Copper theft is a costly issue and safety hazard for electric co-ops. According to a 2009 survey performed by the Electrical Safety Foundation International (ESFi), the total estimated impact of copper thefts from utilities nationwide was $60,397,818 for the previous 12 months. The estimated number of injuries resulting from copper theft nationwide was 52, and the estimated number of copper theft fatalities nationwide was 35.

“It’s affecting everybody,” says Jim Hixson, Manager of Purchasing for NW Electric Power Cooperative (NWEPC), which has roughly 140 substations around northwest Missouri. Hixson taught ‘Protecting Your System from Copper Theft’ at the March, 2012 Tech Advantage conference in San Diego. He adds, “It’s not localized in any one particular spot anymore. It’s global in nature.” And the costs associated with copper theft are often passed to members as operating costs.

Copper theft generally increases or decreases in direct correlation to the market price of copper—and the price is expected to rise. Consequently, co-ops, large corporations, law enforcement and other agencies, are exploring better tactics to deter and prevent theft. When theft does occur, some of these new tactics can provide evidentiary proof in copper theft prosecution. And if the crime is successfully prosecuted, it may deter future thieves.

1 In the ESFi report, Copper Theft Baseline Survey of Utilities in the United States, (see http://esfi.org/index.cfm/page/Copper-Theft-Baseline-Survey-of-Utilities-in-the-United-States/edid/18983/pid/10272) 3100 electric utility companies were surveyed (from EEI, APPA, and NRECA) with 618 participants responding, giving the survey a 95% confidence level.
COPPER THEFT TRENDS
FBI reports show that the price of copper rose 500% between 2001 and 2008. And theft typically fluctuates with the market price. Corroborating what Hixson says, Director of Operations for NWEPC, David McDowell, explains, “We see an increase in theft when the price is up. It seems like when the price drops down, they ease off.” Hixson says that they had gone three years, from 2008 to 2011, where a theft was happening anywhere from once a month to almost every week. Then it leveled off and for the last year, it diminished substantially.

Statistics provided by the DOE in their 2010 report, An Updated Assessment of Copper Wire Thefts from Electric Utilities (www.oe.netl.doc.gov/docs/Updated%20Assessment-Copper-Final-101210%20c.pdf) (figure ES-1), shows that metal theft peaked in 2008. “Copper theft appears to have gone down [since then],” says John Ostrich, Infrastructure Systems Analyst for the DOE. In the Assessment, DOE culled media reports nationwide to determine their numbers, but he cautions that the numbers are only as accurate as the media stories themselves. Since their report, he says DOE goes by Energy Assurance Daily, which indicates copper theft has decreased.

But what can co-ops expect in the next few years? Theft rates follow copper prices, which currently fluctuate between $3.00 and $4.00 a pound. While that’s high, NWEPC’s Hixson says, “It’s projected to go even higher. Two years out they’re predicting $6.00 a pound.”

TARGET: MAINLY SUBSTATIONS

Within the electrical systems, substations tend to be the thieves’ target of choice. According to Hixson, “It’s a lot more work for them (thieves) to get the copper out of the poles. (And) in substations they go for the larger, above-ground copper wire.”

McDowell adds that with poles “they’re only getting the small # 6 copper wire, four or five feet of it, probably. And our spans are long enough that they’ve got to do a lot of hiking to get to those. In our substations they can get much, much more in a much shorter period of time.” It’s mostly the ground wire, he says. “They will cut those in two to three foot sections, just cut them with bolt cutters. We’ve got to go back in and dig down into the gravel and weld wire back on.” That adds up to about a full day’s labor for three or four workmen.

Georgia Transmission (GTC) reps also find that the problem is more prevalent in the substations than in the poles. GTC Investigator Lee Swann says that’s one reason most of their security is installed at substations, but safety also plays a role in this decision. “If there’s a choice between a substation security preventive measure and a transmission structure, we will most likely continue to go with a substation due to the higher risk of injury to one of our employees in a substation environment,” says Swann. “As far as I am aware, in
Georgia no one uses any deterrent measures for distribution pole grounds."

Steven Hinds, System Control Coordinator of Hoosier Energy Rural Electric, a G&T in Southern Indiana, says in the mid 2000s their problems with copper theft had increased, but in recent years Hoosier has been successful in deterring it. Hinds says "We were experiencing more and more copper theft in our primary stations, and also in our distribution substations, they were stealing grounds off of anything from transformers and regulators to the structure grounds, and also in our microwave tower sites."

CAMERAS AND LASER SENSORS
Co-op representatives say they are turning to numerous strategies to counteract theft, some of which involve laser sensors and cameras.

NWEPC has used laser sensors from Optex (www.optexamerica.com/levelsecurity.aspx?11=1). "These devices consist of two parallel laser beams arranged vertically and separated by several inches, McDowell explains. "Both beams have to be broken to produce an alarm. When installed several feet off the ground it takes a large object, such as a person, to break both beams simultaneously. This eliminates most nuisance alarms. Since installing them in several substations we have had very few false alarms and they seem to be reliable at transmitting an alarm when people are in the station."

The downside to laser sensors is the price. As NWEPC’s Hixson explains, “you can spend up to $5,000 in substations very quickly just to try and catch copper thieves.”

For that reason, NWEPC started by using game cameras in their substations, which are a lot cheaper. The game cameras are typically used for deer hunting and can cost about three or four hundred dollars, explains McDowell. “At one of our stations I got some pictures of a guy stealing copper and that led to the arrest. The camera was mounted inside the substation pointing at a leg that had copper ground wire on it. It's motion activated so that when the guy got in there and started cutting, it automatically comes on and takes some small short video clips."

McDowell explains “The reason I'm using the game camera instead of something more sophisticated is [because] a lot of our stations are rural in nature and we simply don’t have broadband communication so I can’t bring the video camera in and watch from a remote location.” He adds, “The game cameras we’ve used can record video or still pictures depending on how you set them up. They store the video or pictures on SD (‘Secure Digital’) memory cards so the capacity depends on the size of the card you use.” For example, he says a 4Gb card has enough room for a couple thousand pictures. But the disadvantage of these cameras is that they don’t sound an alarm at the time of the theft. “It may be two or three weeks before our station checkers
get to the station and realize that there’s been a theft, and then we have to go back and review the camera to see when the individual was in there.” Also, sometimes the thieves see the camera and just take it.

Hoosier Energy went so far as to design their own security system, buying parts from different companies. Hinds says that around 2008 they started using game cameras at the distribution substations, and those were effective. “When we found out that we could catch people with those, we designed a better system.” They used cameras that had motion sensing in them, and then added a few bells and whistles. “When the motion would catch them, it would turn on a strobe light that starts going off real bright, and a siren, and it also has a recorded message saying, ‘you’re on private property, the police have been called…’ and then the camera would start filming. After that went off we never saw anybody. That really stopped a lot of our problems that we had.” He adds, “At our primaries and our microwave sites we have network connections there that could get back to Hoosier, so we could actually see the video real time, and it would set off an alarm in our control center. Right now we’re in the process of installing it at our distribution subs.”

“If a motion sensitive camera is triggered at a Hoosier distribution substation, it sends an alarm to our system control center and we can call up the camera,” says Hinds. The camera doesn’t stream images constantly “because it eats up too much air time. The video servers also have a thumb drive, flash drive that that can record these video clips.”

**NEW WIRE TRICKS**

Recently some co-ops have turned to replacing the kind of wire they use. “We’re putting some signs up in the stations that say we’ve replaced the grounding with Copper Coated Steel (CCS),” says McDowell. “When they (thieves) take it to try and sell it to the scrap dealer, hopefully, if they haven’t noticed by then that it’s not pure copper, the scrap dealers will and they won’t give them any money for it. It’s not an immediate fix; it’s more of a long term fix.” Also, “it is more difficult to cut than copper, so they may have more difficulty with it.” GTC’s Swann says that on transmission lines they tend to use CCS wire. But, he explains, “Even though we use the CCS wire, most people are slow learners.” Plus the replacement cost of a stolen transmission structure ground is the same whether the wire is CCS or copper wire.

Swann says in 2010 they started using a product developed by Southwire called *Proof Positive Copper* (PPC) as a replacement for stolen copper. It has been effective in deterring theft and has also proven useful in theft prosecution, he adds.

According to Charles Holcombe, Senior Project Development Engineer for Southwire, with PPC, they replace a center inside strand with a silver-colored, tin coated copper strand. They also replace a tin coated copper strand on an outside strand (a ‘candy stripe’), to identify it as PPC. The center strand is laser printed with...
three codes and those codes are repeated on every twelve inches of wire. The codes include:

1. **The license code.** Consisting of characters and letters, this code is used by Southwire. It is a constant throughout the wire and is part of the traceable code. Southwire records the license code at the time of purchase, along with the name of the company that bought the product.

2. **The serial code.** Consisting of numbers only, the serial number changes over the length of the wire so that every foot of the cable is uniquely identifiable from the next. Southwire records the serial code at the time of purchase, along with the name of the company that bought the product.

3. **The URL www.2IDCU.com.** It's a 'track-your-copper website,' explains Holcombe. It redirects to a website off of the home site.

GTC's Swann says “The bonus is that when you go to the website and the proof positive proper page, you put in the company code and the serial number. It will tell you who owns that wire. That can be solid evidence for later prosecution for theft. With PPC you can positively state, 'yes that is my wire.' Since they've implemented its use, he says GTC has been successful in three copper theft prosecutions and they have two other cases pending which involve PPC. Perhaps one of the biggest compliments to the product says Swann, involved one particular situation in the courtroom. “After explaining the wire identity process of the PPC wire, the serial number and so forth to the defense attorney representing the suspected thief, the attorney said ‘Well, we have no defense on this, this is an indefensible position.’ Her defendant went ahead and pled out, and was sentenced to five years.”

**WORKING WITH LAW ENFORCEMENT**

Most co-op representatives say that seeking additional help from law enforcement or hiring more security guards is simply not an option. McDowell says they couldn’t justify the expense with 140 substations.
“Now if we have an area where we’re getting hit more often, we’ll talk to the local county sheriff’s office and ask them to have their patrolmen run by it more often, but that’s about all we can do.” Hinds says there is a security department at Hoosier’s headquarters which monitors several sites. “There are two subs that are real close and they will go patrol those because they are within a mile of headquarters. When we have construction at substations we do hire private security firms that come out at night and watch the material,” but otherwise they don’t employ extra security.

Hixson says in Missouri all co-ops are getting ready to enter a program where they will put signs up on substations with an 800 number to call offering a $1000 financial reward to anyone who can offer information on a copper theft. “We’re collectively coming together to try and put a common face out there saying we’re not tolerating it anymore.”

As for wire methods like PPC and CCS, which are helping some co-ops slow down copper theft incidents, law enforcement officials say that these measures are not always successful. Sergeant Mike McGinty of Houston’s metal theft unit, which frequently deals with CenterPoint Energy as a theft victim, says that while copper clad wire is impressive few law enforcement departments have anything to do with scrap yards. The wire may be identifiable, but someone has to actually identify it and take action.

McGinty says that the other problem facing law enforcement is scrap yard competition.

There are about 115 scrap yards in Houston. He says that “if someone brings in some wire (that’s questionable), the thought is, ‘If I don’t sell it, they will just go down the street and sell it to the next guy.’” Also, many of the areas can be rural and law enforcement officials there aren’t aware of the updated laws on copper theft.

Lieutenant Rick Rivas of the Dallas police department’s metal theft unit, which inspects the registered scrap yards in Dallas, says some of the utilities there have taken preventive measures where they started covering their metal wires with identifiers. Insulated wire has a rubber or plastic sealant about an inch thick and it’s stamped with the utility company’s name whether it is Oncor, Time Warner, etc. But thieves simply burn off the sealant and sell the wire. “99.9% of the time they’re trying to cover it up because they’ve burnt that rubber sealant from it.” Texas has now addressed the problem legislatively, he says, and as of September 1st, 2011, scrap yard dealers throughout the state of Texas are no longer allowed to buy burnt copper wire.

There are other agencies working with law enforcement to eliminate theft, such as the Institute of Scrap Recycling Industries Incorporated (ISRI), a Washington, D.C. based trade association, which represents more than 1,600 for-profit recycling companies. Gary Bush, ISRI’s Law Enforcement liaison and Director of Material theft prevention, says until recently, the majority of law enforcement agencies around the country really didn’t track metal theft because it is a ‘property’ crime, which generally takes a
back seat to major crime. As far as crime statistics, metal theft is usually lumped in with other property crimes like auto thefts or a burglary. Now some of these law enforcement agencies are actually tracking these types of crimes separately.

Bush is in charge of ScrapTheftAlert.com, an alert system established by ISRI. Anyone can register for no charge on the website and businesses trying to prevent theft are encouraged to join, says Bush. A registered law enforcement officer investigating any kind of metal theft from a power substation or utility can actually enter the information in the system and once their report is approved, it’s broadcast to every registered law enforcement officer, recycler and other stakeholder within a hundred mile radius of the location of the theft.

The radius can be expanded, he adds. And an alert can be accompanied with up to four photographs. There’s a section on there where they can mark whether it’s copper, iron or whatever...plastic, paper. Additionally, they can even do a ‘suspicious activity’ alert. “If a recycler got in something questionable, for example, a bronze statue of a dolphin, he can issue an alert asking if anybody is missing something like that.”

Currently there are about 13,244 registered ScrapAlert users in the U.S. and Canada, including recyclers, law enforcement officers, power companies, utilities, railroads, and construction companies. (Georgia Transmission is on the list, Bush adds.) The system was implemented in December, 2008. As of March 1st, 2012, roughly 7080 total theft alerts, almost all of them metal, have been reported in the U.S. and Canada. About 3990 of those alerts have been for copper and/or brass, says Bush.

There is no easy solution to the problems imposed by metal theft. And generally, more sophisticated efforts to offset theft means more cost and upkeep. According to Security and Theft Preventions for Electric Cooperatives, a report prepared for CRN and NRECA in June, 2011, “as the size of a security system and the complexity of the underlying technology increase, the effort required to properly implement, maintain and manage such a system also increases.” The report discusses cost-effective approaches to security (see www.cooperative.com/about/NRECA/CRN/Results/Documents/SecurityandTheftPreventionTechnologies.pdf).

As DOE’s Ostrich says, it’s up to each co-op to decide the best strategy, and perhaps use “a multi-layered approach.” The best method for everyone involved is prevention, he says.

“It doesn’t help me if I’m the owner of a co-op and we’ve caught the person after the fact. I still have to fix the wires that were ripped out. And how often do you actually prosecute somebody, put them in jail?”

Hoosier Energy’s Hinds sums it up nicely. “Our goal was, if we caught them, fine, but mainly what we wanted to do was deter them. Certainly from a financial standpoint, that’s the most cost effective method.”
Damage Done

After being subjected to copper theft, a substation can become a hazardous environment. If the grounds on oil-filled equipment are cut, the situation is particularly hazardous.

Assuming no one is injured during the robbery—and no equipment suffers serious damage—the break-in still generates costs beyond the simple replacement of the copper. For instance, if thieves cut the fence to get in, it must be repaired. Because of the danger posed by lack of grounding, it is not uncommon to take a substation offline so that repairs can be made. This means some customers may experience an outage if backfeed capability from other substations is not available. Alternatively, a mobile substation may be used, but there is a cost (in manpower and time) to move and setup the mobile substation.

To maintain safety, minimize damage to equipment, and speed repairs, cooperatives may want to consider developing a comprehensive “After Copper Theft” inspection procedure.

Although utilities focus their security on substations, theft from poles and other equipment does occur. Copper thieves have been known to attach a rope or chain to distribution pole grounds, with the other end secured to an all terrain vehicle (ATV). Once attached, they drive away from the pole, ripping down the ground wire. Often times installed pole top equipment (transformers or capacitor bushings) are damaged due to the pulling of the wire.

See Also...

*Federal Copper Theft Law Proposed*, ECT.coop, August 14, 2012

*Co-op Aids Copper Theft Sting*, ETC.coop, August 7, 2012
[www.ect.coop/industry/crime/co-op-aids-copper-theft-sting/46963](http://www.ect.coop/industry/crime/co-op-aids-copper-theft-sting/46963)

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