TowerXchange Meetup Africa 2018 Post Event Report

Key market insights and takehomes, attendee profiles and award winners
Our informal network of advisors

TowerXchange’s “Inner Circle”

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CEO, International Digital Infrastructure Alliance

Zhiyong Zhang
Chairman & President
Miteno

Akhil Gupta
Chairman
Bharti Infratel

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Sharing New Business Program Director, Orange

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Standard Bank

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Eaton Towers

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Managing Partner & Investment Committee Member, Digital Colony
CEO, Digital Bridge Holdings

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Irrawaddy Green Towers

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edotco

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Chief Executive
CTIL

Ted Zhong
Founder & CEO,
Astro Tower

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Executive Vice President & Chairman
of Latin America and EMEA
American Tower

Nobel Tanihaha
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PT SOLUSI TUNAS PRATAMA (STP)

Umang Das
Chief Mentor
American Tower

Gilles Kuntz
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TowerCo of Madagascar

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CEO
Torrecom

Tilak Raj Dua
Director General
TAIPA

Dimitris Lioulias
GM of Strategy
Saudi Telecom Company

Kurt Bagwell
President International
SBA Communications

Jim Eisenstein
Chairman & CEO
Grupo TorreSur

Bimal Dayal
CEO
Indus Towers

Inder Bajaj
Advisor, Helios Investment Partners & former CEO
HTN Towers

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Vice Chairman
SWAP International

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Dhabi Group

Scott Coates
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Wireless Infrastructure Group

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and Chairman, Towertel

Alexander Chub
President
Russian Towers

Steve Weiss
CFO
Protelindo

Toni Brunet
Corporate & Public Affairs Director,
Cellnex Telecom

Manish Kasiwal
VP and Chief Business Development Officer,
C&SE Asia, American Tower

About TowerXchange

Founded in 2012, TowerXchange is your independent community for operators, towercos, investors and suppliers interested in EMEA, CALA and Asian towers. We’re a community of practitioners formed to promote and accelerate infrastructure sharing. TowerXchange don’t build, operate or invest in towers; we’re a neutral community host and commentator on telecoms infrastructure.

TowerXchange produces a monthly newsletter and quarterly journal, both available to subscribers, which cover industry news and provide deep insights into telecoms infrastructure worldwide. We also host annual Meetups on each of four continents to bring together the leading tower industry stakeholders.

TowerXchange was founded by Kieron Osmotherly, a TMT community host and events organiser with 21 years’ experience, and is governed with the support and advice of the TowerXchange “Inner Circle” – an informal network of advisors.

TowerXchange was acquired by Euromoney Institutional Investor PLC on December 1, 2017.

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Dear colleagues,

Thank you once again for attending the sixth TowerXchange Meetup Africa.

The Meetup was TowerXchange’s biggest ever, with an expanded networking garden adding to the buzzy atmosphere which traditionally welcomes the tower community to Meetup Africa. Alongside an impressive contingent of towerco decision makers, Meetup Africa attracted a growing number of mobile network operators who wanted to share in the expertise on offer from our passive infrastructure experts. They were warmly received and contributed to our working groups and roundtables, adding a fresh perspective to operational conversations and adding a new dimension to discussions around challenges in the field.

The Meetup also explored longer-term opportunities and goals including fibreco collaboration, active management, long-term capital and the growing role of ESCOs in the global tower market. We began discussing 5G investments and how future infrastructure optionality can be incorporated into planning decisions made now. We also

I hope you had a productive meeting and that these excerpts and highlights will be helpful to you.

Matthew Edwards
Head of Research, EMEA
TowerXchange
TowerXchange Meetup Africa 2018 at a glance

### Industry breakdown

<table>
<thead>
<tr>
<th>Category</th>
<th>People</th>
</tr>
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<tbody>
<tr>
<td>Towercos</td>
<td>20</td>
</tr>
<tr>
<td>Operators</td>
<td>15</td>
</tr>
<tr>
<td>ESCOs and Managed Service</td>
<td>10</td>
</tr>
<tr>
<td>Infracos and infraco bodies</td>
<td>5</td>
</tr>
<tr>
<td>Monitoring and Management</td>
<td>3</td>
</tr>
<tr>
<td>Tower designers, manufacturers</td>
<td>2</td>
</tr>
<tr>
<td>and builders</td>
<td></td>
</tr>
<tr>
<td>Energy Equipment Providers</td>
<td>1</td>
</tr>
<tr>
<td>Advisors, consultants, investors</td>
<td>1</td>
</tr>
<tr>
<td>and others</td>
<td></td>
</tr>
<tr>
<td>Government Regulators</td>
<td>1</td>
</tr>
<tr>
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<td>Advisors, consultants, investors</td>
<td>1</td>
</tr>
<tr>
<td>and others</td>
<td></td>
</tr>
<tr>
<td>Government Regulators</td>
<td>1</td>
</tr>
</tbody>
</table>

### A packed out agenda and interactive sessions including:

- **44 interactive roundtable discussions**
- **8 senior panels and debates**
- **7 technical and strategic breakout sessions**
- **1 exclusive networking dinner**

### Sponsors and exhibitors benefitted from:

- Interviews and exposure in 300 printed special edition books
- In-depth technology working groups
- Access to 44 specialist roundtable discussions
- Buyer briefings with active towercos & ESCOs
- Branding to 311 attendees over 2 days

### Seniority breakdown

<table>
<thead>
<tr>
<th>Seniority</th>
<th>Percentage</th>
</tr>
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<tr>
<td>C-level</td>
<td>24%</td>
</tr>
<tr>
<td>VP/SVP</td>
<td>12%</td>
</tr>
<tr>
<td>Director</td>
<td>28%</td>
</tr>
<tr>
<td>Department Head</td>
<td>6%</td>
</tr>
<tr>
<td>Manager</td>
<td>22%</td>
</tr>
<tr>
<td>Associate, Other</td>
<td>22%</td>
</tr>
</tbody>
</table>

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4 | TowerXchange Africa 2018 report | www.towerxchange.com
Over 30 tower transactions of scale have been completed in the Sub-Saharan African market and towercos now own 61,169 (39.3%) of the region’s estimated 155,538 towers. The vast majority of the region’s towerco owned towers are owned by four players, American Tower, Eaton Towers, Helios Towers and IHS Towers (figure one) although a number of build to suit players, led by the prolific Atlas Tower, continue to show steady organic growth with a handful demonstrating an appetite to acquire tower portfolios that their larger competitors have shied away from.

The most recent tower transaction of scale was the sale and leaseback of 715 towers by Telkom Kenya with American Tower, closed at the end of 2018. Al Karama’s acquisition of 525 Expresso Telecom sites in Senegal is still pending, and was paused while Senegal’s election played out. One small acquisition with big consequences that should close imminently is Helios Towers’ acquisition of SA Towers. Although SA Towers has a small portfolio of towers (a tower count from Helios Towers is expected next month) the acquisition marks Helios Towers’ entry into South Africa, their fifth market.

One African trend you will read more about in TowerXchange is the convergence of fibreco and towerco. Fibre is becoming an increasingly important focus for the continent’s towercos with American Tower signing a partnership with Frogfoot Networks in South Africa, IHS formulating its fibre strategy in Nigeria, Helios Towers forming a joint venture with Vulatel as part of their South African strategy, and Eaton also having expressed an interest in diversifying their business model.

For that reason we are pleased to announce the TowerXchange Meetup Africa 2019 will be co-located with the FTTX Council Africa’s annual conference in Johannesburg on the 8th and 9th of October. The FTTX Council Africa’s event is the continent’s premier meeting place for the fibre industry, with a 1,000 fibre-focused attendees at the linked event.

Besides fibre, one can expect that there will be further partnerships and potential M&A between infracos in Sub-Saharan Africa as the trend towards converged infrastructure models continues; whilst fibre looks the most imminent add-on, the industry is studying how DAS and small cells, edge data centres and satellite backhaul could present additional revenue streams. As MNOs diversify their outsourcing strategies, the region’s towercos are also starting to look at options to diversify their business models. A number of DAS and IBS systems...
have been deployed by towercos in the region, and at least one African towerco is quietly building a small cell centre of excellence.

Outside of the four major towercos there is a wealth of experimentation and expertise in the middle-market towercos market in Africa. Over the next few months, TowerXchange will be compiling a ‘who’s who’ of the continent’s middle-market towerclos, profiling the leaders of these smaller, but critical players in the African tower ecosystem. Some are slowly acquiring substantial tower portfolios, others are bringing new expertise to build-to-suit, and a few are pioneers delivering connectivity in difficult markets.

Some of the region’s MNOs who have yet to divest their tower portfolios continue to learn from their towercoco counterparts, creating dedicated teams to proactively secure co-locations on their towers (such as in the case of South Africa’s Vodacom and Kenya’s Safaricom) or even going so far as to carve out their tower business into a separate unit (such as Telkom’s Gyro Towers). Airtel Africa has appointed advisors in advance of a prospective IPO, but rumours abound about the possibilities of a few more substantial tower sales in Chad, Gabon, Madagascar, Malawi and Tanzania. One telco to watch in 2019 is Ethio Telecom – its privatisation is a priority for government, and TowercXchange has heard of credible proposals for the carve-out of its ~8,000 towers, with a sale or partnership arrangement being considered.

Significant growth opportunities exist across the entire continent, from new build and co-location to site optimisation. TowerXchange provide a country by country analysis of tower ownership and market dynamics across 23 of the more active tower markets in sub-Saharan Africa.

Country Overviews

Angola

**Subscribers:** 14.0mn*
**Towers:** 2,600
**MNOs:** Two (plus entrance of Angola Telecom and another MNO imminent)
**Towercos:** ANTOSC

* Source: GSMA Intelligence

Angola has two MNOs, Unitel and Movicel with Unitel having around about two thirds of the market share in terms of subscribers and Movicel the other third. Unitel has the larger portfolio of towers, possessing 1,700 sites and Movicel is a relatively young network with just 800 sites. In order to reach the level of coverage they are targeting, Unitel needs to add a further 1,000 sites and Movicel a further 2,000. Unitel’s dominance and thus lack of sizeable competition in the market means that it hasn’t had the impetus to invest in its networks but change is on its way.

In late 2017, fixed incumbent, Angola Telecom was awarded a Unified Global’ communications license (covering all mobile, fixed voice, data and TV services) with the company expected to launch mobile services imminently. In addition, talks around the entry of a fourth operator into the Angolan market are hotting up with news expected in Q4 2018. Whilst firm details of interest parties are yet to emerge, Vodacom has been one name strongly linked with the new license.

Whilst infrastructure sharing to date has been limited, a new law came into force in 2016, prohibiting the construction of a new site in close proximity to an existing one. Such legislation will necessitate infrastructure sharing going forward. ANTOSC are Angola’s first independent towerco in the process of building 30 sites with a further 70 sites planned for 2019. The towerco expects to have around 400 sites within three years.

Grid infrastructure in the country is poor with 85% of sites understood to be operating on diesel generators. Unitel in particular have put a lot of focus on renewables, looking at solar hybrid systems on a number of their sites whilst ANTOSC have deployed DG battery hybrids on the first wave of towers they have rolled out.

Burkina Faso

**Subscribers:** 20.1mn*
**Tower count:** 1,700
**MNOs:** Three
**Towerco activity:** Eaton Towers
**ESCOs:** Aktivco

* Source: GSMA Intelligence

There are three MNOs in Burkina Faso; with Onatel (part of the Maroc Telecom group) and Orange (which acquired Airtel’s opco in the country) having just over 40% market share each and third placed,
Telecel with 16% (Source ARCEP August 2017). 3G was launched in the country in 2013 and 4G trials were begun by Onatel and Orange following the introduction of a new licencing region. However, mobile broadband penetration still sits at only 27%, however the overall mobile penetration rate recently hit 100%.

Prior to their opco being acquired by Orange, Airtel sold their towers to Eaton Towers which now possesses a portfolio of 700 sites in the country on which Orange is the anchor tenant. Orange also reports that it leases space on just over 100 towers owned by the other MNOs whilst retaining a portfolio of around 100 sites.

In July 2018, Orange signed a ten-year ESCO agreement with Camusat’s Aktivco, and whilst the number of sites this covers has not been disclosed, TowerXchange estimate this to be around 300 (with only a third of those being telecom towers).

**Cameroon**

| Subscribers: | 19.3mn* |
| Tower count: | 3,200 |
| MNOs: | Four |
| Towerco activity: | IHS Towers |

* Source: GSMA Intelligence

There are four MNOs in Cameroon; MTN, Orange, state-owned CamTel and Viettel-owned Nexttel. In September 2017, Afrimax (which traded as Vodafone Cameroon) had its license revoked and ceased operations in the country. IHS Towers owns or manages a portfolio of 2,284 sites having acquired towers from MTN and entered into a management with license to lease (MLL) contract with Orange. Orange manage 100 sites outside of their arrangement with IHS.

**Chad**

| Subscribers: | 5.7mn* |
| Tower count: | 2,000 |
| MNOs: | Three |
| Towerco activity: | None |
| ESCOs: | Aktivco |

* Source: GSMA Intelligence

There are three MNOs (Airtel, Tigo and Sotel) and an estimated 2,000 towers in Chad, a country where electrification sits at just 4%.

Airtel had previously agreed the sale of their towers to Helios prior to the transaction being cancelled because of an unfavourable regulatory environment.

To address power issues, Millicom’s Tigo has signed an ESCO contract in the country with Camusat’s Aktivco. Millicom are looking to exit the African market, with Econet reported to have expressed an interest in acquiring their remaining opcos in Chad and Tanzania.

Helios Towers Africa is the sole towerco in Congo Brazzaville, having closed a deal to acquire Airtel’s 384 towers, representing 49% of the country’s towers. Around half of Helios’ sites are reported to be off-grid, with power availability of on-grid sites averaging 15 hours a day.

**Congo Brazzaville**

| Subscribers: | 5.1mn* |
| Tower count: | 800 |
| MNOs: | Three |
| Towerco activity: | Helios Towers |

* Source: GSMA Intelligence

IHS own or manage a portfolio of 2,518 towers, having acquired sites from MTN and entered into an MLL arrangement with Orange. Number three MNO, Moov still retains their tower portfolio which numbers about 1,000 sites.

**Cote d’Ivoire**

| Subscribers: | 32.5mn |
| Tower count: | 4,142 |
| MNOs: | Three |
| Towerco activity: | IHS Towers |
| ESCO activity: | Aktivco |

* Source: GSMA Intelligence

There are three mobile network operators in Congo Brazzaville, all of which are backed by regional players. MTN Congo and Airtel Congo compete with the much smaller Bintel-owned Equateur Télécom (trading as Azur Congo). Airtel had a 3G monopoly for nearly two years until MTN launched its own 3G service in August 2013 and 4G in December 2016.

Negotiations to sell Airtel’s Congolese opco to Orange lapsed, but MNO consolidation is not a new phenomenon in Congo, Airtel having acquired Warid’s operation in the country in 2014 vaulting them over MTN to become market leaders.
## Figure 2: MEA’s biggest tower transactions to date

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Buyer</th>
<th>Tower count</th>
<th>Deal value US$</th>
<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Kenya</td>
<td>Telkom Kenya</td>
<td>American Tower</td>
<td>715</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2016</td>
<td>Tanzania</td>
<td>Zantel</td>
<td>HTA</td>
<td>185</td>
<td>6,700,000</td>
<td>36,216</td>
<td>SLB**</td>
</tr>
<tr>
<td>2016</td>
<td>Senegal</td>
<td>Expresso Telecom</td>
<td>Al Karama Towers</td>
<td>450</td>
<td></td>
<td></td>
<td>SLB*</td>
</tr>
<tr>
<td>2016</td>
<td>South Africa</td>
<td>Eaton Towers</td>
<td>American Tower</td>
<td>300</td>
<td></td>
<td></td>
<td>Portfolio Acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>DRC</td>
<td>Airtel</td>
<td>HTA</td>
<td>967</td>
<td>165,000,000</td>
<td>170,631</td>
<td>SLB</td>
</tr>
<tr>
<td>2016</td>
<td>Nigeria</td>
<td>Hotspot Network</td>
<td>IHS</td>
<td>85</td>
<td></td>
<td></td>
<td>Portfolio Acquisition</td>
</tr>
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<td>2016</td>
<td>Nigeria</td>
<td>HTN Towers</td>
<td>IHS</td>
<td>1,211</td>
<td></td>
<td></td>
<td>Company Acquisition***</td>
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<tr>
<td>2015</td>
<td>Nigeria</td>
<td>Etisalat</td>
<td>IHS</td>
<td>555</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Rwanda</td>
<td>Airtel</td>
<td>IHS</td>
<td>164</td>
<td></td>
<td></td>
<td>SLB</td>
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<tr>
<td>2014</td>
<td>Zambia</td>
<td>Airtel</td>
<td>IHS</td>
<td>949</td>
<td>150,000,000</td>
<td>158,061</td>
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<td>2014</td>
<td>Nigeria</td>
<td>Airtel</td>
<td>American Tower</td>
<td>4,717</td>
<td>1,060,000,000</td>
<td>224,719</td>
<td>SLB</td>
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<tr>
<td>2014</td>
<td>Niger</td>
<td>Airtel</td>
<td>Eaton</td>
<td>600</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Ghana, Burkina Faso, Kenya &amp; Uganda</td>
<td>Airtel</td>
<td>Eaton</td>
<td>2,681</td>
<td>540,000,000</td>
<td>201,417</td>
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<tr>
<td>2014</td>
<td>Nigeria</td>
<td>MTN</td>
<td>IHS</td>
<td>8,850</td>
<td>984,000,000</td>
<td>226,911</td>
<td>Joint venture (IHS 49%, MTN 51%)****</td>
</tr>
<tr>
<td>2014</td>
<td>Nigeria</td>
<td>Etisalat</td>
<td>IHS</td>
<td>2,136</td>
<td>485,000,000</td>
<td>227,060</td>
<td>SLB</td>
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<tr>
<td>2014</td>
<td>Congo B</td>
<td>Airtel</td>
<td>HTA</td>
<td>393</td>
<td>50,000,000</td>
<td>127,226</td>
<td>SLB</td>
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<td>2014</td>
<td>Rwanda</td>
<td>MTN</td>
<td>IHS</td>
<td>748</td>
<td>57,000,000</td>
<td>76,203</td>
<td>SLB</td>
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<td>2013</td>
<td>Tanzania</td>
<td>Vodacom</td>
<td>HTA</td>
<td>1,149</td>
<td>75,000,000</td>
<td>65,274</td>
<td>SLB with direct investment in HTT+</td>
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<tr>
<td>2013</td>
<td>Kenya</td>
<td>Telkom Kenya</td>
<td>Eaton</td>
<td>1,000</td>
<td></td>
<td></td>
<td>MLL (Contract since cancelled, towers currently for sale)</td>
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<tr>
<td>2013</td>
<td>Cameroon &amp; Cote d’Ivoire</td>
<td>Orange</td>
<td>IHS</td>
<td>2,000</td>
<td></td>
<td></td>
<td>MLL</td>
</tr>
</tbody>
</table>

* announced, not yet closed  
** 101 closed as of 31 Dec 2017  
*** Deal included 368 SWAP sites under MLL; agreement since cancelled  
**** MTN’s equity since restructured for additional shareholding at IHS group level  
+ Vodacom acquired a 24.5% stake in HTT, which Helios has since purchased for $58.5mn
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<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Cote d'Ivoire</td>
<td>MTN</td>
<td>IHS</td>
<td>911</td>
<td>141,000,000</td>
<td>154,775</td>
<td>SLB</td>
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<tr>
<td>2012</td>
<td>Cameroon</td>
<td>MTN</td>
<td>IHS</td>
<td>820</td>
<td>143,000,000</td>
<td>174,390</td>
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<td>2012</td>
<td>Uganda</td>
<td>Warid</td>
<td>Eaton</td>
<td>400</td>
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<td>2012</td>
<td>Uganda</td>
<td>Orange</td>
<td>Eaton</td>
<td>300</td>
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<td>SLB</td>
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<tr>
<td>2011</td>
<td>Uganda</td>
<td>MTN</td>
<td>American Tower</td>
<td>962</td>
<td>89,250,000</td>
<td>181,912</td>
<td>Joint venture (AMT 51%, MTN 49%)</td>
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<td>2010</td>
<td>Tanzania</td>
<td>Millicom/Tigo</td>
<td>HTA</td>
<td>1,200</td>
<td>81,000,000</td>
<td>112,500</td>
<td>Joint venture (HTA 60%, Millicom 40%)++</td>
</tr>
<tr>
<td>2010</td>
<td>DRC</td>
<td>Millicom/Tigo</td>
<td>HTA</td>
<td>521</td>
<td>41,500,000</td>
<td>132,758</td>
<td>Joint venture (HTA 60%, Millicom 40%)++</td>
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<td>2010</td>
<td>Ghana</td>
<td>MTN</td>
<td>American Tower</td>
<td>1,856</td>
<td>218,500,000</td>
<td>230,835</td>
<td>Joint venture (AMT 51%, MTN 49%)</td>
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<tr>
<td>2010</td>
<td>South Africa *</td>
<td>Cell C</td>
<td>American Tower</td>
<td>1,400</td>
<td>200,000,000</td>
<td>142,857</td>
<td>SLB with BTS+++</td>
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<tr>
<td>2010</td>
<td>Nigeria</td>
<td>Starcomms</td>
<td>SWAP</td>
<td>407</td>
<td>81,000,000</td>
<td>199,017</td>
<td>SLB</td>
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<td>2010</td>
<td>Ghana</td>
<td>Vodafone</td>
<td>Eaton</td>
<td>750</td>
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<td>MLL</td>
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<td>2010</td>
<td>Nigeria</td>
<td>Visafone</td>
<td>IHS</td>
<td>800</td>
<td>67,000,000</td>
<td>83,750</td>
<td>SLB</td>
</tr>
<tr>
<td>2010</td>
<td>Nigeria</td>
<td>Multilinks</td>
<td>HTN</td>
<td>400</td>
<td></td>
<td></td>
<td>MLL</td>
</tr>
<tr>
<td>2010</td>
<td>Ghana</td>
<td>Millicom/Tigo</td>
<td>HTA</td>
<td>831</td>
<td>54,000,000</td>
<td>108,303</td>
<td>Joint venture (HTA 60%, Millicom 40%)++</td>
</tr>
<tr>
<td>2010</td>
<td>Ghana</td>
<td>Millicom/Tigo</td>
<td>HTA</td>
<td>750</td>
<td>54,000,000</td>
<td>120,000</td>
<td>Joint venture (HTA 60%, Millicom 40%)++</td>
</tr>
</tbody>
</table>

Totals / average: 41,248 towers, $4,726,950,000, $187,486 per tower

* announced, not yet closed  
++ Millicom restructured their equity into Helios' operations into a 24% stake at group level (since reduced to 22.83%) which Millicom is now looking to monetize  
+++ Cell C deal included 1,400 existing towers plus 1,800 to be constructed. Total acquisition cost of US$430mn excluded here because the BTS component distorts the average
The regulator had previously revoked the operating licenses of smaller operators Comium, Cafe Mobile and GreenN in the market before awarding and then subsequently revoking a license from LPTIC (GreenN’s backer). There are understood to be about 400-500 sites which were previously owned by the different parties, with a significant degree of parallel infrastructure.

Overall estimations suggest that the market needs a further 2,000 towers to be added between all operators within the next three years. With regards power, Orange has recently signed an ESCO agreement with Camusat’s Aktivco whilst IHS has invested heavily in upgrading energy equipment, with over 70% of its sites now equipped with solar hybrid solutions.

Since Orange acquired Tigo in 2016, there are five MNOs in the DRC; Vodacom, Airtel, Orange, Supercell and Africell, with Smile planning to launch 4G services.

Helios are the country’s only towerco having acquired first Millicom’s and then Airtel’s towers. The Millicom deal involved the operator retaining a 40% stake in Helios Tower DRC which they then restructured to a 24% stake at group level (a stake which they are now looking to monetise). Helios’ acquisition of Airtel’s 950 sites spurred a major decommissioning program, involving the removal of 150 duplicated sites. Helios have also built well over 100 new sites in the country and recently announced plans to upgrade and build backbone sites, covering 1800km in the country. The towers, each to be 80-100m tall and 40km apart, will add significant capacity to existing satellite connectivity in the area. A further backbone of 500km, for a third MNO, is also in the works.

With around 4,293 towers serving 40.6mn connections, DRC has one of the highest number of SIMs per tower in the world, and with only 25% of the population having a mobile phone and 50% of the population living in an area with mobile coverage, the potential for growth is huge.

Grid power is reasonably reliable in Kinshasa, but less reliable in Lubumbashi and Goma. Almost all sites outside these three cities are off-grid and the delivered cost of diesel can be 2.5x more expensive in rural areas, with Helios’ average cost of diesel per tower over double that in its other markets. 55% of Helios’ towers are off-grid and with such high cost of fuel, the case for solar is strong. Helios has deployed solar at 430 sites in the DRC, with solar investments generally delivering a three to four year payback.

Orange has recently signed an ESCO contract with GreenWish Partners to take over energy
TowerXchange understands that the carve-out of its ~8,000 towers is being considered, with a sale and leaseback or partnership arrangement possible. A likely first step will see Ethio Telecom split into an infrastructure division and a services division, before a further two telco licenses are issued in the country of 105mn. An independent telecoms regulator has already been established to oversee the issuance of the licences, with a further mandate to encourage infrastructure sharing.

Further expansion of the network stalled due to a lack of debt capacity by the Ethiopian state to finance further investment. Ethiopia’s grid is unreliable and many sites are off-grid, so there is significant demand for energy management for cell sites within the country. Any tower sale would be the first step in a substantial programme of build-to-suit to infill the network and expand geographic coverage.

A number of African and Middle Eastern carriers are said to be showing an active interest and some have small offices already established in Addis Ababa. Independent towercos have also previously

The reforming government of Abiy Ahmed has announced a privatisation of Ethio Telecom, one of the world’s last monopoly telecoms operators.

Although long a telecoms laggard, a surge in investment from 2013 onwards saw coverage expand from below 30% to around 60% today.

Figure 4: Estimated tower counts for selected countries in SSA

Source: TowerXchange

Ethiopia

Subscribers: 68.3mn*
Tower count: ~8,000
MNOs: One
Towercos: None
* Source: GSMA Intelligence

management of 280 sites, deploying solar-hybrid solutions with their partners Sagemcom.
Figure 5b: Towerco footprints in sub-Saharan Africa

Source: TowerXchange

Figure 5b: Single-country towercos

Source: TowerXchange
Gabon

Subscribers: 3.0mn*
Towers: 1,000
MNOs: Three
Towercos: None
ESCOs: Energy Vision

* Source: GSMA Intelligence

There are two MNOs in the market since Gabon Telecom merged with Moov to create the country’s largest operator ahead of Airtel. However, financial pressures may soon force the total closure of Bintel’s Azur. Airtel is deploying LTE, but mobile broadband penetration is still only 24% at the end of 2018, with cities well covered but rural areas still underdeveloped.

Airtel’s efforts to monetise their towers in Gabon never made much headway, so all the country’s towers remain MNO captive for the time being. Whilst the electricity grid in the main cities is okay, the grid is much less extensive in more rural areas leading to 30-35% of the country’s ~1,000 sites being off-grid. Energy Vision signed the first real ESCO contract in Africa with Airtel, offering power on a fixed monthly price with no upfront capex. The project encompasses a full solar hybrid system with CDC batteries and has been extended to cover 280 sites (of which 40% are off grid, 10% are on unreliable grid and 50% are on grid). Energy Vision has also been awarded responsibility for all passive elements of the sites, with a view to extend this to sites on unreliable grid.
Ghana

Subscribers: 39.1mn*
Towers: 6,314
MNOs: Eight

* Source: GSMA Intelligence

Ghana has a crowded MNO landscape with eight MNOs since 2017’s merger of Airtel and Tigo. MTN leads the market, followed by AirtelTigo and third placed Vodafone. The NCA has formally notified Expresso of its intent to terminate the company’s license, with the authority also issuing a similar threat to Glo (both operators having less than 3% market share). The MNOs are joined by three LTE only players – Surfline, Blu and Busy.

There are three major towercos active in Ghana after a series of four tower transactions. In 2010, Helios Towers set up a joint venture with Tigo as minority partners into which 831 towers were transferred (Tigo has since restructured their stake in the joint venture to a shareholding at Helios’ group level, a stake which it is currently looking to monetise).

Shortly afterward Eaton Towers closed their deal with Vodafone Ghana, then American Tower set up another joint venture with MTN to which 1,856 towers were transferred. The latest transaction in the market was the sale of Airtel’s towers to Eaton which was finalised in 2015. In addition to the three large towercos, towerco Pan African Towers has 300 sites in the country and African Towers has also built a portfolio of 150 macro sites as well as has installed DAS at around 50 different sites including major airports.

Whilst grid coverage and availability is good by African standards (with one towercos reporting over 95% of sites to be on-grid and availability trending towards 20 hours a day), electricity prices have skyrocketed in the past year meaning that the business case for solar and hybrid is strengthened and the use of deep cycle batteries is growing.

Whilst strict permitting and environmental policies had dampened new build in the market, 2018 has seen the amount of new towers being built pick up with 200-250 expected to be added this year (versus around 100 in 2017).

Kenya

Subscribers: 48.1mn*
Towers: 6,629
MNOs: Three
Towercos: Eaton Towers, Atlas Tower, SEALTowers, American Tower**

* Source: GSMA Intelligence
**pending closure of Telkom Kenya deal

There are three MNOs in the Kenyan market, Safaricom, Airtel and Telkom Kenya. Market leader Safaricom, which has 64.2% market share, owns 5,256 of Kenya’s 7,571 towers. Eaton Towers entered the market following the acquisition of Airtel’s sites and currently have a portfolio of 1,300 sites in the country after some build-to-suit additions. Telkom
Kenya sold 715 towers to American Tower in a sale and leaseback deal which closed at the end of 2018. TowerXchange have also been made aware of a new towerco, SEALTowers a start-up focussed on low cost compact tower site solutions and hybrid power innovations, and which expects to have 500 sites built by Q3 2018.

Extensive new build is required, with Telkom stating their intent to add 500 new sites; towercos have proven the most cost effective way to add new sites MNOs. Safaricom carried out extensive 4G rollout in 2017, Airtel’s 4G rollout has recently commenced after obtaining a license in early 2018. Telkom Kenya has announced plans for 800 4G sites. Around 500 buildings are suitable for DAS with a hundred or so covered already; Safaricom are currently operating shared DAS networks.

The grid is relatively robust in Kenya with Safaricom reporting that 60% of sites are on good grid connections, 25% on bad grid and 15% off-grid. Safaricom’s internal towerco, which offers co-location on around 800 of the MNO’s sites, is starting to offer power as a service. The majority of Safaricom’s sites are DG plus battery hybrids, with some solar in the mix.

**Madagascar**

| Subscribers: 8.3mn* |
| Tower count: 2,310 |
| MNOs: Four |
| Towercos: Towerco of Madagascar |

* Source: GSMA Intelligence

**Figure 9: Tower ownership in Mozambique**

Telma, Orange and Airtel operate in the Madagascan market with Blueline the country’s newest MNO. Telma launched 4G operations in 2015, with Orange and Airtel following in 2017; 4G rollout is still under way to extend coverage across the country. Towerco of Madagascar (TOM), initially spun out of Telma but now an independent towerco in its own right and operates a portfolio of 1,200 sites in the country, 55% of Madagascar’s total towers.

Towerco of Madagascar (TOM), initially spun out of TELMA but now an independent towerco in its own right and operates a portfolio of 1,030 sites in the country, just under half of Madagascar’s total towers.

Madagascar represents one of the few markets where Airtel still retains its towers, with the MNO owning a portfolio of 500 sites in the country. There had been rumoured interest in an acquisition of Airtel’s towers, followed by reports that the MNO had signed an ESCO contract, although TowerXchange understands that the opco has decided not to pursue this, instead favouring a review of its managed services contract to bring down costs.

Orange has issued an ESCO RFP in the Madagascan market.

The operational challenge of operating a distributed tower network, particularly during the rainy season is not for the feint hearted, and with significant energy challenges in the country, (Airtel report that 50% of its sites are off-grid) TOM has been extensively evaluating a number of different energy options including a pilot of a wind project in the country.
Malawi

Subscribers: 8.6mn*
Tower count: 1,000
MNOs: Two
Towercos: None
* Source: GSMA Intelligence

There are two MNOs in the Malawian market – Airtel and TNM. Airtel reached an agreement to sell their towers to Eaton back in 2015 but the deal was cancelled with no signs of returning.

TNM is currently undergoing a project to rollout over 200 towers across the country. TNM launched 4G services in 2016 with Airtel launching in early 2018.

Mozambique

Subscribers: 14.5mn*
Tower count: 4,400
MNOs: Three
Towercos: None
* Source: GSMA Intelligence

There are three MNOs in Mozambique, mCel, Vodacom and Viettel’s Movitel. The entrance of a third MNO Movitel back in 2012 caused a radical shakeup of the telecoms sector with the Vietnamese-owned operator rapidly deploying their network and securing 49% of the mobile subscriber market share by the end of 2015.

The country has an estimated 3,000 foundation-based towers, supplemented by an additional 1,800 guyed masts (primarily owned by Movitel). Fibre rollout to the tower has been relatively extensive, resulting in microwave backhaul dishes being removed from sites, thus freeing them up for further active equipment.

Infrastructure sharing in the country has been limited, with a just an estimated 50 towers being shared between mCel and Vodacom. The government passed a first reading of a bill mandating infrastructure sharing in November 2015, however talks have stalled. The government has however been putting pressure on operators to share infrastructure in rural areas to meet the country’s universal service access goals, in a country where 68% of the population lives in rural areas.

State-owned mCel has long standing debts and appointed Barclays to oversee the sale of its ~1,000 towers in order to reduce leverage. In July 2016, it was announced that mCel would be merged with fixed line incumbent TDM to create a single more sustainable entity and discussion around a tower sale seemed to fall by the wayside.

There had also been speculation of a potential tower sale at Movitel although a formal process was never announced. Rumour has it that the entrance of Movitel into the market was part of a government plan to expand network infrastructure and then sell the assets. If this were the case, the decision to sell may be more likely to come from FRELIMO than Viettel.

As to who the likely bidders would be in a Mozambique tower sale from either mCel or Movitel, it is not yet clear – mCel’s earlier tower sale announcement didn’t appear to have attracted the interest of the continent’s leading towercos.

In late 2013, a domestic company, TowerCo Mozambique, tried and failed to set up towerco operations in the country. It is thought that the company was unable to reach an agreement on lease rates with mCel and Vodacom and as such, talks were disbanded. We have yet to hear rumours of any other domestic players forming in.

Namibia

Subscribers: 2.8mn*
Towers: 749
MNOs: Three
Towercos: Powercom
* Source: GSMA Intelligence

The Namibian mobile market has been dominated by two government owned MNOs: MTC and Telecom Namibia, although the entrance of privately held Paratus following an overhaul of the country’s telecoms regulation has introduced a new level of competition.

PowerCom, owned by MNO Telecom Namibia, is Namibia’s first dedicated infrastructure player. Managing a portfolio of 311 towers, the company has ambitions to integrate further assets into its portfolio. The company has tenancies from all three operators in the market as well as a number of non-traditional tenants. South Africa’s fastest growing
towerco, Atlas Tower, has also recently entered the Namibian market.

The Communications Regulatory Authority of Namibia has proposed a new regulation mandating infrastructure sharing and prohibiting operators from setting up new infrastructure where there are existing sites. An announcement from the regulator is expected imminently regarding the legislation.

The government have also introduced a network facility license category to regulate a designated infrastructure provider in the country.

MTC has announced plans to roll out over 524 rural towers in 2018, with 40 contractors and 17 different suppliers selected for the process.

In terms of power, the country's electricity grid is extensive and as such, most sites only need rectifiers and battery banks, with back up DGs only on critical sites. Powercom report that only two of their 311 sites is off-grid.

Niger

There are four MNOs in Niger; Airtel, Moov, Orange and Sahelcom. Airtel sold their portfolio of 600 sites to Eaton, with the transaction closing in 2017.

Over 50% of the country’s towers are off-grid with Eaton examining renewable energy options (including the repair/ replacement of 200 solar sites the company has inherited).

Orange recently signed an ESCO contract with Camusat’s Aktivco covering around 500 sites. Whilst new build in the market has been fairly modest, Airtel’s recent turnaround in profitability in the African market, coupled with them obtaining a 4G license means that Eaton expects build-to-suit activity to pick up.

Nigeria

Subscribers: 156.6mn*
Towers: 29,653
MNOs: Four GSM players (accounting for over 99% of the market share), two CDMA operators and host of LTE-only players
Towercos: IHS Towers, American Tower, BCTek Engineering, Communication Towers Nigeria, Pan African Towers (plus a handful of smaller players)

* Source: GSMA Intelligence

There are four GSM mobile network operators in the Nigerian market, namely MTN, Glo, Airtel and 9mobile (formerly Etisalat Nigeria). In addition to the four GSM players there are two CDMA operators and a host of LTE-only players.

Nigeria is a benchmark tower market for many reasons. It’s the largest mobile market in SSA, with 156.6mn connections among a population...
of 198.4mn*. It’s the oldest growth independent towerco market in Africa; towercos have been building towers in Nigeria since 2006. Almost half of SSA’s towerco-owned towers are in Nigeria, and over US$2.5bn has been spent by towercos to acquire 79% of Nigeria’s towers. Towercos have proved their ability to deliver 99.9% uptime in challenging grid conditions in Nigeria. Nigeria is not just a benchmark for African towers, it’s proof of the efficacy of the independent towerco model in any emerging market.

American Tower entered the Nigerian market in 2014 following an acquisition of Airtel’s 4,700 towers, whilst IHS acquired the portfolios of Etisalat and MTN in the same year. IHS has further consolidated its position in the market, acquiring HTN Towers portfolio of 1,211 sites as well as sites from Hotspot Network. IHS’ acquisition of HTN Towers also included a MLL contract for SWAP’s 368 towers, IHS has however since terminated the agreement. Pan African Towers has around 1,000 towers in the country.

A deep recession and the devaluation of the Naira had a major impact on Nigeria’s MNOs with knock on effects for their towerco partners. Unable to service a loan, Etisalat’s opco in the country was taken over by its creditors and rebranded to 9mobile; at the time of going to press, 9mobile is in the process of being acquired by Teleology Holdings. Towercos continue to recover lease payments owed by the operator.

MTN, whose NGN330bn fine for a failure to disconnect unregistered SIMs compounded their financial challenges, also struggled to make lease payments to towercos, with the operator recently renegotiating their contract with IHS. According to a statement from the operator, the new terms have “facilitated certain network volume commitments and provided more attractive terms for MTN Nigeria’s future network roll-out applicable from 2018 onwards”.

In spite of challenging macroeconomic conditions in Nigeria, IHS report strong growth, with the towerco having completed 4000+ technology upgrades for the year to date in Nigeria, on top of 2000 upgrades in 2017 and having built 1700 new sites in the same period.

IHS has invested heavily in upgrading power systems through their ‘Big Five’ initiative in the country, replacing diesel generators with solar hybrid solutions on over 10,000 towers through five different contractors (now four). The towerco is continuing to explore further green and energy efficiency solutions and are looking now at options to supply power beyond the tower which may ultimately require a tripling of the energy generation capacity of some of their sites. IHS has a license to deploy fibre in Nigeria and they are starting formulate their fibre strategy, having identified about a third of their towers which they think have a good business case to deploy fibre to. Four other companies hold infraco licenses in the country which enable them to deploy fibre.

**Rwanda**

*Source: GSMA Intelligence*

There are now two MNOs in the Rwandan market following Airtel’s acquisition of their larger rival, Tigo in early 2018. The new unit moved ahead of their competitors, MTN, in terms of market share.
IHS has acquired both Airtel’s and MTN’s Rwandan towers and, after having added build-to-suit towers and undertaking decommissioning work, now owns a portfolio of 841 sites. As a small market, new build is limited and decommissioning is still required.

IHS have announced that they are assessing solar farm opportunities in Rwanda that could potentially supply power to the national grid in the first ‘energy swap’ model to be used in Africa.

Of all the SSA regions, Rwanda is showing some of the strongest promise in small cells and DAS making it a key target for such companies looking to enter Africa; IHS have explored shared DAS.

**Senegal**

...with the operator planning to add an additional 200-250 sites in the next twelve months as part of the regulatory mandate for MNOs to increase coverage to underserved areas of the country. The transaction is expected to close imminently.

Sonatel (in which Orange has a controlling stake) had reportedly looked into a sale of its towers previously but talks failed, reportedly due to workforce resistance. Speculation has arisen as to whether the change in ownership of Tigo could precipitate the sale of towers, a portfolio likely to prove attractive to Al Karama Towers.

Sonatel is the only operator to possess a 4G license in the country but Tigo and Expresso had expressed a strong interest in securing licenses, with the sale of Expresso’s towers designed to raise capital for such a license. In February 2017, the Senegalese regulator, ARTP granted three new ISP licenses to locally owned entities, following in the footsteps of Hayo which is providing coverage in the Matam region. The introduction of the new ISPs is hoped to reduce consumer prices and improve the quality of service; it also presents additional tenants for Senegal’s new towerco.

There have been reports that a joint venture between South Korea’s SK Telecom and Middle Eastern firm CKG Group has applied for a fourth MNO license in the country, in a bid to access Senegal’s nascent LTE market.
South Africa

**Subscribers:** 97.4mn*

**Towers:** 28,977

**MNOs:** Four, plus new market entrant, Rain

**Towercos:** American Tower, Atlas Tower, Helios Towers, Sentech, International Tower Corp, Eagle Towers, Coast to Coast, Blue Sky Towers, Pro High Site Communications, SA Towers and Comco plus Telkom’s Gyro Towers

* Source: GSMA Intelligence

There are four MNOs in the South African market – MTN, Vodacom, Telkom and Cell C, with new data focussed MNO, Rain, having recently launched.

Towercos have struggled to get a foothold in the South African market since Cell C sold their portfolio to American Tower back in 2010; with Cell C currently rebuilding their own tower portfolio. Telkom has carved out their tower business into a separate unit, Gyro Towers in order to better commercialise its 6,500 towers. Vodacom has developed a successful commercial towerco business model in house, including a platform on which other frequency holders can view available space on Vodacom sites. Towercos have long been eyeing up MTN’s portfolio of 10,500 sites with the operator having previously hinted at its appetite to divest the assets, there are however no signs of an imminent tower deal.

A long tail of build to suit towercos have emerged in South Africa, headed by the rapidly growing Atlas Tower which now has a portfolio of 701 sites in the country. Broadcast towerco, Sentech has 340 sites which it promotes for co-location. Eaton Towers had built a portfolio of 300 towers in the country before being acquired by American Tower back in 2016. With disagreements over lease rates, three of South Africa’s four MNOs have issued a moratorium on the use of American Tower sites and new build is being given to some of the country’s smaller players, whilst also supporting managed service companies to retain tower portfolios.

Helios Towers South Africa launched in early 2019 as a joint venture between Helios Towers and local fibre-player Vulatel.

The power grid is robust and widespread in South Africa, with MTN reporting that all but 53 of their 10,500 sites are on-grid, however the reliability has recently suffered with Eskom forced to use rolling blackouts to manage demand. Unlike the majority of their sub-Saharan African counterparts, South Africa’s towercos tend to operate a steel and grass model more akin to the developed markets of Europe and the U.S. with power managed as a pass through. Towercos have begun to eye up the fibre market in South Africa, with American Tower signing a partnership with fibreco, Frogfoot, and Helios Towers partnering with Vulatel.

The ECA bill was making its way through parliament with a proposed introduction of a Wholesale Open Access Network, but this has been shelved, possibly permanently. Spectrum is in short supply in the South African market with an auction long overdue; ICASA is expected to stage a new spectrum auction in 2019.
Tanzania

- **Subscribers:** 43.4mn*
- **Towers:** 8,278
- **MNOs:** Seven
- **Towercos:** Helios Towers

*Source: GSMA Intelligence*

Helios own 3,519 towers in Tanzania having acquired both Vodacom and Millicom’s portfolios in the country as well as Zantel’s mainland sites. In the Vodacom transaction, Vodacom sold 100% equity in the towers but obtained a 24% stake in Helios Towers Tanzania, a stake which Helios has since purchased. In the Millicom deal, Millicom and Helios formed a joint venture in which Millicom held a 40% stake, the 40% stake was then restructured into a shareholding at Helios’ group level, a stake which the operator is now looking to monetise. Millicom is in the process of consolidating Zantel.

In 2016, Airtel agreed the sale of the 1,350 sites to American Tower, but the deal was cancelled. One of the biggest contributing factors to the calling off of the deal was the introduction of a new legal requirement for telecom companies to list a 25% stake on the Dar Es Salaam stock exchange; a ruling which was introduced after the deal was announced and a ruling which applies to towercos as well as operators. Vodacom have been the first company to issue their IPO prospectus but with limited liquidity in the local market, the process has had to be opened up to international investors.

In addition to Tigo, Vodacom, Airtel and Zantel, Smart, Halotel and TTCL are present in the market, with each of the main MNOs dominant in a different part of the country. Halotel has been particularly aggressive in their national rollout, driving significant additional tenancies to Helios. Azam Telecom became the newest MNO to be awarded an operating license and expects to start rolling out its network imminently.

Millicom has commenced proceedings to sell its opco in the country with the operator having received non-binding offers from several parties.
Operators rumoured to have expressed an interest in the opco include Econet, MTN, Airtel and Vodacom (with the latter two companies already having a presence in the market).

Helios report that approximately 80% of their towers in the country are on-grid, with grid availability currently around 20 hours per day. In July 2016, it was announced that each of the three main MNOs have entered into a RANsharing agreement to improve coverage in rural areas.

**Uganda**

- **Subscribers:** 24.9mn*
- **Towers:** 3,554
- **MNOs:** Five
- **Towercos:** American Tower and Eaton Towers

* Source: GSMA Intelligence

There are 5 MNOs in the Ugandan market; MTN, Airtel, Africell, Smile and UTL. A sale of UTL to Telegeology Holdings fell through in early 2019, leaving the future of the state-owned operator and its 400 towers in doubt. Smart, i-Tel, Afrimax have all recently exited the market. Lycamobile, the international calling specialists and previously MVNO-only operator, is partnering with local ISP Tangerine to launch a MNO into Uganda and is in talks with local towercos about their tower requirements.

Eaton Towers has completed three tower transactions in Uganda, acquiring the towers of Orange, Warid and Airtel. Airtel has since acquired Warid whilst Orange has sold out to Africell. Eaton Towers now has a portfolio of 1,300 towers in the country.

American Tower entered into a joint venture in the country with MTN (with American Tower having a 51% controlling stake in the joint venture). American Tower now has a portfolio of 1,462 towers in the country.

Around 150 new towers are expected to be added by the two towercos in the next 12 months. Around 27% of sites are off-grid, with about half of new build being off-grid. Grid outages are common, even in Kampala, meaning that lots of investment is going into hybrid solutions. Eaton currently have a pilot study underway to assess hybrid solutions under both capex and opex models.

**Zambia**

- **Subscribers:** 14.9mn*
- **Towers:** 2,300
- **MNOs:** Four
- **Towercos:** IHS Towers

* Source: GSMA Intelligence

There are now four MNOs in the Zambian market, with UZI Zambia (a unit of MNO Unitel which has operations in Angola, Sao Tome and Principe, Cape Verde and Portugal) being awarded a license in March 2018. UZI Zambia joins Airtel, MTN and Afrimax (which trades under the Vodafone brand). IHS Towers have acquired the portfolios of both MTN and Airtel and now have a portfolio of 1,714 sites in the country which has an estimated 2,300 towers. IHS has been investing heavily in solar hybrid solutions in the country with around 20% of sites hybridised as of Q2 2017.

**Zimbabwe**

- **Subscribers:** 13.0mn*
- **Towers:** 2,700
- **MNOs:** Three
- **Towercos:** Eighty Four Dynamics
- **ESCOs:** Distributed Power Africa

* Source: GSMA Intelligence

There are three MNOs in Zimbabwe, market leaders Econet Wireless alongside NetOne and Telecel (with the government having a stake in the latter two). POTRAZ, the Zimbabwean telecoms regulator has proposed a revamp of existing legislation. The regulator had previously announced its appetite to promote infrastructure sharing in the country.

Econet owns the largest tower portfolio in the country with around 1,500 towers; the operator had initially planned to carve out the towers into a separate business unit, Ecotowers, but plans appear to be on hold. Telecel and NetOne own around 600 towers each. Econet reports that it currently uses around 60 third party towers.

With regards to the power situation, Econet reports that just 46 of its towers are off-grid, running on solar battery hybrids. Grid availability for on-grid sites in Zimbabwe is good, currently sitting around 95%. Econet’s in-house ESCO, Distributed Power Africa manages power across its tower portfolio, whilst also providing power to other commercial and industrial customers.
Figure 16: TowerXchange SSA towerco activity and tower transaction heatmap

Legend
- Towercos active
- New tower deal announced
- No known towerco activity

Source: TowerXchange

Meetup Americas 2019
9-10 July, Boca Raton

Meetup Africa 2019
8-9 October, Johannesburg

Meetup Asia 2019
3-4 December, Singapore

Meetup MENA 2020
28-29 January, Dubai

Meetup Europe 2019
19-20 May, Barcelona

www.towerxchange.com
Burkina Faso: Aktivco
Côte d’Ivoire: Aktivco
Chad: Aktivco
DRC: GreenWish+Sagemcom
Gabon: Energy Vision
Niger: Aktivco
Nigeria: IHS ‘Big Five’: IPT, Makasa Sun, M-P Infrastructure, Biswal
Lebanon: IPT
Sudan: Ascot
Zimbabwe: Distributed Power Africa

Country with confirmed live ESCO(s)
ESCO RFP live or rumoured to be imminent
Confirmed live ESCO(s) with further RFPs live or rumored
No ESCO activity yet detected

Guinea Conakry: IPT with further RFP rumored

Source: TowerXchange
Feedback from Meetup Africa 2018

“The content and professional level of attendees are great!” *Aldo Pertile, Fiamm Energy Technology Spa*

“MeetUp Africa 2018 far exceeded our expectations after a successful 2017 event. We understood more clearly how to manage our time during the event and maximised our focused demonstrations at our stand” *Michael Mullen, Polar Power*

“As the founder of Small Cells the TowerXchange Meetup Africa provided me with genuine insights and hugely stimulated the development of disruptive ideas and models for the African telecommunications ecosystem. The event also forged many new relationships across Africa and Asia. The two conference days were the most valuable days in the history of my start-up” *Lars Stuber, Smallcell*

“This was one well organised event” *Rudolf Jingo – Econet Wireless Zimbabwe*
African towerco CXO
2018 perspectives

IHS Towers, Eaton Towers, Helios Towers and Atlas Tower provide their year in review and look ahead to 2019 and beyond.

Between them, IHS Towers, Eaton Towers, Helios Towers and Atlas Tower own over 36,400 (17%) of Sub-Saharan Africa’s 155,538 towers and have a presence in 20 African countries. IHS Towers possesses the largest portfolio, owning close to 23,000 towers, of which two thirds are currently in Nigeria; Helios Towers has over 6,500 sites in the DRC, Tanzania, Ghana and Congo Brazzaville; Eaton Towers has the most diverse portfolio with 5,000 towers in five markets; whilst Atlas Tower, which has held the accolade of being South Africa’s fastest growing towerco, has recently expanded its footprint to Kenya and Botswana. Invited to this year’s towerco CXO panel, hosted by Gulfraz Qayyum from Citi, the towercos shared their feedback on 2018’s events and looked ahead to what the market holds for towercos in Africa.

Growth potential and challenges in existing markets

Each of the towercos on the panel remained bullish as the level of growth that we would see in macro-sites across the continent. The towercos observed that each of the markets in which they are currently operating are under penetrated with low subscriber levels, with the towercos believing that they will continue to play a key role in feeding growth in those markets. Eaton’s Terry Rhodes explained that there is still a need for broader coverage, quality of service is still a major concern and investment in networks is required to overcome this, 4G licenses are being awarded fuelling further rollout and the continent continues

Keywords: Africa, Atlas Tower, C-Level Perspective, Country Risk, Eaton Towers, Exit Strategy, Helios Towers, IHS Towers, IPO, MNOs, Nigeria, Towercos

Read this article to learn:
- The scale of growth opportunities in each of the towercos’ existing markets
- Appetite for geographical expansion
- The impact of MNO consolidation
- Pressures being felt by towercos and MNOs
- Insights into 2018’s postponed IPOs
to see a data revolution which is driving further investment from mobile network operators.

Speaking on some of the specifics of the markets in which they operate, Helios’ Kash Pandya explained how average mobile penetration sits at just 40% across their four markets, with mobile ownership in the DRC, Helios’s largest market, being just 25%. With a population of over 85mn in the DRC, this equates to 63mn citizens without access to a mobile phone (and the population continues to grow).

Helios’ tenancy ratio sits around 2x, up from 1.1-1.2 back in 2010. The towerco has invested heavily in readying their towers for further tenants, with a significant proportion of sites able to take three or more tenants. Given the number of customers in each of their markets, with three or four or even up to six MNOs in a given country, Helios remained confident that they would fill such space.

With Nigeria representing IHS’ largest market, and the largest mobile market in Africa, Citi questioned IHS’s Ted Manvitz about how recent events such as 2016’s economic downturn, Etisalat’s insolvency and MTN’s fine had impacted growth. Manvitz explained that it was important to separate out perceived and real risk. In the case of Etisalat/9mobile, their contracts in place with IHS held up through the change in ownership and the operator continued to pay them. Despite the noise around the challenges facing the operator, IHS felt that 9mobile remained a good business; the MNO still has 15mn subscribers and IHS will continue to work with them as they restructure and reinvest.

With regards to MTN Nigeria, their fine a couple of years meant that they invested less for a period of time. This also came at a time when macroeconomic conditions were poor and dollar scarcity in the market created challenges for all concerned. Fast forward however a year or two and organic growth in Nigeria is looking strong, IHS has completed 4000+ technology upgrades for the year to date in Nigeria, on top of 2000 upgrades in 2017 and have built 1700 new sites in the same period.

Throughout the devaluation of the Naira and contraction of the economy a couple of years ago, IHS still grew in double digits, and the past couple of years are some of the best that the towerco has ever had. Manvitz explained that you tend to hear a lot about the bad news in markets, with the good news rarely getting the same amount of airtime.

Manvitz added that IHS had invested for the long run and that whilst they always knew there would be hiccups along the way, the towerco’s core business continues to be strong. Whilst many of the perceived risks are real, the impact of such risks isn’t as dramatic as many expect and there is a need for education. IHS felt encouraged by the future growth potential of Nigeria and its other markets.

With their African business having been confined to South Africa until recently, Citi questioned Atlas Tower on how they viewed the proposed introduction of a wholesale open access network (WOAN) in the country. Nate Foster shared his view that nowhere on the planet has a wholesale open access network been very successful, and questioned to what extent the South African government was well equipped to run such a network, with state owned entities in the rail and power sector for example, having been plagued by challenges. Foster offered the opinion that commercial operators would do a better job with the spectrum than a WOAN would and said that he was not optimistic about how successful a WOAN could be in the country. Foster added that the introduction of a WOAN could also disadvantage some of the more entrepreneurial companies in the sector, having a further negative impact on the market.

**Geographical expansion on the horizon**

All towercos on the panel had an appetite for further geographical expansion when it made business sense. Eaton voiced that whilst they would restrict expansion to the African continent, they remained committed to looking at new opportunities, Helios explained that they had allocated a significant chunk of capital for expansion outside of their existing markets, feeling that diversification of their geographical footprint was important. IHS is in the process of entering the Middle East, with their acquisition of Zain’s towers in Kuwait expected imminently and discussions underway with other operators. And Atlas has
recently commenced building towers in both Kenya and Botswana, expanding beyond the South African market.

**MNO consolidation and its impact on Africa’s towercos**

The African continent continues to see a reasonable wave of MNO consolidation with M&A activity in 2017 and 2018 having been seen in multiple markets in which the towercos operate. Helios, who witnessed the acquisition of Tigo by Orange in the DRC in 2016 and the merger of Airtel and Tigo in Ghana in late 2017 observed that they had weathered M&A activity successfully. Kash Pandya explained that having robust contracts in place was fundamental to this success, something that all the major African towercos have, having learned from their US counterparts; if an MNO wants to terminate a given contract, they need to pay down the life of the contract. It is also important that your value proposition stacks up, Helios has worked hard to maintain a price point that offers a better TCO for an operator, thus making it very difficult for the operator to move away from the arrangement. Maintaining a healthy dialogue and being flexible is also key to retaining and extending contracts through periods of consolidation.

Eaton’s Rhodes added that although you may see a standstill in investment for a while when MNOs consolidate this will generally be followed by a substantial uptick in investment and amendments with extra equipment being put on towers. MNOs don’t just merge and cut costs, they merge and invest. What’s more, due to the underpenetrated nature of the markets in which the towercos are operating, the upsides are usually outweighed by the downsides following MNO M&A activity. Following operator consolidation in Uganda, Eaton observed that they gained more in additional commitments than they lost in decommissioned towers. Helios’ Pandya added to this stating that you will often see the competitive behaviour of other MNOs ramp up following the merger of their competitors; when Airtel and Tigo merged in Ghana, MTN invested in network rollout; in the DRC, Helios benefited from investment by Vodacom following the takeover of Tigo by Orange.

**MNO pricing pressures and how to face them**

MNOs continue to feel pressures on their margins, they are struggling to keep up with technology cycles whilst ARPU is not keeping pace and so we are starting to see a trend whereby MNOs are asking for discounts from their towerco partners.

Speaking on the subject, Terry Rhodes underscored the importance of getting contracts right from the beginning. It is important to set lease rates at the right levels, not substantially higher or lower than the market rate; MNOs should be discouraged from taking too much money out from the sale of the towers and towercos should avoid overpaying for a tower portfolio. It is important to make sure that the starting point is right, whilst the MNO may be tempted to take a large amount of capital upfront, it can set unsustainable lease rates over the next 10-15 years.

The panel also explained that it was also important for towercos to make sure that they are delivering when it comes to service. MNOs are looking for good operating performance from their towerco partners and if that is delivered and trust is maintained, then a healthier relationship whereby the MNOs feel they are receiving value is achieved.

**Working together on common threats**

Whilst frictions can ensue between MNOs and towercos over lease rates, with the two parties sitting on opposite sides of the table, there are many pressures and threats which impact both companies and which can be best addressed by working together in partnership. Regulatory and taxation issues are good examples of issues which can have a negative impact on both MNOs and towercos; in Uganda for example, Eaton referenced the social media tax which the regulator has proposed. Whilst the tax of around five cents per day doesn’t sound like much, this is around half of ARPU in the country; if the tax stays in place, MNO margins will be hit significantly and the knock on effect to towercos will be that the operators won’t invest as much in their networks. On issues such as this, it is important that MNOs and towercos work in partnership to jointly manage the risks.
2018’s IPO developments

Given Helios’ formal announcement and postponement of IPO proceedings in 2018, and both IHS and Eaton having looked into flotations, the inevitable questions of what happened and whether we could see IPOs return to the table in 2019 were raised.

Both IHS and Helios commented that the macro environment in 2018 was suboptimal for a listing. 2018 wasn’t a great year for listings full stop; of the 40 IPOs on the London Stock Exchange, only half of these managed to get away, and then subsequently traded off.

Education of investors remains critical, explained Manvitz. The private equity investors which have capital at work in the towercos understand the risks and opportunities in Africa; the conversation is now being extended to public equities investors with a proven appetite for towers, but investors who may not yet have been exposed to Africa. IHS decided to issue a public bond to bring the dialogue to investors, and familiarise them with the business. Commenting on the strength of the company, Manvitz added that IHS is a mature business which is cash flow and bottom line positive, with margins reflecting that of their US peers and FX protection in place. The company will continue to diversify and show strong organic growth and when the macro-economic environment improves, the opportunity in the public market will return. IHS and its investors are not pressed on time and so can wait for the right conditions.

Helios also referenced that they could well revisit an IPO, the earliest being in H2 2019 but potentially in 2020. Pandya explained that Helios would retain its readiness for a listing, a lot of work goes into preparing the business and so it is important to keep that capability whilst engaging with investors. As with IHS, Pandya commented on the strength of Helios’ financials observing that they had reported 14 successive quarters of growth, with EBITDA having risen from 25% to 49% from 2015 to 2018. Whilst investors need to become more comfortable with the African market, Pandya explained that the perceived risk of Africa is greater than the reality and that a well run business such as Helios will continue to succeed.

Eaton’s Rhodes commented that whilst Eaton did look at the option of a listing, they never gave an intention to float. Those that did test the financial markets found that they were uncomfortable with the African towerco business, lacking a benchmark from which to be able to price companies. The financial markets recognise towercos in the US, Latin America and Indonesia but are less familiar with the African market and are unnecessarily worried about risk.

Eaton are growing fast, with double digit organic growth and investors that are happy and in no hurry. With Eaton’s peers having stepped back from listings for now, this allows Eaton to refocus on their core business, something they are very happy to be doing.

Whilst Atlas themselves would be unlikely to aim for an IPO, Foster commented that successful IPOs by either Helios, Eaton or IHS would be useful in creating a valuation benchmark for towercos in Africa. Whilst an IPO would not be on the horizon, Atlas commented that there would be an eventual exit plan but there is still a lot of growth ahead for the towerco. Foster observed that Atlas are building 1.2 towers every working day with plans to reach 1000 towers in South Africa by the end of 2019 and are starting to build in Kenya and Botswana, remaining focussed on the macro tower market.

What the future holds

Discussion around diversification of business models beyond macro towers was reserved for a separate panel at this year’s Meetup, with activity in this area on a global, and more recently African level, starting to ramp up. Whilst the appetite of the towercos on the panel to expand beyond macro towers and beyond Africa varied, all felt that there was still a lot of growth in the African macro tower business, with significant organic growth in each of their existing markets.

Helios Towers, Eaton Towers, IHS Towers and Atlas Tower hosted further roundtable discussions at this year’s Meetup, reports from some of which will also be available shortly ■
Geographical footprint of IHS Towers, Eaton Towers, Helios Towers and Atlas Tower
MTN’s energy use, GHG performance and carbon reduction plans
How Africa’s largest operator is addressing climate change

With MTN’s total greenhouse gas emissions increasing and 84% of emissions originating from their communications networks, the operator’s technology, sustainability and network property teams joined the 2018 TowerXchange Meetup Africa to engage with the tower industry and energy supply chain to address the issue. TowerXchange shares the vision presented by Zakhia Rehman from MTN Group’s Sustainability, Regulatory & Corporate Affairs Department on how the operator is working to tackle its carbon footprint.

Keywords: Africa, Africa & ME, Energy, Energy Efficiency, MNOs, MTN, Renewables, Risk

Read this article to learn:
- Greenhouse gas emissions by the ICT sector and how these are forecast to change
- The myriad of factors motivating telecoms companies to reduce their emissions
- Emissions by different areas of MTN’s business
- How MTN is working to reduce their greenhouse gas emissions
- Concerns over towerco owned sites used by MTN
- MTN’s search for partners to tackle their carbon footprint

The contribution of the ICT sector to climate change

Climate change poses a multitude of threats to the global population with the scientific community stating that temperature rises should be limited to 1.5-2°C before the end of the century to mitigate the worst impacts. With economies dependent on fossil fuels for growth, major steps need to be taken by the international community to help reduce greenhouse gas emissions. No single sector or company is able to meet the challenge alone, rather a concerted effort is required across the board to address the scale of the challenge ahead.

In 2010, the ICT sector contributed 2.5% of global greenhouse gas emissions, however if left unchecked, this figure is expected to rise to 14% by 2040 (to put this in context, all forms of transport globally contribute 28% of greenhouse gas emissions). Data centres remain the number one producer of ICT greenhouse gas emissions, accounting for 45% of ICT emissions, with communication networks (comprised of base stations, towers and switches) accounting for 24% of ICT emissions (figure one).

Motivations for ICT players and MTN to curb greenhouse gas emissions

Whilst the humanitarian and environmental impacts of climate change should (and to some extent, do) drive greenhouse gas reduction initiatives amongst global ICT players, current
or potential future pressure from regulators and investors ensures that climate change remains a subject very much on the boardroom table. Whilst telecoms regulators have not yet specifically focused on GHG emissions, general regulatory oversight is increasing and investors are already demanding transparency into how companies are reducing energy use and greenhouse gas emissions. On top of this, the effects of climate change themselves (such as flooding, droughts and temperature changes) can have a very real impact on business operations and expenses.

In the case of MTN, the MNO operates in 23 countries in the Middle East and Africa, a significant proportion of which are some of the world’s least developed countries, poorly equipped to deal with the impacts of climate change.

Figure one: Greenhouse gas emissions per ICT category

*Source: Journal of Cleaner Production “Assessing ICT global emissions footprint: Trends to 2040 & recommendations” by Lotfi Belkhir, Ahmed Elmeligi, McMaster University Canada (December 2017)*

Figure 2: MTN’s energy consumption and greenhouse gas emissions
Climate change presents business risks to MTN, both directly and indirectly. Extreme weather events resulting from climate change can cause direct physical damage to towers and base stations, whilst indirectly impacting operations through disruption of energy supply or works by contractors. The company’s emissions are tracked by the Carbon Disclosure Project which submits data to investors, plus as an entity listed on the FTSE/JSE Responsible Investment Top 30 Index, climate change initiatives from MTN come under close scrutiny to assess what kind of meaningful impact they are having.

Climate change related laws and regulation pose further risks to the operator. Carbon taxes are reported as financial risks in three of MTN’s markets (South Africa, Cameroon and Zambia) for their potential impact on energy costs. Plus in South Africa, mandatory emissions reporting for organisations with total national installed capacity of 10MW was introduced by the Department of Environmental Affairs in 2018. Whilst it is not yet clear how this data will be used, the move shows how seriously the country is taking climate change and it is highly likely that other countries may take similar steps.

**MTN’s greenhouse gas emissions**

Globally, the biggest contributor to greenhouse gas emissions in the ICT sector is data centres, accounting for 45% of emissions. In the case of MTN, however, 84% of their total greenhouse gas emissions come from their communication networks, more than five times that produced by their data centres, buildings and transportation combined (figure 2). In total, MTN’s communication networks use over 16mn GJ of energy a year, emitting close to 1.7tCO₂e.

How MTN reduces greenhouse gas emissions from their communications infrastructure

With the operator’s communication networks (comprised largely of towers and base stations) accounting for 84% of the company’s greenhouse gas emissions, MTN has put major focus on a combination of efficiencies and investments in lower carbon technologies to reduce emissions at their own sites. Close to 30% of savings come from the deployment of diesel hybrid solutions at cell sites, with around 15% from energy efficiency and around 20% from the use of alternative energy solutions (figure 3).
To illustrate the savings that can be made by MTN’s investments in energy efficiency and low carbon technologies, MTN highlighted an off-grid site at which a 6.6kW solar and 7.5kW wind hybrid system was installed. There would have been a significant cost of grid power even if a connection to the site could have been extended, and with the grid being powered by coal, connection would have resulted in an increase in greenhouse gas emissions. By installing the solar-wind hybrid system, MTN generated opex savings of approximately ZAR39,530 annually, avoiding approximately 16,000kWh of electricity from the grid annually and avoided annual carbon emissions of approximately 15 tonnes, thus demonstrating the significant impact that such steps have on even a site level.

Emissions from MTN’s owned and outsourced sites

MTN has divested tower portfolios to towercos in seven of its markets (figure 4) and also uses towerco and other operator owned sites across its portfolio in markets where it retains towers. Whilst emissions from MTN-owned sites have declined steadily in recent years, as the operator has continued to outsource towers to third parties and lease space on third party owned sites, emissions from outsourced sites have grown and now account for the largest proportion of greenhouse gas emissions (figure 5).

Overall, MTN’s total greenhouse gas emissions have continued to grow, a function at least in part...
of the operator’s increasing subscriber base, but cautiously, so too have greenhouse gas emissions per subscriber (Figure 6).

**Looking ahead and the importance of partnerships and cooperation**

In order to curb and reduce their greenhouse gas emissions, MTN stated that they need to be moving harder and faster, finding and working with partners that are keen to pursue proofs of concepts, pilots and investments in solutions that help them manage their use of energy and drive down their greenhouse gas emissions. With an increasing proportion of emissions coming from assets outside of their control, assets under the control of towercos, partnerships with towercos to tackle greenhouse gas emissions across their portfolios also remain key, whilst cleaner technologies and energy efficiency solutions are required for their own assets.

Amongst other considerations, MTN recommend that their partners:

**Scope 1:** Direct GHG emissions from energy from company owned or controlled sources (e.g. base station sites that MTN own and operate whereby MTN burns diesel to generate energy, thus directly creating GHG emissions)

**Scope 2:** Indirect greenhouse gas emissions that MTN contribute to by virtue of purchasing energy that another organisation has created (e.g. GHG emissions as a result of utilities burning fossil fuels and MTN purchasing power from the utility)

**Scope 3:** GHG emissions from sites not owned or operated by MTN (e.g. sites owned by towercos which may either use grid power or burn diesel)
Actively drive an energy and carbon reduction strategy
Incorporate efficiency into design and retrofit plans
Introduce energy efficiency and greenhouse gas reduction targets are key performance indicators for business units
Demonstrate evidence of climate change risk identification and management in business processes
Use global standards such as the CDP to transparently report on material risks and opportunities posed to their business by climate change, and actions taken to reduce GHG emissions.
Work with network operators to share data in order to maximise transparency in disclosures
Ideally incorporate carbon emission considerations and price climate change impacts into business cases/new investments wherever possible

MTN’s significant engagement across the board at the 2018 TowerXchange Meetup Africa relates in large part to their quest to work closely with partners and suppliers to tackle carbon emissions. Over the course of the next 12-18 months, MTN’s technology team will focus heavily on assessing new and green technologies which can help reduce emissions, engaging with key stakeholders from across the value chain whilst working closely with partners to reduce emissions further.

Source: TowerXchange

Figure 6: MTN's greenhouse gas intensity per subscriber
Pioneering towercos from South Africa, Botswana and Angola joined current and prospective suppliers and partners at the Southern Africa roundtable at the TowerXchange Meetup Africa 2018. The resultant discussion provided intriguing and contrasting snapshots of opportunities for towercos, and their partners, in five Southern African countries. TowerXchange has supplemented what we learned at the roundtable with additional market research to build the following analysis.

**Keywords:** ANTOSC, American Tower, Angola, Atlas Tower, Botswana, Build-to-Suit, Carve-Out, Country Risk, Energy, Fibre, Market Overview, Namibia, PowerCom, Pula Towers, Research, SSA, South Africa, Zimbabwe

Read this article to learn:
- Why operators are increasingly behaving like (and competing with) towercos
- How and where build to suit towercos are thriving
- How leading towercos diversifying into fibre in South Africa
- A review of cell site energy requirements in South Africa, Angola, Namibia and Zimbabwe
- Ten tips for tower entrepreneurs

**South Africa**

Any review of opportunities in Southern Africa tends to commence with a look at South Africa, simply as a function of the size of the market. With a stock of around 29,000 towers, a competitive MNO landscape with four established prospective tenants and new entrants Rain, South Africa would seem at first glance to be an ideal market for towercos, yet a significant majority of the country’s towers remain trapped on MNO balance sheets.

Tensions run high between the country’s MNOs and American Tower, which has the largest independent portfolio of some 2,608 towers. Many stakeholders attribute these tensions to the relatively high leaseback rate agreed by Cell C when they sold their towers back in 2010, and as a result Cell C are seeking to rebuild their own tower portfolio. These tensions also translate to significant downward pressure on lease rates in South Africa – challenging since the cost of land continues to increase.

South Africa has also seen the carve-out of the African continent’s first operator-led towerco of scale, Telkom’s Gyro Towers, which markets co-locations on around 6,500 structures. Vodacom also have an in-house towerco boasting an impressive tenancy ratio, believed to be around 1.8x. International towercos have long coveted MTN’s ~11,000 South African towers, but rumors of a potential sale and leaseback of those assets have not resurfaced for several years.
South Africa is home to several smaller private towercos including International Tower Corp, Eagle Towers, Coast to Coast, Blue Sky Towers, Pro High Site Communications and Comco. Broadcast towerco Sentech also markets 300 sites for co-location by MNOs.

By far the fastest growing towerco in South Africa is Atlas Tower, which has over 700 sites in the country, with a healthy pipeline of further sites secured. Atlas are confident they will have over 1,000 South African towers by the end of 2019, representing a significant share of the 1,000-1,500 new sites being built per year in the country.

Africa’s third largest towerco Helios Towers recently entered South Africa through the acquisition of private towerco SA Towers, and in a partnership with fibresco Vulatel, with a goal to deploy R1.4bn into communications infrastructure, including 10,000km of fibre and both macro towers and small cells along those fibre routes. American Tower has similar aspirations to diversify into fibre, having already signed a partnership with fibresco Frogfoot.

Spectrum is in short supply in South Africa – which could suppress demand for densification sites. The controversial Electronic Communications Amendment Bill (ECA) will not be passed before the country’s 2019 general election. The ECA included a framework for the creation of a wholesale open-access operator. While this may seem a daunting prospect for South Africa’s emerging tower industry, similar open-access models have been proposed and seldom realised in several other countries, while in Mexico the open-access operator ALTAN Redes quickly became the towercos’ number one customer.

Botswana

Both Pula Towers and the aforementioned Atlas Tower have secured licenses to build towers in Botswana – they both describe the licensing process as relatively quick and easy.

While the ~850 towers in Botswana remain on the balance sheets of the three MNOs (Orange, Mascom and incumbents BTC), there does seem to be a gap in the market for independent tower companies. The caveat of course is that Botswana is a small country (566,730 sq km) with a population a little over two million, but the country does not lack liquidity for good investments, and the towerco model makes sense to local financiers. While 4G rollouts commenced as long ago as 2015, there is still need for densification sites.

Angola

There are around 1,000 towers in the capital Luanda and ~3,000 nationwide in Angola. That inventory of towers needs to be doubled to achieve coverage targets – reports suggest less than 50% of the country’s administrative divisions currently have mobile coverage.
Market leader Unitel owns the majority of Angola’s towers, challenger Movicel’s network includes around half as many structures. In late 2017, fixed line incumbent Angola Telecom was awarded a license enabling them to launch a wireless service, but no launch seems imminent, while a fourth operator is expected to be announced shortly. Unitel has deployed 4G to Angola’s largest cities, but the majority of subscribers remain on 3G platforms.

Tower ownership has transferred from government to Angola’s MNOs, but the government remains an engaged stakeholder: regulator the Institut Angolias Des Communications (INACOM) has created a committee to create basis of common basis of sharing towers, indeed INACOM arranged for a substantial delegation of stakeholders to attend the TowerXchange Meetup 2018. INACOM objectives include to promote a culture of infrastructure sharing and to accelerate permitting. There is also an enthusiasm to reduce opex, both in terms of lease costs and power. Independent towercos are recognised as a potential means of bringing down opex, and for accelerating rollout for new entrant operators.

ANTOSC are Angola’s first independent towerco in the process of building 30 sites with a further 70 sites planned for 2019. The towerco expects to have around 400 sites within three years.

Prospective towerco enterpreneurs /investors continue to maintain a watching brief over the Angolan market, monitoring the streamlining of permitting processes to make a local tower industry viable, and the potential creation of an investible towercos license regime, supported by rule of law to enforce contracts. The identity and rollout strategy of the fourth MNO will be critical to the investibility of Angolan towers.

**Namibia and Zimbabwe**

The roundtable covered Namibia and Zimbabwe only briefly as there was finite appetite among participants to invest in the countries’ tower markets.

While Namibia is seen as an attractive potential tower market, extensive government participation, including in the country’s two leading MNOs and in the country’s only towerco PowerCom, mean international towercos have struggled to secure a license in the country. Two state-owned MNOs MTC and Telecom Namibia lead the market, with privately owned new entrant Paratus stimulating competition. MTC is currently extending its 3G network into rural areas, with plans to build 524 rural towers in 2018-19.

Telecom Namibia owns Namibia’s sole towerco, PowerCom, which has around 300 sites with tenancies from all three MNOs as well as a number of non-traditional tenants.

“The identity and rollout strategy of the fourth MNO will be critical to the investibility of Angolan towers”

“Namibia may be too small for two towercos,” concluded one roundtable participant.

At time of writing, unrest and inflation continue to headline a level of country risk which makes international investment difficult in Zimbabwe.

“While Zimbabwe interesting country, there are obviously substantial macro economic and political issues to consider,” said one roundtable participant. “Historically they’ve required 51% local ownership, which effectively rules international tower investors out of the market.”

There are around 2,700 towers in Zimbabwe, ~1,500 of which are owned by market leaders Econet Wireless. There has been pressure to share infrastructure, particularly directed at Strive Masiyiwa’s Econet Wireless, which at one point saw
Ten tips for tower entrepreneurs

One of the tower entrepreneurs TowerXchange most respects in Africa – in fact worldwide – is Atlas Tower CEO Nathan Foster. While moderating the Southern Africa roundtable, Nate shared a few pearls of wisdom applicable to towerco entrepreneurs globally.

1. “Every tower site is its own profit centre – you can make good money on ten towers”
2. If you seek to scale beyond that “be careful from SG&A perspective.”
3. “We’ve invested in countries where there is good rule of law – where we can enforce your contracts.”
4. You won’t be first to market for long: “We started in Alaska – there are six towercos there now.”
5. “We have to get increasingly creative to get vertical real estate into dense urban areas.”
6. “We’re building smaller towers on average than in the past – we call them small macros – we have a patented Clean Site that is 10-20m.”
7. “Towercos must be faster and better at acquiring real estate than MNOs - a lot of our staff are former town and city planners.”
8. “If you can control the four corners of a rooftop (and increasingly the sides of buildings) it’s an asset you can lease back to operators.”
9. How do Atlas identify new sites? “We use third parties, RF engineers… we have a great speculative programme”.
10. “While we acquire sites speculatively, only a very small percentage of our actual build is speculative – naked towers in advance of a lease”.

the operator seemingly on the brink of carving out a towerco. That seems less likely in the immediate future, but Econet has created their own Energy Services Company (ESCO) Distributed Power Africa, which does provide power to third parties.

There has been some suggestion that Econet’s competitors, state owned NetOne and partially State-owned Telecel, could be part-privatised. Each owns around 600 towers.

Cell site energy in Southern Africa

While distributed generation is not as widely deployed in Southern Africa as West Africa, there are significant pockets of demand.

While perhaps as few as 100 of South Africa’s sites are off-grid, there is a growing demand for towercos to provide backup power as a service in the country, driven by load shedding, itself a symptom of finite generation capacity. It should be noted that power-as-a-service is not yet the norm – most South African towercos provide ‘steel and grass’ only.

In Angola’s capital Luanda main electricity grid power is widely available but not 100% reliable. “You need backup power to achieve Service Level Agreements”, said one roundtable participant. As many as 85% of Angola’s sites have a degree of reliance on distributed generation – mostly diesel gensets, with some battery hybridisation, and with increasing adoption of renewables, particularly at remote rural sites.

Namibia’s extensive grid means most sites need only rectifiers and battery banks, with backup diesel gensets only on critical sites. PowerCom report that less than 1% of their towers are off-grid.

The vast majority of Zimbabwe’s towers are on-grid, and the country has plenty of generation capacity.

The general reluctance of many Southern African towercos to take on power (“power cash flow is not consistent and long term, like tower cash flow, so I’m worried about value creation,” said one towerco at the roundtable) may mean an increased appetite to partner with ESCOs. “Not all MNOs require us to manage power,” said one towerco “and where we do provide it, we prefer a pass through model.”
Driving efficiencies in site operations
The view of an operator, towerco and O&M provider

Complementing the multi-dimensional roundtables on operational issues at this year’s TowerXchange Meetup Africa, TowerXchange invited three stakeholders, Helios Towers, Econet Wireless and ieng Group to a panel to summarise some of the key steps they are taking to improve cell site operations. Here we summarise six of the key actions raised.

Keywords: Africa, Econet, Energy, Helios Towers, ieng Group, Lithium Ion, LPG, Managed Services, Masts & Towers, Monitoring & Management, O&M, Operational Excellence, Opex Reduction, Renewables, Site Management System, Site Surveys, Site Visits, Skill Workforces, Uptime

Read this article to learn:
- The benefits brought by tower audits
- Challenges in integration and contractor accountability
- Investments being made into power solutions
- The move from reactive to proactive maintenance
- The potential for drones in the tower industry

In an operationally challenging market such as Africa, where operators, towercos and O&M providers are tasked with managing a large number of sites, spread over large geographic areas, often with poor access due to underdeveloped infrastructure, challenging terrain or security concerns, and where local skills levels can typically be low - putting in place robust process and technologies to rollout and manage networks is of paramount importance.

It is an area where partnerships are key, from the mobile network operators using the sites and the towerco partners who may own the infrastructure, to the O&M providers who are in the field managing the day to day operations. To discuss some of the steps that the telecom industry is taking to drive efficiencies in the operation of sites, TowerXchange invited MNO Econet Wireless, towerco Helios Towers and O&M provider, ieng Group to join a panel discussion this October.

Moderated by Spencer Crawford White from Delmec, the expert panel explored key steps that each of the stakeholders had taken to improve cell site operations and examined new areas that they planned to focus on for the year ahead. Discussions were supported by more detailed interactive roundtables on the specific topics, inviting input from additional companies and individuals. Here we summarise six of the key areas raised by this year’s panel.

1. The benefits of conducting a full tower audit

Over the past few years, one of Helios’ biggest
undertakings from an operational standpoint was a full audit of their portfolio of 6,500 towers, conducted in partnership with Delmec. Historically, audits at sites had been conducted on an ad hoc basis, for example, when a client requested additional space on a site, and as such Helios had an incomplete picture of the condition of their tower portfolio. Working in partnership with Delmec, they devised a three year programme to do a full audit of their entire portfolio, looking at the maintenance condition of sites, their foundations, other inventory and structures around the sites as well as the additional capacity available. In creating full documentation on their sites it has enabled Helios to conduct a full analysis of their portfolio and work more efficiently. Helios was able to analyse their structures for the addition of more tenants, enabling them to create efficiencies in the design and upgrade process, prioritising which sites to upgrade first and having a clear picture of the ability to fulfil requests from operators.

*ieng Group commented how they had seen an increasing appetite across the African market for site audits, with towerco's requiring detailed information on what was available on sites. Initially audits were in markets where acquisitions were happening and then the next logical step was to audit tower portfolios that had been acquired. Most of the acquired towers were built with a single tenant in mind and so audits led to a lot of strengthening work.

### 2. Investing in power solutions

Econet, who have formed an in-house ESCO, Distributed Power Africa, commented on their focus on standardising hybrid solutions, making sure that all sites have green power where possible. The company has just begun testing with lithium ion batteries but see a future where all new deployments would likely use lithium ion and Econet has also started exploring the use of diesel generators being run by LP gas. Econet underscored the importance of making sure whatever technology they used would stand the test of time and commented that they were moving away from the capex to an opex model, whereby the EPC contractor assumes responsibility for the equipment. They also commented that operators should be focussed on finding ways to reduce energy usage, driving down the power consumption of their active equipment.

Helios added that like everyone, they were also working to reduce opex through energy upgrades but as with Econet, ensuring a robust product was essential. The towerco commented that they were aiming to get below one minute of downtime per tower through efficient integration. Having acquired much of their portfolio there was a high degree of variation in the equipment installed on towers and Helios has been working to upgrade technologies over the past few years. With a mixture of good, bad and off-grid sites and sites in both rural and urban locations, one size never fits all but some element of standardisation is important as bespoke designs can slow you down. It is also important that power solutions are modular, Helios commented that their power consumption can rise from under 1kWh to 6kWh thanks to an increase in site lease up. When it comes to renewable energy, Helios has rolled out solar at 500 sites. Questioned on the subject of whether wind technology could present a viable alternative, Helios commented that there was always the concern that it would take up space that could be sold to a customer. Innovations are however always coming through with Helios adding that every time they come to TowerXchange, they find that someone is doing something new.

### 3. Tackling technology integration and assigning responsibility

On site operations, Econet explained that the principal challenges they were experiencing related to the integration of different technologies. With multiple companies and stakeholders involved, finger pointing can ensue and complications arise. Having a single point of contact would help to alleviate some of this headache, each site should have a single company which is responsible for operations, taking ownership of the site as a whole.

In the past three years, Helios observed that they had reduced the number of suppliers they were working with by 80%. For site operations, this has enabled Helios to build strong partnerships with contractors, training and supporting them and giving them responsibility for the network.

### 4. Reducing site visits

Helios spoke extensively at the 2017 Meetup about their initiative to bring down sites visits to an average of one site visit per month. In Q4 2015, Helios' average downtime per tower per week was 22 minutes and they were visiting...
sites on average six times a month. This level of inefficiencies led to Helios adopting their business excellence programme. Helios are currently down to an average of just over one site visit per month but see potential to advance this to one site visit per quarter. The biggest source of accidents in the business relates to the amount of travelling, reducing this will not only improve efficiency but also health and safety.

ieng Group added that from an O&M provider's perspective, one site visit per month enables them to also save costs, reducing the amount of human resources required, the amount of truck rolls and the amount of time spent on sites. Ieng Group added that it is an interesting model being explored between towercos and their partners and something that can lead to considerable savings for all concerned.

5. Making better use of data and analytics

Whilst reducing the number of site visits can help to curb costs, ensuring that sites are functioning in the interim between increasingly spaced out visits is of paramount importance. The volume of data obtained from the multitude of remote monitoring systems can be overwhelming and so how best to manage this data remains a priority. Helios commented that they rely on their IT department and product partners to turn data into a beneficial operational action. Gathering and analysing information effectively will enable the towercos to take their site management to the next level.

Both Econet and Helios commented on the number of different RMS platforms that they have trialled, with varying degrees of success reported. The biggest challenges have come from the reliability of the systems and also the support provided. RMS is key however in moving from a reactive to proactive environment at the NOC, Helios are shifting to this at their operations in Ghana first and Econet commented on their increasing move to also rely more on preventative approach.

6. An emerging role for drones?

Drones have become something of a hot topic and buzz word in the industry at the moment, although usage of the technology is still in the early stages. Delmec explained they were passionate about drones and were using them quite a bit in Europe for line of sight activities; Helios explained that they were trialling the usage of drones in Ghana, using the technology to check active equipment and could also see that the technology would have useful applications for site acquisition purposes. The panel felt that the potential held by drones was phenomenal but that the technologies still required further development.

The panel provided just a snapshot of some of the current thinking and focus at the region’s cell site owners and operators with more focused roundtables on energy, site management systems, site visits, operations and upgrades tackling the topics in more depth. To get involved in 2019’s roundtables or to share your views on optimising site operations, contact Laura Graves: lgraves@towerxchange.com

Meetup Americas 2019
9-10 July, Boca Raton

Meetup Africa 2019
8-9 October, Johannesburg

Meetup Asia 2019
3-4 December, Singapore

Meetup MENA 2020
28-29 January, Dubai

Meetup Europe 2019
19-20 May, Barcelona
An excerpt from TowerXchange’s annual Telecom ESCO market report 2018

An extract from our study of the projects and providers of energy as a service to telecom tower companies and MNOs in Africa
Executive Summary

The Energy Services Company business model for telecom has achieved launch velocity. In 2015 telecom ESCOs had contracts to manage 8,664 cell sites, and over the subsequent three years we’ve seen 251% growth in terms of the number of sites managed by ESCOs. TowerXchange has identified 20 active telecom ESCOs, who between them own and operate the energy equipment at 30,375 cell sites at time of writing (September 2018).

15,880, or 52.3% of contracted ESCO cell sites are in the fastest growing geographical market: Sub-Saharan Africa. 6.3% are in the new MENA market. 21.1% of sites are in the oldest ESCO market, India, where growth has slowed due to MNO and towerco consolidation. Growth prospects are healthier in Myanmar, where 7.8% of the world’s ESCO sites are located. Despite the popular assumption that grid power is too widely available and reliable for the ESCO model to work in developed markets, 6.7% of the world’s ESCO sites are in Central America, with 5.6% in Europe. Of the sites where ESCOs own and operate the power systems, a little under two thirds (63.1%) of those sites are owned by towercos. A little over a third (36%) are owned by MNOs.

MNOs and towercos alike increasingly recognise ESCOs as proven business partners, able to deploy capex into long-term payback hybrid and renewable energy solutions, reducing energy opex and carbon footprints, while improving uptime and quality of service (QoS). ESCOs deploy anything from US$10,000-$40,000 of up front ‘improvement capex’ to hybridise the power systems at a cell site, with India generally at the lower end of that range, Africa at the upper end.

The majority of ESCO contracts are of a ten year duration. 69% of ESCO contracts used a fixed monthly fee model, often combined with tiered pricing based on site load. A variant on the fixed energy model has emerged for towercos: the guaranteed savings contract, pioneered by IPT PowerTech and their partners IHS Towers. 9.5% of ESCO contracts use the guaranteed savings model. 9.5% of ESCO contracts use a more variable, kWh consumption or PPA model.

73.7% of ESCO sites are off grid or on unreliable grid connections. Perhaps more importantly, 23% of ESCO sites are on grid, proving that ESCOs can extend their business model to manage backup power for sites with reliable grid power.

TowerXchange has quantified a 389,920 site addressable market for ESCOs, of which 7.8% have been contracted to date, suggesting a long runway for growth.

Cost of capital remains the number one challenge ESCOs must overcome. Towercos own the energy equipment at 53% of the world’s cell sites, and many of those towercos can access capital at a low single digit cost. ESCOs are generally less mature businesses, with the majority dependent on debt and equity which mean their cost of capital can be five times (or more) that of a towerco. This explains why seven of the last eight ESCO contracts have been with MNOs rather than towercos, with a similar proportion in the near-term pipeline.

TowerXchange forecasts that the ESCO industry will celebrate contracting its 50,000th site during 2021, reaching 67,300 sites worldwide by 2024. There is potential for upside in this forecast should more major MNOs or towercos adopt a policy of partnering with ESCOs across their footprint.

This short excerpt highlights some further findings from the ESCO report and how they relate to towerco and MNO needs and goals in Sub-Saharan Africa.
TowerXchange’s methodology is simple: we speak to the management teams of the ESCOs, plus their clients, suppliers and investors, we ask them to share key data points with us, then we consolidate and analyse the results. It should be noted that we do not verify ESCO site counts, nor their descriptions of contract structures, by reviewing the actual contract – this is impossible due to non-disclosure agreements. Inevitably this means there will be some dispute about portfolio sizes, and as to whether what one company calls an ESCO is defined as such by another company. TowerXchange’s focus has been to identify every ESCO and ESCO-type contract and supplier – we’ll leave it to the reader to make up their own mind whether what one company calls an ESCO satisfies their own definition.

TowerXchange don’t use complex models to forecast the growth of the ESCO market – we rely on simpler market data – how many sites are there live RFPs for now? And in which countries do we know MNOs and towercos are considering partnering in the future? And how many sites do those MNOs and towercos own in those countries? We lengthen out the forecast timeline because complex deals like ESCO partnerships inevitably take longer to agree than stakeholders anticipate, then we moderate the forecast to assume one or two ESCO deals are absorbed by tower sales or absorbed into towercos power-as-a-service agreements.

How we define a telecom ESCO

TowerXchange has used a broad and inclusive definition of an ESCO in this study. We define an energy services company (ESCO, sometimes known as a TESCO – Telecom Energy Services Company, or RESCO – Renewable Energy Services Company) as any company which deploys their own capital to acquire energy equipment for telecom cell sites, then selling energy back to the site owner (MNO or towerco), either charging a fixed monthly fee or charging by the kWh consumed.

An alternate model is the ‘guaranteed savings’ model, under which the towerco or MNO continues to deploy their own capex, but their ESCO partners still take a risk in guaranteeing the performance of their systems.

For the sake of clarity, a tower company providing a full power-as-a-service model is not included as an ESCO unless that power is provided in partnership with a specialist third party which owns (or at least co-owns) the energy assets.
Business drivers to partner with ESCOs

The principle drivers for MNOs and tower companies (towercos) to partner with ESCOs are simple: the need to reduce operational costs and the cost of network expansion, whilst maintaining high uptime standards and the associated quality of service experience for subscribers.

While reducing the cost of cell site energy is a key driver, making energy costs more predictable, to the point of levelising the cost of cell site energy, is similarly important.

Energy represents around 50%[1] of the total operating costs for many cell sites, particularly those off-grid or on unreliable grid connections.

Whilst renewable energy programmes are progressing from pilot to full rollouts, the majority of off-grid / unreliable grid cell site power systems are still dependent on diesel, the cost of which is compounded by delivery costs and pilferage. Pilferage is widely confessed to account for 10-15% of diesel costs, but in extreme circumstances it can rise above 30%.

Optimising energy efficiency is a capitally intensive undertaking. While many MNOs are struggling with debt-laden balance sheets, their capital expenditure priorities are often acquiring new spectrum and extending / densifying their networks – hybridising cell site energy systems is seldom at the front of the queue. While towercos that provide power-as-a-service do have an incentive to reduce their cost of sales by improving energy efficiency, they seldom push beyond the ‘quick wins’ of battery hybridisation. While some power-as-a-service towercos have invested in solar hybrids, their priority is always going to be to lease-up their towers and extend their networks.

An ESCO contract is, before anything else, about balance sheet optimisation. When MNOs outsource the power to an ESCO, they convert it from a high cost power generation expense with exposure to fuel price, currency fluctuations and import risk, to long term fixed contracts thus creating predictability in opex whilst also reducing opex and total cost of operation – Charlotte Aubin, Founder, GreenWish Partners

Energy Vision has delivered Power Availability (PA) of 99.99%, reduced CO2 emissions by 3,088 tons/year and reduced fuel consumption by 1,157m³ per year, equating to a 68% fuel and CO2 emission reduction! – Ofer Ahiraz, CEO, Energy Vision

Only ESCOs have an undiluted focus on cell site energy efficiency.

Partnering with ESCOs also reduces the complexity of sourcing, deploying, operating and managing hybrid power systems. Such power systems often combine many different suppliers and technologies, so the ESCO becomes the single point of contact for cell site energy.
# The current state of the telecom ESCO market

## Figure one: The fragmented global ESCO market, by site count

*Data extracted Sept 2018  Source: TowerXchange*

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Site Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPT PowerTech</td>
<td>9,800</td>
</tr>
<tr>
<td>Enertika</td>
<td>3,500</td>
</tr>
<tr>
<td>M-P Infrastructure</td>
<td>2,000</td>
</tr>
<tr>
<td>Bhaskar Solar</td>
<td>800</td>
</tr>
<tr>
<td>Ascot[2]</td>
<td>2,110</td>
</tr>
<tr>
<td>Distributed Power Africa</td>
<td>1,600</td>
</tr>
<tr>
<td>Ardom Towergen</td>
<td>500</td>
</tr>
<tr>
<td>Cambridge Clean Energy</td>
<td>464</td>
</tr>
<tr>
<td>Pace Power</td>
<td>400</td>
</tr>
<tr>
<td>Aktivco</td>
<td>2,000</td>
</tr>
<tr>
<td>GreenWish Partners[3]</td>
<td>300</td>
</tr>
<tr>
<td>Energy Vision</td>
<td>280</td>
</tr>
<tr>
<td>Biswal</td>
<td>2,000</td>
</tr>
<tr>
<td>Voltalia, 171</td>
<td>171</td>
</tr>
<tr>
<td>OMC, 150</td>
<td></td>
</tr>
<tr>
<td>ACME Group, 100</td>
<td>100</td>
</tr>
<tr>
<td>MedIPower, 150</td>
<td></td>
</tr>
<tr>
<td>HYBRICO, 40</td>
<td></td>
</tr>
<tr>
<td>Yoma Micro Power, 10</td>
<td></td>
</tr>
</tbody>
</table>
20 active ESCOs have over 30,000 cell sites between them: TowerXchange research has revealed that the energy equipment at 30,375 cell sites worldwide are currently owned and operated by 20 different ESCOs (see figure one).

IPT PowerTech is the market leader, with 9,800 sites across Nigeria, Guinea Conakry, Lebanon and Myanmar. IPT has 32% of all ESCO contracted sites. Applied Solar Technologies reportedly has 4,000 sites and is the largest ESCO in India, where Bhaskar Solar (800 sites), Ardom Towergen (500), Cambridge Clean Energy (464), Pace Power (400), OMC (150) and ACME Group (100) are also active.

New entrants HYBRICO have secured an initial 40 sites in Central America, with a pipeline to add hundreds more. ENERTIKA is the CALA market leader, where they claim to have 2,000 sites, with a further 1,500 in Europe.

Leading diesel and hybrid genset manufacturer Ausonia also has a 150 site ESCO business in Europe, trading under the brand ‘MediPower’, while their peers Ascot claims to have ESCO contracts on 2,110 sites worldwide: 60 in Europe, 30 in Indonesia, but the majority in the Middle East and Africa.

Africa’s Aktivco is the fastest growing ESCO in the world, having contracted all 2,000 of their sites in the last two years. Aktivco are competing for contracts with GreenWish Partners (which secured a deal in DRC) and Voltalia, which is also active in Asia, and which claims to have the healthiest balance sheet among ESCOs, with a €180mn turnover and €900mn of assets on their balance sheet.

The Who’s who section of this report includes profiles of 26 current and aspiring ESCOs as well as many of their partners. The six most credible prospective telecom ESCOs that have not yet secured contracts – or that have not yet disclosed that they have secured contracts – are listed in figure two.

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**Figure two: Aspiring ESCOs yet to secure a contract (or yet to disclose that they have secured a contract)**

<table>
<thead>
<tr>
<th>Cooltech</th>
<th>CREI (ieng)</th>
<th>Cysalys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reon Energy Solutions</td>
<td>Tillman GTS</td>
<td>TowerPower</td>
</tr>
</tbody>
</table>

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**Runway for growth:** While the total of 30,375 ESCO sites represents just 0.7% of the world’s 4.4 million cell sites (see figure three), that statistic is misleading as TowerXchange has estimated that the addressable market for ESCOs is currently 389,920 cell sites, suggesting 7.8% ESCO addressable market penetration to date (see figure seventeen).

Many of our competitors are private equity backed, with a limited near-term capacity for investment whilst they re-finance. Voltalia has a very solid industrial background, €180mn annual turnover and over €900mn of assets on our balance sheet – we can afford to take a long term view -

**Charles-Henri Duprez, Managing Director, Renewable Energy for Telecom, Voltalia**

---

IPT PowerTech currently manages power on 9,800 sites having signed ESCO contracts in Myanmar, Guinea Conakry and Lebanon and a Guaranteed Savings contract in Nigeria. This makes IPT PowerTech the leading T-ESCO globally –

**Khaled Habbal, VP & COO, IPT PowerTech**
Referring to figure four, you will see that 73.7% (22,387) of the cell sites currently managed by ESCOs are on unreliable grid connections or off grid. Energy equipment is owned and operated by ESCOs at less than 10% of the total number of the world’s cell sites that are off grid or on unreliable grid connections (where grid power is usable for less than 16 hours per day).

ESCOs’ 7.8% penetration into their own addressable market, and their single digit penetration into the number of off-grid and unreliable grid sites worldwide, indicate the long runway for growth for ESCOs, assuming ESCOs can build compelling business cases to both secure the trust of MNOs.
and towercos, and assuming they can raise the necessary low cost capital.

**Despite low penetration today, ESCOs are growing fast:** TowerXchange analyses suggest that the number of cell sites managed by ESCOs has increased by 251% in the last three years (ESCOs had 8,664 sites in 2015). While growth in the Asian ESCO market has been relatively slow (33% over those same three years), growth has been driven by new ESCO projects in Africa (Nigeria, Gabon, Chad, DRC, Niger and Ivory Coast), and in MENA (Lebanon). The total number of ESCO sites in MEA has risen from a low base of 200 in 2015 to 17,800 today.

Towercos own 2.95mn (67%) of the world’s 4.4mn investible tower and rooftop sites. 63.1% of ESCO sites are owned by towercos – that’s almost in proportion. 36% of ESCO sites are owned by MNOs, with 0.9% undisclosed (see figure five).

**Healthy pipeline for continuing growth:** While the pipeline of the next 10,000 ESCO sites come almost exclusively from MNOs, most MNO ESCO contracts are for relatively small portfolios – hundreds at a time. An ESCO winning a contract with one of the 79 towercos that own 1,000 or more sites would obviously be more transformational in terms of scale.

Alongside the 12 countries in which ESCOs are currently active, TowerXchange has identified a near term pipeline of opportunities for ESCOs to contract over 10,000 more sites in at least eleven more countries, including Cameroon, Sierra Leone, Egypt, Mozambique, Madagascar, Liberia, Afghanistan, a second potential ESCO contract in Guinea Conakry, and potentially multiple opportunities in Iraq. In addition to the named countries, there are at least two near term opportunities in countries TowerXchange are not at liberty to name. A new 3,000 site ESCO opportunity is believed to be coming to market in India, where there may also be opportunities to drive scale by consolidating existing ESCOs in the country.
Figure six(a): Current and prospective ESCO projects, MEA

Burkina Faso: Aktivco
Côte d’Ivoire: Aktivco
Chad: Aktivco
DRC: GreenWish+Sagemcom
Gabon: Energy Vision
Niger: Aktivco
Nigeria: IHS ‘Big Five’: IPT, Makasa Sun, M-P Infrastructure, Biswal
Lebanon: IPT
Sudan: Ascot
Zimbabwe: Distributed Power Africa

Guinea Conakry: IPT with further RFP rumored

Country with confirmed live ESCO(s)
ESCO RFP live or rumoured to be imminent
Confirmed live ESCO(s) with further RFPs live or rumored
No ESCO activity yet detected

*data extracted Sept 2018  Source: TowerXchange
Quantifying the addressable market for ESCOs – a regional breakdown

In seeking to quantify the addressable market for ESCOs, let’s take one final look at the current (or “addressed”) ESCO market on a regional basis.

17,800, or 52.3% of sites contracted to ESCOs are in Sub Saharan Africa, with a further 1,920 (6.3%) in the Middle East and North Africa. Both markets have seen exponential growth in recent years. India is home to the ‘old growth’ ESCO market, with most contracts pre-dating TowerXchange commencing following the market in 2014. Despite local stakeholders suggesting there are closer to 10,000 ESCO sites in India, TowerXchange has only been able to identify 6,414 ESCO sites (21.1% of total ESCO sites), with the total Asian count raised to 8,825 by the addition of sites in Myanmar and a small portfolio in Indonesia. 2,040 ESCO sites have been identified in CALA (6.7%) and 1,710 in Europe (5.6%).

What do we mean by “addressable market”?

While it is tempting to simply say “there are 300-350,000 off-grid or unreliable grid towers in the world, that’s the addressable market for ESCOs,” to do so ignores two key factors. One, many of those sites are already served by power-as-a-service towercos with finite appetite to partner with ESCOs; and two, as this study illustrates, the ESCO model can also be applied to on-grid sites: 5,778 (19% of) ESCO sites to date are on-grid.

So instead TowerXchange define the ‘addressable market’ for ESCOs in terms of identifying glass ceiling for the ESCO model as we know it today, based on MNO or towerco appetite to partner with ESCOs, and based on local tower market dynamics and grid conditions in 2018. All of these factors are variable: the appetite of MNOs and towercos will shift as decision makers change or as ESCOs become more proven; the ESCO business model may evolve, for example becoming more attractive for on-grid sites; wireless networks will inevitably densify and expand, while towercos will acquire more towers; and investments in electricity grids may extend electrification and improve reliability. Thus our measure of the addressable market is both a snapshot of sites that could be served by ESCOs today, but also differentiates opportunities addressable in the short-to-medium term, from more medium-to-long term opportunities.

Our definition of the “addressable market” should not be confused with our forecast. The addressable market is not the ‘low hanging fruit’, quite the opposite: here we are endeavouring to quantify all the sites which could possibly be served by the ESCO model as it is today, if ESCOs hypothetically had access to the vast capital and human resources required to address all these opportunities. In short, we’re asking “how many fish are in the sea?” Not “How many fish will ESCOs catch?”
Middle East and Africa (MEA): Sub-Saharan Africa (SSA) is a prime target market for ESCOs because 41% of the region’s 146,947 telecom towers are either off grid or on unreliable grid connections (where grid power is usable for less than 16 hours per day). In the Middle East and North Africa (MENA) grid power is as bad as SSA in some countries, but much better in others. There are a total of 271,489 towers in MENA.

ESCOs currently own the power systems at 17,800 of the 418,436 towers in MEA. While the 251% growth of the ESCO market in MEA has been impressive in the last three years (see figure...
thirteen), current penetration of just 4.3% of MEA sites indicates there is a long runway for continuing growth. So where could that growth come from? We’ll start by explaining how we arrived at the figure of 125,280 addressable ESCO sites in MEA.

As illustrated in figure fourteen, MTN has sold around 40% of their 57,000 sites to power-as-a-service towercos, including the towers in their largest markets, with the exception of from South Africa. The relative reliability of the electricity grid in South Africa means ESCOs are unlikely to get a contract to manage MTN’s ~10,500 sites in that country, while the quality of grid in Cyprus means MTN’s opco in that country is also excluded from the ESCO addressable market. This leaves a total of around 23,000 MTN sites to be included in the addressable market for ESCOs. Addressable MTN markets for ESCOs include Benin, Togo, Liberia, Congo Brazzaville, Botswana, Sudan and South Sudan, Guinea Bissau, Guinea Conakry, Syria, Iran, Afghanistan and Yemen.

25% of Orange’s 33,000 MEA sites are either owned or operated by power-as-a-service towercos, or leased from towercos or from other MNOs, and as such they are excluded from our ESCO addressable market. Orange already has ESCO contracts for around 3,200 sites across Niger, DRC, Burkina Faso, Côte d’Ivoire and Guinea Conakry. Orange also has live ESCO RFPs for Egypt and Madagascar, plus multiple other undisclosed countries. So potential...
ESCO target Orange opcos include their businesses in Egypt, Madagascar, Iraq, Jordan, Mali, Senegal, Guinea Bissau, Sierra Leone, Liberia, the Central African Republic and Botswana, with Tunisia and Morocco and perhaps secondary targets. This adds up to ~20,000 Orange sites as an addressable market for ESCOs.

Airtel Africa has sold 69% of their ~15,000 sites to power-as-a-service towercos, leaving just under 5,000 sites as an addressable market for ESCOs. Airtel has had success with their maiden ESCO project with Energy Vision in Gabon, but they also discontinued an ESCO RFP in Madagascar, so Airtel's appetite for the model remains questionable.

Vodafone, and the Vodacom and Safaricom opcos in which they own stakes, are supported by a strong power management team at Vodafone Procurement Company. So while these entities have sizeable site portfolios, TowerXchange does not have grounds on which to forecast ESCOs winning substantial contracts from Vodafone and related entities, so we have not included any in our addressable market.

Millicom has been more enthusiastic about adopting lean business models, partnering with towercos in Ghana, DRC and Tanzania, and with ESCO Aktivco in Chad. However, with a power-as-a-service towerco or ESCO partner in every African market in which Millicom operates, TowerXchange has not included any Millicom African sites in the addressable market for ESCOs.

With 22,212 sites and 47.4mn subscribers across eight countries in MENA, Zain would be an attractive client for ESCOs, and the MNO is known to be exploring the ESCO model. Zain has agreed the sale of their 2,292 towers in Kuwait to IHS, and is in exclusive negotiations to sell 8,263 towers in Saudi Arabia to the same power-as-a-service towerco. Perhaps the most attractive target Zain opcos for ESCOs might be Iraq\(^{10}\) (4,482 sites), Lebanon (1,313) and (country risk notwithstanding) Sudan (2,542).

Similar to Zain, Etisalat has explored the ESCO model, where the most obvious need might be found in Afghanistan, although an ESCO could also be an option in Egypt where the withdrawal of subsidies has increased the cost of diesel. Etisalat also owns a 53% stake in Maroc Telecom / Moov, which operates in nine SSA countries. Moov has no deep towerco partnerships, and is believed to be in the early stages of examining the ESCO model.

Beyond these tier one MNOs are several more layers of prospective customers for ESCOs, including highly attractive prospective MNO partners that are strong in one or a small number of countries (e.g. Ooredoo, Unitel, Globe, TELMA, mCel); successful challenger MNOs who could make great ESCO clients (e.g. Africell, Viettel, Cell C); State-owned MNOs in strong market positions; and a long tail of tier three MNOs with offering variable credit quality. Excluding MEA countries where the grid is widely available and reliable, TowerXchange estimates a further 20,000 sites in the region addressable by ESCOs.

It should be noted that there are significant barriers to be overcome in several markets we have identified as target ESCO markets. In some the regulation of distributed energy generation is sub-optimal, while there may be difficulties raising capital for others due to trade sanctions, in others simply because perceived country risk often exceeds reality.

In addition to a core addressable market of 85,837 MNO cell sites in MEA, TowerXchange adds a second tier target of a further 39,443 MEA cell sites owned by power-as-a-service towercos. These are considered second tier targets because there is no indication of near-term appetite from the African towercos to partner with ESCOs. This 39,443\(^{11}\) total includes parts of the IHS Towers and American Tower portfolios, and the entire portfolios of Helios Towers, Eaton Towers and 13 smaller independent towercos\(^{12}\). The count excludes the 10,000 IHS Nigeria sites already contracted under the ‘Big Five’ initiative, as well as 10,284 towerco sites in South Africa (2,575 of which are owned by American Tower), where the grid is relatively good.

Access the full report here
Orange pioneers the ESCO model in Sub-Saharan Africa

With five ESCO contracts signed and another two RFPs live, Orange has been leading in the adoption of the ESCO model in the telecom space. TowerXchange speak to Nat-sy Missamou, Orange MEA’s Director of New Business Models for Network Infrastructure to understand the MNO’s perspective on ESCOs and how they are fitting into their passive infrastructure strategy.

Keywords: Africa, Botswana, Best of TowerXchange, Burkina Faso, Cameroon, Central African Republic, Cote d’Ivoire, DRC, ESCOs, Egypt, Energy, GreenWish Partners, Guinea Bissau, Guinea Conakry, Infrastructure Sharing, Jordan, Liberia, Madagascar, Mali, Morocco, Niger, Opex Reduction, Orange, Sagemcom, Senegal, Sierra Leone, Tower Count, Tunisia

TowerXchange: Please can you explain more about Orange’s footprint and history of sharing and outsourcing passive infrastructure?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA:
Orange has a footprint in 22 markets across the African and Middle Eastern region, owning a total portfolio of around 33000 radio sites. Of these sites, 34% are shared with half under towerco ownership or management and another half where Orange is hosted directly by another MNO (figure one).

We work with towercos in Cameroon and Cote d’Ivoire (where we have a management contract in place with IHS Towers) and in the DRC (Helios Towers), Madagascar (Towerco of Madagascar) and Niger and Burkina Faso (Eaton Towers).

In general, in markets where towercos are present, they manage the vast majority of our sites in the country (figure two).

TowerXchange: When and why did Orange start studying the ESCO model as an outsourcing strategy?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA:
We started assessing the model several years ago, seeing it as an opportunity to lower our cost of operations. Whilst towercos present one opportunity there are certain limitations of working with them. Towercos only have an appetite for towers with sharing potential, this means that
even in markets where towercos are present there are towers they have no interest in buying, managing or building, which remain Orange’s responsibility. Plus we also need to power things other than mobile towers, in Cote d’Ivoire, for example, we have sites for our fixed network which do not have mobile equipment on them and so do not make sense for towercos. On top of this we have shops and other forms of infrastructure which require power but are outside of a towerco’s remit.

ESCOs offer a solution in areas that towercos cannot; we don’t see ESCOs as competitive to towercos, rather we see them as complementary. In markets where towercos operate, they still remain our biggest partners, managing the vast majority of our sites.

TowerXchange: In which markets is Orange examining the ESCO model and how advanced are you in this?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA: Orange has signed five ESCO contracts to date, in the DRC, Niger, Guinea Conakry and Burkina Faso. In addition to this we have two further RFPs live in Egypt and Madagascar. We are also studying opportunities in other markets. Generally speaking, in markets where we have a small number of towers, our plan would be to hand the full portfolio over to an ESCO, whereas in our larger markets it will most likely be a subset of towers.

TowerXchange: With the DRC being the most advanced of your projects, please can you shed a bit more light on the details of your ESCO agreement

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA: In the DRC we signed a contract with GreenWish Partners and Sagemcom for them to take over management of power on 250 of Orange’s sites in the country, [Editor’s note: Since going to press this figure has been extended to 300 sites and datacentres] with Sagemcom responsible for field operations. This figure includes towers but it also includes shops and the provision of energy to houses. The contract

“ESCOs offer a solution in areas that towercos cannot; we don’t see ESCOs as competitive to towercos, rather we see them as complementary.”
was signed in July and GreenWish-Sagemcom has now taken over management of all sites. They are working to upgrade equipment based on its level of performance and so it will be an ongoing process over the duration of the project.

**TowerXchange: Did you carry out pilot projects prior to deciding on a winning bidder?**

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA: Sagemcom have the experience of operating a large number of towers across the African continent and Orange have worked with them previously and so as such, we did not deem it necessary to carry out a pilot project. Pilot projects would slow down the process and Sagemcom have proven experience in carrying out the works already, including for some towercos.

**TowerXchange: Is the agreement very similar to that in the other markets in which you have signed contracts?**

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA: When it comes to setting the terms of the contract, that is something which is decided upon by Orange, and generally speaking the details of the contract are very similar, country to country and RFP to RFP. We don’t ask for the bidders to come up with alternative agreements, rather they must differentiate based on price and their ability to execute the project. It is up to the bidder to decide on what technology they will use, but we have tended to find that most bidders are using very similar suppliers.

**TowerXchange: Can you share some details into the typical length of agreement that you are offering to ESCOs?**

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA: The ROI on the project is typically 6-7 years and so we don’t give any less than that to enable the ESCO to invest in the project. If you shorten the terms of the contract you end up having to pay more as a fixed fee. Whilst the shorter limit of the contract duration is 6-7 years, the upper limit is around 12-

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### Figure two: Breakdown of tower ownership across Orange’s 18 markets in MEA

#### Markets where Orange uses over 1000 towers

<table>
<thead>
<tr>
<th>Country</th>
<th>Owned and managed</th>
<th>Leased from other MNOs</th>
<th>Towerco managed</th>
<th>Leased from towercos</th>
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<tbody>
<tr>
<td>Côte d’Ivoire</td>
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<td>DRC</td>
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<td>Egypt</td>
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<td>Guinea Conakry</td>
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<td>Jordan</td>
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<td>Mali</td>
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<td>Morocco</td>
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<td>Senegal</td>
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<td>Tunisia</td>
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#### Markets where Orange uses under 1000 towers

<table>
<thead>
<tr>
<th>Country</th>
<th>Owned and managed</th>
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<tbody>
<tr>
<td>Botswana</td>
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<td>Burkina Faso</td>
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<td>CAR</td>
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<td>Cameroon</td>
<td>Orange owned</td>
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<td>Guinea Bissau</td>
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<td>Liberia</td>
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<td>Madagascar</td>
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<td>Niger</td>
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<td>Sierra Leone</td>
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15 years. One never knows what is going to happen and so committing to a longer period doesn’t make sense.

TowerXchange: To what extent does the ESCO take over management of the existing energy equipment on site, versus install new equipment?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA:
It varies; in some instances the energy systems in place are performing well and so the ESCO just takes over the equipment, whereas in others the systems are reaching the end of their lifespan or are performing sub-optimally and so it makes sense to replace them. It really depends on the quality of the equipment in place. Ultimately however, the upgrade of energy systems will be a rolling and continuous process, rather than the just one major upgrade project from the start.

TowerXchange: Do you see a role for ESCOs in carrying out additional site activities and services beyond power?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA:
Some ESCOs who are participating in our RFPs also have experience in building towers as well as carrying out O&M. When a company carries out additional works beyond the power we term them an “ESCO plus”; i.e. ESCO plus tower and it is something which we are looking at.
TowerXchange: Have you seen the types of companies approaching you change from when you started studying the ESCO model?

Nat-sy Missamou, Director of New Business Models for Network Infrastructure, Orange MEA:
When we first started looking at the ESCO model, the majority of interest was from the large power companies, players such as Engie, Total, etc. Over time we have started to see the number of companies with an interest in the space starting to expand, and have increasingly seen companies with a background in telecoms and towers reaching out to us.

We now see technology companies, pureplay ESCOs, different types of investors and O&M contractors all submitting bids in our RFPs; often in partnership with each other to either bring a better cost of finance or greater experience in the sector to the bid. It remains to be seen which types of companies will predominate in the long run and each have their pros and cons; for example the big power companies have access to good solutions and good sources of financing but on the flip side they can be a bit slow to react, with a lot of internal processes and decision making to go through which makes it harder for them to follow Orange’s timelines.

The very nature of an RFP process is that it is a competitive bid and so we remain open to studying proposals from a broad spectrum of companies and make our selection based on the most competitive offer, which usually comes down to price, optimised power solutions and their ability to execute the works in the field.

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See you at our future events!

Meetup Americas 2019
9-10 July, Boca Raton

Meetup Africa 2019
8-9 October, Johannesburg

Meetup Asia 2019
3-4 December, Singapore

Meetup MENA 2020
28-29 January, Dubai

Meetup Europe 2020
19-20 May, Barcelona

See you at our future events!

www.towerxchange.com
IPT PowerTech add Guinea Conakry and Lebanon to their ESCO portfolio

How the world’s largest T-ESCO is going from strength to strength

IPT PowerTech, the world’s largest T-ESCO, operates the energy equipment across four countries with the largest number of ESCO sites worldwide. Established in the 1990s, IPT is also a managed service and energy equipment provider with a presence in 11 countries in Africa, South East Asia and the Middle East. TowerXchange speak to IPT PowerTech’s VP and COO, Khaled Habbal to find out more about how their ESCO business is developing.

Keywords: Africa, Africa & ME, Asia, Energy, ESCOs, Guinea Conakry, IHS Towers, IPT PowerTech, Lebanon, Middle East, Myanmar, Nigeria, Off-Grid, On-Grid, Ooredoo, Orange, Renewables, RMS, Solar, Unreliable Grid, Uptime, Who’s Who

Read this article to learn:
- Who IPT PowerTech are
- Details of their recently signed ESCO projects in Guinea Conakry and Lebanon
- How their guaranteed savings contracts have evolved in Nigeria
- IPT PowerTech’s attitude to working with third party equipment providers
- How IPT PowerTech envisage the ESCO investment landscape evolving

TowerXchange: Please can you re-introduce IPT PowerTech to TowerXchange readers.

Khaled Habbal, VP & COO, IPT Powertech: IPT PowerTech was founded back in the 1990s, initially focused on the provision of starter and specialty batteries. When the telecom sector started to pick up in the mid-90s we started offering battery systems to the sector before expanding into the sale of power systems, being one of the first companies to first launch the battery hybrid concept. We spotted the need to integrate power equipment into outdoor cabinets and began manufacturing our own cabinets independently. Innovation has always been at the heart of our business.

In parallel, we built our telecom services division, providing site construction services (of both towers and fibre), telecom installation and network services and field managed services and maintenance.

Whilst the product and managed services divisions remain key parts of our business, our focus has increasingly turned to our telecom-ESCO business where we see huge potential.

TowerXchange: Please tell us more about your T-ESCO business.

Khaled Habbal, VP & COO, IPT Powertech: IPT PowerTech currently manages power under T-ESCO contracts in Myanmar, Guinea Conakry and Lebanon and is enrolled in a Guaranteed Savings contract in Nigeria. The large number of
IPT worldwide ESCO sites and our extensive know-how makes IPT PowerTech the leading T-ESCO globally. Our current pipeline sits around a total of approximately 10,000 sites under Guaranteed Savings and T-ESCO and we remain very ambitious in our growth plan beyond this.

Recognised as a Telecom Energy Service Company (T-ESCO), we offer various models to MNOs and towercos reflecting the appetite for CAPEX savings and CAPEX leasing, while ensuring the deliverables of power availability and reliability to the network respecting all SLAs related are met.

**TowerXchange: What do you think is driving the adoption of the ESCO model by the telecom sector?**

**Khaled Habbal, VP & COO, IPT Powertech:** Operators across the globe are coming under increased financial pressure with competition from OTT players and ARPU continuing to decline. They are searching for ways to decrease OPEX whilst minimising capex and the ESCO model offers an ideal solution.

**TowerXchange: Please can you share further details on the new ESCO projects that you have signed in Guinea Conakry and Lebanon?**

**Khaled Habbal, VP & COO, IPT Powertech:** In Guinea Conakry we have signed an ESCO agreement with Orange, with high probability of extending to new sites within the upcoming 3 -5 years.

Initially we will take over management of the existing power equipment on sites, but over time we will upgrade this to make the system more efficient, a process which we have begun already. Of the total number of sites, around a third are off-grid entirely with the quality and availability of on-grid sites varying significantly. In the worst grid areas, availability can range between 6-12 hours per day, but as you get closer to urban centres this improves. All on-grid sites however require significant backup and alternative generation and so our plan is that most sites in the country will have solar in place.

In Lebanon, we are enrolled on an ESCO contract with one of the two operators in Lebanon, where the majority of sites are on unreliable grid connections: typically, 18-21 hours of usable grid in Beirut, falling to 6-12 hours in rural areas.

The grid quality in Lebanon is better than the grid quality in Guinea Conakry but grid availability can still be quite low; in Beirut, grid availability is around 18-21 hours per day but in rural areas this drops to around 6-12 hours. There is however a power schedule in Lebanon meaning that you know when power will be on or off. This predictability makes the design and management of an optimal power system a much more scientific process.

As with Guinea Conakry, we have inherited legacy power equipment with plans to upgrade this over time, in Lebanon however, most of the power equipment is IPT PowerTech equipment and so we are very comfortable with managing it.

**TowerXchange: Can you tell us more about developments in IPT PowerTech’s involvement in IHS Towers’ “big five” project in Nigeria; and for those less familiar with the model, please can you explain the difference between the Guaranteed Savings model you have in place in Nigeria and the ESCO model you have in place in other markets.**

**Khaled Habbal, VP & COO, IPT Powertech:** IPT Powertech Group is engaged in Nigeria with the largest towerco on a major project of Guaranteed Savings across the African continent under the “Big Five Initiative”, supplying energy efficient power solutions—including management and long-term maintenance — and OPEX optimisation under a long-term contract.

The guaranteed savings model is something which IPT PowerTech have been promoting for a long time, having introduced the model at TowerXchange’s Meetup in Africa about five years ago. Historically, when an MNO or towerco has purchased energy equipment, they have used contractors to deploy, operate and maintain it. When the equipment isn’t performing as hoped, a blame game can ensue with the contractors complaining that the equipment isn’t delivering on expectations, whereas in reality it may have been incorrectly deployed or maintained by the contractor.

Our approach in eliminating the blame game is simple: combine energy equipment provider, system integration, and O&M service contracting services to create a single point of accountability.
By being the energy system integrator and the contractor at the same time, we are able to manage key points in the value chain, thus leaving no room for performance failure—or for the ‘blame game.’ In fact, we believe that our group is one of the few solution providers globally offering and merging hybrid and renewable energy solutions with telecom infrastructure services and offering field managed services and maintenance all at the same time.

Under a guaranteed savings model, we sell the equipment to the MNO or the towerco who then pays a fixed rate for us to install and maintain the equipment. We guarantee that we will deliver the savings promised, any deviation from this will be absorbed by IPT PowerTech. This gives the MNO or towerco not only clarity on the capex to install the system but also provides predictability in opex. With IPT PowerTech providing, deploying and maintaining the equipment, it avoids the blame game between equipment vendor and contractor that can so often occur in the management of power on cell sites.

The guaranteed savings model offers an alternative to the ESCO model, whereby the MNO or towerco still deploys the capex (whereas in an ESCO agreement the ESCO would invest the capex).

TowerXchange: What technologies does IPT PowerTech manufacture and supply and what equipment does it source from third parties? How does it select these third parties?

Khaled Habbal, VP & COO, IPT Powertech: The dedication of our professional team exceeding 4500 specialists, impelled the group into serving more than 60 operators in 50 countries and becoming one of the few companies in the region to combine product R&D to our assembly facilities in Romania and Lebanon. Our modernised factory in Romania is a leading ODM enclosures manufacturer of outdoor cabinets, and an integration facility for advanced energy solutions, allowing us to combine high quality in-house products of enclosures and cabinets coupled with our own services proposition.

IPT has also incorporated the controllers for all our gensets, and lately IPT RMS, a complementary tool to all our solutions guaranteeing optimal performance, and allowing mobile operators better surveillance of their sites globally in terms of energy availability and efficiency. IPT Digital Platform features advanced machine learning along with existing energy equipment compatibility, ensuring smart and centralised monitoring across the network.

On the other hand, IPT Powertech is an integrator of top-notch products, developing and identifying best technologies to create products, optimising the output of the solution. Our D&D team always makes sure to choose top international brands from trusted suppliers ensuring optimal performance of the products. We know our suppliers well; how reliable their products are and the level of service that they provide. Whilst we do consider new suppliers from time to time, we are very cautious as our reputation is also dependent on the quality of suppliers that we use.

TowerXchange: At present does IPT PowerTech provide all the financing for ESCO projects and do you envisage using outside investment in the future? What kind of investors do you see as being interested in the ESCO space?

Khaled Habbal, VP & COO, IPT Powertech: We have relied on our own funds this far but do envisage that we will look at outside financing. We are receiving a large amount of interest from investors on both the debt and equity side from banks and funds and could foresee that many investors which have played in the towerco space will start to look at investment opportunities in ESCOs.

The challenge however is that the T-ESCO model is still very new and investors are still trying to understand it; there is a lot of ambiguity in the term ESCO, people don’t understand what type of contracts or MLAs are in place. There’s also a lack of sizeable ESCOs in the market which investors can compare; after IPT Powertech, the next biggest sized ESCO is way behind.

Ultimately however, there are a lot of parallels between ESCOs and towercos; it is still in the telecom infrastructure space involving long term (10 year) contracts with creditworthy MNOs and towercos. There is a lot of commonality in the two business models and the fact that towercos often view ESCOs as the competition only goes to support this view.
Energy Vision: the first ESCO of scale in SSA

Energy Services Company takes on 400+ sites in Gabon

MNOs in Africa seeking to reduce operational complexity have to date tended to focus on strategic partnerships with tower companies. But when the tower sale process of one operator in Gabon faltered, they sought an alternative strategic partner: pioneering ESCO Energy Vision. Africa’s first ESCO project of scale, Energy Vision are currently managing the first 50 of what will become over 400 towers, 30% of which are off grid. To find out more, TowerXchange spoke to our old friend Ofer Ahiraz, who readers will recognise as former CEO of Leadcom, who is now Co-founder and CEO of Energy Vision.


Read this article to learn:
- Energy Vision’s simple proposition: reliable and environmental friendly energy at a reasonable, predictable, fixed monthly price
- What proportion of Gabon’s cell sites are on-grid, on bad grid and off-grid
- The scope and current progress of SSA’s first ESCO project of scale
- How the project staffed and financed
- Which solutions technology agnostic Energy Vision chose to deploy

TowerXchange: Please introduce Energy Vision to our readers.

Ofer Ahiraz, CEO, Energy Vision: Founded four years ago, Energy Vision is an Energy Services Company, or ESCO/RESCO, providing Energy as a Service on a pure opex model with zero capex to MNOs and towercos currently focusing on the African telecoms market. Our team has many years of experience in the telecom market from business sectors including at an MNO, a towerco, turnkey provider, and a network and infrastructure engineering company.

Our vision is simple: to offer MNOs or towercos reliable energy at a reasonable, predictable, fixed monthly price. We deploy the capex to modernise sites’ power systems to the latest green technology including RMS, and undertake maintenance, upgrades and refuelling to offer reliable and with high availability -48VDC to power telecom equipment.

We are vendor agnostic, so have the freedom to select the best, most reliable and cost effective technical solution for the specific use case, country or environment. We measure total cost of ownership (TCO) over a ten year period.

TowerXchange: First please give us some context by introducing the structure of the mobile and tower markets in Gabon.

Ofer Ahiraz, CEO, Energy Vision: In Gabon there were four MNOs, led by fixed line incumbent Gabon...
Telecom, which trades under the Libertis brand, which is being privatised and is consolidating networks with MOOV, now also owned by Maroc Telecom. Their main competitor is Airtel Gabon, joined by Azur, a new small operator.

There are around 1,000 cell sites in Gabon, most of which are in the main cities, with the usual blend of rooftops and light towers in urban areas. While Airtel did try to sell their towers, 100% of the country’s towers remain owned by the MNOs. Very few towers are shared.

4G was launched and there is reasonably good coverage and QoS in the main cities. Gabon was the first country in Africa to have mobile coverage; they’ve been pioneers in Digital TV, fiber and cellular coverage. The country has near 100% economic coverage.

42.3% Gabon Telecom
34.7% Moov
15% Airtel
8% Azur
50% on grid
20% bad-grid
30% off-grid

Sources: TowerXchange, GSMA Intelligence, ARCEP, CIA Factbook

Fast implementation schedule. They were also impressed by our familiarity with the country: myself and my colleague have worked in Gabon for more than 20 years. Prior to my time at Leadcom, I worked for 18 years for Motorola and in the early 90’s we were rolling out OPT Gabon’s analogue cellular network.

TowerXchange: What have been the drivers for the MNO in Gabon to partner with an ESCO?

Ofer Ahiraz, CEO, Energy Vision: The MNO we are working with were seeking to reduce opex while securing a commitment to improve power availability. Energy Vision now gives them a single point of responsibility for power availability; we have clear KPIs governing power availability with penalties if we were to fall short of our Service Level Agreement. The SLA KPI we achieve on a monthly basis is 99.99%. This partnership relieves the MNO of the financial burden to investment in power equipment, freeing their budget to invest in their network.

Our client was impressed with the level of professionalism Energy Vision showed regarding our proposed solutions, and by our

TowerXchange: What is the scale of the project? And how has it been financed?

Ofer Ahiraz, CEO, Energy Vision: The scope of project will include over 400 sites and the contract has a nine year duration.

The venture is financed by our equity shareholder Allied Group, a multi-billion-Euro private European trust, and we got also the support from GIEK, the Norwegian export credit agency, via one of our partners Eltek.

TowerXchange: What is the current state of the project? How many sites do you have under management?

Ofer Ahiraz, CEO, Energy Vision: We have 280 sites running our equipment (full hybrid outdoor systems, most with solar) connected to our NOC via Remote Monitoring System (RMS). We are successfully delivering against a 99.99% uptime service level agreement (12 month average) and for the last six months, Energy Vision has also been awarded responsibility for management of all passive elements of the sites – towers, fences, structures et cetera.
We have already driven DG runtime on some sites down from 24 to 1.8 hours per day. Energy Vision has reduced CO₂ emissions by 3,088 tons per year, reduced fuel consumption by 1,157 m³ per year, equating to a 68% fuel and CO₂ emission reduction.

TowerXchange: Tell us about the operational environment in Gabon, for example what proportion of the sites are on good grid, unreliable grid and off grid? How spread out are the sites and what are the implications for the autonomy necessary to maximise uptime?

Ofer Ahiraz, CEO, Energy Vision: Around half the sites, mostly those in the main cities, are on good grid connections, with around 40% off grid and a further 10% on bad grid connections, where more than six hours of grid power is not usable. Generally the grid is relatively good in Gabon compared to elsewhere in SSA; with enough battery backups, urban and suburban sites should not be a major problem. However, we have started with the most complicated sites in remote areas, where there is the greatest necessity to have reliable power solutions.

At just over 250,000 sqkm, Gabon is slightly smaller than the State of Colorado, but sites are still quite broadly dispersed, so we organise our O&M team into nine regions, each taking a cluster of towers such that they are able to reach the site in a time consistent with our SLA commitments.

TowerXchange: Who undertakes the installation, operations and maintenance of the power systems at the sites – what capabilities have you kept in-house and what is outsourced?
Ofer Ahiraz, CEO, Energy Vision: All our O&M and NOC staff are in-house. It’s part of our vision that our guys are local and well trained – they understand the technology, they understand ours and our client’s expectations.

Yes we outsource some mechanical installation labour, or outsource transportation to serious logistics companies with the right cranes and trucks to do the job, but energy management is the core competence of an ESCO, so that’s all in-house.

The solutions we offer to the market are much more advanced than what is typically on today’s cell sites. Our equipment is IP controlled and remotely monitored, which means our technicians need a level of competency and skills way beyond oil changes. Our field technicians are using their laptops to configure controllers and communicate with different elements of sites. Without the right training, support and information refreshment, we won’t achieve the necessary talent level, so we have no option to outsource.

This competence will be our main asset in a few years.

TowerXchange: As this is the first ESCO of scale in SSA, it will be interesting to learn how it is resourced. Please take us through your organisation chart.

Ofer Ahiraz, CEO, Energy Vision: Today we have a team of 25, but that will increase as we take on more sites. Each cluster has a dedicated technician and an engineer equipped with spare parts. Each of these were formally trained by our equipment manufacturer’s experts, both theoretical training and on the job training at two or three sites.

Back in the control centre we have our GM, our Operational Director, who is effectively the leader of the field technician team, and our Technical Director, who oversees training, the NOC, performance stats, benchmarking and reports. When the technicians escalate an alarm or technical issue, it goes to him.

We also have finance and admin, warehousing and logistics – our headcount will be 35+ once we take over all the sites.

Within the mother company, there are a further six people: myself, our CTO, two in business development, a CFO and a Supply Chain Manager.

TowerXchange: It’s notoriously difficult to retain scarce skills in SSA – how will you minimise staff turnover?

Ofer Ahiraz, CEO, Energy Vision: Staff retention is a challenge at every level and company. From my previous experience, by creating the right atmosphere and company’s DNA we can keep them motivated and committed to the company.

We will invest in and promote our people as we believe in our people.

We are very open in our communications – our team can call me anytime – we are quite informal. We’re developing a warm, family environment.

Yes people might leave, but we want to build an employer of choice – for everyone who leaves, two to three other talented people knock on our door.

For our first round of recruitment in Gabon, we were still a new company in the market, but today we’re already getting good CVs from candidates who see we’re serious and committed to the market and the unique technology we used is challenging them.

TowerXchange: We understand Energy Vision are technology agnostic; what technologies are you deploying and why?

Ofer Ahiraz, CEO, Energy Vision: In any project we will use at least two or three suppliers to benchmark equipment performance, diesel consumption and after-sales service. So if we have two 1.5kW sites, we have real fuel consumption benchmarks from the field to compare supplier X versus supplier Y – partner selection isn’t about slides and lab test results, but proven results on our own sites. This creates healthy competition, and if suppliers deliver good results, we will keep using them in the future.

At some off-grid sites we are using Flexenclosure with their controller and DGs from Grupel, while at other off-grid sites we are using Ausonia’s all-in-one system with DC DG in one compartment and the DC system in another compartment. With the
help of the Norwegian export credit, we use Eltek systems at on-grid and on/bad-grid sites.

Generally we prefer to use proven technology and solutions, adding some mechanical strengthening to equipment to prevent theft and sabotage.

We’re using full hybrid solar and CDC batteries. We use as much solar as we can even though Gabon not one of the best countries in SSA for solar irradiation, and we’re satisfied with results so far.

We are using integrated RMS aggregated into our own platform in the NOC to see the total network, enabling us to integrate different suppliers in the future. We wanted to avoid the finger-pointing and blame game that comes with using third party RMS! In phase two we will collect and group information into a master NOC platform.

TowerXchange: What has been the thinking behind deploying relatively capital intensive, premium energy solutions?

Ofer Ahiraz, CEO, Energy Vision: As a serious and responsible company, we selected tier one suppliers that are proven in tough market conditions and tough environments. We have past experience, long and extensive business relations with those suppliers.

We build configurators and evaluate ROI over a ten year period. We know where we expect our suppliers to be, and partner with them to achieve the performance goals necessary to support our business model.

We are cultivating long term relationships with our technology partners – we hope they take up the challenge to support us in our ambitious expansion plans within and beyond Gabon!

TowerXchange: What is your vision to drive expansion in Gabon and beyond? And how will you finance such growth?

Ofer Ahiraz, CEO, Energy Vision: We have good relationships with the MNOs and OEMs in Gabon, and that has fast tracked our entry into the market. We’ll take some of our proven team in Gabon to ramp up in other countries like I did at Leadcom – develop a pool of local African people to support the growth of the company.

In Gabon there are still two MNOs who have their own towers – they are target customers for our proposition. We believe in the potential for further deals in the Gabon market, but in parallel we’re developing discussions with different carriers in different countries. We hope by Q1 2017 we will have a second country in our portfolio, and we’re targeting a third country before the end of 2017.

We will synchronise raising further investment and vendor finance with the growth of the business as we continue to increase capex.

Currently we are finding MNOs more receptive to our vision than towercos, but it’s only a matter of time – the market will come once ESCOs prove they can do it as well if not better!
Who’s who in sub-Saharan African towers: 2018 update

TowerXchange presents an A to Z of key stakeholders in the sub-Saharan African tower industry

TowerXchange takes a deep dive into the African tower industry, providing the most comprehensive directory to date of the key MNOs, towercos, infracos, investors and ESCOs active in the market.


9mobile: Nigerian MNO, formerly known as Etisalat Nigeria which was rebranded following a takeover by a consortium of banks after defaulting on loan repayments. The operator is in the process of being acquired with Teleology Holdings the confirmed buyer.

African Infrastructure Investment Managers: Joint venture between Macquarie and Old Mutual with capital at work in IHS.

African Towers: Ghanaian towerco which owns 150 macro towers with plans to add about 50 new sites in the next 12 months. The company has also deployed DAS at around 50 sites, including in major airports in the country.

Africell: African MNO with a presence in the DRC, Uganda, Sierra Leone and Gambia (being market leaders in the latter two). The company took over Orange’s operations in Uganda, where Orange had previously sold their towers to Eaton. To roll out their network in the DRC, Africell built few towers, choosing instead to co-locate on Helios’ existing portfolio.

African Mobile Networks: Rural towerco with an interesting business model that combines active and passive infrastructure, with AMN funding the capex and sharing revenue for sites. AMN has deployed networks in six countries and is the process of deploying in a further nine countries in sub-Saharan Africa.
Airtel: African subsidiary of Indian operator, Bharti Airtel with a presence in 15 African countries and having sold towers in ten of these (figure 1). The company has sold towers to each of the big four African towerco's, divesting their portfolios to Helios in the DRC and Congo B, to American Tower in Nigeria, to IHS in Rwanda and Zambia and to Eaton in Burkina Faso, Ghana, Niger, Kenya and Uganda.

The operator has twice agreed the sale of their Tanzanian towers, firstly to Helios and then to American Tower, however both deals were cancelled. The MNO now retains towers in five markets, namely Tanzania, Chad, Madagascar, Malawi and Gabon. In the latter, Airtel has signed a deal with Energy Vision, whereby Energy Vision will take over the management of cell site power systems through an ESCO agreement. Whilst Airtel had examined the ESCO model for its other opcos, the economics on offer were not favourable to the operator and so Airtel has abandoned further ESCO plans, favouring renewal of their managed service contracts instead.

Aktivco: Camusat’s ESCO which has signed four contracts; three with Orange in Niger, Burkina Faso and Cote d’Ivoire and a fourth with Millicom in Chad. The company has around 2,000 towers under ESCO management in SSA with plans to increase this to 10,000 in the next four years.

Albright Capital Management: Chaired by former US Secretary of State Madeleine

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Figure 1: Airtel’s tower ownership and transactions across its 15 African markets

- Sold to Eaton Towers
- Sold to American Tower
- Sold to Helios Towers
- Sold to IHS
- Retains towers, ESCO contract signed with Energy Vision
- Currently retains towers
- No opco present
- Sold to Eaton Towers; opco subsequently acquired by Orange

Source: TowerXchange
Albright, Albright is an investor and advisory firm dedicated to the emerging markets and an investor in Helios Towers Africa.

**Al Karama Towers:** Newly formed Senegalese towerco, backed by M&A Capital, in the process of acquiring Expresso Telecom’s 550 sites in the country (up from 450 sites at the time of the deal’s announcement). The sale and leaseback transaction also includes first right of refusal on new build for Expresso. Al Karama Towers has an appetite for further towers in Senegal and has plans to expand into further West African markets, having entered high level discussions with MNOs in at least two other countries.

**American Tower:** The world’s largest independent towerco with a global tower count over 150,000. The towerco has completed five tower transactions of scale in sub-Saharan Africa, with the acquisition of Telkom Kenya’s 723 sites marking a sixth deal which is expected to close in the second half of 2018 (figure 2). In Africa, American Tower currently has 11,098 towers across four markets (Q2, 2018), with the Kenya transaction adding a fifth market to their portfolio (figure 3).

The company continues to undertake new build across its markets and whilst figures separating new build from small scale acquisitions and decommissioning activities are not available, the net increase in American Tower’s African portfolio was 277 sites in 2017. One can take this as a rough proxy for the number of new towers built.

### Figure 2: American Tower’s major acquisitions in Africa

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Tower count</th>
<th>Deal value US$</th>
<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Kenya</td>
<td>Telkom Kenya</td>
<td>723</td>
<td></td>
<td></td>
<td>SLB*</td>
</tr>
<tr>
<td>2016</td>
<td>South Africa</td>
<td>Eaton Towers</td>
<td>300</td>
<td></td>
<td></td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2014</td>
<td>Nigeria</td>
<td>Airtel</td>
<td>1,211</td>
<td>1,060,000,000</td>
<td>224,719</td>
<td>SLB</td>
</tr>
<tr>
<td>2011</td>
<td>Uganda</td>
<td>MTN</td>
<td>962</td>
<td>89,250,000</td>
<td>181,912</td>
<td>Joint venture (AMT 51%, MTN 49%)</td>
</tr>
<tr>
<td>2010</td>
<td>Ghana</td>
<td>MTN</td>
<td>1,836</td>
<td>218,500,000</td>
<td>230,835</td>
<td>Joint venture (AMT 51%, MTN 49%)</td>
</tr>
<tr>
<td>2010</td>
<td>South Africa</td>
<td>Cell C</td>
<td>1,400</td>
<td>200,000,000</td>
<td>142,857</td>
<td>SLB with BTS**</td>
</tr>
</tbody>
</table>

* Announced not closed; **Deal included 1,400 existing towers plus 1,800 to be constructed. Total acquisition cost of US$430mn excluded here because the BTS component distorts the average

Source: TowerXchange

### Figure 3: American Tower’s sub-Saharan African portfolio

Nigeria
4,757

South Africa
2,575

Uganda
1,490

Ghana
2,276

Kenya
723*

*announced, not closed

Source: American Tower Q2 2018 results (Kenya added for illustrative purposes)
The company has begun to explore opportunities and business models beyond macrosites in Africa, reporting 23 owned DAS sites in Ghana (Q4, 2017) and having recently formed a partnership with fibre player, Frogfoot in South Africa, leasing capacity to communications and internet service providers as well as third party operators.

ANTOSC: Angola’s first towerco in which managed service provider Anglobal has a 35% share. The towerco was formed in response to new legislation introduced in 2016, preventing new towers being built in close proximity to existing sites and thus mandating MNOs to share infrastructure in order to expand their networks. ANTOSC expect to have a portfolio of about 30 sites by Q3 2018 with the addition of 70 sites currently forecast for 2019. The towerco is targeting 400 sites in the next three years.

Atlas Tower: South Africa’s fastest growing towerco. As of Q3 2018, Atlas’ South African portfolio totals 691 sites with this expected to reach 748 by the year end. Atlas has invested in several further African countries and expects to complete around 25 new builds in Kenya and Botswana in 2018. The company, which also has a presence in the US market, has focussed its business model around organic rather than inorganic growth.

BCTek Engineering: Nigerian towerco with a 20 year contract to manage and market a portfolio of 700 towers originally built as a surveillance network, over 80% of which are police compounds.

Blackstone: Serial towerco investor currently working with Phoenix Tower International in CALA. Blackstone has previously evaluated investment opportunities in one of Africa’s privately owned towercos.

Blue Sky Towers: Privately owned towerco with a portfolio of 60 sites in South Africa, with 15 additional sites expected to come online by Q417. Part of Merlin Project Services, an MSP which has been operating in the country for 18 years.

Capital Group Private Markets: Private equity fund focus on emerging markets with a diverse portfolio. Major shareholder in Eaton Towers.

The Carlyle Group: Private equity and alternative asset management firm with money at work in Indonesian towers. Yet to invest in Africa.

Cell C: South African operator who monetised their towers back in 2010 with a sale to American Tower. Cell C maximised upfront capital in their deal with the towerco in order to raise capital for rollout and to grab market share, but in doing so agreed a high leaseback rate which the company has been unhappy with. Cell C have since made their decision to rebuild their portfolio, agreeing a build-operate-transfer arrangement with Proef Group’s International Tower Corporation and using sites of other smaller towercos.

Citi: One of the world’s leading tower transaction advisory groups can be found in the TMT team at Citi.

Coast to Coast: One of South Africa’s smaller independent towercos with a portfolio of 38 towers.

Comco: Small South African towerco.

Communication Towers Nigeria: Nigerian towerco which claims to have 500 cell sites across all 36 states.

Connect Africa: Company focussed on bringing connectivity to rural areas in Africa. Most recently Connect Africa has deployed a series of Wi-Fi hotspots in rural areas across Zambia. These base stations costs less than $10,000 and are partly funded by advertising. Connect Africa has over 200 sites deployed successfully with three operators.

Convergence Partners: Firm focussed on early-stage investments in the African TMT sector. Had looked at an investment in the tower industry a few years ago.

CREI: ieng Group’s ESCO business unit.

CSquared: Pan-African fibreco with a footprint in Uganda, Ghana and Liberia and an appetite for geographical expansion.

Dark Fibre Africa: South African open access fibreco in which Remgro are majority shareholders. Have an interest in exploring new business models with towercos.

Delta Partners: Leading TMT consultant and...
investment advisory company with extensive global expertise in the tower industry.

**Development Partners International**: Private equity fund focussed on Africa with money at work in Eaton Towers.

**Digital Bridge**: Infrastructure firm involved in the acquisition, funding and management of firms in the infrastructure sector such as Mexico Tower Partners, Vertical Bridge, Andean Tower Partners, ExteNet Systems, DataBank and Vantage Data Centres. Digital Bridge recently formed a joint venture, Digital Colony, with Colony Northstar (a leading real estate management firm) to invest in towers, data centres, small cell networks and fibre. Whilst the company is yet to make an investment in Africa, Digital Bridge and Digital Colony have a global outlook.

**Distributed Power Africa**: Econet’s in-house ESCO which is also offering solar power solutions to sectors beyond telecoms. Distributed Power Africa currently has 1500 sites under ESCO management.

**Eagle Towers**: Private towerco with a portfolio of 50 towers in South Africa.

**Eaton Towers**: Africa’s fourth largest towerco with a portfolio of 5,000 sites across Burkina Faso, Ghana, Kenya, Niger and Uganda (see figure 4) having acquired sites from Airtel (in all five countries) Orange and Warid in Uganda and entered into an MLL arrangement with Vodafone in Ghana (see figure 5). In 2013, the towerco entered into an MLL arrangement with Telkom Kenya, but the arrangement was cancelled nine months later. Eaton had built a successful portfolio of 300 towers (and a pipeline of 1,000 further sites) in South Africa before the opco was sold to American Tower. Eaton’s investors are known to be looking for an exit, although earlier plans to IPO have been put on hold.

**Econet**: Major TMT conglomerate which is Zimbabwe’s largest operator, with a footprint...
also in Burundi and Lesotho. The company had considered the formation of an internal towerco, although plans are yet to move forward. Econet has recently formed their own in-house ESCO, Distributed Power Africa which not only intends to supply power to their towers but is also providing solar power to other commercial and industrial sectors in Zimbabwe. Econet is also the parent company of pan-African fibreco, Liquid Telecom.

**Eighty Four Dynamics:** Newly formed Zimbabwean towerco whose sister company has over eight years experience constructing tower sites for the major operators in Zimbabwe.

**Emerging Capital Partners:** Private equity fund focussed on Africa; investors in IHS.

**Energy Vision:** Pioneers of the ESCO model in sub-Saharan Africa, having signed the continent’s first ESCO contract of scale with Airtel Gabon, based on a fixed energy business model with a nine year term. Energy Vision has now taken on all 280 allocated sites in Gabon, successfully delivering against a 99.99% uptime service level agreement (12 month average). The company has also been awarded responsibility for management of all passive elements of the sites including towers, fences and structures. Energy Vision is technology agnostic with an appetite for further ESCO projects on the continent.

**Ethos Private Equity:** Private equity firm with money at work in Eaton Towers since May 2015.

**Expresso Telecom:** Tier two MNO Expresso with a footprint in Sudan, Ghana, Guinea, Mauritania and Senegal has agreed their first tower sale, announcing a SLB agreement with Al Karama Towers for their 550 towers in Senegal. The deal is expected to close in H2 2018.

**FMO:** Dutch development bank 51% government owned, 49% by commercial banks and financial institutions. Have invested in African towercos.

**Frogfoot:** South African licensed open access fibre network provider (funded by Rand Merchant Bank, Investec and Metier Capital) which has signed a partnership agreement with American Tower in the country.

**Gabon Telecom:** See Maroc Telecom.

**Globacom:** Operator with a footprint in Nigeria, Ghana and Cote d’Ivoire which has shied away from infrastructure sharing and tower deals in spite of the presence of towercos in its home markets.

**GreenWish Partners:** ESCO which has signed an ESCO contract with Orange in the DRC, with Sagemcom as operational partners.

**Gyro Towers:** South African MNO Telkom’s new carve out towerco.

**Hardiman Telecommunications:** A unique consultancy equally capable advising on engineering and operational issues as they are on commercial strategy and corporate finance. Extensive experience advising on both the buy-side and sell-side in tower transactions.

**Helios Investment Partners:** Investment firm making private equity investments in Africa, with a primary focus on the sub-Saharan region. Helios’ portfolio companies operate in 35 African
countries across a range of industry sectors, with telecom infrastructure and services playing an important part. Founder investors in Helios Towers and previous investors in HTN Towers (prior to the towerco’s sale to IHS).

**Helios Towers**: Africa’s third largest towerco, the company completed its first major tower transaction in 2010, acquiring 750 towers from Tigo in Ghana and have since completed five further major tower transactions establishing a footprint in Congo Brazzaville, the DRC and Tanzania (figure 7). The first towerco to enter each of its jurisdictions, the company remains the sole towerco in the latter three markets and possesses a strong urban presence in Ghana where it competes with American Tower and Eaton Towers. The company now owns a total of 6,533 towers across the four countries (figure 8), having added build-to-suit towers and smaller bolt-on acquisitions to its portfolio. In 2018, Helios announced plans to enter the South African market, also reaching an agreement with fibreco, Vulatel, in the country. Helios has recently announced a major project in the DRC, building a 1,800km backbone network incorporating 80-100m high towers approximately 40km apart. In 2018 the company announced plans to IPO but cancelled the process a few weeks later.

**Hotspot Network**: Nigerian towerco which build a network of 160 sites through build to suit contracts with Airtel and Etisalat. The towerco recently sold 85 of its towers to IHS.

### Figure 7: A history of Helios Towers’ major tower transactions

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Tower count</th>
<th>Deal value US$</th>
<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Tanzania</td>
<td>Zantel</td>
<td>185</td>
<td>6,700,000</td>
<td>36,216</td>
<td>SLB+</td>
</tr>
<tr>
<td>2016</td>
<td>DRC</td>
<td>Airtel</td>
<td>967</td>
<td>165,000,000</td>
<td>170,631</td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Congo B</td>
<td>Airtel</td>
<td>393</td>
<td>50,000,000</td>
<td>127,226</td>
<td>SLB</td>
</tr>
<tr>
<td>2013</td>
<td>Tanzania</td>
<td>Vodacom</td>
<td>1,149</td>
<td>75,000,000</td>
<td>87,616</td>
<td>SLB with direct investment in Helios*</td>
</tr>
<tr>
<td>2010</td>
<td>Tanzania</td>
<td>Millicom/Tigo</td>
<td>1,020</td>
<td>81,000,000</td>
<td>132,353</td>
<td>Joint venture (Helios 60%, Millicom 40%)**</td>
</tr>
<tr>
<td>2010</td>
<td>DRC</td>
<td>Millicom/Tigo</td>
<td>729</td>
<td>41,500,000</td>
<td>94,878</td>
<td>Joint venture (Helios 60%, Millicom 40%)**</td>
</tr>
<tr>
<td>2010</td>
<td>Ghana</td>
<td>Millicom/Tigo</td>
<td>750</td>
<td>54,000,000</td>
<td>120,000</td>
<td>Joint venture (Helios 60%, Millicom 40%)**</td>
</tr>
</tbody>
</table>

* Deal includes the right for Zantel to use some of Helios' existing sites* Vodacom acquired a 24.5% stake in HTT, which Helios has since purchased for $58.5mn ** Millicom restructured their equity into Helios' operations into a 24% stake at group level (since reduced to 22.83%) which Millicom is now looking to monetise

### Figure 8: Helios Towers’ African portfolio

<table>
<thead>
<tr>
<th>Country</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>3,508</td>
</tr>
<tr>
<td>DRC</td>
<td>1,771</td>
</tr>
<tr>
<td>Ghana</td>
<td>870</td>
</tr>
<tr>
<td>Congo B</td>
<td>384</td>
</tr>
</tbody>
</table>

Source: TowerXchange
HTN Towers: One of the first towercos in Africa, HTN Towers (formerly Helios Towers Nigeria) built a portfolio of 1,211 towers in Nigeria before being acquired by IHS Towers in 2016. HTN Towers also signed a management with license to lease contract with SWAP Telecoms & Technologies which was transferred to IHS upon IHS’ acquisition of the towerco. The contract is understood to have since been cancelled.

IHS Towers: Towerco with the largest African portfolio, totaling 22,860 towers across Cote d’Ivoire, Cameroon, Zambia, Rwanda and Nigeria (figure 10), with over 60% of its towers in the latter. The towerco has completed transactions with Airtel (Rwanda & Zambia), Etisalat (Nigeria), Orange (MLL arrangement in Cameroon and Cote d’Ivoire) and MTN (in all five countries); in 2016 IHS also acquired rival Nigerian towerco HTN Towers and their 1,211 sites (figure 9).

Outside of Africa, the towerco has recently expanded into the Middle Eastern market reaching a deal to acquire Zain’s Kuwaiti sites and entering exclusive negotiations with the operator in Saudi Arabia.

Privately owned, IHS’ investors include MTN with a 29% stake, Wendel and the IFC.

Infratel: Rural infraco in the DRC whose equipment is on 800 cell sites.

International Finance Corporation (IFC): The IFC is a member of the World Bank Group, the

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**Figure 9: A history of IHS Towers’ major tower transactions in Africa**

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Buyer</th>
<th>Tower count</th>
<th>Deal value US$</th>
<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>Nigeria</td>
<td>Hotspot Network*</td>
<td>IHS</td>
<td>160</td>
<td></td>
<td></td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>Nigeria</td>
<td>HTN Towers</td>
<td>IHS</td>
<td>1,211**</td>
<td></td>
<td></td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2015</td>
<td>Nigeria</td>
<td>Etisalat</td>
<td>IHS</td>
<td>555</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Rwanda</td>
<td>Airtel</td>
<td>IHS</td>
<td>164</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Zambia</td>
<td>Airtel</td>
<td>IHS</td>
<td>949</td>
<td>150,000,000</td>
<td>158,061</td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Nigeria</td>
<td>MTN</td>
<td>IHS</td>
<td>8,850</td>
<td>984,000,000</td>
<td>226,911</td>
<td>Joint venture (49% IHS, 51% MTN)**</td>
</tr>
<tr>
<td>2014</td>
<td>Nigeria</td>
<td>Etisalat</td>
<td>IHS</td>
<td>2,136</td>
<td>485,000,000</td>
<td>227,060</td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Rwanda</td>
<td>MTN</td>
<td>IHS</td>
<td>550</td>
<td>48,000,000</td>
<td>87,273</td>
<td>SLB</td>
</tr>
<tr>
<td>2014</td>
<td>Zambia</td>
<td>MTN</td>
<td>IHS</td>
<td>748</td>
<td>57,000,000</td>
<td>76,203</td>
<td>SLB</td>
</tr>
<tr>
<td>2013</td>
<td>Cameroon &amp; Cote d’Ivoire</td>
<td>Orange</td>
<td>IHS</td>
<td>2,000</td>
<td></td>
<td></td>
<td>MLL</td>
</tr>
<tr>
<td>2012</td>
<td>Cote d’Ivoire</td>
<td>MTN</td>
<td>IHS</td>
<td>911</td>
<td>141,000,000</td>
<td>154,775</td>
<td>SLB</td>
</tr>
<tr>
<td>2012</td>
<td>Cameroon</td>
<td>MTN</td>
<td>IHS</td>
<td>820</td>
<td>143,000,000</td>
<td>174,390</td>
<td>SLB</td>
</tr>
<tr>
<td>2010</td>
<td>Nigeria</td>
<td>Visafone</td>
<td>IHS</td>
<td>800</td>
<td>67,000,000</td>
<td>83,750</td>
<td>SLB</td>
</tr>
</tbody>
</table>

* Transaction announced, not yet closed
**Plus HTN’s managed services and co-location marketing agreement concerning SWAP Telecoms & Technologies 702 towers will be transferred to IHS following completion of the transaction
***MTN’s equity since restructured for additional shareholding at IHS group level

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**Figure 10: IHS Towers’ African tower portfolio**

Source: TowerXchange
world's leading DFI. The IFC has invested around half a billion dollars in debt and equity into eight towercos across emerging markets and is an investor in IHS.

**International Tower Corporation:** Part of Proef Group, South African towerco which is working with Cell C to rebuild their tower portfolio under a build-operate-transfer model.

**Intrepid Advisory Partners:** Advisory firm established by Daniel Lee which advised on 11 of the first 13 tower deals to close in Africa.

**IPT PowerTech:** Telecom ESCO which participated in IHS’ ‘Big Five’ project in Nigeria and recently signed an ESCO contract with Orange in Guinea. Further deals are expected from this ambitious ESCO.

**IPX Extenso:** Rural towerco which has developed a platform bringing together low CAPEX infrastructure and low-OPEX airtime. The company is in the process of deploying its first full platform model. Expect an announcement soon.

**Lap GreenN:** Operator who has tried to monetise towers in Uganda but has been hindered by trading restrictions placed on the Libyan owned parent. The company also has a presence in Sierra Leone and South Sudan.

**Liquid Telecom:** Pan-African fibreco which is part of the Econet Group. Liquid Telecom also
owns Africa Data Centres which has data centres in South Africa and Kenya.

**Macquarie Group:** Serial towerco investors, with capital at work in Arqiva, Russian Towers, Axicom (formerly Crown Castle Australia), Mexico Tower Partners and Viom Networks (now part of ATC India). Macquarie also has an excellent TMT advisory practice with experience of advising on tower transactions.

**Maroc Telecom:** Moroccan headquartered MNO in which Etisalat has a 53% stake. Has expressed little interest in divesting their towers to date and remains conservative in regards to infrastructure sharing. In addition to their presence in Morocco, Maroc Telecom has strong West African presence, having opcos in nine African countries (figure 10) where it operates under the brands Moov (Benin, Central African Republic, Cote d’Ivoire, Niger, Togo), Onatel (Burkina Faso) Sotelma (Mali) Mauritel (Mauritania) and Gabon Telecom (Gabon).

**Mauritel:** See Maroc Telecom.

**mCel:** Mozambican state owned MNO. In a bid to reduce long standing debts, the company appointed Barclays to oversee a sale of its ~1,000 towers but the deal stalled following limited interest from towerco. The government has since announced the planned merger of mCel with fixed-line incumbent TDM, in a bid to transform the loss-making entities into a single, more profitable unit.
Millicom/Tigo: Millicom undertook the first pioneering tower transactions with Helios Towers in Ghana, DRC and Tanzania from 2010-11, but the group hasn’t done a SSA tower deal since. Millicom owns, and is in the process of selling, the 24% stake it acquired in Helios Towers following the transactions.

The operator has recently sold opcos in Senegal (to a consortium involving NJJ, Sofima and Teyliom Group) and Rwanda (to Airtel) after having previously sold its DRC operations to Orange back in 2016. Airtel recently merged their Ghanaian operations with Airtel.

In Chad, Millicom has signed its first agreement with an ESCO, handing over management of power on its sites to Camusat’s Aktivco. In Tanzania the company has recently entered into a RANsharing agreement with the two other MNOs to increase coverage in rural areas. Rumours have emerged that Millicom may look to sell its two remaining African opcos, with Econet understood to have an expressed interest in at least one of them.

Moov: See Maroc Telecom.

MTN: MTN, with a presence in 17 African countries, has monetised their towers in seven – representing the majority of their most attractive portfolios. The company has raised around US$2.5bn to date and retained equity in selected markets. MTN commenced their passive infrastructure monetisation strategy in 2010-11 with the formation of joint venture towercos.

Figure 13: MTN’s history of tower sales

Source: TowerXchange

Sold to IHS
JV with American Tower
MTN retains towers
No opco present
with American Tower in Ghana and Uganda, in which MTN retained 49% equity. This was then followed up with sale and leasebacks of 100% of the equity in their towers in Cameroon, Côte d’Ivoire, Rwanda and Zambia – this time with IHS as the counterparty. In Nigeria, MTN formed a joint venture with IHS in which it retained a non-controlling 51% stake. In February 2017, MTN exchanged its 51% stake in the joint venture for additional shareholding at IHS group level, taking its equity stake in IHS Holdings from 15% to 29% and simplifying its ownership structure in the process.

MTN’s most significant portfolio they retain in Africa is South Africa where the operator has approximately 9,000 towers (the company’s Iranian opco, MTN-Irancell also has a portfolio of 13,000 towers in Iran). Beyond this, MTN’s smaller portfolios are yet to attract the interest of towercos and the operator is reportedly considering the ESCO model in such markets to rid themselves of the main operational complexity of managing the towers.

**Oceanic Infrastructure**: Kenyan towercos.

**Onatel**: See Maroc Telecom.

**Orange**: Orange has a presence in 14 Sub-Saharan African markets but has only entered into tower deals in three, signing an MLL arrangement with IHS Towers in Cameroon and Côte d’Ivoire and selling 300 towers to Eaton in Uganda (before then selling their opco to Africell). With towercos present however in a
total of six of their markets, Orange does lease space from independent towercos, whilst also sharing sites with operators.

Orange has been a pioneer of the ESCO model in Sub-Saharan Africa and has signed contracts in the DRC (with GreenWish Partners and Sagemcom as their operational partner), in Niger, Cote d’Ivoire and Burkina Faso (with Camusat’s Aktivco) and in Guinea Conakry (with IPT PowerTech). The operator has also confirmed that it has issued ESCO RFPs in Madagascar and Egypt but further ESCO RFPs are expected in other markets.

**Pan African Towers**: Towerco with 1,000 sites in Nigeria and 300 in Ghana with further extensive new build planned. In Nigeria, the company has Airtel, 9mobile, Smile and some small broadband companies as tenants, expecting to sign up with MTN in the latter half of 2018. The company’s business model is predicated on leases being denominated in local currency.

**PowerCom**: PowerCom, owned by MNO Telecom Namibia, is Namibia’s first dedicated infrastructure player. Managing a portfolio of 300 towers, the company has ambitions to integrate further assets into its portfolio.

**Pro High Site Communications**: South African towerco with a portfolio of eleven towers.

**Pula Towers**: Botswana’s first towerco which has a focus on both macro towers and in building solutions.

**RIT Capital Partners**: Chaired by Lord Rothschild, RIT Capital Partners is an investment trust, listed on the London Stock Exchange with a widely diversified portfolio, including an investment in Helios Towers.

**Safaricom**: Kenyan MNO, possessing Vodacom as a shareholder, dominates the Kenyan mobile market. Whilst the company considers its towers too strategic to sell, Safaricom has for some time been swapping or leasing their tower portfolio, by far Kenya’s largest and most extensive, to MNOs and other tenants. The company has recently begun offering power as a service to its tenants.

**SEALTowers**: Start-up Kenyan towerco focussed on low cost compact tower site solutions and hybrid power innovations. Expect to have 500 sites built by Q3 2018.

**SENTECH**: South African broadcast towerco with a portfolio of 340 sites.

**Sky Coverage**: South African towerco with an undisclosed tower count.

**Smile**: LTE pioneer, Smile, with a presence in major cities in the DRC, Nigeria, Tanzania and Uganda rely primarily on co-location on third party towers in order to rollout their network.
Sonatel: See Orange.

Soros: Quantum Strategic Partners (QSP) is a private investment vehicle, managed by Soros Fund Management LLC. QSP focuses globally on investments in several strategies, including capital-intensive start-ups, buyouts, and growth equity transactions. Investors in Helios Towers.

Sotelma: See Maroc Telecom.

SWAP Telecoms & Technologies: Another claimant to the title of Africa’s first towerco, Nigerian towerco SWAP acquired the towers of Multilinks’ CDMA competitor Starcomms back in 2010. After the loss of their anchor tenant, SWAP struggled to generate revenues and after speculation over a merger between competitor towerco, HTN Towers and SWAP, the two reached an agreement whereby HTN would manage, market and lease space on the SWAP towers. This agreement was passed on to IHS Towers following their acquisition of HTN Towers, with 368 of their 702 understood to be live. It has been reported that IHS has since given notice to tenants on a number of SWAP towers with a view to decommissioning sites and moving tenants onto existing IHS owned sites.

Telkom Kenya: Kenyan operator which recently agreed the sale of its 723 towers to American Tower. The operator had previously entered into a management with license to lease agreement with Eaton Towers back in 2013, only for the deal to be cancelled nine months later. Rumours had been circulating that third placed Telkom Kenya and second place Kenyan operator, Airtel
were considering a merger in the market to create a sizeable competitor to market leaders Safaricom. Merger talks now appear to be off.

**Telkom South Africa:** South African MNO with under 5% mobile market share in the country (Q4, 2017). Telkom had an on/off tower sale but in 2017 announced the formation of their own towerco, Gyro Towers to maximise the profitability of their sites.

**Tigo:** See Millicom.

**Tilmann Global Holdings:** Investor with broad appetite for towerco investments anywhere from early stage opportunities (where the company has been involved in build to suit programs with Eaton Towers in Africa and Apollo Towers in Myanmar) to sale and leasebacks in mature markets of thousands of sites.

**TowerCo of Madagascar (TOM):** The only towerco in Madagascar, Towerco of Madagascar (TOM) have a portfolio of over 1000 sites in the country (Q1 2018).

The company is part of the Axion Group of companies, owned by Hassanein Hiridjee, which also includes TELMA (the number one operator in Madagascar) and EDM, the national electricity company. TOM has further extended its presence into the Indian Ocean managing towers from the Axion Group after the group acquired the mobile branch of Outremer Telecom in La Reunion and Mayotte and the second mobile license in Comoros.

The company is extensively reviewing alternative energy options, including the pilot of a wind project in Madagascar.

**Unitel:** Largest of Angola’s MNOs with two thirds of the market share in the country and a portfolio of 1,700 sites.

**Viettel:** Africa’s most aggressive new entrant, Vietnamese military backed Viettel had initially seemed reluctant to accelerate time to market by leveraging co-location. However they have since reached co-location agreements with IHS in Cameroon (where they operate as Nexttel) and Helios Towers in Tanzania (where they operate as Halotel), the latter of whom attracted ~1,000 co-locations. The company also has a footprint in Mozambique (Movitel) and Burundi (Lumitel). Viettel had expressed an interest in the Nigerian market and was previously linked to the 9mobile sale.

**Vodacom/ Vodafone:** Multinational MNO with a presence in South Africa, Tanzania, the Democratic Republic of Congo, Mozambique and Lesotho and a controlling stake in Safaricom in Kenya. (In North Africa, Vodafone has a presence in Egypt). Apart from an early ‘manage with license to lease’ (MLL) deal in Ghana with Eaton Towers and the sale of 1,149 Tanzanian towers to Helios Towers Africa in 2013 (where Vodacom acquired a 24.5% stake in Helios Towers Tanzania, a stake which Helios has since purchased), Vodacom and its parent company, Vodafone consider their tower assets too strategic to divest. Both Vodacom South Africa and Safaricom run in-house towercos, actively pursuing co-locations on their existing sites.

**Voltalia:** Major energy player offering an ESCO solution to the telecom sector. Voltalia has signed an ESCO contract with Myanmar towerco, MNTI and has an appetite for projects in the African market.

**Vulanet:** South African fibreco which has recently reached a partnership agreement with Helios Towers.

**Wendel:** Family fund, leading investor in IHS

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**Who have we missed?**

Advance apologies: we’re bound to have missed one or two key stakeholders in African towers – if so we’d like to know as we’re on a mission to assemble everyone at the 6th Annual TowerXchange Meetup Africa being held on 9-10 October 2018 in Johannesburg!

If you feel your company should be profiled in the TowerXchange who’s who in African towers, please email Laura Graves, Managing Director, EMEA, TowerXchange, at: lgraves@towerxchange.com
2019 sponsors

Gold sponsor:

Bladon

Bladon is a pioneer in the design, development and manufacture of Micro Turbine Gensets (MTGs) – using high-speed, ultra reliable, low noise and clean-burning microturbines together with patented air-bearing and heat exchanger technologies that will transform distributed power generation.

Bladon is the world’s first manufacturer of microturbine gensets for the telecom market. Providing 12kW of power the Bladon MTG has up to 8,000 hour service intervals, fuel flexibility to use diesel, kerosene or mixture, secure packaging and reduced environmental impact. The Bladon MTG is the world’s only EURO V emission standard compliant 12kW diesel genset and uses no engine oils or liquid coolants thanks to its one moving part and air bearings technologies.

www.bladonmt.com

Silver sponsor:

Acsys International Ltd.

Acsys International is a global technology company specialized in security and access management of critical infrastructure through the emerging field of remote access management solution. Instigated in 1999 from the technologies of two French defense contractors, Acsys International provides remote access control using both smart-key and keyless solutions. The signature Intelligent Access Management System (iAMS) is a platform that brings together smart-padlocks, smart-keys and management software to provide a powerful means to control who goes where and when, indoors and outdoors.

Our highly specialized and international team of engineers develops world-unique and patented solutions—from the Code Generation System (CGS) and Keypad Key to remote staff management via the mobile App. This modular, and solution-oriented approach sets Acsys International apart from other security solution provider in the market. With presence in 64 countries, our clients are global leaders from different industries, including telecommunications, power, mining, logistics and more.

www.acsys.com

Silver sponsor:

Delmec

Delmec has been a primary component in the telecommunication industry, not only within the infrastructure area but also providing state of the art telecom solutions for Ireland, UK, Africa, Europe, America and the Middle East for over 30 years. With the company's headquarters based in Ireland, Delmec provide structural and network solutions, infrastructure builds, steelwork, renewable energy and fibre network builds. Our expertise has led us to become a renowned provider of engineering services to the telecom and utility sectors, specialising in full turnkey solutions from design concept to live on air.

Delmec’s reputation can be witnessed in over 40 countries where key services have been provided to a wide range of clients whom many have continually sought the expert knowledge of Delmec for their telecom’s needs. Delmec strive to provide services ensuring the client is given the best customer service, maintaining a high efficiency and always to a quality that is highly regarded in the telecom industry with many of our clients stating that Delmec are; The best in the world at what we do.

www.delmec.ie
We have significant industry experience, advising on
telecoms transactions in numerous countries, including
across Europe, Africa, Asia, the Americas and the Middle
East and our team is well recognised for such transactions
worldwide. Our telecommunications advice includes
acquisitions and disposals, debt and equity financing,
infrastructure development, operational arrangements,
regulatory matters and dispute resolution.

We also have significant experience in the negotiation and
drafting of sale and purchase, debt and equity financing,
master lease, build-to-suit, site management, site marketing
and service level arrangements, fibre IRUs and other
complex commercial contracts.

Apollo Solar
Apollo manufactures complete energy systems for telecom
BTS towers. Our US made equipment has the reputation for
reliability in challenging climates and is highly respected
globally. Not just Solar + Storage, the Apollo Smart Hybrid
systems use energy from the lowest cost source to achieve
minimum OPEX. Integrated Remote Monitoring provides Site
Status, Alarms, KPI Reports and Charts of critical parameters
updated every minute.

Modular for cost effective solutions for loads from 500
watts to 60kW, our Cabinets can be upgraded in the field as
loads increase. Our customers include ESCOs, MNOs, Tower
Companies, System Integrators, Maintenance Contractors and

Energy Vision
Energy as a Service – Leading Company Energy Vision
specializes in renewable and high efficiency power
solutions for telecom sites.

Energy Vision invests in the latest hybrid technologies
and provides all in-country services, including logistics,
implementation, operation, NOC services of 24/7,
upgrade and preventive and corrective maintenance.

Energy Vision assures site’s power availability as per
SLA, having RMS for real-time performance control and
monitoring.

Energy Vision developed its services based on more than
30 years of experience in solutions integration, towerco,
MNO and Implementation & maintenance services in
over 40 countries worldwide.

Its business model is based on fixed monthly payment
covering capex and opex and releasing the customers
from any risk relating power supply in their network.

Vinson & Elkins RLLP
Vinson & Elkins R LLP
Vinson & Elkins is one of the oldest and largest international
law firms, with approximately 700 lawyers located in 15
offices around the world.

Our global telecommunications team has extensive
experience advising on international telecoms and telecoms
infrastructure M&A transactions, including in respect of
towers, data centres, fibre, wireless and wireline technology.

www.genergy.vision
to significantly cut their OPEX and optimize their TCOs. AUSONIA Telecom Generators have guaranteed 15-years proven successes to ESCOs in Europe and have been deployed to power thousands of Telecom sites in OPEX model in Africa and LATAM.

Exhibitor:

Crossflow Energy

Crossflow Energy Company is a UK-based developer of affordable and reliable integrated energy solutions (IES), providing firm clean power for off and weak-grid applications. With containerised components for security, Crossflow’s quickly deployable units focus on reliability, cost-optimised operational services and energy security. The inclusion of a robust, long life, low maintenance and quiet Crossflow wind-turbine within the IES unit allows for 100% renewable energy generation at an affordable price. Ideal for rapid network extension or technology upgrades Crossflow IES are the ideal option to improve reliability and reduce both energy costs and environmental impacts in remote locations.

Exhibitor:

Egis Projects

At Egis, our 13,600 people are dedicated to supporting energy, ecology, digital and territorial transition to shape tomorrow’s world.

We draw on our capacity for innovation and our ability to ingeniously transform ideas into solutions that are tangible, operational and, most importantly, useful for our clients all over the world.

Our assignments lead us to operate in a wide range of domains addressing the major challenges of the planet, such as transport, buildings, water, the environment, energy, urban development and mobility services. To deliver them, we call upon a broad spectrum of disciplines, ranging from the design of infrastructure to its operation, also including consulting, turnkey delivery and project structuring.

The Group generates more than one billion euros of managed revenue.

Exhibitor:

Enatel Energy

Enatel Energy delivers an expansive portfolio of configurable systems designed to meet every telecommunication network power requirement. Solutions offer flexibility and scalability, by way of hot pluggable combinations of modular Rectifiers, Inverters, Converters, Solar/Wind Chargers and encompass advanced energy management. Enatel’s SYNERGi hybrid solutions include unique patented generator control capabilities allowing dynamic optimisation to accommodate off-grid site variables so ensure the highest levels of network uptime, ease of deployment and OPEX savings. Renewable energy inputs can be integrated simply and blended intelligently. Enatel Energy offers renowned support, reliability, and system efficiencies. Solutions are New Zealand made to guarantee design, manufacture and process integrity.

Exhibitor:

Ausonia

AUSONIA is leader in providing power solutions specifically designed to meet the Telecom industry requirements for high power availability and operational excellence. Among its solutions portfolio – entirely made in Italy – AUSONIA also offers AC Generators, Variable Speed DC Gensets and Hybrid Power Systems, ready for integration with Solar/Wind/Grid. Extended maintenance intervals, reduced fuel consumption and a complete web-based RMS allow AUSONIA Customers
GS Yuasa manufactures a full line of technologies including lithium, lead acid, nickel metal hydride, and nickel cadmium for the automotive, industrial, and specialty battery markets. Especially for Telecom market, we have developed a 48V lithium ion battery module that has outstanding cyclic life and charge acceptance that can reduce the runtime of generators and the total cost of ownership of telecom base stations.

With 37 affiliates in 17 countries, GS Yuasa has a worldwide presence operating under the GS Yuasa, GS, and Yuasa brands.

www.gs-yuasa.com/jp/index.asp

HIMOINSA

HIMOINSA is a global corporation that designs, manufactures and distributes power generation equipment worldwide. It has extensive experience in the telecommunications market, having supplied equipment with power outputs ranging from 8 to 45KVA in the international market to well-known companies in the sector. Our telecom range gensets can work remotely, providing efficient and reliable power and incorporate functionalities such as: GPS system, making it possible to locate the machine at any time, fuel level alarm, remote management and remote control for gathering and recording data in real time. HIMOINSA has develops a variable speed hybrid generator sets that reduces fuel consumption by 40% and extend maintenance periods up to 1000 hours.

www.himoinsa.com

ieng Group

i engineering Group provides end-to-end engineering infrastructure solutions to the telecommunications and power industries across Africa, the Middle East and Southeast
2019 exhibitors

Asia. Employing a dynamic team and personal approach, we’ve grown rapidly since our inception in 2007 and are now operational in eighteen countries: Afghanistan, Algeria, Cameroon, Chad, Congo, DR Congo, Ethiopia, Ghana, Guinea, Kenya, KSA, Lebanon, Liberia, Myanmar, Nigeria, Pakistan, Uganda and Zambia.

We do managed services (active & passive) on one hand; procurement, site build and commissioning on the other; as well as fiber optic. We manage today over 11,500 sites for Africa’s largest MNOs and all 4 towercos.

www.ieng-group.com

Exhibitor:

Crowd SiteIntel by M2Catalyst, LLC

Introducing Crowd SiteIntel, a new business intelligence tool available through TowerXchange, which enables towercos and MNOs to better understand the locations, performance, and technologies of the towers and small cell sites in a given country, and which MNOs are tenants on each. The new service is driven by M2Catalyst’s crowdsourcing platform, which provides trillions of network measurements across 200 countries and 800 carrier networks, enabling Crowd SiteIntel users to identify opportunities to improve coverage and capacity, including in-building.

http://www.m2mobileinsights.com/blog/a-paradigm-shift-in-how-towers-are-valued-and-how-co-locations-are-sold/

Exhibitor:

Metalogalva

Metalogalva is a Portuguese steel manufacturing company with more than 47 years of activity in fields of Energy, Communication, Transport, Lighting, Renewables and Steel Protection (with own Hot Dip Galvanizing Unit and Painting). Has 5 industrial units (total area of 60000m² and total gross area of 198000m²), with a galvanizing capacity/year of 100000 tons. Metalogalva exports 80% of its own manufacturing for more than 85 different countries. Has continuously invested on new equipment to face the requirements/delivery times of the international markets. Metalogalva promote the excellence of its services, investing in the researching, development and innovation of its products.

http://www.metalogalva.pt/

Exhibitor:

NANHUA Electronics Co., Ltd.

NANHUA is an independent enterprise with modern management which is located in Shanghai. We design, manufacture and sell world leading signal, lighting and control products which be applied in industrial areas since 1990, and focusing on aviation obstruction light system from 2007, has full experience in the complete line of cost-effective obstruction lighting and control solutions. NANHUA products have been proven to be professionally designed and highly reliable.

NANHUA will continue to maintain reliable, safety and simple R&D concepts, combine with the latest technology, commit to developing new products to help customer solve problems and enhance customer value.

www.nanhua.com

Exhibitor:

NETIS

NETIS is a Service and Infrastructure provider for the Telecom Industry in Africa, founded in 2009. NETIS operates permanently in 9 countries namely, Côte d’Ivoire, Ghana, Burkina Faso, Togo, Benin, Gabon, Kenya, Uganda and Tanzania. 5,500 sites are under NETIS Passive and Active maintenance management, in 6 countries for the top 4 TowerCos. Hundreds of sites and Power solutions have been built and deployed all over the African networks and NETIS has built strong partnerships with vendors whom are specialized in Power solutions, RMS, RDUs, COWs, etc.

NETIS Optical Fiber division delivers full turnkey projects from marketing survey, design, network construction, rollout, maintenance and customer operations.

At NETIS we strongly believe in partnership, the best way leading to success!

https://netis.group/

Exhibitor:

NorthStar Battery

NorthStar is a global leader in designing, manufacturing and deploying a wide range of batteries and energy storage solutions. Our mission is to deliver reliable and sustainable power to the world.

Using advanced technology, our products have been built to ensure longer battery life, lower operating costs and reduced environmental impact. We maintain a global presence with major operations in Sweden, USA, China and the Middle East and distribution and service centers in Latin America, Europe, Africa and APAC. Visit our booth for more information about our innovative products including NorthStar ACE® – Wireless Battery Management.

www.northstarbattery.com
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**Exhibitor:**

**Polar Power Inc**

Polar Power, Inc. (POLA), designs, manufactures and sells direct current, or DC, power systems, lithium battery powered hybrid solar systems for applications primarily in the telecommunications market. Polar’s systems provide reliable and low-cost energy for applications for off-grid and bad-grid applications with critical power needs that cannot be without power in the event of utility grid failure.

Our systems integrate DC Generators, Solar PV, DC Air-conditioning, and batteries. Our Hybrid Solar Systems provide reliable power with very low maintenance and operational costs. Our Prime Power DC Generators provide very low fuel consumption, low maintenance with 3,000-hour oil change interval and long generator life. Our Backup DC Generators provide compact, lightweight, minimum fuel storage providing long reserve.

[www.polarpower.com](http://www.polarpower.com)

**Exhibitor:**

**SerEnergy**

SerEnergy is a world-leading developer and manufacturer of power systems providing primary, supplementary and backup power for telecom and utility applications.

With a system based on reformed methanol fuel cell technology, SerEnergy provides a very compact power generation system that does not generate harmful emissions, noise or vibrations. The methanol fuel cell power system is a front-runner in terms of low maintenance requirements while being environmentally friendly. SerEnergy provides premium-quality methanol fuel cell solutions with an electrical efficiency of 40-50% and with highly skilled staff in and outside Denmark, we strive to provide all our customers with high-quality service and support.

[www.serenergy.com](http://www.serenergy.com)

**Exhibitor:**

**PRAMAC**

PRAMAC is a global company, headquartered in Siena, Italy which designs, manufactures and distributes power generation products and material handling equipment.

Selling into over 180 countries through a broad distribution network, PRAMAC can rely on its five worldwide manufacturing plants and 16 global commercial branches.

PRAMAC has been supporting and developing solutions for the telecoms sector for over 15 years and has sold over 20000 units worldwide for a wide range of applications and sites. The large product portfolio covers diesel and petrol generator sets, along with cleaner energy options such as gas-fueled, ethanol, biodiesel and hybrid systems.

[www.pramac.com/](http://www.pramac.com/)

**Exhibitor:**

**Shaanxi Xintong Intelligent Technology Co., Ltd.**

Since 1997 XinTong Intelligent has been focusing on designing, developing and manufacturing a comprehensive product range including full types of power modular /control & monitoring modules etc. as well as system integration (both software & hardware).

With over 21 years’ solid industry experience, XinTong prides itself on the dedication to quality, compliance and customer service. Our concentration on quality flows from the design phase through to the post-sale service.

We are committed ourselves to combining a better solution with a strong commitment to quality and reliability throughout a truly understanding of our partner’s requirements now and into the future.

[www.xaxintong.com](http://www.xaxintong.com)

**Exhibitor:**

**TSS**

TSS solar hybrid power you can trust.

Founded in 2003, TSS designs and delivers reliable stand-alone solar power solutions to tackle the energy-related costs and operating challenges at remote and off-grid sites.

Our solar hybrid solutions for off-grid BTS sites maximize the use of solar power as primary energy source, optimize battery life to 5 years or better and minimize the runtime of the back-up diesel generator, reducing fuel consumption and costly on-site visits for refuelling and maintenance to 6 months or better.

Designed to operate independently and reliably for prolonged periods in the harshest and most remote environments, our bespoke solutions will keep your mission critical operations up and running ensuring you will meet or exceed your upfront TCO, ROI and energy savings goals.

[www.tss4u.com](http://www.tss4u.com)
Capitel

Capitel is a specialist transaction advisory firm with a focus on addressing the most complex techno-commercial issues for our clients, especially for major transactions and investments.

Our primary focus area is techno-commercial due diligence and planning to support transactions and investment decisions for TMT infrastructure such as wireless towers, fiber, data centers as well as TMT networks such as fixed broadband, wireless broadband and media distribution networks. Capitel is headquartered in Singapore with offices in New Delhi and New York, and the recently opened branch office in London for EMEA markets. Capitel advises global infrastructure funds, private equity funds, public market investors as well as towercos, fibercos and telecom operators, and has advised on 25+ transactions and investment decisions with a cumulative investment value of $40bn+ in the last six years.

http://capitelpartners.com

Hardiman Telecommunications

Hardiman Telecommunications Ltd. was established in 1994. We are a boutique consultancy specialised in strategy development, due diligence assessment and valuation support.

Our clients include major TowerCos, private equity funds, corporate finance / advisory and investment functions of leading banks, and telecommunications carriers. We are particularly active in end-to-end support of mergers, acquisitions and divestitures.

Meetup Americas 2019
9-10 July, Boca Raton

Meetup Africa 2019
8-9 October, Johannesburg

Meetup Asia 2019
3-4 December, Singapore

Meetup MENA 2020
28-29 January, Dubai

Meetup Europe 2019
19-20 May, Barcelona

www.towerxchange.com/meetups/meetup-africa
TowerXchange Meetup Africa 2019 exhibition preview

TowerXchange is not only about the views of towerco and MNO strategists. One of our top priorities is to provide a platform for proven passive infrastructure equipment and service providers to introduce themselves and their activity.

From static asset manufacturers to access control systems, site management systems, RMS and backup power solutions, these companies play a critical role in ensuring the efficiency and safety of towercos, MNOs and their employees.

In addition to interviews and articles featured elsewhere in the journal this section gathers further interviews with a selection of the top service, solution and equipment providers that joined TowerXchange Meetup Africa last October and will be rejoining us in 2019.

93 Acsys Technologies Ltd 114 Enatel Energy
96 Apollo Solar 118 Flexenclosure
99 Asentria 121 GS Yuasa
102 AUSONIA 124 Himoinsa
106 Bladon 127 ieng Group
111 Delmec 130 NETIS
134 NorthStar Battery
139 Phixflow
143 Polar Power
148 SerEnergy
151 TSS
157 Vinson & Elkins RLLP
Enhanced security and operational efficiencies through improved access control

An interview with leading access control provider - Acsys

Poor access control can not only lead to security concerns but it can also have a significant impact on a company's operational efficiency and bottom line. In this interview, we speak to leading access control system provider, Acsys, to understand how the telecom tower industry has been affected by poorly managed access control and discuss the advantages that mechatronic locks can bring to the sector.

**Keywords:** Access Control, Acsys, Africa, Health & Safety, Job Ticketing, KPIs, Logistics, Masts & Towers, MLA, MNOs, Monitoring & Management, NOC, O&M, Operational Excellence, RMS, Site Level Profitability, Site Surveys, Site Visits, SLA, Towercos

**Read this article to learn:**
- Limitations with mechanical locks
- Challenges in controlling access to NOCs
- The importance of access control in enforcing SLAs
- How mechatronic locks can contribute to increased efficiency
- Safety and security benefits afforded by mechatronic locks

TowerXchange: Please can you describe some of the limitations of mechanical locks and keys?

Rani Ariss, VP Sales EMEA, Acsys: There are several limitations in the use of mechanical locks and keys; keys can be copied, lost and forgotten or unreturned and the cost of replacing the lock is often higher than the lock itself. In managing keys, operators need to employ numerous amounts of workers who require training and the wrong keys can be given to the vendor. With traditional mechanical lock and key there is no way to prevent collusion, and users can forget to close sites (intentionally or not).

Regular audits need to be undertaken to ascertain the amount of keys in use and the keys’ location and the management of keys and locks requires dedicated space and security. Managing keys on weekends or during an emergency is a problem as staff will not be present, it is critical to be able to respond quickly to downed sites but if access is prevented in the absence of keys then the only way is to cut the locks which will require a lock replacement and sites can stay unsecured for quite some time.

When keys are copied it is difficult to detect when a theft or loss occurs and with picking and bumping there is no proof of break and entry and as such there are high insurance premiums. The result of these inefficiencies is that some vendors eventually make their own copies of the keys to gain access.
TowerXchange: In relation to controlling access and NOCs, what are some of the operational challenges faced?

Rani Ariss, VP Sales EMEA, Acsys: The NOC deals with a complex set of equipment that is scattered around a region and is impossible to control efficiently with mechanical locks. The NOC also deals with a large amount of vendors, who are responsible for site maintenance. It is hard for the NOC to respond efficiently to emergencies as they don't know where the vendors are located and false alarms can cause disorder.

Access to the NOC is impossible to control. Vendors are requested to do maintenance and only do it when they are able to do it, not necessarily when the NOC has requested that they do it. When sites are down it can be difficult to find the vendor, the NOC then needs to call other support to get someone to the site.

The NOC is looking for a solution whereby tickets are issued and acted upon as quickly as possible in a first phase. In a second phase the NOC needs to rely solely on the vendors assertions.

TowerXchange: What challenges can poor access control systems have on SLA implementation and adherence?

Rani Ariss, VP Sales EMEA, Acsys: MNOs and towercos will have SLAs in place with their vendors to regulate site maintenance. These SLAs have escalation clauses that dictate when a vendor should arrive on location. It is hard for the NOC to see when vendors are going to the sites and if they completed the job correctly making SLAs redundant.

The lack of data prevents an operator from setting operational KPIs to benchmark the performance of the various vendors between each other. The fact that there is no or little data from the performance on the SLA also means that the NOC and operator need to rely on the vendor to obtain performance information which creates a conflict of interest. SLAs fees are being paid when the services that need to be provided aren't being carried out. Vendors invoke the problems of collecting and returning keys as a valid reason for non-compliance with SLAs.

TowerXchange: What are the advantages of implementing mechatronic locks for remote site management?

Rani Ariss, VP Sales EMEA, Acsys: Mechatronic locking systems cannot be picked/bumped, hacked, copied or corrupted in any way. Telecom customised software enables the NOC to manually or automatically control where users can go, for how long wirelessly and in real-time with minimal cost.

Mechatronic solutions allow the NOC to control precisely what assets can be opened and when. All keys and locks memorise the last thousand actions giving an incorruptible record of the user's actions, providing the NOC and operator with valuable operational data.

The mechatronic locks combine four important solutions into one system; a wireless and real-time access control system, a high security lock and key solution, a time and attendance solution and a key management solution.

TowerXchange: What are some of the basic practical advantages of mechatronic locks?

Rani Ariss, VP Sales EMEA, Acsys: The solution is a standard padlock and Euro-Din cylinder configuration meaning that no modifications are required to install them. The padlocks and cylinders can be fitted on all equipment and no maintenance is required. The stainless steel plating prevents corrosion on the padlock body and cylinder and what's more anyone can use the solution.

The operational advantages of using mechatronic locks are instantly visible after deployment and lasting over time, uptime is increased and the solution prevents keys being copied, stolen, lost or unreturned, locks being picked, issues around collecting and returning keys, the requirements for lock and key audits and unauthorised access.
TowerXchange: How do mechatronic locks contribute to increased efficiency?

Rani Ariss, VP Sales EMEA, Acsys: Users can service more sites in one day and a user’s position and length on site is controlled and monitored. The NOC can have a real-time view of site status looking at the number of sites, which sites have guards and are they present or not, which site is in need of maintenance and for what reason and which and how many vendors are on the site.

By implementing mobile apps, the NOC is now able to receive real-time site information and user performance, such as when did the user receive the task, accept the task, arrive on and leave the site. This system can also monitor what the user did on the site (watermark GPS pictures) and can also receive information on whether the user closed the locks after leaving the site.

This data has significant value to determine SLA adherence because the tower owner can now see exactly what is happening on their site. Being able to understand who is going where and for how long means that the owner can make smarter business decisions. Data collected by mechatronic locks gives concrete undisputable data on whether the vendor has been meeting the SLAs. Furthermore upon additional analysis of the data, site operators can create and negotiate more suitable SLAs using the information collected.

TowerXchange: How do mechatronic locks increase site and user security and reduce theft?

Rani Ariss, VP Sales EMEA, Acsys: With regards to safety and security, as the NOC knows who is on the site and for what reason, in the case a vendor does not request a locking code (because of a fall or injury) the NOC is able to act on that.

In relation to thefts, most thefts are caused by people who had a mechanical key at one stage and copied it. The mechatronic keys can have an embedded feature that monitors where the key is being used, if the user tries to fraudulently use the key three times, the key will automatically block themselves thereby forcing the user to go back to the NOC or programmer to update his key.

TowerXchange: What information can be collected to monitor behavioural patterns and how does this translate into more cost effective operations?

Rani Ariss, VP Sales EMEA, Acsys: The NOC will be able to download the access logs stored on the key through programmers and study what sites or assets were accessed and when, how long the vendor spent on each site, whether the user tried to access sites or assets without authorisation and on which day, time or location.

By collecting data on user performance the NOC and operator are now able to obtain site maintenance benchmarks which in turn allow them to set KPIs for certain tasks.

In addition, mechatronic locks allow for increased flexibility. When a technician is unavailable, another can be called as a substitute with no wasted time or resources. A temporary access can be instantly granted ‘on the fly’ for a site normally outside of this technician’s work zone.

By collecting data on behavioural patterns, the financial department is also able to control how much time was spent on site by users, thereby gaining a better control over payment of billable hours to vendors.

TowerXchange: How will the data that mechatronic locks provide influence the way in which the telecoms sector works?

Rani Ariss, VP Sales EMEA, Acsys: Using the data that mechatronic locking systems provide effectively will lead to more efficient access policies, enhanced SLA agreements and increased productivity. The data collected does not only benefit the site owner, but is also valuable for tenants and vendors. The data helps build relationships between the ecosystem by aiding their understanding and giving evidence of site activities. The more a database is built and the further it is integrated the more valuable it becomes to its users.
Why solar continues to strive ahead as the best solution for remote telecom sites

An interview with Apollo Solar

TowerXchange: Please can you introduce Apollo Solar to TowerXchange readers. How extensively have Apollo systems been deployed? Who are some of your key customers?

John Pfeifer, CEO, Apollo Solar: Apollo Solar is a manufacturer of the electronic equipment required for supplying electricity to remote telecom towers. We design and build all the hardware and develop the software in our plant in the USA. Our strong suits are reliability and low cost of maintenance. Over 1000 Apollo systems are installed with sites on every continent, and the majority in the challenging environments in Africa.

Our equipment is completely wired and tested and shipped in the simple cabinet shown in figure one. This is just 1000mm wide and 1200mm tall and it IP66 sealed against water and dust.

We sell directly to ESCOs and installation contractors as well as tower companies and telecom operators. Our customer list includes Orange and their partners, American Tower, Camusat, Tower Company of Madagascar, Solene and others.

TowerXchange: Space constraints are typically cited as one of the biggest barriers to the use of solar on telecom sites. Typically what kind of footprint is required for different power loads with Apollo’s system? What is the sweet spot when it comes to the use of solar power at towers and what size is the addressable market for the use of solar in telecoms?

John Pfeifer, CEO, Apollo Solar: The typical tower
requires about 750 watts per BTS, so an average site with 2 BTSs needs about 1.5 kW continuously, plus another 500 watts for a microwave backhaul channel. If we focus on the pure solar systems with no diesel generator at all, 12 kW to 15 kW of solar array will do the job. Today the average PV module will produce 160 watts per sq metre, so 12 kW requires 75 m² and the 15 kW array will need 94 m². When the space is a constraint, we simply leave the diesel generator on the site and let it run for a few hours each day. Such a hybrid system can be sized anywhere from 0% to 99% solar, so there are no longer any sites which are too small or too large for solar. Apollo Solar makes pure solar systems for loads from 250 watts to over 5 kW of DC Power and Solar/DG systems with 2 kW to 15 kW of load.

The most popular system is 2.5 kW, but that is increasing as more equipment is installed on the towers. Pure solar systems are most cost effective at the small end, but hold their own up to 3 kW to 4 kW of load depending primarily on the real cost of diesel fuel delivered to the sites. Our hybrid solar/DG systems do not have any limitation on size, they just run the generator for a little longer each day. Since the amount of power is not a limitation, our addressable market is equal to the number of towers that are currently running on just the diesel generators. The last numbers we saw published totalled about 800,000 remote tower sites that were running on diesel generators world-wide.

TowerXchange: With many maintenance contractors more familiar with mechanical gensets rather than solar systems, how has Apollo Solar developed a system which tower owners can be confident will be properly installed and maintained?

John Pfeifer, CEO, Apollo Solar: We have trained many maintenance contractors on the installation and support of our systems. We have been successful at doing this in the Americas, Australia, Asia and Africa. The secret to the reliability of our systems is that they require almost nothing in the way of maintenance or support; solar has no moving parts, there is nothing to wear out and nothing needs to be adjusted, oiled, replaced or rebuilt. Apollo builds our electronics with redundancy for every critical component so the chance of a system going down is extremely small. In the case of a failure the power electronic parts can be swapped out by anyone. Furthermore, our integrated remote monitoring software allows us to watch every site along with the tower owner, and the maintenance contractors, from anywhere on the planet.

In the end, confidence is built over time and we have done that since our systems that were installed in 2008 are still working today, 10 years later. Not all solar electronic manufacturers have achieved this level of reliability because they cut corners with critical parts.

TowerXchange: The cost of solar panels themselves has come down dramatically in recent years but looking at Apollo’s solar hybrid system as a whole, what developments have there been to improve the TCO?

John Pfeifer, CEO, Apollo Solar: Certainly our pure solar systems are easier to purchase today when the cost of the solar panels is at $0.28 per watt as compared against about $4.00 per watt ten years ago. Over that same period, Apollo Solar has reduced the costs of our electronic cabinets by standardising on components to take advantage of economies of scale while increasing our volume
purchases. Today, the total cost of ownership of a pure solar or even solar hybrid systems is largely driven by the cost of the battery. By partnering with battery manufacturers our customers have been able to negotiate lower prices with long term, higher volume contracts.

TowerXchange: Can you tell us a bit more about the components that go into Apollo’s solar hybrid systems; which partners do you work with and are these changed? What is manufactured by Apollo? How do the components compare to others in the market?

John Pfeifer, CEO, Apollo Solar: We deliver a cabinet with all the electronics inside so that the installation is a simple matter of attaching the solar array, the battery and the BTS. Apollo manufactures everything inside the cabinet for the pure solar systems. We integrate a rectifier into the cabinet for the hybrid systems which is made for us by a high quality rectifier manufacturer that brings that expertise to our partnership.

The major difference between Apollo’s equipment and others’ is that Apollo designs and builds everything with our own people. This gives us several advantages: We know how to support and enhance the products going forward, we can control our costs and delivery times, and we are not exposed to trade tariffs from China. Some others in this market have simply installed components built by others into a box of one size or another.

TowerXchange: How do you see the shift towards renewables changing in the telecoms space and what are the factors driving this? Do you see a role for other renewables beyond solar?

John Pfeifer, CEO, Apollo Solar: It should be clear to everyone that solar energy is the best solution for towers that are not connected to a reliable electric grid. Besides cutting the Carbon Dioxide emissions to zero, solar is a simple, low cost and complete answer to the problem of fuel theft. Apollo Solar has proven that solar powered sites experience essentially 100% up time, thus eliminating the costly down-time penalties. The headaches of generator maintenance are minimised when the run time is cut with the hybrid systems or zeroed out with pure solar. As the tower companies, ESCOs and others begin to focus on cutting their energy related operating expenses, solar is growing in popularity and will continue to do so.

We work with other renewables. Apollo can connect to any electrical input and prioritise the use based on the cost. There is nothing wrong with wind power, and we have installed sites with wind turbines feeding the batteries. However, small turbines of the size required in this market are not as cost effective as the megawatt turbines that make the news. And, unfortunately the small turbines have not been reliable. Wind is free energy, but it is much less predictable than solar, so we must have enough solar to power the tower without any wind power. Any extra energy from the wind turbine is not of any use to us unless the wind just happens to coincide with 3 days of dark weather. Furthermore, we see no reason to add moving parts that require maintenance after we just got free of those problems by eliminating the diesel generators.
Ensuring RMS systems work in the field

How Asentria bring extensive expertise in trials to ensure a solution is fit for purpose

Asentria, with over 100,000 sites in operation have become an integral part of their customer’s cell site optimisation efforts. Bringing extensive experience from working on fully operating networks, Asentria’s application engineers understand what is essential to get a network up and running successfully and cost effectively, with proper trials fundamental to this process. Asentria’s Jon Baars examines why RMS projects can often fail and explains where Asentria’s successful track record in such projects stems from.

Keywords: Asentria, Monitoring & Management, O&M, Operational Excellence, RMS, Site Level Profitability, Site Surveys, Skilled Workforces, Who’s Who

Read this article to learn:
- How Asentria has evolved into more than just a hardware supplier
- The number of sites using Asentria systems in operation worldwide
- The mistakes many companies make in selecting an RMS system
- How trials and selection processes should be designed to minimise the risk of failure
- What differentiates Asentria from its competitors

TowerXchange: Please can you introduce Asentria and their portfolio of solutions for the telecom sector - what is the company’s origins?

Jon Baars, Director of Sales and Marketing, Asentria: Asentria is a thirty year old hardware manufacturer based in Seattle, WA USA. We began by designing and manufacturing hardware devices to integrate to PBX (voice) switches, and deliver alarm and telemetry data. Telecom operators began to use our devices for different purposes than just for PBX. The US military was also an early user. We began to transition to working more specifically with US-based mobile network operators to monitor their remote locations; power, security, and environmental issues at cell sites primarily. We have installations with two US based MNOs with approximately ~10,000 sites apiece currently in operation, and other worldwide networks with hundreds or thousands of sites deployed. Our current customers refer to us as part of “cell site optimisation” efforts. It is far beyond just alarming now.

TowerXchange: What is Asentria’s go to market strategy?

Jon Baars, Director of Sales and Marketing, Asentria: We are used in many different telecom networks; rail or highway projects, oil and gas, utilities, and others. Our focus, however, is on MNOs and tower companies. There is a large amount of upfront integration and support necessary in order to get the most sophisticated projects up and running. The primary product we sell is hardware, but there is
also a large component of services and integration that go with that hardware to get a project up and running within the operational environment of a large network operator. With larger network operators, the projects really never end, it is more of a partnership. We seek large networks as the large scale enables us to devote significant upfront time to integration, proof-of-concept, and rollout plans. We help people who are motivated to solve a variety of operational issues at those sites optimise their sites. We’re broadening the geographic scope of our market seeking these large networks and the people responsible who want to make their networks better.

TowerXchange: The first question our readers usually ask of any vendor in the RMS category is “how proven is your solution in the field”?

Jon Baars, Director of Sales and Marketing, Asentria: We have over 100,000 sites in operation at this moment. The largest deployment we have had was approximately 18,000 sites at its peak for a US based MNO; it was a pretty sophisticated solution. Our hardware device was in a smaller cabinet, and we allowed wireless (EDGE) access to the cabinets, and enabled them to reboot individual -48VDC powered devices within the cabinet. The initial goal was to reduce truck rolls and mean time to repair, but the solution evolved to where we were managing many other things at the site; antenna tilt, managing power usage, and general network troubleshooting. Our current largest ongoing project is for a US based MNO, and it is more focused on issues tower owners would be concerned with; power, security, and environmental monitoring and integration to all the various sub-systems at the site. We “flatten” all this data into a usable form so that operational decisions can be taken. We are doing a project for hundreds of sites in the Middle East primarily for security purposes. We have a current project in the EU for what will eventually be thousands of sites that is based primarily on wireless modem access to sites.

TowerXchange: Why do you think it is that RMS projects often fail?

Jon Baars, Director of Sales and Marketing, Asentria: At this point, we have a lot of experience in what is actually being done successfully and cost-effectively. We expect to do a trial for any large network; go to a site and deploy our solution so we test our assumptions and prove that we work. Sometimes decisions are made regarding an RMS system solely based on paper RFQ document. It is difficult for us to know what exact solution we would propose until we actually go to a few sites. We expect to go to one site, then move on to deploying to a few sites, testing our deployment documents, and then support the process as it moves on to a broader deployment. As previously mentioned, we look at this as an ongoing process.

Trials are a must; it is very difficult for us to come up with realistic pricing until we can agree with the customer what the solution is. Very rarely do
we decide in advance what the solution is, and the scope of the solution doesn’t change during the trial phase. If we had our preference, there would be an initial request for information phase, where some broad data could be given by the RMS vendors. A short list of vendors could be created and some small budget could be dedicated to getting the short-listed vendors to come do a trial at a small number of sites. Using this method, I think failures would be much more rare. Everyone could agree in advance of a large rollout what was to be delivered and the RMS vendor could deliver a much more accurate price based on a promised solution.

TowerXchange: Finally, what differentiates Asentria from other RMS providers?

Jon Baars, Director of Sales and Marketing, Asentria:
We have a lot of experience doing these systems. We expect every large project to run through a trial phase and we have application engineers whose job is to successfully create these trials. People in this application engineering role have generally worked on many other fully operating networks, and have a very good idea of what the standards are that are necessary to get a network up and running. We are aware of what other network operators are doing successfully and cost-effectively, and we will push to make our trials model the ideas that others are currently making work. We bring a lot of value at the trial phase, just for the opportunity to show what our solutions can do. We have a broad, flexible, and high quality product, and have thirty years of experience successfully implementing these projects.

Meetup Americas 2019
9-10 July, Boca Raton

Meetup Africa 2019
8-9 October, Johannesburg

Meetup Asia 2019
3-4 December, Singapore

Meetup MENA 2020
28-29 January, Dubai

Meetup Europe 2020
19-20 May, Barcelona

TowerXchange
www.towerxchange.com
Ausonia: the field-proven efficiency in powering sites through Hybrid Solar DC Gensets, even in OPEX model

Italian firm discusses solutions for off-grid and remote sites in Africa and beyond

With 85 years of experience in the power business and thousands of installations across the globe, Italian company Ausonia offers a wide portfolio of energy solutions to help African MNOs and towercos reduce fuel consumption and maintenance costs. To cater to the evolving demands of the industry, Ausonia has also created its own energy service company (ESCO) known as MediPower, to provide energy-as-a-service, based on the opex model. With both capex and opex solutions available and against the backdrop of various regional market drivers, Ausonia looks to continuously adapt its offerings to best serve its customers.

Keywords: Africa, Ausonia, Batteries, Capex, DG Runtime, Energy, Energy Efficiency, ESCO, Hybrid Power, Medipower, O&M, Off-Grid, Opex Reduction, Outdoor Equipment, Rectifiers; ROI, Site Surveys, Site Visits, Unreliable Grid, Uptime, Who’s Who, Wind

Read this article to learn:
- Ausonia’s history, experience and footprint in Africa
- Beyond energy products, the creation of Ausonia’s ESCO
- How to improve energy efficiency in off-grid and remote sites
- Clever solutions to reduce total cost of ownership (TCO)

TowerXchange: Could you please introduce yourself, your role and background?

Giuseppe Taranto, International Sales – Telecom Business Leader, Ausonia: I have over 13 years of experience in the power business, including business development and sales in different geographical areas (EMEA, Americas, Asia and Oceania). I joined Ausonia in 2012, when the CEO, Massimo Ombra, asked me to help him launch the new Hybrid and High Efficiency DC gensets portfolio recently designed by the company to meet the needs of the telecom industry in lowering opex and TCO.

Over the years, we have worked with tens of MNOs and towercos across the globe and came to understand their specific power needs to identify the right energy solutions for their sites. As a result of our efforts and partnerships with our clients, we have one of the most acclaimed portfolios of AC and DC genset solutions in the telecom industry, with thousands of installations in different countries and strong references, even among the ESCO community.

TowerXchange: For those that might not be familiar with Ausonia, please tell us about the company and the customers you work with.

Giuseppe Taranto, International Sales – Telecom Business Leader, Ausonia: If you ask any power specialist working in our home market (Italy), they will certainly know Ausonia. In fact, we were the...
first company in Italy to manufacture generating sets and we are constantly expanding our footprint in the local market. On top of this, the know-how and experience we have accumulated over many years of business helped the company achieve a high level of specialisation and quality, such that our products today are widely requested by different industries and customers.

We are very active in sectors where power is a critical issue. Our gensets are used to power drilling stations for the oil and gas industry from Sub-Saharan Africa to Central Asia, to ensure backup power to hospitals, airports and industrial sites from South East Asia to Latin America. We even serve NATO with gensets for their military applications.

In the telecom industry, Ausonia has a long history of success, with thousands of generators installed worldwide. We receive positive feedback year-on-year since 2003 by our controlled ESCO known as MediPower, which uses Ausonia gensets to perform their services under the Power Lease Agreements signed with all the MNOs operating in Italian territory (Vodafone, TIM, Wind 3).

The capability to develop, design, manufacture and offer energy solutions to our customers, starting from a basic capex offer to a pure opex business model represents a unique value proposition in the telecom market. This gives new potential customers a strong sense of confidence, as they see us not only as a manufacturer of power solutions, but also as the first user of our own products.

TowerXchange: Specifically, what is your footprint in Africa and what are some key issues and challenges your clients face in this region?

Giuseppe Taranto, International Sales – Telecom Business Leader, Ausonia: Ausonia started looking at Africa in the seventies, when the company was strengthening its focus on the nearest export markets. We approached various customers in the region, from Morocco to Egypt, to the Sudan, from Ethiopia to Nigeria and Zimbabwe, and we realised their power requirements were very specific and could not be standardised.

Since then, we have delivered generators to companies in Sudan, Zimbabwe, Ethiopia, Egypt,
Mozambique, Morocco, Tunisia, Libya, Algeria, Liberia, Gabon, DRC and many other countries. Today we are in discussions with major regional players in the telecom industry for the supply of generators to power their off-grid and poor-grid sites.

At this time, the main concern is around the opex of their traditional power solutions and everyone is trying to understand what would be the best energy solution to be deployed on each site, with the ability to achieve the lowest capex and the highest opex reduction. Within this context, Ausonia is an ideal energy partner as we have the skills and expertise to design customised and efficient energy solutions in line with their technical and financial needs, supporting them also with local maintenance teams and warranty.

Additionally, our energy solutions can be equipped with anti-theft devices which help our customers in reducing the risks connected to robbery of fuel, batteries and other components of the power systems, thereby further increasing their savings on the capex replacements and making our proposals more attractive.

**TowerXchange: What do you think is the Ausonia advantage?**

Giuseppe Taranto, International Sales – Telecom Business Leader, Ausonia: There are multiple advantages in selecting Ausonia as an energy partner. On top of what I said earlier about our history and know how, our products offer several configurations of energy solutions which, thanks to a significant reduction in the fuel consumption and to different capacities of integrated fuel tanks, can extend the refuelling intervals up to three to four months.

Moreover, our high efficiency solutions can be configured to require preventive maintenance after as many as 2,000 running hours, equivalent to more than 80 days, allowing customers to schedule only four or five site maintenance/refuelling visits per year, with great savings in yearly opex.

Additionally, our power units can be controlled and managed remotely through a dedicated web-based system, which can be integrated to the network operation centre (NOC) of the customer for managing alarms tracking, ticketing and escalation.
Last but not least, thanks to the scalability of our modular solutions, we can deliver systems to power multi-tenant sites, in which a new operator can be added and billed singularly for its energy consumption.

Considering all this, if our customers compare our DC gensets solutions with the traditional solutions installed around the globe, they realise that the payback period is often less than one year and the product lifetime typically goes over five years, making it an excellent investment, even looking at short-term business plans.

**TowerXchange: Lastly, what is the vision for the company, and for Ausonia’s presence in the African region moving forward?**

**Giuseppe Taranto, International Sales – Telecom Business Leader, Ausonia:** Being a proactive and flexible company, we see great opportunities of growth in Africa, especially in countries where telecom players need to urgently go through a renovation of their power assets, or where the network expansion is mandatory to comply with local strategies or simply to follow the indications given by the local regulators.

In Africa different scenarios are possible. We see opportunities in supplying our energy solutions directly to the MNOs or to local and regional towercos. But there is also increasing attention and study towards the power lease offers (energy-as-a-service), in which Ausonia Group can play a direct role by offering its local presence in the market, as well as partnering with local managed service providers (MSPs) who want to add something more to their current service offerings.

The market in Africa is changing fast and new scenarios and players are emerging, and this naturally lends to new energy requirements which Ausonia is ready to follow closely, by adapting our energy solutions portfolio to new power demands, more specific technical requirements and efficient technologies.
Micro Turbine technology makes once a year site maintenance visits a reality

Cost effective innovative solution has up to 8,000 hour service intervals, is cleaner, quieter and can use multiple fuels including diesel, kerosene or paraffin or a mixture to reduce costs and deter fuel theft by up to 60%

It’s not often TowerXchange comes across a genuinely innovative alternative to a traditional diesel genset that provides primary or backup power to many emerging market cell towers, but when we heard about Bladon’s Micro Turbine gensets (MTG), we had to find out more! While the MTG is cleaner and quieter than a traditional DG what makes the MTG particularly interesting to towercos is the fact that they require as little as once a year maintenance. A key business requirement we continuously see from mobile operators and towercos is to reduce site visits to once a month or less.

Read this article to learn:
- How Bladon harnessed the power of microturbines for telecom power solutions
- The advantages of Micro Turbine Gensets (MTGs) over conventional DGs
- How the product addresses the weakness in all hybrid genset solutions – reinventing the diesel genset
- More about the ultra-low maintenance solution: no engine oil, no water, only one moving part
- The importance of an energy efficient solution that compliments your existing supply chain – MTGs can run on almost any liquid or gas fuel
- Time to breakeven/crossover in different scenarios, compared with traditional DGs
- Details of the World’s only EURO V emissions standard compliant diesel genset (12kW)

Gas turbines aren’t new. This is a 70 year old technology, and is the method of choice for providing ultra-reliable power as a utility to millions of people and businesses globally. Bladon has innovated the application of turbines to telecom tower power by making a microturbine fit into the space where normally diesel gensets are situated. Our secret sauce is not so much a new technology as a manufacturing methodology that enables us to produce microturbines economically in

TowerXchange: Where does Bladon fit in the telecoms infrastructure ecosystem?

Stuart Kelly, VP Market Development, Bladon:
We have invested considerably in R&D over the last 5 years and perfected the design and manufacture of a genset that has a microturbine technology at its core. A Micro Turbine Genset (MTG) is an evolutionary step in replacing conventional diesel gensets in a prime power, hybrid or standby power application. Without making any drastic changes in business process, supply chain or taking a risk on new technologies towercos can drastically reduce their daily fuel and maintenance costs and see those reductions immediately. The MTG’s superior reliability and performance along with its multifuel capabilities nicely positions it to be the ideal replacement of noisy, inflexible and high maintenance diesel generators. Bladon’s MTGs are ultra-quiet, cleaner and greener, which is critical for towercos and mobile network operators alike that have strong corporate social responsibility and environment friendly agendas.
volume. One of our most important manufacturing techniques is a process to cut turbine blades from a single piece of material. We’ve been able to manufacture to a price point such that our MTGs are commercially viable compared to reciprocating diesel gensets.

TowerXchange: How did your micro turbine engines evolve as a solution for cell sites?

Stuart Kelly, VP Market Development, Bladon: Bladon has been working on turbine and gas turbine technology for over 10 years now, with special projects for the automotive industry funding a large part of that work. Then realising that almost 20% of the 2,000,000 diesel gensets sold globally are purchased by the telecoms market we saw an opportunity. An opportunity to show off Bladon’s technology in a single vertical market and evolve the way distributed power is deployed on telecom tower sites. Realising that the lion’s share of opex incurred by telecom towers was in fuel and maintenance costs we knew immediately that Bladon could offer a compelling value proposition.

TowerXchange: Which telecom markets are you targeting and why?

Stuart Kelly, VP Market Development, Bladon: The amount of activity in rejuvenation, investment and growth in the telecom tower market is most impressive in Africa, especially sub-Saharan Africa. That’s why we are using the TowerXchange in Johannesburg to formally launch our 12kW Micro Turbine Genset (MTG). We have conducted field trials in Africa over the last year and learned valuable feedback from our partners there. Some of our field trial units have been running nonstop for 3000+ hours without ANY filter changes or servicing. Whether an MTG is deployed as a primary power or hybrid installation servicing the MTG will be maximum once a year. That’s a really compelling proposition to towercos that are crippled with genset maintenance costs.

We have attended TowerXchange Meetups around the world to share Bladon’s vision with MNOs and towercos. With so many assets changing ownership in Africa, there is a new focus and financial drive to leverage tower assets harder. When towers are bought, or being prepared for sale, audits often reveal the assets aren’t operating as efficiently as the owner might have thought. But the new owners don’t want to create too much turbulence in the supply chain, so it’s important that our
solution complements the existing energy supply chain in developing markets. The Bladon MTG allows MNOs and towercos to evolve their energy strategy, take advantage of serious opex savings without drastically changing the business model or increasing their energy capex budgets.

**TowerXchange: Tell us about your solution’s maintenance requirements.**

**Stuart Kelly, VP Market Development, Bladon:** Microturbine engines are an ultra-low maintenance solution. Unlike a diesel reciprocating engine, there is no engine oil and no liquid coolant. The turbine itself consists of just one moving part, which runs on air bearings. Maintenance is a key issue at remote sites that might be many hours’ drive on a lousy road – the cost to get there can kill the TCO – so a technology with the potential to dramatically reduce site visits can be very compelling. There is a very low skill requirement to maintain our MTGs – in the highly unlikely event of a turbine failure, our strategy is remove and replace, not rebuild onsite. For lesser maintenance issues, such as filter changes, the O&M subcontractor can readily maintain a stock of fuel and air filters.

As well as reducing fuel and maintenance costs, thieves are less inclined to steal our MTGs as there are few, if any, parts, they can recycle. Aspiring ESCOs that are currently in the business of maintaining traditional diesel gensets have an opportunity to profit handsomely by deploying a more reliable solution like ours – their goal of selling at a price per kWh rate becomes more achievable. Our MTG unit has robust telemetry built in, so you need fewer field engineers as many of the MTG settings can be changed remotely. From the NOC you can see if units are operating outside of their tolerances, enabling preventive maintenance rather than waiting for it to break. Also, and not insignificant for the tower operator, is the use of telemetry to know where the unit is, as well as having the inbuilt electronics to stop the unit operating if moved without permission – the same technology as a tracker system on a car. We have standardised also on the DeepSea Controller 7320 MKII to make it even easier for towercos and MNOs to fold the MTG into their estate and manage it through their NOC will minimal disruption.

**TowerXchange: Okay, so what are the advantages of microturbines over other alternate energy solutions such as fuel cells or solar?**
Stuart Kelly, VP Market Development, Bladon: There is no reliable or sustainable supply chain to support hydrogen or methane fuel in Africa yet. As a technology that is hostile to the current supply chain, the practical challenges of keeping fuel cells running are prohibitive to embracing that particular alternative energy solution in more than perhaps 20% of the estate. We don’t see our solution as an alternative to a 200sqm PV array; our solution is so much more compact that the use cases differ significantly.

Solar has to be a part of the future, but in the context of telecom towers it’s not a killer app, it’s a point solution. Our MTGs can be used to smooth power from solar as well as replacing a chugging tractor engine based generator. When renewables work the MTG can become a part core part backup, there are no start up issues even if it’s left idle for some considerable time between uses. The fuel will contaminate before the genset has a problem! But the important thing is that this is an evolution not a revolution – the MTG can be adapted to any local fuel supply resource. Bladon gensets, in keeping with all turbine based solutions, run on a wide range of fuels, including green alternatives such as natural gas and biofuels as well as diesel and kerosene. Bladon MTGs will also tolerate a blend of fuels like diesel mixed with kerosene thus making the mix useless for thieves planning on using it for other diesel engines.

TowerXchange: How does the capital outlay for your MTGs compare to traditional DGs, and when does the Total Cost of Ownership (TCO) crossover?

Stuart Kelly, VP Market Development, Bladon: The capital outlay for an MTG is currently slightly higher than a quality diesel genset solution, but the price difference is a double not triple digit percentage. Running for 12 hours a day in SSA in 30° heat then within 15-19 months the TCO will crossover having recovered the difference in capital outlay through fuel and maintenance cost savings.

TowerXchange: How near are your MTGs for telecom to being a market-ready solution?

Stuart Kelly, VP Market Development, Bladon: We go into production this year (2018). The first run of MTGs have already been ordered, and we’ve signed distribution agreements already with partners in Africa and Australia.

TowerXchange: How near are your MTGs for telecom to being a market-ready solution?

Stuart Kelly, VP Market Development, Bladon: Our Bladon MTG12 MTG delivers up to 12kW, with 230V AC output. Most telecom sites need somewhere
between 3kW and 6kW for constant power, maybe 9kW if there is a hybrid arrangement requiring battery bank charging. Since the MTG runs at variable speed to match the load, our efficiencies are much better at partial loads compared to conventional DGs.

**TowerXchange**: How do you ensure modularity as power requirements increase with the addition of multiple tenants?

**Stuart Kelly, VP Market Development, Bladon**: Given that operators are trying to drive power consumption down, a new BTS might need 1kW when the last model needed 2kW. At the moment the applications we see don’t consume more the 3kW in total, so it should be possible to add a second tenant without upgrading the MTG. Because our unit doesn’t de-rate over time, its ability to deliver continuous power is stronger. The MTG is a more reliable means of delivery of consistent power than a conventional DG for a multi-tenant site. If additional tenants are added beyond what one MTG can provide, the answer is to add a second unit in a daisy chain. And if the power requirement reduces again, our units are relatively easy to relocate to another tower.

**TowerXchange**: How do you bring Bladon to market – do you sell direct or through channel partners?

**Stuart Kelly, VP Market Development, Bladon**: Our model is to sell through partners. Towercos and MNOs need the credibility of boots on the ground to provide after sales service, even with a low maintenance solution such as ours. We are targeting key managed service providers on the front lines of tower builds, upgrades and maintenance, with the objective of creating a pipeline for thousands of unit sales.

**TowerXchange**: Finally, please sum up how you would differentiate Bladon from other cell site energy solution providers.

**Stuart Kelly, VP Market Development, Bladon**: We’ve taken a well-known form of power generation in the reciprocating engine, turned it on its head and married it with another established technology in gas turbines, then developed a manufacturing process to bring to market an innovative solution with a lower TCO business case for telecom tower operators. Micro jet engines are ultra-reliable, super durable, low maintenance, and generally have a TCO runway in Africa and India from 9 to 19 months. The MTG is designed to support the current supply chain, which means our solutions can be easily introduced with an expectation of a short term payback. The fact that it’s an exciting jet engine is only so interesting – what matters is reducing fuel bills, and the ability to deploy it into the field easier and cheaper than a regular diesel genset.
TowerXchange: Tell us about Delmec’s current footprint and key markets.

Spencer Crawford-White, CTO, Delmec Engineering: Our company is based in Ireland, with operations in Africa, Asia, UK, Europe and the Middle East. Projects in North and South America are growing at present with Central America, India and Western Europe also markets of interest for us.

Our core offerings are centred around our highly skilled technical team who are totally telecoms focused. Our core offerings include:

- Portfolio assessment & management;
- Structure refurbishment solutions;
- Technical due diligence;
- Structural engineering and design;
- Design & supply of structures;
- Training & certification;
- Installation & project management services.

TowerXchange: What are the core capabilities which Delmec offers to the tower industry?

Spencer Crawford-White, CTO, Delmec Engineering: The assessment and certification of structures and people is our core capability – it’s what we do best. Our services have all been designed around supporting our customers’ needs and requirements. There’s a certain synergy and efficiency in what we offer – we’re not the cheapest but we are the most cost effective when we combine all our offerings together for our clients. What we offer is the means to get the job done right first time and reduce...
timescales allowing sites to support additional equipment quicker, which can have an enormous revenue benefits.

We recognise the value of utilising local resources, it is inefficient to fly direct resources to the field for day to day maintenance and survey works so we have developed dedicated courses where we train and certify local contractors to our recognised standards. Increasing their quality assists us by improving the quality of the site data received. Site data is collated into TiMs our custom in house software system that allows management and sharing of site data with our team and clients.

TowerXchange: Where does Delmec see the biggest growth in the tower industry taking place over the next few years?

Spencer Crawford-White, CTO, Delmec Engineering: The African market needs to build more structures for network in-fill but the headache of leases and planning isn't interesting to an MNO. Towercos are more focused on the infrastructure and are well positioned to offer large scale build programmes to support MNO expansion plans. Overall the global market will move towards the independent towerco business model, meaning you'll have infrastructure owners and MNOs totally separated. Tower networks have been traded for over 20 years now, but I think towercos are now doing it on a greater scale than before. Post the down turn investors are more cautious and are looking to place money in secure tangible assets with recurring revenue from blue chip customers. This is fuelling the tower portfolio industry and Delmec are well positioned to advise and support clients when buying or upgrading these assets.

TowerXchange: Given Delmec's track record in auditing asset registers, what would you say is the most common problem which towercos and MNOs face in creating and maintaining accurate asset registers?

Spencer Crawford-White, CTO, Delmec Engineering: Globally, maintenance and inventory records are not well maintained and verified. Every single company we've spoken to has issues with asset data around both the active and passive infrastructure. They have an idea of what they have on their asset register, but this rarely has the detail of what they have in each location from a safety or structural perspective. The more we've gone to Africa and started helping, the more interest we've had from their European counterparts, which leads us to believe that even assets there don't have as good a set of records as possible.

Maintaining site data generally is a big issue globally both in terms of the structure and recording what's on it. Most site providers that do physical reviews for are surprised by the equipment on their towers. There are huge implications for lost revenue and also significant safety concerns if you don't have a handle on what's hanging on your towers. Unregistered equipment hanging on towers is a huge loss in terms of revenue and capacity. It's mostly down to poor record keeping but there's also the odd opportunist – smaller radio broadcasters or broadband microwave solution companies who might have reached a private arrangement with the land owner where the site is located. There are also instances of unapproved power connections, which of course is the biggest cost to infrastructure managers in Africa due to the lack of reliable grid provision.

TowerXchange: How would you go about rectifying problems with an asset register?

Spencer Crawford-White, CTO, Delmec Engineering: The main reason we're employed is because at the starting point, towercos often struggle to align the recorded data they received with what is on the ground. They'll do an audit on 10% of the proposed sites before an acquisition and ask questions like can you get there? Is there a tower? Has it got a fence and does it look okay? No other information comes back, not even photos in most cases. When we go out we've often got nothing beyond co-ordinates and a theoretical size of structure. They might have pictures of 10% of the towers if we're lucky, we help them assess every tower and ensure collection of a complete active and passive data set for every site.

How do we rectify problems? Initially we carry out a Red Amber Green (RAG) report of the portfolio, which guides and prioritises our action plan for the sites. We train and certify local contractors and employees to survey the sites. The data gathered is
fed to our in-house team who create an analysis and design solution for each site. Reports are tailored to suit our customers’ needs from basic summaries through to full rectification instructions and bills of materials.

Part of our solution is to arrive at a certificate of conformity when we know 100% that the site is okay. We will give clients a report detailing what and how to improve, then we will sign off on a local contractor for them, then certify the structure on a scale from ‘gold’ to ‘white’. For gold certification we go and inspect the site ourselves, silver is checked by one of our approved contractors, bronze is certified by the client’s contractor and for white certification the client details what they have done and we take their word for it. Unsurprisingly everyone wants gold level certification once they have committed the time and funds to the upgrades. They can take the certificates to the bank for investment for the future as our certificates are well known in the market.

TowerXchange: So tell us about the full benefits of certification?

Spencer Crawford-White, CTO, Delmec Engineering: A reduction in insurance premiums, ability to increase borrowings, getting a higher (and more reliable) calibre of customer. MTN, Tigo or Vodafone want to protect their network and they’re looking for something of this standard, which is important to ensure their SLAs are met. It’s also very useful for further investigation – we receive a 40% return rate of business, so having that data in our system means it can be very quick for us to help customers know how they can maximise their assets.

The site owner is responsible for safety and security of the site, whether they are independent owners, towercos or mobile network operators, certification gives them peace of mind.

TowerXchange: Who should use an asset register auditing service and why is it important? When is it most effective to review an asset register?

Spencer Crawford-White, CTO, Delmec Engineering: Commercially, of course, it’s critical. Maintaining an accurate asset register is critical when aiming to maximise a tower portfolio’s earning potential and capacity.

Accurate asset registers are also important for safety – keeping an accurate accident register is vital. Commercially, of course, it’s also critical.

When should they be reviewed? If you look at the standards there are significant variations across the type and location of a structure. Yearly inspection should really be the norm, but certain clients could see that every couple of years is enough. Some might leave it five years but in our experience it’s a lot cheaper and more effective to keep on top of problems as they arise than to wait for something serious and risk having to make major repairs or even replace infrastructure.
Enatel’s SYNERGi solution achieves 90% less genset runtime
Opex and efficiency boosted with Enatel Energy’s power solutions

Enatel Energy offers an expansive portfolio of fully customizable DC power systems and industrial battery chargers, designed to meet every power conversion requirement. Solutions offer flexibility and scalability by way of rack-mount, hot-pluggable combinations of modular AC-DC rectifiers, DC-AC inverters and DC-DC converters with advanced monitoring and control.

In this interview, Murray Wyma, CTO DC Systems, Enatel Energy, talks about the work that the business has done recently in Mexico, explains why MNOs are likely to see energy costs go down in the future, and gives an insight into what makes Enatel Energy’s products so unique.

**Keywords:** 3G, Africa, Americas, Asia, Australia, Batteries, Central America, Chile, Colombia, Enatel Energy, Energy, Haiti, Hybrid Power, Interview, Kenya, Madagascar, Mexico, Myanmar, New Zealand, Nigeria, North America, Off-Grid, Opex, Pacific Islands, Renewables, Solar, South Africa, South America, South Asia, Southeast Asia, Tanzania, Unreliable Grid

TowerXchange: Please give us a brief overview of your company for our readers that aren’t familiar with you.

Murray Wyma, CTO DC Systems, Enatel Energy: Enatel Energy is a division of Enatel, which was founded 14 years ago by the same personnel that created Swichtec Power Systems, a company successful in designing and manufacturing switch-mode power solutions, primarily for the telecommunications industry. Based on over 30 years’ of experience, our core business is the design and manufacture of power conversion products for the telecommunications, IT, utility, materials handling and renewable energies sectors. Headquartered in Christchurch, more than 90% of everything we design and manufacture is exported internationally to over 70 countries throughout the world.

Competing with the best in the world, our products include a range of high-efficiency rectifier and converter modules, hybrid power systems, and rack and compact power solutions, supported by embedded and GUI-based software, along with a range of ancillary products. We also participate in the renewable energies sector with a range of high-efficiency solar inverters and modular, high-efficiency battery chargers for the material handling equipment industry.

At Enatel, our core focus of research and development is utilizing creative, cutting-edge technology so we can offer our customer’s better products, performance efficiency and value.
for money. This approach ensures that we stay committed to the continual development and enhancement of our suite of AC and DC power systems, intelligent modular rectifiers, DC-DC converters, control and monitoring options as well as motive power and solar energy solutions.

TowerXchange: Could you share some details of one of your more challenging projects since we last spoke?

Murray Wyma, CTO DC Systems, Enatel Energy:
The Sinuoso site, located in North-West Mexico, on the edge of the Sonora desert, is challenged by its environment and is a fully off-grid site with 2G (including air-conditioning) and 3G cellular loads in self-contained cabinets.

A hybrid system had previously been deployed with a mix of DC rectifiers, solar converters and AC inverters, from a range of suppliers, with a third party PLC controller for supposed hybrid functionality. This was a good example of an attempt to pull together a hybrid system, including solar from a disparate array of different manufacturers’ equipment that never worked as intended. The decision was made to upgrade the site with our SYNERGi solution with five 2kW solar converters, nine 2kW rectifiers (phase-balanced) and six 1.2kW inverters, to provide the necessary efficiencies and cost savings.

The SYNERGi hybrid power system cycles the batteries, saving diesel and maintenance expenses by operating the existing generator in its optimum efficiency power range for longer periods. The ‘solar optimization’ feature also ensures that the genset does not run if solar power is available. SYNERGi incorporates its own self-learning algorithm to track sunrise through the seasons, to give well-defined stop conditions to the generator to ensure it does not run unnecessarily during the ‘solar day’. It does not require connection to external date or time references, and does not require links to weather forecasting web pages. It operates autonomously.

The SYNERGi solution is modular, requiring about a quarter of the space, and represented a harmonized, single-controller solution where all the power modules work in a unified, coordinated manner to optimize Opex.

The battery is usually the crucial element in a hybrid system, but in this instance a reconditioned set of 1500Ahr AGM batteries was supplied to analyse cyclic performance over time before deciding on the best battery fit – a lithium battery solution is currently being considered.

Over the month of August 2016, SYNERGi delivered some remarkable results. In fact, we’ve reduced the genset runtime hours by 90%, the usage of diesel and the CO2 emissions by 87% and the maintenance costs by 83%. This means annual CO2 savings of 56,052kg and monthly savings in excess of US$3,400.

ROIs and paybacks are site dependant, but in most cases full payback on these sites can easily be achieved in less than twelve to eighteen months.

TowerXchange: What is your installed base at cell sites worldwide, and what is the approximate energy mix within that installed base?

Murray Wyma, CTO DC Systems, Enatel Energy:
Enatel Energy systems have been installed within...
hundreds and thousands of cell sites globally, with numerous hybrid systems deployed through a network of integrators. These systems are located in Kenya, Madagascar, Chile, Tanzania, Colombia, South Africa, Myanmar, Nigeria, Mexico, Haiti, Australia, Pacific Islands and New Zealand.

All conceivable climates and conditions are encountered in such diverse geographic locations, everything from integrated generator solutions and outdoor cabinets to walk-in shelters and buildings. We see energy mixes from the normal single cell/single tenant sites with average loads of approximately 1kW through to large sites (as in the Sinuoso example) and multi-tenant sites of 4 or 5kW.

Lately, we are seeing requirements for off-grid solutions approaching 9kW load. In sites this size, the use of cyclic batteries becomes uneconomic, often forcing the owner to once again consider 24/7 operation of the generators unless large renewable energy sources are available. This could be a controversial statement, but as long as a genset is operating at maximum efficiency, then no amount of cyclic charge/discharge would deliver comparable fuel use in terms of overall litres per kWhr of energy.

TowerXchange: Should cell site energy solutions be owned and operated by MNOs, towercos or ESCOs?

Murray Wyma, CTO DC Systems, Enatel Energy: As an embedded power system provider, we are agnostic with respect to the energy solutions owner. As time progresses, we are obviously seeing more of a shift from MNOs towards towercos and ESCOs. This enables more efficient use of tower space, and energy as now many sites are multi-tenant. Ultimately, this must lead to lower costs for the MNOs and consumers. However, for MNOs who already own the tower infrastructure, retaining ownership of the tower can ensure fixed levels of tower (and power) servicing cost, rather than be exposed to the risk of rent increases. We are also focussed on next generation power architectures for initiatives that migrate a towerco into a powerco, allowing monetization of those traditionally distributed stranded assets. This applies similarly for an MNO looking to diversify – as some are.

The other factor in the equation is the ease of deployment and monitoring of the power solution. This is where Enatel Energy differentiates itself by offering scalable solutions that monitor and report full energy logging of all system parameters (loads, battery, charge/discharge, genset kWhrs, solar kWhrs et cetera., hourly, daily, and monthly).

We are seeing a big increase in solar power supplementation for remote sites and our easily integrated converters offer clever functionality such as solar optimization (minimizing genset run-time) as mentioned in the Sinuoso example.

For us, it is all about making life easier for the energy solution owner, and of course, providing secure power with high 9s uptime to meet the most demanding SLAs.

TowerXchange: SLAs often demand 99.5% or higher uptime – tell us about the reliability and autonomy of your solution.

Murray Wyma, CTO DC Systems, Enatel Energy: Our designers come from a long history of DC power in the telco space (since the mid 1980s). The telco uptimes typically required are greater than 99.9999%. The best way to describe how we provide high 9s reliability is through the quality of design in our products, redundancy and plurality of supply. The other factor is fail-safe operation. No matter the state of any controller/monitor, the core power system operates autonomously. This is a cornerstone of telco DC power system design.

We include patented features such as dynamic generator anti-stall in our products to ensure higher uptime. As a result we can raise alarms if the generator goes into a ‘low power’ state, possibly due to poor fuel quality, blocked air filter et cetera.

The other benefit of detecting the generator’s peak power capability is that we can then programme the genset to operate at its peak efficiency during the battery recharge.

Enatel Energy offers optimal dynamic phase-balancing where we can adjust rectifier output to ensure the phases on the generator are balanced (within the scope of the applied load/battery recharge).

The intention of the SYNERGi hybrid solution is to ensure that the generator will run efficiently.
A further line of defence to prevent the site collapsing is the ability to control load shedding. SYNERGi has the ability for the operator to shed their loads and maintain critical site and transmission capability. These features are unique to Enatel Energy and demonstrate Opex savings through optimized functional capabilities which maximize uptime and avoid unnecessary truck rolls.

**TowerXchange: How is your solution scalable to accommodate the increasing power requirements as multiple tenants are added to a site?**

**Murray Wyma, CTO DC Systems, Enatel Energy:** Allowing space for extra power modules and battery connections can be easily catered for at the time of design for minimal cost. When a site is first deployed, the system frame can be supplied with a minimal number of power modules. This can be done through modular configurations that support the use of wind turbines and expansion shelves. We are also currently addressing multi-tenant metering of up to six or more.

**TowerXchange: Should M2M technology be built into energy systems, or should third party remote monitoring be used to provide visibility into performance?**

**Murray Wyma, CTO DC Systems, Enatel Energy:** Certain levels of M2M technology are already built into Enatel Energy systems. We have built in full SNMP functionality through to SNMP V3. This includes a full suite of traps, gets and sets. This enables easy integration of third party SNMP managers. This is advantageous due to their well-proven legacy and in many cases SNMP managers are already in use by our clients and end-users. Further to this, we have built in UDP communications for use with our craft tool which enables set-up, log access and bootloading facilities across a narrow bandwidth (sometimes 2G) sites. Designing ‘narrow band capable’ remote communications is essential to the developing nations market.

It is vitally important to be able to maintain the communications channel to the device from the equipment manufacturer remote control facility. Monitoring solutions, where third party site control systems have been added to our monitoring, limited access to our equipment, blocking visibility, and the ability to change key system parameters.

**TowerXchange: Please sum up how you would differentiate your solution from your competitors?**

**Murray Wyma, CTO DC Systems, Enatel Energy:** Enatel Energy presents the most complete, comprehensive telco hybrid system on the market with the SYNERGi system. With SYNERGi, users can automatically generate maximum power tracking and anti-stall. They can automatically set their generator loads to a predefined optimum level and carry out dynamic phase balancing. Our solution also allows users to control two generators simultaneously and alternate their cycles to synchronise their services.

Users can also seamlessly include green energy sources through solar and wind converters and take advantage of true plug-and-play power modules (rectifiers, solar and wind converters) with self-setting addresses. The system also provides full kWhr logging of all energy sources (grid, gensets, solar and wind) on an hourly, daily and monthly basis. Just as importantly, the solution can be accessed remotely through via HTTP, SNMP (v2C and V3) and UDP scripting.

SYNERGi features a one-step front-panel control that provides a battery initialization (commissioning) charge to enable installation technicians to set the system and walk away without the need to return to site. Generator start-up has adjustable settings that can be based on time of day (up to two periods per day), battery voltage, battery Ahrs (battery capacity) and periodic genset tests (independent of other settings). The start and stop functions can be enabled simultaneously to provide maximum security.

If a battery is stolen, disconnected, lost, or found to be ineffective, the system will detect the problem and notify the user. Battery history can also be logged to enable battery warranty claims if necessary. As previously mentioned, the system can be optimized for solar use to ensure that the generator does not run unnecessarily by predicting the ‘solar day’ and limiting the use of the system to ensure maximum possible solar harvest.
Energy Vision Powers Ahead with Flexenclosure’s eSite
A case study

Having used Flexenclosure’s eSite on a previous project in Gabon, Energy Vision once again selected the system for their most recent ESCO project, completing the installation in record time to the highest standard. Flexenclosure introduce the project and the competitive advantage that eSite brings.


Read this article to learn:
- The scope and challenges the Energy Vision ESCO project
- Details of Flexenclosure’s eSite
- How the two companies managed to work on such a tight timeframe
- The use of remote monitoring in system optimisation
- eSite’s competitive advantage

Background
A major pan-African mobile operator was rapidly expanding its network in the West African nation of Burkina Faso. It selected Energy Vision, a leading telecom-focused Energy Service Company (ESCO), to deploy power systems at a large number of its new tower sites and to be responsible for ongoing site power delivery under an Energy as a Service (EaaS) contract.

The Challenge
All the tower sites at which Energy Vision needed to provide power were new, meaning that there was no pre-existing telecom-specific power supply that could be used. And while some sites did have grid connections, the electricity supply was unreliable – certainly not good enough to maintain uninterrupted network uptime.

Given this situation, Energy Vision’s EaaS proposition was very attractive for the mobile operator. And while it is a fast-growing segment across Africa, EaaS demands the highest levels of long-term performance and reliability from site power systems if the ESCO is going to be able to guarantee generator run hours, meet uptime targets, avoid financial penalties for missed EaaS SLAs, reliably predict energy costs over the long term and maintain a meaningful return on their investment. To make the opportunity financially viable, Energy Vision would therefore need an extremely reliable state-of-the-art solution that could draw heavily on renewable power sources while significantly reducing diesel-related costs.
Further, Energy Vision had a very short time window within which to establish power delivery to the new tower sites if their customer was going to achieve their aggressive network rollout goals. And the challenges didn’t end there, with extreme environmental conditions and an often-inadequate road infrastructure seriously hampering access to many of the more remote sites.

Energy Vision turned to Flexenclosure for help...

**The Solution**

Flexenclosure’s eSite x10™ site power system was selected by Energy Vision.

eSite x10 is the world’s first telecom site power system purpose-built for outdoor telecom sites and to outdoor telecom standards. It is a patented, sealed, tamper-proof outdoor rectification unit with passive convection cooling, no filters, no moving parts and it requires no maintenance. eSite x10 offers the lowest total cost of ownership in the most challenging operational environments and is the perfect long-term ESCO solution.

As a landlocked country, standard shipping to Burkina Faso by sea and then land would have delayed Energy Vision’s required rollout schedule. But the eSites’ compact size meant that they could be air freighted instead, thus significantly accelerating time to deployment. In fact, eSite x10 is so compact that it can be carried by hand, so transport to site, however remote, is a simple operation.

eSite x10 is designed for fast and easy plug-and-play installation. All sensors are built in to the unit during manufacturing, and configuration and full testing also take place in the factory. This leaves no possibility of installation errors and maximised the efficiency of Energy Vision’s rollout teams across the country.

With each and every site being unique, Energy Vision was able to use eSite Tools – eSite’s powerful built-in remote management system – to fine tune their systems at an individual site level in order to optimise overall ongoing performance. In this way, diesel use was reduced, battery lifetime extended and the highest possible uptime ensured. And eSite Tools enabled all of this to be achieved remotely from Energy Vision’s network operations centre, further reducing OPEX through no physical site visits being required.

All the eSites were preconfigured for solar power to make best use of renewable energy – a critical requirement for Energy Vision’s business case. And ATS functionality was also built in to each eSite, meaning that when grid power eventually arrives at any given site, the system is ready to receive it.

Having previously deployed eSite systems for another project in Gabon, Energy Vision was familiar with eSite technology. Their team also had a very good working relationship with Flexenclosure. And they knew they would get 100% focussed attention, training and support from Flexenclosure’s system specialists whenever necessary to ensure a successful rollout and ongoing power service delivery.

**The Flexenclosure advantage**

By working with Flexenclosure, Energy Vision was able to capitalise on a number of additional and significant eSite differentiators.

Site power suppliers have always had to factor rectifier replacements in to their financial
calculations due to regular failures. This is a major issue, especially for ESCOs managing EaaS contracts. However, eSite’s purpose built, robust and reliable rectification system is specifically designed to secure continuous site power without failure even in the most challenging environments, meaning an ESCO can trust eSite and will be able to avoid ongoing rectifier-related OPEX hits.

eSite x10 has been purpose-built from an individual component level, IP65 sealed and ruggedised to withstand operational challenges such as heat, humidity, sand, dust, electrical disturbance and accidental physical shocks – and all without the need for any on-going or on-site maintenance.

It has been tested and certified to the strictest CE and ETSI requirements and includes significant innovations including protective soft switching between the grid and connected gensets to replace mechanical ATS switching and thus protect the unit from potentially damaging input – one of the more common causes of rectifier failure at telecom sites.

eSite x10 can significantly reduce genset run hours and fuel use at off-grid sites. At bad grid or good grid sites genset run hours and fuel use are further reduced by maximising energy harvesting from any available grid power. At solar sites eSite x10 optimises the use of renewable energy. And all of this results in significantly reduced carbon emissions.

With sensors built in to the unit and calibrated in the factory, eSite x10 ensures sustained performance from data you can trust. The system uses a substantial local data buffer to avoid any data loss. And uploaded data is stored in a secure and cost-efficient data cloud, where it can be accessed by eSite Tools for analysis and by web services for smooth integration with other systems.

It’s part of Flexenclosure’s DNA to work very closely with every customer in order to ensure that every eSite deployment is optimised for lowest ongoing OPEX and highest overall long-term success. And having delivered projects in more than 20 African countries, Flexenclosure is extremely experienced in delivering solutions that are specifically designed to cope with the most challenging of environmental conditions.

Flexenclosure’s eSite has been a critical enabler in Energy Vision’s establishment as one of the leading ESCOs in Africa.
Dual Chemical System using lead acid batteries and lithium ion batteries
Perspectives on a new generation of energy storage solutions

GS Yuasa is a leading manufacturer and distributor of energy storage solutions which has been serving various industries for decades prior to its final merger back in 2004. The company has been supplying mobile network operators with its solutions and is now actively doing business with independent towercos and ESCOs. In this exclusive interview, GS Yuasa’s General Manager, Mr. Keigo Hayashi, shares his views and insights on the dynamics of the energy business and how the company can support green targets as well as cost reduction initiatives.

Keywords: Africa & ME, Asia, Batteries, Energy, Energy Storage, GS Yuasa, Lithium, Off-Grid, Rectifiers, Unreliable Grid, Uptime, Who’s Who

Read this article to learn:
- Who GS Yuasa are, who they have worked with and what differentiates them from their competitors
- The strengths of lithium ion and how extensively GS Yuasa’s lithium ion batteries are being used by the industry
- The concept of their new Dual Chemical System combining lead acid and lithium ion batteries
- Why the Dual Chemical System is particularly suited to unreliable grid sites
- How the Dual Chemical System integrates into existing equipment

TowerXchange: Tell us about GS Yuasa.

Keigo Hayashi, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: GS Yuasa is a Japanese company formed in 2004 by the merger of two large, 100-year old battery manufacturers; Japan Storage Battery Co., Ltd., known as GS, and Yuasa Corporation. At US$3.5 billion in sales, GS Yuasa is currently one of the world’s largest battery manufacturers. GS Yuasa manufactures a full line of technologies including lithium ion, lead acid, nickel metal hydride, and nickel cadmium for the automotive, industrial, telecommunications and specialty battery markets. With thirty-six affiliates in sixteen countries, GS Yuasa has a worldwide presence operating under the GS Yuasa, GS, and Yuasa brands.

TowerXchange: What is the advantages of lithium ion batteries and how does the product address the environmental issues in markets where green initiatives are flourishing?

Keigo Hayashi, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: Our new lithium ion products have cutting edge performance, which allows us to offer new approaches to energy storage that were not previously feasible. The lithium ion battery has especially superior characteristics for cyclic life performance, quick charging and deep discharging and is attracting a huge amount of interest from MNOs as well as towercos, who use lithium ion batteries as a core power component.
for the telecom base stations in areas with poor electricity networks.

Our batteries are usually deployed as components of larger systems. Their use in the power delivery system of a telecom base station is a typical example. We believe that the environmental impact of our products should be evaluated as part of the whole assessment of a particular application, rather than a narrow definition of battery production and disposal impacts. In off-grid and unreliable grid scenarios, the choice of battery can strongly influence the selection of the primary energy source. Our lithium ion technology is allowing our clients to avoid utilising any fossil fuel based solution thanks to its high charge acceptance and long cycle life at elevated temperatures. In some sites we are able to avoid the deployment of diesel generators altogether by harnessing intermittent grid supplies or renewable power sources more effectively. Having an overall cost benefit, in addition to environmental advantages, generally helps promoting green initiatives. Luckily this isn’t hard when diesel generators are involved!

TowerXchange: Who are your key clients and which products are they showing their interests in the most?

Keigo Hayashi, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: Our key clients in the telecommunications sector are mobile network operators who own telecom towers to whom we have been supplying batteries for many years. As for the footprint of lithium ion batteries, we have installed the batteries for 25 customers over 18 countries. In Africa, we have supplied into four countries and are intending to expand this number.

Recently, towercos and ESCOs, who have started managing passive equipment including batteries, are becoming a very relevant part of our business. We are aware that the independent towerco model is widely accepted in developing countries, where the need for cell site densification and extension is urgent and capex intensive.

In terms of customers’ requirements, we experience a variety of scenarios. Although our principal service is to supply batteries for site backup, the choice of product depends on a combination of factors, including peripheral devices, renewable generation, remote monitoring, electricity condition and grid stability. GS Yuasa is a well established battery manufacturer with exceptional experience of supporting new applications. It is our strength to have a wide lineup of products such as long life VRLA, advanced VRLA with superior cyclic life performance and lithium ion batteries.

TowerXchange: What is the concept of the new “Dual Chemical System” product?

Keigo Hayashi, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: “Dual Chemical system” is a product designed to use lead acid batteries and lithium ion batteries in the same site. The aim of developing the system is to eliminate generators at unreliable grid sites.

In an unreliable grid site, there are both short periods of blackout and long periods of blackout. For example, daily blackout can be 1-2 hours/ cycle, occurring 8 - 10 times per cycle and once in a every few months, 15 – 20 hours of blackout occurs.
With the Dual Chemical System, LiB takes care of the short period and lead acid batteries are used for the long periods of blackout. Therefore, sizing of LiB is much more compact than using pure LiB solutions since you do not have to worry about the long blackout period. In addition to it, the life of lead acid batteries will be extended due to the decreased number of cycles.

By optimising the performance of both lead acid batteries and lithium ion batteries, we believe the equipment will finally achieve the goal of running sites without generators in unreliable grid areas.

TowerXchange: What are the unique features of the Dual Chemical System?

Keigo Hayashi, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: One of the unique features of the product is that the system is compatible with any existing equipment. The system consists of a protection circuit and an additional small rectifier, an existing rectifier is used for charging lithium ion batteries and the small rectifier is used for charging lead acid batteries. The existing rectifier quickly charges lithium ion batteries and the small one charges lead acid batteries over 1 – 2 days. The lead acid batteries are used only occasionally so that they can be charged gradually.

The other unique point is that we, GS Yuasa, are the only company that manufacturers both top-of-the-line lead acid batteries and lithium ion batteries in the world. It is not only the product that gives us a competitive advantage, but the experience of manufacturing batteries and serving the telecom industry for more than 100 years; this enables us to propose battery solutions satisfying various customers’ needs.
HIMOINSA: power solutions for the global telecom industry

The benefits of selecting a vertically integrated manufacturer and distributor

Guillermo Elum, Sales & Marketing Director, HIMOINSA

TowerXchange: Please introduce yourself, HIMOINSA and its offering.

Guillermo Elum, Sales & Marketing Director, HIMOINSA: I am in charge of sales and marketing for HIMOINSA, a global corporation and member of Yanmar group, that designs, manufactures and distributes power generation equipment worldwide.

HIMOINSA was founded in 1982 since when it has grown to become one of the leading manufacturers and distributors of power generation solutions. To date, it serves mobile network operators in Europe, Africa and the Americas with its diesel and hybrid gensets. In this interview, TowerXchange discusses with HIMOINSA’s Sales & Marketing Director, Guillermo Elum, some of their most recent field applications and range of products.

At HIMOINSA, we are acutely aware of the specific needs of the telecom sector and we have developed generator sets and hybrid power solutions specially designed for them, providing efficient and reliable power.

The company has nine production plants located in China, India, Spain, France, Brazil, the United States and Argentina. These highly productive facilities are robotised and utilise the latest manufacturing techniques. HIMOINSA also has eleven subsidiaries around the world located in Germany, United Kingdom, Portugal, Poland, Singapore, Panama, Dominican Republic, Argentina, Angola, South Africa and the United Arab Emirates.

TowerXchange: Which clients do you typically serve?

Guillermo Elum, Sales & Marketing Director, HIMOINSA: We have extensive experience in the telecommunications sector, having supplied thousands of generator sets on the international market to well-known telecom companies and we are ranking among the top six vendors in the global generator market for this sector, according to Technavio Research’s recent studies.

Keywords: Asia, Batteries, Central America, DG Runtime, Energy, Energy Efficiency, Europe, Fuel Security, HIMOINSA, Hybrid Power, Multi-Region, Renewables, Site Visits, South America, Uptime, Who’s Who

Read this article to learn:

- HIMOINSA's footprint, customers and range of power solutions
- The benefits of selecting power gensets designed to reduce site visits
- Some recent field applications of HIMOINSA's products in Spain, Asia and South America
- Why should telecom operators select vertically integrated solution providers
International telecom operators believe in the reliability of HIMOINSA generator sets and, since it was founded, the company has supplied equipment to leading companies such as Vodacom, Ericsson, Orange, Tunisiana, Maroc Telecom, France Telecom, Movistar, Teléfonica, Viva, Claro and Entel. We are providing our customers not only high quality generators but also our deep technical know-how to adapt our products to their projects and needs.

**TowerXchange:** How proven are your solutions in the field? Can you give us some practical examples of the performance of your products?

**Guillermo Elum, Sales & Marketing Director, HIMOINSA:** Our company is constantly working on the manufacturing of generator sets for telecom operators all over the world.

Recently, we have delivered a 2MW genset for a Teléfonica's data center based in Barcelona, Spain. We supplied also twenty-four generators to the first Tier IV-certified data center in South America and 24MW for the data center of the largest e-commerce company in the Asia-Pacific region, the Alibaba Group.

**TowerXchange:** How has your solution been designed to maximise autonomy and minimise the number of site visits required?

**Guillermo Elum, Sales & Marketing Director, HIMOINSA:** We are highly focused on the development of user-friendly control units and geolocation devices. We have just released our new Fleet Manager that can locate the generator sets and control fuel consumption levels, as well as any malfunction or breakdown in the equipment at remote locations where access is complicated.

We have developed generator sets equipped with state-of-the-art technology for the telecom sector. Our generator sets require maintenance every 1,000 hours and could be equipped with 1,000-litre fuel tanks, which allow our customers to considerably reduce fuelling and maintenance visits to the site.

These generator sets have a longer running time, thereby guaranteeing lower operating costs and making them among the most competitive solutions on the market. In addition to the standard fuel tank, which can be connected to remote bulk tanks, we can provide a range of large capacity, double wall fuel tanks, which offer high integrated running.

**TowerXchange:** What magnitude of fuel consumption savings can your solar-hybrid gensets deliver?
Guillermo Elum, Sales & Marketing Director, HIMOINSA: HIMOINSA has developed the HPS 1500DCV and HPS 3000DCV hybrid generator sets with a variable speed engine which guarantees 40% fuel consumption savings when compared to a standard generator set and 20% when compared with other fixed-speed hybrid gensets currently available on the market.

A 1000h maintenance kit requires maintenance every month, our Hybrid Power Solution only requires maintenance every four months.

TowerXchange: Please sum up how you would differentiate your solutions from your competitors’?

Guillermo Elum, Sales & Marketing Director, HIMOINSA: I find our ability to offer an integral service a great added value to companies that operate in the telecom sector. Most of the time, telecom projects are developed by engineering companies specialised in IT, which are unaware of the idiosyncrasy of the power generation field.

I believe that our technical capacity and availability to support and advise our customers from the very beginning to the completion of the project does make a difference. Moreover, being a vertically integrated company manufacturing all the genset components in-house, HIMOINSA not only delivers the highest quality product but is also able to guarantee the shortest delivery times in the market.

We offer a complete telecom range from 8 kVA to 45 kVA, providing hybrid solutions that include batteries and reduce the environmental impact as they can be connected to renewable technologies. All our models are equipped with Yanmar engines, which currently boast the lowest fuel consumption on the market, as well as very low level of noise emissions. Having Yanmar as a partner in this project is one of HIMOINSA’s strongest points.

Guillermo Elum, Sales & Marketing Director, HIMOINSA: HIMOINSA has developed the HPS 1500DCV and HPS 3000DCV hybrid generator sets with a variable speed engine which guarantees 40% fuel consumption savings when compared to a standard generator set and 20% when compared with other fixed-speed hybrid gensets currently available on the market. They can operate efficiently without any kind of maintenance for four months. Whereas a standard genset with the same
Rural rollout, densification, site upgrades and ESCO contracts

Infrastructure experts, ieng Group, expand their support to the telecom industry

Leading turnkey infrastructure provider ieng Group has further expanded its capabilities in tower design, power system provision and tower services through the integration of GreenPole and Eki.Struct and formation of their new ESCO sister company, CREI. TowerXchange speak to ieng Group’s Co-CEO, Kadri Hakim to catch up on the company’s latest developments and how ieng Group is strengthening its position as an invaluable partner to the African and Asian telecom markets.

Keywords: Africa, Camouflage, Capacity Enhancements, CREI, Densification, Eki.Struct, Energy, ESCOs, GreenPole, ieng Group, Multi-Country Partner, Network Rollout, O&M, Site Surveys, Urban vs Rural, Who’s Who

TowerXchange: It was a while since TowerXchange last interviewed ieng Group and the company has expanded and integrated new companies since then. Please can you introduce i-eng Group and its subsidiaries.

Kadri Hakim, Co-CEO, ieng Group: ieng Group is a leading turnkey infrastructure solution provider active in both the African and Asian market providing end-to-end engineering infrastructure solutions to the telecommunications and power industries. The company was founded in 2007, initially focused entirely on EPC (site build and refurbishment), and then in 2009-10 we moved into also providing O&M services to the telecom sector. We now have 11,000 sites under management with plans to increase this to 20,000 sites by 2020.

ieng Group has recently integrated tower design and manufacturing business, Eki.Struct into our group. Eki-struct produces a broad array of different tower designs; from lattice, tubular and hybrid (a combination of angular and tubular towers) solutions to low cost, quick deployment towers and camouflage designs. With a fully-fledged design and engineering office in Croatia, adopting a customized approach to designing towers for our clients, Eki. Struct has acquired more than 120 tower structure certifications for various clients across the globe, from a library of more than 200 solutions.

In addition to Eki.Struct, ieng Group recently integrated power business, GreenPole into the group. GreenPole designs and co-manufactures intelligent hybrid power systems for telecom clients across the globe. Our system combines battery power cabinets

Read this article to learn:
■ How ieng Group’s structure, subsidiaries and service offerings have expanded
■ The role that ieng Group is playing helping operators improve rural coverage
■ Details of Eki.Struct’s Multi-Tenant modular solution and how it can revolutionize the way Towercos specify sites
■ ieng Group’s ambitions in the ESCO market
with gensets and/or grid connection, with our smart controller allowing for remote monitoring, control and optimization of the system.

ieng Group is also expanding into the ESCO space through our new sister company, CREI which has entered into negotiations with telecom companies in multiple markets.

Headquartered in Lebanon, ieng Group has a presence in 20 countries (figure one), employing over 1,500 staff. The integration of Eki.Struct and GreenPole and creation of CREI enables ieng Group to offer a more holistic service offering to the industry (figure two).

TowerXchange: There is a major focus in Africa at present on improving rural coverage, something that ieng Group is heavily involved in. Please can you tell us more about this?

Kadri Hakim, Co-CEO, ieng Group: In Africa, all MNOs are focused on finding ways to access the 20-30% of the population that they are yet to connect, most of which live in rural and remote areas. With typical high sites costs being around US$80-100k to build with an annual opex of around $1500-2000 (depending on the country), the revenue that could be generated in such rural and remote areas would not be sufficient to cover costs.

We have developed the ieng low cost rural (ILCR) and ieng ultra low cost rural (UICLR) sites to address this area of the market. The solutions, combining both active and passive infrastructure as well as a power source (solar) can deliver coverage for dramatically

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**Figure one: ieng Group’s geographical footprint**

![ieng Group’s geographical footprint](image)

**Figure two: ieng Group’s range of telecommunication services**

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lower capex and opex. Our iLCR sites, which cover a radius of approximately 15km cost US$50k to build, whilst our iULCR sites which cover a radius of around 3km cost US$35k, including passive and active material; both have an opex of around $400-500 per month. As simpler systems, deployment is rapid, with it taking around a week to build a site.

Different contractors are offering a range of different business models to operators to deploy low cost rural sites. A large number of players offer a revenue sharing model, others offer a pure capex model and others offer an opex model. ieng Group offers the capex model to MNOs, with some opcos opting for a capex model and others opting for opex and revenue sharing models.

With operators competing to cover rural areas in Africa, we are getting a huge amount of interest in our iLCR and iULCR solutions and we expect demand to continue to increase dramatically over the next 3-5 years. There is a big race between operators to be the first into a given market, capturing market share ahead of their competitors.

TowerXchange: What about new build outside of ultra-rural areas, have you seen this picking up in Africa? What demands do you see from clients and how is ieng Group addressing these?

Kadri Hakim, Co-CEO, ieng Group: We have seen new build picking up across Africa; the market is turning a corner following the recession and 4G rollout is requiring an increased number of sites.

In terms of requests from clients, the one constant is the need to push down prices. For this, you need to take into consideration both the tower structure and the foundations. Eki.struct tower designs are particularly efficient, being able to take the same load whilst using less steel. In terms of foundations we have explored different options including towers that are up to 55m high without conventional foundations. In this instance, boxes filled with stones at each of the corners are used in place of concrete foundations. The result is that the sites are much quicker to deploy with a lower TCO, such sites are useful in rural areas.

In urban areas we’re seeing increased rollout of sites to improve capacity for 4G and even for 3G. We see lots of demand for monopoles with a smaller footprint (although these are typically more expensive than angular towers), as well as for demand for alternative structures such as advertising boards and street lights. We are currently looking at the potential to develop a smart street pole solution.

TowerXchange: Ease of upgrade is an important feature in tower designs, particularly for Towercos whose business model is predicated on securing additional tenancies. Can you tell about Eki.STRUCT’s multi-tenant modular solution and the benefits this can offer?

Kadri Hakim, Co-CEO, ieng Group: Our Multi-Tenant modular, is a single tenant tower which is upgradable to a two, three or four-tenant tower in a single day. This allows Towercos to deploy towers with lower initial capex, safe in the knowledge that they are able to upgrade them to sites capable of hosting multiple tenants within just a few hours. It is a groundbreaking solution for Towercos, allowing them to deploy lower capex solutions without slowing their ability to add further tenants. Towercos save around 15-20% on capex by deploying a single tenant tower and only need to pay the additional amount when upgrading to multiple tenants. This generates considerable savings for the Towerco and changes the way that Towercos prepare for tower specifications.

TowerXchange: And finally, looking more towards the power side, we have seen ESCO activity picking up considerably in the telecom sector at present with several contracts now signed and further RFPs live. Can you tell us more about ieng Group’s ambitions in the ESCO market?

Kadri Hakim, Co-CEO, ieng Group: ieng Group has formed our new ESCO sister company, CREI which stands for Communication and Renewable Energy Infrastructure. CREI has been involved in pilot projects in Afghanistan and Myanmar and we are also participating in a number of RFPs, hoping to be able to make some announcements this year.

Whilst it is not a requirement, our expectation is that we will use GreenPole power equipment in our projects, whilst also leveraging ieng Group’s extensive field experience in operating sites. We offer both an ESCO model and a guaranteed savings model to the market, anticipating that Towercos will have a stronger appetite to invest the capex themselves and opt for the guaranteed savings model, whilst MNOs will lean more towards the ESCO model (although there are always exceptions!).
Driving up quality amidst operationally and economically challenging conditions

How NETIS established their leading reputation in the African market

With a footprint in eight countries and a client base including Africa’s four major towercos, NETIS have established themselves as a leading service provider in the continent’s tower industry. TowerXchange speak to NETIS’ Operations Director, Michael Shehata to find out some of the factors underpinning the company’s success in what is becoming an increasingly challenging marketplace.

Keywords: Africa, Benin, Burkina Faso, Capex, Core Network, Backhaul & FTTT, Cote d'Ivoire, East Africa, Energy, ESCOs, Gabon, Kenya, KPIs, Logistics, Managed Services, Market Entry, Multi-Country Partner, NETIS, Network Rollout, O&M, Site Level Profitability, Skilled Workforces, Tanzania, Uganda, Uptime, West Africa, Who's Who

Read this article to learn:

- NETIS’ footprint and experience in the African market
- Key processes and procedures introduced to ensure operational efficiency
- How the company balances increasingly tight budgets with stringent quality requirements
- The impact that power system upgrades have on site operations
- How NETIS see growth in macrosites, alternative site typologies and fibre
- What differentiates NETIS from its competitors

TowerXchange: Please can you re-introduce NETIS to TowerXchange readers; what services does the company offer, for how long has it been operating, in which markets do you have a footprint and who are some of your key clients?

Michael Shehata, Maintenance Director, NETIS: NETIS is the preferred partner for maintenance service, infrastructure and smart power solutions for several operators and towercos in different countries in Africa.

NETIS Group was established in 2009 with Headquarters in Côte d’Ivoire. NETIS Group currently operates in eight countries namely: Côte d’Ivoire, Ghana, Burkina Faso, Bénin, Kenya, Uganda, Tanzania and Gabon. Our target is to have a footprint in at least ten African countries by the end of 2018.

NETIS Group currently maintains over 5000 sites for major African towercos namely IHS Towers, Eaton Towers, Helios Towers Africa and American Tower Corporation. We maintain both passive and active network management in five countries for all major African towercos.

NETIS is a major contractor for major telecom infrastructure projects such as fibre optics (FTTX, GPON and Digital Cities), turnkey site build and power optimization projects. We have a tower manufacturing facility in Côte d'Ivoire which enables quick deployment of tower and steel structure solutions for our customers.

NETIS has also deployed, built and maintained
numerous power/telecom solutions across Africa and is a proud partner of several vendors specialised in power solutions, RMS, RDUs, COWs and other telecommunications solutions.

TowerXchange: Can you explain some of the steps that NETIS has taken to improve operational efficiencies in the management of cell sites; where do some of the biggest inefficiencies come into play and what does NETIS do to circumnavigate this?

Michael Shehata, Maintenance Director, NETIS: NETIS has taken several steps to ensure the improvement in cell site management. At NETIS we have a strong belief in quality processes and procedures and put great emphasis on operational efficiency. One of our key strengths is our internal process through the use of a quality management system. All our processes are ISO 9001 certified and we ensure continuous improvement by conducting regular internal and external audits. NETIS boasts a SHERQ Team that plays a key role in maintaining quality processes and having ISO certification for every NETIS operation.

Selecting highly qualified managers and directors for all business aspects to ensure that service offered to the clients is of the highest quality is key, NETIS has a continuous training program for all its staff along with a continuous performance review program. This program is aimed at developing the teams to meet company standards and customer targets.

We believe in employee empowerment and motivation. All our teams are well equipped with the necessary tools and facilities to carry out their various tasks. Teams are also well remunerated and well trained to manage daily and complex tasks.

In terms of the biggest challenges that we deal with, some of the networks under our maintenance are quite old with constantly failing equipment. This is in addition to high customer expectations and stringent customer budgets. This results in more site visits than necessary resulting in low efficiency. In addition, the countries in which we operate are sometimes rife with security issues or have difficult terrain, poor road networks and generally poor infrastructure. This increases the cost of operations and reduces our efficiency.

Tight customer budgets, difficult terrain and old equipment has not prevented us from meeting our goals. Where we need to focus more attention, we do so proactively and avoid failures and the subsequent impact on our client. These challenges are overcome through modification of procedures to suit every unique operation and to create the best possible result.

TowerXchange: With power uptime perhaps the most important performance metric, how does NETIS work with their MNO and towerco partners to improve uptime whilst also keeping a handle on opex?

Michael Shehata, Maintenance Director, NETIS: At the start of each project, NETIS carefully dimensions its operational structure to allow the cost to fit within the customer budget. This is done while keeping a clear focus on details such as the longest possible MTTR in case of a failure. This structure with minimum customer impact and reasonable budget is always followed.

NETIS makes use of the most qualified staff for key customer sites and makes use of proactive measures to prevent sudden failure. Routine
loop plan must be adhered to and teams are well trained on customer expectations. This gives each customer quality service unique to their SLA and requirements.

**TowerXchange: What trends have you started to see in the type of power systems being installed on cell sites and what kind of impact is this having on site performance as well as maintenance requirements? From a technology standpoint what causes the most headaches in managing cell sites?**

Michael Shehata, Maintenance Director, NETIS:
More and more, MNOs and towercos are reducing their OPEX and CAPEX through the installation of smart power solutions. We are seeing solutions such as lithium ion batteries, solar, hybrid systems and complete elimination of generators from sites. This is aimed at reducing fuel consumption and having long equipment life.

These solutions have a positive impact on equipment performance as there is less maintenance for automated smart power solutions. However less maintenance implies fewer visits to site, leading to lower profit margins for the maintenance vendor. New solutions also mean improving technician skillset to be able to maintain the new type of equipment. It takes time and training to bring the teams up to speed with smart power solutions as most are accustomed to the older type of generator and rectifier maintenance.

The biggest maintenance headaches are from skills development. With different skills in each country and different types of equipment, we face challenges in ensuring teams are ably trained to manage the equipment and to follow manufacturer recommended procedures. It takes time to have a competent and technically strong team.

**TowerXchange: What kind of growth in the number of macro-sites do NETIS forecast across the markets that they work in and do you see much business in alternative site typologies?**

Michael Shehata, Maintenance Director, NETIS:
NETIS Group’s core business is passive and active maintenance activities and the target is to increase the total number of sites to be managed from 5,000 sites to 6,500 sites in 2018. This is in addition to providing our customers with total power and energy solutions including generators, DC systems, batteries and complete solar solutions. In the long term, we see the ESCO model coming into play and are encouraging our customers to move to the latest energy solutions so as to enhance performance and reduce their OPEX.

The alternatives are few and far between. Network penetration rate is still low in majority of our operating markets. Last year we noticed a willingness from the MNOs to rollout new macro-sites either through towercos or even directly when towercos do not think it makes economic sense to build certain sites. This shows and brings new positive dynamics in our markets but it is very difficult to quantify at this stage. As we all know, decision-making in the telecom business is very radical and anything could happen between now and next year.

There is still room for companies like ours with innovative approaches as far as alternative site typologies are concerned. We are present in very different markets with varying economies and topography. Our propositions therefore have to be innovative solutions that are, low cost, security conscious (e.g bunker sites), easy to move (e.g CoWs), energy efficient (solar wind), stealth (e.g. camouflage) and capable of rapid deployment sites, et cetera

NETIS’ target is to penetrate the fibre market very strongly. We have so far managed to build 750km of cable. Our target is to add at least 1,000km in the next two years with the capability to manage the fibre projects as a complete turnkey solution.

**TowerXchange: What do you think is NETIS’ biggest strength in relation to its competitors in the market?**

Michael Shehata, Maintenance Director, NETIS:
Amongst other factors I think NETIS’ greatest strengths are defining the strategic objective and the flexibility of following the customer philosophy and strategy.

**Key strengths:**

**Defining the strategic objective:** The strategic objective is the single, specific objective that will drive the business over the next few years. It is based on the maxim, “If you don’t know where you are going, any road will get you there.” It is not to be confused with the company’s mission, vision or values, which are not useful as strategic goals.
Flexibility of following the customer philosophy and strategy: NETIS’ strategy is always flexible to meet the customer targets and philosophy, NETIS’ team is always developing themselves to understand the market changes and pursue the up to date technology in the market.

Qualified and professional crew: NETIS’ policy has always been to choose the most competent crew to deliver the purposed service from the customer.

Process driven: Processes were developed for all activities in O&M and implemented with the key of improving and maintaining operational support at all times.

Operational support: NETIS’ strategy in terms of support has been a priority and forward support to operations was created by developing regional offices with Logistics Officers, Administrators, SHERQ Officers and warehouses in each region. This gives the field teams the time to concentrate on their core business (operations) whilst the support from the back office is maintained 24/7 (which is controlled by the head office).

Sustainability and sustainable: Business change isn’t always predictable especially in the telecom market, trends comes along that can make or break everyone. Sustainability is the capacity for humans to endure given the growth rate of population and economic activity.

Capital: NETIS Capital investments can represent a sustainable competitive solution if you own unique capital that no one else can buy.
NorthStar is more than just a battery company. They’ve made a commitment to really supporting their customers. A commitment to help customers select the right batteries. A commitment to identify and resolve power system problems, even if they aren’t caused by batteries. And a commitment to manufacture, and dispose of, lead-acid batteries in an environmentally aware manner. Of course, NorthStar also manufactures premium lead acid batteries which they say represent the best compromise between capex and opex, which is why they are one of the market leaders in energy storage for emerging market cell sites.

Keywords: Who’s Who, How to Guide, Meetup Preview, Energy, Installation, Opex Reduction, Batteries, Fuel Security, Air Conditioning, Off-Grid, Unreliable Grid, ROI, Hybrid Power, DG Runtime, Dimensioning, Procurement, Warehousing, Shelters, Rectifiers, Africa, Asia, Pakistan, NorthStar Battery

Read this article to learn:
- Why premium lead-acid batteries remain the best compromise between capex and opex
- How to choose the right battery for the grid profile and application
- How to overcome common problems in the installation and setting of batteries
- How to cool batteries with just 40W, even at 30-40°C ambient
- How to protect batteries from theft and vandalism
TowerXchange: Why are lead acid batteries standing up to the challenge of alternate energy storage chemistries in a telecom context?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: Frank Fleming, our renowned CTO, has a strong belief that lead acid can remain the technology of choice for telecom energy storage for the next 50 years, as long as we push the limits of the design.

We also want to push back against the bad environmental image of lead acid batteries, which is why we invested massively in environmental controls when we built our new factory. Many of our key customers select NorthStar as their preferred / strategic supplier partly because of our strong environmental control. Corporate Social Responsibility policies make environmental control a key target for companies like Ericsson, with whom we’ve been a key strategic partner since 2002. We’re also strategic suppliers to NSN, Huawei and ZTE.

TowerXchange: How much tailoring to the specific requirements of individual sites can really be achieved through the selection of batteries?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: One battery cannot fit all applications. You need different chemistry depending on the grid profile and energy situation. There’s a huge difference between the battery you should deploy on a stable grid in USA, compared with the unpredictability of the grid in Pakistan, and pure off grid applications in Myanmar for example.

NorthStar differentiates ourselves by offering different chemistry depending on the application and grid profile. Whereas with other vendors the battery is a standard, commoditized component, forcing site designers to solve their problems through the modification of other power systems, NorthStar have been able to customise the design of our batteries for different grid availability and telecom applications.

For example, one of the most unstable grids we have experienced was in Bangladesh. No matter what power system we used, there were so many repeated power outages that it seemed we were never able to fully recharge our batteries. That presents a problem for traditional lead acid energy storage technology, but we were able to modify our electro chemistry to be fully partial state of charge (PSOC) compatible.

TowerXchange: Why is the replacement cycle so much shorter for batteries on developing market cell sites, and what can be done to deliver reliable, sustainable power?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: We think there is too little understanding of why batteries are failing. While the right choice of battery is crucial, it’s as much about the electrochemistry as it is the choice of supplier – so simply switching to a different supplier won’t fix the problem. Energy storage solutions need to be redesigned to provide reliable, sustainable power to cell sites in emerging markets, providing faster recharge, high cyclic, high temperature, high efficiency operation.

You need to deploy the right power system, on the right settings and ensure it’s installed properly. This is why we are launching the NorthStar Academy – to help to extend battery life by two to three times and save energy.

While some battery vendors may prefer their batteries die sooner to accelerate replacement cycles and sales volumes, NorthStar want to make sure our batteries last a long time and deliver the opex savings targeted. Our success comes from our people in the field, people with a background from the power industry, who can address power system problems holistically and who can help our customers fix those problems. If it’s not a battery problem, we don’t just say “talk to the power system vendor”, we help the customer to change controller settings, cabling et cetera – training their people to avoid repeating mistakes.

TowerXchange: I understand NorthStar initially, and to a certain extent still do, sell a significant proportion of batteries via OEMs – how does the entry of the independent towercos affect the criteria against which energy storage solutions are acquired?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: We have always had a strong strategic relationship with OEMs and we will always will. But we also realised we need to escalate the battery technology and solutions awareness at the end customer level such as with towercos as they are more and more driving the battery selection process.
Our technology has been approved already by two major emerging market towercos this year. We still see a few examples where energy storage solution selection is driven by short term capex savings, resulting in a temporary improvement in the P&L. However, making the wrong decisions in the selection of energy storage is does not yield performance improvements that are sustainable in the medium and long term, particularly at unstable and off grid sites.

There are only three or four factories worldwide that can manufacture premium AGM batteries. But the good thing about premium AGM is that they have a two year shelf life thus we can then easily maintain inventories in hubs all around the world and provide a short lead time to our customers; we adapt to the logistical challenges to ensure our products are available as close as possible to market.

TowerXchange: What is the performance, and cost, difference when using premium lead acid batteries versus lower cost alternatives at cell sites in harsh conditions?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: A premium AGM (thin plate technology) would normally cost 30% more than a Standard AGM battery with three to four times greater storage life and up to five times longer operating life in real harsh conditions (typically 2.5 X the life).

A lot of our customers are migrating from dual DG to DG plus battery hybrids to cut DG runtime by 50% or more. If you want to optimise energy efficiency programmes, you have to think about total efficiency; about DG efficiency, the efficiency of rectifiers, and the efficiency of batteries. A standard battery can suffer two to three times more loss than a premium battery, which can make a huge difference for some applications. A premium, fast charge battery can take a lot of energy to recharge the battery in short time, which enables the customer to run the DG faster and more efficiently, for a shorter time.

For example, when we rolled out NorthStar Blue Technology in Pakistan, we found that most of the operators were buying low cost batteries because of their focus on capex. When they saw that at off grid sites we were cutting DG runtime by up to 85%, we helped them realise that it doesn't even matter if you replace in your batteries every two to three years if you payback the investment in three to four months. NorthStar Blue Technology is ideal for unstable and off grid sites; it’s a fast charge, high efficiency battery with Partial State of Charge (PSOC) compatibility. If used in a hybrid genset combination, it offers the best capex and opex compromise. Other technology such as sodium and lithium batteries are two to three times the price and are not so easy to implement in large scale projects.

TowerXchange: Why are telecom batteries failing so early? And what are the key steps towercos and MNOs can take to extend battery life?
Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: We need to increase customer awareness of the root cause of batteries problems. What NorthStar have done, and what all the battery manufacturers should have done, is make an assessment on over 60 countries where our batteries had been installed, to find out what were the key challenges were with using batteries, and to and try to find a solution for each:

1. Make sure to select the right battery based on grid and application including sizing/dimensioning; in too many cases there is not enough power to recharge the batteries. Our recommendation is that customers need to use different chemistries for different locations.

2. Solve installation and setting issues: everything from cabling the battery properly to controller settings (charging voltage, boost timing et cetera); low voltage disconnect; temperature sensor configuration and cooling systems. Too many site installers don’t even know how many rectifiers they need to recharge the batteries – spending an extra US$200 on a rectifier can save a US$5,000 battery bank.

3. Temperature: a 10°C change in temperature can reduce battery performance by as much as 30-50%. But air conditioning just to cool energy storage elements costs a lot of money. A few years ago we partnered with one of the most famous fridge manufacturers to leverage proven consumer product technology into the telecom fields. We took the high efficiency, high reliability DC compressor cooling technology, added a unique cabinet structure and made the world’s most efficient telecom battery cooler called SiteStar. We can now cool batteries with just 40W even at 30-40°C ambient. Over 30,000 sites have been equipped with our SiteStar technology to date with very positive feedback from the field.

4. Protect batteries from theft and vandalism: One approach we’re trying is to protect batteries in a safe-like structure. We’ve co-operated with a safe manufacturer to come up with a cabinet which used to be a safe box; made of robust, very thick metal. Another area we’re starting to explore is advanced locking systems.

In some countries theft is related to the parallel market; at one point batteries were even being resold to the operators from which they were stolen! This was resolved with a relatively easy to fix – an engraving that cannot be removed. In other cases the parallel market is home usage, but I feel that’s minimal.

No single approach to combating theft can be successful everywhere as there are different causes of theft, from theft by large organisation’s to pilferage within the fuel supply chain. Ultimately combating theft requires working with the operators and towercos to develop an understanding of the nature of their theft problem and what budget they can afford to resolve it. Theft is a problem, and we want to address it.

NorthStar can help MNOs and towercos overcome all four of these challenges. I’m particularly concerned when people talk about minimising the competence required of people in the field. While the solution needs to be as simple as possible to be installed

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Why are telecom batteries failing so early?

- **35%** Wrong setting or installation
- **30%** Incorrect battery selection
- **20%** Temperature
- **10%** Theft and vandalism
- **5%** Others

Source: NorthStar Battery

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Why are telecom batteries failing so early?
and operated, the competence of the average field engineer is not necessarily the same in Southern Asia and Africa as it might be in Europe. We see a lot of mistakes in installation, and we’re happy to deliver first training at the NorthStar Academy on the basic principles – we can put all the installers in one room, identify common problems and misconceptions, and make corrective actions.

**TowerXchange: How do NorthStar ensure you remain sensitive to environmental considerations from manufacture to disposal?**

Thierry Tardivent, Head of MEA and APAC, **NorthStar Battery**: NorthStar has invested heavily in building the most environmentally advanced battery plant in the world. But our environmental policies actually start from the design of the product; making sure the battery is designed to last longer and also not to deteriorate beyond the end of its life. We are also developing an advanced solution to operate batteries with the minimum energy consumption – our SiteStar battery cooler designed in Sweden is still the most energy efficient Battery cooler in the industry.

**TowerXchange: Finally, please sum up how you would differentiate NorthStar’s batteries from other energy storage solutions for remote cell sites.**

Thierry Tardivent, Head of MEA and APAC, **NorthStar Battery**: Most battery companies are focusing only on selling their own components. But NorthStar are more than just a battery company. We take a different approach – we really want to help our customers (as well as help ourselves). How we support our customers is a tangible, core value for NorthStar Batteries. In the past few years we’ve assessed the typical problems faced by our customers, and come up with solutions for what can we do to extend battery life and save energy.

We seek to understand our customers’ problems. We’ll audit your site for you and we won’t leave without giving you an analysis of the problem and corrective actions. You won’t get an “it’s not a battery problem – talk to power system vendor” attitude with NorthStar – we have a strong competence on the whole power solution, not just the batteries.

We’ve changed the focus of our business to help our customers understand how to select the right batteries. One best electro-chemistry and battery technology isn’t right for all grid profiles and applications. For example, low technology batteries could be good enough for some developed market applications. But battery performance is more problematic in developing markets, so we’ve developed energy storage solutions for unreliable and off grid applications which we think represent the best compromise between capex and opex.

Lastly we are developing solutions which have a very quick payback. Payback after five to ten years won’t work in telecom industry – everything needs to pay for itself in less than two years. NorthStar are focused on developing the best opex solutions, with affordable capex and quick payback – making our energy storage solutions a ‘no brainer’!
TowerXchange: Please can you introduce PhixFlow, how long has the company been in operation, which sectors is it active in and how has it grown?

Andy Humphries, CTO, PhixFlow: Based in Cambridge UK, PhixFlow began in 2004, when co-founders David Coales and I identified a need in the market for a new approach for telecoms billing, rating and revenue assurance. Before founding PhixFlow, we both worked on delivering the globally successful telco billing engine, Geneva. David was a member of the Geneva Technology board, heading up the global services team, and I was a member of the product strategy group, responsible for integrating Geneva billing with emerging technologies.

The complexity of tariffs and pricing at that time amongst MNOs in the UK, combined with the volume of call event data, was restricting the MNOs’ ability to adapt to meet the commercial needs of the business. Legacy systems were too big and taking too long to change. The early versions of PhixFlow addressed this problem by providing a central platform, with a large number of interfaces to different systems, that could be configured to find and fix data quality issues, provide what-if analysis for new pricing models and provide many different revenue assurance controls. This approach gave PhixFlow an early reputation in the sector for being able to connect to any system and fix the data and processes. This approach is still being used by large MNOs and Internet Service Providers today.

Since that time, PhixFlow has grown by building on

Keywords: Job Ticketing, Monitoring & Management, O&M, Operational Excellence, PhixFlow, QoS, RMS, Site Management System, Who’s Who
the initial functionality of the core product, adding rapid application development tools for building user interfaces, data visualisation tools and other concepts that make it easy to quickly develop and deploy applications without the need for traditional bespoke software development.

Customers now use PhixFlow to solve highly complex and challenging problems, building solutions in many sectors including towerco, TV & media, utilities and financial services. More recently PhixFlow is winning contracts in such diverse sectors as healthcare, retail and automobile manufacturing. PhixFlow is proud to be working with some of the UK and world’s largest and most successful companies including Liberty Global International, TalkTalk, Tesco, BUPA, The UK Post Office, Fujitsu and more recently IHS Towers across Africa. These companies rely on PhixFlow for business critical processes, knowing that our approach, a combination of expert consultants and the PhixFlow platform, delivers solutions quickly.

Privately owned, PhixFlow has achieved year on year growth since its inception, re-investing back into the business, and achieving in excess of 30% growth per annum. PhixFlow is constantly building future capacity by adding technologists, consultants, project managers and subject matter experts in the sectors that we are active in. The majority of our business comes from existing customer relationships, our market reputation and existing users recommending PhixFlow when they move companies, with minimal outbound sales and marketing activities.

**TowerXchange: How does PhixFlow help to support clients and what is so innovative about your platform?**

**Andy Humphries, CTO, PhixFlow:** PhixFlow supports clients with specialist consultants from each sector it works in, and has a truly innovate approach to delivering business solutions.

Where a highly standardised process is used such as in accounting, off-the-shelf packages typically serve the business requirements well, and deliver good return on investment. But not many processes are standardised. Software must continually adapt to help companies stay ahead and gain a competitive advantage. Processes need optimising continuously to reduce costs and software must be agile enough to meet the ever-increasing demands of legal and regulatory compliance.

Large ERP platforms claim to address this with customisation or configuration. But many products that claim to be configurable are often actually being customised with significant amounts of .NET code plugins. These modules often represent the core logic and functionality and can take as long to develop as bespoke development. Over time this approach creates the same technical debt as with bespoke development, leading to slower delivery of changes, issues upgrading older code onto new operating systems and an inability to migrate to modern cloud platforms.

In order for businesses to adapt more quickly shadow IT is now commonplace in many companies, for example, creating processes in spreadsheets. This brings a whole set of new problems for IT governance. PhixFlow responds to these types of challenges in a number of ways:

- The PhixFlow Platform and its features alone are used to build all applications – zero source code is created.
- The original integration capability is still a pivotal part of PhixFlow. The platform has built-in modules for any type of connectivity, from switch binary data to vendor specific OData API’s, as well as FTP, Email message discovery and even web page scraping. This significantly reduces time and complexity to connect to any system or data source.
- Whilst trained business users can and do extend the solutions within some customer companies, PhixFlow security, access and authentication tools ensure that this is managed properly with granular access and privileges and utilisation of a customer’s existing authentication providers such as Microsoft Active Directory. The product also includes robust audit tools to track changes and the ability to export and transfer configured applications between development, test and live environments.
- Since inception, PhixFlow has released a new version of the platform at least every six months. Each release introduces new functionality which makes it faster to create applications and integrate with other systems and services. Each new version upgrades the platform and existing customer solutions automatically - no upgrade development work is needed.
TowerXchange: When looking at billing and revenue assurance, what are some of the challenges that you have observed in the telecom sector that lead to inefficiencies?

Andy Humphries, CTO, PhixFlow: The major limitation has been the inflexible nature of the legacy systems used and the time to adapt them to changes in business requirements. With PhixFlow, logic is built iteratively and hierarchically, using configurable objects which are then linked together onto PhixFlow “models” and grouped into “applications”. This approach makes PhixFlow extremely agile.

Within revenue assurance systems specifically, many solutions stop with the identification of mismatches between systems leaving users to figure out and manage the corrections manually. With PhixFlow you can set up a workflow defining exactly how each type problem should be resolved, assigning issues to different queues and individuals together with screens showing all relevant data in one place. PhixFlow correction paths can be set up and initiated through menus to either apply fixes directly or to initiate corrective processes in other systems.

Within rating and billing, the sheer volume of the data can create challenges to completing processing in a timely manner and prevent what-if analysis from being done. PhixFlow has been built to scale from day one.

TowerXchange: Can you share details on clients that you have worked with and the impact that PhixFlow’s solution has had?

Andy Humphries, CTO, PhixFlow: Within each customer, PhixFlow typically delivers many projects of different sizes, working closely with individual teams to deliver tactical solutions as well as with central IT departments and the office of the CIO to deliver strategic solutions. A small number of examples are given below.

TalkTalk
A team of trained TalkTalk staff have configured their own revenue assurance framework on PhixFlow with just application support to help build the very first models. Since 2011, TalkTalk have used our examples, online training, context sensitive help and application support staff to create their own models to cover all aspects of revenue assurance.

Processing approximately 1.6 billion switch CDR’s as part of the interconnect reconciliation alone each month, the scalability and performance of PhixFlow is proven.

Post Office
The Post Office needed to replace the process of checking hundreds of thousands of received payments between their bank accounts and their general ledger. PhixFlow delivered a solution in just six weeks using one consultant with the following results:
- Significant reduction in manual effort leading to a reduction in team size required to manage the process
- Unallocated payments reduced by 50%
- Reconciliation completed in hours instead of days

Liberty Global International
The PhixFlow platform was used to develop natural language processing rule sets to analyse, categorise and rank vast amounts of IT support data from helpdesk software. This was then used to understand the utilisation of several thousand software applications across the enterprise globally as part of a software portfolio management project.

Virgin Media
Virgin Media deploys high speed underground fibre infrastructure to residential and business regions in the UK. These projects are extremely complex; each site has varying requirements regarding size and complexity and requires detailed planning, civil engineering and cabling which all need to be costed and scheduled as part of the business case. Traffic sensitive areas require liaison with local authorities to apply for permits in advance to close roads and substantial fines can be imposed by the authorities if delays occur.

The PhixFlow platform was used to quickly build an application to automate estimating, scheduling, costing and revenue generation forecasts for deploying fibre to each region. This solution was deployed to users nationwide. Virgin Media staff and a PhixFlow telecoms consultant worked closely together to ensure that the system met both the business and end-user requirements. By providing a working, end-to-end prototype very quickly, Virgin Media staff were able to confirm that the PhixFlow consultant understood the scope and logic required but also enabled quick feedback and turnaround on new features, logic and screen layouts so that the toolkit evolved towards exactly
the functionality required. From start to finish the PhixFlow consultant worked a total of six weeks on design, configuration and testing. Because the users were engaged throughout the process, acceptance testing was completed in just one week enabling the solution to go live successfully.

**TowerXchange: What’s next for PhixFlow?**

**Andy Humphries, CTO, PhixFlow:** Our overall strategy has remained unchanged since 2004, to manage growth carefully, to continually enhance our product, enabling customers and consultants to deliver solutions to complex problems even faster and more cost effectively, and to forge strong long-term relationships with successful forward thinking companies.

With a number of projects now in Africa and the Middle East, a current area of interest is opportunities within MNO and towerco sectors in these regions. We are in the process of gaining product certification from the Zambian Revenue Authority and working on various projects to help customers meet IFRS reporting requirements.

PhixFlow are particularly interested in talking to companies facing challenges in the following areas:

- Impact of active sharing and sectorisation technologies on billing and revenue assurance
- Management and reporting of SLAs for power consumption and availability
- Companies interested in rapid solution prototyping or trialling the PhixFlow platform to assist with regulatory compliance projects or to replace spreadsheet-based processes

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**See you at our future events!**

**Meetup Americas 2019**
9-10 July, Boca Raton

**Meetup Africa 2019**
8-9 October, Johannesburg

**Meetup Asia 2019**
3-4 December, Singapore

**Meetup MENA 2020**
28-29 January, Dubai

**Meetup Europe 2020**
19-20 May, Barcelona

[www.towerxchange.com](http://www.towerxchange.com)
Why Polar Power is moving up the value chain

Why Polar Power have started offering new engineering, design and construction services for towers and how it could help enhance rural connectivity

This isn’t the first time we’ve interviewed you about Polar Power, so please give us a short introduction to yourself and the company.

Arthur D. Sams, President and Chief Executive Office, Polar Power: In 1979, I co-founded Polar Power and started delivering solar photovoltaic power systems to remote locations worldwide. Polar Power has become a leading end-to-end designer, manufacturer and distributor of DC generators for the telecom, marine, oil and gas, military and automotive industries.

Today, starting in Namibia, we have moved up the value chain and now provide engineering, design and construction services for towers so that we can put out technology to work in the most efficient and effective way possible. We intend to spread through Southern Africa once we are established in Namibia, but in time we may be building towers across the world, including our home market, the US.

Polar Power is publically traded on Nasdaq under the symbol POLA. This gives our customers transparency on Polar’s financial strength along with the confidence that we will be around for long into the future to service their needs. Polar directly employs 165 employees comprising of manufacturing, engineering R&D, customer service, and administration. Most of the company’s management is made of highly experience engineers. We are a very hands-on team and we do understand the real technical challenges of our

Keywords: Africa & ME, C-Level Perspective, Community Power, DG Runtime, Energy, Hybrid Power, LPG, Managed Services, Market Entry, Masts & Towers, Microgeneration, Namibia, Network Rollout, Off-Grid, Passive Equipment, Polar Power, TowerXchange Research, Unreliable Grid, Urban vs Rural, Who’s Who

Read this article to learn:
- Polar Powers ambitious plans in Southern Africa
- How supply chain rationalisation is pushing Polar Power to enter new markets
- The potential of alternative fuel sources to reduce genset total cost of ownership
- Strategies for enhancing rural connectivity and development
customers. One of my favourite pastimes is to visit rural communities to explore (and put into practice) ways to improve the lives of people by providing power and cooling.

In the 1990s we pioneered Hybrid Solar Systems using DC generators and this enabled us to lower both the capex and opex while improving upon the system reliability. In 1995, Polar was the first company in the telecom industry to introduce DC generators as a prime power replacement to AC generators. Polar was also the first to incorporate DC generators into Solar Hybrid systems. Actually, our first product in 1979 was a solar powered vaccine refrigerator for use in remote areas worldwide, developed in cooperation with the World Health Organization, NASA, and the U.S. Agency for International Development. Since 1995 and continuing, our focus has been improving every component within the system through engineering innovation, new production tooling and raw material sourcing. A few very simple components can cause a functional problem that requires one or two expensive maintenance trips to the site for corrective action.

Within our Los Angeles headquarters, we manufacture in volume our own alternators, controls, engine accessories and enclosures. We have also developed, alongside Bosch and Toyota our own LPG engines, with a 15-25% fuel efficiency advantage over its predecessors.

TowerXchange: What has prompted the shift from being a manufacturer and provider of energy solutions to engineering and construction?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Recently there has been a trend towards simplifying supply chains. That means cutting down on the number of suppliers and reducing the variety of installed components and service providers. This allows for easier supply chain monitoring, and the building of longer relationships between buyers and sellers, but it also involves some compromise in cost and quality. If you reduce the number of suppliers you work with it reduces your capacity to bid down prices to the
We have always offered a quality product and worked well with sophisticated buyers, but many of those constructing towers are not sophisticated buyers of energy solutions. The traditional energy solution is a standby or temporary diesel generator but these are not designed to be long-lived when used autonomously, or to have the flexibility and finesse required of modern telecoms infrastructure. The most competitive level, and it reduces your ability to explore more suppliers to find the highest quality product.

At the moment only around 10% of African cell sites are using DC gensets, and that means 90% of cell sites are missing out on a cleaner, cheaper, easier to use alternative to their AC gensets. Part of our strategy will be to bring our expertise and DC genset products to market through our construction business.

We have always offered a quality product and worked well with sophisticated buyers, but many of those constructing towers are not sophisticated buyers of energy solutions. The traditional energy solution is a standby or temporary diesel generator but these are not designed to be long-lived when used autonomously, or to have the flexibility and finesse required of modern telecoms infrastructure.

Today, if you point to a site we will put a tower there, and if you’re not sure what type of tower would work best on the site we can help you with the engineering services to decide what tower would be optimum. For example, at some sites wouldn’t require an elaborate foundation and so we could save you money and time. Right now, we are helping to install the radios and helping to calibrate the antennae, but we don’t do site acquisition. We are engineers, so there are some things we are comfortable with, and some things which belong to someone else’s skill set.

TowerXchange: There are more mature and larger markets around the world, why are you entering Namibia first with your tower construction business?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Namibia is a wonderful market to work in. And a beautiful country as well. First of all, for a small market, there is already an existing tower industry that has done a lot to professionalise the tower industry in Namibia.

Overall, Namibia is an easy country to do business in, with reliable payments and banking infrastructure and is part of a Southern African Customs Union. That zone includes Botswana, Lesotho, Namibia, South Africa and Eswatini. It also has close regional ties with Angola, Zimbabwe and the other 14 members of the Southern African Development Community. Namibia is also just a pleasant place to live, safer than many other countries and a good place to base a regional team.

We are working for a major telco in Namibia to help them in their roll out. They have ambitious plans to add hundreds of towers to bring universal coverage to Namibia’s populated areas. Many regions of Namibia have very limited wireless broadband,
especially in rural areas. That’s a big problem in a country with such potential as a tourist destination. Namibia has some of the most amazing wildlife, but without the reassurance of quality telecoms infrastructure they will be unable to maximise the potential of Namibia as a tourism destination.

We want to make an impact here. We are setting a precedent for our way of doing construction and engineering. We want other countries and companies to see how we are incorporating power systems into our build and design and our innovative way of running and servicing the sites.

**TowerXchange: Tell us more about your approach to solar and hybrid systems, and what role alternative fuels can play in improving the operational efficiency of towers.**

Arthur D. Sams, President and Chief Executive Office, Polar Power: There have been some amazing advances in photovoltaic cells, but now they have reached a level of efficiency where you can buy them as a commodity, the real value add comes from taking a systems approach to your energy set-up. There’s very little cost you can pull out of a solar module, but there is often a lot of cost you can pull out of your overall energy system by making it work smarter. For example, a fuel-based back up can save you a lot of money relative to a battery back-up system. A system which is powered 80-90% solar and 10-20% fuel can have lower overall cost, especially when opex costs like ground rent and battery maintenance are included. Although the land used by extra solar panels is usually relatively minor, because the tenant is a large corporate, and the need for power is usually acute, rental costs can inflate.

Often people’s default picture of a genset is a diesel generator, but there are alternative fuels which we are really excited about. There are big advantages to diesel in terms of familiarity and ease of transport, but that doesn’t mean towercos, telcos and their managed service providers shouldn’t be leading the way in exploring alternatives. For all its benefits, diesel can be dirty, smelly, polluting and also cause vibrations and noise which disturb neighbours.

Alternative fuels like liquid natural gas (LNG), compressed natural gas (CNG) or propane can fuel engines engineered for long life, but the modified petrol engines operating on gas have given this application a bad reputation. We have worked with the propane council and they have been telling us about 80 years old tanks they’ve discovered, still sealed and the fuel was still good. Unlike diesel you don’t need to treat them to stop algae or use additives to stop them gelling in cold temperatures. We have found that these alternative fuel engines have three of four times the life expectancy of diesel engines. We worked with Toyota and Bosch to design and build the ideal gas (LPG and natural gas) engine, and includes our own alternator. We plan to start to deploy this engine into the field at the end of Q2 2019.

There are some key ways that we are reducing the total cost of the energy system. First of all we reduce the maintenance on your starter battery by eliminating it, we use a capacitor instead which is more reliable. Because we’re not using diesel we’re also not using a fuel injector. If water gets into your diesel and that passes through your injector it will seriously reduce its lifespan which again pushes up maintenance costs and site visits. The alternative fuels also work well at a lower rate of compression so your bearings, crankshaft, pistons, et cetera all
take less punishment and last longer. All across the engine we’re reducing the wear and tear it will suffer in normal operation and taking out components which can go wrong. To also reduce maintenance and greatly improve fuel economy we removed the parasitic load of the engine including all V-belts, belt driven alternator, belt driven water pump, and the charging battery alternator.

**TowerXchange: What is holding back the greater adoption of alternative fuels? Are the distribution networks there for it?**

Arthur D. Sams, President and Chief Executive Office, Polar Power: We’ve been deploying alternative fuel generators for nearly 20 years. For example, in the US, if a tower is on federal land you cannot burn diesel without a special permit. Even on military sites, natural gas and propane is used. So there’s a market for them and the technology is proven. At the moment there is an infrastructure deficit, but with the potential efficiency gains, it will be worth investing to fill that gap.

Towers and telcos wouldn’t be the only market for these fuels. Deforestation is a major issue in many places in Africa, and many hours a day are spent just collecting wood to burn. A propane distribution network displaces that and gives every family that uses propane a couple of extra hours a day to do more valuable work. Fuelling telecoms sites creates the sort of throughput that a distribution system needs to get started, but once the market for cooking fuel is live it doesn’t require any subsidies. What we can do with alternative fuels we can do with other aspects of the telecoms value chain to push rural development. It is a big opportunity.

**TowerXchange: As something of an outsider to tower construction, how do you want to see site development change?**

Arthur D. Sams, President and Chief Executive Office, Polar Power: There’s a big opportunity for rural development, which in my view, we are missing out on because we as an industry aren’t involving the whole value chain created by telecom site development. On current lines, the business case for connecting rural sites is lacking, but of course, without connectivity it will take even longer for those reason to develop strong business cases for investment.

But for the last 25 years, we have seen banks enter rural areas and put in a power system for a remote ATM. Today, you don’t need an ATM to access banking services, but you do need wireless broadband. The development also supports safety and security services which are essential for attracting tourists. Bringing it back to our roots, it also enables the storage of vaccines and for medical treatment which supports the development of future generations of producers and consumers.

So the whole pie grows, it helps commerce, health, tourism, finance, security, education. But the issue is we’re not collaborating. It’s not an easy problem to solve, to coordinate all the different parties who would benefit and crystallise it into a viable investment plan, but it is what is needed. Sadly we cannot rely on government programmes to connect rural areas because they move to slowly.

In developing areas the two most important areas are power and broadband and that is what the tower industry provides. A power system alone in many areas would be great, but it needs to be maintained and telcos can provide, or contract for, maintenance. Broadband and low-cost power go hand-in-hand. How you monetise that power generation and justify that maintenance cost is another question, whether you can give access to your generation for charging batteries or use excess energy to power a school, and your independent systems, fuel service and maintenance personnel are shared. Or perhaps the schools or local business enterprises generate power and sell to the tower company, these are some of the options.

Once upon a time, a major beverage company investigated using solar generators in remote locations so people could enjoy cold beverage in rural areas. Years later when people moved to the cities they still enjoyed that cold beverage and kept buying it because they remembered it had been there when they were young. Viettel are using this strategy in Tanzania, going to rural areas, winning customers, and then keeping them and banking a lifetime of income far in excess of the cost of the capex required to reach that rural community. There’s so much more value add possible in the telecoms industry, but it requires even more coordination.
Methanol fuel cells making inroads into the telecoms sector

An interview with SerEnergy, the world’s largest methanol fuel cell manufacturer

SerEnergy is the largest methanol fuel cell manufacturer in the world, supplying solutions for ships, vehicles and stationary power generation across the globe. TowerXchange speak to the company’s Head of Stationary Power, John Lindegaard Kjær to understand where fuel cells can bring real benefits to grid connected, poor-grid and off-grid telecom sites.


John Lindegaard Kjær, Head of Stationary Power, SerEnergy

SerEnergy is the largest methanol fuel cell manufacturer in the world, supplying solutions for ships, vehicles and stationary power generation across the globe. TowerXchange speak to the company’s Head of Stationary Power, John Lindegaard Kjær to understand where fuel cells can bring real benefits to grid connected, poor-grid and off-grid telecom sites.


Read this article to learn:

- Who SerEnergy are, which sectors they serve and what their fuel production capacity is
- Use cases of fuel cells and how they compare to other sources of power generation
- Serenergy’s fuel cell efficiencies and space requirements for indoor and outdoor scenarios
- How easy fuel cells are to install and maintain
- The CO₂-emission reduction potential of fuel cells
- What differentiates SerEnergy from other fuel cell suppliers

TowerXchange: Please can you introduce SerEnergy.

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: SerEnergy is a world leading developer and manufacturer of reformed methanol fuel cell solutions applicable for ships, vehicles and stationary power generation, for example for telecom sites, running either as backup, supplementary or primary power source. Systems are largely deployed within all areas around the world.

SerEnergy’s products are based on High Temperature PEM fuel cell technology providing the customers with high-quality solutions with attractive economic returns and features. The products reflect on the company’s rich experience within system design, offering cost-efficient and highly reliable systems.

With a green mindset SerEnergy aims to contribute to the world’s transition from fossil fuels to renewable energy at the same time as overcoming some of the known obstacles within the renewable sector such as flexibility and availability.

With headquarters in Aalborg Denmark, SerEnergy is the largest methanol fuel cell manufacturer worldwide with a production capacity up to 25MW (5000 units) per year. On top of a premium product, SerEnergy is continuously investing heavily in creating a service organisation that can support our customers within all areas worldwide.
Fuel cells are not something that have been spoken about as extensively in TowerXchange discussions, can you explain what grid situations they are most suited to and how extensively they have been deployed?

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: There are various types of methanol fuel cell systems, but in general they can be used for backup power, supplementary power or primary power.

**Backup power**
A lot of customers around the world rely on being able to run communication systems at all times. This also puts more stress on the reliability of the systems and on grid availability. This means that even if you are based in areas where loss of grid (down time) only happens every second year or less you still need a backup system that is always able to provide power so that your systems keep running. If you need longer than 6-8 hours of backup time, batteries typically become too heavy, space demanding and expensive. Traditional diesel generators offer long backup time, but for systems that are not running very often they still need to be maintained and you need to make several startups per year to make sure they can run in a backup situation. Our fuel cells offer great advantages in those cases since they are able to be used for both short and long backup time. At the same time, they are more or less self-maintaining and even if they are not in use the systems are able to be kept in optimal conditions through self-test programs and automatic startup cycles.

** Supplementary power**
In many situations and in many regions in the world you need a supplementary power system which is able to take over when the primary power source is not running. The system could run several hours per day or per week. This could be for regions with unreliable grid but it could also be part of a green installation with solar panels, wind turbines or other energy sources where the fuel cells can ensure that the system is running 24/7. In many parts of the world, especially Asia and Africa the grid is highly unreliable and in order to keep telecom sites up and running you need either an alternative to grid power or a system that can run several hours a day or per week due to outages. Methanol fuel cells offer an ideal solution to conventional power sources like diesel generators due to low fuel cost and less maintenance.

**Primary power**
Methanol fuel cell systems are a great alternative to traditional diesel generators when it comes to providing power on off-grid sites. Typically, there are large investments involved in connecting especially remote sites to the grid, so together with the low operation cost and the relative little investment the fuel cell system can offer large cost benefits for the customers. Compared to diesel generators both maintenance and fuel cost are in most cases much lower when operating a methanol fuel cell system.

**TowerXchange: What advantages do fuel cells offer above other sources of generation?**

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: The fuel cell technology has a number of advantages compared to batteries and diesel generators especially making them suitable in many situations both for backup, supplementary and primary power. First of all, the fuel cell system is a technology that offers a 50-95 % reduction of CO2-emissions. Besides that, the fuel cell technology
offers several clear advantages compared to diesel generators. Especially in densely populated areas where the surroundings are quite sensitive to noise, vibrations and harmful emissions. Diesel generators will give you all three at the same time, while the fuel cell system can offer you low noise, no vibrations and no harmful emissions due to the nature of the technology. This allows customers to setup the base-stations where the coverage is best and it also makes it easier to get the required approvals from the owner of the property as well as the authorities.

Fuel cell solutions offers a very compact design per kW. It can be installed in either an outdoor cabinet next to the actual telecom equipment or it can be integrated into an existing indoor solution. In an outdoor solution, the footprint for up to 15 kW is typically not bigger than 1x1 metre including cabinet, modules and tank while in an indoor installation offers an even smaller footprint integrated into e.g. a 19” rack system. Not only is it convenient on existing sites but it also saves money on rental cost and installation.

Our fuel cell system is fully monitorable, not only when it comes to power output but you are also able to monitor the state of the inside of the system e.g. fuel cell stack, reformer etc. At the same time the system is running fully automatically and will be more or less self-maintaining and conditioning. The monitoring system also allows you to monitor fuel levels, state of the grid and alarms making it possible for the customers to respond faster to alarms, service requests etc.

The efficiency of the fuel cell system is another area where it outperforms existing technologies. The fuel cell system is dimensioned according to the exact needs of the customers and it runs at a very high efficiency no matter if it is delivering 30% of its capacity or 100%. The efficiency rate is typically between 35-45%.

Methanol fuel cell offers a cheap fuel source. Methanol fuel cells runs on a blend of water and methanol which is easily accessible in most parts of the world and at low rates. At the same time the use of methanol offers a CO2-neutral alternative to traditional fuels, depending on the source of the methanol.

**TowerXchange: How robust is the system and how simple is it to install and maintain?**

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** Fuel cells offers a robust design which is used for both stationary as well as mobility applications like cars and buses, meaning that the technology is equipped for the most extreme conditions. The installation of the fuel cell system is quite easy and in most cases, offers more flexible and faster installation options than traditional power sources – like the options for integration into existing enclosure solutions. The fuel cell system is a compact and lightweight design which is a big advantage for base stations with limited space and also for installations in city areas on rooftop sites, in buildings et cetera.

**TowerXchange: What kind of opex reductions can fuel cells provide and how does TCO compare to other sources**

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** Our methanol fuel cell systems offer low maintenance because they are self-conditioning and maintaining and the systems can be monitored remotely resulting in large savings in terms of service cost, unplanned site visits et cetera. As mentioned previously methanol is a cheap fuel source and in most cases and in most parts of the world methanol is cheaper compared to traditional fuel sources.

**TowerXchange: How do SerEnergy differentiate themselves from other fuel cell providers in the market?**

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** SerEnergy was established back in 2006 and has since then worked intensively with the implementation of the technology into e-mobility, marine as well as stationary application like telecommunication. That also means that the SerEnergy fuel cell systems have been tested and deployed in many markets and with many customers giving a proof of concept which not many competing companies can match. SerEnergy is committed to serving our customers commercially and technically meaning that we support our customers remotely and locally in a way that not many of our competitors are able to offer. With SerEnergy being owned by Fischer Group, we also offer a solid financial base.
TSS: Reliable solar solutions tailored to each client’s needs

TSS have installed over 1,100 sites and have 15 years’ experience in low-maintenance solar solutions

TSS are specialised off-grid system integrators, specialising in solar and hybrid systems. They work especially on critical applications, like telecoms networks, which sit off-grid but need reliable uptime.

TowerXchange took some time to interview TSS’s Sales & Marketing Manager for Telecom Erik Blokhuis to find out more about how solar systems are offering improved capex and opex compared with diesel-led solutions.

Keywords: Batteries, Capex, Energy Storage, Hybrid Power, KPIs, Masts & Towers, NOC, Off-Grid, Opex Reduction, Renewables, Solar, TSS, Unreliable Grid, Who’s Who

Read this article to learn:
- The experience of TSS’s management team and field technicians
- How passive cooled solar can reduce both capex and opex
- Options for tailoring a solar solution to your needs
- How the in-house TSS charge controller keeps their system reliable
- How the TCO of solar systems changes as power demand increases

TowerXchange: Please introduce your company – where do you fit in the telecoms infrastructure ecosystem?

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: We were founded in 2003 by ex-Shell Solar engineers, people who had been working in solar since the early 90’s. So the calibre of expertise here has been high from the very beginning. We don’t just focus on the solar panels alone but are pushing the envelope technically, rather in the commercial applications of solar technology as a primary energy source. We create highly reliable solar and hybrid systems, take full system responsibility in delivering a functional and reliable solar system in a project, from design, engineering delivery and commissioning. All in collaboration with our client, and always tailored to the site’s requirements.

TowerXchange: Please tell us about the performance of your solution in the field – who is using it and what results have been achieved? What is your installed base at cell sites worldwide?

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: Over the last 15 years we have installed over 1,100 sites across Africa, Southeast Asia, the Middle East and Europe. Most of the work we do is to provide reliable power for remote telecoms units. And to be clear, we’re a solar energy driven company, we believe in renewable energy technology and its benefits and it is at the core of what we do. Lots of the time these have been within the oil and gas sector where reliability is paramount for mission critical and remote applications.
We want to minimise points of failure and guarantee the uptime our clients expect. We ensure long battery lives and minimum service intervals by doing a proper system sizing, using fewer components, and less complex designs. This reduces the points of failure. Fewer components mean less capex, and fewer points of failure means lower maintenance opex. This is what gives us our high reliability and a better total cost of ownership (TCO).

As we are an engineering and system integration company, specific client requirements can also be taken into account.

I can provide a few examples. In Algeria, we installed a number of off-grid solar systems last year with custom designed three meter high solar module support structures to mitigate the existing theft risks in that area. We recently also got awarded another project in Algeria for 45 off-grid solar energy systems. Those systems will be installed on 15 meter high monopoles, also as an anti-theft solution.

For a VSAT service provider in Indonesia last summer we installed and commissioned a 500W stand-alone solar energy system with 96 hours (four days) of battery autonomy and a simple network management protocol (SNMP) uplink to their network operations centre (NOC). This helped demonstrate the reliability of solar and battery back-up versus using diesel gen-sets to the local authorities involved in the project.

TowerXchange: You engage with customers from design and project management to training, remote monitoring and system integration – please talk us through a “typical” collaboration between TSS and a cell site owner.

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: As an off-grid solar system integrator we take full responsibility for the complete system in a project, but there is no one-size-fits-all solution or configuration. We work with the client to establish what they need from their sites in terms of performance, whether they need a pure solar system, or zero-diesel solution as you could call it, or something hybridised and then we get to work. There’s lots of room for optimisation based on the individual site specifics or client’s specific needs.

We recently developed a new solar module support structure, specifically designed to reduce handling and transportation costs and to support local
manufacturing in Asia or Africa. We don’t see the added value of shipping support structures from Europe to those markets and there is also an increasing preference or regulatory requirement for local content in those markets.

The on-site installation can be either undertaken by the client themselves, their preferred local third-party contractors, or TSS selected local third-party contractors. The installation will be overseen on-site by a TSS field service technician who will be doing the commissioning and hand-over to client.

Remote monitoring and control is paramount to effectively managing remote off-grid telecom installations. TSS have developed a flexible and customisable cloud-based remote monitoring and control application together with one of our IT partners. This solution allows our clients to cost effectively monitor and control the TSS solar hybrid systems 24/7 remotely from any internet connected device. We also enable clients to feed our systems data directly into their own Network Operations Centre software.

TowerXchange: The most frequent complaint about solar power systems TowerXchange hears from towercos and MNOs is that they can be too complex for their current field service partners to effectively maintain. How do you overcome such concerns?

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: We do provide training, so that maintenance teams in the field can understand our systems, but honestly the maintenance requirement for our solar and hybrid systems are minimal. That’s how we’ve designed it, to keep it simple. Things can be a bit more demanding in terms of maintenance requirements if there’s a diesel generator involved, but if you just have solar panels and storage batteries there should be very little to maintain and very little should go wrong. You would just need to clean the solar modules periodically. It does not get any simpler, really.

Our solar systems are passive cooled energy systems. We have no active cooling systems and fans and no moving parts, so wear and tear is limited and the internal energy consumption is extremely low. Maintenance involves tightening a few battery and support structure screws and employing a cleaning company to keep the solar panels clean and at full capacity. We really wanted to minimise last mile risk. Plus, we also only work with Tier One vendors in the markets in which we operate so local maintenance support is covered.

We see a transition in the telecom market to move from diesel based off-grid energy systems towards “zero diesel solutions.” However, until today the large majority of stand-alone solar power systems installed in the telecoms market apparently do not run trouble-free 24/7 throughout the year. Expected battery lives are not met either, negatively impacting upfront TCO and ROI calculations. As a result, quite a few MNOs and towercos consider solar with batteries unreliable and still prefer diesel gensets as a mandatory back-up despite the associated high maintenance and fuel costs.

However, we would say, and have proven over
time, that a well-designed and correctly sized solar energy system with battery storage can be highly reliable, hardly requiring maintenance and minimising opex, making a good business case for the additional capex.

**TowerXchange: What’s the sweet spot for your solutions in terms of grid availability and the load your solutions can support?**

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: We focus exclusively on off-grid applications and areas with very unreliable grids. But in terms of sweet spot for installed sites, we can run standalone solar and battery combinations to any capacity, the only limiting factor is space.

For example on towers with multiple tenants you increase the energy demand but also minimise the space on the tower on which you can install solar panels. For single tenant towers, with energy demands up to 1kW or 1.5kW continuous, it is very straightforward to deploy the pure solar solution. Alternatively for sites with higher energy demand we can install solar modules on the ground at the site and when there is not enough space the hybrid systems come into play, and secondary energy source can be a diesel generator set, or it could be wind or any other energy source. We are flexible and look at the optimum solution per site.

**TowerXchange: How many hours of sunshine is necessary for your renewable energy solution to start to become a viable option? How is increasing solar cell and battery efficiency affecting that?**

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: Any site between the two tropics with high solar irradiation is a good site, but we have also installed quite a number of sites in Europe. That might involve using more solar modules, changing the tilt angle for optimal solar yield, but the solution is flexible. Solar module efficiency is improving and that helps us produce more energy on a restricted amount of space.

An example of supporting higher solar efficiencies and lower internal energy usage are the TSS in-house developed charge controllers; they are world leading for use in high temperatures and harsh environments without any de-rating and without forced cooling as offered by other vendors. The increasing efficiency of solar modules have made us...
redesign a new version of our TSS charge controller to harvest the maximum solar energy, supporting our client’s ROI and TCO targets.

As batteries are the big ticket items in a solar energy systems, we continuously strive to achieve the best battery lifetimes for our clients to guarantee the system performance and to secure their investment. Therefore we continuously test and enhance our TSS battery charging regimes in close cooperation with battery OEM’s like EnerSys and Saft.

**TowerXchange:** What magnitude of fuel and O&M savings can be realised using your solutions, and how does TCO compare with traditional diesel-oriented energy solutions over an eighteen month, three year and five year scenario?

**Erik Blokhuis, Sales & Marketing Manager Telecom, TSS:** With rising fuel prices, environmental concerns and increasing pressure on opex reduction, the business case for solar based energy systems is getting better and better.

To give you an indication, for sites up to 1kW and 1.5kW continuous load, the ROI for a stand-alone solar with batteries system can be as low as one year compared to a 24/7 running diesel generator. Maintenance visits are generally reduced to just once every six months to one year depending the location, and diesel cost is completely eliminated. Above 1.5kW continuous load, the ROI for solar diesel hybrid solutions can be anywhere between two to five years maximum depending on the actual site load, solar irradiation, fuel costs and local logistical conditions and costs. With fuel subsidies been significantly reduced nowadays in many countries including the Middle East, deploying solar is a good measure to mitigate the opex risks of these future fuel price hikes.

To give you a real life example, the diesel runtime and fuel consumption reductions we have observed in our solar diesel hybrid trial project in the Middle East are excellent. Compared to a typical 15kVA diesel genset running continuously and directly connected to the load, we have achieved on average 91% reduction on runtime and over 83% on average reduction on diesel consumption. The number of site visits based on runtime and refuelling have been reduced from once every month to just once a year. Compared to a typical 15kVA DG+Batteries solution running eight hours cyclic per day at 80% load, the average runtime reduction we achieved is close to 80% and the average fuel consumption reduction 50%. The number of site visits based on runtime and refuelling have been reduced to just once a year instead of four times a year based on a 250 hours’ runtime service interval.

The advantage of deploying solar goes further than just opex reductions. It allows the reduction of site
visits which directly reduces the health and safety risks associated with the crew’s mobilisations and demobilisations. As health and safety is an increasingly important KPI for companies nowadays it strengthens the case for deploying solar.

**TowerXchange: SLAs often demand 99.5% or higher uptime – tell us about the reliability and autonomy of your solution and your after sale advice and remote monitoring services.**

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: TSS’s core business is supplying solar based energy systems to mission critical applications where uptime and reliability are of paramount importance. In order to ensure operations we have a unique fall-back functionality incorporated in our charge controller which kicks in should the digital controls fail. This mode extends the reliability of the system and provides the operator more time to get to the site. Besides this we can also offer a dual set up which allows to switch off 50% of the system for maintenance purposes while the other 50% still provides energy.

**TowerXchange: How is your solution scalable to accommodate the increasing power requirements as multiple tenants are added to a site?**

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: If there is enough space on site to install additional PV modules to increase the amount of solar output then that will always be the preferred choice. In Gabon for example, the client’s load has increased over the years so we have upgraded the system three times. If the increased load is within the foreseeable future, the best thing to do is to factor in a percentage spare capacity to cater for future increased load requirements. For multiple tenant sites, which are generally above 1kW continuous load anyway, a solar diesel hybrid system will be deployed, and the increased energy demand can be either provided by additional PV modules or by increasing the diesel genset runtime or adding a wind turbine for example.

**TowerXchange: Please sum up how you would differentiate your solution from your competitors?**

Erik Blokhuis, Sales & Marketing Manager Telecom, TSS: Off-grid solar has been our core business for the past 15 years and we have a proven track record of over 1,100 off-grid systems reliably running all year round in the most remote and harsh environments. We have 100% passive cooled solar energy systems that reduces maintenance and energy usage. We continuously test and enhance our battery charging regimes to get the most out of our batteries. We are so confident of our capabilities that we actually are happy to discuss with our clients providing them performance output guarantees for as much as long as seven years. To finish, I’d like to call upon the MNOs and Towercos to challenge us with their off-grid energy issues!
The devil is in the detail – the detail of painstakingly constructed and hard negotiated Sale and Purchase Agreements (SPAs) and Master Lease or Service Agreements (MLAs) that define the main terms in any tower transaction. Jeff Eldredge and Rob Dixon, Partners at Vinson & Elkins, have advised on numerous sale and leaseback transactions in the last few years across Africa, Asia and Europe. Rob and Jeff kindly agreed to meet with TowerXchange and to provide us with an overview of tower sharing SPAs and MLAs.

Keywords: Anchor Tenant Privileges, Due Diligence, Infrastructure Sharing, MLA, Novation of Leases, Regulations, SLA, Service Level Agreements, Transfer of Assets, Vinson & Elkins

Read this article to learn:
- The conditions precedent that need to be fulfilled before assets are transferred
- What happens to towers that aren't transferred in the first close
- Why the real value lies in the MLA
- How critical towers are sometimes treated differently

The buyer will require a certain number of towers before the deal is economically viable. Typically, therefore, the deal will be structured so that closing does not happen unless and until a certain number of towers are ready to be transferred (i.e. the tower-specific conditions precedent are satisfied or waived).
Jeff Eldredge, Partner, Vinson & Elkins: One key point in the process is the extension of ground lease terms. Towers deals can involve thousands of different parcels of land. Different ground leases will expire at different times, giving uncertainty on future costs. The buyer will therefore seek to have the ground leases extended for a reasonable period as part of the transfer process.

Rob Dixon, Partner, Vinson & Elkins: As a result of that and certain other conditions taking time to satisfy, there are typically a number of closings at different times, giving uncertainty on future costs. The buyer will therefore seek to have the ground leases extended for a reasonable period as part of the transfer process.

TowerXchange: What happens to any towers for which the CPs cannot be satisfied?

Rob Dixon, Partner, Vinson & Elkins: The treatment of ‘stub sites’ depends on the deal. The operator is unlikely to have the ongoing capability (or desire) to maintain and operate the sites so the towerco may agree to manage the sites (with the operator retaining ownership). The buyer is likely to conduct legal diligence on a representative sample of sites so that it has a reasonable idea of the position before signing the deal. The SPA is, of course, only one part of a sale and leaseback deal. It’s relatively short-lived compared with the MLA which will often govern the parties’ relationship for many years. The MLA needs to be as future proof as possible.

TowerXchange: So tell us about the critical consideration when drafting Master Lease Agreements.

Jeff Eldredge, Partner, Vinson & Elkins: The MLA is where the real value is for the tower company and where most of the real complexity lies in a deal. It’s a long term contract (with a significant initial term and then options to renew) and a large value contract. The operator needs sufficient flexibility to manage its needs to deploy and maintain equipment, while the towerco needs sufficient control to maximise the co-location opportunities and create a robust long term revenue stream – that’s how they build value. Thus, there’s a natural tension that needs to be resolved to everyone’s satisfaction. Effective governance mechanisms are important.

The MLA is an umbrella agreement which – traditionally – defines the operator’s rights as anchor tenant in terms of leasing space and capacity (wind load) on the transferring towers and the towerco’s obligations to the anchor tenant in terms of such space and capacity (including the service levels which apply). Different rights and obligations typically apply to different towers. For example, network planners can get very nervous about sharing particularly critical towers with other operators and therefore a small number of the towers might be identified as exclusive to the anchor tenant.

Rob Dixon, Partner, Vinson & Elkins: The service levels for different classes of towers are also likely to vary and be closely negotiated. These will typically be set out in a service level agreement, which may form part of the MLA. The impact of IFRS16 on the way in which tower companies provide services is a key topic. There are also of course other agreements which are important in most towers deals – for example the Build to Suit Agreement – but perhaps all of that is for another time!
See you at our future events!

**Meetup Americas 2019**
9-10 July, Boca Raton

**Meetup Africa 2019**
8-9 October, Johannesburg

**Meetup Asia 2019**
3-4 December, Singapore

**Meetup MENA 2020**
28-29 January, Dubai

**Meetup Europe 2020**
19-20 May, Barcelona