Towers and Poles Report Ed 9 2021
Chapter Summaries

EXECUTIVE SUMMARY

Chapter 1 - OVERVIEW OF SUPORTERS – TOWERS AND POLES

Overview of the market and infrastructure, with installed population and demand of towers and poles by segment.

Chapter 2 - ELECTRICITY AND TELECOM LATTICE TOWERS - INSTALLED POPULATION

Installed population of lattice towers by segment, electricity transmission/telecoms, by country.

Chapter 3 - SALES OF TRANSMISSION AND TELECOM LATTICE TOWERS IN UNITS

Sales of lattice towers in units by segment, electricity transmission/telecoms, by country, 2019 to 2026.

Chapter 4 - SALES OF TRANSMISSION AND TELECOM LATTICE TOWERS IN NOMINAL $ VALUE

Sales of lattice towers in nominal $ value by segment, electricity transmission/telecoms, by country, 2019 to 2026.

Chapter 5 - ELECTRICITY, TELEPHONE, STREETLIGHT & CAR PARK POLES - INSTALLED POPULATION

The installed base of poles in units by segment, by material – wood/steel/concrete/composite.

Chapter 6 - ELECTRICITY, TELEPHONE, STREETLIGHT & CAR PARK POLES – SALES IN UNITS & $ VALUE

Summary charts of sales of poles in units & nominal $ value by segment, by material – wood/steel/concrete/composite, by pole length.

Chapter 7 - SALES OF POLES IN UNITS

Sales of poles in units by segment, by material – wood/steel/concrete/composite, by pole length.

Chapter 8 - SALES OF POLES IN NOMINAL $ VALUE

Sales of poles in nominal $ value by segment, by material - wood, steel, concrete, composite, by pole length.

Chapter 9 - THE IMPACT OF COVID-19 ON THE MARKET AND INDUSTRY FOR TOWERS AND POLES

The impact of the pandemic on the market in terms of supply and demand.

Chapter 10 - LONG TERM DEMAND CYCLES FOR TOWERS AND POLES

The growth of transmission line networks is a fundamental driver of the markets for towers and poles, both in line length and voltage. Long term demand is a function of the age and the expansion of the networks.

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Chapter 11- THE VALUE CHAIN – THE MARGIN STACK

The value chain is a continuous process of adding cost to a product. Depending where you position it, the value changes, the end user's capex being some five times the cost of original materials. The value chain is analysed with different mark-ups for each of six stages.

Chapter 12 - TRANSMISSION MONOPOLES vs. LATTICE TOWERS

The March of the Monopoles - long established in the US, EHV monopoles are breaking into new markets with innovative new designs, replacing lattice towers, especially in Europe. This trend is driven by pressure on rights-of-way, visual criticism of lattice towers and public fears of EMF dangers to children.

Chapter 13 - TYPES OF TOWERS OR PYLONS

Lattice towers are designed for different functions and stresses and there is wide variation in cost; suspension towers, tension towers, angle suspension towers, dead-end towers, transposition towers. Tower installation is a dangerous and complex procedure and has an impact on costs.

Chapter 14 - SERVICE LIFE AND MAINTENANCE OF STEEL LATTICE TOWERS AND MONOPOLES

The service life of steel monopoles and lattice towers can be severely curtailed after a period of time without preventive treatment. Deterioration goes through three identifiable stages before the structure collapses, each with cost implications.

Chapter 15 - COMPETITIONS FOR TRANSMISSON POLE DESIGN

Chapter 16 - NATIONAL MARKETS FOR ELECTRICITY AND TELEPHONE DISTRIBUTION POLES

The statistics for utility poles are not very systematic and are variable in extent from country to country. With wide searching a large amount of data has been accumulated and StatPlan has assembled and maintains an ever-increasing databank for this topic.

Chapter 17 - STREET LIGHTING

Street lighting is a hot topic, because of the developments of IoT, of the smart city and the advent of energy saving LEDs. With urban and transport development, street lighting is a growth sector. This has implications for the pole markets in renewal of old poles and substitution with new materials such as composites.

Chapter 18 - PARKING

Parking light poles are a small segment of the street lighting stock. Parking is receiving attention from planners as cities expand and urban space becomes more crowded.

Chapter 19 - THE SMART CITY AND SMART UTILITY & STREET LIGHTING

A fast growing expansion driven by efficiency and the Internet of Things.

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Chapter 20 - PASSIVE SAFETY

Passive safety has made strides in the last ten years and is now the subject of regulation in many advanced countries and attracting attention in some developing countries. It is an important driver for street lighting and for electricity and telephone poles built along roads.

Chapter 21 - UTILITY POLE MATERIALS AND SERVICE LIFE - TRADITIONAL MATERIALS/WOOD/STEEEL/ CONCRETE

The various materials used for poles – wood/steel/concrete/composite are discussed.

Chapter 22 - COMPOSITE POLES

Composites are analysed in a detailed section discussing this technology, applications, advantages and disadvantages, market status and manufacturers. Factors such as safety, pricing, the production processes of filament winding and pultrusion are outlined. The launch market in the United States is reviewed, with the increasing use of composite cross arms on wooden or concrete poles, and the beginning of a move from niche market status to wider take-up. Composites are gaining acceptance in the desert climates of the Middle East. After being spearheaded in Scandinavia, composites are being trialed in other European countries.

Chapter 23 - TYPES OF POLES

The different types of pole are described, with their functions, characteristics and service lives.

Chapter 24 - POLE SPAN

The span between poles is a function of the weight of lines they bear and the density of population beneath them. The design of a network involves a trade-off between longer poles which are more expensive but need fewer accessories, or shorter poles which are cheaper but need more cross-arms and other equipment.

Chapter 25 - SPACE ALLOCATION ON JOINT USE UTILITY POLES

Many utility poles are used by more than one line or service. Conventions exist for the allocation of space on the pole; for transmisson lines, sub-transmission lines, distribution lines and telephone lines

Chapter 26 - MANUFACTURERS OF WOOD, STEEL, ALUMINIUM AND CONCRETE POLES

Over 100 companies listed, with profiles of the majors.

Chapter 27 – MANUFACTURERS OF COMPOSITE POLES AND HARDWARE

32 companies listed, with profiles of the majors.

Chapter 28 – CIRCUITS, PHASES AND CONDUCTORS

The basics of circuits and phases are outlined. These have a vital effect on the design and mechanics for towers and poles as well as overhead lines.

Chapter 29 - RIGHTS OF WAY

ROW - Rights of Way are increasingly scarce and expensive. They are discussed with various alternative schemes outlined.

Chapter 30 - DANGER to AND FROM BIRDS

The danger from birds nesting on or colliding with lines and towers can cause not only harm to the birds but outages to the network. The extent of the problem is analysed, with mitigation and prevention methods outlined.

METHODOLOGY

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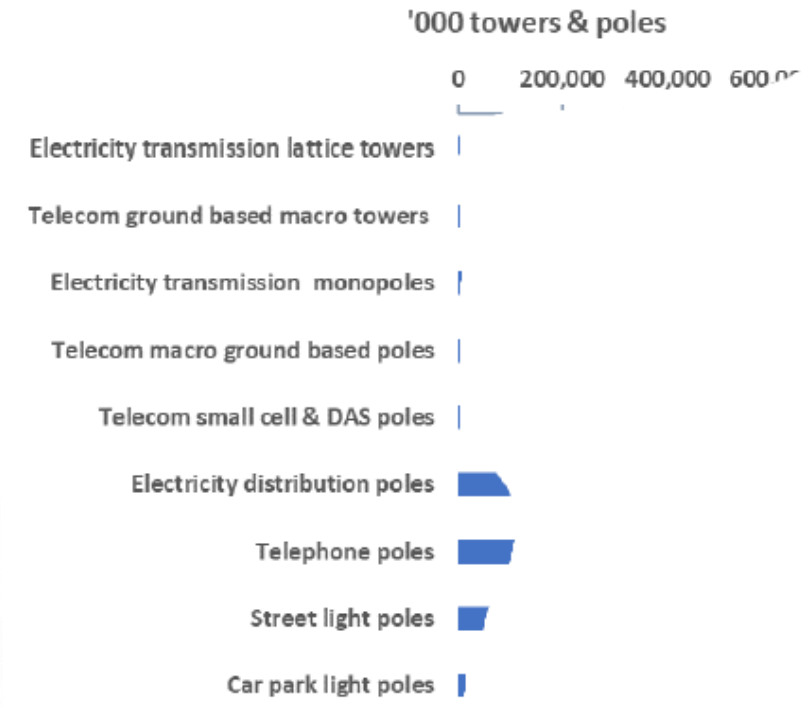
Supporters are commonly separated into two groups, lattice towers and poles. Lattice towers are used for higher voltages and large 'macro' telecom base stations. Poles are divided into two sub-groups; large poles, often called 'monopoles', for high voltage use and macro telecom stations, and smaller utility poles, which are versatile and perform a number of roles.

The different infrastructures in which towers and poles are used.

- Electricity transmission, sub-transmission - towers and large monopoles
- Electricity distribution - small towers or pylons and utility pol
- Landline telephone communications - utility poles
- Telecoms macro cell base stations - to
- Telecoms small cell sites - de
- Cable televisio
- Stree
-

Figure 1: The global population of towers and poles in 2020 by primary user/owner



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Transmission towers outnumber telecoms towers by a large margin, with XX million transmission lattice towers in 2020 and XX million telecoms towers. The telecoms towers are confined to ground based macro stations and do not include rooftop cell sites in this analysis. Rooftops do have some towers and poles in service but we do not have data breaking them down together with those sites without either but with a boxlike structure. Both electricity transmission and telecoms bulk transmitters also employ monopoles, which are included in the chapters dealing with poles as opposed to lattice towers.

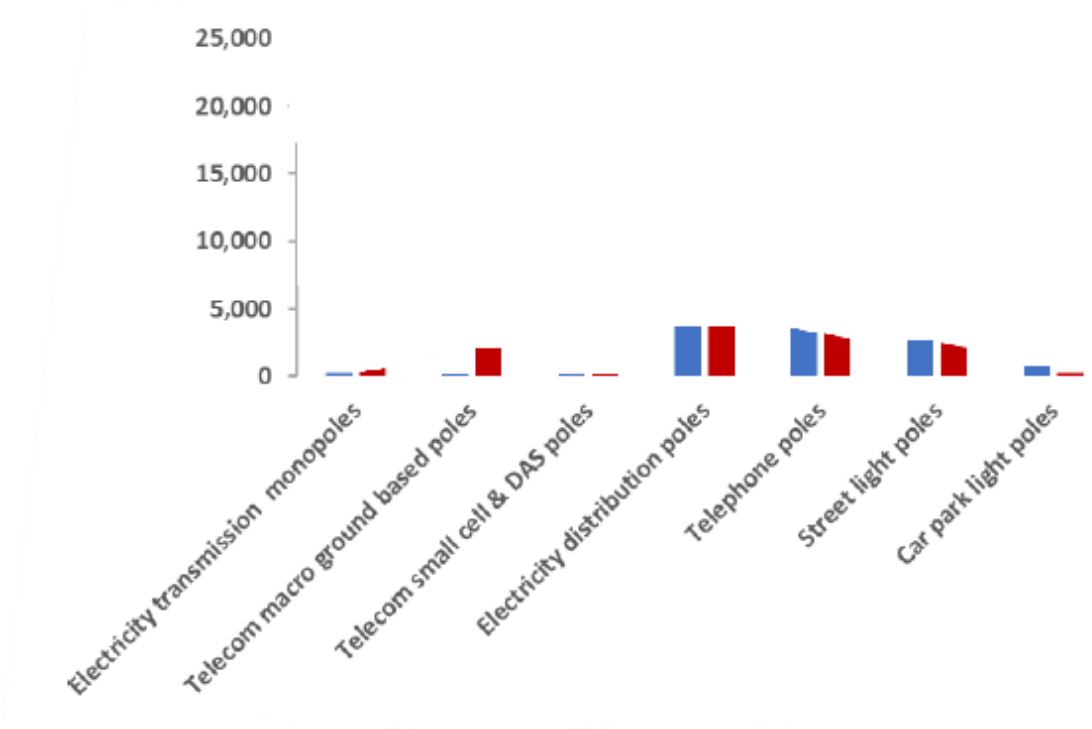
Table 4: Installed population of transmission and telecom lattice towers by country, Europe, 2020

	Electricity transmission	Telecom macro	Total towers
Albania	7,535		
Austria			
Belgium			
Bosnia & Herzegovi			
Bulgaria			
Croatia			
Cyprus			
Czech Republic			
Denmark			
Estonia			
Finland			
France			
Germany			
Greece			
Hungary			

In 2020 demand for poles will reach XX million, XX%% of which is in Asia Pacific. In value, Asia Pacific has a lower share with XX%. One third of global demand in units, XX%, in accounted for by two countries, China and the United States. India had a share of XX% in 2019 but this has dropped to XX% in 2020 due to the Coronavirus crisis, which has hit India severely. Brazil has XX%.

Utility poles, including electricity transmission and distribution and telephone poles, account for XX million poles for a value of XX million, or XX% of poles and XX% of the value. Streetlight poles account for XX million poles for a value of $XX million, or XX% of poles and XX% of the value.

Figure 8: Demand for poles by function, 2020



By far the largest share of poles in terms of length is in the category under 40 feet or 12 metres, amounting to XX% of demand. In value, the smallest size <40 feet (12 metres) and the medium 40-70 feet (12-21 metres) ……

MONOPOLES vs. LATTICE TOWERS

There is a clear trend towards the increased use of monopoles for higher voltage transmission but this trend is variable around the world. These will not totally replace lattice towers but where they are chosen they will be installed in new lines and as replacements when lattice towers are due for renewal. A large share of the market for lattice towers will continue……..

Netherlands

In the Netherlands, the transmission operator, Tennet, has started to install monopoles instead of lattice towers. The project was initiated in 2007 and new pylons have been designed by engineers at Tennet, in collaboration with KEMA, the Dutch research company and unusually, in conjunction with appointed architects. Instead of a single lattice tower, the cables are supported by two steel poles up to 65 metres high.

The electromagnetic footprint has been a powerful driver of change in the Netherlands. Based on epidemiological studies of people living near power lines in Sweden and the US, Dutch authorities advise avoiding long-term exposure of children to magnetic fields higher than 0.4 microTesla. To meet such stringent requirements, power line corridors for traditional HV transmission projects would normally have to be some 300 metres wide, meaning major obstacles given the dense infrastructure and public perception of overhead lines and the small area of the Netherlands.

Figure 1: New 400 kV monopole designs in the Netherlands

Wintrack Design – TenneT 2 x 400kV

Wintrack Design – TenneT 2 x 150kV + 2 x 400kV

Source: Tennet

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Table 1: Sales of poles in units by country, Asia, 2019-26

	2019	2020	2021	2022	2023	2024	2025	2026
East Asia								
China								
Hong Kong								
Macau								
Korea, North								
Japan								
Mongolia								
Korea, South								
Taiwan								
East Asia exc China								
South-East Asia								
Brunei								
Cambodia								
Indonesia								
Laos								
Malaysia								
Myanmar								
Philippines								
Singapore								
Thailand								
Timor-Leste								
Vietnam								
Southeast Asia								
Southern Asia								
India								
Afghanistan								
Bangladesh								
Bhutan								
Maldives								
Nepal								
Pakistan								
Sri Lanka								
South Asia exc India								
Total Asia								

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NATIONAL MARKETS FOR ELECTRICITY AND TELEPHONE DISTRIBUTION POLES

United States

The United States is one of the largest single markets for utility poles with an installed base estimated at XXX million. XX% are owned by electrical utilities, XX% by telecoms companies and XX% by railways…….

Europe

Around 2,400 electricity distribution companies distribute electricity to customers in the EU. Eurelectric, the association for the European electrical industries is a strong proponent of wooden utility poles. The use of wooden poles in distribution networks has kept its position within electricity networks. These have come under fire in recent years for environmental reasons because of preservatives, creosote in particular. The European impregnation industry has for over 60 years been producing creosote poles according to industry guidelines and national standards, the WEI specifications but wood preservatives……..

……..

France

In France electricity distribution poles are mainly wood or concrete. Out of XXX wooden poles installed each year, XX% are treated with creosote (source: ERDF). Other DSOs still using wooden poles (in particular in rural areas). A number of local authorities require the use of wooden poles. France Telecom owns XXX million wood telecoms poles.

Various experiments for constructing reinforced concrete poles were made in Europe, and the first known experiment was made in 1896 by a French engineer

Germany

XX% of electricity poles installed, of which over are wooden, XX% concrete and XX% steel. There are reported to be XXXmillion wooden utility poles in service. Wooden poles, concrete poles, tubular steel poles and steel lattice towers are used for medium-voltage overhead power systems. Concrete pylons are used in Germany normally only for lines with operating voltages below 30kV. In exceptional cases concrete pylons are used also for 110 kV lines, as well as for the public grid or for the railway traction current grid.

Greece

About XX million wooden poles installed in the Greek electricity distribution networks. About XX% of overhead distribution networks' poles are creosote impregnated wooden poles. Every year, about XXX

new wooden poles are installed in the distribution networks, in new lines or for replacement of damaged poles.

…….

Japan

There are XXX million utility poles in Japan, XX million owned by the EPCOs, the electrical utilities and XX million by NTT the telecoms utility. In Japan, the wood pole market has been shrinking because concrete poles now dominate the utility pole market. Japanese wood poles are limited to use for broadcasting wires in the countryside and as supporting poles for trees. A service life of 15 years is quoted in Japan for wood utility poles. A feature of Japan, and one which surprises many visitors to such an advanced country is the plethora of overhead lines in cities. Unlike most developed cities around the world, where various kinds of cables are kept underground, most Japanese cities have them above ground. The reason for this is that after World War II Japan wanted to bring electricity as quickly as possible to as many people as possible and it was easier and much less expensive and obstructive to do this by putting up utility poles.

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THE VALUE CHAIN – THE MARGIN STACK

The cost of any product such as towers and poles, can be measured at a number of stages in the value chain, at the start when it is no more than a piece of unworked ore, to its final installation in working order and finally as a constituent of capital expenditure. At each level in the value chain, value is added and profit margin is 'stacked'. The 'cost of doing business' (CODB) refers to all the expenses incurred by a firm or a sole proprietor in producing and selling goods or services. The 'margin stack' is the total amount of profit charged by the suppliers of materials, transport, sales and any other processes which are part of the final CODB plus the final profit margin. The point of interest in the chain depends on the business of the person who is assessing the value. The value chain starts with the input of raw materials. These inputs, in this case steel, typically constitute from 50-80% of the manufacturing cost of a finished product.

The value chain at 6 levels

1. **BOM, bill of materials** - Metal producers and refiners are concerned about the prices they can get for their output in its basic form, ingots, rods, plates etc. For the equipment manufacturers this price translates into the BOM (bill of materials) as a cost of production. CODB + margin.
2. **Manufactured CODB** - Adding the cost of fabricating the materials into finished products produces the manufactured cost.
3. **Factory gate price (MSP)** - The addition of non-manufacturing costs such as sales and finance costs brings it up to the factory gate price or manufacturer's selling price. This does not include any transport cost. (Note: factory gate price is sometimes quoted with manufacturer's profit margin and sometimes not.) CODB + margin.