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“TowerXchange is a niche platform exclusively for the telecom tower and infrastructure fraternity, not only to network and share knowledge but also serving as a de facto search engine for the global towerco industry.”

Tushar Kapadia, Former VP Strategic Initiatives, **GTL Infrastructure**

”

“

“When we meet with investors, we use TowerXchange reports to provide independent market data and to corroborate our view of the market.”

Dagan Kasavana, CEO, **Phoenix Tower International**

”

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“TowerXchange Meetups have become the definitive gathering for business leaders in telecommunications infrastructure, and TowerXchange’s publication is widely respected as the industry’s journal of record.”

Suresh Sidhu, CEO, **EdgePoint Infrastructure**

”

“

“We use TowerXchange as something of a vendor directory to know which suppliers in the industry we need to talk to. As a start-up towerco with bold ambitions for growth, TowerXchange’s resources and contacts have been instrumental in helping us build our business”

Ben Joseph Evangelista, Founder and CIO,
LBS Digital Infrastructure

”

The Energy Report

2022

Sustainability targets and actions put in place by the towerco industry

As towercos put in place formal GHG emissions reductions targets and begin to issue annual sustainability reports, TowerXchange reviews the key trends and challenges arising

Just a few short years ago, ESG matters were not of primary importance to towercos. Whilst the more forwardthinking players had started to put ESG strategies in place, there was only marginal interest from customers, shareholders, banks and other stakeholders. Whilst some towercos were feeling a growing moral obligation, a robust ESG strategy was not of critical business importance.

Yet as of 2022, ESG has moved front and centre of board room discussions. With ESG targets of their own, MNOs are demanding sustainability metrics and initiatives from their towerco partners. ESG is a key part of any investment or financing decisions from shareholders and banks, with towercos being subjected to detailed questioning and reporting requirements on a regular basis. Plus, employees and the communities that towercos serve are wanting to see companies fulfil their role as responsible corporate citizens.

There is 360-degree pressure on towercos to meet the needs and aspirations of a broad base of stakeholders (see figure 1). To retain customers, secure investment and keep communities and their staff happy, towercos must prioritise ESG matters.

Where to start with their ESG strategies, how to prioritise what is material and important and how to effectively measure and monitor against set targets presents a major challenge and a huge amount of legwork.

Towercos report that the volume of questions they're receiving from various stakeholders has become overwhelming, and a lack of standardisation and uniformity is amplifying the issue further. There are around 600 different sustainability reporting frameworks (see figure 2 for a snapshot of frameworks and indices being followed by towercos), and it is impossible to count the

number of sustainability metrics being reported, with the figure likely reaching the billions.

It is challenging to define what is material for a towerco or the tower industry, and in fact it can be hard to define which industry category towercos fall into - are they real estate or telecoms?



Figure 1: Stakeholders engaged when assigning ESG priorities

Yet in spite of these challenges, towercos must continue to drive forward their own ESG ambitions, setting goals, putting in place action plans and hitting such

self-imposed targets. Towercos must come together to develop streamlined and standardised ways of reporting, whilst also sharing best practice in some of the ESG initiatives they are undertaking. Such cooperation will not only reduce workloads, but will lead to tangible benefits for the telecoms industry, for society and for the environment.

To aid towercos in meeting this challenge, and in the context of the 2022 TowerXchange Energy Report, TowerXchange has collated the emissions reductions and renewable energy targets publicised to date by towercos (see figure 3).

Whilst not all the towercos in the table listed below have put in place targets, those that haven't have taken steps to report GHG emissions and have focussed on driving reductions across their business operations, and many have issued dedicated sustainability reports.

COVERING THE BASICS

Carbon neutrality versus net zero

In some reports, towercos have put in place target dates by which they aim to be carbon neutral, other towercos speak of net zero targets – but what's the difference?

Net zero refers to the amount of all greenhouse gases (GHGs) – carbon dioxide (CO₂), methane or sulphur dioxide – that are being removed from the atmosphere being equal to those emitted by towerco activity. Carbon neutrality refers to just the carbon component of greenhouse gases and so is a narrower term.

Scope 1, 2 and 3 emissions

Reports also reference scope 1, scope 2 and scope 3 emissions but what do they refer to?

Scope 1 emissions are all direct emissions under a company's control. In the context of a towerco, this includes emissions from fuel usage by their vehicle fleet or by generators supplying their office buildings for example. Where towercos provide power at towers using diesel generators, this would also usually be included in scope 1 emissions, although this depends on the contracted terms for energy purchase between towerco and tenant.

Scope 2 emissions refer to indirect emissions associated with an organisation's own energy consumption. In the context of a towerco, this would include, for example, emissions produced as a result of the electricity used to power their office buildings or electricity usage at towers to power equipment owned by the towerco (e.g. lighting).

Figure 2: Select sustainability initiatives and indices to which towercos are signatories



Figure 3: GHG emissions reductions and renewable energy targets of select towercos












Towerco	GHG emissions reductions targets	Renewable energy targets	Latest sustainability report
American Tower	<ul style="list-style-type: none"> 40% reduction in absolute scope 1 and 2 GHG emissions by 2035 (from a 2019 base year) 40% reduction in indirect scope 3 value chain GHG emissions by 2035 (from a 2019 base year) 	<ul style="list-style-type: none"> 12,000 solar assist sites, representing 66MW of installed capacity by 2025 	
Cellnex	<ul style="list-style-type: none"> Reduce carbon footprint 30% by 2025, 50% by 2030 and 100% by 2050 (from a 2020 base year) Reduce absolute scope 1 and 2 GHG and scope 3 GHG emissions (fuels and energy) by 70% by 2030 (from a 2020 base year) Reduce scope 3 GHG emissions (goods and services and capital goods) by 21% by 2025 (from a 2020 base year) 	<ul style="list-style-type: none"> 100% of energy to be sourced from renewables by 2025 	
China Tower	<ul style="list-style-type: none"> Align with government's Carbon Peak and Carbon Neutrality targets (Carbon peak in 2030, Carbon neutrality by 2060) 		
Crown Castle	<ul style="list-style-type: none"> Carbon neutral in scope 1 and scope 2 emissions by 2025 		
DigitalBridge owned towercos	<ul style="list-style-type: none"> Net zero GHG emissions by 2030 	<ul style="list-style-type: none"> Source 100% renewable energy through onsite generation and PPAs by 2030 	
edotco	<ul style="list-style-type: none"> Carbon neutral across all national tower companies by 2030 		
Helios Towers	<ul style="list-style-type: none"> Net zero carbon emissions by 2040 Reduce carbon emissions per tenant by 46% by 2030 (from a 2020 baseline) 	<ul style="list-style-type: none"> Invest US\$100m between 2022 and 2030 in further renewable energy solutions 	
IHS Towers	<ul style="list-style-type: none"> Reduce the Scope 1 and Scope 2 kilowatt-hour emissions intensity of its tower portfolio by 50% by 2030, using 2021 emissions data as the baseline. US\$214mn capex towards these efforts between 2022 and 2024, including increasing capex guidance for 2022 to US\$645-685mn from US\$545-585mn. 		
Indus Towers			
INWIT	<ul style="list-style-type: none"> Carbon neutral by 2023 Reduce GHG scope 1 and 2 emissions by 43% by 2030 (compared to 2020 baseline) 	<ul style="list-style-type: none"> 100% renewables as early as 2022 	

Figure 3: GHG emissions reductions and renewable energy targets of select towercos

Towerco	GHG emissions reductions targets	Renewable energy targets	Latest sustainability report
Mitratel			
Phoenix Tower International	<ul style="list-style-type: none"> Carbon neutral since 2021 		
Protelindo	<ul style="list-style-type: none"> Reduce energy at least 1% from the previous year 		
Summit Digital	<ul style="list-style-type: none"> Net zero by 2050 		
Vantage Towers	<ul style="list-style-type: none"> Net zero by 2040 	<ul style="list-style-type: none"> 100% of electricity used procured from renewable energy sources by summer 2021 	First report expected Q4'22

Scope 3 emissions refer to all other indirect emissions associated with a company's upstream and downstream activities. There is a large range of elements that contribute to scope 3 emissions from business travel, to the footprint of equipment bought from suppliers, to (where towercos provide power as a pass-through to tenants), the emissions associated with the electricity consumption by tenants.

As well as being outside of a towerco's control, scope 3 emissions are the hardest to measure and many companies have initially decided to just focus on their scope 1 and 2 emissions. To truly measure and mitigate GHG emissions however, a focus on scope 3 emissions is also required.

THE BIGGER PICTURE

Telecoms industry emissions and emissions reduction targets

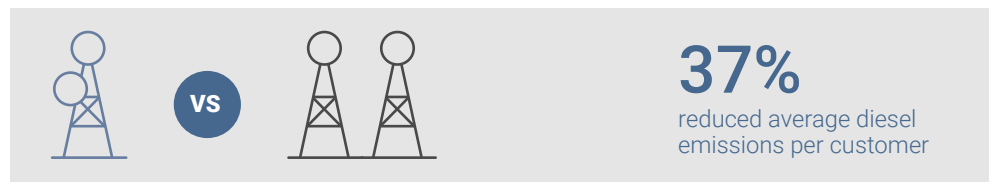
The telecoms sector emitted 3mn tonnes of CO₂ in 2019 – a figure not dissimilar to the airline industry. Projections suggest that CO₂ emissions by the telecoms sector could reach 8mn tonnes by 2025.

In a bid to tackle the sector's emissions, in February 2020 the GSMA announced that the industry had agreed to a Net Zero carbon emissions target by 2050. By adopting new Science-Based Targets (SBT), MNOs will adopt sector-specific decarbonisation pathways that allow them to set targets in line with the latest climate science.

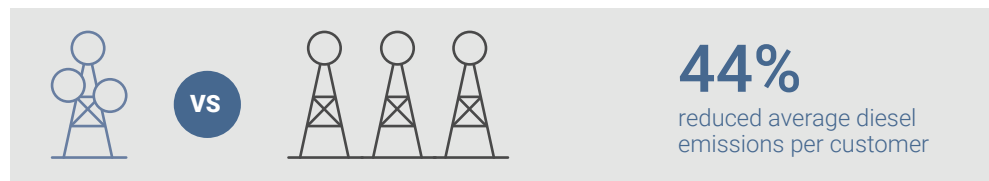
At the end of 2020, 69% of operators by connections and 80% by revenue disclosed their climate impacts. 31% of operators by connections and 36% by revenue had set carbon reduction targets to be net zero by 2050.

Figure 4: Diesel emissions reductions afforded by co-location

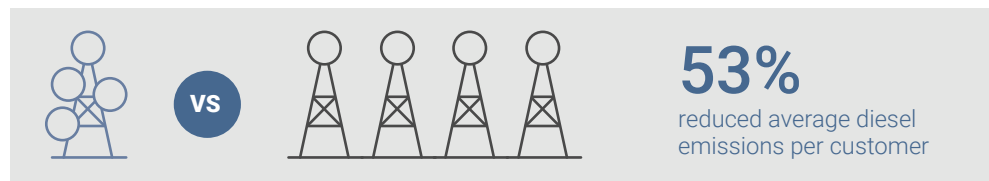
Two tenants



Three tenants



Four tenants



Average diesel emissions reductions have been calculated from diesel consumption figures for the whole Group, comparing consumption on towers with 1,2,3 and 4 tenants.

Source: Helios Towers

The inherent energy and emissions reductions afforded by telecoms and towercos

Whilst the telecoms sector itself is a major emitter, the sector is also an enabler of greenhouse gas reductions. For example the sector provides connectivity, that enables reductions in travel as well as improved automation and energy efficiency in manufacturing processes. According to The Carbon Trust, the telecoms sector enables over 2mn tonnes of GHG emissions reductions annually. According to a study by the GSMA, mobile communications technologies can avoid ten times the emissions from the mobile industry itself.

Further – the towerco industry as a subsector of the telecoms industry – can enable further greenhouse gas reductions. The building and leasing of shared infrastructure to host multiple operators is inherently more environmentally friendly and sustainable than each operator building its own – reducing the consumption of energy, materials and resources.

One illustration of this comes from Helios Towers’ 2021 sustainability report (figure 4), highlighting the reduction in diesel emissions per customer that co-locating tenants on a single tower achieved as compared to the construction of parallel infrastructure. Co-locating two tenants reduced diesel emissions per customer by 37%, co-locating three tenants reduced emissions by 44% and co-locating four tenants by 53%.

Climate change risk to the telecoms sector

As well as the actions towercos take impacting climate change, climate change in itself has the potential to impact the sector and poses certain risks. An increase in extreme weather events, rising sea levels and water shortages can all pose physical, operational and financial risks to towers and towercos. From direct damage, to impaired ability to carry out certain projects – towercos have begun to identify the risks that climate change poses to their business. Identification of such risks acts as a further motivating factor to encourage towercos to take action to address their impact on the environment.

CHALLENGES AND MOTIVATIONS FOR TOWERCOS VARY BY MARKET AND BY BUSINESS MODEL

When it comes to the setting and meeting of ESG targets, not all towercos are created equal. Priorities can vary country by country. Societal factors are often given more weighting over environmental ones in developing economies, and emissions reductions are more challenging in markets which have grids reliant on fossil fuels or countries which lack carbon certification programmes.

Lowering emissions becomes even more challenging in markets with poor or nonexistent electricity grids. It is unfair to compare emissions of towercos providing power-as-a-service in such countries, with those operating steel and grass business models in countries with green and reliable grids.

Figure 5 demonstrates how American Tower's GHG emissions per tower in Africa (and to a lesser extent APAC), dwarf those in Europe and the Americas.

TO REPORT OR NOT REPORT ENERGY USAGE BY TENANTS?

At a tower, the bulk of the energy consumed is by the active equipment owned by the mobile network operator. How much energy is consumed by that active equipment is not under a towerco's control. The MNO is responsible for selecting the equipment, and along with managed service partners, is responsible for the installation, maintenance and optimisation of the equipment. How much energy it consumes is a function of not only the technology choice and optimisation, but also of the volume of traffic on the network. All factors beyond the control of the towerco.

For towercos who provide power-as-a-service, understanding the energy load of a tower is critical. They must size energy equipment appropriately to ensure the active equipment stays online and uptime KPIs in SLAs are hit. The emissions from providing such power then contribute to their scope 1 and 2 emissions.

Figure 5: American Tower scope 1 and 2 GHG gas emissions (MTCO₂ e) by tower

Region	2019	2020	2021
Africa	20.7	15.2	14.5
APAC	11.3	10.3	9.6
Europe	0.0	0.0	0.7
Latin America	0.2	0.1	0.1
U.S. and Canada	0.8	0.8	0.9
Average	6.9	6.2	5.1

Source: American Tower 2021 sustainability report

On the other end of the spectrum, most towercos offering just a steel and grass model have spent little to no time studying the energy consumption of

their tenants, and lack the tools (or access to MNO tools) to do so. Because of this, many towercos have opted not to report energy usage by tenants in their sustainability reports. But should they?

Energy usage by tenants is a key part of a towerco's scope 3 emissions. Whilst not all towercos have set scope 3 emissions reductions targets, for those that have, knowing the emissions resulting from tenant energy consumption is essential.

Reporting emissions due to tenant energy usage also creates different behaviours in towercos. Rather than seeing the emissions as not their problem to fix, it forces towercos to work more closely with operators to find more energy efficient and green ways to run networks – ultimately having a beneficial impact on the environment.



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INCENTIVISING INVESTMENTS IN RENEWABLE ENERGY AND ENERGY EFFICIENCY

For towercos in much of sub-Saharan Africa and in select markets in Asia, towercos long evolved to have power-as-a-service as a key part of their business model. With unreliable or non-existent grids, and energy supply chains fraught with challenges, the handing over of passive infrastructure to towercos also came with the handing over of responsibility of power.

How good a towerco was at managing power quickly became a strategic differentiator, with power availability and site uptime a core KPI in service level agreements between towercos and their tenants. Failing to meet such KPIs brought heavy financial penalties.

As well as an incentive to invest in more reliable sources of generation, the incentive to invest in more efficient sources of generation also exists. Whilst if an MNO uses more power than afforded by the standard energy system configuration a towerco provides, the towerco will pass through the additional cost to the MNO (thus incentivising the MNO to keep power consumption down), for energy savings within the standard configuration, towercos reap the rewards – making additional margin on the power they provide to tenants.

When it comes to towercos who provide power solely as a pass-through, or who don't provide power at all, the same incentives don't exist. Without such mechanisms in place, the motivation to invest in energy efficient and renewable energy technologies is significantly reduced.

This is reflected in the stance of towercos who have opted to steer clear of investments in energy equipment, but increasingly, more and more towercos who only pass-through power costs are beginning to roll out energy efficiency and renewable energy initiatives. So why? On the one hand, there is pressure from shareholders and investors. Putting in place measures to reduce the already limited use of diesel generators, transitioning to electric/hybrid vehicles

over a petrol/diesel dependent fleet and buying green certified energy in offices and limited site equipment ticks some of the boxes for investors, but not all. They want to know what further steps towercos are taking to tackle climate change, and investment in renewable energy and reduction of scope 3 emissions are a key part of this.

Investing in renewable energy and energy efficiency technologies can also help improve client relationships, working more closely in partnership to help tenants meet their own ESG targets. Being green may influence operator decision making when it comes to new co-locations or build-to-suit programmes, plus such enhanced services also hold the potential to generate new revenue streams for towercos with analytics on energy consumption being useful data the operator may be willing to pay for.

With spiking electricity prices, MNOs are also more focussed on how towercos buy and bill power. For towercos providing power as a pass through, a better understanding of network power consumption will enable better forecasting and procurement.

All these signs point to motivations to better track power consumption and green networks – and whilst not all towercos are there yet, more are starting to move in this direction.

STEPS TOWERCOS ARE TAKING TO REDUCE CARBON EMISSIONS – A SPOTLIGHT ON FINDINGS IN SUSTAINABILITY REPORTS

So what steps are towercos taking to reduce emissions? A review of publicly available sustainability reports highlights certain trends whilst also identifies some unique measures being explored by different players.

Over the course of the energy report, TowerXchange will share insights into some of the key initiatives in place across the globe, with figure 6 highlighting some of the most common steps being made by towercos.

Figure 6: The top initiatives towercos are taking to reduce GHG emissions

- | | |
|---|---|
| • Reducing diesel consumption | • Conversion to outdoor cabinets and deploying free cooling |
| • Connecting to the grid | • Switching to more efficient rectifiers |
| • Purchasing green energy from utilities | • Deploying on-site renewables |
| • Signing PPAs with renewable energy developers | • Changing tower lighting systems to LED systems |
| • Optimising grid utilisation | • Switching to hybrid and electric vehicle fleet |
| • Deploying energy management systems | |

TowerXchange's European Guide

A country-by-country guide to the
European tower industry

Q2 2023 UPDATE

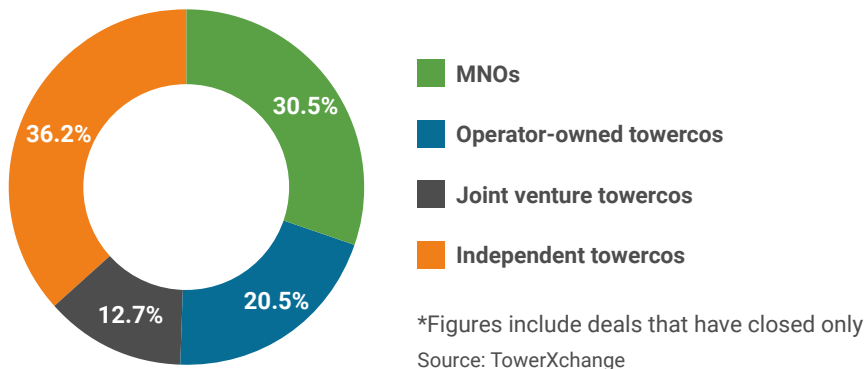
Regional Guide Europe

The biggest news from the past quarter sees more activity picking up in CEE with the Saudi towerco TAWAL announcing its acquisition of 4,800 sites from United Group in Bulgaria, Slovenia and Croatia for EUR1.22bn. Pending regulatory approvals, TAWAL will manage the assets under the TAWAL Europe towerco, which the new European player is rumoured to headquarter in Bulgaria where the majority of the assets are located.

United Group's opco towers in Greece were sold to Vantage Towers. United Group Bulgaria's owner Slovenia Broadband Group has sought permission from Bulgaria's competition authority to buy 167 towers and fibre in Bulgaria from fixed broadband and satellite paid-TV operator Bulsatcom. Staying east, we continue to watch Telekom Austria Group's spin-off of 5,400 towers in Austria which is expected to complete by the end of 2023, pending regulatory approvals.

Vodafone's sale of 81.7% of its stake in Vantage Towers, its pan-European towerco to a consortium of investment firms KKR & Co., Global Infrastructure Partners (GIP) and The Public Investment Fund of Saudi Arabia (PIF) has closed. The newly formed co-control partnership of the MNO, GIP and KKR called Oak Holdings has bought out the minority shareholders in Vantage Towers and now holds a 89.3% stake. The towerco will be delisted later in 2023.

Figure 7: Ownership of Europe's estimated 723,450 sites*



The sale of a 51% stake in Deutsche Telekom's GD Towers to DigitalBridge and Brookfield has now closed. With over 40,000 towers in Germany and Austria, the GD Towers assets had been hotly contented with a number of high profile towercos and investors linked to the deal.

Deutsche Telekom's Czech MNO T-Mobile CZ has announced it had begun to carve out its passive infrastructure into a separate company T-Mobile Infra CZ. No tower spin-off plans have been announced for its Slovakian operations yet. PPF Group has announced the separation of its passive infrastructure in Slovakia into O2 Networks "mirroring the operating model applied by the Group in all its subsidiaries."

The movement of the towerco model East in Europe is an interesting development. To the west of the continent, many countries are starting to see 100% of towers in towerco hands, but as shown in figure 5, much of Central and Eastern Europe remains relatively untapped by the towerco model.

In terms of other carve out and M&A activity, Italian MNO Wind Tre has announced the carve out and sale of its mobile and fixed network to EQT Infrastructure for an enterprise value of EUR 3.4 billion. Following the close of the transaction, which is expected to complete in six to nine months, EQT will own 60% in the new company while Wind Tre's current owner, CK Hutchison, will own a 40 percent stake in the new entity.

As well as inorganic growth, 5G rollout continues to present significant co-location and new build opportunities for Europe's towercos despite the latter being slowed down due to issues with steel supply as a result of shutdown or redirection of Ukrainian steel production. Fibre to the tower is becoming increasingly important to deliver on the low latency of the technology. Whilst there is growth in the traditional macrosite business, outdoor small cells deployment is picking up mostly across the western part of the continent, as it presents new monetisation opportunities.

Street works are however showing a lot of promise, delivering macro-cell like capabilities with small cell like footprints, and outside of the urban centres

more joint ventures are being formed to address rural coverage.

Alongside more traditional revenue streams, 5G is further accelerating towerco's focus into new service lines. The provision of in-building solutions is now commonplace for many towercos, plus public transport network coverage has seen particular growth as EU initiatives combined with the energy crisis are channelling more focus into transport networks.

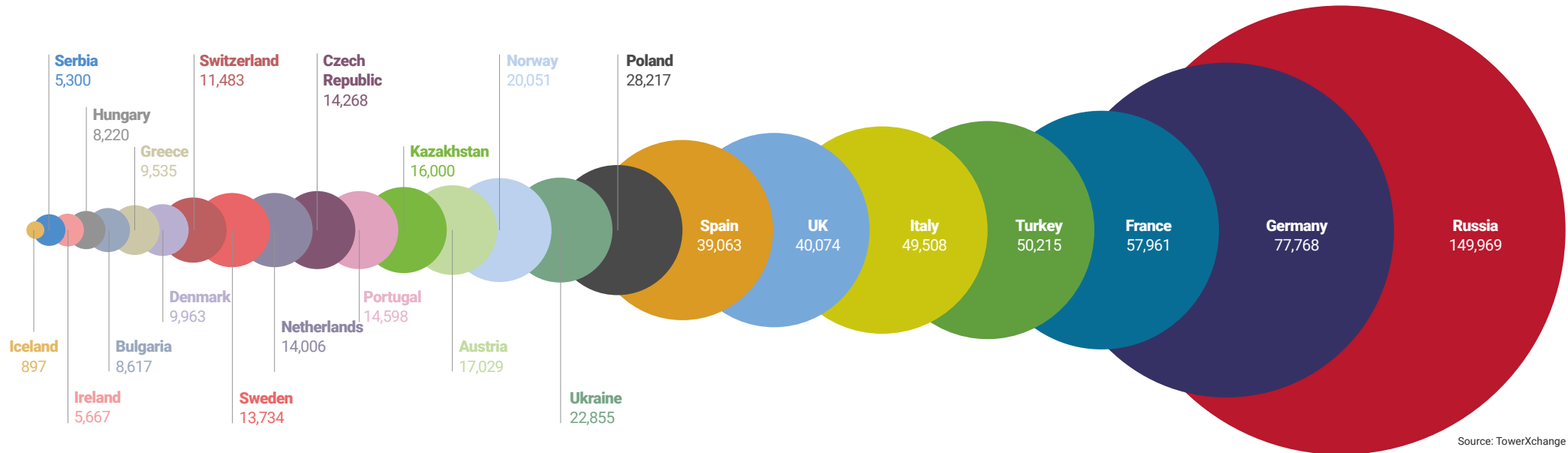
Whilst not for all towercos due to the departure from their conventional skill sets, mobile private networks are moving into the commercialisation phase, with the MPN space being tipped as the money-making opportunity in 5G.

Plus, whilst traditionally associated with towercos operating in developing markets rather than those in a good grid market such as Europe, the provision

of energy and energy services is starting to feature more significantly in towercos' service offerings. Escalating energy consumption by networks, increased electricity costs and a heightened focus on ESG are all driving a further emphasis on power and power security. TowerXchange will release our TOP 20 Tower Executives report in July 2023, where prominent towerco executives share their plans for securing infrastructure for their customers and strategic direction. Over the coming months we look forward to exploring new opportunities for European towercos, whilst keeping track of all the latest M&A news, and working with key players to understand their business priorities for the year ahead.

Visit www.towerxchange.com to stay abreast of all the latest news, reports and analysis.

Figure 8: Estimated tower and rooftop counts for select markets in Europe



Source: TowerXchange

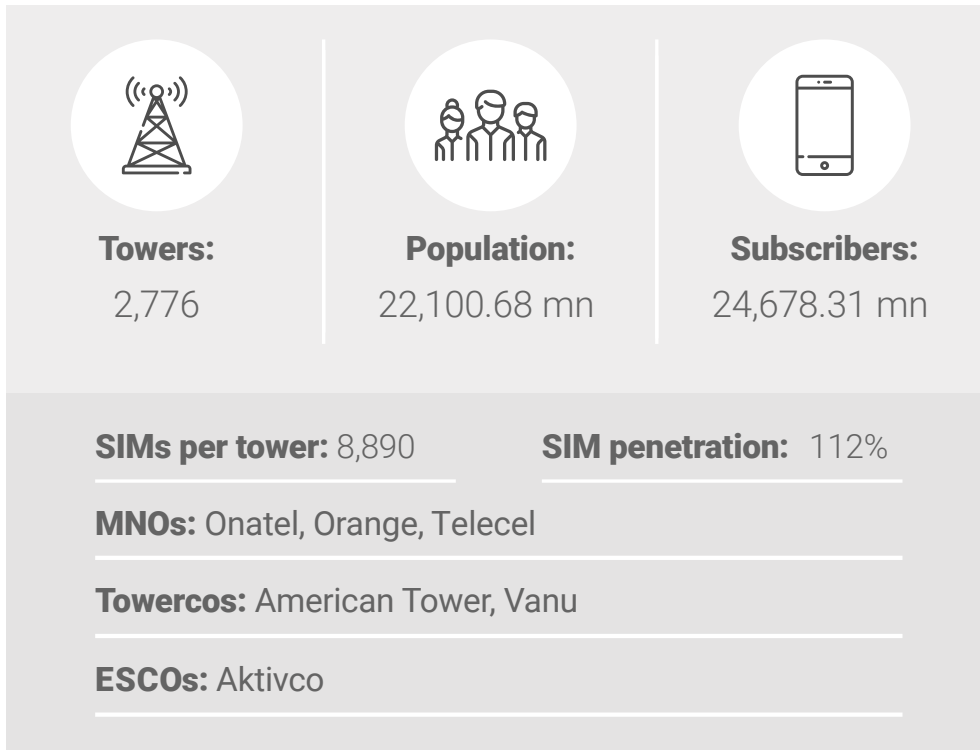
TowerXchange's Sub-Saharan African Guide

A country-by-country guide to the
Sub-Saharan African tower industry

Q2 2023 UPDATE

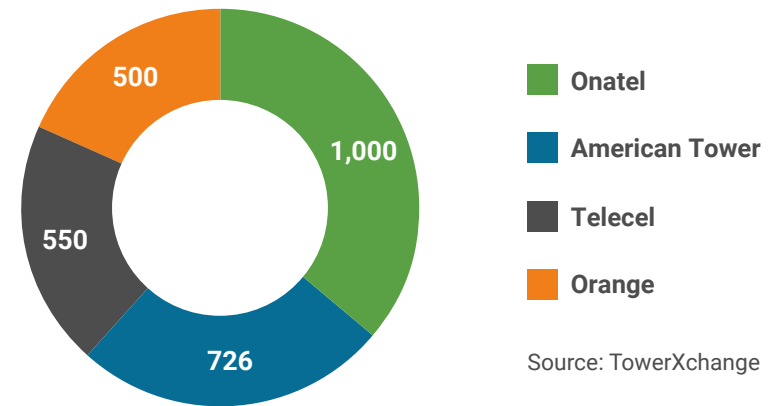
Burkina Faso

Country profiles found nowhere else



There are three MNOs in Burkina Faso; with Onatel (part of the Maroc Telecom group) having 42% market share, Orange (which acquired Airtel's opco in the country) having 44% market share and third placed, Telecel with 14%. 3G was launched in the country in 2013 and 4G trials were begun by Onatel and Orange following the introduction of a new licencing region. However, mobile broadband penetration still sits at only 47%, with the overall mobile penetration rate hovering around 100%. At the start of 2020 American Tower acquired Eaton Towers and all its sites within Burkina Faso. Prior to their opco being acquired by Orange, Airtel sold their towers to Eaton Towers which acquired a portfolio of nearly 700 sites on which Orange is now the anchor tenant. Omatel has the largest portfolio of towers in the country, at approximately 1,000 sites. Telecell owns around 550 towers.

Figure 9: Burkino Faso – estimated tower count



Eaton Towers had engaged in some decommissioning and build-to-suit, with American Tower announcing the acquisition of 677 towers, but its primary investment in Burkina Faso had been in upgrading the energy assets it inherited from Airtel. Orange also reports that it leases space on just over 100 towers owned by the other MNOs whilst retaining a portfolio of around 300 sites. In July 2018, Orange signed a ten-year ESCO agreement with Camusat's Aktivco, and whilst the number of sites this covers has not been disclosed, TowerXchange estimate this to be around 500, including some organic growth delivered by Camusat. American Tower has also been adding sites at a slow by steady rate.

Orange has contracted with US-based wireless solutions provider Vanu to deploy 170 sites on a Network-as-a-Service model, as well as 700 in the Ivory Coast and 200 in Liberia. Although not technically a towerco, Vanu is one of several rural specialist firms delivering offgrid ultra-rural networks for operators across Africa, alongside NuRAN and AMN.

Regional Guide **Africa**

A decade+
of market
data

Year	Country	Seller	Buyer	Tower count	Deal value (US\$)	Cost per tower (US\$)	Deal structure
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	1,200	81,000,000	112,500	Joint venture (HTA 60%, Millicom 40%)+
2010	DRC***	Millicom/Tigo	HTA	521	41,500,000	132,758	Joint venture (HTA 60%, Millicom 40%)+
2010	Ghana***	MTN	American Tower	1,856	218,500,000	230,835	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	831	54,000,000	108,303	Joint venture (HTA 60%, Millicom 40%)+
2010	Ghana	Millicom/Tigo	HTA	750	54,000,000	120,000	Joint venture (HTA 60%, Millicom 40%)+

+ Millicom has sold its entire stake in Helios Towers as part of moves to expend its presence in Africa

TowerXchange Tower League Table

Q2 2023 UPDATE



TowerXchange is now tracking 324 towercos who between them own 3.83mn of the world's 5.16mn investible towers and rooftops (74.3%)

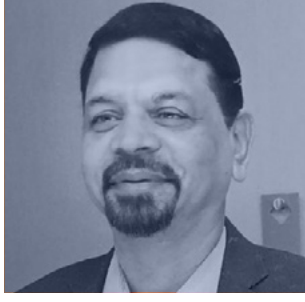
Rank	Company	Towerco type	Towers	Geographical footprint	Country code	Last updated
1	China Tower Corporation	Operator owned	2,055,000	China	1	Q422
2	American Tower	Pureplay independent	225,656	Argentina, Australia, Bangladesh, Brazil, Burkina Faso, Chile, Colombia, Costa Rica, France, Germany, Ghana, India, Kenya, Mexico, Niger, Nigeria, Paraguay, Peru, Philippines, South Africa, Spain, Uganda, USA	23	Q123
3	Indus Towers Limited	Operator owned	192,874	India	1	Q123
4	Summit Digital	Pureplay independent	160,000	India	1	Q223
5	Cellnex [1]	Pureplay independent	107,384	Austria, Denmark, France, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, UK	12	Q123
6	EDOTCO [2]	Operator owned	58,364	Bangladesh, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka	9	Q123
7	Vantage Towers [3]	Operator owned	46,200	Czech Republic, Germany, Greece, Hungary, Ireland, (Italy), Portugal, Romania, Spain, UK	10	Q223
8	GD Towers	Pureplay independent	41,300	Austria, Germany	2	Q123
9	Crown Castle	Pureplay independent	40,000	USA	1	Q422
10	IHS Towers	Pureplay independent	39,104	Brazil, Cameroon, Colombia, Ivory Coast, Kuwait, Nigeria, Peru, Rwanda, Zambia, South Africa	10	Q223
11	SBA Communications [4]	Pureplay independent	37,873	Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, Panama, Peru, Philippines, South Africa, USA	15	Q123
12	Mitratel	Operator owned	36,439	Indonesia	1	Q123
13	Sites	Operator owned	34,103	Argentina, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Dominican Republic, Uruguay	15	Q123
14	New Towers	Pureplay independent	30,200	Russia	1	Q122
15	Protelindo	Pureplay independent	29,757	Indonesia	1	Q123



Tower  Xchange

The Top 20 Tower Industry Executives

2020



Mohammad Alhakbani | CEO, TAWAL



TAWAL

Years in role: January 2020 – present day

Company tower count: 15,400

Countries of operation: Saudi Arabia

TowerXchange: Please can you introduce yourself and your path to becoming CEO of TAWAL?

Mohammad Alhakbani, CEO, TAWAL: First, thank you for giving me this opportunity to share TAWAL's fantastic journey so far that my team and I are very proud of. As for myself, I have more than 20 years of experience in the telecom sector and have held various leadership positions. I started my career with stc in 2003 as a network planning engineer and grew through the ranks over the years. In 2007, I moved to Indonesia to work as a project manager responsible for launching stc's mobile network. In 2011, I was promoted to the position of General Manager for Network Services and Solutions at stc KSA. In 2015, I became the Vice President for Business Operations and shortly after started leading the Enterprise Sales unit as its Vice President. In January 2020, I was fortunate enough to be selected by the Board of Directors to lead TAWAL as its CEO. In terms of my educational background, I hold a Bachelor's degree in Electrical Engineering and a Master's degree in Computer Engineering. Aside from leading TAWAL, I am also the Chairman of the Board at stc Bahrain and hold other board membership positions within stc subsidiaries.

TowerXchange: Can you introduce the management team supporting you?

Mohammad Alhakbani, CEO, TAWAL: I have been fortunate to join a very talented management team that were selected due to their rich and diverse experience and deep understanding of the KSA market. The executive team includes:

- **Mr Saeed Al-Shehri**, Chief Operation Officer: Saeed has more than 20 years of experience in the telecommunications field, including leading stc's Network Planning and Performance as General Manager. He brings extensive experience in infra deployment, network operations, and technology and innovation. At TAWAL, Saeed has been instrumental in making the business completely autonomous by establishing a state-of-the-art Tower Operations Center. He holds a Master's degree in Telecommunications Engineering.
- **Mr Abdul Rahman Al-Moaiqel**, Chief Commercial Officer: Abdul Rahman has 14 years of experience in telecommunications and infrastructure management. He has extensive experience in managing largescale business/ commercial operations for sector pioneers like Ericsson and Cisco. He holds a Bachelor's degree in Electronics and Communications Engineering.
- **Mr Richard Ltaif**, Chief Strategy and Governance Officer: Richard has 15 years of experience in the Telecom/ICT sector. He is an expert in strategic planning and execution, governance and board related matters, M&A, and managing regulatory and legal affairs. He holds an MBA

from London Business School and a Master's in Engineering from Cornell University, USA.

- **Mr Saud Al-Toaimy**, Chief Finance Officer: Saud has extensive experience in leading finance and accounting functions for leading real-estate companies. He holds an MBA from Clark University, USA, with a major in Accounting. Saud has also completed the Uniform Certified Public Accountant (CPA) in the USA.



Our vision clearly articulates TAWAL's ambitions - we want to "become the leading regional ICT infrastructure services provider". Our strategic ambition is two-fold; (1) to grow and lead regionally in the core towerco business; (2) to expand our product portfolio to become a one-stop shop for ICT clients' infrastructure needs.

- **Mr Hareth Al-Sahan**, Chief Human Resources Officer: Hareth has more than 15 years of experience in the field of Human Resources and Development. He has significant experience in leading HR departments for multinational companies, including a large telecom operator. He holds a Master's degree in Human Resources.

TowerXchange: What is your strategic vision for the company?

Mohammad Alhakbani, CEO, TAWAL: Our vision clearly articulates TAWAL's ambitions - we want to "become the leading regional ICT infrastructure services provider". Our strategic ambition is two-fold; (1) to grow and lead regionally in

the core towerco business; (2) to expand our product portfolio to become a one-stop shop for ICT clients' infrastructure needs.

Our core product growth in the local market will be driven by realising efficiencies, increasing tenancies, and passing these benefits to MNOs and other clients. We will build upon our deep relationships with mobile network operators to start offering adjacent products such as IBS, small cells, FTTS et cetera.

Today, we pride ourselves on creating a passive telecom infrastructure leading business in KSA. I am confident that with this two-pronged strategy we can further create substantial value for our clients and shareholders.

TowerXchange: What have been some of the biggest success stories during your tenure?

Mohammad Alhakbani, CEO, TAWAL: Fortunately, we have had many success stories in a very short time span. Here are the top five:

O&M cost/ carbon footprint reduction: TAWAL has been successful in reducing the O&M costs significantly by renegotiating better prices with our managed service provider and going for aggressive electrification of sites. What makes us proud is not just the cost reduction, but the significant reduction in diesel consumption which is lowering our carbon footprint.

Land lease costs reduction: Land lease cost is the biggest cost item for towercos. We have developed a dynamic site lease database and negotiation playbook which helps identify sites where our land lease costs are higher than market rates and helps select the right negotiation tactic to reduce our costs. Over the last 12 months, TAWAL has been able to reduce land lease costs substantially on more than 1,000 sites.

CAPEX reduction: The tower Industry is one of the most capex intensive industries. We have developed a comprehensive strategy to become more efficient in capex deployment. We have added new vendors offering competitive prices and our network team has come up with further innovative designs to optimise capex spend for the business. This has led to a double-digit reduction on our average capex per site.

Signing of commercial deals: In the last 12 months, we have signed two strategic commercial deals:

Frame service agreement with ITC: TAWAL will help ITC expand its network through colocating its equipment on TAWAL's towers. In its initial phase, the agreement saw ITC installing approx. 150 PoPs across the Kingdom.

Partnership with Diplomatic Quarters: The strategic partnership is the first of its kind in Saudi Arabia through which TAWAL will be managing the ICT infrastructure and dealing with the mobile network operators in fulfilling the Diplomatic Quarter's network requirements.

State-of-the-art TOC launch and improved PIN availability: TAWAL has built a state-of-the-art Tower Operation Center (TOC) which makes extensive use of automation and predictive maintenance to assign tickets and identify sites which may have an outage in future. This enables us to prioritise such sites for maintenance and improve their future capability. I am proud to share that we have improved our Passive Infra Network (PIN) availability from 99.7% to 99.9% in only 12 months.

TowerXchange: How do you see the role of the towerco evolving?

Mohammad Alhakbani, CEO, TAWAL: Before we discuss how the towerco role will evolve, let us understand what its role is today and how it can pave the way to future possibilities. To date, the independent towerco model has been established globally (with the GCC countries being the latest entrant) and the value proposition of any towerco is their ability to convert huge capex requirements of MNOs to more efficient and predictable opex. The mobile network operators in turn can focus on their core business and enjoy significant savings due to co-location and other efficiency benefits. The future role of towerco will be to take the philosophy of infra-sharing and efficiencies to other ICT infrastructure needs. We believe that the success story of tower sharing will be replicated by towercos for other infrastructure needs such as IBS, small cells, ODAS, CoWs, FTTS et cetera.

TowerXchange: Which towerco innovations excite you the most?

Mohammad Alhakbani, CEO, TAWAL: Towerco innovations stem at two levels:

Firstly, at a business level: With the advent of 5G, we see the emergence of potential new customers beyond MNOs and other typical clients. These include IoT service providers as well as users of such services (e.g. in the automotive industry for connected cars). To serve these customers, towercos are developing innovative business models for example - selling colocation space of <0.5 m2 EPA, selling services as consideration-in-kind and getting revenue share et cetera. Such innovations in business models are not only critical for towercos to generate revenue growth but also act as a catalyst for IoT services adoption and success.

Secondly, at an operations level: Towercos are identifying innovative approaches to managing sites and reducing unplanned interventions. One such approach is smart remote site management system which is an interplay of remote monitoring, data analytics, and predictive analytics to optimise operations and prevent failures. The "smart tower" approach is also key for better and timely fulfilment of customers' needs as well as, pre-empting their requirements and making the appropriate site upgrades ahead of time.



The tower Industry is one of the most capex intensive industries. We have developed a comprehensive strategy to become more efficient in capex deployment. We have added new vendors offering competitive prices and our network team has come up with further innovative designs to optimise capex spend for the business. This has led to a double-digit reduction on our average capex per site.



On international expansion, we have developed a comprehensive strategy and identified the key markets we wish to expand into in the near future. While the focus for expansion will primarily focus on the MENA region, TAWAL will be open to opportunities in other regions if there are synergies and scope for value creation for our shareholders.

TowerXchange: Can you share your vision for how TAWAL will work with other towercos and MNOs as it matures into a major new player in the industry?

Mohammad Alhakbani, CEO, TAWAL: With MNOs, we will strengthen our partnership to accelerate the roll-out of future networks, for example, 5G networks and the Internet of Things (IoT) by giving them reliable and cost-effective infrastructure.

With towercos, we want to establish a continuous exchange of knowledge to enable us to build solutions which will help make the tower industry more resilient and efficient. Other areas where we will look to partner with include sustainability initiatives, reducing the carbon footprint of the ICT sector and improving infrastructure sharing solutions.

TowerXchange: As MENA's largest towerco, can you tell us about your plans to expand into other vertical markets as well as new Middle East and North Africa jurisdictions?

Mohammad Alhakbani, CEO, TAWAL: On product/ verticals diversification, we have already expanded our license to offer IBS solutions in KSA and we will soon be launching IBS services. We have identified other products which will enable us to become a one-stop shop for most telecom infrastructure related needs of MNOs.

On international expansion, we have developed a comprehensive strategy and identified the key markets we wish to expand into in the near future. While the focus for expansion will primarily focus on the MENA region, TAWAL will be open to opportunities in other regions if there are synergies and scope for value creation for our shareholders.

Key takeaways from Meetup Asia 2022

Q2 2023 UPDATE

Key takeaways from Meetup Asia

366,513. That's how many towers changed hands since we last met in 2019.

And the show was awash with new and old faces alike!

Amplitel. Indara. EdgePoint. Summit Digitel. Connexea. Waveconn. MIDC. None of these towercos existed when TowerXchange last opened the doors to the Marina Bay Sands. Others have changed dramatically in that time, growing from tens of employees to hundreds and scaling from single digit towers to multiple thousands.

2022 alone was a transformative year for APAC towers. In addition to 12 significant sale and leaseback transactions, towercos have consolidated portfolios and spread their wings into new markets and new digital infrastructure asset classes.

The Australian market has continued to evolve at pace with Optus's carve out making a series of acquisitions that included the former largest Independent towerco in the country (Axicom), before rebranding to Indara.

OMERS acquired the final MNO held portfolio alongside independent towerco Stilmark to create yet another new towerco Waveconn. The towerco fever jumped the Tasman Sea to New Zealand last year with Spark and Vodafone both carving out and monetising towers. Connexea (the name given to Spark's carveout) has since gone on to acquire towers from the nation's third MNO, 2degrees.

The Philippines saw six sale and leaseback transactions with EDOTCO, EdgePoint and Unity buying towers from PLDT, while Globe sold half its portfolio to MIDC, Frontier and Philtower. Japan announced its first transaction of note early in the year with NTT coming to terms with JTower to be transferred towers upon the meeting of "certain conditions". So far no towers have changed hands.

In Indonesia, EDOTCO entered their 9th Asian market by closing a sale and

Asia's top 10 towercos (excluding China) – Q4 2019 VS Q4 2022			
Towerco	Q4 2019	Q4 2022	Change
China Tower	1,979,000	2,049,000	70,000
Indus Towers [1]	127,946	187,926	59,980
Summit Digitel	0	155,000	155,000
American Tower	75,073	77,132	2,059
edotco	29,924	52,866	22,942
Mitratel	15,213	35,051	19,838
Protelindo	19,152	29,708	10,556
GTL Infrastructure	27,707	27,000	-707
Tower Bersama	15,131	21,666	6,535
EdgePoint Infrastructure	0	13,200	13,200

[1] The former Indus Towers was merged with Bharti Infratel (41,050)



leaseback deal in with parent company Axiata and Mitratel acquired a further 6,000 towers from its own parent company, Telkomsel.

Pinnacle Towers made their first foray beyond the Philippines with an acquisition of AB Hightech, one of Bangladesh's four licensed tower companies, that expanded their frontier tower associates brand.

Africa Demand Forecast

Q2 2023 UPDATE

Demand Forecasts: Telecom Infrastructure in SSA

Vendor opportunity matrix	Energy	Data collection & utilisation	Tower manufacture	Turnkey infrastructure	Small cells, DAS, IBS and OpenRAN	Advisors	Towercos	MNOs	ESCOs
Burkina Faso 	High	Medium	Medium	Medium	Low	Low	American Tower	Orange Onatel Telecel	Camusat/ Aktivco
<p>Over 60% of the population is in rural areas and with ARPU being low, Burkina Faso needs low-cost solutions along with satellite backhaul in order to improve coverage for much of the population. Over 50% of the country's towers are off-grid and Eaton had historically invested significantly in renewable and hybrid energy options, including the repair/replacement of 60 solar sites they have inherited. Camusat's Aktivco has signed an ESCO contract with Orange which covers ~300 sites, they have begun a modernisation programme. New build in the market is expected to pick up with about 100-120 new towers expected to be added per annum, with the majority built by American Tower. Huawei is installing fibre backbone in the country and extension of this will present opportunities for managed service providers. 4G is only beginning to be introduced.</p>									
Cameroon 	High	Low	Low	Medium	High	Medium	IHS Towers AMN	MTN Orange Nexttel (Viettel) Camtel	TBC
<p>IHS own or manage the majority of Cameroon's towers having acquired MTN's portfolio and entered into a "manage with license to lease" arrangement with Orange. Africa Mobile Networks own a portfolio of around 200 sites, with plans to grow their network further. In 2018 both MTN and Orange agreed to expand their networks as a condition of their concession renewals, requiring both to bring 4G to all key urban and economic activity areas. IHS has also secured contracts with CamTel so expect further co-locations. Around 25% of sites are off-grid with about a third of these relying on solar. Declining grid availability means back-up power is a high priority for on-grid sites. IHS Towers have hundreds of solar-hybrid sites and are continuing to deploy more across their portfolio of 2,200+ towers. Orange expects to close an ESCO partnership in Cameroon in 2020 and then embark on a site modernisation programme.</p>									

Is Japan ready for a towerco explosion?

Read this article to learn:

- Who are JTOWER, Japan's first towerco?
- JTOWER's BTS and SLB plans with Japan's MNOs
- Why have 5G rollouts acted as a catalyst for sharing for both passive and active infrastructure
- The outlook for the industry and why its appealing for international investors

Is Japan ready for a towerco explosion?

CEO Atsushi Tanaka shares outlook for JTOWER as both passive and active sharing pick up speed in one of Asia's relatively untapped markets.

30 May 2023

This interview is a preview from TowerXchange's 2023 top 20 Towerco CEO Report, which will be published June 2023. Subscribe today to unlock 19 more exclusive towerco interviews.

TowerXchange: Tell us about your journey to launch JTOWER, and what are some of your biggest challenges and proudest achievements to date?

Atsushi Tanaka, CEO, JTOWER: I am the founder and CEO of JTOWER, a Japanese Infrastructure sharing firm that I launched 11 years ago. I started that my career as a telecom analyst at Goldman Sachs and then after I did that for three years set up a broadband company called eAccess with my former boss in 1999. I was CFO of EMOBILE, which ended up being acquired by Softbank (one of Japan's four MNOs) in 2012.

At eAccess we initially focused on providing ADSL services and broadband, but then also entered the mobile space as EMOBILE in 2005 as the government wanted to issue a new licence to improve competition.

We raised US\$3 billion in funding and went out and built a mobile network from scratch. I realised that in other markets across the world, towercos were buying the tower portfolios of MNOs and facilitating sharing.

I thought Infrastructure sharing made a lot of sense, but we had nothing like this in Japan. When I realised this, I thought it offered a great opportunity. There was very little sharing, and until recently that was still the case.

So our greatest achievement so far is making that happen! We started with indoor solutions in 2014. I started this venture independently and had little leverage with MNOs. I approached them and asked about leasing their towers, and building their new sites, but we didn't get much interest.

The decision to pivot to indoor solutions came after speaking with building owners and real estate developers and managers to explain about the sharing of communication infrastructure in their buildings.

They liked the sound of it, because it meant they could minimise the space they were using to host the equipment and could save on electricity costs. With the building owners on board, it was easier to sign up the MNOs as tenants, but they were still hesitant to let us own or build their outdoor sites.

This changed when the government assigned 5G spectrum to four operators (NTT DOCOMO, KDDI, Softbank and Rakuten Mobile) in 2019. One criteria of the spectrum allocation was that the operators had to cover parts of Japan where they didn't have a 4G footprint.

There's a reason they were not there themselves, they were low traffic sites that did not justify the capex investment. So at that time we went back to them and offered to build the sites and they were far more receptive.

We also cut two deals to acquire towers from 2021 to 2022. 207 towers were agreed to be purchased from NTT West and NTT East, and a further 6,002 towers from NTT DOCOMO.

We have started building in rural locations as well, and by March 2024 we will have 150 towers. One of our criteria for building a tower is that we need to make sure that there is a co-location with a second operator. As a result, all 150 of these towers will have a minimum tenancy ratio of 2x.

It's probably important to mention now that while I started the business from scratch, we have secured equity investment from Japan's MNOs. This gives a unique relationship with them, as we are still neutral and independent, but we have close relationships, and they have an interest in us succeeding and

growing as a business.

TowerXchange: After working for 11 years at JTOWER, what is it that you like about working in the tower space, and what advice would you offer someone looking to enter the industry as a career?

Atsushi Tanaka, CEO, JTOWER: I think it's fair to say from my journey as CEO of JTOWER that working in this segment of the industry offers you the opportunity to really make a difference from an environmental standpoint and fundamentally change how the industry is structured.

As I mentioned, the building owners were receptive to the idea due to the fact they needed less space and had more costs. We also reduce costs for MNOs both indoors and outdoors, and it's great to be able to revolutionise the mobile infrastructure industry and have an impact on tangential industries like real estate.

We are also reducing the need for more towers, which means less steel is produced and this has benefits to the physical environment and on carbon emissions.

JTOWER has its routes in Japan, but you have expanded into Vietnam as well. What does the business look like there?

Vietnam is similar to Japan, in the fact that the vast majority of outdoor towers are still owned by MNOs, but ahead of Japan in the sense that pretty much all of the inbuilding connectivity is shared.

There are a number of IBS companies in Vietnam. On 31 July 2017, we completed the acquisition of the largest IBS company in Vietnam, Southern Star Telecommunication Equipment Joint Stock Company (SPN) through a special purpose company (VIBS Pte Ltd.) jointly established with Japan South East Asia Growth Fund L.P. (JSEAGF) and jointly funded and managed by Development Bank of Japan Inc. (DBJ) and Risa Partners Inc. (RISA).

This portfolio includes over 230 IBS.

Recently though, with the change in attitude from MNOs and the ministry in our home market, we are more focused on Japan. While the Vietnam business

is still successful, we are not prioritising expanding anywhere else for

TowerXchange: What do these domestic opportunities look like for JTOWER? What is your strategic vision for the business over the next five years?

Atsushi Tanaka, CEO, JTOWER: MNOs are no longer competing on networks, rather they are competing in the non-telecom fields such as ecommerce and other services they can offer subscribers. The ministry is also far more supportive of encouraging sharing now, at the same time MNOs are looking to make their networks more efficient. We see this as a big opportunity for JTOWER.

Primarily, we will be interested in making further acquisitions on both towers and BTS sites. There are a lot of towers in Japan (~220,000 according to TowerXchange data), so our over 6,000 site transaction with NTT group is just a small percentage of what we could own for them.

We are in conversations with all the MNOs in Japan about further sale and leasebacks, and we are in a good position to buy the towers from them if the economics make sense for both sides. The 6,002 tower sale from NTT DOCOMO might very well be the first domino to fall.

Today, all energy equipment in Japan is managed by MNOs. Whether that be a backup generator or backup batteries. Right now we are focused on migrating the NTT sites, but as we own rural towers there may be opportunities in the future to invest in energy equipment and allow operators to share them on our sites.

Grid power is getting more and more expensive in Japan, and we have seen in other markets, even with a good grid, towercos are providing energy monitoring services to help reduce operator costs. This could be the direction the Japanese market travels in as well, so we would be happy to help if the demand from MNOs is there.

We are also working with a Taiwanese firm to develop the sharing RU (part of the base station), complying with Open RAN technology. We plan to launch this service by the end of this fiscal year.

Our equity relationship with the MNOs comes into play here, as we are able to have discussions with their radio engineers about the equipment they need and the services we can provide.

Alongside this, we are also expanding our indoor services, upgrading sites to 5G and working with real estate developers to cover new developments with 5G SA technology.

TowerXchange: We've spoken about 5G rollouts being the catalyst for infrastructure sharing in Japan. Can you just tell us a little bit more about the strategies that MNOs are taking towards 5G?

Atsushi Tanaka, CEO, JTOWER: The strategy varies from one mobile carrier to another, but I think it's fair to say Japan is slightly behind where we expected to be with 5G deployment.

Two years ago the government put a lot of pressure on Japan's mobile network operators to reduce the price of their tariffs. Doing so had a significant impact on their revenue which made them far more cautious to spend on the Capex required to build their networks.

A solution they employed was to use existing 4G spectrum for 5G so the handset can see 5G but actually you don't have much difference between 4G and 5G, because it's still using the existing spectrum band. Now however, the major operators are starting to deploy 5G standalone. We're hoping to see this pick up significantly by the end of the fiscal year.

We also see our 5G mmWave RU sharing project helping with 5G deployment. Handsets in Japan hardly access mm wave spectrum and due to the propagation of this spectrum, it will be hard for MNOs to find enough space for new base stations indoors, and hard for the structures to support new base stations on existing outdoor sites.

We think there will be demand for our Radio Remote Unit when this new spectrum is going to be deployed en-mass, to keep costs of deploying these frequencies as low as possible. Some industry observers are concerned that moving more into the active space can affect towerco valuations.

Starting as an in building solution provider, we have active network equipment at the core of our business, so we think we are in a good position to capture

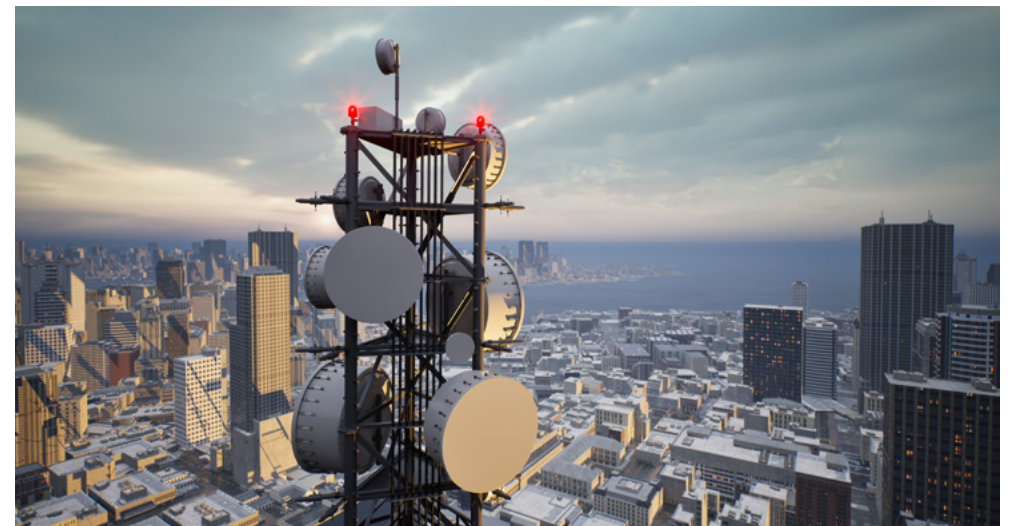
We already have experience monitoring and servicing active equipment from the indoor business, so these competencies can help us offer these services to outdoor networks as well, especially if MNOs are using our Remote Radio Units.

TowerXchange: What is the outlook for the towerco industry in Japan? JTOWER are the only towerco for now, will that change?

Japan has a healthy Mobile market, with lots of towers still owned by MNOs, so that naturally makes it attractive to investors.

Furthermore, the Yen is quite weak now, relative to a few years ago and the Bank of Japan has kept interest rates negative at -0.1%. We secured a cost of capital of roughly 2.5% for the leverage we needed to secure the NTT assets.

We do see the big infrastructure funds looking at the Japanese market. I don't know if they have any specific plans to make an investment here yet, but based on activity elsewhere in Asia, it could make sense.



Ryse Energy more than double telecom business in three years

Read this article to learn:

- What are the benefits of wind power?
- What the key growth opportunities for wind in telecoms?
- Who is Ryse Energy?
- Why have Ryse Energy raised new capital?



Ryse Energy more than double telecom business in three years

Since we last spoke with Ryse Energy in 2020 they've doubled their count of telecom sites, raised £15mn and signed some major contracts

30 May 2023

TowerXchange is always keen to follow new technologies and how they impact telecom site resilience and infrastructure sharing. Humans have been using wind for nearly 6,000 years, but its only been recently that distributed wind generation has made an impact on telecoms. TowerXchange speak again with Alistair Munro, CEO of Ryse Energy about why wind is taking off.

TowerXchange: Briefly introduce your solution for telecom energy, and tell our audience what makes your solution different.

Alistair Munro, CEO, Ryse Energy: Ryse Energy is an impact-driven, innovative, decentralized renewable energy technology company with more than 4,000 installations across all seven continents.

Ryse Energy is a manufacturer of high-performance small wind turbines, with a range of products from micro to medium capacity. We offer wind and solar as standalone technologies either grid-connected or off-grid with energy storage – but we are specialised in combining our wind technology with solar PV and energy storage to create hybrid renewable systems, decarbonising critical infrastructure such as telecoms towers, pipelines and offshore infrastructure.

TowerXchange: It's been three years since we last spoke with Ryse Energy, what's happened since we last spoke at the end of 2020?

Alistair Munro, CEO, Ryse Energy: The big change since 2020, besides the obvious, is that from Ryse Energy's perspective we've seen significant change in the market's attitude to wind. Before then we were pushing water up a hill, but now it's the other way around. We are being approached by MNOs and major towercos to help them understand how to integrate wind into the mix.

We offer an integrated power solution, but our USP is our knowledge of wind. Most of the big towercos have now expressed an appetite to accept wind as

part of their technology mix. That is the big change we've seen in the last couple of years for telecoms. And this isn't just in poor grid markets like Africa, it's also in Europe and the Middle East. In fact, the only area where we're yet to generate a significant volume of leads is SE Asia but we are confident that will change

The industry now understand the value wind power generation can add. If you're just using lithium ion batteries with solar then you hit a limit on the amount of renewable energy you generate either due to battery size or land use constraints. Adding wind to the mix allows you to significantly reduce your reliance on diesel power or grid energy.

In 2020 we could point to distributed opportunities for a number of regional MNOs, but now we can talk about work on a global basis with strategic supply agreements from MNOs and Towercos across multiple countries. We're moving from commitments for 10s or 100s of sites to 1,000s of sites. It is a game-changing shift in the distributed wind sector, and hybrid renewables space.

We have the advantage as we have the largest install base and in depth knowledge in deploying wind in telecoms and other critical infrastructure. So we are seen as the 'go to' in the market.

TowerXchange: Congratulations on the fundraising, what can you tell us about your investors, and where the money is going?

Alistair Munro, CEO, Ryse Energy: I'll remind you that telecoms is still only 20% of the business, but a growing proportion. Its one application of the wind technology we manufacture but wind has a massive potential across the world, so we needed growth capital to unlock the pipeline of opportunities we've built.

Firstly, we will be putting the investment towards expanding our team and

offices. We will be moving ahead with an Indian manufacturing plant for the domestic Indian market which has the potential to be substantial. We are also increasing our field services and installation teams to support our increased customer base.

Secondly, beyond that we also need to invest in certification of our products to enter the distributed and community power market in USA and other markets. The landmark Inflation Reduction Act of 2022 includes an enormous ramp up of renewable subsidies to drive carbon reduction and clean energy across all sectors of the economy including telecoms. This is of course a major opportunity for us and we need to be proactive in our USA market entry.

Thirdly, we are using the investment to change the way we work and increase our working capital. At present we build to order and that can extend lead times but keeping more turbines in stock and ready to roll we'll be able to deliver more quickly. When you're looking at high volume customers you're expected to have 50+ turbines in stock to deploy quickly. That ties up working capital, but it is worth it to better serve our customers.

TowerXchange: North America and Africa look like two key target markets, but they're as different economically as possible. How does the business case differ for wind between these two large and diverse markets?

Alistair Munro, CEO, Ryse Energy: We have now split the business in two to focus our offer to clients. We have hired a very senior executive to become CEO of our UK, Europe and Americas business called Richard Caldwell, ex-MD of Proven Wind and SD Wind. I will continue as Group CEO and regional CEO for Africa, the Middle East, India and Asia. The dynamics in the markets are just so different that splitting management makes sense.

In North America policy change is driving significant investment in renewables. The Inflation Reduction Act is directing tens of billions of dollars towards renewable energy and we are helping to deliver that.

Whereas in developing countries, our offer in bad grid markets is more about site resilience and economics. The cultures of regulation and business mentality, attitude, not to mention time zones, are very different, so splitting the business will enable a better focus on our markets. That said, we are a global company

with a local approach, in our core markets we aim to hire locally to provide on-site technical and commercial expertise.

TowerXchange: When we first spoke Ryse Energy were providing power to 400+ sites. How many telecom sites are Ryse Energy powering today?

Alistair Munro, CEO, Ryse Energy: We now have in the order of 1,000 telco and critical infrastructure sites live now, which shows substantial growth through a difficult period characterised by a lack of business travel and international supply chain disruption.

Beyond MNO or towerco towers, we've also been providing energy to radar towers and other critical infrastructure. For example, you may have seen Ryse Energy at COP27 because we have been helping turn the Suez Canal green. We're delivering energy systems for the command and control infrastructure, and providing power to the communications that keep the canal running smoothly. The wind-solar hybrid renewable system is the primary source of electricity for the stations, and since installation, renewable energy has powered the site for over 99% of the time, showcasing the resilience of the renewable system. Because of that we have had a very high profile in Egypt and COP27.

TowerXchange: Please tell us about the next steps for Ryse Energy and the future role you see for wind in telecom power.

Alistair Munro, CEO, Ryse Energy: We will be opening service centres and support facilities across four regions in Africa focusing on Egypt, Kenya, Nigeria and South Africa. This hub structure will enable us to service the different countries and cultures of Africa. This allows us to get in front of our customers and deliver new sites to them.

We will also be expanding the team in North America as previously discussed and continuing the certification process to capture the potential within the market.

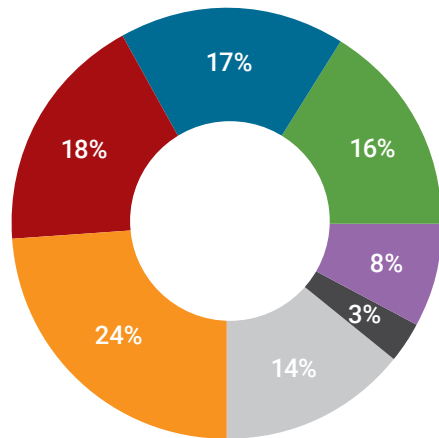
In the past, wind energy has been hampered by bad execution and technical failures. We plan to ensure all our sites operate efficiently, correctly and receive the correct care and maintenance to deliver resilient and reliable renewable energy for our customers.

TowerXchange's membership base

Who uses the TowerXchange resource centre?

In addition to a network of over 2,500 towerco and MNO professionals, the TowerXchange resource centre is used by a diverse set of stakeholders who use our data sets, market analysis and trend coverage to meet a range of business needs.

Analysis of non-towerco, non-MNO members



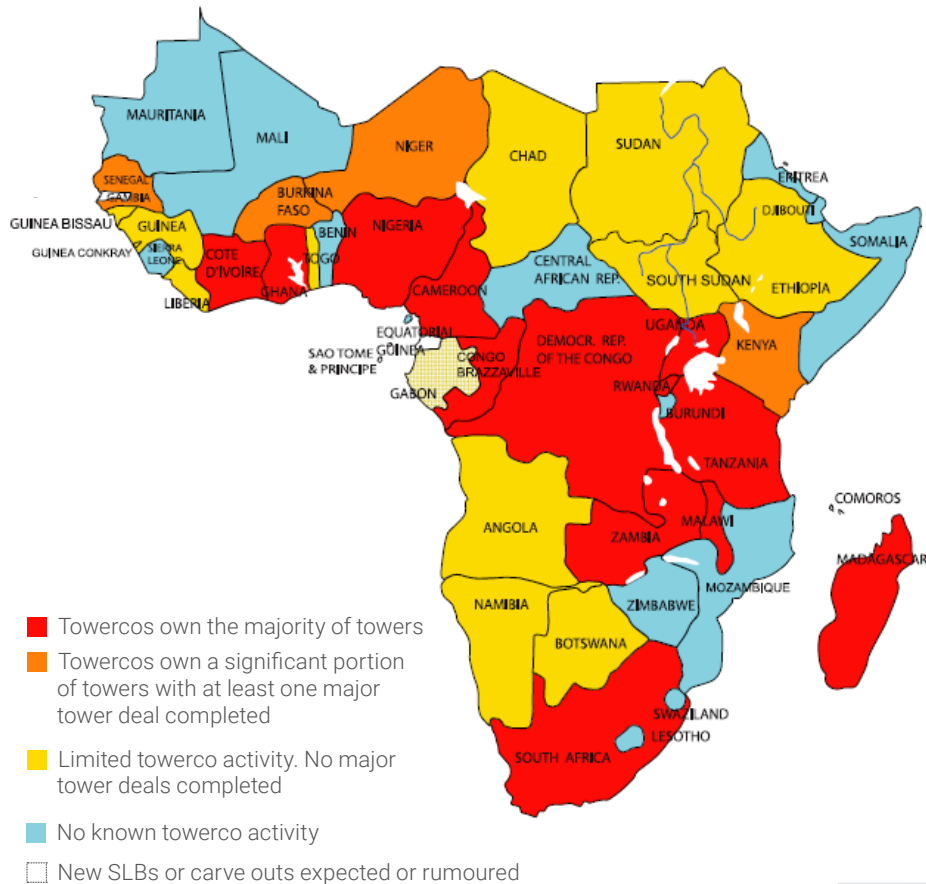
- Investment bank
- Technology provider
- Consultant
- Investor
- OEM
- Service provider
- Other

Example members (past and present)

- | | | | | |
|--|--|---|---------------------------------|------------------------------------|
| - A.T. Kearney | - Caterpillar | - Facebook | - Jefferies | - PowerX Technology |
| - ABN AMRO | - CDC Group | - Faraday Partners | - JP Morgan | - Pramac |
| - ACOMÉ | - CHEM Energy | - FTI Consulting Media Center | - Kathrein | - Prenax |
| - Actis | - Chengdu Hizima Technology | - Fullerton Financial Holdings | - KDDI Corp | - Proparco |
| - AIIM | - Cisco | - Gave Electro | - Kearney | - PwC |
| - Albright Capital Management | - Citigroup | - Generac | - Kempen & Co | - Radio Evolution Sweden |
| - Alpina Capital | - CMA Strategy Consulting | - Gibson Dunn & Crutcher | - Khatib & Alami Global Holding | - Ramboll India |
| - Altman Solon | - Communications and Information Technology Commission | - Global Information | - Kohler-SDMO | - RBC Capital Markets |
| - Analysys Mason | - Consilience Analytics | - GNB® Industrial Power | - Linklaters | - Rivulet Capital |
| - Ancala Partners | - Constructive Capital | - Goetzpartners | - Macquarie Group | - Roland Berger |
| - APL Tech Industries | - Credit Agricole CIB | - Goldman Sachs | - McKinsey & Company | - Rosenberger Site Solutions |
| - Ardian | - Credit Suisse | - Green Street | - MD7 International | - Sagemcom |
| - Arthur D. Little | - CrossBoundary | - Grolleau | - Merrill Lynch | - Signature Management Consultants |
| - Aryason | - Crossflow Energy | - GSMA | - Mitsubishi | - Simply Cellular |
| - Ascot Industrial | - Cue Dee AB | - Halo Energy | - Mobiserve Holding | - Sojitz Corporation |
| - Ashurst | - Deccan Value | - Hayat Communications International | - Moelis & Company | - Standard Bank Group |
| - Bain & Co. | - Deloitte Consulting | - HIMOINSA | - Monarch Alternative Capital | - Stonepeak |
| - Bank of Tokyo Mitsubishi | - Deloitte Touche Tohmatsu | - Houlihan Lokey | - Moody's Analytics | - Stonewater Partners |
| - Bechtel | - Delta Electronics Netherlands | - HSBC | - Morgan Stanley | - Stulz |
| - Beijing Dynamic Power | - Dense Air | - Huawei | - Moropa | - Submer |
| - Berenberg | - Detecon | - Huber + Suhner | - Mubadala Investment Co | - Tambora Systems |
| - Bharat Heavy Electricals | - Deuther Cooling | - Hybrico Energy Technologies | - Natixis | - The Bank of Nova Scotia |
| - BlackRock | - DNB Bank | - Hydrogen Energy Applications | - Naya Management Llp | - The Boston Consulting Group |
| - BNP Paribas | - Duff & Phelps | - Indigo Telecom Group | - NEC Corporation | - Unison Site Management |
| - Bradesco | - Eidsiva Energi | - Inspection2 | - Netlink Nbn Management | - Valmont Structures |
| - Brennan Asset Management | - Energy Vision | - Instrumental | - Ningde Amperex Technology | - Vertiv |
| - Brizo Capital | - EnerSys | - Intelsat | - Nokia | - Volitalia |
| - Brookfield Asset Management | - Engro Corporation | - Inter-American Development Bank | - North Highland | - Wells Fargo Bank |
| - BRT Nigeria | - Ericsson AB (EAB) | - International Finance Corporation (IFC) | - NTT Facilities | - WHP |
| - BTS Towers | - Ernst & Young | - Invendis Technologies India | - Perella Weinberg Partners | - Wind-it |
| - Caban Systems | - eSite Power Systems | - Investa Capital | - Perkins Engines | - World Bank |
| - Cadian Capital Management | - Exane | - Invictus Strategy Associates | - Phillips Lytle | - Yoma Micro Power |
| - Canada Pension Plan Investment Board (CPPIB) | - Exicom Telesystems | - Invus Group | - PJ Solomon | - ZTE Corporation |
| - Capgemini | - Exide Technologies | - ISEO Serrature | - PMP | |
| - Capital Group Global | - EY-Parthenon | - Iwireless Solutions | - Point72 Asset Management | |
| - Cartesian Capital Group | | | - Pomona Impact | |

Unlock a wealth of data points and tools

Sub-Saharan African towerco activity and tower transaction heatmap



Major tower transactions in the Latin American tower industry

Year	Country	Seller	Buyer	Tower count	Deal value (\$)	Cost per tower (\$)	Deal structure
2022	Brazil	Gruppo TorreSur	IHS Towers	2115	\$315,000,000	\$148,936	Portfolio Acquisition
2022	Chile, Ecuador, Paraguay, Colombia, Peru	BTS Towers	Andean Telecom Partners	375			Company acquisition
2021	French West Indies	Outremer Telecom	Phoenix Tower International	203			SLB
2021	Brazil	Skysites	IHS Towers	1000			Company acquisition
2021	Brazil & Colombia	Centennial Towers	IHS Towers	819			Portfolio acquisition
2021	Brazil	Oi	Highline	687	\$199,600,000	\$313,348	Portfolio acquisition
2021	CALA and Europe	Telefónica	American Tower	30,722	\$9,400,000,000	\$304,000	Company acquisition
2020	Brazil	Phoenix Tower do Brasil	Highline	2,500			Portfolio acquisition
2020	Brazil	Telefónica	Téxius	1,909	\$151,000,000	\$79,099	Portfolio acquisition
2020	Brazil, Peru & Colombia	Cell Site Solutions	IHS Holdings Limited	2,300			Portfolio acquisition
2019	Chile & Peru	Entel	American Tower Corporation	3,248	\$772,000,000		SLB
2019	Brazil	Highline do Brasil	Digital Colony	~300			Portfolio acquisition
2019	Brazil	Gruppo TorreSur	SBA Communications	1,313	\$460,000,000	\$350,342	Portfolio acquisition
2019	Ecuador & Colombia	Telefónica	Phoenix Tower International	2,029	\$317,000,000		SLB
2019	Bolivia	Trilogy	Phoenix Tower International	600	\$100,000,000	\$166,666	SLB
2019	Mexico, Nicaragua, Colombia	Uniti Towers	Phoenix Tower International	500	\$100,000,000	\$200,000	Portfolio acquisition
2018	Dominican Republic	Teletorres	Phoenix Tower International	1,049	\$170,000,000	\$162,059	Portfolio acquisition

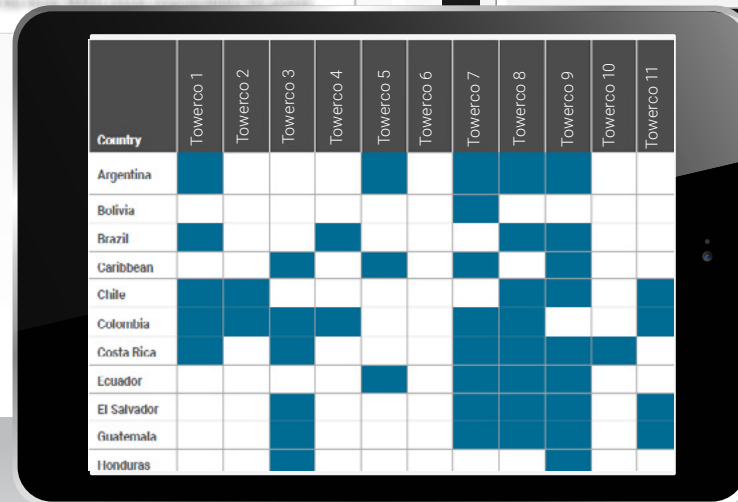
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Market	Energy	RMS, ILS, Digital Twin and Access Control	Tower Manufacturers	Turnkey Infrastructure	Beyond Towers	Advisory
Australia	Low	High	Medium	Medium	High	Low

Tower strategies of Europe's major MNOs

Company	Other allies	European countries of operation	Tower strategy
A1 Group (Telekom Austria)	A1, vip	Austria, Belarus, Bulgaria, Croatia, North Macedonia, Serbia, Slovenia	Telekom Austria has begun plans to spin out their towers into a separate towerco unit to reap tower benefits from tower assets through 3G targeted management focus on efficiency and higher service-level agreements. Partners have now been set up in Austria, Bulgaria, Croatia, Macedonia and Serbia. Austria (A1) - Telekom Austria majority shareholder - has former operator owned towers. Telekom in Mexico and in the process of forming another towerco. Also, Telekom is planning to set up in 11 Latin American markets. Telekom is based in the former Czech Republic and Austria (A1) has similar plans for Slovakia and Hungary.
Altice	SFR	France, Portugal	In France, Altice spun out their towers into a separate towerco, Towerco, in which they sold a 49.9% stake to H3G. They have subsequently been sold to Cellnex. In Portugal, Altice spun out their towers into Towerco, which is now owned by Cellnex.
Deutsche Telekom	Telekom Deutschland, Magenta, Telekom	Austria, Czech Republic, Germany, Netherlands, Poland, Slovakia (Plus direct and indirect investments in Croatia, Greece, Hungary, Montenegro and North Macedonia)	German towers moved into Deutsche Telekom in 2010. Austrian towers moved into Magenta Towers in 2011. Both are now under the Cellnex Towers business unit. Deutsche Telekom has started a unit to spin out Cellnex Towers, with the operator saying they would prefer to retain a minority shareholding in the towerco enabling them to reap up the tower business more significantly and complete effectively with other towercos. Slovak towers have been merged with Cellnex Netherlands portfolio, with Cellnex and Deutsche Telekom creating a new investment fund. Digital infrastructure vehicle which holds 20% stake of Cellnex Netherlands as it sold asset. Cellnex plans to seek third party investment and invest in other digital infrastructure. In Poland, Telekom towers are managed through a JV with Orange (Poland). Deutsche Telekom has begun the process of spinning out its towers in the Czech Republic and Slovakia.
Hutchison	3, H3G, Wind Tre	Austria, Denmark, Ireland, Italy, Sweden, UK	Towers sold to Cellnex for 650m in cash and 10% share of Cellnex shares (3.7% Cellnex capital). Hutchison UK towers are managed by Cellnex. In Ireland, Hutchison set up a separate unit to manage the towers in Ireland. In Sweden, a portion of Hutchison's towers are managed by the Cellnex. All but the UK portion of Hutchison's towers are now owned, although the UK portion is now managed by Cellnex.
Ilad (and other MNOs owned by Kowit Niels N.V.)	etf, Epic, Free, Iliad, Monaco Telecom, Salt	Cyprus, France, Ireland, Italy, Malta, Monaco, Poland	Ilad has moved companies have sold their towers to Cellnex in four markets. In 2016, Ilad sold their towers in France and Italy to Cellnex, retaining a 20% stake in the former Cellnex holding and acquired the remaining stake. At the same time, Cellnex acquired towers in the towerco, retaining a 10% stake in France. Ilad also sold towers to Cellnex, with Cellnex retaining a 40% stake in the towerco, retaining a 10% stake in France. Ilad also sold towers to Cellnex, with Cellnex retaining a 40% stake in the towerco, retaining a 10% stake in France. Ilad also sold towers to Cellnex, with Cellnex retaining a 40% stake in the towerco, retaining a 10% stake in France.

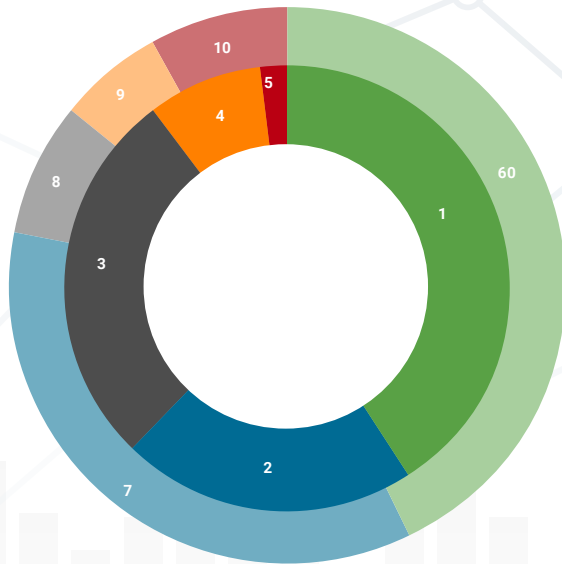
Country by country demand forecast for passive infrastructure equipment and services in the APAC tower market



Geographic footprints of Latin America's towercos

Unlock a wealth of data points and tools

Ownership of ground-based towers and rooftop sites in the German market



Tower counts of Europe's towercos



Burkina Faso

AFRICA

Population (mn):
20.9

Subscribers (mn):
20.4

Access to electricity: % of population 18.4%

Access to electricity: % of urban population 64.6%

Access to electricity: % of rural population 4.7%

Towers
2757

MNOs: Onatel, Orange, Telecel

Towercos: American Tower

ESCOs: Aktivco

SIM Penetration
97.6%

Proportion of sites off-grid/on bad grid:

Legend: MNO owned Towerco owned

Country-by-country profiles of the telecom tower energy landscape

About TowerXchange

TowerXchange has been recognised as the home of the global telecom tower industry since 2012. Our research, analysis and events provide unparalleled insights and access into the global towerco market as it grows in prominence.

About TowerXchange Community Membership

Becoming a member gives you access to the world's most comprehensive online portal of tower industry news, interviews, analysis and data including:



The industry's most trusted resource of global tower counts



Monthly newsletter rounding up the latest industry news



Detailed country studies of telecom and towerco market dynamics



Critical examination of emerging trends



In-depth analysis of the latest tower deals



Special focus reports on the industry's biggest issues



Regular interviews with the biggest names in the telecom sector



Detailed write-ups of the main take-homes from our five world-leading tower industry Meetups

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Pricing

12-month TowerXchange Community Membership	£2,500pp
Towerco and MNO membership (for full time employees of towercos and MNOs only – proof of affiliation required)	FREE
Corporate / multi-user membership	POA Contact membership@towerxchange.com

FAQs

Q: How much does it cost for an annual membership?

A: An annual membership is £2,500. For full time employees of MNOs and towercos, membership is free

Q: Can everyone at my company use my log-in?

No, an annual membership is for individual use only. Corporate memberships are however available on request. Please contact membership@towerxchange.com for more information

Q: Can I quote TowerXchange data points and reproduce TowerXchange figures in my own reports?

A: Please contact the TowerXchange team regarding the data set in question. For internal reports only, the general rule is that you can quote figures as long as you reference TowerXchange as the data source. For reports for wider public distribution, requests will be subject to approval.

Q: How often are data points updated?

A: Our regional guides and towerco league table are updated on a quarterly basis

Q: Can I have a free trial?

A: Due to the value held in our data we are unfortunately unable to offer a free trial. One of the TowerXchange team would however be happy to walk you through a demonstration. Please contact membership@towerxchange.com to arrange a demonstration

Q: Does becoming a member give me access to your Meetups?

A: Delegate passes to Meetups are not included as part of your membership, however discounts are available when membership and delegate passes or membership and sponsorship are booked together.



Tower Xchange