TowerXchange

TowerXchange Meetup Africa & Middle East 2017 Post Event Report

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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 bi-weeky 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 ■

Foreword

The fifth TowerXchange Meetup Africa & Middle East

Laura Graves, Managing Director, EMEA, TowerXchange

2017 marked the fifth year for TowerXchange's Meetup Africa & Middle East. Close to 400 delegates came together in Johannesburg for two days of roundtable discussions, keynote panels and private meetings whilst new features such as our buyer briefings (closed door sessions for MNOs and towercos to explain their procurement needs in the absence of their competitors), regulatory working group (to examine emerging threats to the towerco sector globally) and energy focus group (tackling the ever present power challenges

in Sub-Saharan Africa) were well received by all involved.

We are pleased to share key take homes from the 2017 Meetup with you in this report, reflecting on discussions, trends and developments talked about over the course of the two days.

Thanks to all our sponsors, exhibitors, roundtable hosts, panellists and delegates for making 2017 a great success! We look forward to convening

again in 2018 to continue discussions and drive efficiencies in the region's tower industry.

Mark your diaries: 6th Annual TowerXchange Meetup Africa & Middle East, 9-10 October 2018, Sandton Convention Centre.

We look forward to seeing you there!

Warm regards
Laura Graves
Managing Director, EMEA
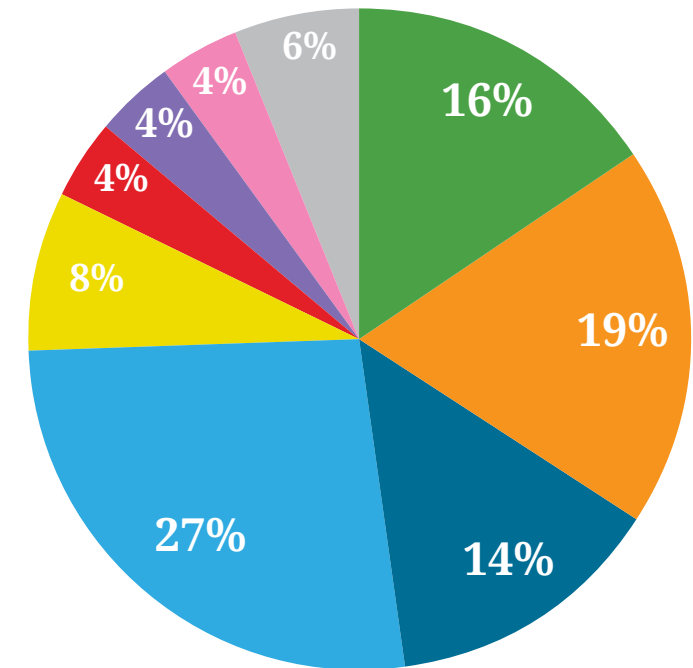TowerXchange

TowerXchange Meetup Africa and Middle East at a Glance

5 | **382** | **75** | **1 $** | **1** | **1** | **44** | **51** | **110**

- **5** years of welcoming the who's who in MEA towers
- **382** delegates
- **75** panellists and roundtable hosts
- **4** buyer-led briefings
- **1** regulatory focus group
- **1** expert energy group
- **44** interactive roundtable discussion groups
- **51** sponsors and exhibitors showcasing the latest innovations
- **110** networking dinner guests

Attending tower owners and operators include:

ECONET Wireless · PowerCom (PTY) LTD · MTN · orange · IHS Towers of strength · helios towers · EatonTowers

TASC · airtel · etisalat · tigo · SWAP · ANTOSC

CELL© · Safaricom · moov no limit · vodacom · PT PULA-TOWERS Elevating Connections · zain

eco enabling connectivity · Telkom · ATLAS · TOWER · skycoverage · PAN AFRICAN TOWERS LIMITED · ITC INTERNATIONAL TOWER CORPORATION

Industry breakdown of 2017 attendees

- **16%** MNOs
- **19%** Towercos
- **14%** MSPs and tower builders
- **27%** ESCOs and energy equipment suppliers
- **8%** Monitoring and management
- **4%** OEMs
- **4%** Investors and analysts
- **4%** Small cells, DAS and alternative coverage
- **6%** Consultants, advisors, law firms and other

Source: TowerXchange

The MEA tower industry at the end of 2017

Key trends and developments observed at this year's Meetup

TowerXchange Meetup Africa and Middle East keynote presentation

How did the industry get to where it is today, what lessons has it learned and where is it heading? TowerXchange examines the tower industry's history and emerging trends, exploring key discussion points from the 2017 Meetup Africa & Middle East.

Keywords: Africa, Africa & ME, American Tower, Eaton, Eaton Towers, Energy Efficiency, ESCOs, Ghana, Helios, Helios Towers, IBS, IHS, IHS Towers, Infrastructure Sharing, Middle East, MNOs, Nigeria, Operational Excellence, Sale & Leaseback, South Africa, Towercos, Valuation

Read this article to learn:

- Key statistics regarding tower ownership in Africa and the Middle East
- Lessons the industry has learned from the challenges it has weathered
- Key talking points around 2017's theme of creating a win-win relationship between MNOs and towercos
- Alternative infrastructure sharing strategies gaining ground
- New site typologies and neutral host business models appearing in the region

The status of the tower ownership in SSA and MENA

Towercos now own 2.95mn of the world's 45.3mn telecom towers (68.7mn), although this figure is somewhat distorted by the behemoth that is China Tower Company, which, with 1.9mn towers, accounts for almost two thirds of the world's towerco owned towers. In sub-Saharan Africa, 39% of towers are now owned by independent towercos, representing perhaps two thirds of the addressable market, with limited appetite amongst towercos to acquire portfolios from tier two MNOs or those in tier two markets. By contrast, MENA remains almost a blank slate for towercos, with just a handful of towers in independent towerco hands, although things are starting to show signs of changing (see figure one).

In Sub-Saharan Africa, the vast majority of the region's towerco-owned towers are owned by four major players; IHS Towers, American Tower, Helios Towers and Eaton towers (figure two). The majority of their towers have been acquired through sale and leaseback transactions with the region's tier one MNOs (figure four), although acquisitions of other towerco portfolios (such as IHS' acquisition of HTN Towers and American Tower's acquisition of Eaton's South African business), coupled with build to suit activity, has further bolstered their portfolios.

Joining the big four in the sub-Saharan tower industry are a handful of smaller towercos (figure five), the vast majority of which have grown organically as build to suit players with a handful

of notable exceptions; for example, in Madagascar, Towerco of Madagascar was carved out of TELMA, whilst in Senegal, Al Karama Towers is in the process of acquiring Expresso's tower portfolio. Some of the region's other BTS players have acquisitive ambitions, eyeing up portfolios and markets that their bigger peers have shied away from.

In MENA, the tower industry is in a much more nascent stage but momentum is building. In Iran, number one and number three MNOs MCI and Rightel have joined forces with domestic towerco Fanasia to create the towerco Iranian Towers; in Egypt, where Orange's tower sale to Eaton was cancelled, towerco licenses are held by four players, although only HOI-MEA have built and retained towers to date; whilst in Kuwait, Zain have agreed the sale of their tower portfolio to IHS Towers (and have entered into exclusive negotiations with the towerco in Saudi Arabia), deals which, when closed, will move the needle significantly in terms of towerco owned sites in MENA. Add to this new legislation surrounding infrastructure sharing in Bahrain and rumours of a tower deal in Tunisia and the market is very much beginning to hot up.

Dynamics affecting tower markets across the region

Whilst a full blow by blow account of individual tower markets can be read in "TowerXchange's analysis of the independent towerco market in Africa & the Middle East" (which is updated on a quarterly basis), exploration of three key markets
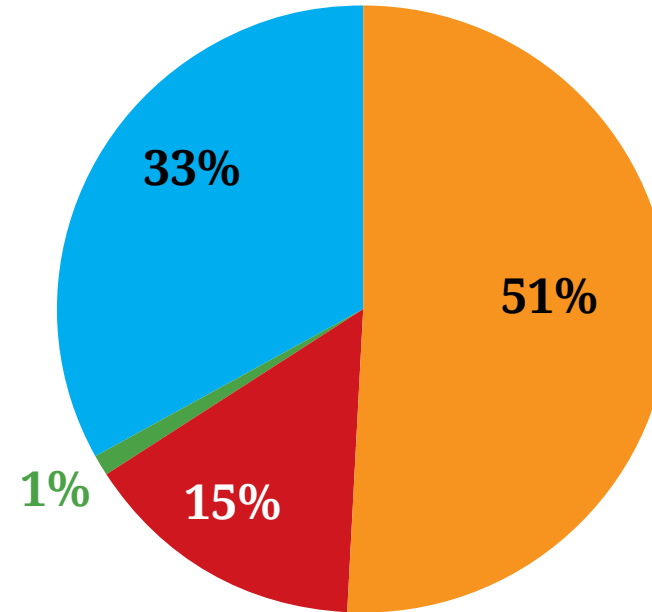
Figure 1(a): Ownership of towers globally

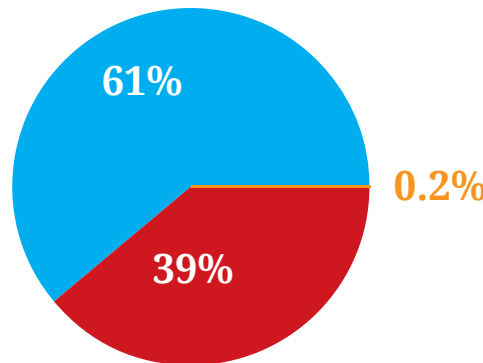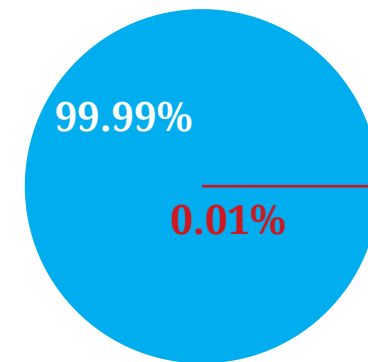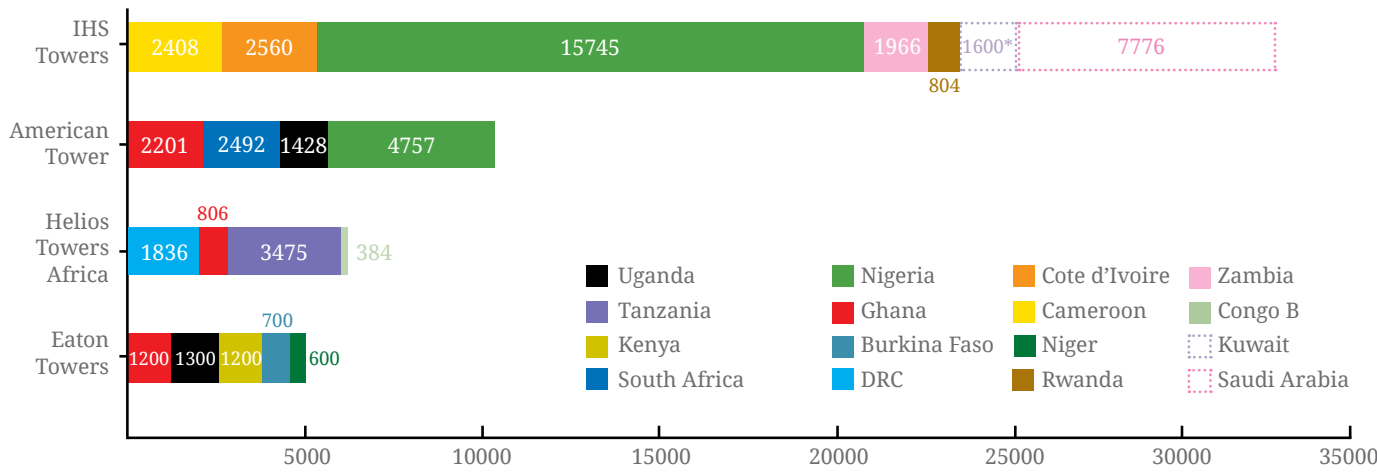## Figure 1(b): Ownership of towers in Sub-Saharan Africa

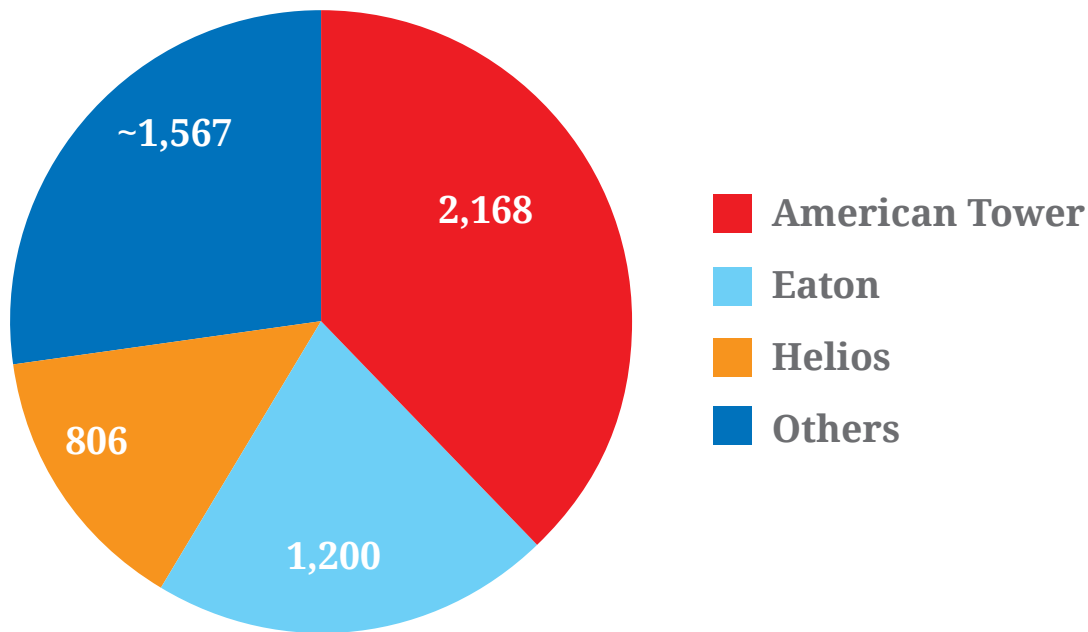## Figure 1(c): Ownership of towers in MENA

Source: TowerXchange Research

Legend:
- Operator-led towerco
- Pureplay independent towerco
- Joint venture infraco
- MNO-captive sites

Figure 2: Tower ownership by SSA's four largest towercos

IHS Towers: 2408, 2560, 15745, 1966, 804, 1600*, 7776
American Tower: 2201, 2492, 1428, 4757
Helios Towers Africa: 1836, 806, 3475, 384
Eaton Towers: 1200, 1300, 1200, 700, 600

Legend:
- Uganda
- Nigeria
- Cote d'Ivoire
- Zambia
- Tanzania
- Ghana
- Cameroon
- Congo B
- Kenya
- Burkina Faso
- Niger
- Kuwait
- South Africa
- DRC
- Rwanda
- Saudi Arabia

*announced not closed

Source: TowerXchange

Figure 3: Ownership of Ghana's ~6,000 towers

- 2,168 American Tower
- 1,200 Eaton
- 806 Helios
- ~1,567 Others

can illustrate some of the dynamics that have influenced the development of the sector in recent years.

Ghana: Towerco competition, high tenancy ratios, lessons in contingency planning and MNO consolidation

Ghana marks the site of Sub-Saharan Africa's first major tower deal, with a total of four tower transactions having been completed in the country and 74% of towers now owned by independent towercos. The MNO market is highly fragmented, whilst the towerco landscape is unique in that three of the region's four largest players are present. The highly fragmented nature of the MNO landscape, coupled with the strict restrictions on new site build by a regulator highly supportive of infrastructure sharing has driven high tenancy ratios; whilst the presence of three large towercos has kept competition healthy.

Whilst a large number of MNOs in a country can present positives in terms of potential tenants, 2017's news that Airtel and Tigo were to merge illustrates the risks and the importance of structuring contracts to withstand such events, something Ghana's three towercos have done. Further MNO M&A is inevitable across the African continent and less experienced towercos need to exercise the same discipline in preparing for this.

The way in which Ghana's towercos handled 2014's economic challenges and power crisis also serves as further learnings for the sector. In 2014,

Figure 4: MEA's biggest tower transactions to date

Year	Country	Seller	Buyer	Tower count	Deal value US$	Cost per tower US$	Deal structure
2017	Kuwait	Zain	IHS (& Towershare)	1600	165,000,000	103,125	SLB*
2017	Tanzania	Zantel	HTA	185			SLB
2016	Nigeria	Hotspot Network	IHS	85			Portfolio Acquisition
2016	Senegal*	Expresso Telecom	Al Karama Towers	450			SLB
2016	South Africa	Eaton Towers	American Tower	300			Portfolio Acquisition
2016	DRC	Airtel	HTA	967	165,000,000	170,631	SLB
2016	Tanzania	Airtel	American Tower	1,350	179,000,000	132,593	SLB (Deal announced but not closed before deadline expired)
2016	Nigeria	HTN Towers	IHS	**1211			Company Acquisition
2015	Nigeria	Etisalat	IHS	555			SLB
2014	Rwanda	Airtel	IHS	164			SLB
2014	Zambia	Airtel	IHS	949	150,000,000	158,061	SLB
2014	Nigeria	Airtel	American Tower	4,717	100,060,000	224,719	SLB
2014	Niger	Airtel	Eaton	600			SLB
2014	Ghana, Burkina Faso, Kenya & Uganda	Airtel	Eaton	2,681	540,000,000	201,417	SLB
2014	Nigeria	MTN	IHS	8,850	984,000,000	226,911	Joint venture (IHS 49%, MTN 51%)+
2014	Nigeria	Etisalat	IHS	2,136	485,000,000	227,060	SLB
2014	Congo B	Airtel	HTA	393	50,000,000	127,226	SLB
2014	Rwanda	MTN	IHS	550	48,000,000	87,273	SLB
2014	Zambia	MTN	IHS	748	57,000,000	76,203	SLB
2013	Tanzania	Vodacom	HTA	1,149	75,000,000	87,616	SLB with direct investment in HTT++
2013	Kenya	Telkom Kenya	Eaton	1,000			MLL (Contract since cancelled)

* Deal announced, not closed   **Transaction included 368 SWAP site under MLL arrangement; the arrangement has since been cancelled

+ MTN's equity since restructured for additional shareholding at IHS group level

++ Vodacom sold 100% of equity in towers but subscribed to acquire a 24.5% interest in HTT which Helios has now purchased

Source: TowerXchange

Figure 4: MEA's biggest tower transactions to date

Year	Country	Seller	Buyer	Tower count	Deal value US$	Cost per tower US$	Deal structure
2013	Cameroon & Cote d'Ivoire	Orange	IHS	2,000			MLL
2012	Côte d'Ivoire	MTN	IHS	911	141,000,000	154,775	SLB
2012	Cameroon	MTN	IHS	820	143,000,000	174,390	SLB
2012	Uganda	Warid	Eaton	400			SLB
2012	Uganda	Orange	Eaton	300			SLB
2011	Uganda	MTN	American Tower	962	89,250,000	181,912	Joint venture (AMT 51%, MTN 49%)
2010	Tanzania	Millicom/Tigo	HTA	1,020	81,000,000	132,353	Joint venture (HTA 60%, Millicom 40%)+++
2010	DRC	Millicom/Tigo	HTA	729	41,500,000	94,878	Joint venture (HTA 60%, Millicom 40%)+++
2010	Ghana	MTN	American Tower	1,856	218,500,000	228,375	Joint venture (AMT 51%, MTN 49%)
2010	South Africa	Cell C	American Tower	1,400	200,000,000	142,857	SLB with BTS
2010	Nigeria	Starcomms	SWAP	407	81,000,000	199,017	SLB
2010	Ghana	Vodafone	Eaton	750			MLL
2010	Nigeria	Visafone	IHS	800	67,000,000	83,750	SLB
2010	Nigeria	Multilinks	HTN	400			MLL
2010	Ghana	Millicom/Tigo	HTA	750	54,000,000	120,000	Joint venture (HTA 60%, Millicom 40%)
			Totals / average	46,220	5,205,400,000	137,910	

+++ Millicom's equity since restructured to a 24% stake at group level; a stake which Millicom is now looking to monetise
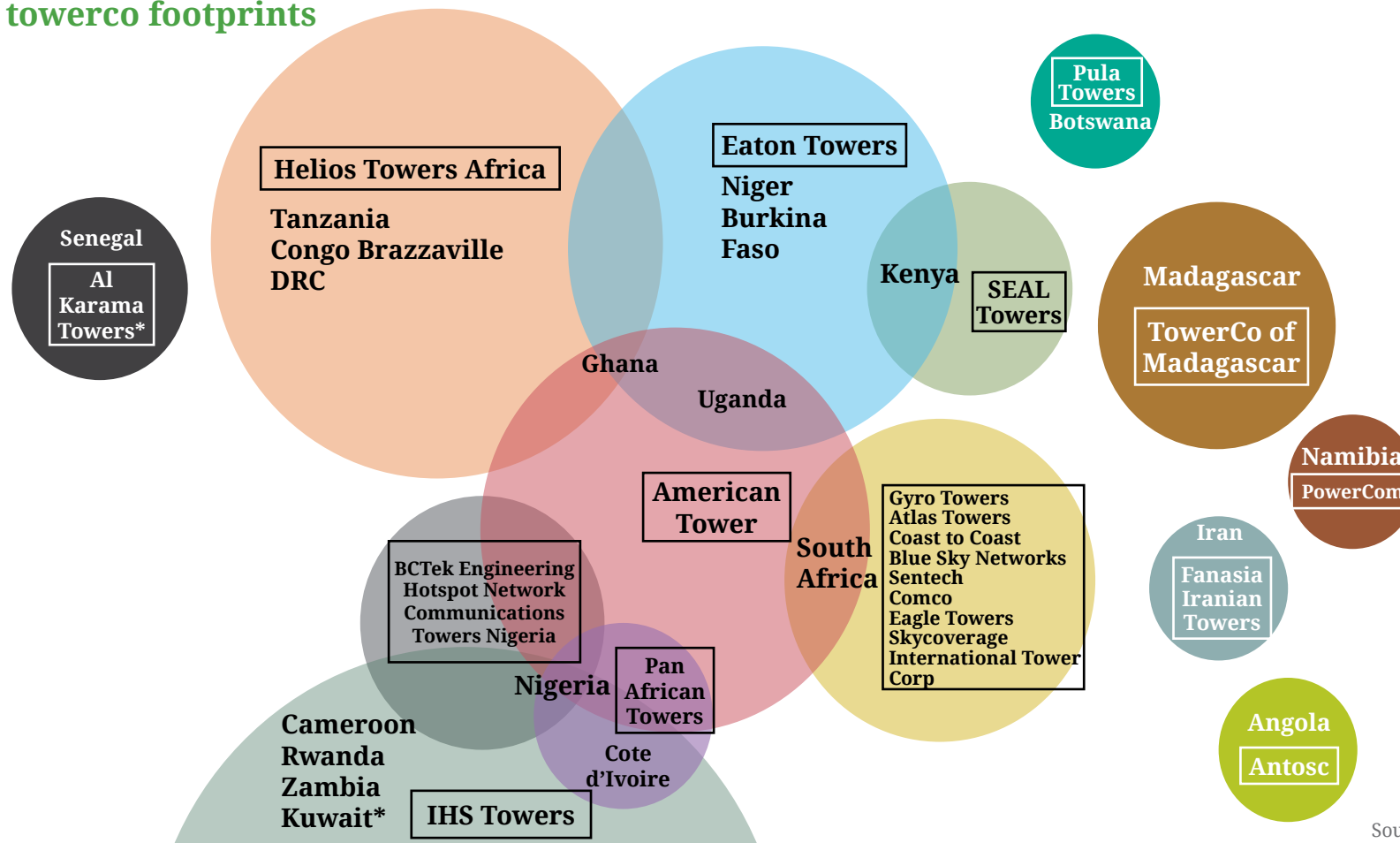
Source: TowerXchange

the Cedi became the world's worst performing currency. Maintenance contractors being paid in cedi needed to buy many consumables in dollars, forcing them to buy cheap, lower quality parts and spares which put pressure on uptime and SLA performance. With fuel shortages, grid availability slid from 22 hours to 14 hours then deregulation of the fuel price in 2015 led to bulk suppliers holding stock as the price went up 25% in a matter of days.

Ghana's towercos learned hard lessons about the need to have dynamic processes to get ahead of fuel shortages, whilst the importance of indexation and escalation clauses in contracts became increasingly apparent. Whilst the grid situation has improved, power costs in Ghana continue to escalate showing that alternative sources of power generation can be important even in countries with comparably good grid.

Nigeria: SSA's largest mobile and towerco market but poor grid infrastructure and challenging macroeconomic conditions

With a population of 190mn and 152mn mobile connections, Nigeria represents Africa's largest mobile market. Plus with a young and growing population, significant investment in telecoms infrastructure is required, with an estimated 30,000

Figure 5: MEA towerco footprints

Pula Towers Botswana

Helios Towers Africa

Tanzania
Congo Brazzaville
DRC

Eaton Towers

Niger
Burkina
Faso

Senegal

Al Karama Towers*

Kenya

SEAL Towers

Madagascar

TowerCo of Madagascar

Ghana

Uganda

Namibia

PowerCom

American Tower

South Africa

Gyro Towers
Atlas Towers
Coast to Coast
Blue Sky Networks
Sentech
Comco
Eagle Towers
Skycoverage
International Tower Corp

Iran

Fanasia Iranian Towers

BCTek Engineering
Hotspot Network
Communications
Towers Nigeria

Nigeria

Pan African Towers

Cote d'Ivoire

Angola

Antosc

Cameroon
Rwanda
Zambia
Kuwait*

IHS Towers

*Acquisition of towers pending, not yet confirmed

Source: TowerXchange

additional towers needed. 76% of towers in the country are owned by independent towercos, with top tier towercos IHS and American Tower joined by a number of smaller Nigerian players.
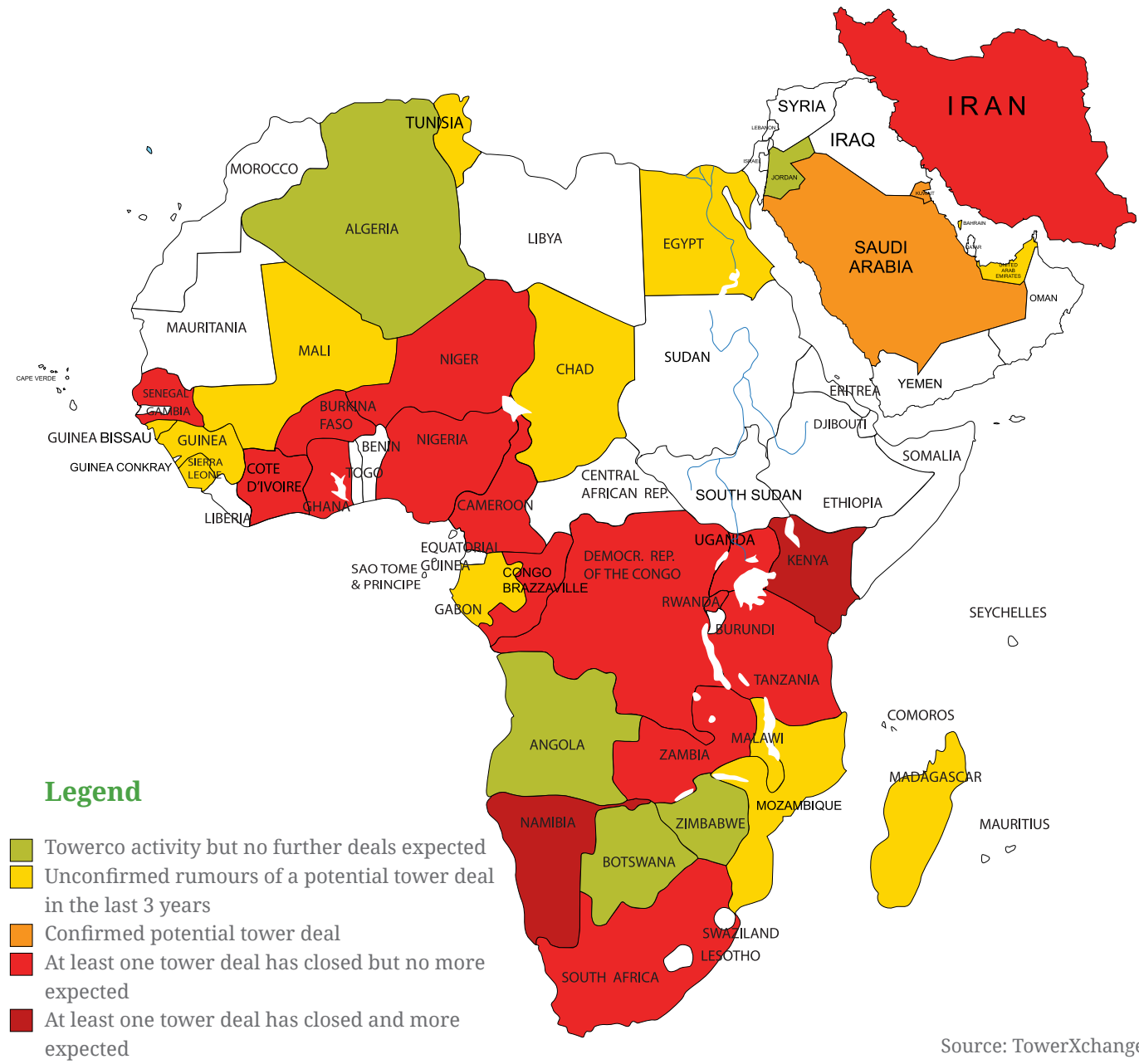
One of the major characteristics of the Nigerian market is the country's poor electricity grid, with less than four hours of grid availability for on-grid sites and no sign of any major grid improvements

on the horizon. This makes Nigeria a very interesting market from a power perspective, with many proof of concept power initiatives having been carried out in the country. IHS' "Big Five" initiative, replacing diesel generators with hybrid solutions on the vast majority of their ~15,000 sites in the country through a network of five partners is the largest energy upgrade initiative of its kind and will provide a benchmark and many lessons

learned for those looking to kick off major energy upgrade projects elsewhere in the region.

As with Ghana, Nigeria has seen its fair share of economic challenges, with the country entering a deep recession in 2016 which lasted for five successive quarters. The sharp drop in the Naira, dollar scarcity and reduced consumer spending was felt acutely by all in the market, with dramatic
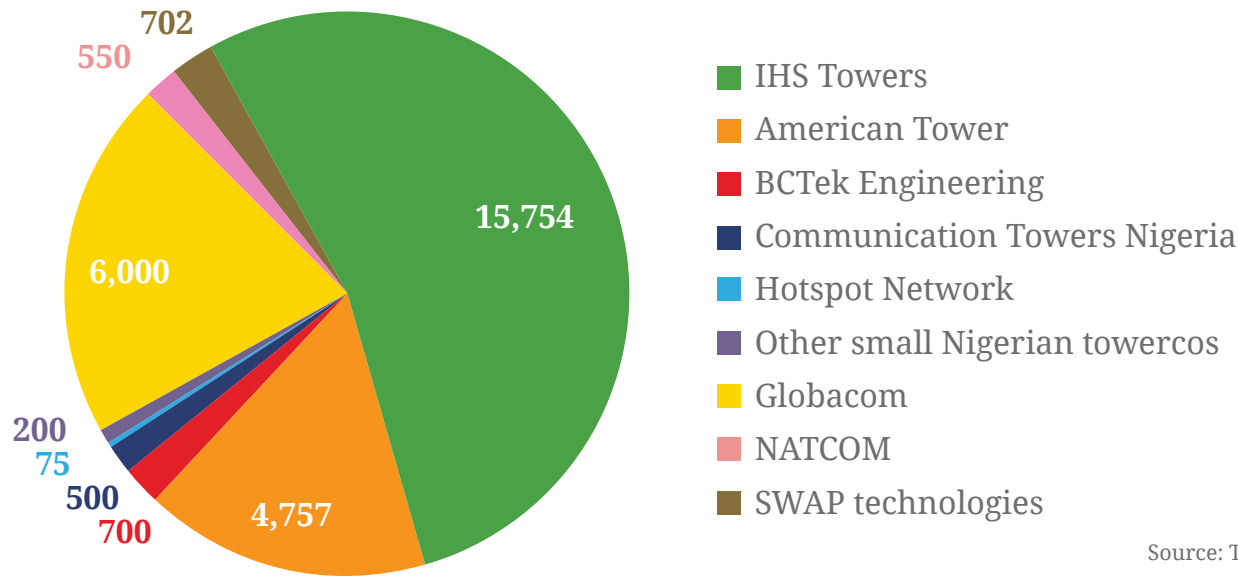
Figure 6: MEA tower transaction heatmap

Legend

- 🟩 Towerco activity but no further deals expected
- 🟨 Unconfirmed rumours of a potential tower deal in the last 3 years
- 🟧 Confirmed potential tower deal
- 🟥 At least one tower deal has closed but no more expected
- 🟫 At least one tower deal has closed and more expected

Source: TowerXchange

effects on the telecoms sector. Unable to meet loan repayments EMTS (trading as Etisalat Nigeria) was taken over by its creditors, with Mubadala and Etisalat exiting the market and the company rebranded as 9mobile. Meanwhile, other MNOs struggled to make payments to towercos of their dollar-linked contracts. Such extreme conditions have caused frictions in the market but have led to deep conversations between MNOs and towercos in order to find a solution to break the impasse.

South Africa: MNOs commercialise sites, towercos compete for BTS, frictions over lease rates

Dynamics in the South African tower industry are distinctly different from much of Sub-Saharan Africa. With a robust electricity grid, towercos tend to adopt the "steel and grass" business model, more akin to European and American markets, and with lower barriers to entry, a long tail of smaller independent build to suit towercos has emerged.

MNOs have also followed in towerco footsteps, adopting a more proactive approach to securing co-locations. Vodacom has developed a strong in house team to proactively pursue co-locations from ICASA spectrum holders in a bid to maximise the value of their infrastructure; whilst Telkom has gone one step further, carving out their towers into a dedicated business unit, Gyro Towers (with early rumours having suggested that they may look to list the entity on the local stock exchange). Cell C are the only operator to have sold their towers, agreeing the sale and leaseback of 1500 sites to American Tower back in 2010. The high lease rate agreed at
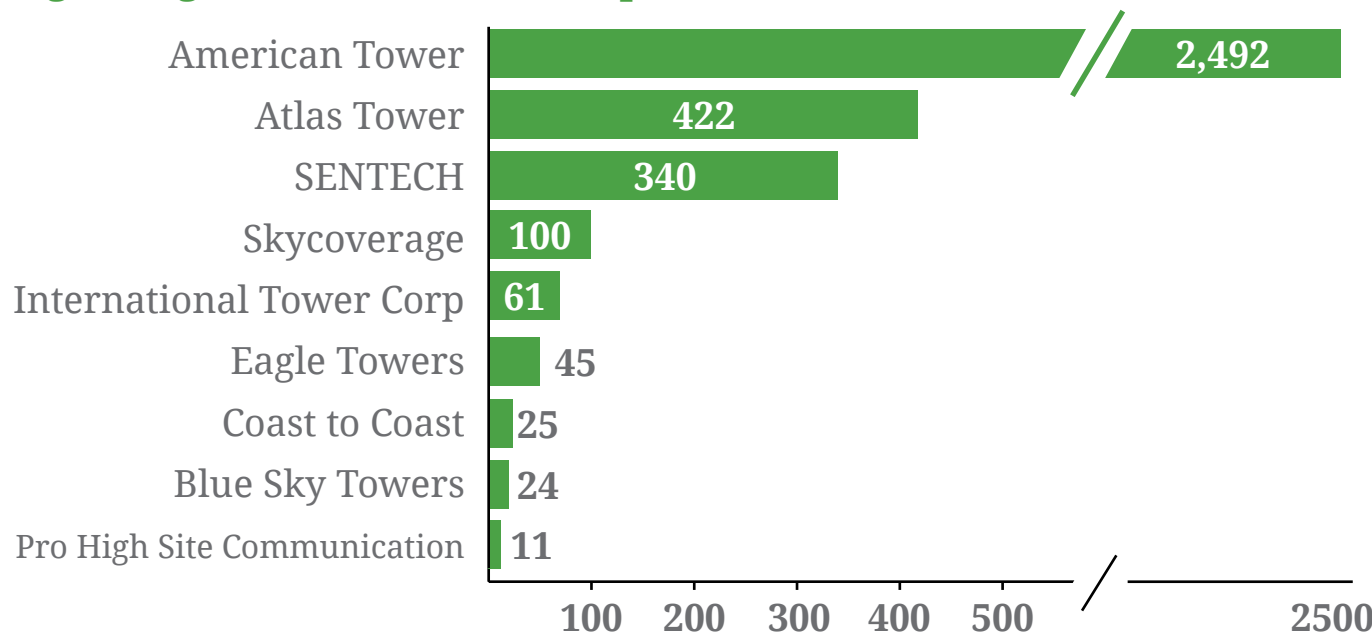
Figure seven: Tower ownership in Nigeria

- IHS Towers — 15,754
- American Tower — 4,757
- BCTek Engineering — 700
- Communication Towers Nigeria — 500
- Hotspot Network — 75
- Other small Nigerian towercos — 200
- Globacom — 6,000
- NATCOM — 550
- SWAP technologies — 702

Source: TowerXchange

Figure eight: South Africa's independent towercos

- American Tower — 2,492
- Atlas Tower — 422
- SENTECH — 340
- Skycoverage — 100
- International Tower Corp — 61
- Eagle Towers — 45
- Coast to Coast — 25
- Blue Sky Towers — 24
- Pro High Site Communication — 11

the time of the transaction (albeit in return for a large upfront sum of capital) has led to discontent between the operator and American Tower, prompting Cell C to rebuild its tower portfolio and serving as a cautionary tale in future tower transactions.

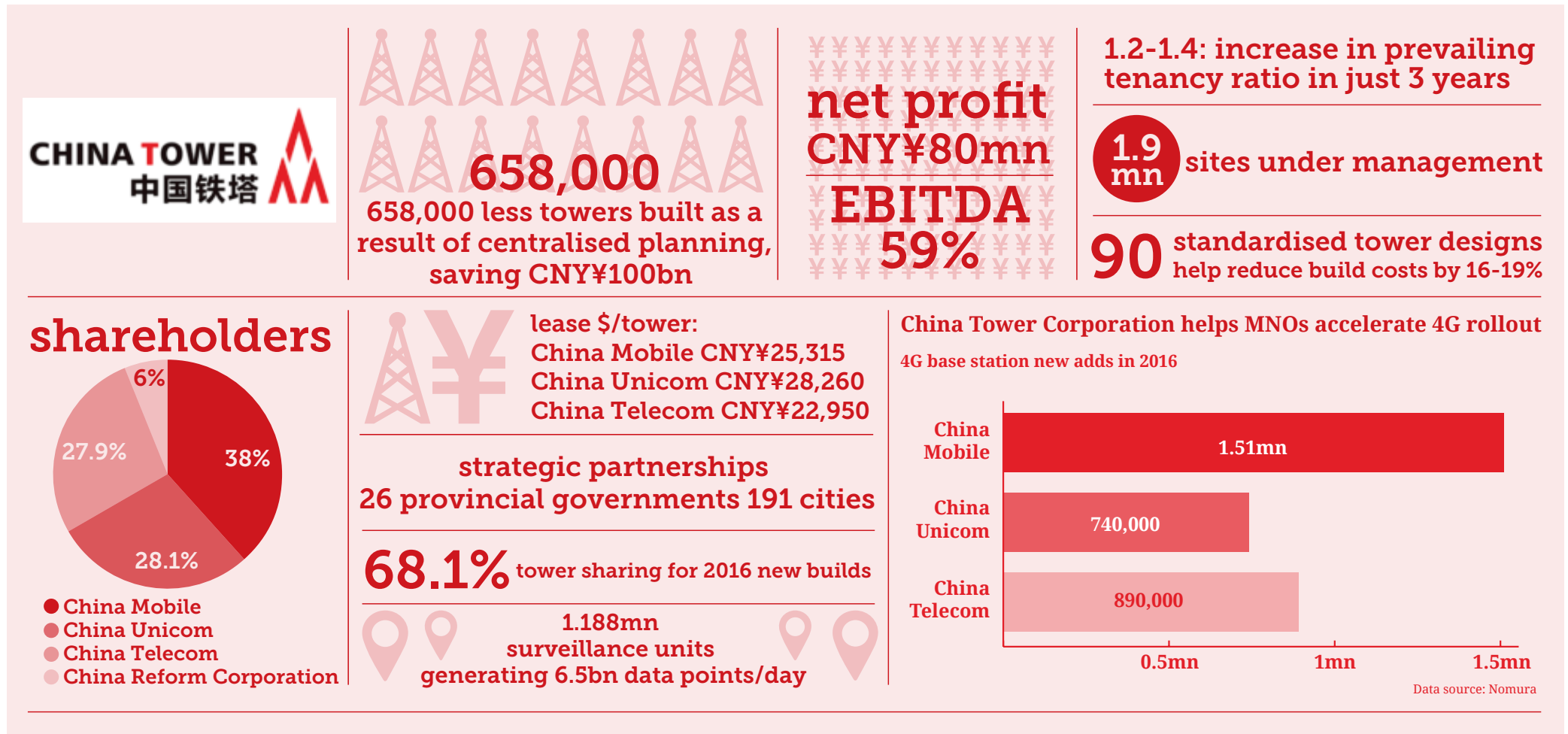### The search for a win-win solution

Given the aforementioned frictions, TowerXchange set a theme for the 2017 Meetup of "the search for a win-win relationship between MNOs and towercos". Ultimately in a time of decreasing ARPU, infrastructure sharing is fundamental to controlling both opex and capex and protecting the margins of all concerned, critical to the health of both MNOs and towercos.

Taking a quick glance at the world's largest towerco, 1.9mn site China Tower Company (CTC) which was created with a co-build, co-share philosophy which was designed to share the benefits of infrasharing and increase the value of MNOs and one can see the marked impact that the venture has had. China Tower is a joint venture between MNOs China Mobile, China Unicom and China Telecom, established in 2014 and in the process of gearing up for an IPO in 2018. Centralised planning by the operators has led to 658,000 fewer towers being built, generating savings of CNYY100bn whilst the implementation of standardised tower designs has helped to reduce build costs by 16-19%. Like the Indian towercos, CTC offers discounts for both the anchor and additional tenants and currently offers the lowest lease rates in the world, with the

Figure 9: Efficiencies at China Tower

CHINA TOWER
中国铁塔

658,000
658,000 less towers built as a result of centralised planning, saving CNY¥100bn

net profit
CNY¥80mn
EBITDA
59%

1.2-1.4: increase in prevailing tenancy ratio in just 3 years

1.9 mn sites under management

90 standardised tower designs help reduce build costs by 16-19%

shareholders

- ● China Mobile — 38%
- ● China Unicom — 28.1%
- ● China Telecom — 27.9%
- ● China Reform Corporation — 6%

lease $/tower:
China Mobile CNY¥25,315
China Unicom CNY¥28,260
China Telecom CNY¥22,950

strategic partnerships
26 provincial governments 191 cities

68.1% tower sharing for 2016 new builds

1.188mn surveillance units generating 6.5bn data points/day

China Tower Corporation helps MNOs accelerate 4G rollout

4G base station new adds in 2016

China Mobile	1.51mn
China Unicom	740,000
China Telecom	890,000

0.5mn   1mn   1.5mn

Data source: Nomura

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company receiving just over $22,000 per tower. In India, the going rate is $76,000 per tower, and publicly listed Bharti Infratel trades at almost a 50% valuation discount compared to the US publics and so it remains to be seen whether CTC can achieve a valuation per tower as high as 10% of that of American Tower when it IPOs. Whilst CTC has demonstrated the enormous savings possible by

infrastructure sharing, a towerco built by MNOs, for MNOs, is a very different entity from Africa's pureplay towercos; so how can MNOs and towercos better work together?

Working with towercos can lead to the more efficient use of land, whilst decommissioning of parallel infrastructure can generate further

savings. Europe's largest towerco, Cellnex has identified 14,500 overlapping sites in Spain and Italy, targeting the rationalisation of 2,000 sites between 2016 and 2019. The decommissioning programme is forecast to create $185mn in annual savings. Decommissioning programmes aren't just confined to developed markets in Europe, in Tanzania following their recent acquisition of 185

Figure ten: Signed telecom ESCO agreements on the African continent

Coutry	Tower owner	ESCO	Site count
Chad	Millicom	Akitvco with Camusat as O&M partner	Undisclosed
Gabon	Airtel	Energy Vision	400
DRC	Orange	GreenWish Partners with Sagemcom as O&M partner	250
Nigeria	IHS Towers	IPT PowerTech, Uppercrest, Makasa Sun, MP Infrastructure, Biswal	10,000*

*5 separate contracts awarded; structure of contracts not classified as a true ESCO by some parties

Zantel sites, Helios Towers has plans in place to decommission 380 sites, the largest initiative on the African continent. The key to success when it comes to decommissioning is negotiating the liquidation of the lease under the decommissioned tower, something that an independent party such as a towerco may be more successful in achieving.

Ultimately however, the search for a win-win solution between MNOs and towercos will be headlined by one issue; lease rates. MNOs and towercos must discontinue the practice of agreeing a deal structure that maximises cash release, saddling the MNO with unsustainable lease rates. What looks like a sustainable lease rate today may not be tomorrow, given the impact of escalators and, more importantly, macro-economics. Dollar linked lease rates have as much as trebled in Nigeria,

prompting an impasse that is as bad news for the towercos as it is for the MNOs. Extreme scenarios like Nigeria notwithstanding, MNOs are going to have a hard time renegotiating lease rates with landlord towercos; rates were agreed and cash paid in good faith. You're effectively not negotiating with towercos, you're negotiating with the investors, banks and pension funds who ultimately own them.

Towercos and MNOs need to come together to look at areas where they can work together to improve efficiencies and lower costs; removing redundant equipment from towers and the enclosures around towers or perhaps agreeing terms for gain sharing and moving indoor equipment outside, using lower energy antenna and investing in hybridisation to reduce energy opex. To examine the subject further, we held a roundtable on the subject of creating

win-win relationships between MNOs and towercos at this year's Meetup; the summary of which will be available soon.

Infrastructure sharing beyond tower transactions

Whilst divesting towers to a towerco is one strategy that an operator can explore to control costs, there are a host of other solutions in their tool box from barter arrangements and co-location sales to other MNOs (as we have seen with South Africa's towercos), to towerco joint ventures (as is the case with Iranian Towers) through to active sharing which has proven more challenging to get off the ground but is something that some MNOs are very much aiming towards.

Perhaps one of the hottest topics of discussion at the 2017 Meetup was the emergence of the ESCO model in the African tower industry. At the time of the 2016 Meetup, discussions centred heavily around whether the ESCO model would take off in the African market, whilst by the time of the 2017 event several ESCO projects were announced (figure ten) with numerous other RFPs in the pipeline.

For more on 2017's discussions about the African ESCO market read "Towards proof of concept of the ESCO model in sub-Saharan Africa"

Investment in energy systems

Whether it be through ESCO arrangements or through MNO or towerco led capex spend,

investment in hybrid systems is now well underway in sub-Saharan Africa. With diesel prices continuing to escalate, and fuel theft presenting a major challenge, investments in new and improved energy systems is seen as a key strategy to control costs.

A host of roundtable discussions and our energy working group (the report from which will be available shortly) delved deep into energy efficiency and cost saving measures, whilst our first series of buyer briefings centred heavily around the solutions for which towercos and MNOs were searching.

Driving further operational efficiency measures

Beyond energy, discussion at the Meetup examined other measures which tower owners are taking to reduce costs, improve margins and deliver win-win solutions for all concerned. Fewer and more comprehensive site visits, supply chain upskilling, longer and deeper partnerships and the application of lean six sigma methodologies were just some of the strategies discussed over the course of the two days. Key take homes from a dedicated roundtable on the topic, hosted by Helios Towers' Colin Gaston, will be available shortly.

The role for alternative site typologies

Whilst much of the discussion at the Meetup remained about macrosites, talk of alternative site typologies started to appear as densification concerns increase in the region's more developed markets and hard to reach rural areas continue to remain a concern.

An increasing proportion of the world's new build urban sites are not 30m+ three legged towers, but are rather microcells, city poles or lamp posts often combined with parking, traffic and CCTV sensors. Whilst the region lags behind European and American markets in this regard, it is important that MNOs and towercos, particularly those in Africa's most progressive markets continue to look ahead. The first green shoots have started to emerge, exemplified by Eaton, Helios and American Tower's indoor DAS deployments and we are starting to see new companies like Boniswa pioneering the rollout of lamp posts and small cells. MNOs are looking for an asset-light business model where neutral hosts will play a critical role in deploying a heterogeneous network layer for both indoor, and, over a longer horizon, outdoor connectivity.

To meet this goal, owning fibre will be important for future neutral hosts (American Tower recently acquired a fibreco in South Africa and IHS have a fibre license in Nigeria) and for both urban and rural networks satellite backhaul will also play a key role (we were pleased to welcome key satellite players to Johannesburg) whilst new business models (such as X's Project Loon represented at the Meetup) will emerge. Whilst there is still a lot more life in rolling out and optimising macro-infrastructure across the region, complementary site typologies will start to play an increasingly important role in urban markets as data consumption grows and business models need to adapt ∎

Tower ◆ Xchange

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Asia 2018
4-5 December, Singapore

Meetup Africa & ME 2018
9-10 October, Johannesburg

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TowerXchange Meetup Africa & Middle East attendee list

MNOs and towercos:
Airtel Tanzania, Network Facilities Specialist
ANTOSC SA, Technical Director
ANTOSC SA, General Director
ASTEM, CEO
Atlas Tower, CEO
Atlas Tower, CFO
Atlas Tower, CSO
Atlas Tower, Legal and Contracts Manager
Atlas Tower, National Business Development Manager
Atlas Tower, Site Acquisition Specialist
Blue Sky Towers, CFO
Blue Sky Towers, Director
Blue Sky Towers, Director
Cell C, Executive: Technical Facilities
Digital Bridge, Managing Director, EMEA
Eaton Towers, CEO
Eaton Towers, Chairman
Eaton Towers, Group Chief Commercial and Legal Officer
Eaton Towers, Group Commercial Consultant
Econet Wireless, CEO, Tower Business
Econet Wireless, Head Operations
Etisalat International, Technology Economics
Gyro Towers, Executive
Helios Towers Africa, CEO
Helios Towers Africa, Executive Chairman
Helios Towers Africa, Director of Operations & Technology
Helios Towers Africa, Director of Operational PMO
Helios Towers Africa, Group Commercial Director
Helios Towers Africa, Director - Technical
IHS Towers, Group General Counsel
IHS Towers, Associate Group General Counsel
IHS Towers, Regional General Manager
Moropa Telecommunications, Director
MTN, CTO
MTN, General Manager, Passive Infrastructure
MTN, Passive Infrastructure Specialist
MTN, Senior Analyst - Mergers and Acquisitions
MTN, Group Management Accountant
MTN, Senior Specialist: Product Specifications and Quality
MTN, Senior Manager: Access Implementation
MTN South Africa, Site Acquisition Supervisor
MTN South Africa, Site Acquisition Supervisor
MTN, National Site Acquisition Manager

MTN, Senior Manager, Property
Orange, Director, Infrastructure Sharing Programme
Pan African Towers, Group CEO
Pan African Towers, Director
Pan African Towers, Finance Director
Pan African Towers, Financial Advisor
Powercom Pty Ltd, CEO
Powercom Pty Ltd, Senior Manager: Infrastructure
Powercom Pty Ltd, Senior Manager: Commercial
Powercom Pty Ltd, Senior Manager: Finance
Protelindo, Director of Corporate Finance
Safaricom, Category Sourcing Manager - Infrastructure
Safaricom, Subject Matter Expert - Structural Engineering
Safaricom, Senior Manager, Wholesale Services
Sky Coverage, Head of Acquisitions
Sky Coverage, Director
Sky Coverage, Director
Telkom, Specialist
Telkom, Manager
Towershare, Senior Representative
Vodacom, Executive Head: Field Force Maintenance & Network Property
Vodacom, Strategic Technologies - Property
Vodacom, Property Manager
Vodacom, Property Manager KZN
Vodacom, National Network Property Manager
Vodacom, Property Manager: Central Region

Managed service providers and tower builders:
Alkan CIT, West Africa GM, Africa Management
Alkan CIT, East Africa Business Manager
Best One, CEO
Camusat, VP Africa
Ganges Internationale, Director
Ganges Internationale Private Limited, Senior Manager
ieng Group, Co-CEO
ieng Group, Co-CEO
ieng Group, Chief Sales Officer
ieng Group, Chief Procurement Officer
IMEDEXSA, Commercial Manager
Leadcom, Head of NTSS Delivery Africa region
Likusasa, CEO
Metalogalva, Business Unit Manager Telecom
Mobax Group, CTO

MTS–Mitas Telecom Systems Inc., Deputy General Manager
NETIS, CTO
NETIS, CSO
NORTHERN ENGINEERING WORKS LTD (NEWL), COO
NORTHERN ENGINEERING WORKS LTD (NEWL), Country Manager
OMSE Foreign Trade, General Manager, Passive Infrastructure
Ramboll, Associate Director - Tower Solutions
Ramboll, Head of International Markets
RPS Services, CEO
SENTECH, Acting COO
SENTECH, Executive: Marketing & Sales
SKIPPER LIMITED, VP Marketing
TowerShield™, CEO
TowerShield™, Business Development Manager
Towertech Africa Limited, Chief Commercial Officer
Towertech Africa Limited, Chief Operating Officer

OEMs:
Ericsson, Director & Senior Advisor
Huawei, Senior Manager
Huawei, Marketing Manager
Huawei, Marketing Manager
Huawei, Marketing Manager
ZTE Corporation, Solution Manager of Energy Product Dept
ZTE Corporation, Marketing Director of Africa & ME

Small cells, DAS and alternative coverage:
Aviat Networks, Director, International Engineering
FMJ Broadband Solutions, Managing Director
Intelsat, Senior Account Director
Intelsat, Senior Sales Director
iQnetworks, CEO & Chairman
Kathrein Africa, Head of Sales & Business Development Anglophone Africa
Kathrein Africa, Group Account Manager for MTN - Ericsson
SES Networks, Head of Strategy, Telco/MNO
X - Project Loon, Strategy and Operations Director

Monitoring and management:
Abloy Oy, Managing Director – Africa
Abloy Oy, PEU Manager – South Africa
Acsys Technologies Ltd, Chief Operating Officer

TowerXchange Meetup Africa & Middle East attendee list

Acsys Technologies Ltd, VP Sales Africa
AIO Systems (Nigeria), CEO
Galooli Power, Director
Galooli, VP Business Development
Hetrogenous, Inc., Chairman & Founder
Hetrogenous, Inc., VP Sales, Asia & Africa
Infozech, CEO
Infozech, Senior Representative
IT-Development (ITD), Managing Director
noké, Director of Business Development
noké, Director of Sales
Qowisio, Business Development Manager
Sera4, CEO
Sera4, Head of Sales & Business Development
Siterra, Accruent, Senior Representative
Siterra, Accruent, Senior Representative
Transaction Control Technologies (TCT), Managing Director
Transaction Control Technologies (TCT), Technical Manager

Energy equipment and ESCOs:
African Power Machinery, Managing Director
Ascot Industrial, Area Manager
AuBren Limited, Managing Director /Owner
Ausonia, Export Manager
Ausonia, CEO
Beijing Dynamic Power Co., Ltd., Overseas Marketing Manager
Bladon Jets, VP Market Development
Bladon Jets, COO
Controllis, VP Sales
Cummins, International Business Leader, Africa & ME
Cummins, Senior Representative
Eltek, Executive Vice President - Business Development
Eltek, Key Account Manager
Enatel Energy, Regional Sales Manager - Africa
ENERGY VISION, CEO
ENERGY VISION, Business Development & Sales Director
EnerSys, Sales Director Middle East and Africa
EnerSys, Regional Sales Manager - SSA
FG Wilson, General Manager
FG Wilson, Business Development Manager
Flexenclosure, Sales Director
Flexenclosure, Sales Director
Generator Logic, Chief Operating Officer
Generator Logic, Technical Director

GNB® Industrial Power – A division of Exide Technologies, Sales Manager Africa
GNB® Industrial Power – A division of Exide Technologies, Product Management for Advanced Applications and Renewable Energy Markets
GreenWish Partners, Investment Director
GreenWish Partners, Country Head
GS Yuasa, Regional Manager - Africa
GS Yuasa, Regional Manager - EMEA
HIMOINSA, Regional Director, EMEA
HIMOINSA, Network Development Manager
IPI PowerTech Group, CEO
IPI PowerTech Group, GM – Power Division
IPT PowerTech Group, VP & COO
IPT PowerTech Group, GM – Telecom Services Division
Jabil Energy, Business Unit Director
Jubaili Bros, AGM
KIRLOSKAR OIL ENGINES LIMITED, Manager International Business
Mahindra & Mahindra, Head International Operations
Mahindra & Mahindra, Head Customer Care & Africa Business Development
METKA IPS, Head of Telecom Division
METKA IPS, VP Business Development
METKA IPS, Business Development Manager
METKA IPS, Sales Manager
METKA IPS, Business Development Manager
NorthStar Battery, President of Reserve Power Division
NorthStar Battery, Sales Director Africa – Reserve Power Division
PG Engineering Control Solutions, Executive VP & General Manager
Polar Power Inc, President & CEO
Polar Power Inc, Director of Telecom Sales and Business Development, Africa
PRAMAC, Group Sales Director
PRAMAC, Area Sales Manager Gulf India & Pakistan
Redflow, Sales Manager Americas
Saft, Telecom Sales Director
Saft, Business Development Manager - Telecom
SEDEMAC, CPO
SEDEMAC, Head – Global Business Development
SerEnergy, Head of Stationary Power
TECNOELETTRA, CEO

TECNOELETTRA, Technical Manager
Teksan, Hybrid Product Manager
TSS, CEO
Vertiv, Global Hybrid Solutions, Marketing/Business Development
Vertiv, Sales Director: Key Accounts
Voltalia, Sales Manager Telecom
Voltalia, Director, Renewable Energy for Telecoms
Wind-it, CTO
Yanmar Europe, Area Manager
ZHU HAI COSLIGHT BATTERY CO., LTD, General Manager
ZHU HAI COSLIGHT BATTERY CO., LTD, Vice President

Investors and analysts
Bloomberg New Energy Finance, Frontier Power Senior Analyst
Capital Group Private Markets, Investment Officer
Capital Group Private Markets, Partner
Citi, Managing Director, Global Communications Group
IFC, Chief Investment Officer
ING Bank, Managing Director
Mitsui & Co Middle East and Africa Projects Investment & Development, CEO
Mitsui, Manager
New Street Research, Partner
Standard Banking Group, Executive - Telecoms, Media & Technology CIB
UBS, Head of Equity Research
Wendel, Senior Director
Wendel, Senior Associate

Advisors, consultants, law firms and others:
Coolsure, CEO
Delmec, Chief Technical Officer
Delmec, Technical Officer
Energize the Chain, Director
Hardiman Telecommunications, Managing Partner
Hardiman Telecommunications, Partner
NANHUA Electronics Co., Ltd., Vice-Director of Sales
Norton Rose Fulbright, Partner
Simmons & Simmons, Partner
Vinson & Elkins RLLP, Partner, Dubai
Vinson & Elkins RLLP, Partner, London
Willkie Farr & Gallagher, Partner

What 2017's attendees had to say about the event

The TowerXchange brings great value as a one stop engagement with the relevant players and information portal to inform decisions on future strategic direction for our organisation - *Timothy Waga, Subject Matter Expert - Structural Engineering, Safaricom*

A really good one of a kind event for networking and meeting various passive infrastructure players and understanding multiple technical solutions to overcome passive network operational challenges. It's also the only place to know what's happening in MEA tower industry - *Divyajeet Mahajan, CEO, Tower Business Unit, Econet Wireless*

TowerXchange meetups are not just for exchanging ideas and solutions, business deals are negotiated and deals are either concluded or rejected there - *Simon Nyadzani, Site Acquisition Supervisor, MTN*

What 2017's attendees had to say about the event

> TowerXchange provides an excellent opportunity to meet up with all the major and minor players in the tower Industry and is the main event on my calendar - *Andrew Edmondson, COO, QTE*

> Big thanks to TowerXchange team for their support before, during and after the event. They are very knowledgeable in the field of tower industry and they always manage to bring the right people from this industry together with the vendors and experts - *Miloud Abdelilah, Managing Director, Eltek*

> Excellent event, well worth participating in it again this year for NEWL. Well done to all the TowerXchange team, looking forward already to the 2018 Meetup - *Ray O'Shea, COO, NEWL*

What 2017's attendees had to say about the event

The meetup was very helpful to increase my knowledge of the business with a very rich exchange of experience - *Arthur Chaves, CTO, ANTOSC*

Excellent networking event for the tower industry- *Amine Zahr, Sales Director, NorthStar*

A well organised interesting event that is a definite MUST for anyone in the industry - *Johan Naude, COO, VAS-X*

Definitely a must attend if you want to do business in SSA, if possible would like to attend this every year. Keeps one updated with the industry & region - *Kashif Shaikh, CEO, NETIS East Africa*

Best organised event I ever attended in my 20 years in the ITC industry! - *Hennie Barnard, Property Manager: Central Region, Vodacom*

TowerXchange Industry Awards 2017

Winners

Winners of the 2nd TowerXchange Industry Awards were announced at this years TowerXchange Meetup Africa & Middle East.

Recognising excellence in the management of the region's telecom towers, nominations were reviewed in five different categories, with a special lifetime achievement award being awarded to IHS Towers' Executive Vice Chairman and Group CEO, Sam Darwish.

This years winners:

Dr Harvey Rubin, Founder & Director, Energize the Chain

CSR initiative of the year: Econet Wireless and Energize the Chain

Awarded in recognition of the fantastic work that the two entities are doing in delivering over half a million vaccines to refrigeration units at over 300 cell sites in Zimbabwe.

Kash Pandya, CEO, Helios Towers

Operational efficiency initiative of the year: Helios Towers

Helios Towers' "One Site Visit per Month" program has reduced the total number of site visits in Tanzania from 21,581 to 8,614 – leading to a 61% reduction in kilometers driven and far fewer corrective maintenance call outs.

Infrastructure sharing company of the year: Atlas Tower

Atlas Tower has demonstrated impressive organic growth, more than doubling its site count in the past twelve months through its dynamic approach whilst maintaining exceptional customer service.

Nate Foster, CEO & Randi Clendennan, CSO, Atlas Tower

Workforce training and upskilling initiative of the year (two way tie): NETIS Group and Helios Towers

Both NETIS Group and Helios Towers have demonstrated exemplary training and upskilling initiatives across their entire operations leading to dramatic improvements in cell site operations and contributing to skills development across the continent.

Colin Gaston, Director of Operations & Technology, Helios Towers & Jean Farhat, Group CEO, NETIS Group

Energy efficiency project of the year (two way tie): Infozech and ZTE

Infozech's iBill software has been deployed by a global towerco with a portfolio of over 100,000 cell sites leading to better accuracy and turnaround times in billing.

Ankur Lal, CEO & Vishal Gajjar,
Business Development Manager - Africa, Infozech

Deploying solutions across 2,000 sites, ZTE have helped MPT/KSGM improve power uptime by 5.8%, reduce TCO by 24% and increase energy efficiency by 44%.

ZTE

Lifetime achievement award: Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers

The drive and passion of Sam Darwish has seen IHS Towers rise from being a pioneering telecom builder and service provider, to today being Africa's largest towerco with over 23,300 towers in five countries.

Melissa Trovoada-Darko, IHS Towers, collecting the award on behalf of Sam Darwish

Our congratulations to all of the winners and shortlisted entries in the 2017 TowerXchange Industry Awards. The calibre of the entrants speaks volumes as to all the hard work that operators, towercos and the supply chain are doing to improve the management of passive infrastructure in an industry whose margins are being increasingly squeezed.

The strategic vision of EMEA's largest independent towerco

Q&A with Issam (Sam) Darwish, Executive Vice Chairman and Group CEO of IHS Towers

Lifetime achievement award

Tower Xchange
MEA Industry Awards 2017

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers

At the 2017 TowerXchange Industry Awards, Sam Darwish, Executive Vice Chairman and Group CEO of IHS Towers received a Lifetime Achievement Award in recognition of transformational impact that he and IHS have had on the region's tower industry. TowerXchange were delighted to interview Sam to understand how IHS evolved to the present day and what ambitions the company has for the future.

Keywords: Acquisition, Africa, Africa & ME, C-Level Perspective, Cameroon, Cote d'Ivoire, Energy, IHS, IHS Towers, Infrastructure Sharing, Ivory Coast, Kuwait, Middle East, Nigeria, Operational Excellence, Rwanda, Skilled Workforces, Towercos, Zambia

Read this article to learn:

- How IHS Towers transitioned from being a tower builder to EMEA's largest independent tower company by tower count
- What the most important factors are in developing a successful towerco
- The outlook for the Nigerian telecoms sector as the country exits recession
- What CSR initiatives are being driven by the organisation
- How the recently announced Kuwaiti agreement fits into the company's expansion plans
- Where IHS sees future opportunities in telecoms infrastructure globally

TowerXchange: Please can you introduce your background and how you got into the telecoms sector?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: I am the Executive Vice Chairman and Group CEO of IHS Towers, the largest independent tower operator in Europe, the Middle East and Africa by tower count and the third largest independent multinational tower company globally. I studied Telecommunications Engineering at the American University of Beirut in Lebanon and graduated with honors. I then joined MCI, one of the largest telecoms carriers in the world at the time, in 1992 and became a manager shortly thereafter. During this time, I developed a deep understanding of the telecoms industry and eventually joined the first Lebanese mobile network – Libancell, now called Touch – in 1996. Subsequently, in 1998, I moved to Nigeria where I was appointed Deputy Managing Director of CELIA Motophone Ltd, Nigeria's first GSM operator.

TowerXchange: What prompted you to found IHS Towers?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: Following the Nigerian government's privatisation of telecommunications in 2001, I co-founded IHS Towers alongside a small group of engineers. This is why IHS has always and will continue to have a strong operating core. We believed there was an opportunity to provide focused passive telecoms infrastructure to enable robust and efficient mobile network coverage.

Nigeria, a country of 125 million people in 2001 then only had approximately 600,000 working telephone lines! The potential, as eventually illustrated, was immense.

TowerXchange: Can you explain IHS Towers' journey from being a Nigerian tower builder to being EMEA's largest towerco by tower count and one of the largest globally – what were some of the most important steps and milestones in its transformation?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: IHS Towers has undergone significant transformation since its inception. We began as a tower builder in 2001 and within few years we were increasingly the company of choice for mobile network operators (MNOs) who needed to build towers in Nigeria. Soon after, and as the number of towers constructed grew exponentially, we converted our business to turnkey site management as the MNOs needed specialised third parties to handle the growing complexities of operating their passive infrastructure. In 2010, we decided to evolve the company into a tower ownership model with a strong focus on the operating elements since that's what makes up our DNA. This concept, though widespread in America and Europe, was not common in Africa and the broader emerging markets until a few years ago.

By focusing on the passive infrastructure elements, we are able to provide MNOs with efficient infrastructure, thereby enabling operators to concentrate on the active side of the business,

including network upgrades and expanding network coverage. We believe that our role within the sector has yielded substantial rewards for all stakeholders: our customers, shareholders and mobile phone end users.

The first seed funding from the international community was $79 million anchored by the IFC. Since then, we have raised $3.4 billion of equity from credible global investors and from respected financial institutions, including Wendel, ECP, KIC, GIC, Goldman Sachs amongst many others, and over $2.0 billion of debt (net of refinancings). Today we own or operate over 23,000 towers and our markets remain poised for continued growth.

TowerXchange: What do you think are some of the most important things that you have learned along the way on how to run a towerco successfully?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: The importance of strategy, planning and continued innovation with a primary focus on the quality of operations; it cannot be emphasised enough. After the Nigerian telecommunications sector was privatised, the industry became increasingly competitive, with new providers entering and setting up towers throughout the country. Building and maintaining towers requires significant CAPEX, therefore many operators are increasingly keen to outsource their towers. We focus on our engineering expertise and are committed to building robust and sustainable towers which are continuously monitored via our

network operating centers (NOCs). Our NOC model is technologically advanced, monitoring many aspects of our towers including access, faults, power and so on.

TowerXchange: Nigeria, where IHS has its largest footprint, has obviously experienced a turbulent time - what is your outlook for the economy and more specifically the mobile sector in the Nigerian market?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: Nigeria slipped into a slowdown due to the receding oil prices last year. However, growth has picked up since. Having said that, people will use their mobile phones in good times and in bad times. Emerging markets have the potential to become the face of global commerce in the years to come – and Nigeria is at the heart of that. According to a recent study from the United Nations, Nigeria's population is projected to exceed that of the United States shortly before 2050, at which point it would become the third largest country in the world – which means that there will likely be a significant growth in demand for mobile services. Furthermore, GSMA suggests that West Africa will see an average subscriber growth of 6%, resulting in an additional 45 million subscribers by 2020. GSMA also forecasts that by 2020, more than 90% of new mobile subscribers will come from developing regions, thus analysts note there are numerous future growth opportunities within the sector. Please also remember that data penetration remains modest in comparison to more developed areas where 3G and 4G is more prevalent. Almost

70% of mobile SIMs in sub-Saharan Africa are still 2G, versus 11% in the US and 31% in Europe, according to industry analysts.

TowerXchange: IHS has been channeling significant investment into solar-hybrid solutions on sites - can you explain some of the motivating factors behind this and what impact the work has been having?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: We have a duty to minimise our impact on the environment and protect not only the places where we operate, but the world at large. Social and environmental sustainability are at the heart of what we do and we strive to use renewable energy wherever possible. IHS Towers has significantly reduced its diesel consumption, in respect of the relevant towers on which hybrid systems have been deployed, currently operates numerous hybrid solar sites throughout its portfolio and continues to roll out new green energy solution systems.

TowerXchange: IHS has also put a major focus on supporting the local communities throughout the African markets in which it operates, can you explain some of the important initiatives that IHS has in place?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: Our Corporate Sustainability and Responsibility program is tailored to each country's operations and focuses on four areas: business ethics, people, environment and education. Our flagship Generator Recycling

> " One of the dear projects close to my heart is the recent launch of our IHS Academy. A one-stop online portal which provides education, training and development for our staff and potentially others. I'm a strong believer in the value of skills acquired through education and training and we continue to invest in such initiatives "

Program has been rolled out in Cameroon, Côte d'Ivoire, Nigeria, Rwanda, and Zambia, which has increased power access for numerous local communities and institutions, including hospitals, orphanages and schools. Earlier this year, we also rolled out various initiatives in Nigeria to address the ongoing famine crisis, including sponsoring an empowerment and training initiative for 40 women to manage 15 community food service centers and various local school feeding programs across Borno State. The Nigeria team is currently pioneering the construction of a new community food service center which is intended as a platform to feed 15,000 people in Borno State annually and is refurbishing the Queen Amina Girls College campus in Kaduna State which serves over 2,000 girls annually. CSR is important to us as a firm and we remain committed to empowering our local communities.

One of the dear projects close to my heart is the recent launch of our IHS Academy. A one-stop online portal which provides education, training and development for our staff and potentially others. I'm a strong believer in the value of skills acquired through education and training and we continue to invest in such initiatives.

TowerXchange: News has just been announced regarding IHS's acquisition of Zain's towers in Kuwait – marking the Middle East's first major tower transaction of scale. What role does IHS see itself playing in the Middle Eastern market and how does this compliment your sub-Saharan African portfolio?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: Like most emerging markets, the Middle East is undergoing a period of considerable

> " IHS is committed to growing its business and capitalising on new and ancillary technologies such as small cell networks, fibre, and 4G-/5G-capable infrastructure. We are optimistic about the potential of wireless data and we continue to evaluate opportunities that will diversify our footprint in emerging markets "

digitalisation and the role of companies like IHS Towers is becoming increasingly important. While completion remains subject to certain conditions precedent, including regulatory approvals, expansion into the Middle East would complement our existing portfolio because it would allow us to apply our learnings from our business in Africa and is in line with our vision to expand operations in emerging markets – the Kuwait agreement is the first step in demonstrating that.

TowerXchange: We see towercos in the US and Europe in particular diversifying beyond owning

macro-sites. Whilst significant new macro-site build is still required across sub-Saharan Africa suggesting there is plenty more business in this yet for the region's towercos, do you see IHS playing a key role in operating other shared infrastructure in the telecoms sector?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: IHS is committed to growing its business and capitalising on new and ancillary technologies such as small cell networks, fibre, and 4G-/5G-capable infrastructure. We are optimistic about the potential of wireless data and we continue to evaluate opportunities that will diversify our footprint in emerging markets.

TowerXchange: Finally can you sum up IHS' vision for the future; what role does the company see itself playing in the global telecoms sector and what should we be watching out for next from the company?

Sam Darwish, Executive Vice Chairman and Group CEO, IHS Towers: IHS Towers has come a long way since we were founded in 2001 and we feel that we are only getting started. We see ourselves as enablers of telecom growth by providing the various aspects of the shared networks on the global emerging markets stage. My aspiration is to see IHS Towers continue to be a leading multinational tower company, and I hope and believe that we will be at the forefront of meeting the demand for an inclusive wireless communications future that helps improve the lives of billions of people all over the world ◼

Tower Xchange

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17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Asia 2018
4-5 December, Singapore

Meetup Africa & ME 2018
9-10 October, Johannesburg

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Investment priorities and infrastructure sharing strategies at MTN, Orange and Etisalat

Three of MEA's leading MNOs share insights

MNO Keynote panel

At the 2017 TowerXchange Meetup Africa & Middle East, TowerXchange invited three of MEA's largest MNOs to share their strategies when it comes to prioritising investment and managing their passive infrastructure. In this article, TowerXchange examine their key messages shared with this year's delegation.

Read this article to learn:

- To what extent decisions are made at both the group and local level
- What limitations exist in improving their network expansion and quality
- Where they each place priority on investment
- What is the company's current tower strategy and from where is it derived?
- What has been the MNOs' experience working with towercos?
- How MNOs view the opportunities presented by ESCOs

At this year's TowerXchange Meetup Africa & Middle East, we were delighted to welcome three heavy weight MNOs to the stage. MTN were represented on the panel by Group CTO, Navi Naidoo. The operator, with a footprint in 20 countries, is Africa's largest MNO and has divested towers in seven of its markets (see figure one). Orange were represented on the panel by Nat-Sy Missamou who heads up the operator's infrastructure sharing initiatives, managing relationships with towercos as well driving their exploration of the ESCO market. Etisalat were represented by Wiktor Barcicki who oversees technology economics for the international unit of the operator, supporting the different opcos in spending capex and opex more efficiently whilst providing input into special initiatives such as infrastructure sharing and tower deals. The panel was moderated by Darragh Stokes, Managing Partner of Hardiman Telecommunications.

How strategy is set market to market

With each of the invited panellists sitting at group level within their respective company, the question arose as to what extent passive infrastructure strategy was driven by the group level and to what extent it came from within each opco. Orange explained that strategy was driven heavily by head office in Paris, although market and cultural differences meant that the company's opcos were broadly divided up into different clusters with common strategies. This pattern was very much echoed by MTN who ran the strategy centrally but with regional groupings and different tiers of operations. For Etisalat there was very much a combination between group and opco-led strategy;

with the Maroc Telecom-owned opcos having, to date, operated rather independently, although Etisalat is looking to become more closely involved.

Whilst group level may be involved in setting strategy, strategy is not homogenous across all opcos in an operator's portfolio. The macrodynamics in a given country heavily affect an opco's spending, and so too does the opco's time of entrance and market share. Where an operator is number one in a market, they will have a very different strategy to one where they are sitting in a much lower position. Speaking on the Kenyan market, Orange referenced how they had made the decision to exit the country as they were never going to be able to topple Safaricom from their number one spot; in the DRC, however, the company is making significant headway in growing their market share. On the subject of time of entrance into a given market, Etisalat explained how their late entrance into Nigeria had been a contributing factor to their struggles in the country, although a crashing economy and currency devaluation were the main factors that led to their eventual exit.

Prioritisation of investment in spectrum and active infrastructure

The MNOs commented on how demand for connectivity is outstripping capacity across the region; it being particularly surprising how rapidly data usage is growing, in spite of the low smartphone penetration in much of sub-Saharan Africa. This particular issue of data usage growing whilst smartphone penetration remains low presents a key problem to operators on the continent; they need to maintain 2G networks to support older handset users whilst also rolling out 3G and 4G to meet the growing data usage by others. Whilst in some parts of Europe and Asia, 2G has started to be switched off, it isn't possible to do this in Africa as you cut off a large subscriber base. Today's operators need to add 3G, LTE and U900 as well as 2G to towers thus creating significant capex and leasing costs.

Requirements to continually rollout and use multiple technologies simultaneously not only puts a strain on budget but also on spectrum usage, with access to additional spectrum presenting another key problem to the region's MNOs. In particular, one of the operators on the panel voiced their struggles in obtaining the lower band 700MHz and 800MHz spectrum; spectrum critical to getting inside buildings and being able to offer high speeds. Without access to adequate 700MHz and 800MHz spectrum, capex outlays can quickly escalate when trying to improve connectivity.

As such, the operators explained how it was of critical importance to work closely with OEMs to get the most out of their spectrum, whilst working closely with infrastructure providers to reduce the costs of rolling out new sites. Early discussions on the panel reinforced the well established viewpoint that operators have a preference for focussing investment on active equipment and spectrum, whilst finding ways to reduce their spend in other areas.

In markets where revenues were dependent on the 2G voice segment, due to a lack of 3G and 4G handsets in use, operators were keen to drive data usage, transitioning users from 2G to 3G and increasing ARPU and customer experience. On the other hand, Etisalat explained that in a significant proportion of their markets, LTE coverage was well over 90% and as such the focus there remained about improving capacity rather than improving coverage. The Middle East, where Etisalat has a significant footprint, has some of the highest data usage figures globally, figures which are continuing to climb.

Whilst there was a preference to spend on spectrum, active equipment and services, operators were also focussed on deploying capex on making the network more efficient; consolidation of infrastructure, cloudification of platforms and bringing multiple countries into a "common factory" remained a key focus at Etisalat.

Infrastructure sharing and the role of towercos

Infrastructure sharing is, of course, one key methodology to make networks more efficient. When questioned as to what extent they view their networks as a differentiator and to what extent they were willing to share, the panellists explained that it was important to include a "timeframe" parameter in the question. When you are the first to roll out infrastructure in a given region you benefit from a first mover advantage; whilst you are securing market share during this period there is less of an appetite to share. After 12-18 months most of the first mover advantage has been obtained and, as such, operators became more willing to share as a means to reduce costs.

Where the MNOs have entered into towerco agreements or passive infrastructure sharing agreements with their competitors was to some extent influenced by the different markets in which they were operating. Orange explained how in Central and Eastern Africa there was a good presence of towercos and so they tended to use them to rollout and manage their passive infrastructure; conversely in West Africa there was a limited amount of towerco activity in many of the operators' markets thus limiting their use. Additionally, in West Africa there is less of a culture of infrastructure sharing between operators which has also limited Orange's strategy on this front; in North Africa however, operators tend to be much more open to infrastructure sharing - an attitude which could ultimately make active sharing a possibility.

MTN has divested their towers in seven markets (see figure one); these divestments represent the majority of the most attractive markets to towercos with some markets where they still retain towers being too small to attract the interest of the major players. MTN explained, however, that they continue to evaluate their strategy in relation to tower sales, assessing what is best for them in each region. On the subject of giving build to suit contracts to towercos, MTN explained how this was dependent on a number of different factors. There may be times of year when the opco is particularly capex constrained and thus in these instances contracts may be given to towercos. At the same time, it depends on whether towercos can offer the most competitive price relative to other vendors, with this not always being the case.

Figure one: MTN's footprint and history of tower sales

Sold to IHS
JV with American Tower
MTN retains towers
No opco present

Source: TowerXchange

Source: TowerXchange

Etisalat explained that increasing the utilisation of both their passive and active infrastructure is an essential part of the company's strategy to lower their cost base. To date, the adoption of infrastructure sharing has been lower than they would like, with many agreements having taken a long time to reach. The lack of regulatory frameworks regarding infrastructure sharing has been a contributing factor to these delays, with there being a difficult decision as to whether you should wait for the frameworks to be ironed out and lose out on benefits in this time; or alternatively forge ahead but potentially risk penalties down the line. Etisalat now have some degree of passive infrastructure sharing in the majority of its markets, working with other MNOs to look at deeper cooperation, although regulatory challenges can prevent active sharing from being feasible. Etisalat has more limited experience in working with towercos, having only sold towers in Nigeria, a market which the towerco has now exited. The company's Saudi Arabian opco, Mobily, had previously explored a tower sale only to cancel it to explore the formation of a joint venture with Saudi Telecom Company, with plans for the joint venture also now on hold (see figure three).

Experiences working with towercos

On the subject of how positive their experience working with towercos has been, each of the MNOs explained that it has not always been plain sailing. Lessons have been learned along the way and there is need to constantly be in discussions and negotiations. Inflation linked contracts, exposure

Figure two: Orange's MEA footprint and history of tower sales

MLL with IHS

Opco acquired from Millicom who previously sold towers to Helios Towers Africa

Orange retains towers

No opco present

Sold to Eaton Towers, operation subsequently sold to Africell

Source: TowerXchange
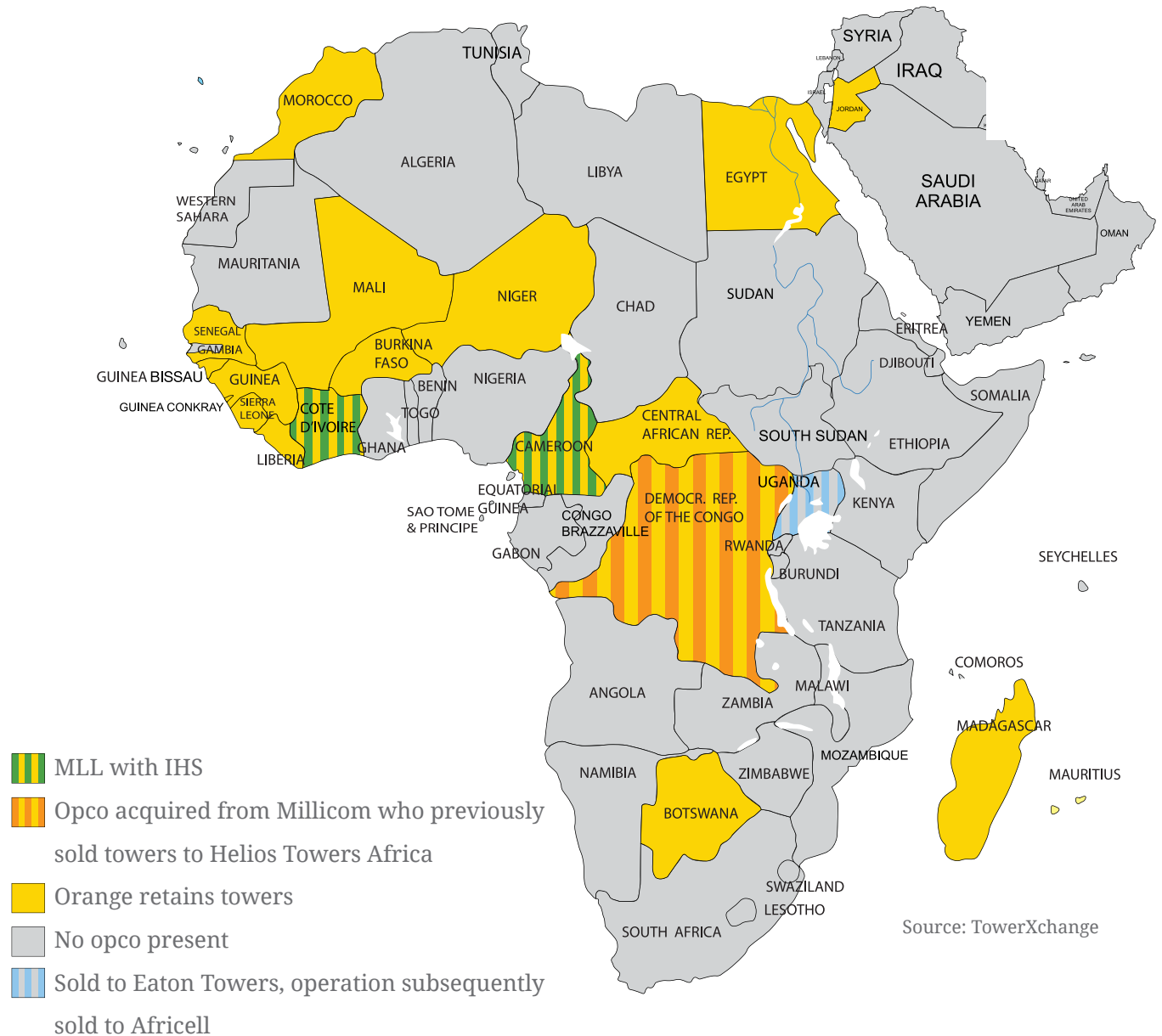
to forex issues plus concerns with power cost and availability have all presented challenges in MNO-towerco relations. In addition to this, operators cited examples of advantages being given to their competitors, in terms of both pricing and access to sites, which has put a strain on relationships.

Another challenge faced by divesting tower portfolios to towercos comes when an operator needs to roll out sites to areas in which towercos do not want to build. With the towerco business model being predicated on securing multiple tenants, and lease payments being their source of revenue, there are areas which are unattractive for a towerco to enter. For operators who have outsourced passive infrastructure, this presents a challenge as they have lost a large proportion of their in house capabilities to build and manage towers.

In spite of this, MNOs did confirm that on the whole, the quality of their networks has improved when they have passed on their towers to towercos. An operator is less incentivised to want to spend money on purchasing the highest quality energy equipment, preferring instead to invest heavily on active equipment. For a towerco, energy equipment is their "active equipment" and so the focus and spending that they have placed on this has delivered results.

The potential held by ESCOs

With outsourcing to towercos having delivered improved power uptime, discussion turned to the role that ESCOs could play in each of the operators'

Figure three: Etisalat's MEA footprint and history of tower sales

Sold to IHS (Opco since taken over by lenders and rebranded to 9mobile)

Towerco JV previously explored, now on hold

Etisalat retains towers

Maroc Telecom (53% owned by Etisalat) retains towers

No opco present

Source: TowerXchange
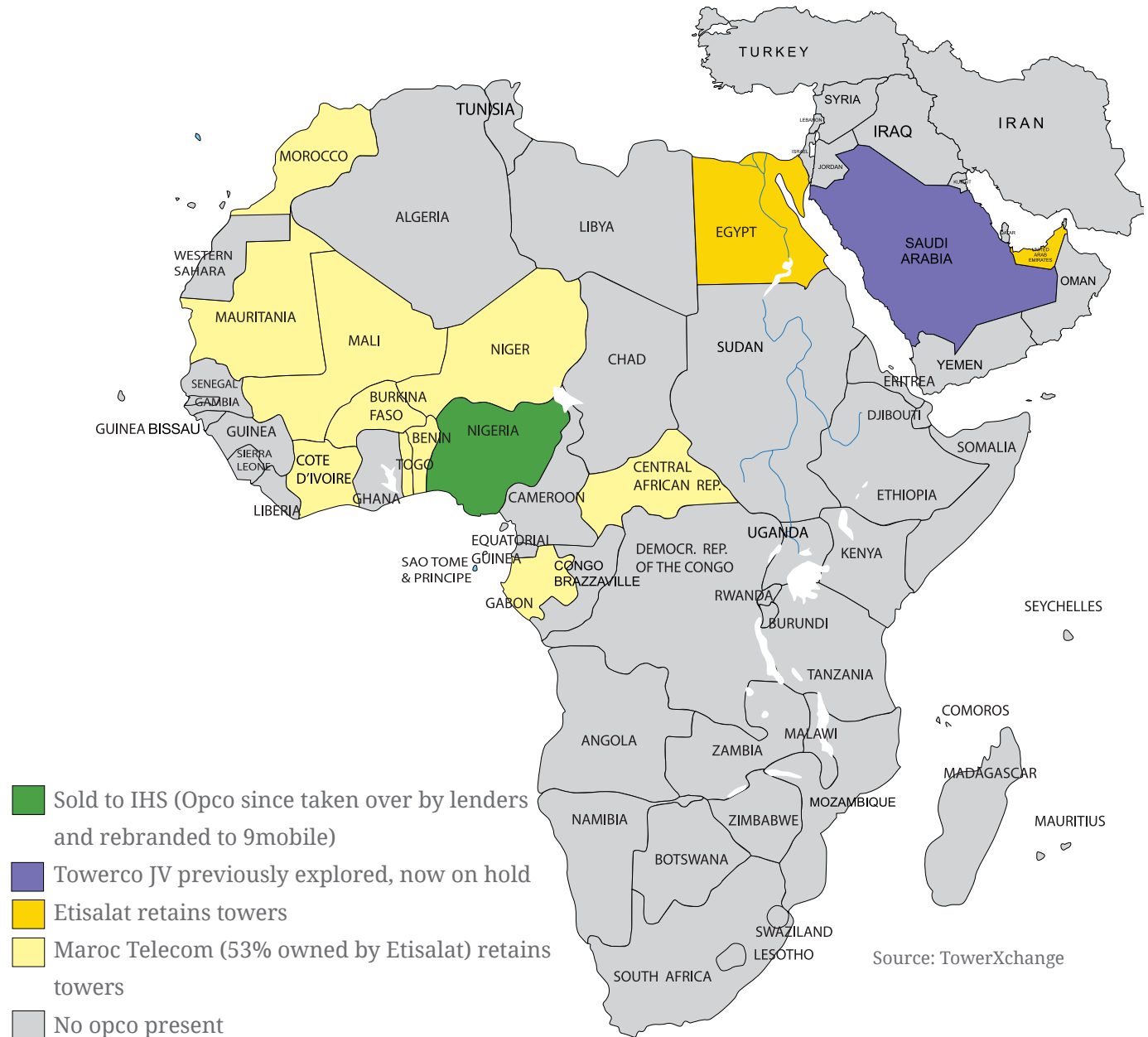
networks. Orange are the most advanced in terms of studying the ESCO model with a contract signed in the DRC with GreenWish Partners and an agreement being finalised in Burkina Faso with Energy Vision. In addition, the operator has at least four further RFPs issued (see figure X). Whilst it was perhaps too early to comment on the impact of ESCOs, Orange expected similar benefits to be observed as had been when outsourcing to towercos. With energy equipment being an ESCO's number one priority in terms of deploying capex, one would expect that similar improvements in power uptime would be seen when sites were taken over by ESCOs.

MTN is just at the beginning of their path in exploring the suitability of ESCO contracts, but for markets where the operator does not expect to sell their towers, the ESCO model could offer an attractive alternative. Etisalat explained that they are not actively looking at the ESCO model at present although they may start to explore this more in a few years. For now, their focus remains much more on improving energy efficiency through the deployment of batteries and cooling solutions ■

For further detailed discussions from the 2017 TowerXchange Meetup Africa & Middle East, stay tuned for the post event report which will be made available in early December.

The next TowerXchange Meetup Africa & Middle East will be held on 9-10 October 2018 at the Sandton Convention Centre Johannesburg. For more information please visit our website at: www.towerxchange.com/meetup/meetup-africa

Figure four: Orange's exploration of the ESCO model

Legend:
- ESCO contract signed with GreenWish Partners
- ESCO contract being agreed with ENERGY VISION
- Power from solar farms owned by Neoen, MEI & Catalyst Private Equity
- ESCO RFP issued
- No formal ESCO RFP in the public domain

Source: TowerXchange

Operational priorities, growth & diversification opportunities for towercos in MEA

The towerco asset class has been experiencing exponential growth, signifying the potential held by and confidence in the towerco business model globally. TowerXchange took a deep dive into the economics, growth opportunities and priorities of sub-Saharan African towercos, inviting Helios Towers, Eaton Towers and Atlas Tower to a discussion at the 2017 TowerXchange Meetup Africa & Middle East.

Keywords: 3G, 4G, Acquisition, Africa, Africa & ME, American Tower, Atlas Tower, Batteries, Build-to-Suit, C-Level Perspectives, Capacity Enhancements, Capex, DAS, East Africa, Eaton Towers, Energy, ESCOs, Helios, Helios Towers Africa, IBS, IHS, IHS Towers, Lithium, Masts & Towers, Middle East, Multi-Region, North Africa, Operational Excellence, Opex Reduction, Procurement, SLA, Towercos, West Africa

Read this article to learn:

- Growth opportunities and limitations in towercos' existing markets
- Attitudes towards geographical expansion
- How and where the companies are prioritising energy investment
- Towerco perspectives on the ESCO model
- Strategies to control overhead and supply chain costs
- The appetite to diversify beyond macro sites

In market revenue growth potential

Significant revenue growth was forecast by each of the towercos in the countries in which they currently operate. Major rollout is required with the emphasis in more developed countries being placed on meeting the growing data demand (with IBS coming to the fore in the most advanced markets), whilst in less developed countries such as the DRC, primary focus was still going to be heavily focussed on improving 2G and 3G coverage and capacity. Speaking on the DRC, Helios commented that the country had one of the highest number of subscribers per tower (approximately 6,000), further emphasising the amount of new build requirements.

Spectrum limitation is an issue impacting growth, although MNO consolidation in markets has helped. Whilst regulators and ministries have been opportunistic about spectrum rollout thus causing bottlenecks, the towercos commented that they plan to be ready when customers have the spectrum to continue to roll out 3G, 4G and ultimately 5G. In South Africa, Atlas referenced how the Ministry of ICT was proposing the formation of the Wholesale Open Access Network in a bid to stimulate MVNO activity in the market but Atlas felt that such spectrum would be better placed in the hands of MTN and Vodacom.

Towercos spoke of operators having significant network upgrade spend planned, with Eaton referencing Kenya in particular as a market where MNOs were channeling investment into both new build and technology upgrades. All of the towercos noted how amendment revenues in particular had

really stepped up in the past year with this becoming an increasingly large portion of the total revenue growth.

With towercos being the only independent telecoms infrastructure providers in many of their respective markets, the growing trust that they have worked hard on developing with the MNOs means that a lot of this spend on network upgrade is coming their way. In markets where there are competitors present, the towercos measure their success by their "take rate", i.e. the percentage of new business won versus the percentage of towers owned.

Geographical expansion

When speaking of tower transactions in the sub-Saharan African market, we repeatedly hear the statement that the land grab is over and that most of the attractive tower portfolios have been sold; but does this mean that the towercos are done buying?

Eaton commented that they were "absolutely not done buying stuff". In particular what makes a lot of sense is acquiring additional portfolios in countries where they already have a presence. Such a move brings immediate benefits as you can spread management SG&A costs across the portfolio (Eaton is known to be in the running for Telkom Kenya's ~1,000 sites, and should the acquisition proceed this would lead to an 80% increase in their total site count in the country). Eaton have turned down different opportunities in markets they haven't seen as attractive but have capital available to invest should the right opportunity present itself in new country; Egypt in particular, where the towerco had

previously agreed to acquire 2,000 MobiNil (now Orange) sites, remains attractive to the towerco.

Helios' ethos is to look at opportunities in the right markets where they are able to be a strong player and deliver good service at the right price point; a high release of capital coupled with high lease rates in tower transactions has caused issues for other players in the sector and so they want to avoid getting into that position. Helios are very keen on the markets that they're in and should towers come to market in those countries, Helios would be in a leading position to acquire them. In terms of expansion outside of the African market, Helios would be open to looking should the right opportunities arise.

Atlas' African footprint has been confined to South Africa, to date, and they remain committed to the market with ambitious growth plans through 2018. The towerco does however have plans to expand into other sub-Saharan African countries with a shortlist in place and investments already made in two countries with local staff recruited.

How attractive is the MENA region for sub-Saharan Africa's towercos?

With IHS having entered the Middle Eastern market in partnership with Towershare through the acquisition of Zain's Kuwaiti sites, and the pair in talks to acquire the operator's Saudi Arabian portfolio, there are significant signs that the Middle Eastern market is opening up to the towerco business model. With few towercos present, Dubai-headquartered Towershare has been

positioning itself to be MENA's leading player, and the partnership with IHS brings much valued scale and a long track record of operational experience to the table. In Iran, the formation of Iranian Towers, a new towerco venture between MNOs MCI and Rightel and towerco Fanasia, represents another significant player in MENA's emerging towerco industry, whilst TowerXchange knows of more parties either active or looking to enter the build to suit market in Egypt, Algeria and Saudi Arabia.

It is as yet unclear as to what extent Zain's landmark deal in the region will precipitate other transactions. The operator themselves is thought to want to get the Kuwaiti and Saudi deals done and then assess lessons learned before examining other potential divestments. In Egypt, MobiNil (now Orange) had previously agreed the sale of c. 2,000 towers to Eaton Towers, only for the deal to lapse after failing to obtain the relevant regulatory approvals in time. Orange is known to have shelved plans for further tower sales across its portfolio preferring instead to focus on the ESCO model as an alternative form of outsourcing; in Egypt the MNO currently has an ESCO RFP out covering 800 sites. Saudi Telecom Company and Mobily's on-off joint venture in KSA appears to be off for now and TowerXchange eagerly await news of their next steps; whilst Ooredoo, which has worked with towercos in Myanmar, is keen to look for partners in its more challenging markets.

With Eaton having previously reached a deal in Egypt, CEO Terry Rhodes commented that they would still go back and address the market should the opportunity arise. Speaking on the Saudi

Arabian market and the ongoing process there, Terry commented that they had looked at it but decided against. Saudi Arabia has totally different business characteristics to those that Eaton are accustomed to; there is huge penetration, high ARPU, enormous use of data and a lower growth potential. Kash Pandya also confirmed that Helios had looked at the Saudi process but decided against it. Speaking more broadly on their appetite to get into MENA, Kash mentioned that it really depends on the market and the market position of the MNO who is looking to sell their towers.

Where is spend on energy prioritised at present?

Towercos are very much incentivised to spend capex on energy equipment, with reduced downtime improving performance on SLAs and their reputation with MNOs, whilst energy savings translate into improved margins for the towercos. Questioned as to what extent the towercos were coming under pressure from their MNO partners to share some of the savings they are achieving through power investments, the panel commented that the pressure was not so great. MNOs are happy to see towercos invest capex to improve the quality of their network and in large part don't seem to disagree with towerco thinking that those who make the capital investment should benefit. Should the MNO take steps on their side to lower power consumption, such as through the installation of more energy efficient active equipment, then the towerco would be more open to discussing gain sharing.

Whilst towercos are incentivised to invest in improving the energy efficiency of sites, there has been a notable difference between the strategies of different players as to how readily they invest in replacing new technologies. IHS has been the most advanced in terms of energy equipment upgrades: in the Cote d'Ivoire over 70% of the company's 2,599 sites now have solar-hybrid systems in place with further upgrade work being done in Zambia and Cameroon. In Nigeria the company is undertaking a major overhaul of energy equipment on its portfolio through their "big five" initiative.

Eaton commented that they had always had a more cautious approach to spending capex, sweating the assets as hard as they can without risking prejudicing service agreements. The company added, however, that there is every incentive to invest and improve: once they can see that a technology is proven to be working at scale they will look to upgrade

Helios Towers have also put in place preventative maintenance programmes to extend generator lifespan and has also embarked on the installation of hybrid solutions with phase two of their programme now underway. The company is on schedule for 400 hybrid sites in 2017 with 400 DRC solar systems planned by Q1 2018. Speaking on the solar systems, Kash Pandya commented that they were pleased with the results so far.

Eaton had inherited several hundred solar sites through various acquisitions and had found that the solar systems were not performing well. The attitude of the previous tower owner had been that solar could be installed and left alone. In reality you

need to ensure that the panels are being effectively cleaned and that you have specialist people who can manage the systems. Whilst Eaton thought that solar looked promising, they didn't forecast any major deployment.

On the subject of batteries, Helios reported that they were in the process of evaluating lithium ion, adding that should they get the results promised, they plan to start switching lead acid for the technology. Further investigation is going into the assessment of alternative chemistries at present with MTN reporting that they're in the early stage of testing different technologies with zinc air showing good promise due to the limited to no re-sale value of components.

Along with the maintenance and upgrade of energy equipment, tower owners are also bringing grid connectivity to more of their sites, with Helios reporting in Q2 that they had brought connections to approximately 200 sites with a further 100 sites planned before the end of the year.

What would it take for towercos to look at the ESCO model?

The ESCO model has been gaining traction in their existing markets amongst MNOs, with Millicom, Orange and Airtel all signing ESCO agreements and MTN voicing that they have begun evaluation of the ESCO proposition.

For towercos, however, the argument has been less compelling. Kash Pandya commented that Helios were keeping a watchful eye on ESCOs but that they are yet to see a strong argument. The very capabilities that

ESCOs are proposing are Helios' core capabilities themselves: Helios serve the telecoms sector but are a power infrastructure business and are keen to look at generating additional revenue from additional services and competencies. Whilst Atlas' footprint in South Africa means that power has been less of an issue for the towerco, their expansion into other markets may present opportunities for ESCOs to get involved. Although Atlas are yet to speak to ESCOs, they are not opposed to having the conversation and remain open minded as to whether a compelling business model can be presented.

Beyond energy, where is emphasis placed on improving efficiencies and optimising spending?

The focus on reducing opex and controlling capex doesn't solely hinge on site technologies; optimising the O&M regime and managing your business with greater discipline is critical to driving efficiencies.

Eaton comes from a low cost challenger culture and so has historically kept a very tight control on costs and overheads. In the company's London headquarters there are just ten people with no more than a further 200 people running the company's local operations in their five markets. In terms of the local operations, Eaton have focussed on employing local staff whilst also pushing more responsibility into their supply chain partners. Further improvements in margins are a knock on effect from not only meeting but improving upon SLAs with their customers, with the towerco reporting that their biggest customer is paying them service level bonuses in every country.

In the wake of the rush of tower transactions, Helios Towers' focus has very much switched to optimising the operational cost base of the organisation with Kash Pandya explaining that individuals such as Colin Gaston and Roy Cursley have come into the business with a valuable set of skills sets which have been driving performance improvements. The company has been using Six Sigma processes to drive out inefficiencies, reporting an 80% reduction in the number of suppliers they use leading to $30mn in supply chain savings. They have trained up 75 individuals in Six Sigma principles, focussed on employing local staff with typically just one expat per country and improved operational headcount per tower by 30%. The company has improved service uptime by over 80% and is making good progress in its target of less than two seconds of downtime per tower per week.

Atlas, who have now been in the tower business for over ten years, explained that the fact that their sites were on grid meant that opex was marginal in comparison to the figures that other towercos are used to. Whilst opex is lower, the towerco still looked at ways to constantly improve their spending, reporting that initiatives such as ensuring a quick turnaround with vendors could help negotiate discounts. As a towerco's portfolio continues to grow, economies of scale start to have an impact, with the company being able to negotiate volume discounts. Having also built the vast majority of their sites, Atlas don't have to deal with many of the issues brought by legacy assets; the company can decide exactly when they want to deploy capex on a quarter by quarter basis meaning that every dollar is spent at the right time.

Similarly to Helios and Atlas, Eaton noted they had also put huge focus on optimising procurement, ensuring that they buy and build as effectively as possible. In addition to procuring effectively, panellists also advocated the use of standard site configurations when designing sites; reducing variation to bring further efficiencies to their operations.

What appetite is there to explore infrastructure beyond macro sites?

In developed markets, there is a growing trend for towercos to diversify their business models beyond macro sites and expand into areas such as small cells, DAS and fibre in order to meet densification requirements and solve capacity problems. In sub-Saharan Africa, activity on this front has been much more limited, and so TowerXchange questioned the panellists on their appetite to expand into this line of business and the role that towercos could play.

On the whole, towercos felt that there was plenty of growth in macro sites still to be had in Africa and so that was where their focus would remain; Africa is at least 6-8 years behind more developed markets and so it is going to be a while before we start to see small cells becoming more important than new macrosite rollout.

With South Africa being a more developed market it was likely that small cells would start to play a bigger role there sooner. Atlas, who are South Africa's fastest growing towerco, observed that they are having to start looking at alternative site typologies, increasingly looking at small cells.

Ultimately a towerco should aim to have as many touch points with an MNO as possible, being a single point of call for access to a whole range of site types.

Helios commented that they were in the very early days of looking at small cells. They have done in-building solutions in some markets and although this remained a small part of their business it was growing. Additionally, Helios are currently piloting a small cell solution in one of their markets, with a view to understanding the business model and associated challenges better and learning from it. Helios' view was that they saw the role of small cells starting to become a more significant part of the African telecom infrastructure business in the next four to seven years.

Eaton have been addressing a small part of addressable market in Nairobi and see there being more potential. The towerco recently went to Indonesia and India to look at what towercos were doing there with small cells, fibre and DAS with a view to understanding what other low cost markets (albeit ones that are more developed) are doing. A lot of interesting things were learnt from the trip but ultimately the economics of playing in that space are more challenging. In addition the space brings new operational challenges, for example, dealing with building owners is harder than dealing with land leases. Ultimately however, it is an area that MNOs want to get into and so towercos want to find solutions that work. In key buildings such as malls, stadiums and convention centres, indoor DAS is already profitable in Africa; as long

as it is an area that all MNOs want to get into, the business model can work.

When it comes to fibre, major rollout is currently underway across the African continent, with one participant commenting that you can even get FTTH in Kinshasa. Liquid Telecom are currently putting a major focus on bringing fibre to the tower, acting as a neutral host from which MNOs can lease capacity, American Tower appear to be dipping their toe in the African fibre market having recently acquired Frogfoot Networks in South Africa and IHS have a fibreco license in Nigeria. Atlas have been involved in fibre in the US market but are yet to look at this in Africa and others stakeholders maintain a watchful eye on the potential held by the fibre sector.

Speculating on how the dynamics will play out, Chuck Green who was one of the founders of Crown Castle commented that when they had created the towerco, there was a notion to move along value chain to share anything that was shareable up to the switch; what Crown Castle is doing today in US is exactly that. It seems logical to expect that in emerging markets we'll follow same pattern with the beauty being that you know what to expect by following in the footsteps of more developed markets, even if you don't know the timeframe. Crown Castle has extended their offering beyond macro sites, densifying into in-building solutions, small cells and now fibre. Ultimately, Chuck added, that's the future for this business model. Towercos need to respond to the demands of the carriers and investors appear happy to continue to build the growth pattern of the business ■

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20-21 June, Boca Raton

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From the first round of capital raising to bonds, IPOs and business model diversification

How finance and investment continues to evolve in the African tower industry

With new towercos forming in the African market, IPO activity ramping up amongst the continent's bigger players and new business models being proposed as the telecoms sector matures, TowerXchange invited three investors and Helios Towers to join a discussion examining finance and investment trends and appetites in the African tower industry. We summarise the key talking points in this article.

Keywords: Africa, Africa & ME, Bankability, Build-to-Suit, Business Case, Business Model, Cashflow Finance, Country Risk, DAS, Debt Finance, EBITDA, Helios Towers, Helios Towers Africa, IFC, IHS, IHS Towers, Investors, KPIs, Private Equity, Project Finance, RBC Capital Markets, Risk, Standard Bank

Read this article to learn:

- What are the key KPIs investors look for when evaluating towerco investments?
- What do bond issuances in the sector tell us about the market?
- What can we expect to see around upcoming IPO activity?
- What appetite do investors have for complementary business models covering small cells, DAS and ESCOs?

This year's panelists

Standard Bank is the largest bank in Africa offering a diverse set of products from finance to advisory through to capital markets. The bank has been very active in the tower sector across the continent and provide debt from their own balance sheet ranging from mezzanine financing to senior debt. Whilst the company doesn't do private equity they can help companies raise private capital and can further support in the public capital markets. Philip Hobden, who is a Director in their TMT unit, joined this year's debate.

Dutch-headquartered ING Bank provides senior debt globally and has a keen interest in the telecom infrastructure space. They have had exposure to the towerco business model in Europe, Indonesia and Myanmar and started looking at the African market five years ago. Whilst the company is active in the Middle East, there hasn't been much towerco activity in the region (to date). Jeroen Kleinjan, Managing Director in their TMT division, joined the discussion.

The IFC has a focus on digital infrastructure which spans towers, data centres and broadband. The organisation has invested in three home grown towercos in Africa whilst also having towerco investments in Asia, Latin America and Eastern Europe. A half to a third of the IFC's tower investments are in sub-Saharan Africa and the company has also invested in CSquared which is rolling out fibre in Uganda and Ghana. Eric Crabtree heads up the company's tower and data centre practice and was one of this year's panelists.

Helios Towers is Africa's third largest towerco with a portfolio of 6,501 sites across four markets. The company has a diverse investor base, issued their maiden corporate bond in early 2017 and is understood to be gearing up for an IPO in the first half of 2018. Helios was represented on the panel by their Chief Commercial Officer, Alex Leigh. The panel was moderated by RBC Capital Markets' Managing Director and Senior Analyst, Jonathan Atkin who covers the telecom sector.

Investor appetites

With a diverse set of towercos in the room, alongside a range of companies who are looking to potentially expand beyond their current capabilities, the panellists were questioned as to what KPIs or milestones they would be looking for in a deal or company in order to get involved.

For ING, the main KPI which they look at is the EBITDA size; it is difficult to finance a start up build to suit towerco with senior debt and so they would require a minimum EBITDA in the range of $20-25mn. Standard Bank, however, voiced that they do not have a minimum EBITDA requirement, adding that they have done zero EBITDA deals if they have the right credentials in place. The bank did however require a minimum transaction size in order to be able to offset the cost of doing the work. For the IFC, as minority investors they would typically look for quality co-investors whilst also seeking a board position in the towerco.

In terms of those aforementioned "right

credentials", a seasoned management team and well structured contracts with creditworthy counterparties were critical. Investors had a much stronger appetite for contracts signed with number one or two MNOs in a market, whilst it became a lot more challenging to do deals where a third of fourth placed MNO was the counterparty. How M&A in a market might play out as well as the macroeconomic conditions, all influenced the investors' decision making process along the way.

From new market entrant to Africa's third largest towerco

As one of Africa's leading towercos, Helios Towers tick the key boxes. The company acquired their first tower portfolio back in 2010 and have since grown their portfolio to over 6,500 sites, posting an EBITDA of $85mn in 2016. Speaking on financing in the early days, Alex Leigh commented how the involvement of Helios Investment Partners had brought significant value to the shareholding. Helios Investment Partners had been one of the investors in build to suit towerco, HTN Towers (which has since been acquired by IHS). The involvement of Helios IP in Helios Towers Africa attracted like-minded investors with either an experience in towers or real emerging markets experience. The first hurdle that the towerco had to overcome was to make investors comfortable in the markets in which Helios operated. Their investors understood the growth opportunities whilst having confidence in the towerco business model with its long term contracts and recurring cash flow.

Helios were supported from a lending point of view by institutions who had African or development finance in their DNA. The likes of Standard Chartered, Standard Bank, the IFC, FMO and other DFIs supported the company's vision as they developed their track record.

Helios' discipline that it has demonstrated in contracts, on par with the contractual discipline of the US publicly listed towercos has helped instill confidence in a wider group of investors, with Helios' drive towards operational and business excellence further strengthening their reputation.

A deep dive into Helios' bond issuance

On 8 March 2017, Helios Towers Africa announced its maiden corporate bond. The $600mn bond, listed on the Irish Stock Exchange and paying a 9.125% coupon with a 2022 maturity date, was three times oversubscribed.

The majority of the proceeds were to be used to refinance existing debt, with US$31mn being used to fund the acquisition of remaining sites not yet closed in the DRC, Congo Brazzaville and Tanzania; $110mn to be used for planned capital expenditures; $62mn to be used to finance the buyout of Vodacom Tanzania's 23.7% stake and remaining shareholder loans in Helios Towers Tanzania; and $23mn allocated for estimated fees and expenses.

Helios' bond, as well as that of IHS, served as great branding for the towercos, and more broadly, the

towerco business model in Africa, with the panel commenting that it introduced the companies to investors who ultimately may invest equity in the potential upcoming towerco IPOs. The size of both bonds was an important factor in their successful listing; at over $500mn greater liquidity was afforded. The bonds enabled firms who were less familiar with Africa to access investment opportunities on the continent with a greater deal of comfort. IHS' bond was given a rating higher than the sovereign rating in Nigeria due to its dollar-linked contracts, a quality which was significant given the economic troubles in Nigeria at the time. For Helios, the geographical diversity of their portfolio as well as the early involvement of DFIs as anchor investors helped bring comfort to conventional investors who otherwise would have had concerns with the African specific risks. The bond also came at a time when there were significant inflows into emerging market asset classes as investors sought high yields; thus creating a perfect time to issue.

Speaking on Helios' bond, Alex Leigh commented that it was a natural step in the company's evolution and growth. Until then, Helios had financed their operations with operation-specific loans which were separate for each market. Whilst they were well supported by the banks, managing separate loans created a lot of additional work from a treasury point of view. The towerco can now support operations with one finance team which has best in class international finance processes. The move has fuelled and simplified growth.

As to whether we could expect more bonds in the African market, the panelists thought that it was very specific to the circumstances of different towercos. Whilst it was impossible to say whether issuances were likely in the short to medium term, one thing the panel did agree on was that Helios' and IHS' bonds have laid the foundations for future issuances by either them or other towercos in the market.

What to expect in the upcoming IPOs

With the bond issuances having also paved the way for potential towerco IPOs in the African market, the question was raised as to what activity we could likely see around the mooted IPOs by three of Africa's largest towercos.

The IFC observed that whilst they haven't yet had one of the towercos in which they are investor list, they have been through the process with internet services company Yandex which listed on the NASDAQ for US$12bn. One take home from the listing was the lengthy SOX compliance required. Ultimately you're looking at spreadsheet yield investors who need stability, systems and order, towercos need to make sure that things such as permitting compliance and environmental compliance are up to scratch and that processes are standardised.

In addition to ensuring that accounting, reporting and governance are all in order, towercos will also be working on their equity stories, firming up their proposition with regards to growth versus dividends

and explaining when one may switch the other. The towercos may also need to reconfigure their board in preparation.

In terms of a listing destination, the panellists commented that the London Stock Exchange and Johannesburg Stock Exchange are the natural homes for African corporates. With the most valuable towercos listed in the US it was questioned whether it would be feasible and indeed favourable for the African towercos to list on the other side of the Atlantic. Jonathan Atkin from RBC Capital Markets, who was chairing the panel, commented that in the past five or so years both a European and a Chinese data centre operator had listed in the US, attracted by the deeper ecosystem of listed firms with common business models. Aiming for a listing on a local exchange when you're the only company of your type may leave you having to educate a generalist.

(For further insights into the prospective African towerco IPOs read: "IPOs on the horizon for Africa's towercos")

Investor appetite beyond macro-sites in the telecom infrastructure space

Whilst discussion around the towerco business model in sub-Saharan Africa tends to centre around macro sites, the panel were asked about their views on the investability of business models that incorporated alternative site typologies. The IFC commented that they hadn't seen any business models with a sole focus on small cells or DAS

in Africa, although they had seen this in other emerging markets, sometimes embedded into advertising and marketing.

Small cells and DAS is a natural step for many towercos although some have been deterred by the requirement to become involved in managing active components whilst others have cited uncertainty about the kind of cost structure of the model and the amount of scale that would need to be achieved in order to make the business profitable.

According to the panel, one characteristic of African towercos which would make them perhaps more adept at handling some of the complexities of the small cells and DAS market than their peers in developed markets, is their superior logistics capabilities. In Africa, a towerco's operations are more complex and having sophisticated processes in place to deal with these may serve them well in handling the logistic and speed to market demands of small cells rollout.

Beyond small cells and DAS the panel touched upon data centres, commenting on how they were yet to see anyone looking to build scale in data centres on the African continent. On the fibre front there has been a bit more progress with American Tower having recently acquired Frogfoot Networks in South Africa and IHS having a fibreco license in Nigeria.

Ultimately however, towercos can leverage their contract expertise and execution capability to

support other infrastructure although the panel thought that it would be a while before we saw any kind of scale in small cells. As the cost of 4G handsets continues to come down however, the demand for data will continue to grow exponentially, creating opportunities for small cell solution providers. The future success of the market requires companies to exert the right kind of discipline to deliver value to MNOs over ten year periods, opportunistic companies who are only in the market for the short haul could be detrimental to the reputation of the sector.

What role do investors see ESCOs playing?

The panel were yet to see any major activity in the ESCO space, observing that the only opportunities to date have been with MNOs on a rather limited scale. Whilst the ESCO model doesn't appear to be gaining much traction with the larger towercos, the panel felt that there could be opportunities for ESCOs to work with middle market build to suit players who do not have the same operational capabilities as their bigger cousins. In India, there has been a mixed response to ESCOs in the market but the investors thought that it could be possible to stitch together a successful ESCO business in the African market.

In conclusion, the panel all echoed the same sentiment that the towerco business model was now well proven and increasingly attractive should the right conditions be in place with the company in question ∎

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Towards proof of concept of the ESCO model in sub-Saharan Africa

Activity and discussions ramp up as the industry hits an inflection point

Meetup Africa and Middle East 2017 panel dicussion

The ESCO model was a hot topic of discussion at the 2017 TowerXchange Meetup Africa & Middle East and as MNOs begin to ramp up their assessment of the model, towercos keep a watchful eye on its potential and an increasing number of stakeholders develop ESCO propositions. TowerXchange summarise some of 2017's most salient discussions and promising developments.

Keywords: Africa, Airtel, Aktivco, Business Case, Camusat, Chad, DRC, ESCOs, Eaton, Eaton Towers, Energy, Energy Vision, Gabon, GreenWish Partners, Helios,Helios Towers, IHS, IHS Towers, IPT PowerTech, Investors, MNOs, MTN, Millicom, Nigeria, O&M, Off-Grid, Opex Sharing, Orange, Pass-Through, Sagemcom, Tigo, Vodacom, Vodafone

Read this article to learn:

- Signed ESCO contracts and issued RFPs in Africa
- MNO and towerco perspectives on the ESCO model
- Key types of ESCOs starting to emerge
- Important considerations in ESCO contracts
- How the ESCO model could evolve to create new synergies

Reflecting back on 2017's TowerXchange Africa Meetup, perhaps one of the most marked changes from the previous four years' events was the prominence of ESCOs; both in attendance and in discussion. Whilst the definition of what constitutes an ESCO and a true ESCO contract remains the subject of debate, the number of companies with ESCO operations or ESCO ambitions in attendance was well into double digits. What's more, in previous years, discussion had centred very much on whether the ESCO model could take off in sub-Saharan Africa; at the time of the 2017 event, three ESCO contracts had been signed and numerous other RFPs had been issued in the region. It's safe to say that 'launch velocity' has been achieved by Africa's ESCOs.

With the exception of IHS' big five project in Nigeria (the labelling of which as an ESCO project divides onlookers), all ESCO projects in the region have been signed with MNOs. In Gabon, Airtel have signed a contract with Energy Vision governing 400 sites in the country (read: Energy Vision: the first ESCO of scale in SSA); in the DRC Orange have signed a contract with GreenWish Partners covering 250 sites, and for which Sagemcom will act as the operational partner; plus in Chad, Millicom have signed an agreement with Camusat's Aktivco, with both parties keeping details close to their chest to date.

One can very much sense that we are on the cusp of major activity in the ESCO space, akin to the tower divestment activity that began in Africa back

in 2010. Speaking to stakeholders on site at the TowerXchange Meetup, there was a feeling that as much as one third of sub-Saharan Africa's towers could end up under ESCO agreements. With under 1,000 (or just under 13,000 if we take IHS' big five initiative into consideration) of sub-Saharan Africa's ~125,000 towers currently under ESCO agreements, we have a long way to go and a lot of deals to be done.

MNO appetite to work with ESCOs

Leading the field in the assessment of the ESCO model is Orange, who have signed an ESCO contract in the DRC and have issued RFPs in at least five further countries. Whilst the company has completed tower deals, selling their Ugandan towers to Eaton and entering into a management with license to lease arrangement with IHS in Cameroon and Cote d'Ivoire, the operator's focus appears to have very much shifted away from tower sales and more towards partnerships with ESCOs in a bid to optimise their network opex.

Speaking on their strategy during a panel at the Meetup, Nat-Sy Missamou, who heads up the company's infrastructure sharing strategy and who is driving Orange's ESCO initiatives observed that ultimately the focus remained on lowering the cost of operations and the cost of expansion. There are a host of strategies which MNOs can use to achieve this, from passive to active sharing and from working with towercos to working with ESCOs.

Figure one: Signed telecom-ESCO agreements on the African continent

Coutry	Tower owner	ESCO	Site count
Chad	Millicom	Akitvco with Camusat as O&M partner	Undisclosed
Gabon	Airtel	Energy Vision	400
DRC	Orange	GreenWish Partners with Sagemcom as O&M partner	250
Nigeria	IHS Towers	IPT PowerTech, Uppercrest, Makasa Sun, MP Infrastructure, Biswal	10,000*

*5 separate contracts awarded; structure of contracts not classified as a true ESCO by some parties

Whilst towerco activity has seen major growth across the region in the past five or so years, one limitation of working with them is that they may not always wish to invest in towers in certain regions. When there is little potential for securing additional tenants on sites, the towerco business model falls down and as such, towercos have shied away from acquiring or building sites in such regions. This can present a problem for operators who have outsourced much of their passive infrastructure to towercos. In selling their assets and leasing space on towerco towers, much of an MNO's in-house capability to manage passive infrastructure, and energy generation, can be lost. Working with ESCOs presents a valuable alternative.

Other MNOs echoed these sentiments, observing the fact that there may be tower portfolios that towercos may not wish to acquire or tower portfolios which MNOs may not wish to sell.

MTN, who brought a substantial delegation to the TowerXchange Meetup, have monetised their tower portfolios in just seven of their twenty markets, but these seven represent the majority of their most attractive markets to towercos. For their remaining, so called "tier three" markets, the ESCO model presents an attractive option to rid the company of the operational complexities of managing energy assets. MTN's assessment of the ESCO model is currently in the very early stages, but as Africa's largest MNO by subscribers, the company represents a very attractive counterpart for ESCOs looking to build their portfolios in the region.

Examining the major operators across the African market, one can see plenty of opportunities for ESCOs to step in and manage the costly energy component which can distract MNOs from their core business. The aforementioned Orange and MTN retain tower portfolios in a large number of

Figure two: Heatmap of ESCO projects

TUNISIA
MOROCCO
ALGERIA
LIBYA
EGYPT
WESTERN SAHARA
MAURITANIA
MALI
NIGER
CHAD
SUDAN
ERITREA
DJIBOUTI
SOMALIA
CAPE VERDE
SENEGAL
GAMBIA
BURKINA FASO
GUINEA BISSAU
GUINEA
SIERRA LEONE
GUINEA CONKRAY
COTE D'IVOIRE
BENIN
TOGO
GHANA
NIGERIA
CENTRAL AFRICAN REP.
SOUTH SUDAN
ETHIOPIA
LIBERIA
CAMEROON
UGANDA
KENYA
EQUATORIAL GUINEA
SAO TOME & PRINCIPE
DEMOCR. REP. OF THE CONGO
CONGO BRAZZAVILLE
RWANDA
SEYCHELLES
GABON
BURUNDI
TANZANIA
COMOROS
ANGOLA
ZAMBIA
MALAWI
MADAGASCAR
MOZAMBIQUE
MAURITIUS
NAMIBIA
ZIMBABWE
BOTSWANA
SWAZILAND
LESOTHO
SOUTH AFRICA

Legend

- ■ Signed ESCO contract in place
- ■ ESCO contract in exclusive negotiations
- ■ RFPs issued
- ■ Markets where MNOs known to be assessing the ESCO model retain towers

Source: TowerXchange

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their markets and are the kind of credit worthy counterparts which ESCOs (and their investors) would be happy to work with.

Airtel currently retains towers in five markets (having sold towers in ten) and recently signed an ESCO contract with Energy Vision in Gabon. On paper, the MNO represents a strong candidate for further ESCO agreements; in Tanzania the MNO has twice reached and then lost an agreement to sell their towers (first to Helios and more recently to American Tower); in Madagascar the MNO had reportedly reached an agreement with an ESCO only for the deal to be cancelled; plus their remaining markets of Chad, Malawi and the Seychelles do not appear to satisfy many towercos' current investment thesis. In spite of this, Airtel has reportedly abandoned any future plans to work with ESCOs, instead choosing to revise its managed service contracts in markets where it retains towers.

Millicom, which has signed an ESCO agreement in Chad, has long been looking to exit the African market having sold their Senegalese opco to a consortium involving NJJ, Sofima and Teyliom Group, merged their Ghanaian operations with Airtel and more recently agreed the sale of their Rwandan opco to the former. The company is also looking to sell their operations in Chad and Tanzania having reportedly entered into discussions with Econet. Such an exit strategy suggests that ESCO agreements may not be top of the operator's list but ESCO contracts structured

to survive a change in ownership could still be on the cards.

Vodacom has historically shied away from the sale of their passive infrastructure, preferring instead to keep the assets on their own balance sheet meaning that there are a number of attractive tower portfolios for ESCOs to target. Whether or not Vodacom will be receptive to such proposals remains to be seen, there are individuals within the business who are advocates of the strategy but to date there has been no sign that the ESCO model is under serious consideration.

Beyond the major multi-country players, there are well over 50 further MNOs active across the region. Whilst amongst that number there are companies whose credit rating and anticipated longevity would make the signing of a bankable contract challenging, there are many which could represent attractive counterparts to ESCOs. For example, towercos have shied away from markets where the potential for infrastructure sharing is limited, markets such as Ethiopia with just MNO; the ESCO business model does not depend on co-location and so such markets could be attractive.

What is the the opportunity for ESCOs with towercos in Africa?

IHS' aforementioned 'big five' initiative in Nigeria, is by some classed as a series of ESCO arrangements; contracts signed with five different parties to manage approximately 10-12,000 sites. With IHS making the capital investment in energy equipment however, others feel that the ESCO definition does not apply.

Joining the ESCO panel discussion and hosting the ESCO roundtable debate respectively, Helios Towers' Chief Commercial Officer Alex Leigh and Eaton Towers' Chief Commercial and Legal Officer Neil Taylor offered a towerco's perspective on the ESCO model. Alex Leigh said that Helios were keeping an open mind when it came to working with ESCOs but felt that they were yet to see a compelling argument. Managing power is a towerco's core competency and something they have become particularly adept at, improving performance against SLAs and decreasing opex across the years. Should this responsibility be handed over to a third party, one of the towerco's major value propositions is removed. What's more, towercos have been fighting to keep the benefits of capex investment, improving margins on power delivery to MNOs by increasing energy efficiency; to hand over this benefit to a third party needs a compelling business case. Ultimately, ESCOs need to approach towercos with a golden spark, something that improves upon and doesn't just replicate what towercos have been doing to date, perhaps a lower cost of capital or added shareability through microgrid projects, for example.

One former executive of a major African towerco at the ESCO roundtable offered an alternative viewpoint. Whilst African towercos have come to see power as a major component of their business model, this has not always been the case with power structured as a pass through in the early days when the companies were more risk averse and less operationally experienced. What's more in many markets, towercos continue to only structure contracts with power as a pass through. Ultimately towercos are aiming for the same multiples as the U.S. publics, multiples which are achievable by their uncluttered, real estate centric business models. Perhaps down the line the towerco perspective may change to align more closely with towercos in developed markets, moving from a tower + power business to a pure 'steel and grass' vertical real estate business. When you look at the US towercos, their operational headcount is much lower, perhaps in the future increasing pressure could be put upon their African counterparts to further outsource and reduce headcount per tower. Should towercos and the financial markets feel that more real estate focussed business models are more attractive, perhaps this carves out a niche for ESCOs in the towerco space.

What types of ESCOs are starting to emerge?

As stated earlier, the number of businesses in attendance with some kind of ESCO offering or strategy at the 2017 Africa Meetup was well into double digits. These businesses ranged from pureplay ESCOs, to traditional centralised energy companies, to O&M contractors and technology vendors. Each of the different players bring different strengths and in many cases, will look to partner with one another in order to strengthen their value proposition.

O&M contractors possess the in-the-field experience of operating energy assets across multiple countries. TowerXchange counts approximately 10-15 multi-country managed service (aka 'turnkey infrastructure') providers who we would class as the most sophisticated players with the largest footprint who would bring credible operational expertise to an ESCO proposition. To what extent these different companies have the financial capabilities and expertise to manage ESCO projects is varied. In the case of Camusat, the company has carved out a new investment vehicle, Aktivco which becomes their dedicated ESCO unit, with Camusat managing the operational element. For ieng Group, they plan to finance ESCO projects themselves and we await further news from the company on their plans. In the case of Sagemcom they have partnered with an investor, GreenWish Partners, in their project with Orange in the DRC, and several other O&M players are understood to be examining a similar route. For an O&M contractor, ESCO contracts represent an attractive proposition. Traditionally O&M players will be awarded O&M contracts for a 2-3 year period; ESCO contracts are more likely to be in the 7-15 year range bringing longevity and certainty to their revenue streams.

For investors eyeing up the ESCO space, many will come from an energy or African background; investors with access to competitively priced finance which enable the ESCO to offer a competitive price point whilst also making a margin for themselves. Centralised energy producers, such as Mitsui, Voltalia and Total are other such entities

with a good cost of capital in addition to strong purchasing power who could bring value to an ESCO model.

Several technology vendors are starting to offer an ESCO proposition, with IPT PowerTech one such company very much positioning itself to be a forerunner in the T-ESCO (or telecom-ESCO) space (Read: IPT PowerTech on what it takes to offer guaranteed savings and T-ESCO). Their proposition of offering a fully integrated service, they feel, not only offers a more competitive cost but also avoids the "blame game" that can ensue when multiple parties are involved. Whilst IPT PowerTech may have an appetite to take on an ESCO contract single handedly, other vendors prefer to just provide the technology whilst perhaps taking a minority stake in the new ESCO SPV formed. Flexenclosure is one such party with an appetite to explore this model.

Whilst IPT PowerTech sing the praises of a vertically integrated approach, pureplay ESCOs in the market, such as Energy Vision, argue that being vendor agnostic is key. Offering a choice of equipment and being nimble in sourcing can help to execute projects in compressed time frames, something that Energy Vision achieved in Gabon.

There is also a growing interest in ESCOs from development finance institutes whose cost of capital can help with ESCO economics. Additionally other social impact investors may express interest should the rural electrification and microgrid offerings be honed.

The opportunity to create microgrids

There was a lukewarm reception amongst participants at this year's TowerXchange Meetup about whether the microgrid model could work in Africa. Whilst in India there have been successful examples of ESCOs connecting to and monetising microgrids (with one company understood to be generating 70% of its revenue from the local community versus the telecom operator), market conditions in Africa make the model harder. Telecom sites in Africa tend to be in more remote areas with fewer power users surrounding them and what's more, participants felt there was a difference in culture between the two regions, with Africa ultimately harder to retrieve payments. The challenge of how you can collect payments from users of the microgrid remains a key one to solve, with established utility companies still grappling with the problem.

In addition to the challenge of obtaining payments from microgrid users, one further challenge lies in the regulatory landscape. In many regions you require a generation license in order to sell power to the different consumers and the ease and cost of obtaining such a license can create a barrier. In some markets, participants at the ESCO roundtable explained that as long as the system was under 100kW you could get around the issue of requiring a license.

Whilst many remained sceptical as to the possibility of successfully selling power to surrounding

communities, all were in agreement that unlocking this would bring new efficiencies to the ESCO model.

Contractual structures

Given the competitive nature of the market, the ESCOs in attendance kept their cards close their chest when discussing their contract models with some citing that they felt the structure of their contracts was their strategic differentiator.

Frequently comparisons were drawn between the towerco model of yesteryear and the ESCO model of today, with towercos cautioning against the mistakes that some of their predecessors had made. As with an Master Lease Agreement, the ESCO contract needs to be signed with a credit worthy offtaker and, given the M&A activity in the MNO sector, structured in such a way that it survives a change in opco ownership. Discipline should be exercised in structuring such arrangements, with the MNO discontent caused by elevated lease rates in return for high release of capital causing frictions in MNO-towerco relations. Additionally, well defined SLAs are critical in order to ensure effective operational governance of agreements.

Skills and synergies in the ESCO market

With the vast majority of projects expected to involve hybrid systems, the operational scope of ESCOs managing sites will extend way beyond generator refuelling and maintenance, with IT skills being voiced as particularly important. Whilst the definition of an ESCO suggests the company will only be engaged in the provision of energy, in reality ESCOs are broadening their service offerings with one company at the roundtable explaining how their telecom client had requested they take on further maintenance tasks. Ultimately, operational efficiency is key to make sure that costs are controlled and uptime is maintained. Reducing the number of site visits by eliminating the large number of different contractors attending to a site helps to drive improvement in site management

Looking forward

At the time of the TowerXchange Meetup Africa & Middle East 2017, three ESCO contracts had been signed in sub-Saharan Africa but TowerXchange has been made aware of several other projects on the cusp of being announced. Multiple RFPs have been issued and further MNOs are starting their assessment of the model in order to benchmark it with other outsourcing strategies. The telecom ESCO market is undoubtedly at an inflection point and 2018 looks set to be an exciting year as ESCOs hone their business models and further contracts are signed.

TowerXchange is currently working on the first ever telecom ESCO market report. If you are an ESCO who would like to be considered for inclusion in the report, please contact Annabelle Mayhew on amayhew@towerxchange.com. The ESCO report will be available in H1 2018 ■

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The health of the Nigerian tower industry at the end of 2017

Etisalat exits, the country returns to GDP growth but what has changed?

In light of the new developments in the Nigerian telecoms sector, TowerXchange held a roundtable discussion on the Nigerian market as a follow-up our Q2 analysis on the country's tower industry. In this article we summarise the most significant recent developments and examine how these are being felt by stakeholders on the ground.

Keywords: 9mobile, Africa, Airtel, American Tower, BCTek Engineering, Build-to-Suit, Capex, Communications Towers Nigeria, EMTS, Energy, Etisalat, Glo,Globacom, HTN, IHS, IHS Towers, IPO, Logistics, MTN, Market Overview, Nigeria, Off-Grid, Regulation, Research, SWAP, Tax, West Africa

Read this article to learn:
- Mobile market shares and tower ownership in Nigeria
- Updates on the sale of 9mobile and MTN's proposed listing
- MNO appetite to invest as the country exits recession
- An update on power system upgrades and new strategies tackling the power challenge
- The interplay of currency, regulations and theft on operating conditions in the market

Earlier in 2017, TowerXchange published a detailed study on the Nigerian tower industry, from how the independent towerco market had first evolved in the country to the impact of Nigeria's deep recession throughout 2016 and early 2017 (read the full article in journal 19). With the recession starting to lift, and further developments being reported in the country's telecom sector, TowerXchange brought together key stakeholders from the Nigerian tower industry to join a roundtable discussion examining how such changes are being felt on the ground. Welcoming a host of different companies and representatives including IHS, American Tower Nigeria's former CEO, Gordon Porter, managed service providers and manufacturers operating in the market, the roundtable was held under Chatham House rule at the 2017 TowerXchange Meetup Africa & Middle East. In this article, TowerXchange examines the key developments in the market in recent months and shares some of the anonymised opinions of the roundtable's participants.

The Nigerian telecom sector and tower industry at a glance

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. GSM subscriptions make up over 99% of subscriptions in the market, with total GSM subscriptions, as of September 2017, standing at 139mn. MTN has the

largest market share (37%), followed by Glo (26%), Airtel (24%) and 9mobile (13%).

Nigeria's total subscriber base has grown by 36% in the past four years, with recent growth impacted by the disconnection of unregistered SIMs in accordance with the government regulations. A further 62mn additional mobile subscribers are expected by 2020, illustrating the huge growth still expected in what is already Africa's largest mobile market. Nigeria is still very much a 2G market (with 2G accounting for 70-80% of subscriptions) although rollout of 3G and 4G is underway as data usage continues to grow exponentially. MTN, the country's largest operator, reports a 72% increase in data revenues for the year to date with voice revenues increasing 5.4% in the same period (source MTN Q3 2017 quarterly report).

There are 29,113 towers in the Nigerian market with 78% owned by independent towercos (figure two). Of the country's four GSM players, three have divested their tower portfolios with Airtel selling to American Tower and MTN and 9mobile (whilst they operated as Etisalat Nigeria) selling to IHS. Back in 2010, IHS also acquired CDMA operator, Visafone's towers and more recently bought HTN Towers and their portfolio of 1,211 sites. As part of IHS' acquisition of HTN Towers, the operator also inherited the management contract for 702 towers owned by SWAP Technologies with 368 of these towers being live; in Q2 2017 this agreement was cancelled. Number two operator Globacom still retains their towers as does fixed line player

Figure one: MNO market share (subscribers)

Legend:
- MTN
- Glo
- Airtel
- 9mobile
- CDMA operators
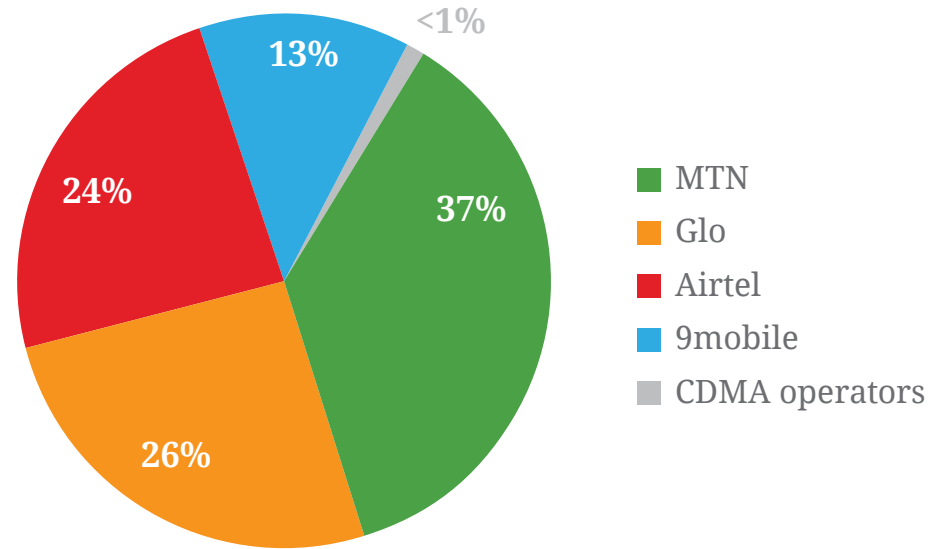
Source: TowerXchange

Figure two: Ownership of Nigeria's 29,113 towers

Legend:
- IHS Towers
- American Tower
- BCTek Engineering
- Communication Towers Nigeria
- Hotspot Network
- Other small Nigerian towercos
- Globacom
- NATCOM
- SWAP Technologies
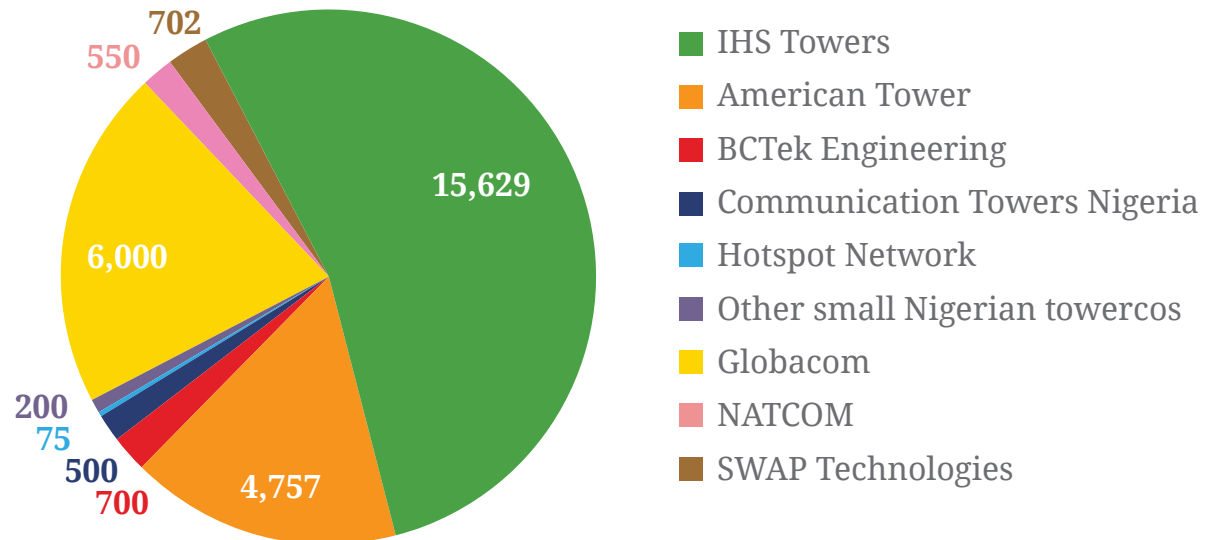
Source: TowerXchange

Figure three: A history of major tower transactions in the Nigerian market

Year	Seller	Buyer	Tower count	Deal value US$	Cost per tower US$	Deal structure
2017	Hotspot Network	IHS	85			Portfolio acquisition
2016	HTN Towers	IHS	1,211			Company Acquisition
2015	Etisalat	IHS	555			SLB
2014	Airtel	American Tower	4,717	1,060,000,000	224,719	SLB
2014	MTN	IHS	8,850	984,000,000	226,911	Joint venture (IHS 49%, MTN 51%)*
2014	Etisalat	IHS	2,136	485,000,000	227,060	SLB
2010	Starcomms	SWAP	407	81,000,000	199,017	SLB
2010	Visafone	IHS	800	67,000,000	83,750	SLB
2010	Multilinks	HTN	400			MLL

* MTN has since restructured its interest to an additional shareholding in IHS Holdings

NATCOM. In addition to IHS and American Tower there are a number of other smaller towercos in the market including BCTek Engineering, Communication Towers Nigeria and Hotspot (who recently sold 85 towers to IHS). Whilst IHS and American Tower remain each other's biggest competitors, the two have commented that the market is big enough for both players, adding that their presence helps rationalise pricing, avoiding any rash price cutting manoeuvres that their smaller competitors might do.

Further details of the evolution of the tower industry can be read in journal 19 in the article "Challenging macroeconomic conditions but a bullish outlook for Nigerian towers"

Recent dynamics affecting the telecoms sector

The two most notable events in the Nigerian telecommunications sector in the past 18 months were MTN Nigeria's NGN330bn fine for a failure to disconnect unregistered SIMs and the takeover of

Etisalat by its creditors after failing to meet its loan repayments.

As part of the settlement with the Nigerian government, MTN is to list shares on the local stock exchange with the operator announcing in a recent analyst call that preparations for the IPO are underway. Having appointed Citigroup and Stanbic IBTC Capital as joint transaction advisors, MTN stated in their Q3 call that they expect a listing in H1 of 2018 if market conditions are favourable.

Since our earlier analysis of the Nigerian market, Etisalat has exited the country after being forced to transfer its 45% stake to United Capital Trustees, the security trustee of the opco's consortium of lenders. The opco was rebranded to 9mobile and Barclays was appointed to find new investors for the embattled MNO. 16 expressions of interest were received by the bank with local press reporting that 10 bidders had been progressed through the pre-qualification phase. Those 10 parties were named as Globacom; Bharti Airtel; Smile Telecoms; Africell with Centricus Capital; Abraaj Capital, The Carlyle Group; Helios Investment Partners; Alheri Engineering; Dangote Group's telecoms business unit; Teleology Holdings Limited; and Africa Capital Alliance (ACA). At the time of going to press, the market still awaits news of who the successful bidder will be although conflicting reports suggest that either Smile or Teleology may be in the running. Sources suggest that all other parties pulled out before submitting financial bids.

How have the developments been felt on the ground?

Whilst MTN still remains conservative regarding capital expenditure and full payment for the fine is yet to be made, those on the ground in Nigeria report that talk around the fine and its impact appears to have mostly subsided and that investment has picked up. On the subject of currency challenges faced by the operator MTN Group CFO, Ralph Mupita commented in a Q3 earnings call that they had no concerns about dollar availability impacting on their plans for network rollout. The company's service revenues grew by 11.2% for the year to date, in spite of the economic challenges in the country, and the operator remains committed to one of its most important markets.

Etisalat were a significant customer for towercos, with IHS in particular exposed given the operator's presence as anchor tenant on the 2,691 towers that IHS had acquired from them. Whilst the operator was behind on their lease payments to IHS, since the opco's takeover by its creditors, IHS report that they are starting to see payments come through. Whilst the opco is up for sale there has been an investment freeze which has a dampening effect on towercos and the supply chain, yet observers expect a buyer to enter. Whilst it is not yet clear who that buyer will be, with just over 17mn subscribers and a good quality network, towercos are optimistic of a turnaround in due course.

In terms of new site build, the majority of build

to suit contracts in the country have gone to IHS with American Tower having historically shied away from new build. It is widely thought that Nigeria requires a doubling of its tower stock in order to meet growing mobile usage, with 13,000 new towers forecast to be added in the next five years. Whilst country specific breakdowns are not available, IHS forecast they will add 1000 new sites per year across their entire portfolio, and with Nigeria accounting for two thirds of their total portfolio size, one can expect the market to receive its fair share of such activity. In Q3 2017, IHS' subsidiary, IHS Netherlands Holdco (which owned the towers outside the former JV with MTN in the country and which issued an $800mn bond in 2016) added 53 new towers. Whilst American Tower have historically not built in Nigeria, the towerco's Q3 results report a net increase of 9 towers in the country, with the operator understood to be considering further new build opportunities. Whilst major new site rollout is required, stakeholders in the market remain cautious as to what timeline this will be achieved in.

Stakeholders report that every year an additional 4,000-5,000 new sites are promised by the country's operators, only for this number to be drastically scaled back amidst cost control measures. After a challenging 12-18 months however, companies on the ground report that MTN, Airtel and Glo have started investing significantly, rolling out additional 3G equipment and moving into 4G. MTN has announced their

intention to take over 11,000 slots over the next year, which is driving the others to act to keep pace.

Whilst the appetite of MNOs to reduce capex spend sends new build opportunities towercos' way, and rollout plans hold the potential for increased tenancies, significant frictions exist in the market between the two parties. With the majority of existing lease payments indexed to the dollar and operators receiving revenues in Naira, MNOs complain of lease rate payments in the market tripling in local currency terms after depreciation of the Naira. Such escalating lease payments were a major contributing factor to Etisalat's exit from the Nigerian market and as such, towercos are coming under increasing pressure from MNOs to reduce their fees; with the regulator threatening to wade in on the situation. With the towercos having paid hard currency for the towers, they have loan payments in USD to repay and pressure from shareholders makes it difficult to meet MNO demands. Such a stance puts towercos between a rock and a hard place, drop the lease rates and risk your own financial metrics or enforce the payments and risk your counterparties going bust.

The ongoing power challenge

Grid availability in Nigeria is reported to be as low as four hours per day, with the vast majority of sites being off-grid. The Nigerian government initiated a utility-scale solar programme to increase generation capacity but the programme appears to be on hold as they await guarantees from the World Bank for

projects. Whilst lack of generation capacity is a contributing factor, Nigeria's power challenges are multifaceted with transmission troubles equally contributing to the poor grid infrastructure.

Whilst a large proportion of Nigeria's ~29,000 cell sites are off-grid entirely, operational experts on the ground comment that this is actually one of the biggest strengths. Managing off-grid sites is better than trying to manage those on poor grid; it is easier to dimension off-grid sites properly rather than deal with the variability of supply to those on poor grid.

Understandably, given the scale of the power challenge in Nigeria, much of the discussions on our Nigeria roundtable centred around methodologies being deployed by local stakeholders to handle such issues.

Running a diesel generator on a site can cost as much as $1500 - $2000 per site per month in Nigeria, and that is before you start taking into consideration the capex spend associated with the replacement of broken or stolen components. The price of fuel in Nigeria has increased relative to the increase in underlying diesel price with such price hikes levied by suppliers who are struggling to locate US Dollars. Towercos also complain of high charges to connect to the grid whilst the implementation of new electricity tariffs has further impacted the sector.

Whilst American Tower have been more conservative in their investment in power infrastructure, with the mainstay of capital being directed towards generator efficiency programs and getting the most out of existing equipment, IHS have had a much more bullish attitude to upgrading the generation equipment on sites.

With a desire to increase the proportion of their operational costs being paid in Naira, IHS embarked on their ambitious "big five" energy initiative to install solar hybrid systems on their portfolio of sites in the country. Dividing their assets between five different contractors (and retaining a portion in-house for benchmarking purposes) IHS handed over the installation and management of energy equipment to their network of partners.

Whilst the partners were known to IHS through their work in the installation, commissioning or operation of sites, many had a steep learning curve as they sought to put in place processes to manage a large portfolio of assets effectively. Simultaneously, the decision to use DC over AC gensets has also caused teething problems as companies got to grips with the newer technology. Whilst rumours had been circulating the IHS may look to cancel contracts with their partners, it is understood that at least four of the five partners are performing within the initial parameters laid out and IHS has reported a 50% reduction in diesel consumption.

Further operational and logistic challenges

Linked to and extending beyond the power challenge, stakeholders reiterated the challenges presented by theft and organised crime in the Nigerian market. One company had had some success with the installation of tracking systems in batteries, using the technology to catch crime syndicates who had turned such theft into a professional operation. Some spoke of designing cabinets with access locking codes whilst others highlighted the success they have had in displaying wanted posters.

Participants explained that it wasn't just the theft of equipment on sites that presented problems, the unauthorised installation of additional equipment on sites by MNOs and their contractors is another area that is eating into profit margins. One participant discussed their use of smart cameras which can detect the addition or amendment of any equipment, although underscored the importance of robust implementation of such systems.

Training and continuity of personnel on sites helps to improve site operations, whilst a balance of local and expat stakeholders is critical to getting the right mix of expertise at the right price. Nigeria has a large and diverse supply chain, with many tiers of contractors reporting into each other. Everyone on the table spoke of their desire to rationalise this supply chain, consolidating the market to fewer, larger, more professional parties in which you could have confidence that the job would be done effectively. Whilst this remained an ambition, few thought that the market would evolve this way any time soon.

The logistics of getting equipment into the country continues to be a challenge with port congestion remaining high. On what kind of import timeline could be considered good, one party suggested 16 weeks as a typical benchmark to aim for. A handful of parties have assembly lines in place in the country, the added advantage being that complete products may be subject to import tariffs of 20%, whilst components may only be charged 5%

Regulatory overreach

In addition to threats from the regulator to interfere in the lease rate disagreements between MNOs and towercos, participants at the table spoke of the increasing influence of both national and local government on the profitability of the tower industry. Often both local and national governments will both handle the same services, with each looking to levy taxes. The regulator has also been threatening to impose quality of service regulations on towercos in the market.

At the TowerXchange Meetup Africa & Middle East this year we held our first regulatory task force for the global tower industry, an invite only session for towerco CXOs co-hosted by the IFC. With participants including American Tower, IHS Towers, Helios Towers, Eaton Towers, edotco, Powercom and ANTOSC amongst others, characterisation of emerging threats as well as industry-wide solutions to tackle them were raised. A full report will be available shortly ∎

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Call for towercos to join Communications Infrastructure Regulatory Working Group

New informal peer-network inaugurated to share best practices, guidelines and templates

At the recent TowerXchange Meetup Africa 2017, ten legal and regulatory affairs decision makers, representing some of the world's largest and most influential tower companies, resolved to create a new informal Communications Infrastructure Regulatory Working Group to share experiences and best practices in the management of dialogues with regulators, ministers and other State and Federal government stakeholders.

Keywords: Bankability, Country Risk, Decommissioning, Leasing & Permitting, Multi-Region, Regulation, Towercos

Read this article to learn:
- Why an informal body was preferred to a formal, Global Communications Infrastructure Association
- An initial 10 key objectives for the working group
- A proposal to broaden the scope of the Working Group beyond towers
- How your towerco can contribute to, and access, this pool of expertise

All towercos worldwide are urged to nominate one individual as their point of contact to enable them to contribute to, and access, the pool of expertise within this new Communications Infrastructure Regulatory Working Group. The Working Group will initially meet quarterly at each of four TowerXchange Meetups, held in Singapore, London, Florida and Johannesburg. While in-person attendance is ideal, international dial-in facilities will be provided to join each meeting.

The Communications Infrastructure Regulatory Working Group aims to create a peer network wherein towercos can share questions, problems and solutions, ultimately building up a resource library of best practices, guidelines and templates – global exemplars to illustrate how Communications Infrastructure companies should be regulated.

Informal working group preferred to a formal, global trade association

The tower industry has already coalesced into formal, regional trade associations, exemplified by the Wireless Infrastructure Association in the US, European Wireless Infrastructure Association, Chinese Independent Tower Association, and India's Tower And Infrastructure Providers Association.

While the idea of creating a formal Global Communications Infrastructure Association was discussed, the majority of participants felt that their requirements were too localised for a formal

entity to be effective enough to justify resourcing. Indeed, it was felt that the creation of a formal Association might risk attracting unwelcome attention from regulators and taxation authorities. However, it was unanimously agreed to create an informal knowledge sharing forum, from which might eventually be derived the future specifications of a more formal body.

In the immediate term, towercos should continue to lead their own regulatory dialogues at a local level, engaging with the Communications Infrastructure Regulatory Working Group as a peer-network with which to share regional benchmarks, experiences, questions and answers.

As governments and regulators' awareness of the tower industry increases, so it becomes increasingly important for our industry to manage their perceptions, encouraging a light touch, enabling regulatory environment, and discouraging licensing and taxation regimes that could disincentivise investment.

At the inaugural meeting of the Communications Infrastructure Regulatory Working Group, 10 key objectives were identified:

1. Education of stakeholders

Many regulators have misconceptions about the tower industry and how it relates to MNOs. It can be important to simply re-emphasise that towercos do not own finite resources like

spectrum. Indeed, given regulators' preoccupation with spectrum, towers can almost be an afterthought.

While most regulators are keen to promote passive infrastructure sharing, the emergence of the Tower Industry to professionalise and commercialise infrastructure sharing has caught many regulators off-guard. Many regulatory stakeholders don't understand the pressure on some MNO balance sheets, the urgency to monetise assets, and the potential to release capital to be reinvested in spectrum, network extension and enhancement.

It was also acknowledged that many members of the tower fraternity would also be keen to be educated on best practices in regulatory liaison and compliance.

2. Fair, predictable taxation

Towercos do not utilise finite national resources like spectrum, so they should not be subject to the same levies as MNOs.

The Communications Infrastructure industry calls for taxation to be both fair and, crucially, predictable. Changing, multiple layers of taxation inhibit investment. Some towercos report instances where four or more Federal, State, Municipal or Ministerial Authorities all seek levies and fees for similar activities.

Tax authorities need to understand the capex intensity of the towerco business model, and resultant implications for corporate taxation liabilities, which might best be set out under the towerco's license.

10 key objectives of the Communications Infrastructure Regulatory Working Group

1. Education of stakeholders
2. Fair, predictable taxation
3. Where licensing is necessary, the regime should be fair and clear
4. Ease rights of way and accelerating permitting
5. Encourage, rather than mandate, infrastructure sharing
6. Ease concerns about competition
7. Encourage foreign direct investment
8. Help deploy and secure critical national infrastructure
9. Seek access to government land and structures
10. Facilitate universal service

3. Where licensing is necessary, the regime should be fair and clear

While a good example of a less formally regulated tower market comes from India, where towercos are registered as IP1s, most (but not all) industry participants feel towercos should be formally licensed. Holding a license exposes towercos to less capriciousness, while investors like the certainty of regulated businesses. The preference that towercos be licensed assumed that the licensing regime was fair, clearly understood, and restricted regulators' commercial interventions to dispute resolution, as opposed to having direct influence on lease rates.

It was also noted that a robust licensing regime would function to qualify the financial and technical credentials of towercos.

The prevailing view was that every country would eventually have a towerco licensing regime, so it would be better to get out ahead of the creation of that regime and lobby for it to take a form the industry recognises.

Another critical regulatory dialogue concerning licensing is the call to futureproof the regime, enabling towercos to move beyond the efficient sharing of passive infrastructure to provide similar efficiencies in the deployment and sharing of microcells, small cells and other alternate site typologies.

4. Ease rights of way and accelerating permitting

A key goal of the Communications Infrastructure Regulatory Working Group will be to ease rights of way for all communications infrastructure, and to accelerate permitting. Such easements should apply as much to the deployment of fibre and small cells as to macro towers and rooftops. The optimal regime may be a time bound strategy, such as the 'shot clock' exemplified in the US and Brazilian tower markets, mirrored in India.

5. Encourage, rather than mandate, infrastructure sharing

In general, infrastructure sharing has been a subject for positive dialogue with regulators, as it's something most want to see happen.

The prevailing view remains that infrastructure sharing is best encouraged rather than mandated. In many cases, infrastructure sharing regulations are drafted, but not enforced until towercos enter a market.

6. Ease concerns about competition

The requirement to engender competition between multiple towercos seems to depend very much on market circumstances. Governments can become concerned competition, particularly in markets where one towerco owns the majority of towers, or where consolidation among towercos could have the same result. It should be noted

that regulators in many countries recognise the merits of a "regulated monopoly", appreciating the inherent efficiency of shared rather than parallel infrastructure.

7. Encourage foreign direct investment

Towercos report that local ownership requirements, often designed for MNOs but 'cut and paste' to apply to towercos, can be a serious impediment to investment – indeed a 51% local ownership requirement is a red flag for most international towercos.

8. Help deploy and secure critical national infrastructure

There is increasing concern about the security of critical national infrastructure – towercos are ideally placed to guarantee the cost-effective and speedy rollout and reliability of security and public safety networks, without need to access the active networks themselves.

9. Seek access to government land and structures

In an effort to accelerate the deployment of critical national infrastructure, several countries have made available government portfolios of land and structures, including for example post offices, the rooftops of Federal and State government buildings, National electricity transmission and transport sites and structures, even defence land and selected military structures. Expediting the availability of such sites, at a fair prescribed rate, can create a new

revenue stream for government, while accelerating communications infrastructure rollout and improving quality of service both for government employees and citizens living nearby.

10. Facilitate universal service

Where towercos are required to contribute to Universal Service Funds, they should be allowed to access those funds, and due consideration should be given to subsidising cell site opex, not just capex, in certain scenarios.

Preliminary resolutions of the Communications Infrastructure Working Group

In addition to highlighting the aforementioned ten key objectives, the conclusions of the inaugural meeting of the Communications Infrastructure Working Group were that:

- The Communications Infrastructure Working Group remain an informal knowledge forum, as

opposed to a formal, Global Association
- The Working Group meet quarterly at each regional TowerXchange Meetup, with international dial in facilities for representatives unable to travel
- The Working Group shall continue to leverage TowerXchange as a central repository and mechanism for the dissemination of resolutions
- Every towerco should be invited to nominate a point of contact for the Working Group

To nominate your representative for the Communications Infrastructure Working Group, please email **kosmotherly@towerxchange.com**.

The next meeting of the Communications Infrastructure Working Group will take place on **December 12 at the 4th Annual TowerXchange Meetup Asia**, hosted at the Marina Bay Sands, Singapore. International dial in facilities will be made available to Communications Infrastructure Working Group members, although in-person attendance is recommended ■

Proposal to broaden scope beyond towers

Subsequent to the inaugural meeting of the Communications Infrastructure Working Group, we have been approached by representatives of the Small Cell Forum, indicating that their members share many common regulatory and deployment challenges with the tower industry.

An agenda item at our next working group meeting will be whether to gradually open the Communications Infrastructure Regulatory Working Group beyond towercos to include other neutral host network providers, such as distributed (or small cell) network operator and fibrecos ■

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Vinson & Elkins RLLP

Vinson & Elkins is one of the oldest and largest international law firms, with approximately 700 lawyers located in 16 offices around the world.

Our global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure transactions. We have significant industry experience, advising on telecoms transactions in numerous countries, including across Africa and the Middle East. 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 and service level arrangements; and have played a prominent role in complex fibre transactions.

www.velaw.com

Exhibitor:

Abloy Oy

Abloy Oy is one of the leading manufacturers of locks, locking systems and architectural hardware and the world's leading developer of products in the field of electromechanical locking

technology.

Experienced Partner

Abloy Oy has a proven history of telecommunication business for decades. Along with the new technology Abloy has introduced new methods and systems to create value and fast pay-back time to customers. Abloy operates in all continents and several telecom customers have chosen ABLOY solutions to be leaders in fast developing telecommunication world.

www.abloy.com

Exhibitor:

Ascot Industrial

HYBRID GENERATORS DESIGNED FOR TELECOM or TOWER OPERATORS that want to enter into a multi-tenancy agreement – CAPEX & OPEX PACKAGE from 5 to 40 KVA load. More than 30 years of experience in the power sector and 34000 installations in the Telecom Market, make Ascot Industrial leader in Africa, Middle East and Asia for tailor made solution to meet customer needs. A real modular, flexible, scalable and plug & play solution is designed by engineers to guarantee cost-effectiveness too.

Portfolio of products
- High Efficiency Diesel AC Generators from 5 to KVA
- Variable Speed and Scalable DC Generators from 5 to 60 KW
- Full Hybrid Solution (DGS+BATTERY+ PV PLUG & PLAY)

www.ascotinternational.com/hybrid-generators/

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.

www.enatelenergy.com

Exhibitor:

EnerSys

EnerSys® is the global leader in stored energy solutions for industrial applications. We complement our extensive line of motive power, reserve power and specialty products with a full range of integrated services and systems. With sales and service locations throughout the world. Headquartered in the United States, with regional headquarters in Europe and Asia, EnerSys employs over nine thousand people and operates 32 manufacturing and assembly facilities world-wide. This vast infrastructure and over 100 years of battery experience positions EnerSys at the forefront of both manufacturing capabilities and new product development.

www.enersys.com/GlobalLanding.aspx

Exhibitor:

FG Wilson

For 50 years, FG Wilson has been a leading manufacturer of diesel and gas generator sets from 6.8 to 2,500 kVA and beyond. Since 1990 alone, we have installed 600,000 generator sets, supported by over 300 distributors, offering world-class levels

of service from product selection to installation and lifetime support. With products specifically designed to meet the needs of the telecoms sector and backed by out expert local dealer support, FG Wilson is the brand providers all over the world have been turning to for trusted and reliable remote power supply, even in the most remote and harsh environments.

www.fgwilson.com

Exhibitor:

Flexenclosure

Flexenclosure is a designer and manufacturer of intelligent power management systems and prefabricated data centre buildings for the ICT industry. The company provides systems that are fully integrated, modular, factory tested for reliability, adaptable to local conditions and quick to install. eSite is a hybrid power system for off-grid and bad-grid cell sites that delivers 24/7 network uptime and diesel-related cost savings of up to 90%. eSite is an integrated single cabinet system for maximum reliability and speed of installation. eManager, an all-in-one toolbox for site power infrastructure management including remote monitoring, power optimisation, KPI reporting and site logistics, is an integral part of eSite.

www.flexenclosure.com

Exhibitor:

Generator Logic

Generator Logic is an innovative manufacturer of custom-built generators that provide power solutions to a wide variety of industries worldwide. For the past decade, Generator Logic has concentrated its efforts in providing power solutions which are specific to the client's industry and are built taking into consideration the often harsh environments in which the industries operate in Africa. Recent innovations include our Hybrid generator incorporating the AC generator, rectifier system and battery bank in a single theft resistant "cube" ; with

an optional add-on of Solar banks. **www.genlogic.co.za** Offices in South Africa, Tanzania and Mauritius.

Exhibitor:

GNB® Industrial Power – A division of Exide Technologies

GNB® Industrial Power – A division of Exide Technologies, one of the world's largest producers and recyclers of lead-acid batteries. The company's four global business groups ¬– Transportation Americas, Transportation Europe and Rest of World, Industrial Energy Americas, and Industrial Energy Europe and Rest of World – provide a comprehensive range of stored electrical energy products and services for industrial and transportation applications.
Transportation markets include original equipment, aftermarket automotive, heavy-duty truck, agricultural and marine applications, and new technologies for hybrid vehicles. Industrial markets include network power applications such as telecommunications systems, electric utilities, railroads, photovoltaics, uninterruptible power supplies (UPSs), and motive-power applications including lift trucks, mining and other commercial vehicles.

www.gnb.com

Exhibitor:

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 and Yuasa. At US$3.5B in sales, GS Yuasa is one of the worlds largest battery manufacturers.

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

Exhibitor:

Hetrogenous, Inc.

Hetrogenous is an Intelligent Industrial IoT Platform that offers powerful hardware and software products to help operators and service providers of all sizes to leverage the power of the "Always On" Internet. We partner with clients to help them tap into the "Internet of Things" by introducing new and powerful applications to expand their user base, access new markets, and improve customer experience. As a sensor and radio agnostic platform, we can help acquire data from any source, over any network, and aggregate it in the cloud with context, to power analytics and bi-directional decision support for remote assets.

www.hetrogenous.com

Exhibitor:

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

2017 exhibitors

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

Exhibitor:

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 Asia. Employing a dynamic team and personal approach, we've grown rapidly since our inception in 2007 and are now operational in twenty countries: Afghanistan, Algeria, Burkina Faso, Cameroon, Chad, Congo, DR Congo, Ethiopia, Ghana, Iran, Kenya, KSA, Lebanon, Myanmar, Niger, Nigeria, Pakistan, Tanzania, 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 6,000 sites for Africa's largest MNOs and all 4 towercos.

www.ieng-group.com

Exhibitor:

Infozech

Infozech is IOT based cost optimization and revenue management solution provider for telecom infrastructure providers and operators since 1999.Infozech's iTower Product Suite helps tower companies with Asset, Billing (Infrastructure & Energy), Site uptime and Energy Management with Analytics powered approach. Infozech's Analytics Product Suite enable consumers with meaningful insights for smarter decisions. We believe that "Data is itself a cost till it is associated to analytics to get actionable insights".

Infozech manages over 100,000 tower sites, tracking over 42 Million litres of fuel per year, reconciling bills worth USD 23 Million, reconciling 700,000 Assets for customers across multiple geographies.

www.infozech.com

Exhibitor:

IT-Development (ITD)

IT-Development (ITD) provides Mobile Network Operators (MNOs) with an innovative end-to-end solution to efficiently manage network rollouts and operations.

We have 12,000 daily users across 20 countries. #MakeTheEverydayBetter summarizes our philosophy to keep ITD products easy to use. Our flagship is ClickOnSite, a SaaS tool specialised in site rollout (project management) and site maintenance (asset management, trouble ticketing, work orders), with remote monitoring capabilities under development.

ITD aims to be the #1 provider of software for managing site rollouts and operations to MNOs in Europe, Africa, Middle East and SE Asia, and become a significant player in the towerco community.

https://en.it-development.com

Exhibitor:

Jag Rattan Daan Singh & Co

Headquartered in New Delhi, India, Jag Rattan Daan Singh & Co., (JRDC) has been a leading manufacturer of full-range of telescopic mobile towers (COW) in India for more than a decade. We design and develop COWs/RDU's that can be readily deployed both in urban and rural areas. Our product range starts from 18 meters to 45 meters COW. Through continuous innovation and absolute workmanship, the company has established itself as a recognized manufacturer and exporter

of telescopic towers which includes COW and RDU in the telecommunication industry.

With a vision to deliver high-quality products using cutting-edge technology, JRDC has carved a niche for itself in developing and designing "COW' in India and abroad.

www.jrdcup.com/

Exhibitor:

KIRLOSKAR OIL ENGINES LIMITED

The Kirloskar Legacy stands for a tradition of excellence for more than a century now. A personification of patronizing values and visionary goals, the name 'Kirloskar' is engraved on numerous nation-building milestones. Incorporated in 1946, KOEL is the flagship company of the Kirloskar group. We have four state-of-the-art manufacturing units in India that offer world-class service. The company has a sizable presence in international markets, with offices in Dubai, South Africa, and Kenya, and representatives in Indonesia and Nigeria. KOEL also has a strong distribution network throughout the Middle East and Africa.

Today KOEL is an acknowledged leader in the manufacturing of diesel engines, agricultural pumpsets, power tillers and generating sets.

http://koel.kirloskar.com/

Exhibitor:

Metalogalva

Metalogalva is a Portuguese steel manufacturing company with more than 43 years of activity in fields of Energy, Communication, Transport, Lighting, Renewables and Steel protection (hot dip galvanizing and painting). Has three industrial units (total area of 44000m² and a total gross area of 160000m²), with a galvanizing capacity (per year) of 100000 tons.

2017 exhibitors

Metalogalva exports 70% of its own manufacturing for more than 40 different countries. Has invested (6.6M€) 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.

www.metalogalva.pt

Exhibitor:

MTS–Mitas Telecom Systems Inc.

MTS MITAS TELECOM SYSTEMS INC. A WORLD-RENOWNED BRAND IN FABRICATION OF HOT DIP GALVANIZED TELECOM TOWERS…Based in Ankara Turkey, MITAS is a leading manufacturer of galvanized lattice and monopole telecom towers as well as wind measurement towers, wind tirbune towers and radar towers. Mitas has three plants in Turkey recruiting 1500 people with an annual steel processing capacity of 120,000 tons. The number of telecommunication towers delivered by Mitas has passed beyond 40,000 pcs in 136 countries. Visit us in TowerXchange Meetup 2017 to discover the unique solutions to steel infrastructure elements tailored for future's telecommucation industry needs.

www.mitastelecom.com

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 for telecom towers 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 7 countries namely, Côte d'Ivoire, Ghana, Burkina Faso, Benin, Kenya, Uganda and Tanzania. 4,555 sites are under NETIS Passive and Active maintenance management, in 5 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 Fiber Optic division delivers full turnkey projects from marketing survey to low-level design, network construction, equipment installation and maintenance. At NETIS we strongly believe in partnership, the best way leading to success!

www.netisgroup.net

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 new innovative products including NorthStar ACE™; the future of energy storage management!

www.northstarbattery.com

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

Exhibitor:

PRAMAC

PRAMAC is an Italy-based company engaged in the manufacturing of power generators and material handling equipment. The Company divides its activities into two main business sectors:

POWER - In the field of power generation PRAMAC offers solutions for every kind of power demand: from the portable

to the industrial power supply both for stand-by and prime power applications. **MHE-** The Company develops, manufacture and sells a complete range of handling equipment aiming at satisfying customers' requests and needs.

PRAMAC has four production plants in Italy, Spain, China and Brazil. It operates worldwide through a global distribution network of subsidiaries.

www.pramac.com

Exhibitor:

Redflow

Redflow Limited is an energy storage specialist that has developed the world's smallest flow batteries. Redflow's unique flow batteries are designed for stationary energy storage applications ranging from its ZCell home battery to its ZBM battery range for commercial, telecommunications and grid-scale deployment.

Redflow is a publicly-listed company (ASX: RFX) that operates R&D facilities in Australia, as well as offices in the US and Europe.Produced in North America by Flex, one of the world's largest supply chain solution companies, Redflow's high energy density batteries are sold, installed and maintained by a global network of system integrators. Redflow batteries connect directly to the telco bus, experience no damage from regular power outages, are 100% depth of discharge and their full capacity is usable over lifetime.

www.redflow.com

Exhibitor:

Saft

Saft backup solutions range from 30 seconds to a whole day. Saft backup batteries for telecom equipment suppliers and network operators ensure continuity of customer service. Since

more than one decade Saft's portfolio meet telecom energy needs everywhere in very hot or cold climates, urban settings or remote, hard-to-access locations.

For low network stability we can offer a solution with good cycling capabilities and good chargeability. Where network stability is high, we have solutions with float charging and a long service life.

Lithium-ion technology offers significant advantages at extreme temperatures, cycling capability, energy density and zero maintenance.

www.saftbatteries.com

Exhibitor:

SEDEMAC

SEDEMAC Mechatronics is a product innovation company which manufactures wide range of control products like a range of AMF genset controllers, electronic governors and variable speed controls for diesel gensets / engines. SEDEMAC was founded by four technocrats who came together as part of a research group at India's premium engineering institute.What started as a small lab-based enterprise has now grown into India's fastest growing powertrain controls company.Today, SEDEMAC is India's No. 1 in genset controls market and is the preferred choice amongst all the major OEMs in India and supplies/licenses unique control products to the leading manufacturers such as Bajaj, TVS, Hero MotoCorp, Mahindra, Kirloskar, Cummins, Ashok Leyland, TATA Motors etc.

Exhibitor:

Sera4

Sera4 reduces operating costs, theft and vandalism for telcos and towercos with our enterprise-grade TeleporteTM solution for access control. Teleporte shares access securely through a seamless interconnectivity between locks, smartphones,

and network servers, all managed in real-time through a simple-to-use interface or server APIs. Teleporte works with all electromechanical locks and is available in many types of traditional mechanical lock. We bring all locks, regardless of type, onto a single network and integrate with existing site management and NOCs.

Data security is at the core of what we create. Ask us how we mitigate against all traditional IoT hacking risks.

www.sera4.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 is able to provide a very compact power generation system that does not generate harmful emissions, noise or vibrations. At the same time, the power system is a front runner in terms of low maintenance requirements while being environmentally friendly.

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.

www.serenergy.com

Exhibitor:

SKIPPER LIMITED

Skipper Limited established in 1981 is one of the leading companies in the Power Transmission & Distribution and the PVC pipes segment. With over 30 years of domain knowledge it is the largest T&D Structure manufacturer in India and ranks

amongst the Top 10 globally basis. Skipper differentiates its offerings with high quality but cost effective solution for infrastructure providers and telecom operators. The company has eight manufacturing facilities in India and engages in manufacturing of Power Transmission Towers & Poles, Monopoles, Mild Steel and High Tensile Angles, Fasteners, GI / ERW pipes and Solar Mounting Structure. Its international footprint spans across continents such as Latin America, Europe, and Africa and is spread across 20 countries.

www.skipperlimited.com

Exhibitor:

Supra

Supra is a leading manufacturer of key-control and entry-management solutions which eliminate the cost and inconvenience of issuing and tracking physical keys. The Supra TRACcess® system is a secure, and cost-effective real time access control solution, that provides users, keyless entry to remote infrastructure, by using anything else than their smartphone.

Supra operates in 4 continents and several telecom customers like Verizon, AT&T, Rogers, Swisscom, or UPC have chosen the Supra TRACcess® solution. Supra as a global manufacturer, work in close partnership with recognized and well-known VAR's in countries, like Transaction Controls Technologies, our partner in South-Africa, and SADC Region.

www.suprasystems.com

Exhibitor:

TECNOELETTRA

TECNOELETTRA is an Italian Company, globally recognized as high quality manufacturer of controllers and innovative solutions in power supply applications.

TILS is the brand of TECNOELETTRA for Telecom Market.

TILS means Telecom InverterLess System, is a unique complete package composed by Controller, PMG alternator and all components for variable speed system, for Hybridize your generator or BTS directly.

TILS is your answer if you want to:
- Hybridize your existing BTS without huge investments and using the existing generator
- Build a Smart Hybrid generator
- Have a real remote control and vision of your fleet

We are your partner if you want to save money in terms of green energy, maintenance and fuel.

BE DIFFERENT

www.tecnoelettra.it

Exhibitor:

TOTAL

Total is the world's fourth-ranked oil and gas company and a global leader in solar energy through our affiliate SunPower. With operations in more than 130 countries, we have 100,000 employees who are committed to better energy. Supplying affordable energy to a growing population, addressing climate change and meeting new customer expectations are the three main challenges Total must meet as an energy major.

www.total.com

Exhibitor:

TSS

TSS the solid partner to energize your operation. At TSS you'll benefit from the world's most concentrated resources of stand-alone solar- & hybrid-energy expertise, in markets as Telecom, Oil & Gas and Rural electrification, with over 15 years of experience in research, design, consultancy, sales and implementation. We serve our customers via offices in The Netherlands (HQ-Europe), United Arab Emirates (MEA) and Malaysia (Asia).

World's most solid solar & hybrid systems. Your installations are remote and off-grid and face extreme conditions. That is why they need a solid solar or hybrid energy system. Based on your needs and your unique circumstances TSS will design such a system for you. We'll keep you going.

www.tss4u.nl

Exhibitor:

ZHU HAI COSLIGHT BATTERY CO., LTD

Zhu Hai Coslight focus on Li-ion pouch battery, Li-ion Prismatic EV etc. We are listed as worldwide TOP 5 polymer cell manufacture. The factory cover an area of over 160,000^{m2} with over 5000 staffs. Total capacity is over 4 billion Wh/year, The present and in planning manufacture facility is fully automation.

Zhuhai Coslight's mainstream MP NCM EV cell can achieve >3000 cycle life with ~200Wh/kg gravimetric energy den sity, further increased to 255 Wh/kg by the end of 2017 through new chemistry introduction. A long term R&D strategy is steadily pushing forward and targets 300Wh/kg energy density by 2020.

www.cncoslight.com/zhdc/zhdc.asp

2017 exhibitors

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.

All of our staff have held profit-accountable positions with global telecommunications carriers, manufacturers and systems integration houses prior to joining us. This allows full support of clients across the continuum from technology through to market effectiveness, spanning engineering, commercial strategy, financial structuring and proven operating methodologies.

www.telecoms.net

SENTECH

SENTECH, a South African State Owned Company (SOC) is the premier provider of electronic communications network services to the country's broadcasting and communications industry.

We provide broadcast transmission services to SABC, eTV, MNet, Community Broadcasters, and over 150 Radio Stations country wide daily.

Our infrastructure and data communications platforms also provide services to South Africa's telecoms sector and mobile providers.

SENTECH fulfilled its mandate by concluding its DTT infrastructure installation process of the 178 transmitter stations nationwide and a Direct-To-Home (DTH) broadcasting infrastructure to ensure 100% DTT access for South African citizens.

The migration from analogue to digital television presents more opportunities for broadcasters in terms of content proliferation and affords South African audiences, a wider range of higher quality television channels.

www.sentech.co.za

TowerShield™

TowerShieldTM is an unique upgrading solution for existing and new build towers. TowerShieldTM is the first solution to use shape factor to reduce wind load on the tower, enabling almost unlimited capacity for new antennas. Reduced wind load diminish the need of upgrading the tower and foundation!

The TowerShieldTM is an invention by GSM Towers, a Norwegian tower supplier offering its own optimized designs for tower, capacity controls of existing structures, and energy solutions on three continents. GSM Towers provides a wide range of in-house engineered tower models tailored to local requirements as well as a full range of accessories.

www.towershields.com/

Tower Xchange

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Asia 2018
4-5 December, Singapore

Meetup Africa & ME 2018
9-10 October, Johannesburg

www.towerxchange.com

Tower ◆ Xchange

6th Annual TowerXchange
Meetup Africa & Middle East

9-10 October 2018,
Sandton Convention Centre, Johannesburg

www.towerxchange.com/meetup/meetup-africa/

Don't miss:

- Keynote panels and interviews from the sectors most forward looking players
- 40+ interactive roundtables connecting you with peers and partners on the subjects that matter most
- Closed door buyer briefings: invite only sessions for MNOs and towercos to explain their procurement needs
- Dedicated ESCO sessions: Focussed content and networking as the model gathers momentum
- 50+ exhibitors showcasing the latest innovations
- Towerco regulatory group meeting to tackle the threats and challenges facing the sector

Gold sponsor:
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ELTEK A Delta Group Company

Bronze sponsors:
ATLAS TOWER
ENERGY VISION
IPT PowerTech
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Vinson&Elkins Established 1917

TowerXchange Meetup Africa & ME 2018 exhibition preview

Enjoying a highly productive event event, two thirds of 2017's sponsors and exhibitors rebooked their participation for 2018 onsite. Here we take a deep dive into some of the viewpoints and offerings of just some of the exhibitors that you can look forward to meeting in 2018.

A flexible solution for access control in the Middle East and Africa

Abloy's PROTEC2 CLIQ system combines the benefits of electromechanical and mechanical solutions

Abloys high security mechanical locks and keys are widely used to secure cell sites across the MEA region. There is a smooth product progression path, without wasting the original investment, to Abloy's electromechanical PROTEC2 CLIQ solution. This is supplemented by CLIQ CONNECT, which manages full access rights and provides an audit trail.

Keywords: Abloy, Access Control, Africa, Africa & ME, Monitoring & Management, Site Surveys, Urban vs Rural, Who's Who

Read this article to learn:

- Abloy's history and footprint in Africa and the Middle East
- How security requirements vary across the region and between customers
- Urban compared to rural sites and their specific risks
- The award-winning Abloy CLIQ Connect and other top range products

TowerXchange: Please tell us about Abloy's activities in Africa and the Middle East. Which countries are you active in?

David Knight, Area Director, Africa, Abloy: Abloy provides high security locking systems to the telecoms market in Africa. We provide solutions that can combine electromechanical systems and mechanical systems. This means most clients start with the Abloy high security mechanical locks and keys. The keys cannot be duplicated and can be set onto a master keying system. This system is extremely effective in sites which are shared. A case in point is in South Africa where most sites are shared between five telecom companies. Everyone's key can open the main gate and then only opens their own equipment (BTS or BBS). This method gives the client a cost advantage as when upgrading to an electromechanical system their previous investments would not be wasted, and can be used in the electromechanical system. Abloy is active in most countries in the Middle East and in the majority of Sub-Saharan countries, namely, SADC countries, East Africa (Kenya, Tanzania, Uganda and Ethiopia) and West Africa (Nigeria, Ghana, Democratic Republic of Congo and Congo).

TowerXchange: Who are your main clients? And how does the demand change between operators and towercos?

David Knight, Area Director, Africa, Abloy: Our clients are mobile network operators and the tower companies. There is a huge demand from

the operators who require site efficiency and long term solutions. There is a growing trend where there is a need for an integrated solution within the sites. Over the last couple of years, with the towercos purchasing, and taking over operators' towers, the demand has certainly moved towards the towercos. The "big 4" towerco companies, IHS, Eaton Towers, ATC and Helios are certainly the main players, however, the operators still have a clear presence in the Sub-Saharan region.

TowerXchange: How does the demand for security solutions differ between different countries across the MEA region?

David Knight, Area Director, Africa, Abloy: In certain countries there is a high demand for security. There are two types of scenarios; first, there is a need for controlling access into our clients' infrastructure, such as the base station sites. Our solution gives the client the ability to determine who actually has entered a site. The second scenario deals with re-enforcing security. In most cases this means the Abloy solution must provide stronger locks which cannot be easily cut. We have also cooperated with cabinet manufacturers to create integrated cabinet locking solutions.

TowerXchange: How do you find security issues vary between rural and urban areas?

David Knight, Area Director, Africa, Abloy: The security issues between the rural and urban

sites differ greatly. We have realised that there is a higher theft in rural areas than urban areas. Rural area sites are generator driven, as opposed to direct electricity in the urban areas, therefore a continuous supply of diesel is required. The theft of diesel is a major headache for the towercos and operators. Due to the fact that the rural sites are generally outside of a populated area, anything of value is vulnerable to theft. In these areas, where thieves have more time on their hands, the demand for re-enforcing security is more prominent than controlling access.

TowerXchange: How does your product differ from others in the market?

David Knight, Area Director, Africa, Abloy: We are an established global company with 110 year track record in protecting critical infrastructure. Our PROTEC2 CLIQ is a proven solution with over 1000 customers worldwide, 500,000 cylinders and 500,000 keys already delivered and in use.

We are also the only company who has introduced a product progression plan. This means clients can install a mechanical solution with the intention of upgrading these products to electromechanical products.

PROTEC2 CLIQ is the only product in the market where one solution combines the benefits of electromechanical and mechanical solutions. The **CLIQ CONNECT** feature provides access rights and logs audit trail in any situation, whether you are

> We are also the only company who has introduced a product progression plan. This means clients can install a mechanical solution with the intention of upgrading these products to electromechanical products

working at an online or offline location. Not only is it a highly advanced electronic key controlling system, but as an extra level of security, we have the **ABLOY PROTEC2** mechanical platform backup. So, if ever your electronic system is compromised your assets remain secure with the mechanical platform backup.

We are also able to provide a complete solution from padlocks and cylinders to door closers and electric locks to secure and protect our clients' facilities, infrastructure and assets ∎

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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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 know when the vendor has arrived, what he has done, whether the problem is fixed and when he has left the site. NOC operations need to rely solely on the vendors assertions

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

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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 ■

South Africa's fastest growing towerco eyes up new opportunities

How Atlas Tower plans to continue innovating and expanding

Nate Foster, CEO, Atlas Tower

Winners of the 2016 TowerXchange Industry Award for best build to suit towerco, Atlas Tower have continued their impressive growth throughout 2017. At the time of the 2016 awards and Meetup their tower count was 160 sites, by the 2017 Meetup this will be 372. TowerXchange speak with Atlas Tower's CEO, Nate Foster to learn more about the company's impressive organic growth and understand their vision for the future.

Keywords: Africa, Atlas Tower, Build-to-Suit, C-Level Perspective, Masts & Towers, Multi-Region, Network Rollout, South Africa, Tower Count, Towercos, Who's who

Read this article to learn:

- Atlas Tower's growth in the South African market since it commenced operations
- The company's culture and strengths and how these translate into business
- Key challenges in the South African market
- Atlas's plans for expansion into other countries
- The company's long term vision

TowerXchange: Please can you introduce Atlas Tower to TowerXchange readers.

Nate Foster, CEO, Atlas Tower: Atlas Tower started operations in the US in 2007 and expanded into Africa in 2014. We have owned and operated over 500 communication towers worldwide. Currently, we are the fastest growing tower company in South Africa, with more than a 3000% increase year on year over the past three years.

We are midsize, manager-owned company that facilitates nimble operations and simple office processes. This results in high speed tower development. We use thoughtful and strategic siting methodologies, coupled with a quick lease process to turn a dot into a structurally sound tower in record time. We hire the grittiest professionals in the market and offer a dynamic work environment where people are free to be creative and successful.

TowerXchange: Atlas Tower have grown rapidly in South Africa, what do you think has been the secret behind this success?

Nate Foster, CEO, Atlas Tower: We strive to be more aggressive and innovative. The MNOs need the best networks, at record speeds to compete for subscribers. We understand this need and run a little faster building infrastructure quickly.

TowerXchange: As densification of urban networks becomes increasingly important in South Africa, what role do Atlas see themselves

(and other parties) playing in supporting this through the deployment of HetNet solutions?

Nate Foster, CEO, Atlas Tower: We have already built what we consider to be "small cells"; 10-15m smart sites in ultra-urban locations. Although this percentage of our portfolio will grow, we remain more focused on the macrosites that are still needed for 2G and 3G growth. Our long term, portfolio diversification and asset creativity is key to revenue diversification and cash flow stability.

TowerXchange: What do you see as some of the biggest challenges that towercos are experiencing in the South African market at the moment?

Nate Foster, CEO, Atlas Tower: Land values are increasing whilst ARPU is decreasing. This is creating board level pressure on opex in all of our markets. We are seeing a constriction in cash flow for single tenants, and therefore, our cash flow success relies more and more on fast lease up rates and same tenant- same tower cash flow levels.

TowerXchange: What does Atlas have planned in terms of geographic expansion and what kind of business model do you foresee in such markets?

Nate Foster, CEO, Atlas Tower: We've looked at most African markets and will say confidently, we are investing in other countries and will be developing small portfolios worthy of disclosure soon. We know this business as well as anyone and feel that our
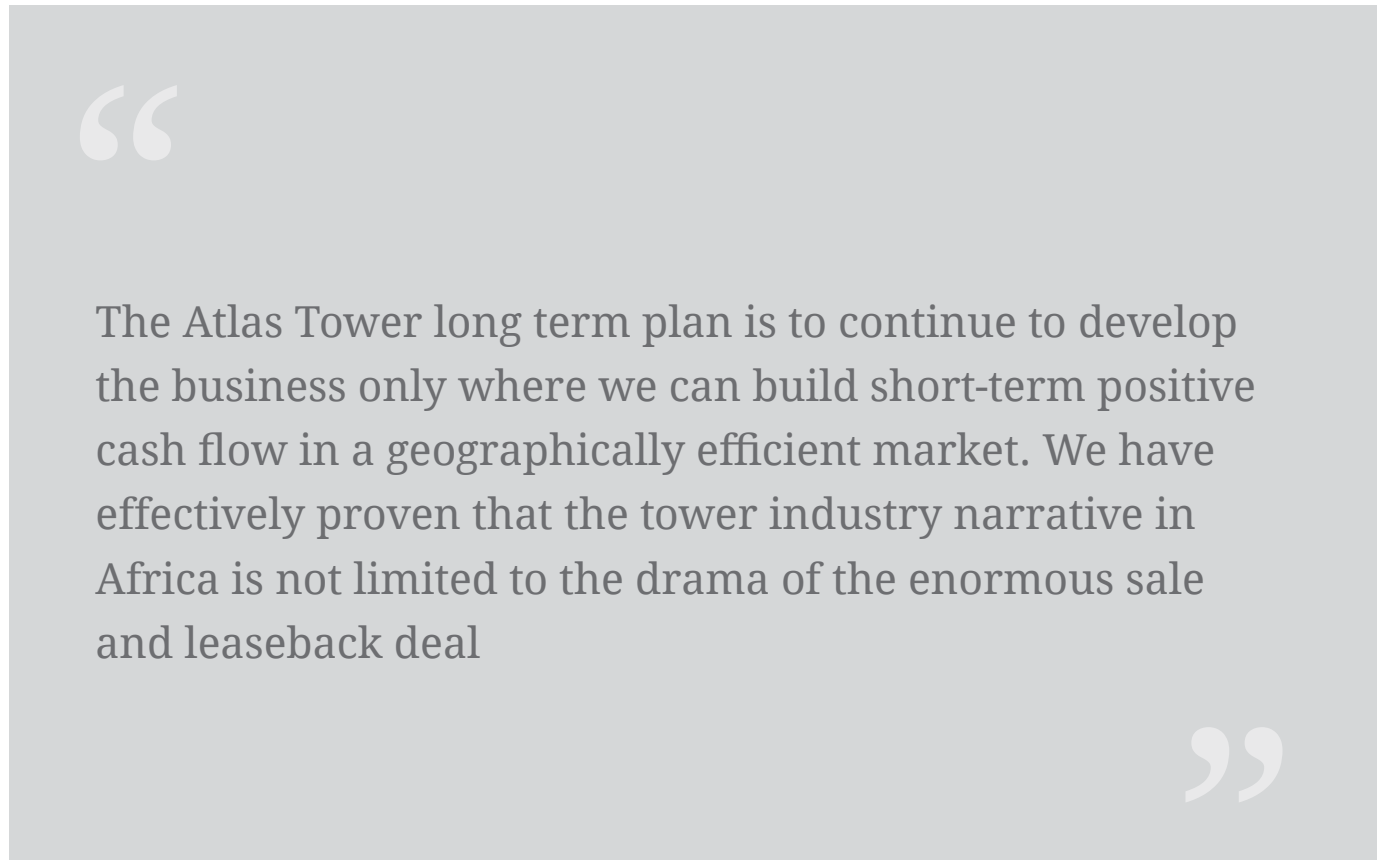
> " The Atlas Tower long term plan is to continue to develop the business only where we can build short-term positive cash flow in a geographically efficient market. We have effectively proven that the tower industry narrative in Africa is not limited to the drama of the enormous sale and leaseback deal "

organic build model will work in selective African Markets.

TowerXchange: What is Atlas Tower's long term vision for the company? Do you foresee yourselves participating in tower transactions? Do you foresee yourselves as having a large pan-African footprint? Is there a roadmap towards a sale?

Nate Foster, CEO, Atlas Tower: We sometimes buy towers or smaller tower cos. This however, is not our core value, but rather a strategic add on. As far as sale leaseback transactions, we can offer a unique solution to the seller and a strong local option for a selling MNO.

The Atlas Tower long term plan is to continue to develop the business only where we can build short-term positive cash flow in a geographically efficient market. We have effectively proven that the tower industry narrative in Africa is not limited to the drama of the enormous sale and leaseback deal. ∎

Ausonia: the Italian (r)evolution of energy solutions

Ausonia explain their switch from capex-only to offering a full opex solution to the market

Massimo Ombra, CEO, Ausonia

As towercos consolidate their portfolios and search for proven power solutions which fit with their need to reduce opex, Ausonia talk us through their long history in the market and how they developed both capex and full opex offering to enable them to deliver power solutions worldwide. Drawing on over 80 years of R&D experience, Ausonia's hybrid solutions are proving successful for both towercos and MNOs.

Keywords: Ausonia, South America, Central America, Batteries, Energy, Energy Efficiency, Energy Storage, ESCOs, Fuel Security, Hybrid Power, Installation, O&M, Opex Reduction, Site Visits, Unreliable Grid, Who's Who

Read this article to learn:

- How Ausonia has grown in the tower industry
- The driving factors fueling their growth in telecom towers
- The importance of flexibility when developing solutions for clients
- How high efficiency solutions can reduce opex costs and O&M demands

TowerXchange: Please introduce Ausonia – where do you fit in the telecoms infrastructure ecosystem? How did you get started in this business?

Massimo Ombra, CEO, Ausonia: Ausonia has a very long history, we were the first company to produce diesel generators in Italy, starting our activities in 1932 thanks to the efforts of my grandfather. We are still a family company today and following the management of my grandfather and my father, I have now the role to lead and manage the company, keeping client satisfaction as our main priority.

Since the outset, we have continuously invested into R&D activities and we expanded our product portfolio to meet all the specific needs of our customers, who come from many different industries and countries, and who always need tailored products. Thanks to this, over the years we provided power solutions to critical sectors such as telecoms, oil & gas, defence, healthcare and many others. Specifically for the telecoms market, we provide different kinds of gensets for powering Base Transceiver Stations, BSC/MSC, data centres – all kinds of cell sites, as well as mobile power units for energy recovery and no-break power systems for TOC sites. More recently, we added into our portfolio High Efficiency Power Units dedicated to remote areas and off grid, BTS power supply applications. With such wide flexibility, we can definitively say that Ausonia is not only a product manufacturer, but it's also a solution maker.

TowerXchange: How has Ausonia grown in the tower market and what has fuelled that growth?

Massimo Ombra, CEO, Ausonia: Ausonia entered the tower market through the supply of power units to MNOs and towercos on a pure capex model basis. After many years of experience in this industry with this business model approach, in 2003 we got the opportunity to enter into a big challenge which definitively changed our way of approaching the telecoms market. That was when we were awarded a contract by Vodafone Italy for the supply of energy to their off-grid BTS sites in Italy through a full opex business model. This was something new to us, but we structured ourselves in order to give Vodafone the utmost power availability on site and achieve their complete satisfaction for the energy services we had to provide.

We then created our energy service company (MediPower, ndr) and developed a genset model specifically designed around the needs of this activity and able to optimise our operational costs. Since then, we have continuously expanded this business by signing power lease agreements also with TIM, Wind (Vimpelcom) and H3G. Furthermore, in 2010, we have also developed a family of high efficiency diesel gensets solutions dedicated to off grid and bad grid cell sites, in order to further reduce our opex and share this advantage with the telecom operators, enjoying of a continuous growth which has been possible thanks to the high quality standards of our products and the excellent service levels offered to the Italian operators. Today we can say we power almost 85%

of the off grid, base transceiver station BTS sites in Italy. We realised that the solid experience we gained directly from the field could allow us to start offering and replicating the full opex business model also in foreign countries.

TowerXchange: How have you found customer response to Ausonia's solutions in the African market?

Massimo Ombra, CEO, Ausonia: Honestly, very positive and with excellent forecasts for the future. Being very flexible in our offer, going from a pure capex offer to the full opex business model, we can now satisfy different kind of demand for power.

After the testing we directly performed on the sites we service in Italy, today we have a proven technology which has been installed in several

Fuel consumption trends over three years (l/kWh)

— Traditional AC gensets
— Hybrid system where batteries lose efficiency over time
— Ausonia variable speed DC gensets
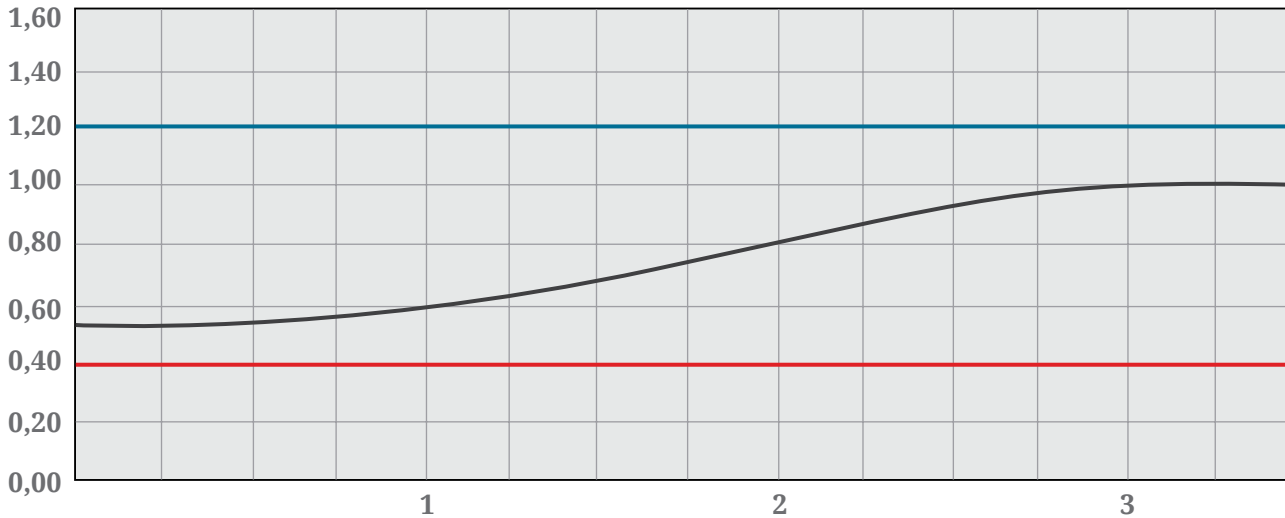
countries with different temperature, humidity and altitude scenarios, guaranteeing extreme reliability and power continuity.

Remember that we are not only a producer of these power solutions, but also first users in performing the Energy as a Service model, so we are perfectly aware of the importance of the reliability of a product, as well as its capability of maintaining unaltered performance over its lifetime. Our customers know this and in recent years they asked us to provide them with our High Efficiency DC gensets, which are based on variable speed DC generator technology we developed internally in Ausonia for the telecom industry. With our units on their sites, our customers

realised that this technology can guarantee them huge opex reductions, both in terms of fuel cost savings and number of maintenance and/or refueling trips to site.

They clearly understood our technology went beyond the typical concept of "hybrid solutions", in which a genset needs to cycle with batteries in order to achieve the desired opex reduction. In fact, we are able to achieve even more savings than the typical hybrid power units available in the market by directly operating our variable speed DC generator, which automatically adjusts the engine speed according to the load existing on site and following the most efficient point of its power curve. All this is done without the necessity

to add deep cycle batteries for CDC operation, and this makes our customers more than happy, especially when they think about their sites located in harsh climatic conditions, where they can eliminate the costs of the batteries and of the ACU needed for the battery cabinet, further reducing both the power and fuel consumption on site.

TowerXchange: In a sector where opex is kept to a minimum, can you talk us through the numbers which make your solution stack up? How does capex and opex compare?

Massimo Ombra, CEO, Ausonia: There are multiple advantages to our high efficiency solutions for powering cell sites. Thanks to the significant reduction in fuel consumption and different capacities of our integrated fuel tank, we can extend the refueling interval of our power units up to three to four months. On top of this, our high efficiency solutions can be configured to have a preventive maintenance interval of up to 2,000 hours, which is more than 80 days and requires only four or five trips to a site per year to perform maintenance activities.

Additionally the systems can be controlled and managed remotely through a web-based dedicated system which can be integrated to the Network Operation Centre (NOC) to track alarms, ticketing and escalation. Moreover, thanks to the scalability of our modular solution, we can deliver systems to power multi-tenant sites, in which each operator can be 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 goes over five years, making it therefore an excellent investment even in preparing short term business plans.

TowerXchange: Do you always work directly with the operator or towerco or do you also work closely with managed service providers in the market as well?

Massimo Ombra, CEO, Ausonia: All these scenarios are possible in this market. We have supplied directly to operators when they owned the passive infrastructure assets, but we have sold our units also to towercos when the sites were on lease. In some other cases, we offered our solutions to local managed service providers who wanted to add a 'plus feature' into their current offers for services. So, I have to say we are totally open to work in all possible directions with any reliable partner, given for us it is mandatory to keep our clients happy - what's best for them is also the best for us! ∎

Tower Xchange

Meetup Europe 2018

17-18 April, London

Meetup Americas 2018

20-21 June, Boca Raton

Meetup Asia 2018

4-5 December, Singapore

Meetup Africa & ME 2018

9-10 October, Johannesburg

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Jet powered microturbine gensets offer a more efficient alternative to traditional DGs

Innovative solution is more cost effective, cleaner, greener, quieter, burns just about any liquid or gas fuel and breaks even compared with DGs after approximately 15 months

Stuart Kelly, Bladon Jets

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 Jet's micro turbine gensets (MTG), we had to find out more! While the MTG is cleaner and quieter than a traditional DG, with almost no maintenance requirements, what makes the MTG particularly interesting to towercos is the fact that they are more efficient and are cleaner and quieter than a similar powered DG. Delivering cleaner and more efficient energy are key business requirements we continuously see from mobile operators and towercos.

Keywords: Africa, Asia, Bladon Jets, Capex, DG Runtime, Energy, Fuel Cell, Hybrid Power, Off-Grid, Opex Reduction, RMS, ROI, Rooftop, Shelters, Site Visits, Skilled Workforces, Solar, Spare Parts, Unreliable Grid, Uptime, Who's Who

Read this article to learn:

- How Bladon Jets harnessed the power of choice at 40,000ft for static power solutions
- The size and weight advantages of MTGs over traditional DGs
- A low maintenance solution: no oil, no water, only one big 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
- Months to breakeven/crossover in different scenarios, compared with traditional DGs

TowerXchange: Where do Bladon Jets fit in the telecoms infrastructure ecosystem?

Stuart Kelly, VP Market Development, Bladon Jets: We have invested considerably in R&D over the last 5 years and perfected the design and manufacture of low cost jet powered microturbine gensets (MTGs). Our MTGs are positioned to replace diesel generators as the primary or backup power solution at cell sites, thanks to our superior performance and reliability. Bladon's MTGs are ultra quiet, clean and green, small and light, which is critical at shared cell sites.

Jet engines aren't new. This is a 70 year old technology, and is the power of choice at 40,000ft. Our secret sauce is not so much a new technology as a manufacturing methodology that enables us to produce microturbines economically in volume. One of our most important manufacturing techniques is a process to cut turbine blades from a single piece of material. Our units are about 30% smaller than a diesel generator, yet they generate the same power. 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 jet engines evolve as a solution for cell sites?

Stuart Kelly, VP Market Development, Bladon Jets: TATA became excited about our micro turbines and invested via Jaguar Land Rover in 2010. The first incarnation was actually in the Jaguar CX75 concept supercar, but the ancillary application of

the technology was for static power solutions for telecoms.

We are finalising our market entry strategy to sell 12kW MTGs into telecoms. For us the towercos, managed service providers and MNOs themselves are all prospective clients.

TowerXchange: Which telecom markets are you targeting and why?

Stuart Kelly, VP Market Development, Bladon Jets: Given the Tata connection, an early market will be India. The continent of Africa is also a key market for Bladon's products. We have conducted field trials in Africa over the last few months and learned valuable feedback from our partners there. Some of our field trial units have been running nonstop for 1000+ hours without ANY filter changes or servicing. 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.

Clean, green and ultra low maintenance makes the MTG most attractive for telecom sites

TowerXchange: Tell us about your solution's maintenance requirements.

Stuart Kelly, VP Market Development, Bladon Jets: Microturbine engines are a low or no maintenance solution. Unlike a diesel reciprocating engine, there is no oil and no liquid coolant in our solution. We have just one moving part, the turbine itself, which runs on air bearings with no liquid lubrication. 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 compelling. Our MTG unit has robust telemetry built in, so you need fewer field engineers as many 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.

TowerXchange: Okay, so what are the advantages of micro jet engines over other alternate energy solutions such as fuel cells or solar?

Stuart Kelly, VP Market Development, Bladon Jets: 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. Let's be honest, green power is not widely used on cell sites. In India for example, eco-friendly cell sites account for less than 1% of the estate, but tower owners still want to migrate away from the reciprocating diesel genset because of the substantial energy and maintenance opex it incurs. We don't see our solution as an

> " 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 "

alternative to a 200sqm PV array; our solution is so much more compact that the use cases differ significantly. Solar isn't the optimum alternate energy solution for all cell sites; even in Africa, sites don't get good quality sunshine all the time, especially in high rise areas with shadows. You can install solar panels on an urban rooftop, and find that six months later the neighboring building has had five floors added! Our solution doesn't succumb to such vagaries. 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 startup issues even if it's left idle for some considerable time between use. 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 Jets: 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 Jets: We go into production later this year. The first run of MTGs have already been ordered, and we've signed distribution agreements already with partners in Africa and India. We'll be manufacturing in the UK, and in Asia soon too, and from the US in due course.

TowerXchange: What is the sweet spot in terms of the load your solutions can support?

Stuart Kelly, VP Market Development, Bladon Jets: Our Bladon MTG12 MTG delivers up to 12kW, with output options 230V AC or 120V AC. We also have a 48V DC output variant that telecom clients tend to like. 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 traditional DGs

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

Stuart Kelly, VP Market Development, Bladon Jets: 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. Another critical consideration is that the MTG can be 25% more efficient as a reciprocating engine when running at part load.

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

Stuart Kelly, VP Market Development, Bladon Jets: 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 Jets from other cell site energy solution providers.

Stuart Kelly, VP Market Development, Bladon Jets: 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

> "We go into production later this year. The first run of MTGs have already been ordered, and we've signed distribution agreements already with partners in Africa and India"

technology in jet engines, 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 ∎

Avoiding common errors in power system design

How Eltek are supporting Africa's MNOs and towercos in optimising energy systems

Eltek are one of the biggest names in energy for telecom applications having installed systems at over 10,000 sites. TowerXchange caught up with Eltek's Managing Director of MEA, Miloud Abdelilah to get his take on where system design falls down and understand the role that Eltek is playing to improve cell site energy systems.

Keywords: Africa, Africa & ME, Batteries, Eltek, Energy, Energy Efficiency, Energy Storage, Hybrid Power, Lithium, MNOs, Microgeneration, Monitoring & Management, O&M, Outdoor Equipment, Rectifiers, Renewables, Solar, Who's Who

Miloud Abdelilah, Managing Director, EMEA, Eltek

Read this article to learn:
- How extensively Eltek's solutions have been deployed in the field
- Why many power systems are sub-optimal and what is the root cause of problems
- Key trends Eltek is observing in technology selection and site design
- What differentiates Eltek from its peers
- How Eltek is responding to changes in the market

TowerXchange: Please can you reintroduce Eltek to TowerXchange's readers, how extensively have your solutions been deployed in the African & Middle Eastern market?

Miloud Abdelilah, Managing Director, EMEA, Eltek: Eltek has deployed more than 2000 Solar Autonomous Power Solutions and more than 5000 Hybrid Power Solutions for telecom operators and towercos in Africa and the Middle East.

TowerXchange: In terms of macro sites in poor or off-grid areas, what do you see as the common mistakes that are made in designing, commissioning and operating power equipment and what impact does this have on uptime and ROI?

Miloud Abdelilah, Managing Director, EMEA, Eltek: Still many sites are operating on diesel generators 24/7 with all the negative impacts such as service cost, CO_2 emissions and noise pollution. Some are using cyclic modes which are better but still this kind of solution remains far from the optimal solution as solar hybrid type of solution. Although it is the best solution so far, it still requires some attention in terms of site optimisation. Operators should work closely with power experts to design the most optimal solution in terms of cost of the solution, ROI and impact on the environment. Together, we can come out with an appropriate design matching the operator's requirements. Many installed sites are having serious issues due to the "wrong" design due to the lack of clear requirements from the operator, under-design from

> "In terms of trends that we are seeing, one key one is the use of outdoor type solutions and we are also seeing some towercos now going for Lithium batteries"

the solution provider, choice of battery technology and lack of maintenance.

TowerXchange: How is Eltek positioned to be able to advise tower owners on the sort of system they should be deploying and what trends are you seeing in the industry?

Miloud Abdelilah, Managing Director, EMEA, Eltek: With over 10,000 sites installed, we have a position as the most experienced supplier of alternative and green solutions. With MSM (Multi Site Monitoring) especially designed for use with solar hybrid

solutions we can provide the best tool to ensure a maximum payback on the investment, looking at micro-grid opportunities and helping towercos track usage by their customers. In terms of trends that we are seeing, one key one is the use of outdoor type of solutions and we are also seeing some towercos now going for Lithium batteries.

TowerXchange: We hear comments from MNOs and towercos that on a technology front there is little difference between suppliers, what do you think differentiates Eltek from others in the market?

Miloud Abdelilah, Managing Director, EMEA, Eltek: Eltek bring a pure power focus with over 45 years' experience in the field. Eltek with its Innova8 program is a leader in developing unique solutions such as MSM (Multi Site Monitoring), universal controllers, Rectiverter (Rectifier and Inverter in one) & Microgrid solutions.

TowerXchange: As more developed markets start to look at 5G and deploy small cells how do you see the energy requirements changing and what is Eltek doing to support this change?

Miloud Abdelilah, Managing Director, EMEA, Eltek: We are in close dialogue with OEMs and operators and are being proactive in finding creative solutions. In our view, the main bulk of sites will remain as we have today with a large portion of macro sites. Whilst microsites will take some time to be used in Africa, Eltek already have solutions for micro & pico sites ▪

Tower Xchange

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Asia 2018
4-5 December, Singapore

Meetup Africa & ME 2018
9-10 October, Johannesburg

www.towerxchange.com

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

Murray Wyma, CTO DC Systems, Enatel Energy

Read this article to learn:

- How Enatel Energy went about upgrading the Sinuoso site in Mexico
- About Enatel Energy's installed global base at cell sites
- Why energy costs are coming down for MNOs
- How Enatel Energy provisions high 9s reliability in its products
- How to handle power requirements on a site with multiple tenants

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

> " 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 "

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-tenanted. 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: the first ESCO of scale in SSA

Energy Services Company takes on 400+ sites in Gabon

Ofer Ahiraz, CEO, Energy Vision

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.

Keywords: Africa, Africa & ME Insights, Airtel, Ausonia, Azur, Batteries, Business Model, DG Runtime, Debt Finance, ESCOs, Eltek, Energy, Energy Efficiency, Energy Storage, Energy Vision, Fixed Price, Flexenclosure, Gabon, Gabon Telecom, Hybrid Power, Insights, KPIs, Logistics, Market Overview, MOOV, NOC, O&M, Off-Grid, On-Grid, Opex Reduction, Outdoor Equipment, RMS, ROI, SLA, Site Management System, Site Visits, Skilled Workforces, Solar, Spare Parts, Tower Count, Unreliable Grid, Warehousing, Who's Who

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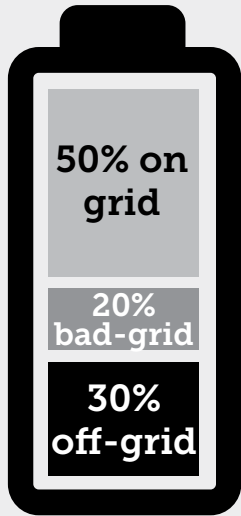
Our vision is simple: to offer MNOs or towercos reliable energy at a reasonable, predictable, fixed monthly price. We deploy the capex to modernise sites' power systems to the latest technology including RMS, and undertake maintenance, upgrades and refueling to offer -48VDC to power telecom equipment.

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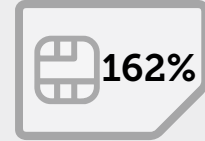
TowerXchange: First please give us some context by introducing the structure of the mobile and tower markets in Gabon.

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
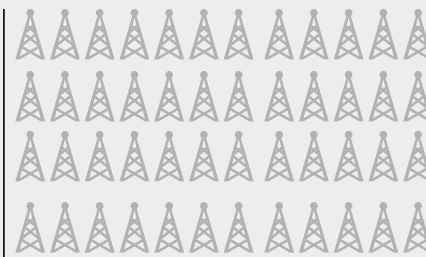
Gabon mobile market context

50% on grid

20% bad-grid

30% off-grid

Pie chart:
- **42.3%** ■ Gabon Telecom
- **34.7%** ■ Moov
- **15%** ■ Airtel
- **8%** ■ Azur
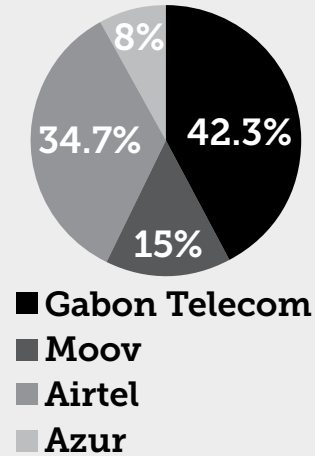
Sources: TowerXchange, GSMA Intelligence, ARCEP, CIA Factbook

1.7mn population

ARPU $8.20

162% SIM penetration

$18,600 GDP per capita (PPP)

~1,000 towers, 40% transferring to ESCO

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 last year 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.

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 KPIs vary between 99.75-99.95% depending on the site priority/category. 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 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 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: By the end of October 2016 we will have 50 sites running our equipment (full hybrid outdoor systems, most with solar) connected to our NOC via Remote Monitoring System (RMS).

We have already driven DG runtime on some sites down from 24 to 1.8 hours per day.

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

The Energy Vision NOC

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 30% off grid and a further 20% 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 250,000sqkm, 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'll outsource some mechanical installation labor, 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

Mechanical strengthening example: metal belt added

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 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 is 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 capitally 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! ∎

Uncontrolled cyclic use of batteries and deep discharge recovery

EnerSys bring their Genesis EP battery to the poor/unstable grid telecoms sector

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys

In poor or unstable grid scenarios, batteries installed on cell sites are regularly subjected to uncontrolled partial state of charge (PSOC) conditions and medium to high cyclic use. This, coupled with the often high ambient temperatures at such sites, puts significant stress on the energy storage system in place. Enersys' deep discharge capable batteries have had significant success in other applications and the company is now introducing their PSOC capable Genesis EP battery to the telecom market. TowerXchange speak to Enersys, one of the global leaders of energy storage solutions to learn more.

Keywords: Batteries, Capex, Energy, Energy Efficiency, Energy Storage, Enersys, Monitoring & Management, Outdoor Equipment, ROI, Unreliable Grid, Who's Who

Read this article to learn:

- Enersys' history and experience in the telecom sector
- How Enersys' Genesis EP battery is ideally suited for unstable grid conditions
- Key factors to consider in TCO calculations and battery selection
- Theft protection systems inbuilt into Enersys' cabinets
- How remote monitoring and control systems enable better battery management

TowerXchange: Please can you provide an introduction to EnerSys® for those who are not familiar with the company?

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys: EnerSys is the global leader in stored energy solutions for industrial applications. We manufacture and distribute reserve power and motive power batteries, battery chargers, power equipment, battery accessories and outdoor equipment enclosure solutions to customers worldwide.

Motive power batteries and chargers are utilised in electric forklift trucks and other commercial electric powered vehicles. Reserve power batteries are used in the telecommunication and utility industries, uninterruptible power supplies, and numerous applications requiring stored energy solutions including medical, aerospace and defence systems. Outdoor equipment enclosure products are utilised in the telecommunication, cable, utility, transportation industries and by government and defence customers. EnerSys also provides aftermarket and customer support services to customers from over 100 countries through our sales and manufacturing locations around the world.

We have extensive long term experience in power management in Middle East and African telecom backup power applications. EnerSys has also introduced many innovative solutions, such as SBS® EON Technology® batteries that provide up to four times more cycles than the standard Absorbent Glass Matt (AGM) batteries in hybrid applications.

> We have recently introduced a PSOC capable Genesis EP® battery which is based on thin plate pure lead technology and has enhanced the ability to recover from deep discharge. This helps in case the battery has entered to this state of discharge, which is quite common in these grid type conditions

TowerXchange: Why is it imperative for tower companies and operators to consider the location of the towers when deciding on their choice of batteries? How does grid availability and reliability affect battery choice?

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys: In general, the grid connectivity or lack of it can be divided to three main areas: in the stable grid environment there is only minimal cyclic use for batteries and a relative stable ambient temperature. The stable grid does not necessarily demand a battery compatible with harsh conditions.

The unreliable grid may need a battery capable of withstanding partial state of charge and to handle more repeating cycles.

In the off-grid scenario we typically find a diesel generator and battery as a 'hybrid' solution. The hybrid solution can also incorporate renewable energy sources such as a wind turbine or photovoltaic array. Warm ambient temperature and regular cyclic use in the off-grid scenario place again different demands for the battery. Understandably it is challenging to choose the right battery, and in addition one needs to also consider related equipment such as outdoor enclosures. A one fit for all approach does not work in these scenarios.

TowerXchange: Considering that poor-grid is still quite common in most parts of Africa what new solutions are available for sites situated on poor-grid? How extensively have these been deployed?

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys: When there is a poor or unstable grid this often means that there is a condition that we call uncontrolled cyclic use of batteries. Very often there is also a warm ambient climate. The battery solutions available should match to the uncontrolled partial state of charge (PSOC) conditions and the medium to high cyclic use of the battery. We have recently introduced a PSOC capable Genesis EP® battery which is based on thin plate pure lead technology and has enhanced the ability to recover from deep discharge. This helps in case the battery has entered to this state of discharge, which is quite common in these grid type conditions. EnerSys has earlier introduced these type of deep discharge capable batteries in other applications such as renewables and home energy storage, and now we are introducing this to the telecom environment.

TowerXchange: In terms of reducing the total cost of ownership of power management there are multiple choices available for equipment such as cabinets, cooling and rectifiers. How does the choice of each affect costs and what recommendations does EnerSys have?

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys: This is a question that may need a webinar or a lecture to answer in detail, but I will try to provide a short answer here.

In general, the Capex (Capital Expenditure) costs for batteries consist of the battery costs, transportation, installation and overheads. The Opex (Operating

Expenditure) costs then cover energy consumption and maintenance of the backup power solution. We have TCO (Total Cost of Ownership) calculators in place for discussion with our customers to assist them with their choices.

However, in the hybrid scenario, the generator maintenance costs and the fuel savings and site visit costs are important considerations. The battery needs to recharge quickly and withstand the high cyclic use. The EnerSys hybrid calculator provides guidance for even the most complex total cost of ownership questions.

The cabinet TCO calculations are covering the capital and operating expenditures but are also based on the following criteria: need for equipment protection in general, free cooling, air conditioning and need for anti-theft features. The outside temperature places demands for the cabinet and cooling method choices. In comparison with batteries, one deployment strategy rarely fits. You will need to consider the need for cooling batteries and other equipment such as rectifiers and power equipment. Some batteries can withstand higher temperatures so you may not want to have the most expensive cooling method, however, in the hybrid scenario the cycles may kill the battery before the temperature element starts to affect the battery life.

TowerXchange: Battery theft is a major issue at the moment. Are there new ways to combat this?

Anssi Laitinen, Marketing Director, Reserve Power

EMEA, EnerSys: There are two ways to look at battery theft from the site operations perspective. If the strategy is to retrofit existing sites with battery protection, then we have battery protection alternatives. If however you want to start a green field operation and need both new battery cabinets and batteries, our outdoor enclosures can provide anti-theft features today.

There are more than half a dozen different protection features available in our cabinets. Thus if you are considering a new site with new cabinet options then you should look at the anti-theft features available both in the cabinet and in the batteries.

TowerXchange: Should tower companies look at remote monitoring of batteries and what benefits this will bring?

Anssi Laitinen, Marketing Director, Reserve Power EMEA, EnerSys: Most definitely they should. With remote monitoring, one reduces the need for site visits. Many industries are already using remote monitoring of their equipment. The benefits are key here with the protection of assets. This can be 24/7 and this can be crucial for instance in the hybrid-off grid scenario as in these sites the backup power solutions provide for the real operation of the site, hence the need for better monitoring. There are additional benefits available if one wants to consider even more advanced solutions: remote management. Instead of sending someone on site, the voltage of a battery can now be corrected remotely, saving an unnecessary site visit ∎

Tower Xchange

Meetup Europe 2018

17-18 April, London

Meetup Americas 2018

20-21 June, Boca Raton

Meetup Asia 2018

4-5 December, Singapore

Meetup Africa & ME 2018

9-10 October, Johannesburg

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Five reasons why ESCOs are the future for African telecom tower power

Food for thought for African tower owners as more players explore the energy-as-a-service model

Carita Tissari da Costa, Sales Director, Flexenclosure

The single biggest challenge to being able to offer stable and reliable mobile phone services in Africa is power. Or more precisely, the lack of reliable power at telecoms tower sites. Tens of thousands of towers across the continent are located in areas without access to reliable electricity grids – or indeed, any electricity grid at all – and they typically have to be powered by diesel generators 24/7. And as the networks expand into ever more rural areas, the problem is getting worse as Africa is the only region in the world where the population is growing faster than the rate of electrification.

Keywords: Africa, Capex, DG Runtime, ESCO, Energy, Energy Efficiency, Flexenclosure, Hybrid Power, Interview, KPIs, Loading, Managed Services, O&M, Off-grid, On-grid, Opex Reduction, Outdoor Equipment, ROI, Risk, SLA, Unreliable grid, Uptime, Who's Who

Read this article to learn:

- What are the drivers for the emergence and growth of ESCOs
- Estimated opex and capex savings for MNOs and towercos
- Estimated carbon reduction for MNOs and towercos through ESCOs
- Minimised operational risks through energy-as-a-service offerings

TowerXchange: Please share with us the context in which you see a growing need for ESCOs?

Carita Tissari da Costa, Sales Director, Flexenclosure: The power challenge has vexed mobile network operators (MNOs) for years, as well as more recently, the towercos which have been acquiring towers from MNOs. Managing the supply of reliable power is not a traditional core business competency of either of these two groups. So just as the MNOs' divestment of assets to the towercos came from a desire to refocus on their core telecommunications service offerings, that same desire to focus is now driving the next evolution in the industry's dynamics – the rise of the energy service companies (ESCOs).

The growth of this new ecosystem of MNOs, towercos and ESCOs is being enabled by a new generation of hybrid power technologies – systems that have been specifically designed from the ground up to operate reliably in even the harshest of environments and over the lifetime required for an ESCO's business model to make good business sense. The result is a set of very compelling reasons why outsourcing power requirements to an ESCO should be a no-brainer to MNOs and towercos alike.

TowerXchange: What might be some of the arguments for an ESCO then?

Carita Tissari da Costa, Sales Director, Flexenclosure: The first is significant opex savings. With an average single-tenant telecom tower site powered 24/7 by a generator consuming about

28,000 litres of diesel per annum, it's not hard to see how site power costs can account for 30-60 per cent of the total operating costs of an MNO or a towerco. Implementing the latest generation of hybrid power systems though, such as Flexenclosure's eSite x10, can significantly reduce opex by decreasing diesel consumption by 70% or more. And these savings can increase further if the power loads are reduced, there is intermittent grid power available and/or solar energy can be harvested. And opex savings are not just made on the cost of diesel. By outsourcing power to an ESCO, the MNO or towerco no longer has to worry about generator maintenance, spare parts, or the cost of an operations team on standby 24/7 to manage power failures, site break-ins, fuel theft, et cetera.

Another major reason is freed-up capex. According to the GSMA, Africa will need tens of thousands of new towers in the next couple of years, yet capex budgets keep tightening as mobile markets become more competitive and much of Africa struggles with economic downturn and forex issues.

When a telecom tower site is powered 24/7 by a generator, that generator will run for 8,760 hours per year and will need replacing every three years, not to mention replacement costs of other legacy power equipment. From a tower operator's perspective, this budget (and effort) would be far better spent expanding network coverage, rolling out revenue-generating services or on customer acquisition activities – and by outsourcing power to an ESCO, that's exactly what they can do with the freed-up capex.

TowerXchange: And what about additional benefits of an ESCO, perhaps less related to capex and opex?

Carita Tissari da Costa, Sales Director, Flexenclosure: All respectable organizations across the globe today are looking at ways of reducing their carbon footprint, so for MNOs and towercos, this means cutting carbon emissions. With an average single-tenant telecom tower site with a

2kW power load running 24/7 on diesel generators producing over 75kg of CO_2 emissions per year, tower operators have very big footprints. By implementing the latest hybrid power technology – such as the pioneering eSite x10 – annual carbon emissions for the same site can be brought down to below 20kg per site. That's a significant drop with equally significant benefits to the environment and to a tower operator's corporate social responsibility aspirations. And as before, lower power loads,

partial grid availability and/or solar energy can further reduce a site's carbon emissions.

TowerXchange: On an operational level, how might working with an ESCO change things for tower owners and/or operators?

Carita Tissari da Costa, Sales Director, Flexenclosure: Its means more risks are outsourced and complexity reduced. Managing power at telecom tower sites is prone to risks related to both the generation and the delivery of power to the active telecom equipment. By outsourcing all responsibility for power generation and delivery, a tower operator can effectively unburden themselves from all the complexities and distractions that power comes with, even at those sites that are connected to an electricity grid. A Power Purchasing Agreement (PPA) with an ESCO will detail agreed SLAs and KPIs, with penalties for non-performance. The result of signing up to such a "power-as-a-service" contract would be the tower operator's moving from having to manage the operational power complexities for all its sites to simply managing an insurance policy of sorts on its outsourced power risks.

TowerXchange: When it comes to investing in new energy technologies, we've often heard that the business case or incentive is not there for a MNO or towerco. But this would be different for an ESCO?

Carita Tissari da Costa, Sales Director, Flexenclosure: Yes, for tower operators – whether MNOs or towercos – historic investment in telecom
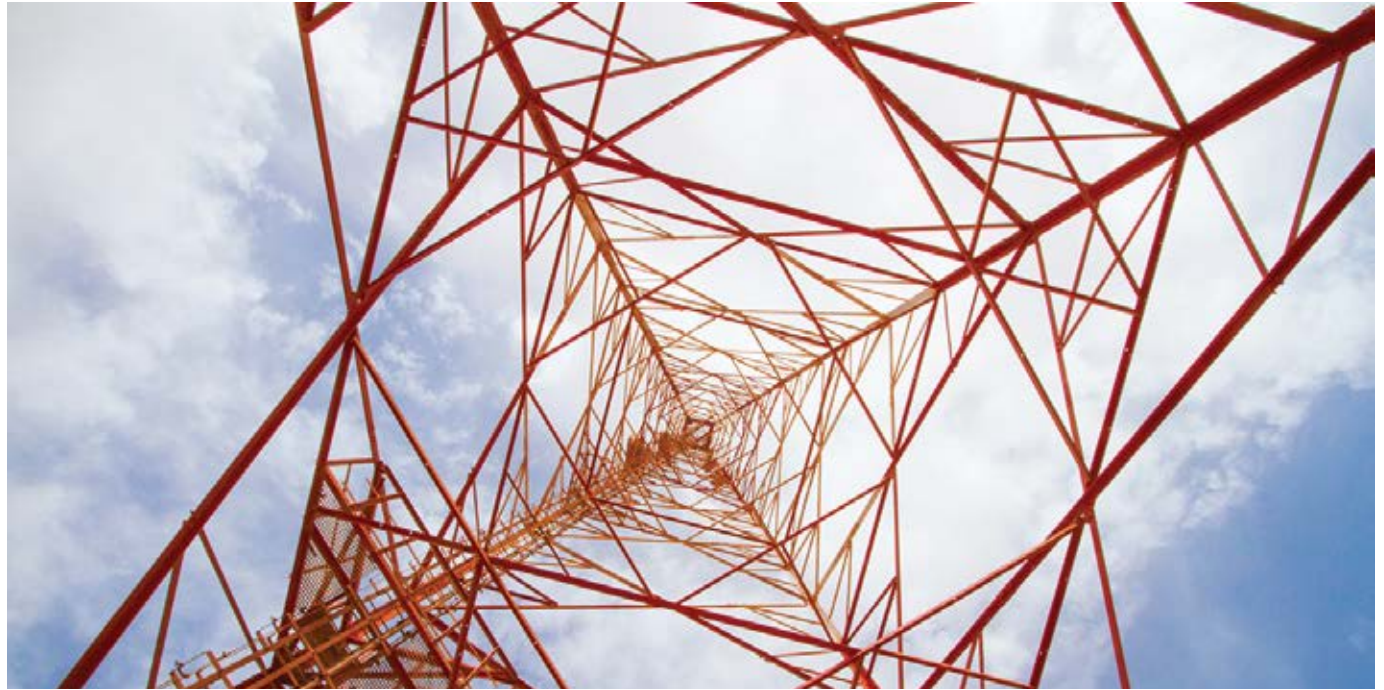
tower power equipment can be a significant obstacle when trying to justify investing in newer power technologies now given it's not core to their business focus. However ESCOs don't have this issue though. Their investment strategy will be to implement the latest hybrid power systems offering the most reliable long-term performance, so it makes absolute sense for tower operators to unload their legacy equipment and pass the power baton to ESCOs to run with.

TowerXchange: Lastly, how might you summarise the ESCO opportunity for Africa?

Carita Tissari da Costa, Sales Director, Flexenclosure: The general consensus in the industry is that approximately 50 per cent of all

telecom towers in Africa will have implemented outsourced power in the coming five years. Whatever the actual number, it is clear that outsourcing power to a specialist ESCO will have far-reaching benefits.

It will release MNOs and towercos from the burden of managing inefficient and unreliable legacy power equipment. It will create a new industry segment within the larger telecommunications ecosystem, thus increasing employment opportunities and skills levels. It will have significant environmental benefits. And most importantly, it will support the "connection of the unconnected" – the quest to bring mobile telephony and online access to the hundreds of millions of people across Africa who still remain beyond the reach of networks today ∎

Fuel monitoring and preventative maintenance reduces fuel consumption by up to 40%

Galooli's integrated site management system brings financial savings to tower owners

Used by personnel from technicians to CEOs, Galooli's RMS system and its intelligent data analysis platform offers MNOs and towercos a fully comprehensive system to manage fleet, workforce and operating efficiencies. Enabling fuel reductions of up to 40% and equipping tower owners with the tools to take a preventative rather than reactive approach to site management, Galooli works hard to deliver financial results to its clients.

Keywords: Change Management, Data Room, Dimensioning, Energy, Energy Efficiency, Fuel Security, Galooli, Galooli Telecom, Job Ticketing, KPIs, Monitoring & Management, NOC, O&M, Off-Grid, QoS, RMS, Site Level Profitability, Site Management System, Skilled Workforces, Who's Who

Ohad Polinovsky, Director, Galooli Telecom

Read this article to learn:

- How Galooli's system offers a truly end-to-end experience for all levels of the business
- Strategies and success rates in tackling fuel theft
- Moving from reactive to preventative maintenance through the use of Galooli's system
- How data is being used to inform business decisions

TowerXchange: Please can you provide an introduction to Galooli and their solutions for the telecom sector.

Ohad Polinovsky, Director, Galooli Power: Galooli Telecom provides innovative Bottom Line Solutions™ (BLS) – the market leading practical business intelligence solution. Galooli's unique strength is its ability to convert big data into reliable and useful tools to achieve real opex savings. From full-site remote monitoring and management to workforce and fleet management, our customisable solutions cover all operational aspects for towercos and operators. Instead of reacting to events that have already happened and alerts available on any standard monitoring systems, Galooli promotes the use of prevention. Galooli is actively operating in over thirty territories with in-country services and support as an integral part of the offering.

TowerXchange: Galooli have been specialising in fuel monitoring for a number of years, how have you seen strategies used by thieves change and how does Galooli's platform meet these challenges?

Ohad Polinovsky, Director, Galooli Power: The main change we saw over the years is that fuel theft carried out by "insiders" is almost not happening anymore. The thieves understand that the organisation can easily cross reference the information from our system and understand who was part of a fuel scheme. Moreover, the MNOs and towercos are no longer responsible for the fuel in the tank, using our system they can pay only for the

fuel that was actually consumed since our system can separate between normal consumption and fuel drops even when the generator is running.

Galooli's reliable fuel monitoring platform enables the MNOs and towercos to agree on common consumption scales and transfer the responsibility for the fuel in the tank to the fueling contractors. Nevertheless, as fuel is the main expense and main concern, there will be always new challenges to cope with, so we keep developing new technologies to overcome them.

TowerXchange: What kind of reduction in fuel theft have your customers seen? How does this compare to other monitoring system providers?

Ohad Polinovsky, Director, Galooli Power: From information gathered for several years we saw that a 30-40% in fuel reduction can be achieved by using our solution in a very short time. Additional reductions are also observed as time goes by as well, but this is not as dramatic as the initial impact. I cannot tell you about our competitors' performance but what I can is that Galooli is constantly looking for ways to reduce MNO and towerco opex by providing bottom-line solutions. This means analysing tools that help in taking operational decisions that also contribute to a reduction in fuel consumption, for example by optimising hybrid cycling time or air cooling system operation.

TowerXchange: There have been criticisms from some towercos and MNOs that current site management systems on the market still exhibit

a number of limitations. What do you see as the limitations of site management platforms and how has Galooli's platform evolved in recent years?

Ohad Polinovsky, Director, Galooli Power: One of the limitations is that MNOs and towercos need to work with several different systems. Galooli develops its solutions to provide a complete offering that anyone in the organisation has use of, from the filing technician with our workforce management mobile app up to the CEO with our analysis and dashboard tools.

Having all of the information from the technicians and site equipment on the same database enables us to present it on one platform. On top of that, Galooli enables integration of any equipment on site that has a communication port, in order to use all the information we can get from the site and provide our clients with a one stop for all the data they need.

Another limitation MNOs and towercos experience is interpreting the collected data. Besides building dashboards for analysis, Galooli develops prediction and prevention solutions to enable bigger savings.

TowerXchange: How is Galooli assisting its customers to react in a preventative rather than reactive manner?

Ohad Polinovsky, Director, Galooli Power: Galooli takes data collected from sites and provides effective dashboards and reports which help the operation managers make decisions. The NOC alerts

> "From information gathered for several years we saw that a 30-40% in fuel reduction can be achieved by using our solution in a very short time"

dashboard is one of the examples of this; we try to make sure alerts pop up before a malfunction or bad event happen. We don't only invest a lot in the technology to be able to do this, but we also invest heavily in creating reliable and professional teams on the ground; workforce quality is critical to the success of the operation.

TowerXchange: Finally, with so many site intelligence system providers to chose from, what differentiates Galooli from its competitors?

Ohad Polinovsky, Director, Galooli Power: Galooli provides bottom line solutions, meaning effective information that leads to real opex savings. We are committed to financial results more than just to data. Galooli has vast experience, its solution is flexible and customisable to meet the client's needs and the company has outstanding after sales support to ensure the client gets the most out of the system ∎

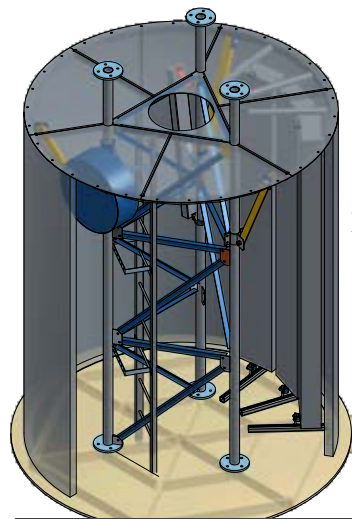# Would you like almost unlimited capacity to add more tenants to your towers?

Innovative 'Tower Shield' can more than double wind load capacity at significantly lower cost than upgrading structures and foundations

It's one of those ideas so simple that you can't imagine why anyone didn't think of it before! In the tower industry we all understand that wind load is usually a more important factor than equipment weight in determining the capacity of a tower. Round shapes are more aerodynamic than boxes. So if we mount a light weight, round shield over the equipment on our towers, will the capacity be increased? Tower design and installation wizard Christian Strømme has built a prototype that could revolutionise the tower business.

Keywords: Camouflage, Capacity Enhancements, Capex, Co-locations, Construction, Foundations, GSM Towers, Infrastructure Sharing, Insights, Installation, Loading, Masts & Towers, Multi-Region, Passive Equipment, Site Level Profitability, Steelwork, Tower Shield, Who's Who

The innovative Tower Shield

Read this article to learn:
- What is the Tower Shield and how does it work?
- How has the concept been proved?
- How Tower Shield can enable a tower designed to accommodate two tenants to accommodate four at half the cost of upgrading the foundation and structure
- How to design new towers to accommodate Tower Shield, thereby reducing weight and cost
- What will Tower Shield cost?

TowerXchange: Please introduce your revolutionary Tower Shield.

Christian Strømme, CEO, GSM Towers: The Tower Shield can enable you to make your towers available to all the tenants you want.

Deploying the Tower Shield will unlock almost unlimited capacity, even on towers designed for single tenants, at significantly lower cost than by upgrading structures and foundations.

The Tower Shield enables towercos to dramatically improve return on investment in improvement capex, and increase tenancy ratios and tower cash flow.

TowerXchange: How does it work?

Christian Strømme, CEO, GSM Towers: A round shape has a lower wind factor than a square shape, such as the antenna and other square-shaped parts mounted on a tower. Installing a round shield over the antenna makes a tower more aerodynamic by reducing the wind forces on any equipment inside it.

The prototype we have designed has an EPA of 4.2sqm, is 3m high with a radius of 2.4m, and has capacity to enclose up to 12 to 16 antennas (depending on the size) inside the shield. But the Tower Shield is designed to be a modular solution, so the shield specification can be adapted to suit the tower, and more shields can be added according to the amount of equipment to be hung on the tower.

The Tower Shield is made of light but strong material which allows signal to pass through without being disrupted. We use a 7mm sandwich laminate GRP – the same material radar domes are made from – which means we are able to achieve a signal loss of less than 0.3 dB.

The Tower Shield complies with the ANSI/TIA-222-G American design code, EN1993-3-1 and EN1993-3-2: Eurocode 3, European codes.

TowerXchange: How would the Tower Shield be installed and mounted?

Christian Strømme, CEO, GSM Towers: The Tower Shield can be easily mounted on the outside of a tower with clamps. Each part is about 60kg, so it's a quick and easy installation – easier than adding an antenna.

TowerXchange: It sounds almost too good to be true. How have you proved the concept?

Christian Strømme, CEO, GSM Towers: We have just completed construction of a prototype in Beijing, from where it will be shipped to be unveiled at the TowerXchange Meetup Africa in Johannesburg on October 3 and 4.

TowerXchange introduced us to some potential customers at their Americas Meetup in June, and we've also done some calculations for another towerco showing how the Tower Shield could enable a tower designed for two tenants to accommodate four tenants at a site in Southeast Asia.

Tower Shield prototype

But Tower Shield can improve the capacity of any tower, anywhere in the world.

TowerXchange: Tell us more about the calculations that revealed that installing Tower Shield could enable four tenants to be accommodated on a tower designed for two.

Christian Strømme, CEO, GSM Towers: We examined a tower located in Southeast Asia which had been designed for two tenants and was just about able to support three. The towerco that owned the tower

had been asked to co-locate a fourth tenant, for which they calculated that they would need to upgrade the existing structure with 5,000kg of steel and 10sqm of concrete foundation.

We found that we were able to deliver more than enough wind load capacity to accommodate the fourth operator by placing a Tower Shield over just the RDUs and filter boxes of one existing tenant. If a 3m x 3m Tower Shield was installed over six RF antennae, each with an area of around 1m, we would reduce the wind load by a factor of 60%, while the coefficient for the antennas is 1.2, so the Effective Projected Area (EPA) was reduced from 8.4 to 5.4, reducing uplift by 7% and compression by 5%.

Installing a Tower Shield would mean the foundation wouldn't need upgrading and the addition of just 400kg of steel would bring the tower within reasonable range.

TowerXchange: That's a great example of upgrading an existing tower. How can Tower Shield transform the economics for new build towers?

Christian Strømme, CEO, GSM Towers: We spoke to one of the Directors of a leading towerco in Indonesia who shared a common challenge that other towercos will recognise: whether acquiring an existing tower or building a new tower, it is difficult to predict whether and when there will be demand for capacity for a second, third or fourth tenant.

As a result most towercos (and an increasing number of MNOs) have designed and built new towers with capacity for two tenants. With Tower Shield you can now use low cost, lightweight, single tenant structures for all new builds, minimising capex, therefore minimising risk. All you need to do is pre-install structures with shield brackets, then a single tenant tower can be easily upgraded to accommodate two, three, even four tenants by adding a Tower Shield.

TowerXchange: What is a 'Top Shield' and what are its use cases?

Christian Strømme, CEO, GSM Towers: The Top Shield is a way to extend the tower while adding the minimal additional load to the structure.

By their nature, tower extensions typically create a heavy burden on the structural capacity of the tower, but by using a Top Shield, the effect of the extension is minimised.

The Top Shield is conceptualised as a 3-5m extension requiring no internal structure - the shield has its own structure - which maximises the space available for new antennas while minimising EPA.

TowerXchange: How have the towercos you've spoken to about Tower Shield responded?
Christian Strømme, CEO, GSM Towers: We spoke to the VP of Tower Development at one towerco. He was a structural engineer and promised us a tough cross examination, but the concept is so simple and intuitive that it took him seconds to understand and he didn't have any questions – he just ran off to tell his colleagues about it!

TowerXchange: What will Tower Shield cost?

Christian Strømme, CEO, GSM Towers: Like any tower modification, the cost depends on the specific requirements and dimensions of the tower concerned.
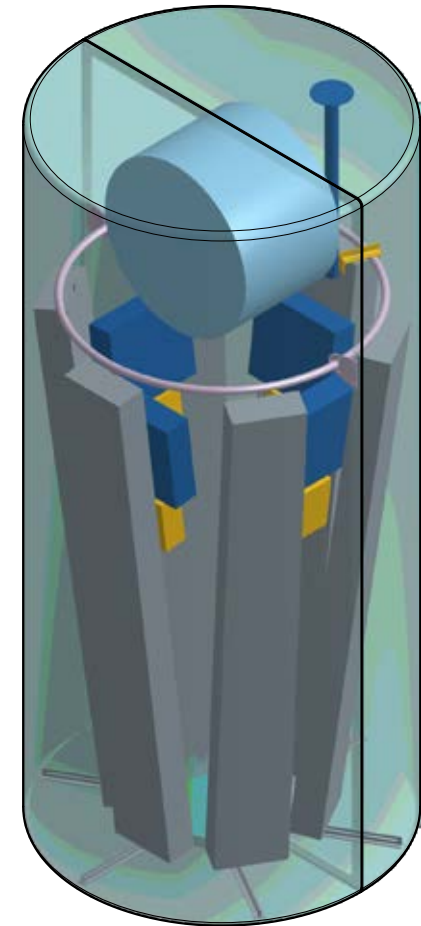
In the example we quoted in Southeast Asia, the improvement capex to upgrade the structure and the foundation to accommodate a fourth tenant would have been in the region of US$20,000. With Tower Shield, we'd anticipate being able to achieve the same capacity for half the price, including shipping and installation.

Of course higher volumes would mean we'd be able to manufacture and sell Tower Shield at a lower price.

We're also making arrangements such that we will be able to provide one to two years of financing.

TowerXchange: Could customers offset the cost of Tower Shield by selling advertising on the shield's surface?

Christian Strømme, CEO, GSM Towers: Sure thing! Where landlords allow the structures to be painted, logos or marketing campaigns can be added on. We have seen examples of this where similar solutions used for camouflaging the tower and antennas have been used as a billboard.

TowerXchange: What is your background – how did you come up with this idea?

Christian Strømme, CEO, GSM Towers: As I'm the third generation of my family in the tower business,

Top Shield

I'd love to say this was something I have invented on my own, but its been a team process! Our engineering, supply and sales departments have worked this one out together. The idea of reducing wind drag on the towers has been discussed both at the office and around the house as long as I can remember; but the combination of three recent circumstances have pushed us to develop this solution.

First, we are frequently asked about upgrading legacy towers by towercos that have recently acquired older towers. We recently had a very detailed discussion with a towerco in Indonesia that wanted to minimise improvement capex, while preserving the potential to make recently acquired towers available for multiple tenants. We investigated re-filling of foundations, easy steel upgrades (adding bracings et cetera), but all the solutions we came up with were either sub-optimal on the saving side or very costly.

Then there was a discussion with a client about extending existing tower structures to accommodate new tenants. Though this is very possible, it eats a lot of the structural capacity, and we were back again looking at how to strengthen towers in an efficient way.

At the same time, we've had the oil crisis in Norway, and though this has been damaging for the O&G industry it lead to us getting a new flow of talent from outside the telecom industry, especially on the engineering side. They brought a fresh approach to things and the result was the idea of the TowerShield ∎

Tower Xchange

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Asia 2018
4-5 December, Singapore
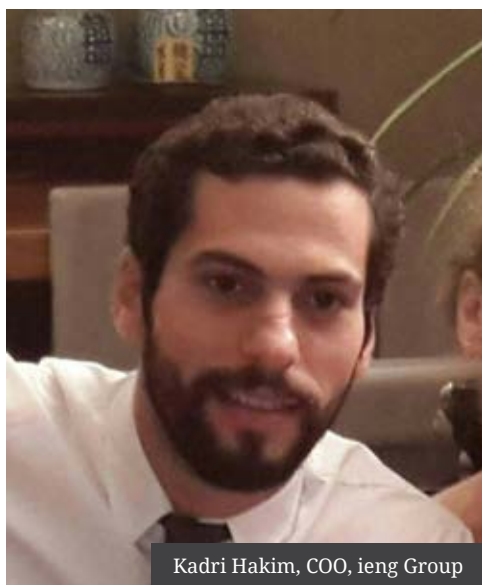
Meetup Africa & ME 2018
9-10 October, Johannesburg

www.towerxchange.com

Surveying, building and strengthening towers for the era of infrastructure sharing

ieng Group is a proven partner to towercos in eleven African countries and in Myanmar

Kadri Hakim, COO, ieng Group

Multi-country turnkey infrastructure solution provider ieng Group has seen their business transform from an initial focus on site build and upgrade, to focusing on longer term O&M contracts. ieng Group increasingly see Africa's 'Big Four' towercos as their primary clients for managed services, tower surveys and strengthening, and for build-to-suit programmes. ieng Group has also recently opened an office in Myanmar.

Keywords: Who's Who, Managed Services, O&M, Construction, Installation, Batteries, Capacity Enhancements, Build-to-Suit, SLA, Hybrid Power, Greenfield, DG Runtime, Site Surveys, Skilled Workforces, Multi-Country Partner, Infrastructure Sharing, Asia, Myanmar, Africa, Algeria, Burkina Faso, Cameroon, Congo Brazzaville, DRC, Ethiopia, Ghana, Rwanda, Uganda, Zambia, Eki-Struct, ieng Group

Read this article to learn:

- i eng Group's capabilities, footprint and credentials as one of Africa and Myanmar's leading TI firms
- The impact of tower transactions on the managed services ecosystem
- Balancing the business between recurring, stable O&M contracts and higher margin, less predictable EPC contracts
- Contrasting the approaches to energy efficiency programmes of towercos in Myanmar and Africa

TowerXchange: Please introduce ieng Group – what role do you play in the telecoms infrastructure ecosystem?

Kadri Hakim, COO, ieng Group: ieng Group is one of Africa's leading turnkey infrastructure solution providers. We are established in twelve countries: Algeria, Burkina Faso, Cameroon, Congo B, DRC, Ethiopia, Ghana, Rwanda, Uganda and Zambia. Our newest and soon to be biggest operation is Myanmar. Our headquarters are in Lebanon. We're a cash flow funded, Lebanese-Canadian company, co-founded by myself and CFO Rami Shibley.

TowerXchange: What are ieng Group's capabilities, and can you tell us who some of your key clients are?

Kadri Hakim, COO, ieng Group: We plan, procure, build, optimise and maintain telecom infrastructure. We also provide tower manufacturing through our partner Eki-Struct.

Most of our business now comes from the Big Four African towercos, although we also work with MTN, Airtel, Orascom and Ooredoo.

TowerXchange: Did you win your managed services contracts after the towercos acquired the towers, or was the relationship with ieng Group transferred from MNO to towerco with the tower transaction?

Kadri Hakim, COO, ieng Group: We were already providing managed services to the MNOs – after

the acquisitions our contracts eventually became with the towercos.

Towers are the core business of the towercos – they know exactly what they want, and they know exactly what it costs. They want the same services we are currently providing to MNOs, but with a higher service quality – reflected in the SLAs.

TowerXchange: When towercos enter a new market, how do managed services providers like ieng Group position yourselves to secure new contracts?

Kadri Hakim, COO, ieng Group: We find out about the tower transactions after the deals close, not before. We use the experiences and credentials we have from our existing relationships with the towerco to enter new markets.

TowerXchange: Do you forsee there still being a role for the tier one OEMs, Ericsson, Huawei, Nokia and ZTE, in managed services for passive infrastructure in Africa?

Kadri Hakim, COO, ieng Group: When they were maintaining both the active and passive infrastructure for the MNOs, it made sense. But towercos don't own active equipment, so they have no need to use a vendor like that for managed services. We believe the towercos will work more and more directly with companies like us to manage their passive infrastructure, leaving MNOs still working with vendors for the management of active infrastructure.

TowerXchange: What is the balance of your business between EPC contracts and O&M?

Kadri Hakim, COO, ieng Group: When we started the company in 2007, all our business was EPC – site build and refurbishment. When the EPC business started slowing down from 2009-10, we went into O&M. We now have more than 3,000 sites under management.

O&M provides good recurring, stable business; we know the work is coming. We try to stabilise our operations on O&M revenue, such that any EPC revenue is the cherry on the cake.

ieng Group provides managed services for both passive and active infrastructure.

TowerXchange: What are the implications for your business of the current wave of tower transactions in Africa, with towercos acquiring 17,877 new towers in the last quarter alone?

Kadri Hakim, COO, ieng Group: We believe all the managed service providers will see a surge in their businesses. Towers are the core business of the towercos, they are well financed and will invest in new site builds, refurbishment programmes, strengthening for co-locations and energy efficiency programmes.

With the recent wave of tower transactions, towerco's short term focus is to understand and stabilise the networks they just acquired, and to understand the quality of sites – based on which

> "O&M provides good recurring, stable business; we know the work is coming. We try to stabilise our operations on O&M revenue, such that any EPC business is the cherry on the cake. ieng Group provides managed services for both passive and active infrastructure"

they will determine which towers they have to refurbish or upgrade. Then they will tackle co-location sales and building new sites for their anchor tenants – the framework agreements often include a build to suit programme.

TowerXchange: What do you anticipate being the impact of the increasingly important role of towercos on the build to suit market?

Kadri Hakim, COO, ieng Group: Whenever we've been asked to execute build-to-suit programmes for

The ieng Group team in Myanmar

the towercos, they've built towers with capacity for at least three tenants.

We're not seeing a lot of single tenant towers being installed any more – EPC contracts from MNOs have decreased significantly.

TowerXchange: What factors influence the cost of upgrading a single tenant tower and power solution to be suitable for multiple tenants?

Kadri Hakim, COO, ieng Group: The power system has to be upgraded or replaced to suit the new power requirements. The tower part is more complicated and depends on the load of the

existing tower structure. We have been providing tower strengthening services to a lot of towercos. We do a structural analysis of tower to see if it is suitable to take another operator. If it isn't suitable, we provide and implement a strengthening solution. Occasionally we find there is no solution and the tower has to be replaced – or we might find that the cost of strengthening is so great that it's preferable to build a new tower.

TowerXchange: How do the priorities of the Myanmar towercos differ from those in Africa?

Kadri Hakim, COO, ieng Group: The towercos in Myanmar are undertaking a massive build to suit

program rather than acquiring existing networks which involves refurbishment, upgrades and tower strengthening services. Myanmar is witnessing for the first time a substantial telecom site deployment, so the priorities and challenges are very different. Because it's new network being deployed, all the towercos have the possibility to utilise the most recent technologies in telecom passive infrastructure, for example they are putting in place the most recent hybrid power systems; energy efficiency programmes and security locking systems.

TowerXchange: Finally, please sum up how you would differentiate ieng Group from other turnkey infrastructure firms in SSA and Myanmar.

Kadri Hakim, COO, ieng Group:
ieng Group has an edge thanks to our well-structured, flexible management system which allows us to adapt to the local culture with our global experience. We understand what's required locally to adapt our structure and be the most efficient turnkey infrastructure firm in each country. We are also fortunate to have a young, experienced, motivated, smart management team that excels in their work.

ieng Group is happy to follow its clients into new countries – we typically start two new operations every year. This includes following the Big Four towercos as they enter new markets in Africa. We know how they work, and they know what to expect from us ■

IPT Powertech Group: Leading T-ESCO globally

"Redefining Power Solutions, Reinventing Telecom Infrastructure"

Khaled Habbal, VP & COO, IPT Powertech

With the power systems at many thousands of sites under management in Nigeria and Myanmar, IPT Powertech is effectively one of the world's largest telecom energy services companies. TowerXchange spoke to COO Khaled Habbal to understand their business model and value proposition.

Keywords: Africa, Africa & ME, Africa & ME Insights, Asia, Asia Insights, Batteries, Business Model, Dimensioning, ESCOs, Energy, Energy Efficiency, Hybrid Power, IHS Africa, IHS Towers, IPT Powertech, Insights, Managed Services, Myanmar, Nigeria, O&M, Off-Grid, Ooredoo, Operational Excellence, Opex Reduction, Pass-Through, Procurement, SLA, Skilled Workforces, Who's Who

Read this article to learn:

- How IPT Powertech evolved from battery sales to managed services and now to a holistic T-ESCO
- Eliminating the 'blame game' – the importance of a single point of accountability
- Contrasting experiences in Nigeria and Myanmar
- How does IPT Powertech select and procure equipment?
- When is the right time to invest in hybrid and renewables?

TowerXchange: Can you tell us some of IPT Powertech's major achievements for the benefit of readers not familiar with your company?

Khaled Habbal, VP & COO, IPT Powertech: IPT Powertech has been a first mover in the industry at multiple times throughout its 24-year-long history. Back in the 1990s, we started out as a provider of starter and specialty batteries. We were the first to introduce and stock sealed and specially application batteries. When the telecom sector picked up in 1995-1996, we immediately noticed the great value we can add, so we started offering battery systems to telcos. A few years later, we expanded into selling power systems, and we were also the first to foresee the need to integrate power into outdoor cabinets, so we made a strategic decision to manufacture our own cabinets independently, and hence became a full-fledged energy system integrator. We were also the first to launch the hybrid battery concept, we became one of the few companies in the region, if not the only one, to combine product R&D to our assembly facilities in Romania and Lebanon.

In parallel, we had launched our telecom services division, which consists of three main pillars:
1) site construction service, that is, building telecom sites and laying optical fibers;
2) telecom installation and network services; and
3) field managed services and maintenance.

Our ability to combine our power expertise, telecom services, and managed services at the same time became our differentiation factor, and this

propelled our recent success in introducing and implementing the Guaranteed Savings and T-ESCO models.

Our journey has been a rapid evolution to becoming one of the regional players in our field with reach to more than 50 countries coupled with a geographic presence in 11 countries in Africa, South East Asia and the Middle East.

The past year has been an exceptional one. We ventured into two large projects for a major towerco in Nigeria, supplying energy efficient power solutions including a long-term management, maintenance, and guaranteed opex optimisation contract.

We also signed a long-term contract with one of the major operators in Myanmar, providing managed services through a combination of a guaranteed savings model and T-ESCO models for their entire network.

All these achievements would not have been possible without the dedication of our 2,500+ experts who live our slogan "Redefining Power Solutions, Reinventing Telecom Infrastructure." They relentlessly serve the top clients in the region and deliver projects to more than 60 operators in more than 50 countries.

TowerXchange: How have you adapted the Telecom Energy Services Company (T-ESCO) business model to better serve MNO and towerco needs?

Khaled Habbal, VP & COO, IPT Powertech: We have been serving the largest MNOs across many continents for more than 20 years by providing a wide range of products and services from comprehensive and tailor-made power solutions through to passive and active infrastructure. Throughout the expansion of our business and diversification of our activities, our broad array of offerings has seen a considerable evolution across the whole telecom and power value chain of MNOs and towercos. As for telecom power, we adapted our business model to fulfill the needs of our customers by providing an holistic solution of energy efficient products and managed services as a Telecom Energy Services Company (T-ESCO).

Our own energy services offerings are categorised in two main streams, one called The Guaranteed Savings Model and the other T-ESCO model and both serve MNOs and towercos in a way to reflect the appetite for capex spending or capex leasing. Both models ensure the deliverables of power availability and reliability to the network respecting all Service Level Agreements (SLAs) related are met.

We have seen in some instances in Africa, MNOs that are not planning to divest their towers however are looking to divest their power equipment. In those instances, with the pressure coming from the global profitability of the MNOs, we are providing the T-ESCO model whereby all investment to modernise power solutions and making them efficient and deliver the required availability are provided by IPT Powertech Group. Naturally, servicing a long-term contract for the same is a key

factor for its success. On the other hand, we have noticed that towercos have access to investment resources and strategic directions whereby they invest themselves through innovative and energy efficient power solutions; however, they need the deliverables to be met and the promise of those solutions to be achieved which is reflected in our guaranteed savings model.

TowerXchange: What is your approach to eliminate the 'blame game' where energy equipment manufacturers and O&M service provider blame each other for any performance failures?

Khaled Habbal, VP & COO, IPT Powertech: It has always been a dilemma between the energy equipment manufacturer and O&M service provider where one side blames the other side either on the actual specs of a product and its deliverables or on the service level and the maintenance operations.

Our approach 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 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.

Managed services contractors buying energy solutions and managing them will only be able to cover themselves during the warranty period. Their real challenge starts after the warranty period expires.

The combination of expertise all under one roof makes IPT Powertech Group one of the few global parties able to eliminate the blame game and provide top-notch services to towercos, MNOs and ultimately power availability for the telecom networks.

TowerXchange: We understand IPT Powertech operate power systems at over 3,200 Ooredoo Myanmar towers - can you give us a sense of the operating conditions and challenges in Myanmar?

Khaled Habbal, VP & COO, IPT Powertech: IPT Powertech Group is enrolled in an end-to-end managed service contract with Ooredoo Myanmar including rollout services, operation and maintenance, grid connection, generator fueling, power management and power colocation which is extremely challenging from a geographical, political, operational and financial perspective.

From an operational and organisational perspective, the situation is very challenging as we are covering the totality of the country with its area of 677,000 sq km ranging between mountains, forests and tough terrains through to rivers, lakes and oceans. Out of the total universe of Ooredoo's 4,500 sites, Linfra Myanmar is currently managing 3,200 sites which

are divided between edotco's 1,250 sites, PAMEL's 1,250 sites and 700 Ooredoo self-built sites which are spread-out all over Myanmar across the 15 regions. Approximately 65% of the sites are off-grid while the remaining are grid connected. The grid availability and reliability is not consistent which means lots of outages, both planned an unplanned. The off-grid sites by themselves bring tremendous challenges from regular fueling to preventive maintenance ensuring mean time to repair (MTTR) is in line with our committed SLAs.

With a five month season of ravaging monsoon and rampant floods, operating conditions become extremely stringent, whereby we take necessary measures to overcome such constraints by deploying additional resources and enhanced logistics to maintain the quality and best performance of our services. We also face access, security and political issues in some regions which are handled by our CSR team who is strongly engaged with local communities and groups to come up with proper resolutions. Availability of stable power remains a major challenge to our operations and service level agreements.

TowerXchange: How do you see the future of cell site energy in Myanmar, given that edotco has committed to provide full power as a service, and that the towerco which owns the other substantial portion of Ooredoo's towers, PAMEL, is for sale? Other Myanmar towercos provide energy equipment with energy costs passed through to the tenant - how can we correct the disincentive to invest in energy efficiency this results in?

Khaled Habbal, VP & COO, IPT Powertech: The tower landscape in Myanmar is divided between seven tower companies surpassing the 10,000 towers mark during 2017. Major players are edotco, Pan Asia (or PAMEL), Irrawaddy Green Towers (IGT), Apollo Towers, OCK, EFT and MIG. Under our managed services contract with Ooredoo, we are fully responsible in managing the energy consumption on sites comprising of supplying and delivering generator fuel and managing the electricity supplied by the national grid of Myanmar. The energy pass-through model does not have a disincentive outcome for us to invest in energy efficiency for two main motives:

■ Our objective is to optimise the operational expenditures (opex) of our customers notably on the energy consumption.

■ Our guaranteed savings model starts with the design, engineering, manufacturing and supply of power-efficient solutions to ensure lowest capex, opex and TCO to our customers. Moreover, we are committed to our environmental values in protecting the environment and reducing carbon footprint by continuously optimising the use of generators, and by reducing engine run-hours while minimising noise pollution to local communities.

TowerXchange: Let's talk about Nigeria. How have IPT Powertech come to be so trusted by Nigeria's leading towerco, IHS?

Khaled Habbal, VP & COO, IPT Powertech: We started working with IHS in 2003. At that time, IHS

was a site construction contractor. Over the years, we developed a strong relationship with IHS by repeatedly reengineering our proposed solutions to fit with their growing site requirements. It wasn't long before IHS became the largest tower company in Africa. Our stellar achievement was the deployment of hybrid concepts on their sites, which was recognised when IPT Powertech was selected as the preferred power solution vendor of several towercos in multiple countries.

Now, we are engaged with IHS in Nigeria on the largest project of Guaranteed Savings across the African continent. We are proud to be one of the largest suppliers of power efficient solutions and one of the main contractors ensuring the Guaranteed Savings Model.

The Guaranteed Savings Model is a risk-free approach for securing full economisation and savings for the operators and towercos. The model works by reducing the capex and opex to reach the optimal Total Cost of Ownership (TCO), while maximising the lifetime of the equipment.

TowerXchange: We understand IPT Powertech manages the energy equipment at a large number of Nigerian cell sites for IHS. How does the contract structure and operating conditions in Nigeria compare to those in Myanmar?

Khaled Habbal, VP & COO, IPT Powertech: As I mentioned, IPT Powertech Group is engaged in Nigeria with the largest towercos on the major project of Guaranteed Savings across the African continent, supplying energy efficient power

solutions—including management and long-term maintenance — and opex optimisation under a long-term contract.

As for Myanmar, we established our business there a little less than two years ago, by offering the Guaranteed Savings Model and T-ESCO Model. Myanmar has interesting potential for the future, and our growth there is stimulated by the need of this region for energy-efficient products and infrastructure services adapted to the local market's requirements. Based on our agreement, all future expansion of the network comes as a kWh model which is effectively our T-ESCO model.

According to this model, energy is sold as a service. We guarantee that no capex, nor capex replacement investment, is required from the operator. The operator will only be charged based on a consumption scale of our own solutions. We will be responsible for all the investment in capex, opex, replacement of spare parts over time, and system management.

TowerXchange: Who defines your energy equipment selection policy? Is it driven by your clients, Ooredoo and IHS, or does IPT Powertech decide what equipment to buy and install?

Khaled Habbal, VP & COO, IPT Powertech: Our selection of energy equipment is a two-phase process that run simultaneously: on one hand, our team undertakes extensive and thorough site surveys to gather useful information that will help us determine the appropriate type of energy equipment; in parallel, we conduct several meetings

with the client to clearly understand their needs, then we crosscheck their requirements with the survey results to decide on the best course of action. The findings of the field study and the customer's main demands are communicated back and forth with our IPT design team, who are always on standby mode to create customised solutions that fully compliment the client's requirements.

Our positioning in the market as the complete solutions provider has provided us with the expertise to propose the right solution that the client is looking for, and we move forward with development, manufacturing the equipment, integrating it within the system, and maintaining our own solution for optimal performance. In short, we provide customers with a complete and hassle-free service, so that they can focus their attention on their core business.

A key element behind the successful relationship with our clients is our common focus on the Total Cost of Ownership "TCO", and in particular that we work with IHS and Ooredoo on long-term contracts.

TowerXchange: Providing energy as a service in Myanmar and Nigeria is a costly undertaking. How is your business financed? Would you welcome third party investment to finance further deals of this nature?

Khaled Habbal, VP & COO, IPT Powertech: One of IPT Powertech's strengths is that it is self-funded, and this has given us an inherent autonomy when it comes to decision-making. Naturally, we take well-calculated risks, which is why we were able to grow

exponentially over the past years without needing external funding. Being highly capitalised with good financial backing from commercial banks allowed us to internally invest in and finance the Guaranteed Savings and T-ESCO models. The introduction of the Guaranteed Savings and T-ESCO models has been extremely successful and has gained the attention of new clients.

In order to accommodate this exponential growth and finance further opportunities, we have recently started looking for external funding though third-party investment or other type of financial means.

TowerXchange: There is often a tradeoff between capitally intensive hybrid and renewable energy equipment with lower operating costs and longer lifecycles, compared to other proven DGs and battery combinations that might have less longevity but which might be more familiar to field engineers - what is your energy equipment investment philosophy?

Khaled Habbal, VP & COO, IPT Powertech: Switching from the conventional solution to hybrid solutions has been an on-going dilemma in the last couple of decades for MNOs and tower companies.

Hybrid solutions were born from the need to reduce opex, which basically consists of maintenance expenses, fuel expenses and energy bills. When any of these expenditures increase — consequently increasing the opex — clients start searching for alternative power solutions. Therefore, we tailor our power solutions based on the country conditions and specificities such as solar and wind applicability, geographic and land conditions, accessibility to sites and the spread of sites and operation method.

When fuel prices skyrocketed in 2007-2014, the majority of the MNOs easily made the decision to switch to hybrid solutions and put an end to this dilemma. Nevertheless, it is not easy to identify the starting point of this switch since the investments and networks are huge. So the focus was on reducing the cost of diesel, which reached unprecedented levels and put a huge stress on MNOs on many levels: operation, logistics, vandalism, cost, and so on. Accordingly, we have designed solutions that reduce diesel consumption drastically. That was an appealing strategy since it eliminated the client's fuel stress while achieving a short payback time, given the high fuel price back then.

IPT Powertech always emphasised to the clients the required resources to run the solution and provided all the training needed accordingly.

Each country and operation has its own specificities and accordingly, their own suitable solutions. Therefore, and after the fuel price went back to lower levels, MNOs and tower companies started to focus more on optimising the maintenance expenditures to control opex. More attention was given to technologies used inside the solutions and its compatibility to the operation and country. Available technologies in the market were not an issue by themselves since they are mature enough and tested, but the technical capabilities of the technical teams and the available business model had a more direct effect on the operation of the solution.

To conclude, each time and period has its own energy equipment investment philosophy. With the price of oil today and the need to reduce opex, we are developing solutions that answer our clients' need.

We can assure that operational excellence is a strategy that proved successful across all times and this can only be driven by operational leadership and by continuously investing in our people.

TowerXchange: Finally, what lessons have you learned that might be transferrable in other countries where MNOs or towercos are considering partnering with ESCOs?

Khaled Habbal, VP & COO, IPT Powertech: Based on our experience, we believe that the long-term partnership between towercos, MNOs and powercos is essential and driven to deliver the lowest TCO.

Our group is proud to be among the few global players that have presence in multiple geographies in different continents along with power system integration expertise putting us in a unique position to be able to offer this end-to-end solution eliminating the otherwise unavoidable blame game which is seen almost everywhere.

Therefore, the single point of responsibility is key to the success of outsourcing power to become a service ∎

KIRLOSKAR OIL ENGINES LIMITED: A leading global presence

An interview with Joint Managing Director, RR Deshpande
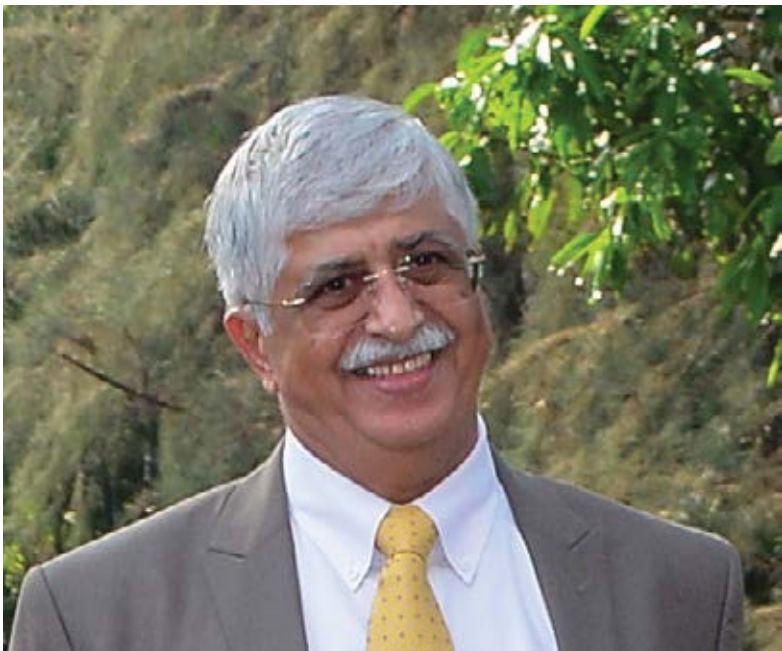
RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED

Having supplied to many of the leading towercos and operators in India, Africa and the Middle East; Kirloskar is a recognised name in the provision of green diesel generating sets to the telecoms sector. With a new product set to be launched and ongoing R&D to enhance generator lifespan, TowerXchange speak to Kirloskar's joint managing director, RR Deshpande to find out more.

Keywords: Africa & ME, DG Runtime, Energy, Energy Efficiency, Hybrid Power, India, KOEL, Kirloskar, KIRLOSKAR OIL ENGINES LIMITED, Opex Reduction, Who's Who

Read this article to learn:

- Kirloskar's history and values
- The company's range of products and how extensively they have been deployed
- Key companies Kirloskar has supplied to in the telecoms sector
- The lifespan of Kirloskar Green Generating Sets
- How the company is adapting to the demand for hybrid solutions
- What differentiates Kirloskar from its competitors

TowerXchange: Please can you introduce Kirloskar Oil Engines and its products to TowerXchange readers.

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: The Kirloskar Legacy stands for a tradition of excellence for more than a century now. A personification of leading values and visionary goals, the name 'Kirloskar' is engraved on numerous nation-building milestones. Today, the Kirloskar Group stands as an enormous industrial conglomerate.

Incorporated in 1946, KOEL is the flagship company of the Kirloskar group. We have four state-of-the-art manufacturing units in India that offer world-class service. The company has a sizable presence in international markets, with offices in Dubai, South Africa, and Kenya, and representatives in Indonesia and Nigeria. KOEL also has a strong distribution network throughout the Middle East and Africa.

Today KOEL is an acknowledged leader in the manufacturing of diesel engines, agricultural pumpsets, power tillers and generating sets.

Kirloskar Green Diesel Generating Sets – have a range from 5 kVA to 625 kVA. We will soon be launching 750 kVA to our global markets. Our products are most preferred in the telecom sector – having an installation base of 75,000 in this segment in India.

TowerXchange: What companies has Kirloskar Oil Engines worked with and what is the company's footprint?

> ## Kirloskar Green Generating Sets have a lifespan of more than 10,000 hours, and in-house R&D teams are continuously developing components and processes to ensure that the life and reliability of the product is improving

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: ATC (American Tower Company), Indus Towers , GTL, Reliance Communication, Idea, and MTN are the companies which Kirloskar has worked with. In terms of geographic footprint, we have supplied into regions including the Middle East, Africa and India.

TowerXchange: Generator lifespan and reliability is something that is frequently spoken about by towercos and operators - what kind of lifespan is reasonable and what can be done prolong it?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar Green Generating Sets have a lifespan of more than 10,000 hours, and in-house R&D teams are continuously developing

components and processes to ensure that the life and reliability of the product is improving.

Emphasis on regular maintenance and service practices provided by Kirloskar, and using genuine Kirloskar spares can surely prolong the lifespan of Generating sets.

TowerXchange: How does Kirloskar Oil Engines see the move to generator-hybrid systems shifting across the telecoms sector and what impact does this have on the company's strategy?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar is aware of the dynamics of the telecom market, and is fully equipped to provide hybrid solutions as per market demands, availability of alternate fuel/hybrid power remains a concern. Kirloskar is already has the technology and is working on providing a cost effective and viable solution.

TowerXchange: With generators often spoken about as a commodity item, how does Kirloskar Oil Engines differentiate itself from its peers?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar has a strong service network, and we have "service as a differentiator" . This puts us way ahead of other generating set manufacturers.

Kirloskar Generating Sets have lower operating costs, and robust performance at right cost makes us the most value added player in the Generating Set market ∎

Tower Xchange

Meetup Europe 2018

17-18 April, London

Meetup Americas 2018

20-21 June, Boca Raton

Meetup Asia 2018

4-5 December, Singapore

Meetup Africa & ME 2018

9-10 October, Johannesburg

www.towerxchange.com

Introducing tower designers and manufacturers Metalogalva

Metalogalva has manufactured over 200 towers for Unitel and Vodacom Mozambique in the last year

Bruno Mota, Metalogalva

TowerXchange asked Bruno Mota, Manager of Metalogalva's Telecoms Business Unit, to explain the quality differentiators and economics of telecom tower design and manufacture, and to describe and how they adapt to meet the changing needs of customers as their structural requirements change from capacity for single to multiple tenants.

Keywords: Who's Who, Steelwork, Tower Design, Tower Manufacture, Installation, Capacity Enhancements, Loading, Retrofitting, Procurement, Masts & Towers, Asset Lifecycle, Infrastructure Sharing, Europe, Africa, Vodacom Mozambique, Unitel, Metalogalva

Read this article to learn:
- The importance of sourcing high quality steel from a reputable company
- How the lifetime, and guarantee, of a tower is extended
- Designing towers to be easily upgraded for multiple tenants
- Metalogalva's experience supplying towers for Unitel in Angola and Vodacom Mozambique

TowerXchange: Where does Metalogalva fit in the telecom tower ecosystem?

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: We design, manufacture and galvanise towers, for telecoms, transmission line poles, substations, lighting poles, road structures, catenaries and solar structures. For the telecom industry, we manufacture monopoles, lattice and tubular towers from existing designs - Metalogalva's standard - or we develop a new design in order to meet customers' specific requirements.

We have our own factories, which we adjust according to the requirements of the work, with capacity to galvanise up to 140,000 tonnes per year. We have specialist equipment including welding robots, plasma and laser cutting machines and CNC machines for cutting, drilling and punching profiles and L shaped section. We also have in-house an automatic powder coating line (with capacity of 1400m²/day) and we have as well a liquid painting unit, so we are able to do the DUPLEX system with good quality at fair prices. Right now we are doing some interesting projects with camouflaged towers (Pine|Palm towers) for a partner with lots of experience in this niche market.

To get an idea of our capacity in telecoms, we recently produced 114 towers in under one month for Vodacom Mozambique.

TowerXchnage: What is Metalogalva's experience in Africa?

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: In the last year we have manufactured over 200 telecom towers which are now installed in Unitel's network in Angola and in the network of Vodacom Mozambique. We're looking to expand to send our towers to countries like Nigeria, Uganda and Tanzania.

In these cases we didn't sell directly to the operators, but were introduced by our partners locally. We've also sold towers into Algeria, Morocco, Cape Verde and São Tomé and Príncipe markets indirectly. We're interested in building relationships with other tower installation companies in Africa, in order to spread our product to other emergent markets.

Metalogalva also have several important clients in Europe, for example we supply towers to E-Plus and

> " We source our steel mainly from ArcelorMittal, the world's leading steel producer - we don't use second rate steel. It's important to confirm that your tower manufacturer uses raw material from a reputable company "

Vodafone in Germany, and two years ago we won a big project for TGV in France called GSMR Synerail to supply GSM towers.

TowerXchange: How should buyers distinguish between the quality of products offered by different tower manufacturers?

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: We source our steel mainly from ArcelorMittal, the world's leading steel producer - we don't use second rate

steel. It's important to confirm that your tower manufacturer uses raw material from a reputable company, and we use 3.1 certified raw material whether we're shipping to Germany or Angola. All the procedures we use are certified like for example welding (DIN 18800) or galvanisation (DASt22). We are as well certified by ISO9001, ISO14001, OHSAS18001, CE mark and EN1090 (EXC3).

There are different standards and specifications in different markets. Our solutions meet the customers requirements and they are adapted to the location

where they will be placed. We have a technical department with eight Structural Engineers able to design structures according to any norm required: Eurocode or TIA for example.

The lifetime of a tower has a lot to do with the thickness of the paint and the zinc galvanisation, so we can offer towers with a 10, 15 or even 25+ year guarantee depending on the client's requirements and its own respective budget. We use the 1461 Euronorm standard for galvanisation.
Our competitiveness comes from optimised and custom solutions, introducing technology on the production process such us robots, lasers, powder coating, and also Kaizen concepts.

TowerXchange: What is the tradeoff between tailor made solutions to meet the specific requirements of each cell site versus installing standard, and therefore lower cost, towers?

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: If we have an order for 200 different towers then that requires lots of unique designs to be verified, lots of different drawings to be prepared - a lot of work is needed before manufacture. In addition the performance of our production line will be reduced, making our solution less competitive. So instead the optimum solution might be to create four variants on a standard tower, enabling us to produce four batches of fifty towers for example, so we can offer a more competitive manufacturing price, and facilitate easier mounting/logistics of the structures on the field.

> " We have a multidisciplinary team of engineers who can quickly verify if it is possible to apply more load "

There are fixed costs that are the same whether we're producing one tower, 50 or 200. We're very competitive at a larger quantity as we can use serial production techniques.

TowerXchange: Tell us about the implications for the design and reinforcement of towers as clients add additional tenants.

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: There are now a number of companies offering solutions to reinforce towers to achieve more capacity.

If one of our customers wants a tower with 6sqm on top, we may evaluate their requirements and find they can be met by a standard tower, or we may need to design a new structure. Then if the customer wants to add additional antennae, requiring additional capacity, then we have a

multidisciplinary team of engineers who can quickly verify if it is possible to apply more load. If there is no additional capacity, the customer may need to reinforce or replace the tower.

We can also offer towers designed to be easily upgraded after installation. For example, we recently applied for a tender in France for two variants of 30m tower designs, evolutive and non-evolutive. The evolutive designs have 4sqm of capacity at the top, but it is possible to add an extra section to add a further 3sqm of capacity to enable sharing the tower with more operators, so we design the structure for 7sqm capacity.

TowerXchange: Finally, please sum up how you would differentiate Metalogalva from other tower manufacturers.

Bruno Mota, Business Unit Manager - Telecom, Railways & Special Projects, Metalogalva: In 2013 we invested €6.6m in new equipment, enabling us to produce towers more efficiently.

Moreover, we have been serving the market for 42 years, which means we have a lot of 'know how' in what we do.

We think it's very important to achieve our lead time commitments, whilst maintaining quality.

And we think it's important to give constant support to our customers, to act quickly to meet their needs, which means Metalogalva has many happy customers! ∎

Driving up quality amidst operationally and economically challenging conditions

How NETIS established their leading reputation in the African market

Michael Shehata, Maintenance Director, NETIS

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

> "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 audit"

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 ■

See you at our future events!

Meetup Europe 2018

17-18 April, London

Meetup Americas 2018

20-21 June, Boca Raton

Meetup Africa & ME 2018

9-10 October, Johannesburg

Meetup Asia 2017

4-5 December, Singapore

Tower Xchange

www.towerxchange.com

NorthStar: more than just a battery company

Market leaders in premium lead acid batteries committed to understanding and resolving their customers' energy storage problems

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery

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: Please introduce NorthStar to our readers - what role do you play in the telecoms infrastructure ecosystem?

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: Since 2000 NorthStar's telecom batteries and site solutions have been delivered in more than 150 countries. NorthStar helps its customers globally to extend battery life and save energy by providing High Performance AGM Batteries specially designed for different grids and telecom applications – I believe today NorthStar Batteries makes the best AGM batteries in the industry.

But NorthStar Battery is more than just a battery company. We also have a unique expertise in power systems for emerging markets which is key to optimise battery life and energy saving.

TowerXchange: We usually ask how many cell sites in Africa, LatAm and Asia the interviewee's solutions are installed - I guess that may be difficult to specify given the scale of NorthStar's business! However, can you give us a sense of the size of your telecoms business in those three regions.

Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: Tens of thousands sites in MEA are equipped with NorthStar products. In Pakistan alone, Northstar has equipped over 5,000 sites with a pure fuel saving application delivering outstanding results. Many thousands of hybrid

sites in Africa have been equipped with NorthStar technology since 2000.

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?
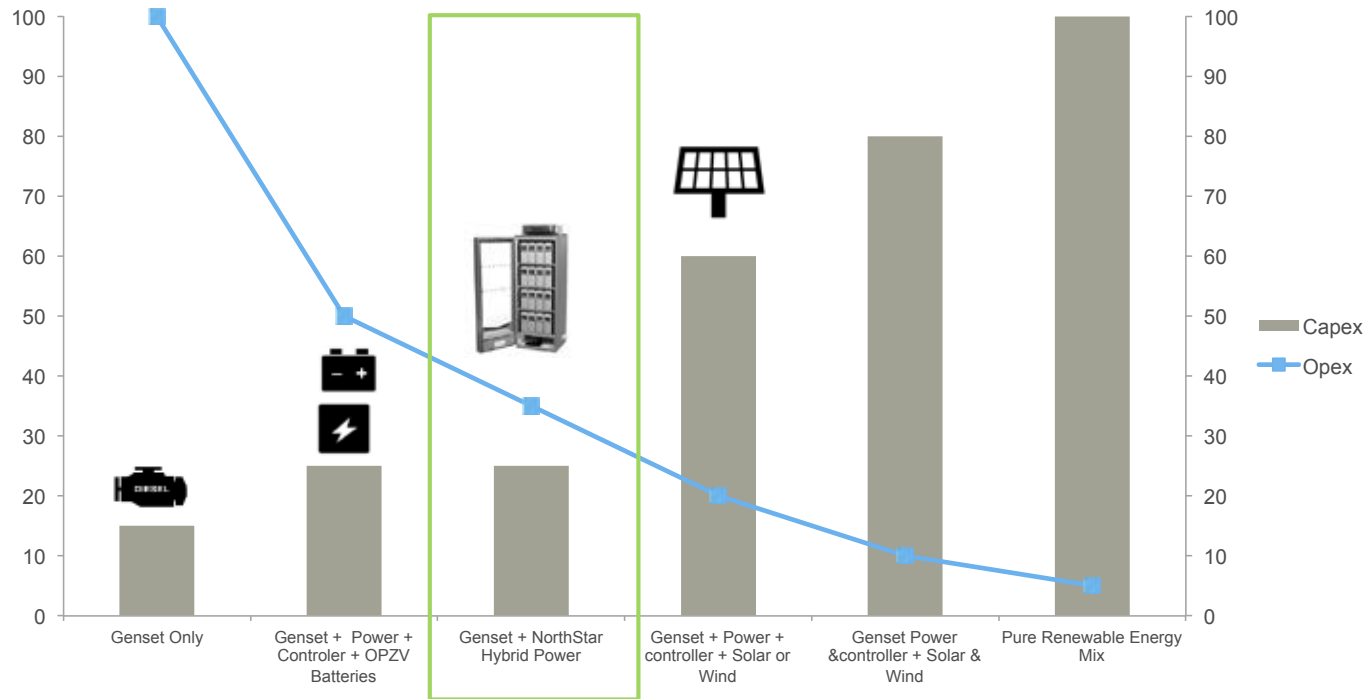
Thierry Tardivent, Head of MEA and APAC, NorthStar Battery: We think there is too little understanding of why batteries are failing. While the right choice of battery is crucial, it's as much

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 lauching 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?

Source: NorthStar Battery

Capex (bar, grey)
Opex (line, blue)

X-axis categories: Genset Only | Genset + Power + Controler + OPZV Batteries | Genset + NorthStar Hybrid Power | Genset + Power + controller + Solar or Wind | Genset Power &controller + Solar & Wind | Pure Renewable Energy Mix

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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

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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 accelerate 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.

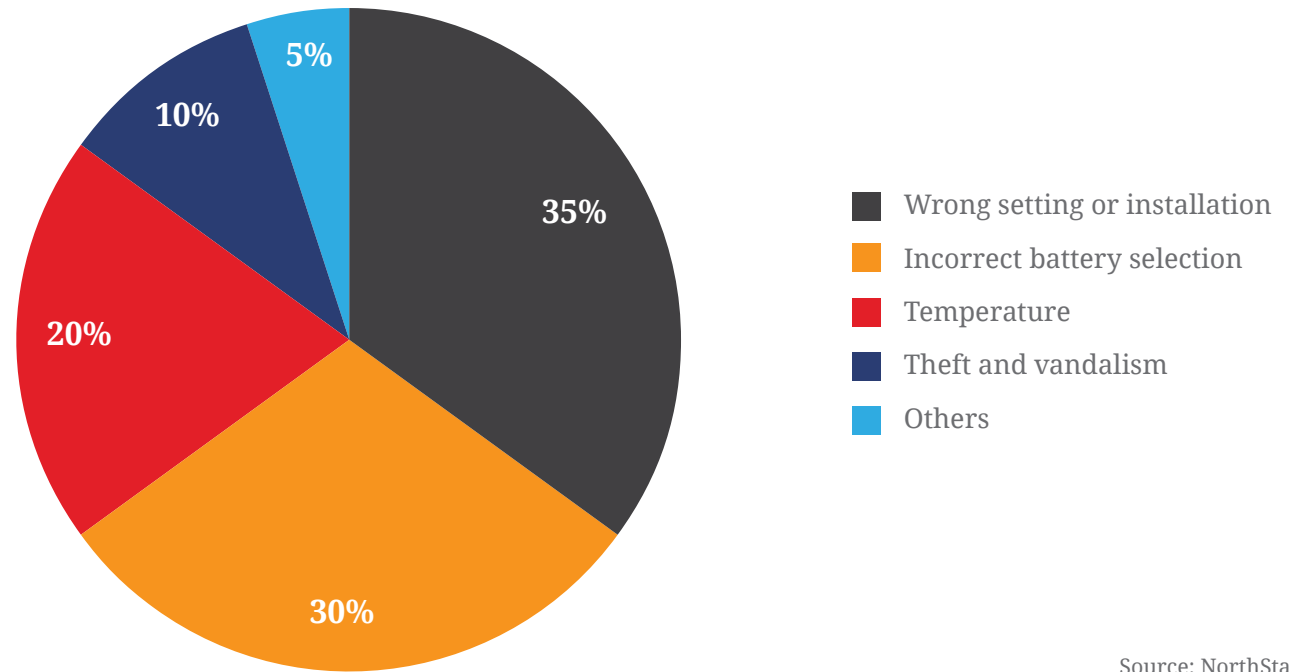years if you payback the investment in three to four months.

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.

Why are telecom batteries failing so early?

- ■ Wrong setting or installation — 35%
- ■ Incorrect battery selection — 30%
- ■ Temperature — 20%
- ■ Theft and vandalism — 10%
- ■ Others — 5%

Source: NorthStar Battery

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 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 the 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'! ∎

Sera4: Combining advanced security software with custom made hardware

An innovative approach to tower security

David Coode, CEO, Sera4

Security continues to be a major challenge for businesses in every sector, especially when valuable equipment out in the field is at risk of theft or vandalism. No security measure is 100% reliable, and electronic solutions present some risk of being vulnerable to hacking. Many towercos are striving to eliminate the need for physical keys that can be copied, and to combine advanced electronic security measures with sturdy doors, gates and locks. We recently spoke to David Coode, CEO of Sera4, an exciting new security solution provider that traces its roots back to BlackBerry.

Keywords: Access Control, LockedUp, NOC, RMS, Sera4, Smartphone, Who's Who

Read this article to learn:

- The benefits of providing site access through a mobile API
- Creating a custom-built physical security solution for each site
- Tracking site access through an online NOC
- The importance of putting electronic security first

TowerXchange: Please introduce your company and tell us about your background.

David Coode, CEO, Sera4: We're a Canadian-based company that provides secure end-to-end distributed access solutions. Sera4 was born out of the ashes of BlackBerry and operates out of the USA, Canada, and Mexico. The founder of the company is our CTO, and he worked on BlackBerry's wireless technical team. The security technology that BlackBerry is famous for is the same that we use to manage remote locks which can be accessed using smart phones. Towercos among our first clients and more recently we have deployed our solution across multiple telecom companies within Latin America. Deploying our solution within Tier-1 towercos and telecoms afforded us to deeply understand the niche needs of both Towercos and Telcos. We have now developed a very compelling value proposition for emerging markets around the world. Our clients had towers that were being vandalised and robbed quite frequently, and they were very happy with the ROI of our solution.

My background is in medical electronics. I spent over a decade at ON Semiconductor, the tenth largest semi company in the world, focusing on electronic solutions at board and system level. The medical electronics industry is highly regulated and requires very high reliability and security. The skills learned there translate well into industrial electronics.
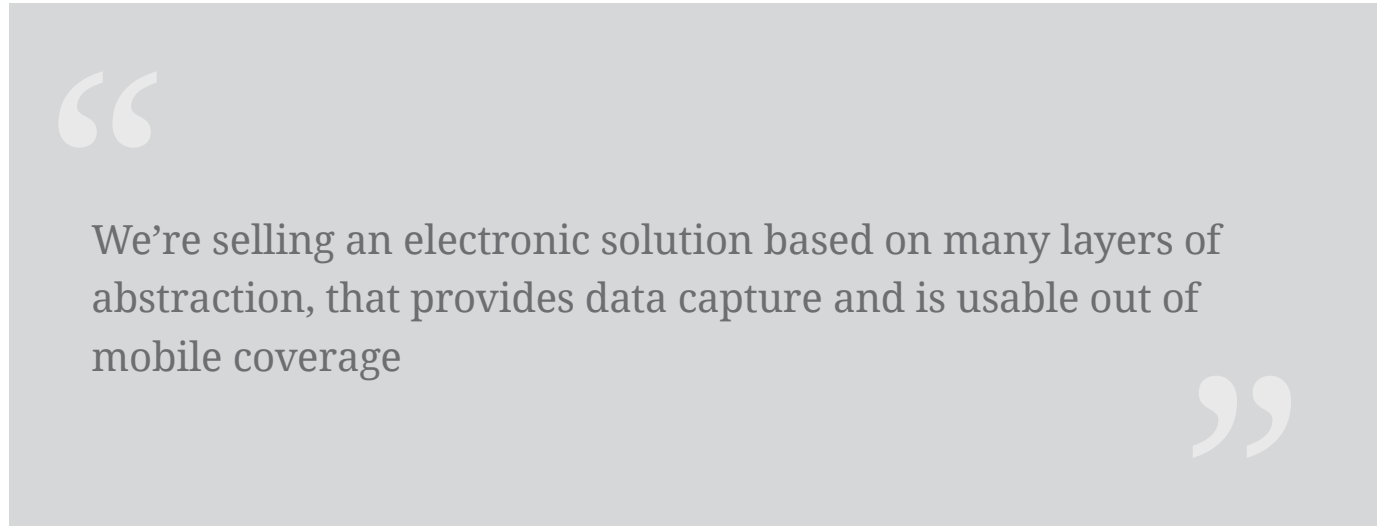
TowerXchange: Tell us about your solution and some applications in the field.

David Coode, CEO, Sera4: The solution has three components; we provide a cloud-based Network Operations Center (NOC), electronic controllers that work with virtually any lock, and smartphone apps that enable secure onsite access. Keys are provisioned to end-user smart phones via the NOC, then used via a secure Bluetooth protocol. Encrypted security certificates unlock the mechanism in the lock. The keys can be programmed at the NOC to expire, and the locks keep a log of every use, letting clients know who has entered and at what time. This makes it much more difficult for contractors to pull off inside jobs as all movements are tracked and linked with a smartphone. We also integrated various electronic and hardware features on the locks to keep people from getting locked out.

Our solution was built with a strong focus on the security software behind the locking mechanisms, which is very important in this era. There was a competition at last year's DEF CON conference in which hackers were given fifteen minutes to open sixteen smart locks. When the time was up, twelve out of the sixteen locks had been compromised. We did an analysis of the methods that were used to hack the locks, and we're happy to say that ours would have been invulnerable to any of the attacks used.

TowerXchange: How has your solution addressed the needs within Emerging Markets?

David Coode, CEO, Sera4: One example is how we securely managed physical access to perimeter

> "We're selling an electronic solution based on many layers of abstraction, that provides data capture and is usable out of mobile coverage"

gates, facility doors, and various cabinets to reduce theft & vandalism resulting in an ROI of less than 3 months. This client had over 60% of theft occurring by someone with authorized access. This client wanted to manage common keys with the ability to secure grant and revoke access to employees and contractors in an operationally efficient and cost-effective manner.

By partnering with Sera4 our client was able to eliminate the need for physical keys, integrate our solution with their pre-existing provisioning system, provide real time access control, remove user anonymity, and generate trusted access logs for audit compliance. The client then leveraged existing smartphones to remote manage 1000s of digital keys

TowerXchange: What differentiates your product from others on the market?

David Coode, CEO, Sera4: Most of our competition within emerging markets are selling a complete locking cylinder or a specific type of hardware. They're basically lock companies selling hardware with an added electronic component. We're selling an electronic solution based on many layers of abstraction, that provides data capture and is usable out of mobile coverage. We then work with integrators and installers to create different mechanisms tailored to a client's physical needs from a security perspective and based on the size and layout of their facility. It works with cabinets, shelters, doors, fuel tanks and gates, which can all be connected to the same system. We offer powerful security technology that can be integrated with any physical lock.

We work with partners to do custom ironwork; as an example for a cabinet they would install a three foot angle bar which would take ten minutes with a grinder to get through. We work to integrate our technology into existing small locking mechanisms

like drop bolts and swing locks. Our premium solution for towercos is a small black box with wireless control of high-power lock actuators and sensors built-in to detect unauthorised access.

TowerXchange: What is the typical capital outlay per site to install your solution?

David Coode, CEO, Sera4: This varies a lot because our solutions are often customised and we often sell through integrators who do the ironwork. Our clients are happy since the cost of the solution is a fraction of the cost of a theft. We provide security for access to whole site or it can be on specific cabinets with equipment.

TowerXchange: How can data from access control systems be integrated with maintenance workflows and job ticketing to reduce O&M costs?

David Coode, CEO, Sera4: A big strength of smart locks is the simplicity of contractors not having to go pick up a physical key, and in addition it's risky when multiple people hold keys to the site; there's always a risk associated with this. On our system the keys sent out to the end users' mobile phones are active only for specific time windows, and data logs are maintained to see who's been in, and for how long. Our clients have access to this data and use it to improve efficiency and know who has been on site. It can also give updates on the location of a lock and sends alerts if a door or lock is open when it shouldn't be. Sometimes a door isn't closed properly or something makes it jam, but the clients

are promptly alerted so that security problems can be addressed immediately.

TowerXchange: What else can you tell us about your NOC?

David Coode, CEO, Sera4: The NOC is an interface to our secure servers. We operate a robust, global server network. NOC support is optional with our solution and clients can manage site security in-house integrating the server with their NOC or dashboard through the API. Most of our clients prefer having security experts like Sera4 managing and maintaining the service. The portal that they access the NOC through can be customised and branded or re-skinned, and it is always kept up to date with the latest features from Sera4.

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

David Coode, CEO, Sera4: Our company is about technical leadership, exceptional customer service, and the enabling of secure enterprise-grade wireless access control. We bring the latest technology to solve the specific physical access control challenges being faced by towercos and telecom companies. We deliver the best in security, features and ease-of-use to any locking system. We have a proven track record of working successfully with network security teams and physical security experts to design custom access control solutions. We work very closely with all our clients and we understand the unique needs of emerging markets better than anyone else ■

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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

Keywords: Africa & ME, Business Case, Energy, Energy Efficiency, Energy Storage, Fuel Cell, Fuel Security, Hybrid Power, Microgeneration, O&M, Off-Grid, On-Grid, Opex Reduction, Outdoor Equipment, Renewables, ROI, SerEnergy, Site Level Profitability, Unreliable Grid, Who's Who

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 CO_2-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.

TowerXchange: 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.
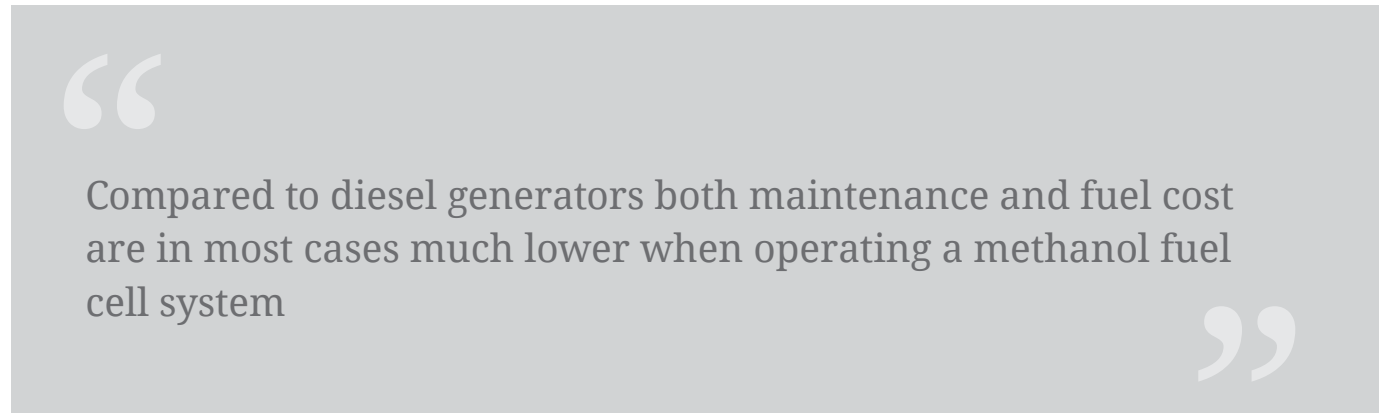
> " Compared to diesel generators both maintenance and fuel cost are in most cases much lower when operating a methanol fuel cell system "

Examples are core telecom sites and security networks but also systems located in regions where you often see extreme weather and environmental conditions with earthquakes or typhoons for example causing long blackouts on the grid.

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 CO_2-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 allow 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 CO_2-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 ∎

Accelerating and enhancing ROI on new and retrofitted hybrid systems

How TECNOELETTRA combine design expertise and in extensive in the field experience to bring energy savings to African telecoms

Davide Zanichelli, CEO, TECNOELETTRA

Keywords: Africa, Batteries, DG Runtime, Energy, Energy Efficiency, Energy Storage, ESCOs, Monitoring & Management, NOC, O&M, Off-Grid, On-Grid, Opex Reduction, Rectifiers, Renewables, ROI, Solar, Tecnoelettra, Unreliable Grid, Uptime, Who's Who

Read this article to learn:

- How TECNOELETTRA accelerated from family business to global brand
- The challenges tower owners face in African markets
- Anticipated ROI versus traditional power solutions
- How retrofitting and working with existing systems can deliver hybrid results
- TECNOELETTRA's plans and ambitions for the future

TowerXchange: Please introduce TECNOELETTRA to our readers

Davide Zanichelli, CEO, TECNOELETTRA: TECNOELETTRA is a dynamic Italian company, globally recognised as high quality manufacturer of controllers and innovative solutions for power supply application. The generator market is our core business where we make almost 80% of our turnover and where we can offer a very wide range of solutions and products.

Since 1985 our vision has always been to approach customer needs with enthusiasm and passion for our job, while keeping our focus on creating a customised solution for the customer.

Our WWT2020 (WorldWideTECNOELETTRA2020) strategy is a vision which has transformed TECNOELETTRA from a family (but always independent) company, to a global organisation that works all around the world, directly or through strategic distributors or local partners, while keeping the same passion with which we founded the company 35 years ago.

All our products are 100% made in Italy and a team of specialised engineers for each application permits us to very quickly develop a customised solution to satisfy every request.

In last six years we have focused our efforts trying to lead the telecoms market and honestly I'm so proud and satisfied with our results today. Our solution for the telecoms market is called TILS (Telecom InverterLess System), and thanks to

this project we can give incredible benefits and ROI to towercos, service providers and generator manufacturers.

TILS is not only a product, it is a complete solution, a complete package consisting of our HYBRID controller, our PMG alternator and all the components needed to make a DC variable speed hybrid system/generator, plus probably the most advanced remote control of the fleet.

A key point of our TILS controller is the smart-software: behind any function there is the target to keep the BTS alive. It means that in case of an alarm we are not simply shutting down the system, rather the controller looks for a possible solution to bypass the problem and, even with reduced performances, to keep providing energy to the BTS.

TowerXchange: What is TECNOELETTRA's footprint? How important is the African market to you?

Davide Zanichelli, CEO, TECNOELETTRA: Africa is our priority 24/7.

We entered into Africa with TILS, and we are already supplying more than 2,000 BTS sites. Thanks to this experience, I can confidently say that TECNOELETTRA now has very deep in the field experience and the hybridisation of telecom sites is our top priority every day.

From this incredible experience we understood and we saw with our own eyes how important it is to support operations in the field and because of this

we have a team which is always ready to come over to Africa to assist and provide training to people and customers.

We are creating, with success, a strong commercial distributorship and finding new partners in each African country.

TowerXchange: Can you explain which of your products and services are most popular in African telecoms?

Davide Zanichelli, CEO, TECNOELETTRA: Looking back at what we have done in the last six years we can see that there are different requests for different applications. We are still manufacturing a lot of panels for dual DG set installations, using a dedicated controller and integrating in a single panel controllers and ATS. This remains one of the strongest products in TECNOELETTRA's portfolio for the African market and generally for the global telecom market.

But what has become more interesting is our proposal for the hybrid application, where our TILS brand has grown a lot in terms of volume, different configurations and optional availability.

Right now we are present in Africa directly, with our dealers or customers, or through our European and Asian customers which export their product with TILS into Africa.

Our hybrid application offering spreads from components plus panels to practically the full package. We can provide the main components of

the TILS kit plus control and power panels. In this case the hybrid DG set manufacturer has to add only an engine, canopy and battery bank and the hybrid unit is done. But through our partners we can also propose different configurations of DG sets, from a basic package without a fuel tank and without a battery bank, to an all-in-one product with 1000 litre fuel tanks and battery banks (with both lead or LIFePO4 technology).

Pre-sales and after-sales are two key points in term of service in the telecom market. The pre-sales activity is mandatory to show to our customer that TECNOELETTRA can be the right partner. We can assist the customer in the design of the power station, and we can follow their requests for customisation. Through our after sales service we are close to our customer during the commissioning of their solution, so we can propose training and we can offer 24/7 assistance through our TRM (Tils Remote Management system). One of our most popular services is the analysis of data collected by the TRM (up to 12 months): with this activity we can suggest how to improve the hybrid system's performance in situ, so that the customer can see immediate benefits.

TowerXchange: Tell us about your experiences in African telecoms, what do you see as the main hurdles tower owners need to overcome in the short term? Do you have any case study examples to share?

Davide Zanichelli, CEO, TECNOELETTRA: Hybrid is the answer to a lot of the requests we receive. But hybrid solutions can disappoint if not properly

Figure one: Screenshot from TRM (Tils Remote Management)
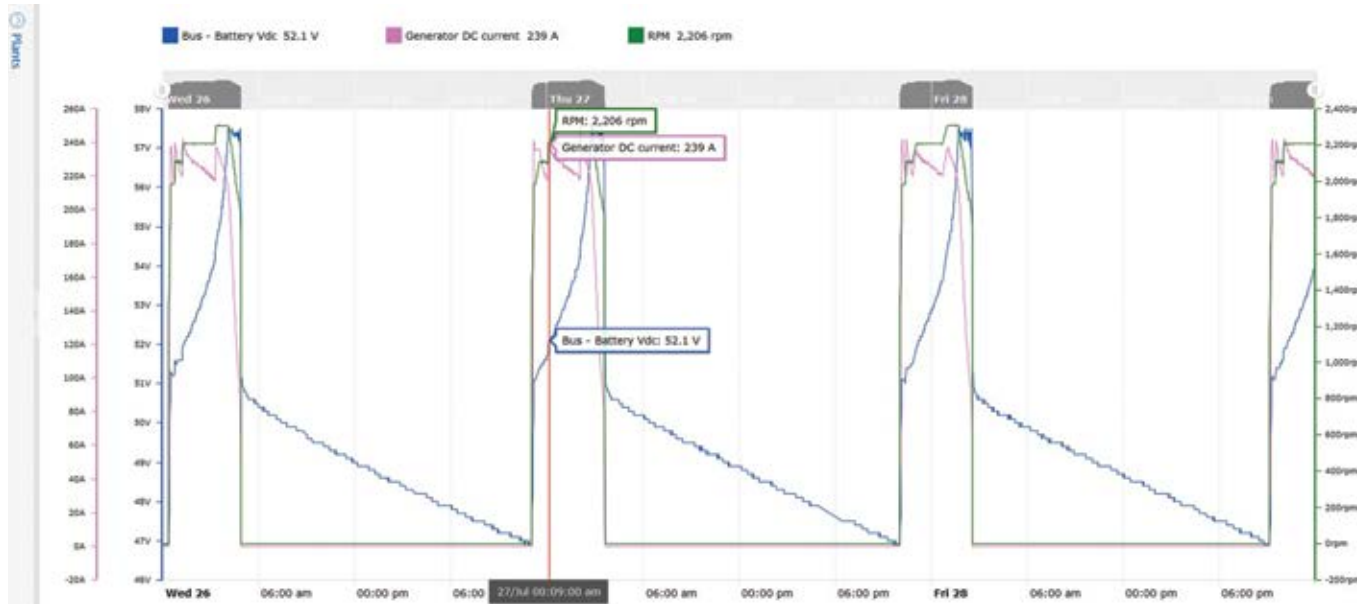
sized. We have often seen the wrong combination of DG set power/battery bank capacity/BTS load. It does not make sense to have a small DG set while there is a big battery bank or a high load. As a consequence the DG set will not be able to properly charge the battery and the result of that will be an hybrid unit running 24/7. TECNOELETTRA can share its knowledge and experience, collaborating with service companies, operators or towercos to help design the full power system. Figure one (a screenshot from the TRM) gives you an idea about the performance of a TILS DG set properly sized; approximately five hours of DG set running followed by approximately 18 hours of standby.

One of the quotes that remained in my mind from the TowerXchange 2016 Africa and ME report was:

"Technology is not the biggest issue – people are." Skills are scarce when it comes to the installation and maintenance of complex distributed generation systems; make them as simple as possible, and training is key. This is absolutely correct. And this is why we have worked to make TILS as simple as possible, removing components that can fail and introducing the concept of "one brain": our TILS controller is the only device in the hybrid unit that teams on the ground have to learn. There isn't an inverter like in a hybrid unit, and there are no other devices that have to be programmed or adjusted according the application. Moreover, the controller can be remotely set to reach the best performance.

We are also aware that the success of our clients is our success. This is why at TECNOELETTRA we

follow our products from the commissioning at the customer site, to the field installation, and even later through the TRM (Tils Remote Management). And this is why we push for the training to all the supply chain team. Maybe different training levels, but training on connections, on settings, on installation and on monitoring are mandatory.

TowerXchange: By optimising equipment and reducing service costs, what kind of ROI can TECNOELETTRA customers expect to see?

Davide Zanichelli, CEO, TECNOELETTRA: The hybrid concept pulls together green energy and OPEX reduction. We cannot forget that the introduction of hybrid units is not only a matter of savings, but it is also a necessity if we want to reduce the ambient impact of the BTS power supply. We have only this world: if the technology allows us to reduce the pollution and the CO_2 footprint, it has to be considered.

TILS is a kit created with the clear target of OPEX reduction. There are two levels of savings, one is on the equipment, the other is on the hybrid concept.

TILS uses a high efficiency PMG instead of a traditional AC alternator and uses a simple and with no electronic rectifier bridge instead of an inverter, and works with a variable speed technology to optimise the engine fuel consumption. This is the first step, and even without the hybrid package the TILS DG set can provide interesting benefits compared to a traditional fixed speed AC DG set.

Figure two
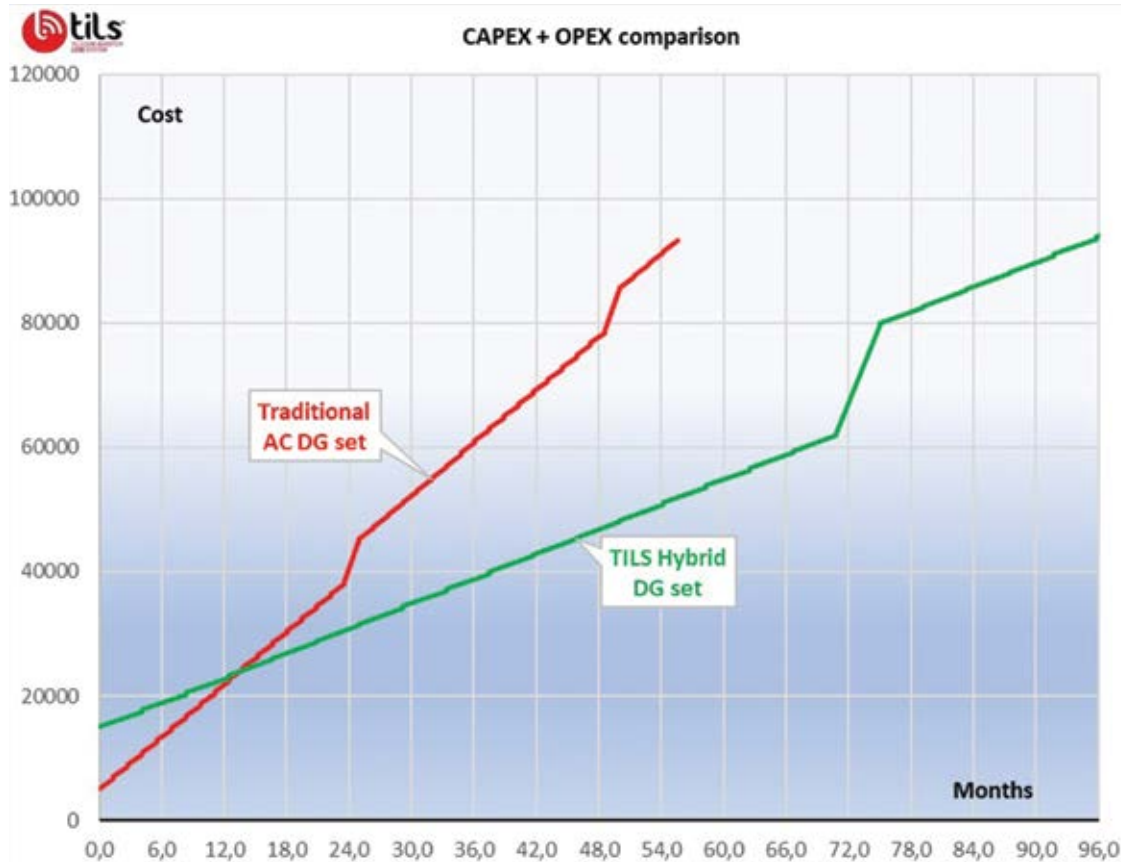
But with the integration of a battery pack the TILS benefits are becoming really large. Let's just concentrate on three key data sets obtained from a typical TILS installation (off-grid, without PV):

Fuel consumption: 50% compared a traditional DG set

Service intervals: three times longer than a traditional DG set

Engine life expectancy: three times longer than a traditional DG set.

With the above data and with our "ROI Calculator", a tool we can provide to our customer, we can track performance as per figure two.

As you can see the ROI is around 12 months. Generally, depending on the different installation and fuel cost, the ROI goes from 12 to 24 months.

But since the slope of the two cost lines is quite different, the savings after ROI is achieved are even more interesting, as per figure three.

In this case, after five years (which could be the life of the hybrid unit) the saving is higher than €40,000 for a single installation.

TowerXchange: Can you share TECNOELETTRA's plans for the future? How do you see the African market maturing and what will your role be in this evolution?

Davide Zanichelli, CEO, TECNOELETTRA: Hybrid technology, if properly sized and installed, can provide a lot of benefits to all the players in the telecom market. But the introduction remains very slow, and mainly remains focused only on new sites.

We think that African market is ready to invest in the hybridization of existing BTS. By this I mean to keep the overall configuration of the power plan, and just introduce the TILS package and a suitable battery bank.

Together with different towercos we have analysed how to integrate a TILS solution in sites still covered by traditional DG sets running 24/7 or running more than 12 hours a day. The cost of the operation can be quickly paid back through fuel saving, engine life extension, and service interval extension.

TECNOELETTRA is ready to assist towercos in this important "retrofitting" operation, starting from the technical integration, moving to the cost

Figure three

DELTA COSTS
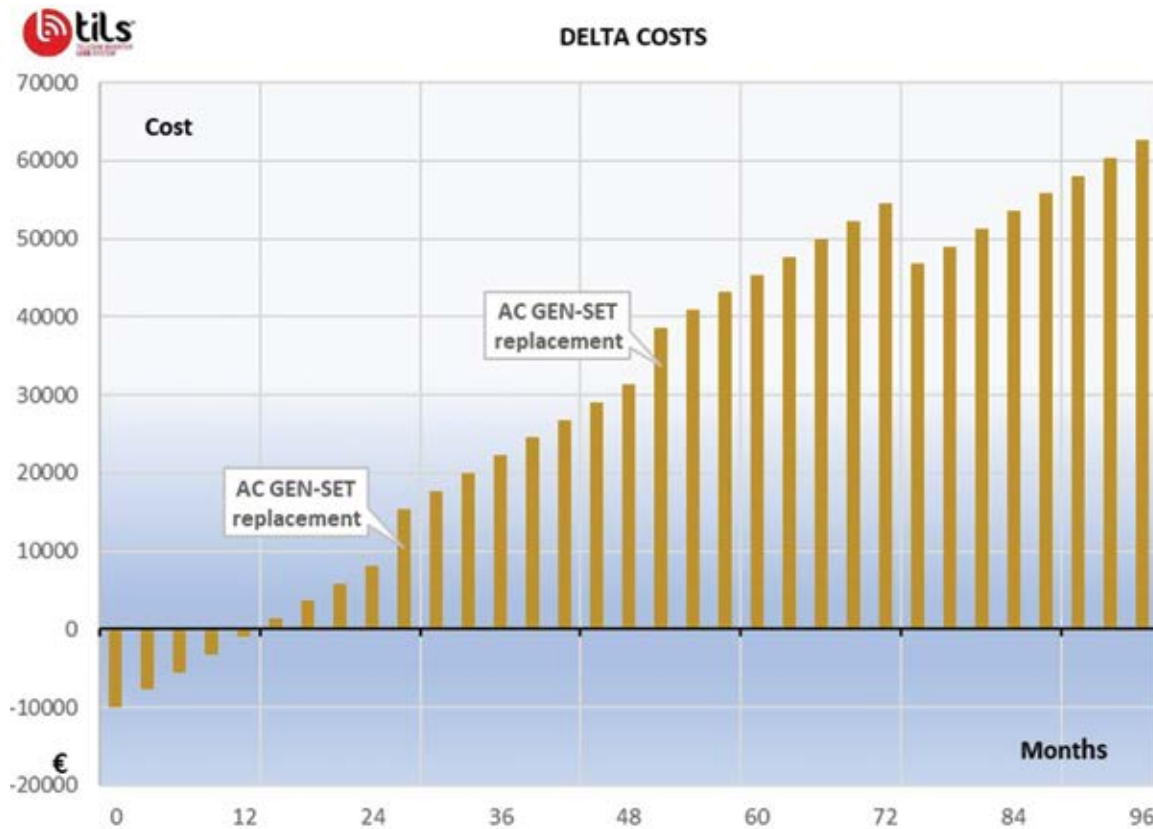
analysis and benefits (ROI), passing through all the logistical issues, and ending with installation and commissioning.

We are looking to establish deep partnerships, where companies trust each other. We have to expand the relationship we already have with a lot of our customers: if you have a problem, trust us and we will help you to fix it. Or even better: if you have a project, trust us and we will be at your side to reach your target.

In terms of the maturation of the African market, i think that there is a lot of potential on this continent, but we have to respect the tradition and the work style over here. The opportunities in Africa are everywhere, but we need to not come here thinking we can teach the 'right' way. One thing we feel is critical is training people about our products, another thing is listening and learning from those who know local ways of working better than us ∎

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Rethinking cell site power systems

Vertiv's take on how and why system design is evolving

Formerly Emerson Network Power, Vertiv is a leading authority on the design of cell site power systems with experience stemming from working with operators and towercos across the globe. TowerXchange had the pleasure of speaking with Chris Williams, Vertiv's Vice President of Sales to get the company's take on how and why they see telecom power systems changing.

Keywords: Africa, Batteries, Community Power, DG Runtime, Energy, Energy Efficiency, Energy Storage, Hybrid Power, Lithium, Microgeneration, Off-Grid, On-Grid, Rectifiers

Read this article to learn:
- The scope of services and products that Vertiv offer
- Key considerations often overlooked in the design of power systems
- How Vertiv see lithium ion stacking up against lead acid batteries
- The limitations of renewable technologies and where the best use cases are
- The potential held by connecting telecom power systems to micro-grids
- Where the telecoms sector can expect to see evolution in power systems

TowerXchange: Please can you introduce Vertiv and the scope of the products and services it offers in the telecoms sector

Chris Williams, Vice President, Sales, EMEA, Vertiv: Vertiv designs, builds and services critical infrastructure that enables vital applications for data centres, communication networks and commercial and industrial facilities. Formerly Emerson Network Power, Vertiv supports today's growing mobile and cloud computing markets with a portfolio of power, thermal and infrastructure management solutions including the Chloride®, Liebert®, NetSure™ and Trellis™ brands. Sales in fiscal 2016 were $4.4 billion.

Vertiv serves the needs of the major telecom operators and leading tower companies worldwide providing critical infrastructure products and services for deployment in mobile access, fixed line networks and telecom core and data centre facilities. Vertiv offers a complete range of services to help customers improve the operating performance of their critical infrastructure, to deliver capacity expansion and to optimise energy costs for operating their infrastructure. As a truly global company, Vertiv has the capability and organisation to help customers roll out critical infrastructure projects wherever in the world.

TowerXchange: With Vertiv supporting operators and towercos in the design of power systems on sites can you tell us some of the most important

considerations to take into account and explain what companies may often overlook?

Chris Williams, Vice President, Sales, EMEA, Vertiv: The fast answer is the ease of quick deployment of a reliable solution, supported with a comprehensive warranty across the site.

With the emergence of other technologies, such as solar, combined with the traditional breakdown of components, what is often lost is the ability to verify that the solution works "well" as one solution. Once you migrate to thinking about the best solution, you address the issues that are often overlooked - Is there space for the equipment under the array? Have fences been accounted for, such that best practices are applied to shade and landscaping? Has the solution been design from array to load (where a compromise on one component is not passed to another)? How do I isolate any surges, before we enter into the cabinets? Is there local training to get the right start and is there a help desk to call? Et cetera.

Think of the site as a one solution that encompasses planning, power, energy and service.

TowerXchange: We hear a lot of talk about lithium ion batteries at present, what is Vertiv's take on the technology? Is the cost at a level where it is competitive? What will be the use cases and how extensively will they replace lead acid?

Chris Williams, Vice President, Sales, EMEA, Vertiv: Vertiv was there when lithium entered the telecom market more than 11 years ago, but lithium had to withdraw and it has re-emerged in some local markets. Participation in this early start illustrated the need to apply some caution, as reliability in the lab and durability in the field are not the same. Vertiv has been a key provider in India, the largest market and proving ground for telecom lithium for the past 4 years. The success of lithium in this very cost sensitive market illustrates that lithium has a role and this role will expand.

What were the market conditions in India that made lithium so attractive, and will this be a factor in Africa? Simply Lithium's tolerance and response to bad-grid conditions from micro-cycling to recovery speed, make lithium batteries an effective replacement; this has reduced India's dependence on standby generators. These advantages are also applicable to Africa and initial growth will be pushed as a replacement for lead acid batteries at "troublesome sites".

Continuing on the challenge of troublesome sites, the change in technology and packaging will substantially reduce theft, and thus finance its own entry into Africa.

There are other gains with lithium that Vertiv sees the benefit of, such as reduced space for small capacities (very small loads) and reduction on floor stress (converged architecture in existing central offices). Lead is the low cost entry solution which has established a reputation over decades for providing reliable service in on and off-grid applications; we foresee "lead" remaining the main contender, however it will slowly lose market share as lithium plays to its strength: size and weight for small capacity environments and recovery in bad-grid environments. If it is a solution to stop theft, the transition to lithium may be a disruptive change over.

TowerXchange: We've seen solar starting to be installed more widely but there are constraints on the use of the technology, not least the space required for solar arrays. What kind of sites are suitable candidates for solar and how can site design be improved for solar to make more sense?

Chris Williams, Vice President, Sales, EMEA, Vertiv: The good news is solar is an adaptable source for many applications; it can assist with bad-grid conditions as a supplementary power source to reduce stress on batteries; in on-grid environments it can be used to reduce expensive utility bills typically associated with remote (island) local AC generation; and in remote off-grid sites it can be used as the supporting energy source maintaining the batteries and reducing demand on generators (both in terms of maintenance and diesel fuel usage). Although solar can be applied to any site, its primary constraint is that it is a low density energy source - as indicated in the above question.

Acknowledging the practical limits of space, solar's best fit is on the network edge in remote locations.

TowerXchange: Do you see opportunities with other types of renewables?

Chris Williams, Vice President, Sales, EMEA, Vertiv: Other renewable sources do exist and can be used, but these solutions do not have the same supply chain or scale as solar to provide the same cost point. Most of these elements often focus on a consumer market, versus addressing upfront the needs for unattended durable commercial solutions. It is acknowledged that other renewable solutions such as wind, may be a good alternative in certain locales, but its rollout is very limited as it drives another set of skills for planning, installation, operations and ongoing maintenance.

TowerXchange: Do Vertiv have experience in connecting sites to micro-grids? How big an opportunity do you think there is in doing this, what are some of the challenges in designing and operating such projects?

Chris Williams, Vice President, Sales, EMEA, Vertiv: Micro-grids and distributed-grids continue to evolve both in terms of expectations and concepts, acting as an emerging answer to a diversified energy market. As such, the purpose, size and financing appears to be in flux, as the world tries to consider how to integrate dynamic telecom energy islands into a larger system, whilst guarding the security of telecom service delivery. Financing of dynamic

implementations remains the primary barrier, any implementation increases the burden on executing the project which brings the question, who bears the additional cost to "help the grid".

Despite this initial negative comment, to date some carriers are stepping up with the most common strategy being the intentional disconnect of site(s) from the grid, sometimes referred to as "Demand-Response". In this instance carriers disconnect at the request of the utility to reduce grid stress and maintain service to other utility customers. Proof of concepts have been successfully completed, albeit with limited implementation, but plans are in place to expand across a larger network of hundreds of sites.

TowerXchange: Can you give us an idea of innovations in power system design or power components which you foresee playing a role in the future?

Chris Williams, Vice President, Sales, EMEA, Vertiv: Component or technological innovations will be incremental, whether that is in the improvements in batteries with carbon, inclusion of graphene or the implementation of silicon carbide in power electronics. In order to be effective, any innovation must account for the existing vast infrastructure in place. While there is a natural response to swarm over a new technology, the focus should always be on how to ease the burden on operations. As networks and services expand and diversify, the

need to fit and function as one solution becomes more important. Thus, maybe what we are looking for in the next generation is about intelligent power networks, and ease of unified management.

TowerXchange: What is Vertiv's vision on how the power requirements of sites will change as we move towards 5G in more developed markets and what role do Vertiv see themselves playing in this?

Chris Williams, Vice President, Sales, EMEA, Vertiv: The simple answer is there will be a diverse array of new requirements. We see that with Edge Computing combined with 5G, similar to the demands that can be made of self-driving cars in the city, there will be a push towards converged infrastructure (AC and DC infrastructure). As these demands are placed on the network, small radios requiring very small amounts of power will start to appear, whilst at the same time there will be growing power demands of consolidated shared services and sites (which will expand and then shrink). The needs will become more complex, but all of these demands must be met while decreasing the cost and burden to provide and maintain reliable power.

Looking beyond the horizon, we see the opportunities and advancements will migrate away from the mechanics of conversion to networks that manage themselves with oversight – including power ∎

How to structure MLAs and SLAs to effectively avoid future disputes

Expert advice from leading law firm in the tower sector, Vinson & Elkins

Rob Patterson, Partner, Vinson & Elkins, Ahmed el-Gaili, Partner, Vinson & Elkins, and Natalie Lamb, Senior Associate, Vinson & Elkins

Vinson & Elkins are one of the most experienced law firms in the tower industry, having advised clients on some of the most complex cases in more than twelve African countries and a number of jurisdictions in the Middle East and Southeast Asia. TowerXchange speak to Vinson & Elkins' team to obtain their expert advice on structuring transactions and designing MLAs and SLAs that avoid the creation of frictions and disputes over the course of the long-term agreement.

Keywords: Active Infrasharing, Africa, Africa & ME, Anchor Tenant, Co-locations, Deal Structure, Energy, Infrastructure Sharing, Lawyers & Advisors, Lease Rates, Leasing & Permitting, Middle East, MLA, MNOs, Novation of Leases, Regulation, Risk, Sale & Leaseback, SLA, Towercos, Valuation, Vinson & Elkins, Who's Who

Read this article to learn:

- Vinson & Elkins' experience advising clients in the tower industry
- Key considerations in designing an MLA to avoid disputes down the line
- How to treat RAN sharing in an MLA to protect both parties
- Strategies for towercos to mitigate the risk posed by tenants with lower credit ratings
- Trends in SLAs and how to design fair agreements that improve site operations and uptime

TowerXchange: Please can you introduce Vinson & Elkins' expertise in the tower industry. What have you advised on and with what types of clients have you worked with?

Rob Patterson, Partner, Vinson & Elkins: Vinson & Elkins has extensive experience in the tower sector, advising clients across the globe on both transactional and dispute work.

Our clients include public and private companies (from startups to well-established businesses), mobile network operators, tower companies and investors. We help them with tower acquisitions, co-location, master lease, build-to-suit, management services and marketing arrangements and all aspects of their businesses all over the world.

Ahmed el-Gaili, Partner, Vinson & Elkins: The matters we advise on include acquisitions and disposals of tower portfolios (often by way of sale and leaseback transaction), equity investments into tower businesses, debt financings, set up and day-to-day running of commercial and operational contracts and the resolution of disputes. We have advised on some of the most complex and high value tower-related transactions and cases in high growth markets to date – including in more than twelve African countries and a number of jurisdictions in the Middle East and Southeast Asia.

Natalie Lamb, Senior Associate, Vinson & Elkins: We understand the regulatory, political and commercial issues that arise and the legal issues facing our international clients doing business in this sector and in these regions.

TowerXchange: We've have seen examples of tower transactions where an operator has been unhappy with the long term contract that has been put in place following a deal. When designing a Master Lease Agreement (MLA), what terms do both parties need to be particularly careful of that can have a negative impact on the attractiveness of a contract in the long run?

Ahmed el-Gaili, Partner, Vinson & Elkins: The lengthy duration of the MLA makes it particularly important for the parties to resolve any natural tensions between them at the outset to everybody's satisfaction.

Rob Patterson, Partner, Vinson & Elkins: For perhaps 10-20 years or more, the MLA will define the operator's rights and the towerco's obligations in terms of space and capacity on the towers. The operator will look to ensure sufficient flexibility to deploy and maintain its equipment and provide the best possible service to its customers. The towerco will be focussed on maintaining sufficient control to maximise co-location opportunities and sufficient independence to attract other tenants. If these needs are not suitably balanced in the MLA, both parties could encounter difficulties and seek to renegotiate the terms of the MLA.

Natalie Lamb, Senior Associate, Vinson & Elkins: One good example is renewal of ground leases. Even a tower with perfect uptime is of limited value to an operator if the ground lease for the land or rooftop on which the tower sits is easily

terminated. The operator will therefore want to ensure at the outset that the towerco commits to full compliance with ground leases, prompt rectification of any breaches and timely renewals of expiring ground lease agreements. If it is too easy for a towerco to terminate a ground lease and substitute the tower for another location, the operator will not have adequately protected its most valuable asset. Conversely, towercos will want to be mindful that they have autonomy on the management of their ground lease portfolios, are not subject to undue interference from their anchor tenants (which could undermine their independence) and maintain the ability to move tenants from troublesome sites in exceptional circumstances. Balancing these rights and obligations from day one is important for the MLA to remain attractive to both parties throughout its long lifetime.

TowerXchange: RAN sharing is becoming an increasingly hot topic globally but can have a significant impact on towerco revenues. How should potential RAN sharing agreements that could arise be treated in designing MLAs?

Ahmed el-Gaili, Partner, Vinson & Elkins: The days when a towerco would seek to prohibit RAN sharing in an MLA are numbered (if not over). The status of the law and regulation around RAN sharing does vary tremendously by geography; to take the extremes, in some markets it is mandated and in others it is not yet legally permitted. There is, however, a likelihood that RAN sharing will be implemented more extensively in a significant number of markets in the short to medium term

> "The days when a towerco would seek to prohibit RAN sharing in an MLA are numbered (if not over). The status of the law and regulation around RAN sharing does vary tremendously by geography; to take the extremes, in some markets it is mandated and in others it is not yet legally permitted"

and it is therefore important to provide as much certainty as possible as to how these arrangements will work at the outset of the MLA (which should help to mitigate uncertainty and disagreement down the line).

Natalie Lamb, Senior Associate, Vinson & Elkins: While there are no hard and fast rules on how to treat RAN sharing in the MLA and establishing how to compensate the towerco for loss of revenue or opportunity is complex and deal specific, emerging

trends include use of a fee-based model (perhaps with fees agreed at the outset or alternatively linked to the market at the time of the sharing). Parties can consider increasing the fees beyond predetermined limits, e.g. if instances of RAN sharing or quantity of equipment shared are exceeded. Distinctions can be made between sharers which are already tenants on the tower and other third parties.

Rob Patterson, Partner, Vinson & Elkins: The parties should also consider whether and how the requirements should change if RAN sharing becomes mandated by law or by the regulator.

TowerXchange: There is an appetite amongst tier 2 operators in sub-Saharan Africa to divest assets but their lower credit rating and thus suitability as an anchor tenant have made the deals less attractive to towercos. How can towercos best protect themselves against future financial challenges in both tower transactions and co-location agreements with such parties?

Rob Patterson, Partner, Vinson & Elkins: Towercos in a tower transaction might consider staging payment of the purchase price for such towers over time, perhaps allowing for set off of outstanding consideration against liabilities of the tenant which may arise, e.g. unpaid rent. In sale and leaseback transactions, the consideration paid for the towers normally correlates with the lease rate agreed between the parties (i.e. the higher the consideration, the higher the lease rate). So a deal could be negotiated where there is a low purchase price but also a low lease rate. The operator would

still free itself of liabilities associated with the day-to-day running of the sites and would benefit from a low lease rate. The towerco would acquire the towers cheaply and would have a more manageable credit risk from the anchor tenant.

Ahmed el-Gaili, Partner, Vinson & Elkins: Another possibility, which could also apply to co-location agreements as well as tower transactions, would be to have the operator's parent company provide a guarantee of the lease payments. This would of course depend on whether the parent company had a higher credit rating. The towerco might also look to ask for payment of rent in advance rather than in arrears and/or a regular payment period and prompt settlement of invoices.

TowerXchange: In speaking to operators and towercos we see a move towards creating service level agreements that not only compensate failures but also reward good performance. What are key things contractually that both parties need to be aware of in creating service level agreements and how have you seen things change?

Natalie Lamb, Senior Associate, Vinson & Elkins: Operators will often want different service levels to apply to different towers. For example, particularly critical towers or hub sites might require faster response and repair times or higher uptime commitments. We therefore typically see different classes of sites provided for in the SLA with some flexibility for the operator to reclassify between classes (allowing for developments in their

business over the term of the MLA). Towercos will want reclassification to be limited or, for example, for overall percentages of site classes remain constant. Otherwise they could find themselves having to provide "critical site" service levels to all or almost all towers.

Ahmed el-Gaili, Partner, Vinson & Elkins: One consideration that parties need to keep in mind is that performance of the SLA will often be contingent on the state of the towers upon transfer. A towerco might not be expected to radically improve performance on the sites on day one if, for example, the towers and related equipment are not up to industry standard at the time of transfer. In these instances, the parties should consider whether a transition period might apply.

Rob Patterson, Partner, Vinson & Elkins: We have seen a move toward additionally rewarding the towerco if service levels are consistently exceeded although SLA trends, like most contractual provisions in these transactions, will vary significantly from jurisdiction to jurisdiction. Another noticeable recent change to SLAs in certain jurisdictions has been an increasing focus on the measurement of power usage and improving energy efficiency. If, for example, not all sites have smart meters, we commonly see the parties commit to a glide path of smart meter installation. Parties will often also consider how to share in any gain where sites become more energy efficient or less reliant on fossil fuels – this requires a certain amount of future proofing and is perhaps a subject for another day! ∎

TowerXchange Meetup prices 2018

Tower Xchange

By invitation only: restricted to Director, VP and C-level attendees. Maximum of 2 delegate passes per company except for MNOs, towercos and sponsors

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Roundtable hosting	Panel moderator	Technology Evaluation working groups	Buyer briefing call and supporting documentation

There is limited availability for roundtable hosts, panel moderators and inclusion on the Technology evaluation working groups please contact **amayhew@towerxchange.com** to learn more

* Discounted rate available to Towercos, Government and Regulator representatives, 100% discount for qualifying Director - C-level execs from Operators

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Industry breakdown of TowerXchange Meetup Africa & ME 2017 attendees

- 16% MNOs
- 19% Towercos
- 14% MSPs and tower builders
- 27% ESCOs and energy equipment suppliers
- 8% Monitoring and management
- 4% OEMs
- 4% Investors and analysts
- 4% Small cells, DAS and alternative coverage
- 6% Consultants, advisors, law firms and other

See you at our future events!

Meetup Europe 2018

17-18 April, London

Meetup Americas 2018

20-21 June, Florida

Meetup Africa 2018

9-10 October, Johannesburg

Meetup Asia 2018

4-5 December, Singapore

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