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## Batteries represent 40-50% of site capex: are you choosing the right ones?

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## Quality, suitability and testing are key factors to maximise ROI and uptime when selecting a battery vendor

### Read this article to learn:

- Why opt for deep-cycle batteries at off-grid and unreliable grid sites
- Which markets are adopting premium battery solutions
- Engineering challenges related to PV solar and diesel sites
- What customers need to know before picking the right batteries

Trojan Battery Company was founded in 1925 and is one of the world's leading manufacturers of deep-cycle batteries. In this exclusive interview, we discussed with one of the company's directors, Chris Bieck, the key drivers behind the adoption of deep-cycle batteries in the telecommunications industry, the main differences between premium deep-cycle batteries and stand-by batteries and how the telecom industry perceives and distinguishes between these two different battery solutions.

TowerXchange: Please introduce your company, offering and geographical footprint

### **Chris Bieck, Director, Trojan Battery Company:**

Trojan Battery Company has more than 85 years of expertise in manufacturing high quality, long life deep-cycle flooded, AGM and gel batteries to serve the renewable energy and telecom industries. Founded in 1925, Trojan provides deep-cycle batteries for BTS sites which operate on unreliable grids or completely off-grid, use PV solar arrays, or other renewable energy systems, and/or hybrid/charge discharge cycling (CDC) solutions.

Trojan has four manufacturing plants in the U.S. and operates warehouses in Germany and Singapore that enable us to swiftly respond to our customers' needs around the world. We are currently planning to set up a facility in Africa to serve the growing demand from the continent for premium cycling batteries. Trojan manufactures all of its batteries in the U.S. to ensure that its rigid quality standards are met.

Trojan manufactures deep-cycle batteries which meet the requirements of mobile network operators and towercos for premium quality deep-cycle batteries to provide DC power to sites on unreliable grids or off grid. Trojan specializes in serving carriers and towercos serving rural communities in emerging markets.

Trojan's global reach allows it to work with key players in the industry which includes telecom vendors, power systems integrators, OEMs, MNOs and towercos.

TowerXchange: Tell us about the business case for renewable energy at distributed cell sites.

**Chris Bieck, Director, Trojan Battery Company:**

Our products suit the needs of unreliable and off-grid sites, and sites running on PV solar or hybrid applications.

The most common solutions today in the market that are designed to reduce diesel fuel consumption are hybrid or charge discharge cycle (CDC) systems. The most common hybrid or CDC solutions use a combination of diesel generators (DG) and deep-cycle batteries to power the load at the BTS site. Other hybrid solutions incorporate a DG, batteries as well as PV solar and perhaps wind.

The main objective of a hybrid solution is to reduce the consumption of diesel fuel and the runtime of the diesel generator. Diesel fuel is often times the single largest OPEX cost to the MNO and towerco today and increasingly the most important area where costs can be reduced at a site especially as diesel fuel prices rise globally and diesel subsidies are phased out in many countries.

The main tool managing the multiple power inputs in a hybrid system is a power controller.

The controller monitors and manages the power status of the site, provides automated onsite management of the DG, and manage the state of charge (SOC) of the battery array which are the main components of hybrid system. A reliable deep cycle battery array is critical for the stable and predictable operation of the hybrid/CDC system, as well as for the MNO or towerco to reach its TCO goal of reducing its OPEX and dependence on fossil fuels.

More complex solutions include another power source such as a PV solar array. This not only reduces the cost related to running the site but contributes considerably to minimise the site's carbon footprint.

Sites running on hybrid or renewable applications are built with an emphasis on reducing fuel consumption. Diesel is a problem due to its cost, environmental consequences and loss due to theft.

While some sites are near a grid, they are not connected because of the difficult and slow process, as well as the high cost of obtaining permits to connect to the grid. For these sites, diesel used to be the obvious alternative. Today, solutions combine different sources of energy and batteries allowing companies to rely less and less on diesel and more on batteries and alternative sources of energy.

TowerXchange: Talk to us about the cycle life of Trojan's batteries

**Chris Bieck, Director, Trojan Battery Company:**

Trojan Battery only produces premium grade lead acid deep-cycle batteries. The charge/discharge cycle or cycle life of a Trojan battery, or any lead acid battery, depends on many factors. These include the routine used to charge the batteries, whether or not the batteries are taken to a full state of charge (SOC) on a regular or daily basis, the temperature

at which the batteries are stored, and the depth of discharge at which the batteries are cycled. If they are flooded batteries, the user needs to stick to a regular maintenance routine, topping them off with distilled water.

The duration of Trojan batteries also depends on the overall engineering of the site. Companies which work with Trojan on these installations offer many different solutions in which the amount of time the battery is expected to power the load varies from 4 hours to several days.

On average batteries represent between 30% to 40% of the total CAPEX of a site running a hybrid or renewable energy solution. It can be more depending on how long the site must be able to operate autonomously and how long it takes to charge the batteries correctly to perform up to their best potential. The cost for batteries can run as high as 60% of the total systems cost.

One of our key challenges is educating Trojan customers to understand that cheap battery solutions seldom pay off in the medium to long term. Many systems fail because they work with stand-by batteries that die just a few months after installation. This is a very expensive lesson for the customer as they then have to incur CAPEX costs they did not anticipate shortly after installing a new solution in their network. Therefore, we always recommend that customers ensure that they pick a product which has been tested to independent international recognized standards by an accredited testing laboratory and not trust the battery vendor's published specifications in their sales and marketing literature for a particular battery which more often than not is misleading.

The MNO and towerco should seek independent and highly qualified confirmation of the true performance of a battery before making a choice.

Trojan Battery tests all of its batteries to the IEC 61427 standard. This is a globally recognized independent standard which best emulates the conditions a lead acid battery will experience in a hybrid or PV solar solution. Most importantly it gives the MNO and towerco an independent standard by which it can benchmark one battery vendor's cycle life claims against another vendor's cycle life claims.

The IEC 61427 standard subjects the battery to a set of operating conditions that more closely resemble what it will actually face in the real world, with the results providing the closest estimate of the battery's service life in an PV or hybrid application in the field.

The IEC 61427 test guarantees that each battery is tested in exactly the same way. This test provides companies a tool to compare and contrast different batteries it is considering for PV solar and hybrid installations and determine if the batteries they are being sold are truly deep cycle and their true cycle life versus the published cycle life the vendor claims.

The IEC 61427 standard subjects the battery to partial state of charge (PSOC) cycles in which the batteries are discharged before they reach a full state of charge. This is a very common

occurrence in hybrid and renewable energy systems. This requirement significantly reinforces the applicability of the IEC 61427 standard for batteries in hybrid and PV systems.

Trojan suggests that the MNO or towerco insist that each battery vendor provide them with the results of their battery tested to the IEC 61427 standard by an independent globally recognized and accredited testing company. If the vendor claims to provide a deep-cycle battery for PV solar applications, then it should have tested its batteries to this standard.

By insisting that all of its battery vendors test to the IEC 61427 standard, MNOs and towercos will not have to rely on the published cycle specifications the vendor provides in its marketing and sales literature or trust the internal tests of the vendor which in most cases are designed to put their battery in the best light possible. Insisting that all its batteries vendors provide the final IEC 61427 test results of a battery which have been performed by a qualified independent laboratory will help you quickly make an “apples to apples” comparison between different battery vendors.

TowerXchange: Where do you get most demand from the telecom sector for your batteries, LatAm, Africa, Asia or elsewhere? And what proportion of your business comes from towercos compared to MNOs?

**Chris Bieck, Director, Trojan Battery Company:**

Trojan Battery is most active in South East Asia in countries such as Myanmar, Cambodia, Laos, Vietnam, Indonesia and the Philippines, as well as in Africa and Latin America.

Additionally, we serve the Indian subcontinent which is a very price sensitive market and yet, one where we are experiencing great success. We have recently won a contract after a two-year trial with American Tower Corporation (AMT) to supply battery systems for a hybrid application which also incorporates PV solar using our deep-cycle Premium line of flooded batteries. In this specific case, AMT realised that the TCO dramatically improved when using flooded batteries. While flooded batteries require a bit of maintenance, they offer a longer lasting and more cost-effective solution. The maintenance of the batteries is automated by using a Trojan self watering kit, which will considerably reduce the OPEX of maintaining the site.

In Africa, we are working mainly in sub-Saharan countries such as Nigeria, Kenya, Uganda, Tanzania, Mali, Niger and Botswana.

Latin America is a smaller market in light of its fairly good power infrastructure, however, we still work with companies such as Claro to provide solutions in countries that need alternative power solutions such as Peru. We are particularly active in the Caribbean and Central America in such markets as the Dominican Republic, Haiti, Guatemala, El Salvador and Nicaragua.

Today approximately 80% of our business comes from towercos and 20% from MNOs.

TowerXchange: Some cell site operators report that battery theft is almost as acute a problem as diesel theft. What can be done to reduce the stealability of cell site batteries?

**Chris Bieck, Director, Trojan Battery Company:**

This is an issue for all lead acid battery vendors as people steal batteries to either recycle the lead that they contain, or use them in common consumer applications such as cars or to run household products.

Possible solutions would be to either avoid using 2V and 12V batteries which are suitable for a variety of commercial and consumer applications and use different voltage batteries such as a 8V AGM battery which Trojan will release shortly. Batteries also can be buried in underground storage cases.

In order to reduce the problem, we are currently designing a passive and active cooling cabinet and rack system for our batteries which can be locked, making it harder for potential thieves to access them.

TowerXchange: Talk to us about the role of Trojan Battery's agent network in ensuring replacement batteries are available just in time.

**Chris Bieck, Director, Trojan Battery Company:**

We have a network of distributors in over 120 countries and, thanks to our existing and planned warehouses, we are able to serve our clients quickly worldwide as we often have a stock of our batteries in-country or in-region. Our distributors stock our products and can meet the demand virtually at anytime, anywhere.

TowerXchange: Finally, please sum up how you would differentiate Trojan Batteries from competitive cell site energy storage solutions.

**Chris Bieck, Director, Trojan Battery Company:**

Trojan Battery has been around for almost 90 years and this is definitely a winning factor when proving our credibility. We have a long history and reputation for manufacturing high quality cyclic batteries. Our investment in advanced R&D facilities and quality control processes ensures that our deep-cycle batteries meet the requirements of the industries in which we operate.

Because of our first rate manufacturing facilities in the U.S. and independent third-party testing, we can guarantee the quality of our products and have a very low failure rate over the course of our history.