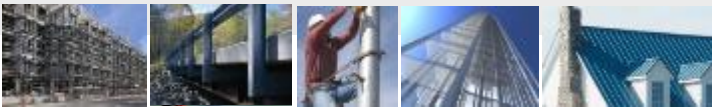


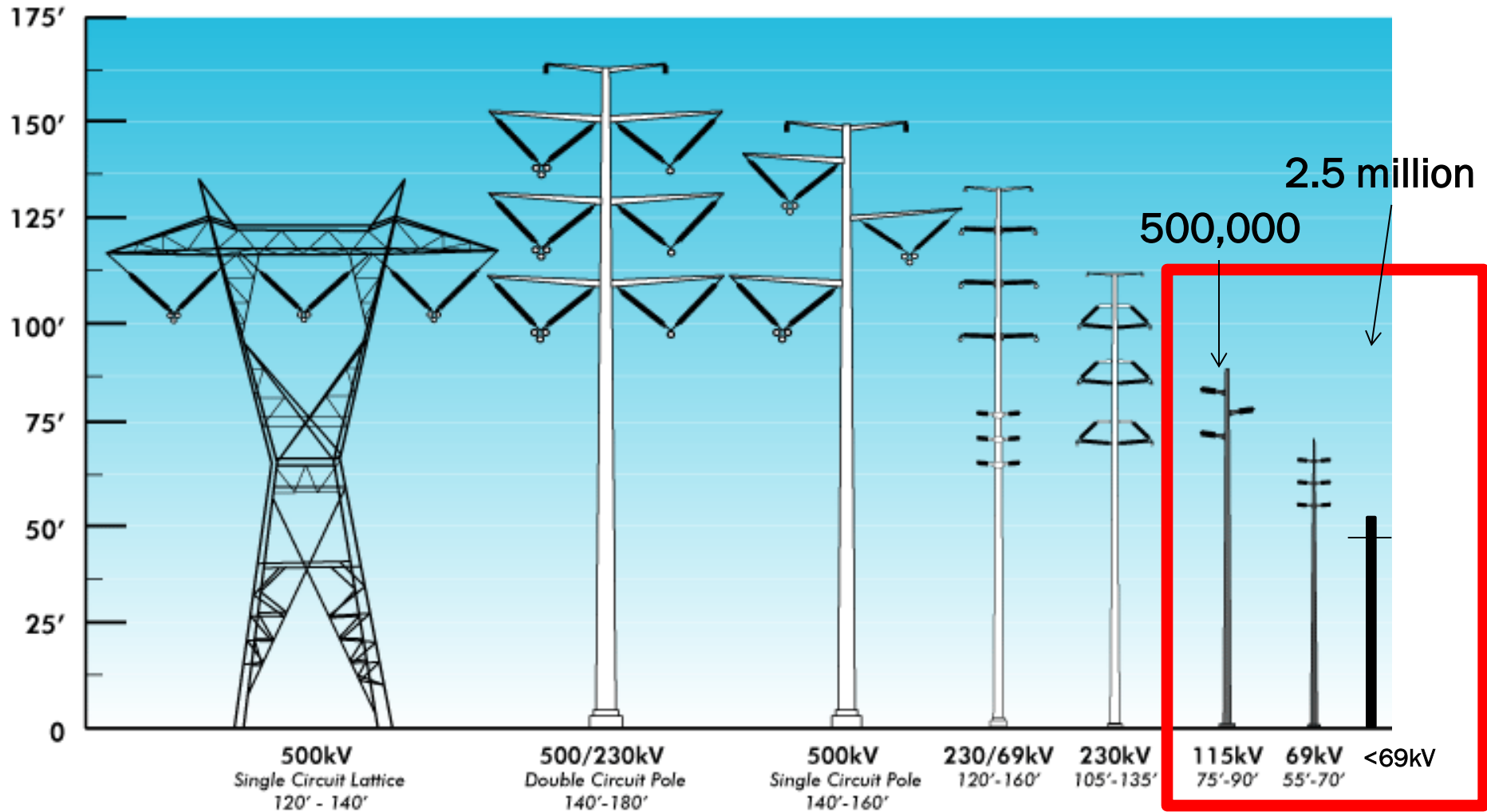
Utility Pole Overview

Dan Snyder, Director of Business Development
dsnyder@steel.org / 301-367-6179





Market



Market

Number of Poles



120 mil. poles
2-3 mil. replaced/year
1.2 mil. Total potential tons



185 mil. poles
4-5 mil. replaced/year
2.0 mil. Total potential tons

Market Share:

- 90% treated wood
- 10% steel, concrete, composite

Steel:

- Over 600 electric utility companies are using steel distribution poles
- An estimated 2 million steel distribution poles have been installed since 2000

Steel Utility Pole Manufacturing Process:

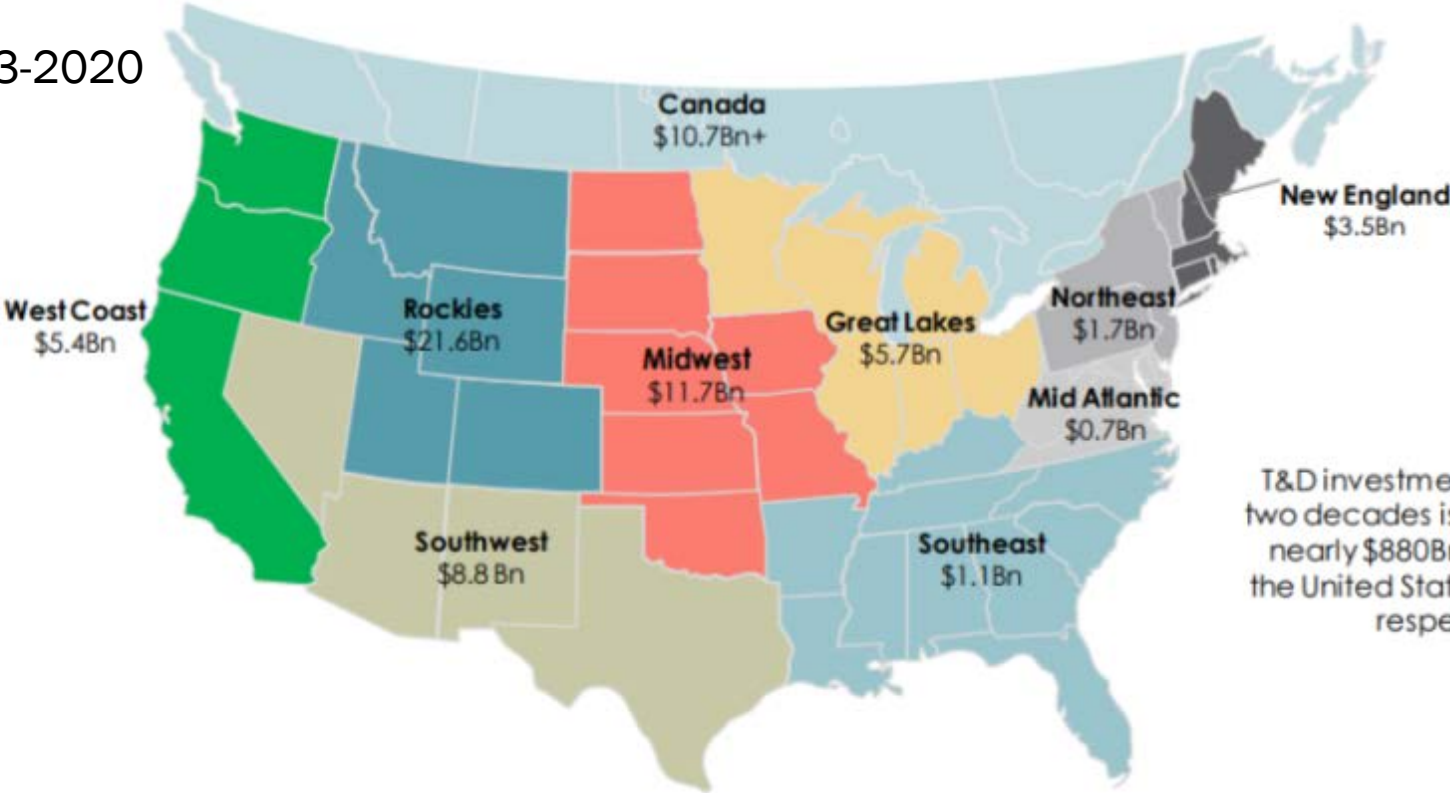
- Hot-Rolled Sheet
- ASTM A570, A572, A607, A715
- Typically made from 11 gauge steel (.1196-.2092")
- 40-50' average length
- Base diameter 7.5-13"
- Top diameter 4-7"
- 5 mils Galvanized Coating (minimum average)
- Polyurethane coating



Market

Exhibit 3
Regional Spending Outlook

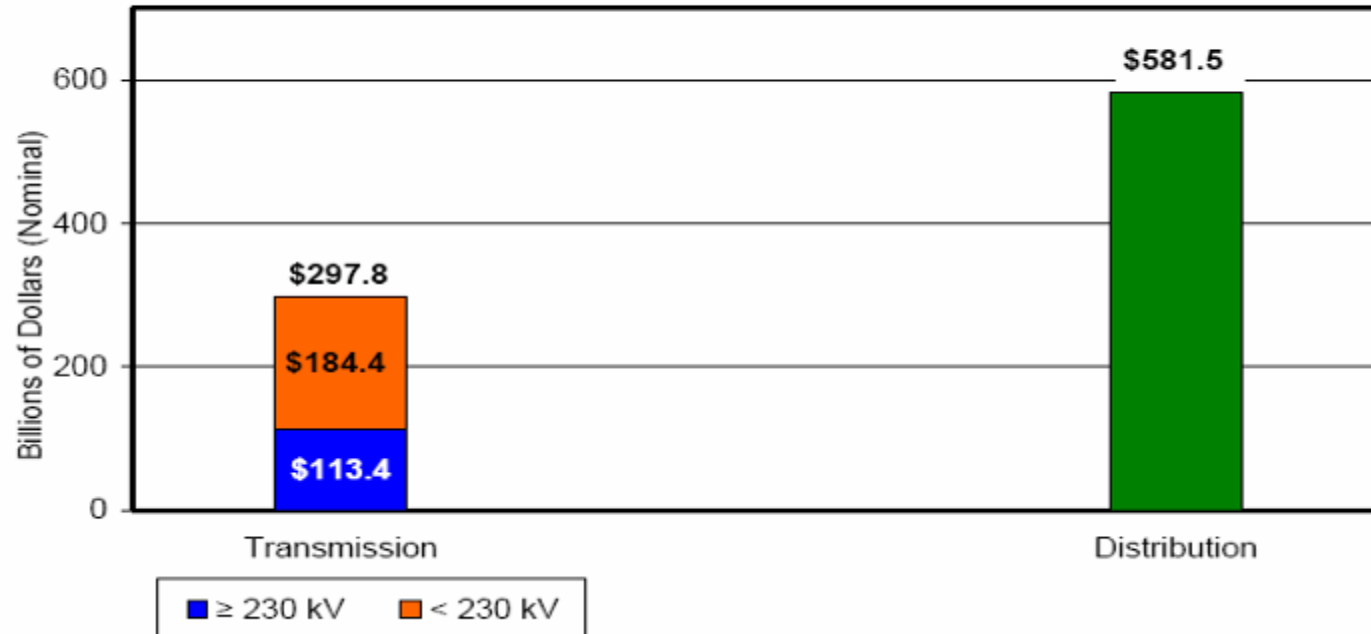
2013-2020



T&D investment over the next two decades is projected to be nearly \$880Bn and \$100Bn in the United States and Canada, respectively.

Utility Pole Market

**Transmission and Distribution Investment Including Smart Grid
(2010-2030)**



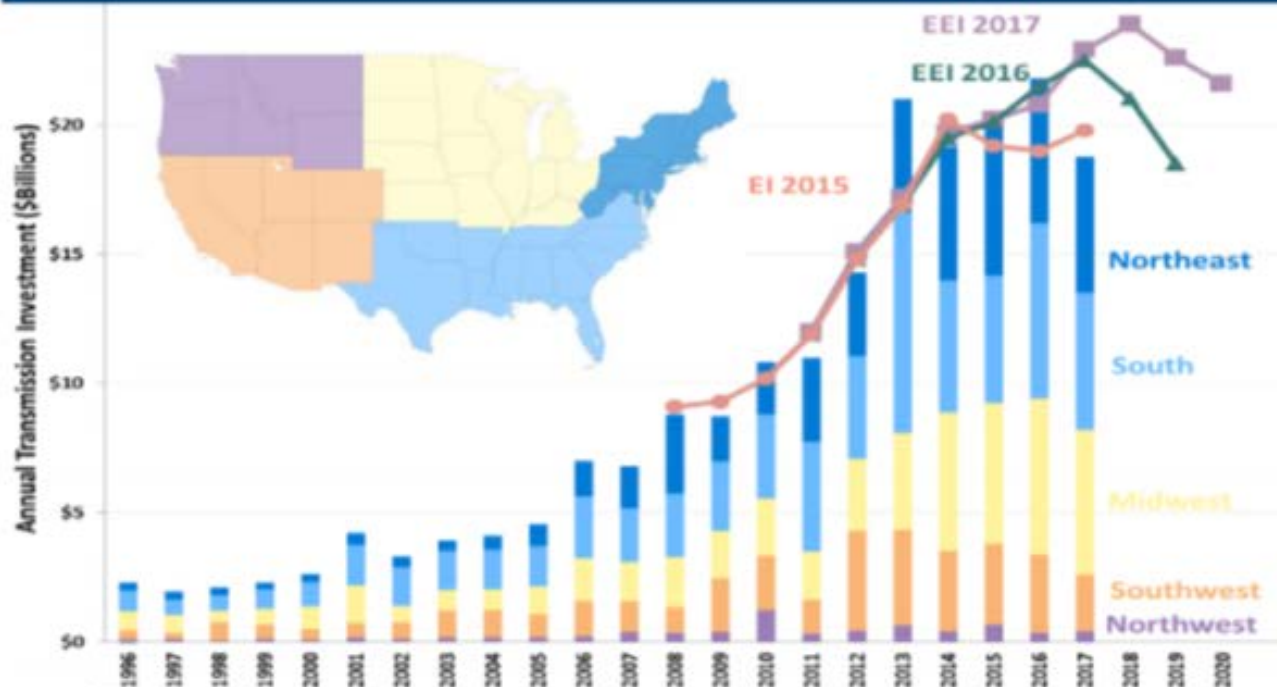
* The Brattle Group

Utility Pole Market

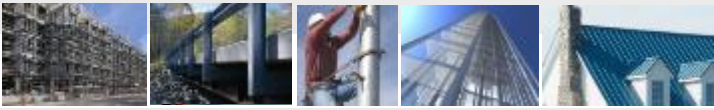
U.S. transmission investments have stabilized at approx. \$20 billion/year in the last five years, after rising steadily from \$2 billion/year in 1990s

Historical and Projected U.S. Transmission Investments

(FERC-Jurisdictional Entities Only)



* The Brattle Group

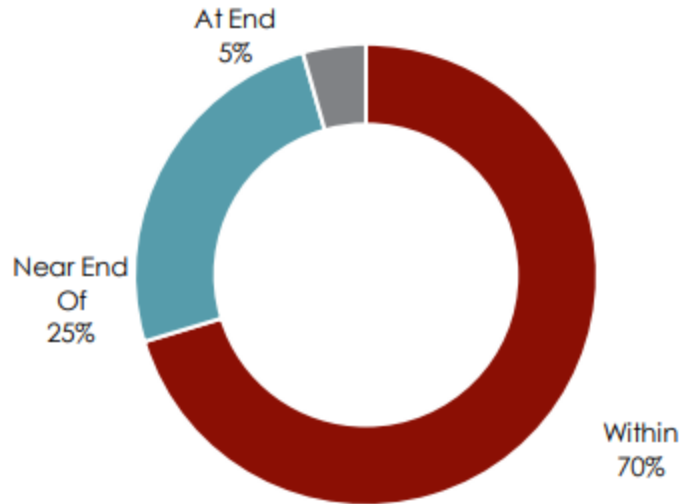


Market

Current Infrastructure Age Relative to Useful Life

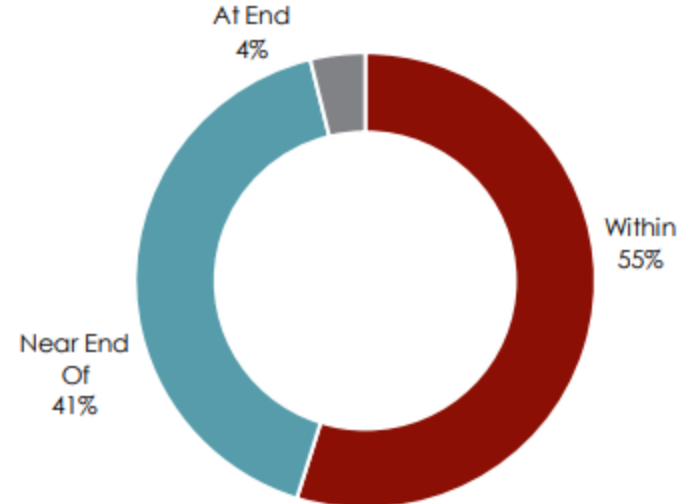
Transmission Infrastructure

(as a % of total)

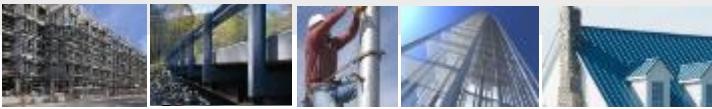


Distribution Infrastructure

(as a % of total)

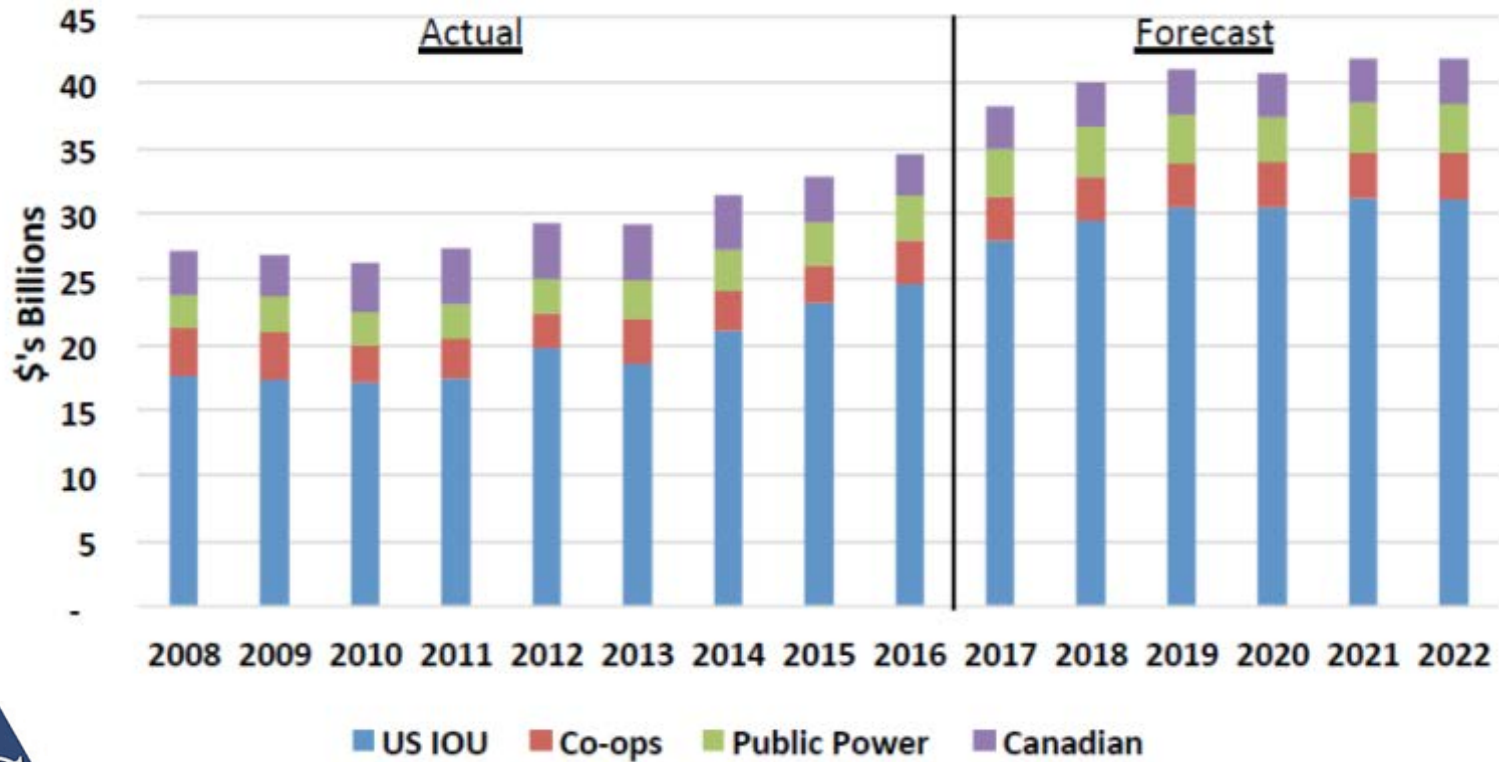


*60% of distribution poles are 30-50 years old

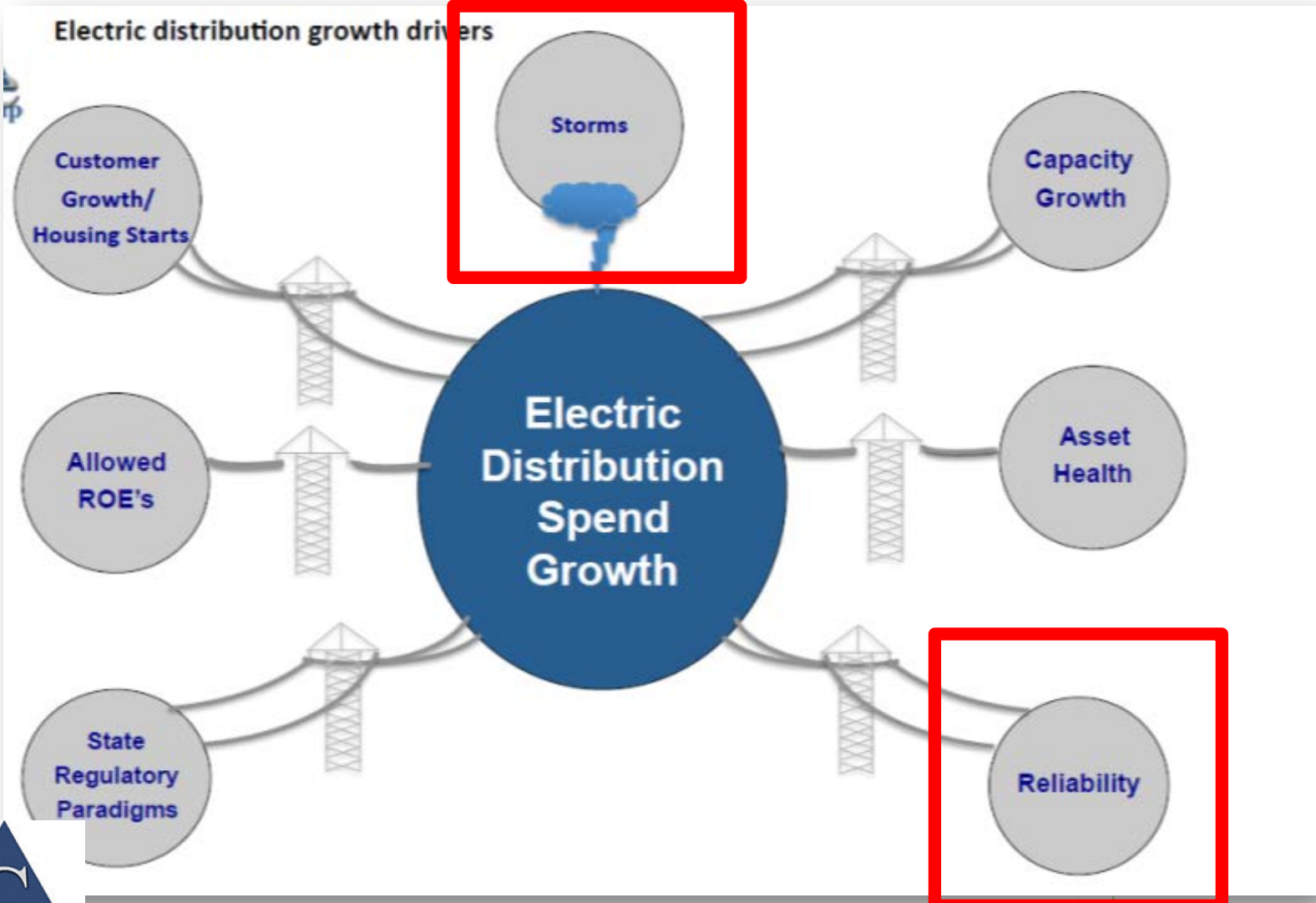
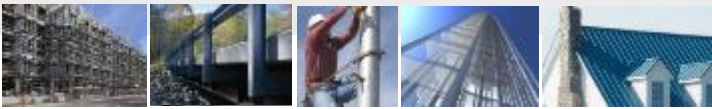


Market

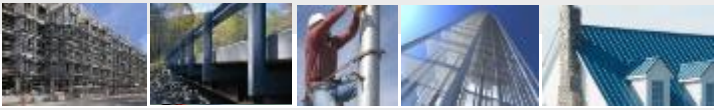
**U.S. and Canadian Electric Distribution CapEx
by Ownership Type**
September 2017 C Three Group Confidential



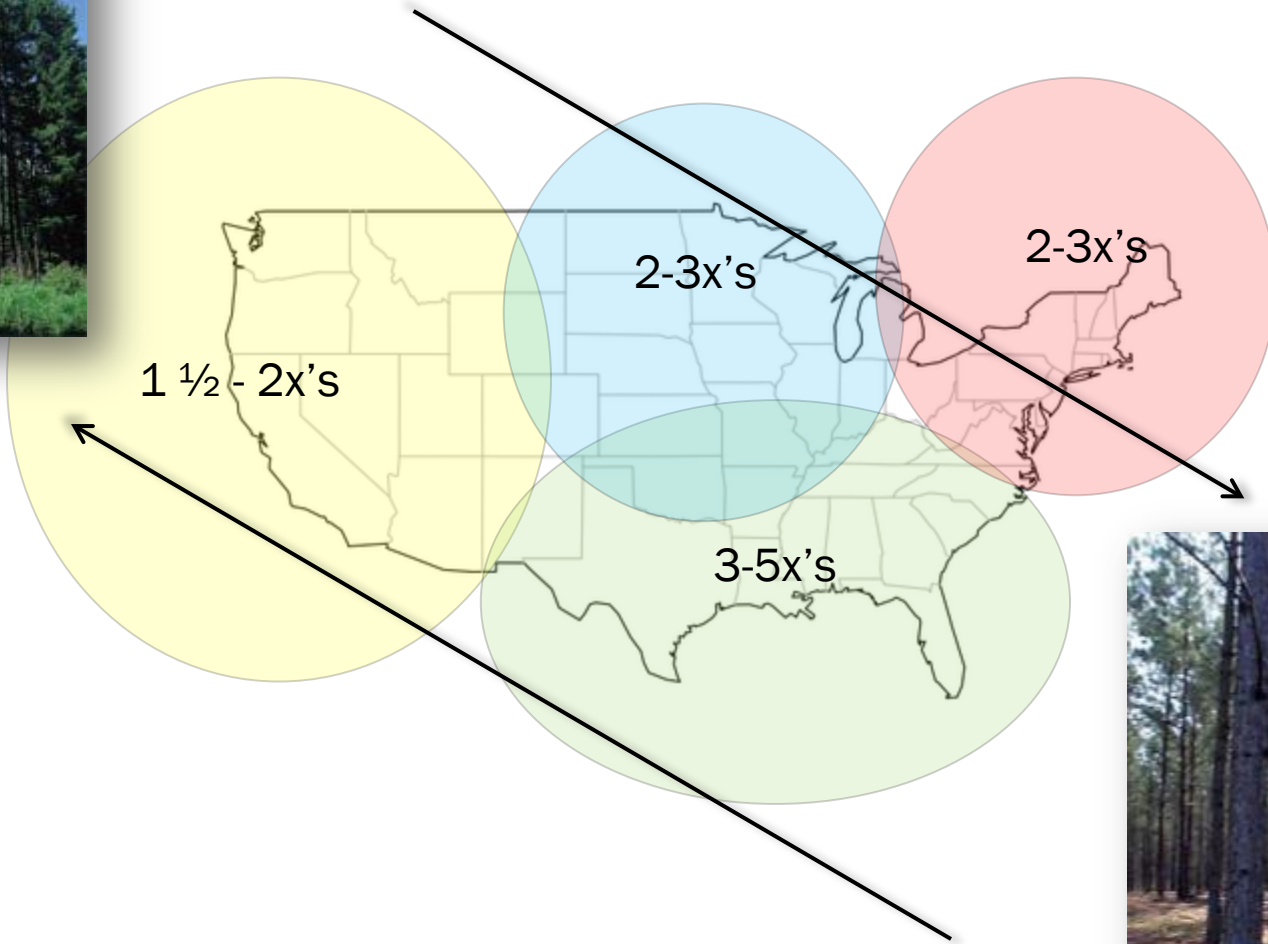
Market



Marketing



Douglas Fir



Southern Yellow Pine



* Some cedar and "other" pine also used

SMDI Steel Utility Pole Task Group - Established 1998

Objective:

Promote the increased use of steel utility poles (wood conversion) in North America.

Investment:

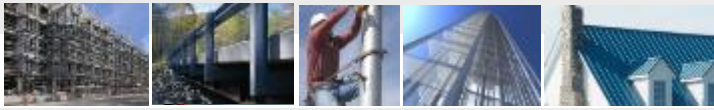
SMDI & Partners have invested approximately \$2 million.

Partners:

20+ partners including fabricators, producers, coaters, educators, etc.

** Past Chairman - Keith Lindemulder, Nucor Corporation*

Successes



Environmental



Owner Conversions

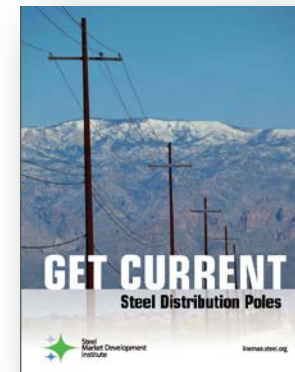


Training & Education

3500 Trained

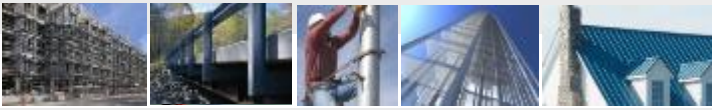


Marketing/Research



Steel Market Development Institute

Environmental



1.5 million poles (40%) with pentachlorophenol
(other 60% are Chromated Copper Arsenate or Creosote)



95% of pentachlorophenol consumption in the U.S. is utility poles



The Environmental Protection Agency (EPA) assigned a **cancer risk 3.4 million times higher** than acceptable for people that apply penta to poles in the field

Environmental



United Nations Environment Program (UNEP), through its Conference of Parties (COP), added pentachlorophenol to Annex A (2015)

94 countries voted in favor of global ban



Potential to add 450,000 tons of steel per year



The U.S. is not a signatory to the Stockholm Convention

Environmental

Schumer to National Grid: Stop installing toxin-infused utility poles



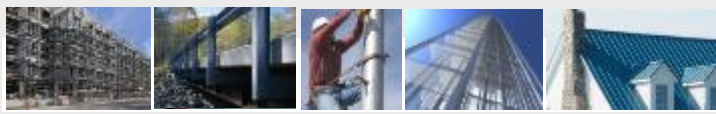
Fife three-year-old 'burned' by creosote telephone pole



- Less time on engineering details
- More time on “user” experience & operations



Training & Education



Lineman Retiring *

- 49 Average Age
- Up to 60% expected to retire in near future
- Utility human resources executives overwhelmingly listed the aging work force as their number one concern



Employment projections data for line installers and repairers, 2012-22

Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22	
				Percent	Numeric
Line installers and repairers	49-9050	249,400	267,700	7	18,300
Electrical power-line installers and repairers	49-9051	114,500	124,700	9	10,200
Telecommunications line installers and repairers	49-9052	134,900	143,000	6	8,100

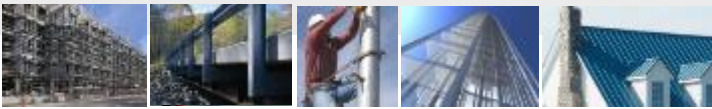
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

* International Brotherhood of Electrical Workers

www.smdisteel.org



Training



Workshops/Rodeos

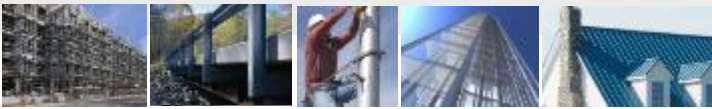


Student Linemen



Journeyman Linemen





Owners



Economics

Lighter Weight



Longer-Spans



Reduced Copper Grounding



Less Maintenance



Marketing

Reliability

Woodpecker



Cascading Effect



Fire



Car Strikes



Remote Locations



Ice



Reliability

...and BEARS!

Attached is a picture of a pole that has been scraped up by a bear. This actually wasn't on our system, but this is what a pole looks like after a bear decides to have its way with it. And we have several poles each year that look like this and need to be replaced.

Enjoy.

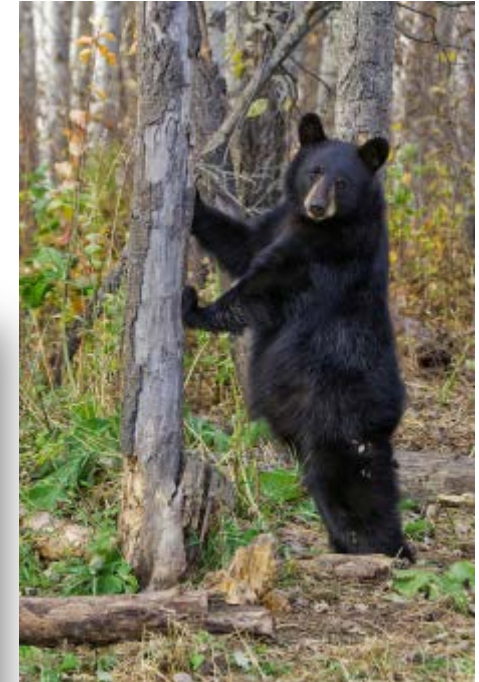
Wesley Repke

Electric & Gas System Engineer

Presque Isle Electric & Gas Co-Op

Office: (989) 733-8515 x887

E-mail: wrepke@pieg.com



Marketing

Woodpeckers Wreak Havoc On Gladstone Branch Poles: NJ Transit

NJ Transit is replacing the overhead wire poles along the Gladstone Branch with resilient steel poles between Gladstone and New Providence.

By Alexis Terenzi, Patch Staff | Feb 27, 2019 1:17 pm ET | Updated Feb 27, 2019 4:16 pm ET

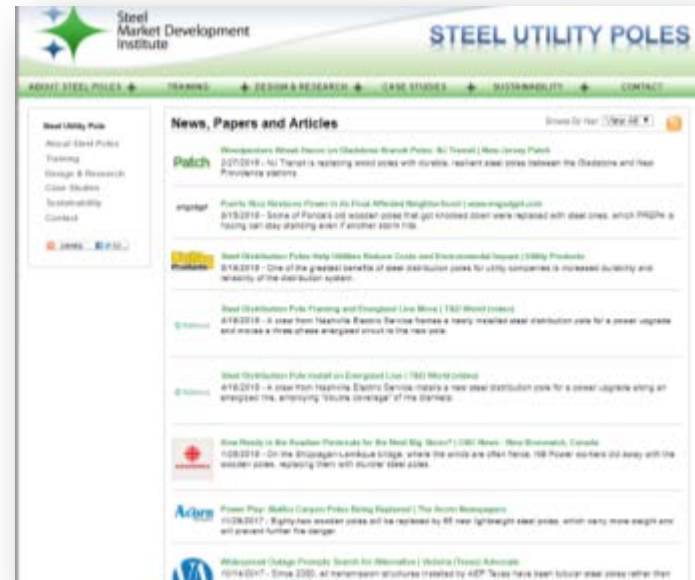
Like 30 Share



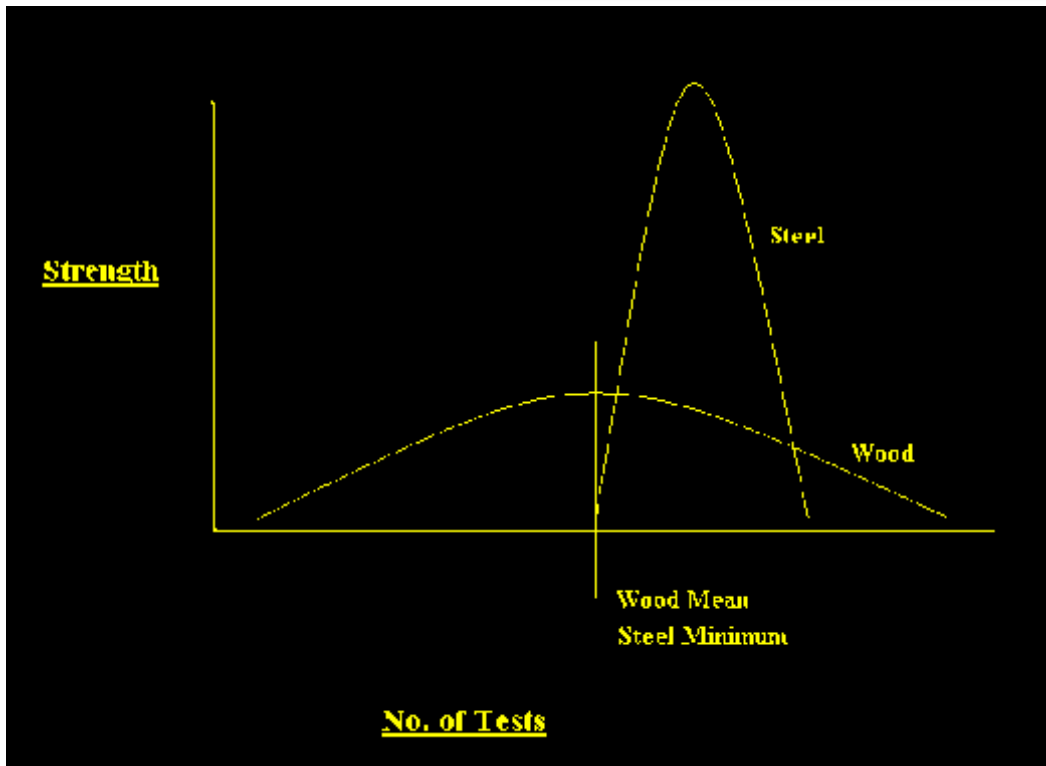
SDG&E Wins Edison Electric Award for Wildfire Preparedness Efforts

POSTED BY TONI MCALLISTER ON JUNE 6, 2018 IN BUSINESS | 195 VIEWS | 0 COMMENTS | LEAVE A COMMENT

In high fire-risk areas, SDG&E replaced wood power poles with taller steel poles to improve fire resiliency. Workers also installed thicker power lines with increased spacing to avoid catching debris, as well as safety systems to halt power when falling lines are at risk of igniting material.



Engineered Product



Wood poles are designed to meet average mean strengths while steel is designed to meet minimum strengths

Sustainability



What's That Smell from New Utility Poles?

Some Seattle City Light customers have noticed a strange odor coming from recently replaced wood utility poles in their neighborhoods. The source of the odor is the pole treatment compound Seattle City Light uses to protect against insects and decay and extend the useful life of the pole.

This treatment uses carrier oils (typically diesel fuel) to carry preservative chemicals into the wood



Marketing

ELECTRIC UTILITY OPERATIONS

Steel Poles Harden Distribution System

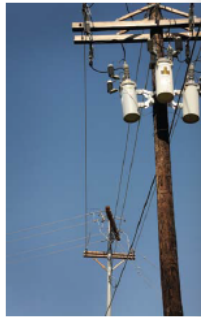
Bluebonnet Electric Cooperative crews inst steel poles to protect system against extre environmental conditions.

By Thomas Ellis, Shawn Ely and David Tobola, Bluebonnet Electric Cooperative

Hurricane-force winds and frequent thunderstorms sometimes topple wood poles in Bluebonnet Electric Cooperative's service territory. When severe storms rage through the region, the environmental conditions often exceed the design specifications of Bluebonnet's electrical distribution system. When this occurs, the probability of poles falling increases significantly. In fact, in some cases, linemen have to replace multiple wood poles that have fallen in succession following a storm.

The non-profit rural utility is one of the largest power distribution cooperatives in Texas with more than 11,000 miles of power lines, more than 200,000 poles and 60,000 meters stretched across more than 3,800 sq miles in central and southeastern Texas. For the past 72 years, linemen have predominantly installed wood poles along the utility's vast network. Unfortunately, in areas of heavy woodpole activity, some of these poles have lasted less than five years.

The utility knew it had to look to alternative pole materials to gain longevity, durability and economic value. As a result, the company began using steel poles to address areas where the company was experiencing structural damage due to woodpole activity. Since that time, the company has expanded their use of steel to include structures that require extensive labor hours to replace such as difficult-to-access areas such as river crossings or primary river poles.



Linemen usually have to replace wood poles every 30 to 40 years because of high wood-pole activity, which means replacing them every five years. For that reason, Bluebonnet is turning to steel poles in hard-to-access areas.

Steel Poles Take Leading Role on Discovery Channel's "Dirty Jobs"

Wyoming's Carbon Power and Light Director of Operations David Cutbirth and crew were featured on the Discovery Channel's popular "Dirty Jobs" program. Steel distribution poles played a leading role.

The episode is a part of the show's series that focused on various types of work, highlighting a different vocation in every state in the U.S.

According to Cutbirth, the Discovery Channel contacted the Wyoming Rural Electric Association in search of a good place in Wyoming to work with utility linemen. Carbon Power and Light was selected for the shoot.

"We gave them two different scenarios," says Cutbirth. "The first one was cutting down trees to clear our right of way. Our forests are being managed by bears kill right now and we're very concerned with a dead tree going down and starting a forest fire. But they didn't like that idea."

"The second idea was to switch out a wood distribution pole and replace it with a steel one. We outlined that we were going into a remote location, decommissioning the line, changing the pole out from wood to steel, and then reenergizing the line. And this is what we went with."

Cutbirth notes that the filming of the steel pole installation made what is typically a quick job into a very long one. "Normally it would take two to three hours to switch out the pole but for the filming it was a 10-hour job."

In the winter of 2009 an ice storm had split the wood pole and the pole had to be replaced. Cutbirth's crew was able to cut the top of the wood pole off in the middle of winter but had to wait until summer to take the pole out.

"We normally use a bucket but we couldn't get to this location with the bucket truck so we had to use the steps for this situation," says the veteran lineman. "This created a perfect 'Dirty Jobs' scenario."

Cutbirth notes that although the "Dirty Jobs" show is about "dirty" work, he says that working as a lineman shouldn't be

perceived as dirty work but instead a challenging profession. He adds that steel has helped make it cleaner rather than dirtier work.



Carbon Power and Light's David Cutbirth and crew were featured on the Discovery Channel's "Dirty Jobs" program.

"In my experience work isn't dirty - it's just a job. It's usually it would take two to three hours to switch out the pole but for the filming it was a 10-hour job. 'Dirty Jobs' crew was very professional. I really appreciate it. I hope they continue to cover our industry and the value of key industrial workers in the poles."



Lining Up With Steel

Tucson Electric Power evaluates the benefits of switching from wood to steel distribution poles.

By Roger Hall and Ron Runyon, Tucson Electric Power

While Tucson Electric Power has been providing power to the same community for more than a century, its employees are always on the front line for new techniques or technologies that might improve service for customers. In recent years, this commitment to quality and innovation has led the utility to begin upgrading its local distribution system with steel poles. While the initial cost of these poles remains higher than compareable wood poles, steel poles are recognized as providing good reliability and excellent long-term value.

Backed in 2002 and a principal subsidiary of Unionwear Energy Group, Tucson Electric Power has more than 2500 MW of generating capacity and relies on more than 5000 miles (13,800 km) of transmission and distribution lines in more than three 200,000 customers in southern Arizona.

Comparing Pole Materials
Like most utilities, Tucson Electric Power has historically used wood poles for its distribution system. Most of its 120,000 distribution poles are wood, but the utility has been using steel poles for higher voltage transmission since the late 1970s. More recently, the utility evaluated the benefits of switching to steel distribution poles from Valmont Industries for the 700 to 1000 steel distribution poles to replace each year through current maintenance.

Tucson Electric Power set up a team to study several issues to deeply to develop a clear understanding of how wood poles compare to the more modern steel ones. The team included employees from engineering, construction, maintenance, environmental, safety and purchasing.

CONNECTIONS STEELING FOR POLES

In about 10 years, Middle Tennessee Electric Membership Corporation in Murfreesboro, Tenn., has taken a flexible approach in replacing poles—choosing steel in certain situations instead of wood.

Necessities arose as poles requiring maintenance wanted to replace an asset called for steel," explains Dave Balfanz, the co-opt electrical engineer. "We use steel poles when we know they will be reliable."

Balfanz indicates a pole in a remote spot can prove costly to install and maintain. The co-op also notes areas where the work must be performed quickly because of outage restrictions related to hot or cold climates.

"We place steel poles in these locations," Balfanz says, "because they are easier to maintain, lighter, and can last for 30 to 40 years, compared to 20 years for a wood pole, when deciding which one to choose. Calculations factor in labor and material prices."

To take to replace a pole is more than the difference between the material cost of a steel pole versus a wood pole or if the installation is labor intensive, then we generally go with steel," Balfanz concludes.

Currently, the co-op's distribution system consists of more than 113,000 wood poles, almost 2,000 miles of line, and about 10,000 steel poles.

Contact: Dave Balfanz, American Iron and Steel Institute, 200 451-7400, email: dg@aisi.org or Dave Balfanz, Middle Tennessee Electric Membership Corporation, 435-624-1120.

UP TO M BELIEVE WE'LL ALWAYS HAVE BOTH WOOD AND STEEL. [POLES], BUT STEEL OFFERS OUR COOPERATIVE MEMBERS, UNIQUE ADVANTAGES.

ELECTRIC UTILITY OPERATIONS

www.tdheworld.com

Steel Pole Basic Training

CONNECTIONS STEELING FOR POLES

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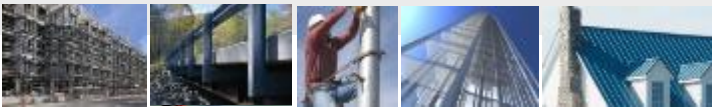
A POWEREDIA Publication August 2009

APS Selects Steel

The deciding factors in pole selection: cost, availability and longevity.

By Duane Oliver, Arizona Public Service Co.

Marketing



AISI's Steel Market Development Institute offers the Steel Distribution Pole Training to provide linemen with important job and safety skills.

Utility Lineman Training with Steel Distribution Poles

AISISteel
Subscribed 147

8,228 views

+ Add to Share More

Night training with steel distribution poles at Southeast Lineman Training Center (SLTC) in Trenton, Georgia.

AISI Steel Pole Training in Trenton, GA (4x3)

AISISteel
Subscribed 147

5,369 views

+ Add to Share More

Hotline School
Nebraska Rural Electric Association (NREA)

Sidney, Nebraska

AISI Sidney Hotline Training

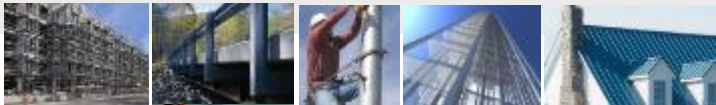
AISISteel
Subscribed 147

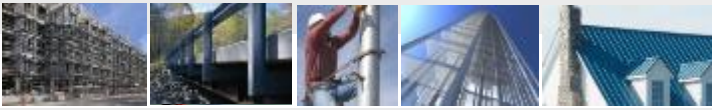
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Marketing






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Steel Market Development Institute


STEEL UTILITY POLES




Reliability & Savings
Steel utility poles increase system reliability and require less labor for installation and maintenance.

ABOUT STEEL POLES | TRAINING | DESIGN & RESEARCH | CASE STUDIES | SUSTAINABILITY | CONTACT

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- Grounding Equivalency of Steel Poles at MSU (1999)
- Placemaking Group (AVISO) Market Research (2000)
- Reliability of Steel Poles in NESC Grade C Construction (2001)
- Steel Utility Pole Corrosions Issues by Seymour Coburn (2001)
- AISI Overhead Distribution BIL Testing at NEETRAC (2002)
- Potential Telecom Market for Steel Distribution Poles (2003)
- Structural Reliability-Based Design of Utility Poles and the National Electrical Safety Code (2005)
- Longevity of Galvanized Steel Utility Poles by Tom Kinsler (2005)
- Steel Distribution Poles in Support of the Disaster Relief Effort by Outside Plan Consulting (2005)
- Revise Rule 094.B.7: Directly embedded steel poles shall constitute an acceptable electrode (2008)
- Pole Conductivity Testing by Gary McDonald (2010)
- Qualification of wood poles as electrical barriers in live work methods by EDM (2011)
- Total Cost of Ownership – proposal (2012)
- Environmental Life Cycle Assessment of Southern Yellow Pine Wood and North American Galvanized Steel Utility Distribution Poles (2013)

Challenges

First Cost



Culture



Resources



Why Now?

- **Every utility has an “issue” – we can “fix” them**
 - ✓ Engineering is no longer a significant “issue” – operations / education is
- **Reliability is of growing importance**
 - ✓ Wind, fire, and ice storms (and woodpeckers/bears) change minds quickly
- **Sustainability is now significant**
 - ✓ United Nations is leading the charge
- **Distribution spending is on the rise**
 - ✓ Transmission spending is on the decline
- **Lineman culture is changing**
 - ✓ “Not a big deal....”
 - ✓ Large turnover in industry (average age near 50)
- **Opportunities exist, need more resources**
 - ✓ Must invest in “people”

Summary



- Low risk market development opportunity with big potential
- Product has inherent strengths & history
- Research/Engineering is done
 - Need strong marketing / educational effort
- Challenge is to offset first cost
- **Shared goals/investment and power of joint effort**