

The American Iron and Steel Institute (AISI) estimates that approximately 185 million utility poles are in service in North America, and most of them are made from wood. When utility poles need to be replaced or a new distribution line set up, utility managers consider factors such as cost and reliability. But increasingly, they are also considering the impact of the material on the environment and reviewing their options.

By **Mark Thimons***

It is a common assumption in the electric utility industry that wood poles are more beneficial to the environment than steel poles, but new scientific data suggests otherwise. The Steel Market Development Institute (SMDI), a business unit of AISI, commissioned a detailed life cycle assessment (LCA) study to compare wood and steel poles in 35 independent category indicators. The study, entitled *Environmental Life Cycle Assessment of Southern Yellow Pine Wood and North American Galvanized Steel Utility Distribution Poles*, was conducted by SCS Global Services, a global leader in third-party environmental and sustainability certification and standards development. It compared the use of treated wood poles and galvanised steel poles over a 40-year timeframe. It applied advanced LCA methods to report the full range of potential environmental impacts associated with both galvanised steel and wood, including local and regional ecological impacts.

The peer-reviewed study focused on 45-foot-tall, Class 2/Grade B distribution poles and included their production, installation, maintenance and disposal or recycling. The wood poles were made from Southern yellow pine grown in the southeastern region of the United States and treated with chromated copper arsenate (CCA). The steel poles were produced using North American hot-rolled steel and were hot-dip galvanised.

Two different scenarios were compared – a Business-As-Usual (BAU) scenario in which wood poles taken out of service continued to be replaced by Class

Steel utility poles versus wood

2 wood poles, and a Steel Pole Replacement (SPR) scenario in which wood poles taken out of service were replaced with galvanised steel poles.

Conducted in compliance with international LCA standards (ISO-14040-series), the study is the most comprehensive environmental assessment of its kind to date, bringing a new level of transparency to the comparative performance of these two material choices.

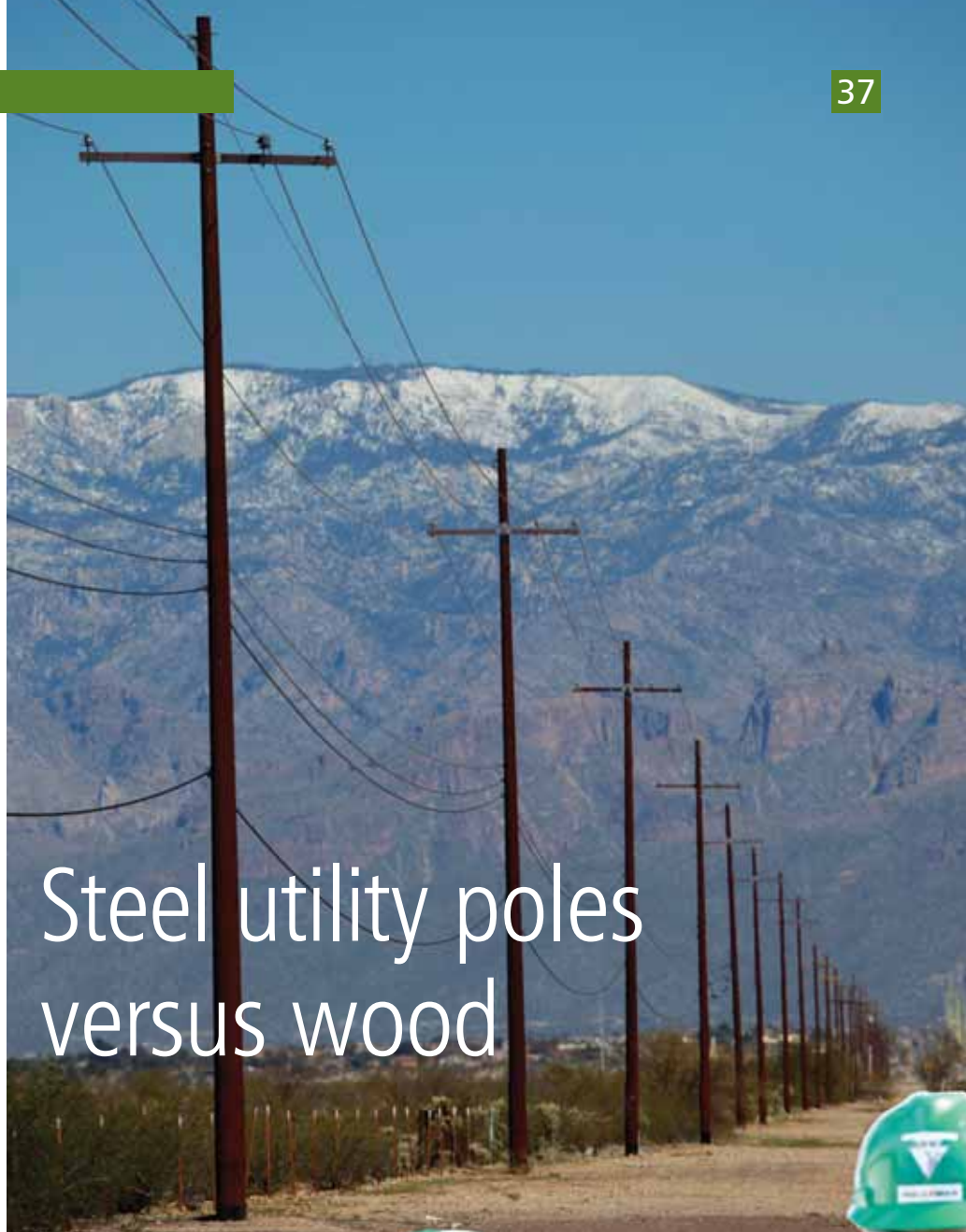
Summary

The study found that, when wood poles are replaced by galvanised steel poles (the Steel Pole Replacement scenario), there are several significant benefits, including:

- **Lower levels of greenhouse gas and aerosol emissions associated with global climate change.** When

* Director, Construction Sustainability,

Steel Market Development Institute, a business unit of the American Iron and Steel Institute



comparing greenhouse gas and aerosol emissions, the researchers considered the entire 40-year time span. They compared the emissions of greenhouse gases and aerosols associated with the CCA-treatment and installation of wood poles and the short-rotation, even-aged forest management practices used in harvesting Southern yellow pine with the emissions from steel poles during hot-rolled coil steel production, galvanisation, zinc smelting and installation. Short-rotation, even-aged forest management practices result in losses of forest carbon storage of between 20% to 30%, equivalent to the loss of 20 to 40 tons of carbon dioxide per acre.

For the steel poles, the largest contributors to global climate change were the production of steel, galvanisation and zinc smelting.

When comparing these two processes over the entire 40-year time span, the accumulated greenhouse gas and aerosol emissions associated with global climate change were lower for the Steel Pole Replacement scenario. This result calls into question the assumption that treated wood products have a lower carbon footprint than steel products.

- **Lower terrestrial biome disturbance to forests in the southeastern United States.** In the southeastern USA, the Southern yellow pine used to produce wood poles is harvested primarily from Loblolly-shortleaf and Longleaf-slash forests. Most forest management in the region incorporates even-aged forestry in "plantation" stands, where entire stands of forest are cut at one time, allowed to grow again, and then cut again on a regular cycle. In the southeastern United States in 2007, 159 million out of 200 million acres were in plantations, accounting for nearly 80% of all timberland in the region. This type of forest management results in a landscape consisting of a patchwork of forests in different age classes, significantly altering these plant communities and threatening the long-term persistence of many species in a landscape that is, on average, between 40% to 60% disturbed when compared to a mature forest.

- **A lower burden on critical energy resources.** When steel poles replace wood poles, it results in the use of approximately one-half of the non-renewable energy resources, requiring 300,000 fewer barrels of oil (equivalent) over a 40-year timeframe.

- **Reduced impacts on the habitats of many threatened and endangered species.** The SCS Global Services study considered key species identified on the *US Forest Service*

STEEL POLES IN THE LINE – THE BENEFITS

In addition to environmental advantages, there are several other benefits to using steel poles.

Steel poles are cost-effective. The approximate lifetime of a steel pole is 80 years, compared with 40 years for a wood pole. When reviewing total project cost and life cycle cost, steel poles are the more cost-effective choice.

Steel poles require minimal maintenance, saving pole replacement and labour costs for electric utilities. Steel poles don't shrink, bend, bow or twist, and the hardware remains tight.

Steel poles are reliable, especially when the weather isn't. Steel poles perform well in the harshest environments, including areas that are prone to high winds and ice storms. They can stand up to fires. And when woodpeckers are looking for food, steel poles remain impervious to their best efforts.

Steel poles don't succumb to the "domino effect." Damage to a single pole in a distribution system rarely propagates to the rest of the system. When hit by a car, steel poles deform but typically keep the lines up and the distribution network functional.

Steel poles can be used indefinitely, saving end-of-life transport/disposal costs and eliminating landfill waste. At the end of its useful service life, a steel pole can be recycled indefinitely into new steel products, so it does not end up in the landfill.

Threatened and Endangered Species List and the *International Union for the Conservation of Nature Red List of Threatened Species*. In the Business-As-Usual scenario, when wood poles replaced other wood poles, almost 90 species were affected, and seven of those species experienced disturbance to terrestrial habitats.

- **Reduced impacts associated with hazardous emissions and wastes.** The CCA formulation used for wood pole treatment is made from arsenic ore that is mined primarily in China. Arsenic is known to be chronically toxic and carcinogenic at elevated levels.

In the United States, old wood poles are exempted from management as a hazardous waste under the Resource Conservation and Recovery Act, although CCA-treated lumber in residential applications is considered a hazardous waste. When wood poles at the end of

their lifetimes are replaced with other wood poles, their disposal results in more than 590kt of waste over a 40-year timeframe, as documented in the study.

The groundbreaking study, *Environmental Life Cycle Assessment of Southern Yellow Pine Wood and North American Galvanized Steel Utility Distribution Poles*, provides significant results that challenge common misconceptions held about the environmental benefits of steel utility distribution poles when compared with their wood counterparts. It provides data that will be useful to utility managers who are considering the long-term impacts of their material choices when replacing or updating their electric distribution systems.

Read more

The Executive Summary of the SCS Global Services study can be found at <http://www.smdisteel.org/Construction/Utility%20Poles/Research%20Reports.aspx> ■



For more information on the benefits of steel distribution poles and case studies of companies that have included steel poles in their distribution lines, visit

<http://www.smdisteel.org/Construction/Utility%20Poles.aspx>