licensed by Commerce and Insurance and that seller must provide valid photo identification or give thumbprint prior to transaction. (introduced 02/08/07)
	SB1038	Rewrites law relative to scrap metal dealers to require that each dealer be licensed by commerce and insurance and that seller must provide valid photo identification or give thumbprint prior to transaction. (introduced 02/08/07)
TX	HB 1766	Adds copper wiring to the language in existing legislature related to the punishment for theft (introduced 02/21/07)
	SB642	Establishes statewide reporting system to track sale of regulated metal; requires registration from the secondhand metal dealer; requires identification from any persons attempting to sell regulated metals; provides penalties. (introduced 02/14/07)



State	Act	Description
UT	HB402	Requires that secondhand merchandise dealers comply with all transaction identification, recordkeeping, reporting, training, and other provisions that apply to pawnbrokers with the exception of regulation of pawn tickets; requires such dealers to provide data to the online database currently used by pawnbrokers. (introduced 01/29/07; signed by Governor 03/19/07)
UT	SB44	Modifies the Criminal Code and requires identification and related procedures for the sale of specified metals and imposes penalties for participating in transactions involving these metals without providing appropriate identification. (introduced 01/02/07; signed by Governor 03/15/07)
WA	HB1251	Adds new sections that address the issue of stolen metal property; removes current exemption of transactions involving "metal junk"; provides clarification in the interpretation and enforcement of the current laws governing pawnbrokers and secondhand dealers. Requires scrap dealers to maintain record of sale, including a photocopy of seller's identification, and maintain the metal in original form for 30 days. (introduced 01/15/07)
	SB5312	Removes current exemption of transactions involving metal junk from the requirements of existing law; provides clarification for uniform interpretation and enforcement of the current laws governing pawnbrokers and secondhand dealers. Requires scrap dealers to maintain record of sale, including a photocopy of seller's identification, and maintain the metal in original form for 30 days. (introduced 01/17/07)
	SB6098	Establishes provisions relating to protecting and recovering property owned by utilities, telecommunications companies, railroads, state agencies, political subdivisions of the state, construction firms, and other parties. Requires electric utilities to put identifying markings on their critical infrastructure (introduced 02/21/07)
	HB1986	Adds a year to standard theft sentences and ensures those convicted get prison time.
WV	HB2748; SB502	Establishes additional reporting and record retention requirements for certain purchasers of nonferrous metal or steel railroad track and track material; clarifies procedure re: law enforcement on stolen items made of such metals; provides for the inspection of records and materials by investigators employed by public utilities and railroads; and increases criminal penalties for violations. (introduced 01/30/07 in House; 02/08/07 in Senate)

Sources: LexisNexis, [www.lexis.com](http://www.lexis.com), March 23, 2007.