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Global leaders in TMT management consulting





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Towerco ESG initiatives should be intentional and prioritised based on a strategic framework that considers stakeholder priorities

Alessandro Ravagnolo, Partner and Sabre Konidaris, Consultant

We have entered an era where all leading companies must develop a compelling environmental, social, governance (ESG) strategy. This is especially relevant to towercos because they operate and manage strategic infrastructure that is highly exposed to criticism about visual and environmental concerns. Although many towercos have already committed to sustainability initiatives in some form, it is has become essential to carry out these initiatives as part of a comprehensive framework rather than on a piecemeal basis.

Many beneficiaries of towercos, such as mobile network operator's (MNO's) end users, may not precisely understand the purpose or role of the towerco, meaning that a clear ESG communication strategy is vital. Towercos must consider the priorities of varied stakeholder audiences and should develop their ESG reporting beyond any base legislative requirements (such as the EU's disclosure regime, discussed here). Listed towercos have been leading on this front and have begun disclosing ESG progress and third-party ratings. For example, IHS Towers reports sustainability spend and American Tower Corporation reports progress toward climate targets in annual sustainability reports,¹ while INWIT in Italy presents its improvements in third-party ESG ratings on its website.²

Towercos must consider the priorities of their key stakeholders

Analysys Mason has identified four types of stakeholders that towercos should consider.

Investors

Towercos must improve their ESG credentials to effectively compete for funding (both equity and debt), especially since access to financing has tightened over the last year.

Equity investors are committing to increasingly ambitious ESG goals. For example, a recent report³ states that 81% of surveyed institutional investors in the US, and 84% in Europe, plan to increase their allocations to ESG products (including ESG-friendly companies) over the next few years, and predicts that the share of ESG assets under management globally will account for over one fifth of all assets by 2026. Investors have also started to require increasingly detailed reporting of ESG metrics.

Debt capital markets are issuing green bonds and several other financial instruments that are indexed to sustainability metrics. These include instruments that support a low-carbon economy (e.g. renewable energy projects) and the basic needs of underserved populations and communities. Such instruments typically offer competitive rates and companies are only eligible for lending if they meet stringent ESG reporting standards.

Customers

MNOs are striving to optimise supply chain sustainability (see [Analysys Mason Research article here](#)) as part of their ESG strategies. For example, Vodafone UK aims to cut operational emissions (scope 1 and 2) to net zero by 2027 and halve emissions from its supply chain (scope 3) by 2030,⁴ before achieving net zero across its entire carbon footprint by 2040. As a result, towercos must ensure that their operations align with the ESG aims of mobile customers and other potential tenants to continue growing their lease-up rates.

“ Towercos can extract significant advantage if they are able to successfully execute their ESG initiatives and communicate the impact to stakeholders

Local communities and municipalities

Towercos should engage with local communities and municipalities to enhance their corporate image and benefit from operational advantages and cost savings. Potential benefits include:

- **Greater chance of permit acceptance and reduced wait times**, which enable towercos to more easily deploy new sites or upgrade existing assets.
- **Reduced risk of vandalism**, as locals can better understand the lifestyle benefits (i.e. connectivity, jobs) and actual risks (e.g. from electromagnetic emissions) associated with the infrastructure; for example, Analysys Mason has observed reduced security concerns for neutral host solutions deployed in remote areas in Africa as a result of community involvement in the asset's protection.
- **Better management of ground lease costs**, due to stronger relationships with landlords. This can reduce the threat of land aggregators and, in turn, mitigate the risks of forced site movements and steep increases in lease costs.

Towercos are already implementing varied community-partnership schemes (such as Helios' pilot of free phone-charging points)⁵ and other community-engagement initiatives to improve the business case to deploy new sites and, therefore, are expanding the addressable market.

Employees

To attract and retain talent (especially when the labour market is tight) towercos must appeal to sustainability-conscious workers. Towercos have been committing to internal corporate social responsibility (CSR) initiatives, such as net zero targets, diversity and inclusion commitments, and training and safety initiatives for site technicians.

Towercos must devise a tailored approach to best navigate stakeholder priorities

Towercos can extract significant advantage if they are able to successfully execute their ESG initiatives and communicate the impact to stakeholders. Towercos should develop a playbook of initiatives that form part of a coherent ESG strategy. Such a playbook cannot be the same for every towerco because it should be tailored to reflect specific stakeholder priorities, which can be difficult.

Accordingly, the ESG contribution of a towerco should be measured, taking into account the company's specific circumstances and markets of operation. For example, while towercos in emerging markets typically use more fossil fuels due to a higher share of deployment in off-grid areas, their investments play a crucial social role in reducing the digital divide and connecting communities. Only a comprehensive framework that accounts for market nuances and company-specific factors can effectively assess a towerco's ESG impact and credentials.

Although relative priority can vary, we have identified some typical key ESG priorities below.

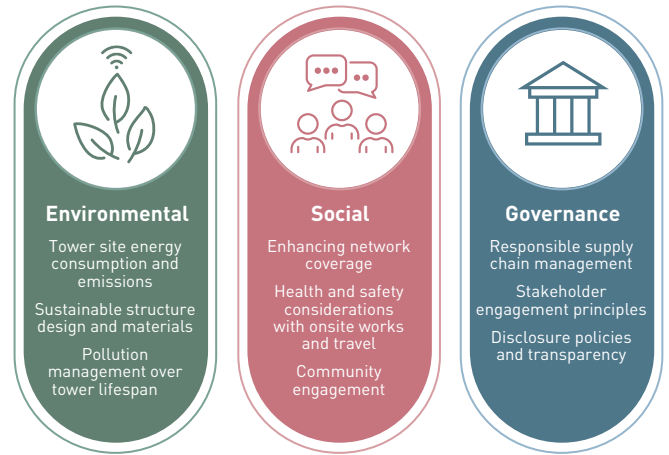


Figure 1: Towerco-specific ESG priorities [Source: Analysys Mason, 2023]

ESG initiatives that have low or no trade-off between financial (return on investment) and social benefit are often deemed high priority. Examples of such prioritised initiatives include Vantage Towers' investment in micro wind turbines,⁶ reducing electrical running costs, and IHS Nigeria's partnerships to improve digital literacy, which are expected to drive mobile take-up and thus generate more demand for towerco services.

Analysys Mason's experience in developing ESG frameworks can help towerco management to prioritise initiatives and guide investments that are consistent with the company's positioning and stakeholders' main concerns. Our frameworks can help investors correctly assess the towercos' ESG policies and the effectiveness of initiatives during the due diligence process.

Analysys Mason recommends that towercos create a coherent ESG framework that incorporates:

- **Initiatives that are designed and developed collectively:** ensuring that each initiative is selected and approached in a way that delivers synergies within the towerco's broader ESG effort.
- **Market and stakeholder alignment:** prioritising fit-for-purpose initiatives that consider unique market characteristics, ideally supported by extensive stakeholder consultations so that towercos may better understand nuanced industry pressures.
- **Effective ESG communication:** integrating a comprehensive ESG reporting framework and communication strategy to reassure key stakeholders, especially investors.

Analysys Mason is the partner of choice of towercos and investors targeting the sector. We offer actionable (and analytical) advice supporting key commercial, technical and operational decisions. The combination of our in-house ESG expertise (over 30 projects) with our unrivalled knowledge of the towerco market (150 projects in the last four years) make us an ideal partner for towercos seeking ESG advisory to achieve sustainable competitive advantage and for investors looking for ESG conscious targets.

Questions? Please feel free to contact Sabre Konidaris, Consultant, at sabre.konidaris@analysismason.com, Alessandro Ravagnolo, Partner, at alessandro.ravagnolo@analysismason.com or Maria Tunberg, Partner, at maria.tunberg@analysismason.com

¹ IHS Towers website: Our performance - IHS Towers; American Tower Corporation website: Sustainability (americantower.com)

² INWIT: ESG Rating - INWIT

³ PwC report (2022): Asset and wealth management revolution 2022: Exponential expectations for ESG (pwc.com)

⁴ Vodafone UK Carbon Reduction Plan (September 2022): carbon-reduction-plan.pdf (vodafone.co.uk)

⁵ Helios Towers Sustainable Business Impact Report 2021: ht-sustainability-report-2021.pdf (helios Towers.com)

⁶ Vantage Towers News Release (2022): 220119-pr-vt-moweae-eng.pdf (vantage Towers.com)



Opportunities for network operators emerge as subsidy schemes enable rural broadband expansion

Ian Adkins, Principal

Network operators are well placed to take advantage of a growing number of government schemes around the world to extend broadband availability to rural populations. But these opportunities come with a caveat: bidding successfully for publicly-funded contracts requires specialist skills that commercial operators may not yet have developed. Without these, bids can run into difficulties and delays.

Analysys Mason has extensive experience of working with network operators to tender for government contracts and is in a prime position to help them navigate the complex journey from pre-tender preparation to contract fulfilment.

Governments around the world are responding to the need for broadband services in remote and rural areas with subsidy models that will be attractive to some network operators and their investors.

In the UK, the government's Gigabit Infrastructure Subsidy scheme, launched in 2021, is well under way. Elsewhere, National Broadband Ireland is rolling out a fibre-to-the-premises (FTTP) network in rural Ireland, the country's largest infrastructure project since rural electrification, while in Germany fibre roll-out is central to the government's Digital and Gigabit Strategies.

The US rural broadband market is also evolving fast. A number of Federal Government grants have been allocated to fuel broadband infrastructure development. Here, growth is also being driven by the penetration of FTTP into areas where ultrafast broadband has previously been dominated by cable networks. For example, AT&T has initiated its 'Gigapower' joint venture with Black Rock for FTTP. Despite an initially small roll-out, it has the potential to bring the benefits of FTTP and open access to the many areas of the country underserved by broadband infrastructure and connectivity.

Many countries have policy ambitions for extensive gigabit-capable broadband coverage, which presents opportunities for fibre network operators because government subsidy schemes will be needed to reach areas where broadband roll-out is not commercially viable.

Despite the differences between the many subsidy schemes in each country, they represent an opportunity for network operators to build scale and expand into new markets. With those opportunities, however, come considerable and unfamiliar challenges for operators seeking to meet the requirements of government contracting, which are very different to the commercial world they are used to. Analysys Mason's experience in working with network operators bidding for contracts under the Gigabit Infrastructure Subsidy scheme has revealed skills gaps that can impede and affect the quality of bids throughout the bidding process. We have recently helped operators to bid successfully for five contracts in the UK. At the same time, our work with the Irish government developing tender documentation and supporting roll-out contract management for the National Broadband Plan has given us unique insight into the stringent governance under which public-funded subsidies are awarded.

The benefits of scrutiny

Preparing for the scrutiny to which bids are subjected on the long journey from the pre-tender stage to mobilisation and contract delivery is an intensive process that involves all aspects of an operator's business. The agility required to change operational systems in order to meet such rigorous compliance rules can be daunting – and might even dissuade an operator from embarking on the process.

The challenges that must be navigated on this journey in order to meet the milestones are substantial. They begin at pre-tender stage, even before the bidding procedure has started, and potential pitfalls lie in wait at every stage along the way. For example, it is imperative to clarify the technical and commercial requirements necessary to comply with wholesale access obligations, as well as the financial requirements and penalties operators could face for non-compliance.



Beyond these complexities, the additional business benefits that accrue by pursuing the process can be significant. When operators answer the questions in the tender, they will also identify improvements that they can make to the way they operate, and extend their own business capabilities.

Coming from a commercial perspective, some network operators may be dissuaded by the daunting and granular preparation necessary to put such a bid together, but withdrawing could mean missing a significant opportunity for expansion.

One size does not fit all

Given the complexities of individual subsidy programmes, there is no single template to suit every case. But there will always be submission templates that can be reshaped for future contracts. Working with an expert who understands those complexities and also understands the time, effort and commitment required to tender and bid for government contracts is a good way to build the knowledge and skills network operators will need in order to take advantage of these significant new opportunities.

In its detailed overview of the Gigabit Infrastructure Subsidy, the UK government outlined the procurement procedure that bidders will be required to follow. They give an idea of the evidence and detailed responses operators will have to provide. This is just one example of such a subsidy, but regardless of the degree of localisation unique to individual contracts in the UK – a variation that will be magnified considerably in the complex emerging broadband landscape of the USA – there is likely to be a common core set of requirements at the heart of all similar projects. They will almost certainly include, for example, guarantees of availability, network access and coverage, capacity, and pricing; the ability to deliver a technology plan to meet certain specifications; and commitments to meet operational KPIs.

Demystifying subsidised procurement


With our global experience of working with governments and operators on subsidy schemes, Analysys Mason has acquired a wealth of knowledge about how schemes are designed and how bidders are evaluated. We have seen the impact that failure to adequately prepare responses can have on a timely and successful outcome. We have also seen that the process gives operators a new insight into their existing businesses that can improve the way they operate. The benefits of engagement with subsidy-based broadband network procurement processes are plentiful, regardless of the initial complexity and challenges of doing so.

“ Our recent successes working with network operators to tender for government subsidies to roll out broadband networks in rural areas has proven the value of specialist expertise

Subsidy is often a new concept for network operators. We have seen how a lack of necessary skills can leave them exposed even at the earliest stages of engagement, which requires a keen focus on capability and capacity. We have also seen the effort needed and the delays that arise because the operator has provided inadequate documentation.

We want to work with operators to help them overcome these hurdles so they can take full advantage of the opportunities that bidding for publicly-funded contracts can bring. These opportunities will only grow in number as governments rise to their own challenges of extending vital rural broadband coverage.

Questions? For further details about how Analysys Mason can support bidding for, and delivering, government contracts for broadband subsidies, please contact Ian Adkins, Principal, at ian.adkins@analysismason.com



OpenRAN: increased collaborative efforts and a realistic view of timing will be needed to deliver the full benefits

Caroline Gabriel, Research Director

New technologies are almost invariably greeted with early enthusiasm, followed by a period of disillusionment when they do not deliver on all their promises immediately. Open RAN is the latest example. After 5 years of industry initiatives, many supporters expected it to have significantly shaken up the RAN supply chain by now, yet commercial progress has been limited. However, this reflects over-ambitious timeframes rather than a failure of the whole concept. This is not the time to despair of the idea of an open, multivendor, cloud-based network, but to redouble collaborative efforts to address the significant challenges, while setting realistic timings.

Analysys Mason's webinar, *Open RAN: translating the hype into revenue*, will outline the reasons to persevere, and the key solutions that the industry needs to develop to turn Open RAN hopes into revenue and profit.

Open RAN initiatives bring hopes of increased choice for operators and new opportunities for vendors

Organisations such as the O-RAN Alliance and Telecom Infra Project initiated the idea of a virtualised network based on standard interfaces, to enable elements from different suppliers to be combined easily within the same RAN. Instead of the single-vendor, proprietary RAN solutions that power current cellular networks, operators could choose different suppliers for each of the main elements of the RAN, the radio unit and the baseband unit. Furthermore, the baseband unit could be virtualised and would then run on cloud technology from yet more vendors.

This goal has been pursued by the following three main groups.

- **Large operators** that want to have an increased choice of suppliers when they take the challenging step of moving to a cloud-based RAN architecture. This would boost innovation and competition, and make it possible to change vendors in future without replacing the entire network. The issue is particularly urgent for operators in countries where governments have restricted access to Chinese equipment for 5G.
- **Small or new operators**, such as private network operators, that want to select equipment and software at lower price points than the top vendors usually support.
- **Vendors** that have been unable to target the RAN market, because the barriers to entry have been so high. Whether these companies are moving from the cloud and IT world, like Dell, or are specialised start-ups, like Mavenir, they are aiming to secure a share of a market worth USD40 billion in 2022, according to Analysys Mason's most recent forecast.

So far, progress has been disappointing, and intensive efforts have not translated into significant change to the status quo

Despite a large number of technology developments and some large trials, to date there have been very few commercial deployments of Open RANs at scale. The most high-profile projects are by two greenfield operators, Rakuten Mobile in Japan and DISH Network in the USA, but these provide limited indicators for the rest of the market. As new entrants, they do not face one of the biggest challenges of Open RAN, integration and co-existence with

“ Operators must reset their expectations for Open RAN, and not give up after a disappointing first phase

established networks. And although both are working with several suppliers, their biggest radio and baseband providers are not new to the RAN market. NEC is the biggest vendor for Rakuten, and Samsung for DISH, and although these large companies have not been global RAN players before, they do not represent the vision of a mobile network ecosystem made up of a large number of suppliers, many from outside the sector.

Even Tareq Amin, CEO of Rakuten Mobile and its vendor arm Symphony, said at this year’s Mobile World Congress that he was “really, really disappointed” with the limited adoption of Open RAN by brownfield operators. Some operators, notably Deutsche Telekom, NTT Docomo and Vodafone, have started to deploy Open RAN in a few small areas, but according to a survey of 75 operators, conducted by Analysys Mason in 4Q 2022, over 80% do not expect to implement multivendor Open RAN in the urban macro network until 2026 or later. That leaves a hiatus during which operators cannot achieve the supply chain disruption and cost savings that they were targeting from Open RAN, and challenger vendors cannot generate significant revenue.

The emergence of common network and chip platforms will help Open RAN to deliver on its promises in the coming years

As we will argue in the webinar, the challenges are real but not insurmountable. Our operator research indicates that there are three main barriers to adoption of Open RAN, as we described in a recent report. These are the immaturity of cloud platforms when handling demanding RAN tasks such as beamforming; the cost and complexity of integrating elements from multiple vendors; and the difficulties that new suppliers face in scaling up their offerings for massive roll-outs.

However, solutions are emerging, and there is strong collective will across the ecosystem to address the challenges. For instance, five large semiconductor vendors showed off Open RAN acceleration solutions at Mobile World Congress. These solutions are designed to offload demanding RAN processes from the central processor in a cloud server in order to boost overall performance.

The other two challenges will be most effectively addressed by a platform approach to the RAN in which hardware and software elements are designed within a common framework of specifications and APIs, so that there can be significant amounts of pre-integration, to reduce cost and time for the operator. In this environment, vendors of all sizes can co-operate to drive solutions to the scale required by large operators. Rakuten Symphony is one example of an emerging RAN platform, but others may develop around large ecosystem players such as Dell or Intel, or through open initiatives such as TIP.



We believe that if the industry effort that is currently being made to address these challenges continues, there will be a tipping point for virtualised and Open RAN in 2025–2026 (Figure 1), which will then start to deliver significant commercial benefits to the entire ecosystem.

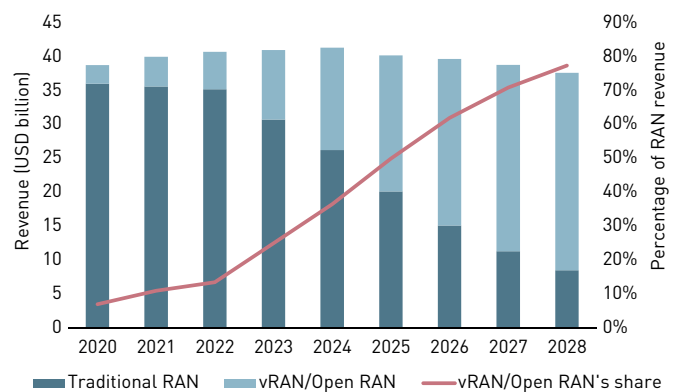


Figure 1: vRAN/Open RAN revenue in RANs, worldwide, 2020–2028 [Source: Analysys Mason, 2023]

Questions? Please feel free to contact Caroline Gabriel, Research Director, at caroline.gabriel@analysismason.com

Understanding the economic impact of cloudification in telecoms

Gorkem Yigit, Principal and Gilles Monniaux, Principal

Communications service providers' (CSPs') networks are undergoing significant changes with the adoption of cloud technologies and the transition towards virtualising network functions. Cloud-based network technologies enable more open and disaggregated network architecture, flexible deployment and commercial models, and new modes of operations, all of which alter the traditional network cost economics for all industry stakeholders, including CSPs, technology suppliers and regulators/policy makers.

Analysing cloud cost economics is an integral part of formulating CSP network cloud and digital transformation strategies

Cloud is driving a major shift away from monolithic, closed telecoms functions to new network architecture and consumption models that are based on disaggregated and distributed network software and hardware layers. The cloud developments that are happening in the 5G mobile era have brought the introduction of cloud-native technologies, such as containers, microservices and Kubernetes, to address challenges in delivering high-performance, low-latency, and scalable services to customers in the mobile core and RAN (including vRAN/Open RAN). Network cloudification activities have also started to extend beyond mobile networks to include transport networks, which are increasingly becoming cloud- and software-based and disaggregated.

CSPs face crucial decisions on how to bring together these disaggregated network cloud components to create common, highly automated digital platforms. CSPs worldwide are expected to spend USD32 billion on network cloud infrastructure by 2027, and need to understand the complete set of costs associated with various approaches to sourcing a disaggregated cloud platform to make informed decisions about their network cloudification strategies and roadmaps. Making informed decisions involves a series of complex steps and factors, including the following.



- **Building a business case justification for investment.** Although CSPs are generally enthusiastic about open and disaggregated cloud network technologies such as Open RAN, they need to secure internal support and make investments to adopt these technologies. Therefore, CSPs should consider holistic total cost of ownership (TCO) studies, such as Analysys Mason's Open RAN model, to test and demonstrate the short-term economic viability, and enable sign-off, of cloud-native network investments.
- **Identifying the most suitable network cloud procurement and implementation models.** CSPs are evaluating multiple paths for building their cloud platforms including vertically integrated clouds from network equipment providers (NEPs), do-it-yourself private clouds using software-only IT vendors' technologies and public cloud providers' (PCPs') cloud technology stacks. Each model has its advantages and disadvantages that CSPs should evaluate carefully. For example, a recent Analysys Mason TCO study showed that taking a PCP-managed cloud platform approach to 5G standalone core networks could offer significant opex savings (44%) compared to a do-it-yourself cloud model.
- **Increasing operational and organisational readiness.** Successful implementations of the cloud-native and disaggregated networks require CSPs to make significant changes to their current mode of operations and investments to bring or build cloud-native software skills in the organization. Our TCO study on IP network disaggregation showed that while the use of white boxes in the network provides capex savings, CSPs need to make large upfront investments in operational automation and relevant skillsets for the end-to-end lifecycle management of disaggregated networks, which has a considerable impact on TCO.

CSPs need to consider several other key factors when they are forming their network cloud strategy and investment decisions such as choosing the right vendor(s), identifying optimal network architecture (centralised or distributed) and cloud delivery models (on-premises, hybrid and SaaS). Each of these has been analysed in TCO studies and cost modelling exercises that Analysys Mason has developed for CSPs, vendors and regulators.

Vendors and regulators must understand cloud cost economics if they are to take advantage of network cloudification

Network cloudification and disaggregation are also transforming the competitive and regulatory landscape by changing CSPs’ relationships with their suppliers, enabling the entry of new players and value-chain disruptions, and raising new regulatory and policy-related considerations.

Understanding the cost economics of network cloud, and educating the market about it, should be a priority for network technology

suppliers such as NEPs, PCPs, OSS/automation vendors and system integrators. This will enable them to foster the adoption of their network cloud solutions, promote best practices and strategies through white papers, case studies and webinars, and guide their R&D efforts and product roadmaps. By doing so, vendors can improve their position in the market and develop solutions that cater to CSPs’ needs, ultimately gaining a competitive advantage.

Like CSPs and vendors, regulators and policy makers need to assess the potential benefits, opportunities and challenges that cloudification presents (Figure 1). For example, they will need to understand the potential cost savings from cloudification and how these savings will affect the cost of regulated services, how cloudification may allow new forms of network sharing, and whether disaggregation of the control and data plane or the more complex supply chain could potentially lead to cyber-security threats, etc.

Stakeholder	Opportunities	Risks
CSPs	<ul style="list-style-type: none"> • Cost savings from higher utilisation • Cost savings from lower prices due to increased vendor competition • Increased service agility improving time to market and new services supporting revenue generation • Potential customer experience improvement 	<ul style="list-style-type: none"> • Cost of, and time taken for, operational and organisational changes • Cost of technical evaluations and performance trade-offs
Vendors	<ul style="list-style-type: none"> • Potential technical improvements • Opportunities for new vendors (such as PCPs) and expansion into new markets • Opportunity for new pricing models 	<ul style="list-style-type: none"> • Potential supply chain disruption if using multiple vendors including smaller players • Cost of, and time taken for, operational and organisational changes • Technical challenges adopting new software skills and technologies
Regulators	<ul style="list-style-type: none"> • Potential for increased competition, innovation and reduced cost • Opportunity for new forms of network sharing • Opportunity for new forms of network access in regulated markets 	<ul style="list-style-type: none"> • Potential market disruption from or increased dependence on non-traditional players (for example, PCPs) • Security issues and data privacy • Potentially not clear which party carries responsibility or liability if the system breaks

Figure 1: Overview of opportunities and risks that network cloudification presents to the telecoms industry [Source: Analysys Mason, 2023]

In conclusion, the transformative impact of cloud technologies on the telecoms industry demands immediate and informed action from CSPs, technology suppliers, and regulators/policy makers. As network cloudification continues to reshape cost economics and industry dynamics, understanding and navigating these changes is essential for success. CSPs must make strategic investment decisions, vendors need to adapt and innovate to maintain a competitive edge, and regulators must assess the implications of this shift to ensure a secure and thriving market. All stakeholders need to collaborate, learn, and embrace the potential of network cloudification, leveraging studies and comprehensive market analysis to shape a sustainable and stable future in the era of cloud-based networks.

Questions? Please feel free to contact Gorkem Yigit, Principal, at gorkem.yigit@analysismason.com or Gilles Monniaux, Principal, at gilles.monniaux@analysismason.com

“ The transformative impact of cloud technologies on the telecoms industry demands action: CSPs must make strategic investment decisions, vendors need to adapt and innovate to maintain a competitive edge, and regulators must assess the implications to ensure a secure and thriving market

TMT companies must adopt new energy strategies to adapt to a changing world








Anurag Dey, Manager

Energy in a changing world

Events in Ukraine and the related use of energy as a tool of war have brought into sharp focus the geopolitical and economic risks associated with a reliance on imported fossil fuels. Within this context, the IMF reported that global wholesale electricity and gas prices increased to a peak of fifteen times the prices prevailing in early 2021. This geopolitical and economic reality has pushed global policy leaders to examine opportunities to diversify their energy supply – especially domestically produced green energy solutions – with renewed zeal. For companies, they are experiencing increased energy opex and higher uncertainty in their forward planning. TMT players (like others) need to make decisions now that could have enduring consequences.

While many companies have been examining opportunities to sharpen their environmental credentials and secure energy supply for several years, the urgency imposed by current circumstances offers a catalysing opportunity: policy makers are reducing barriers to adoption for green energy; demand for green energy technologies is driving innovation and price reductions; and consumers (while under severe pressure regarding the cost of living and inflation partly caused by the same geopolitical forces) are more vocal and are choosing to support companies which align with their values.

In the short-term TMT players should identify opportunities to increase operational efficiencies and reduce consumption. In the medium term, increasing their resilience against volatility in energy prices will be key, and, in the long term, they should explore strategies to decouple their energy consumption from emissions.

	Investment options	Description	Case studies
	Power purchase agreements (PPA)	PPAs are long-term renewable energy contracts that support both the decarbonisation of energy consumption and price security	Telia, Telstra, KPN, Meta, Microsoft
	Solar panels	Installing solar panels as a modular addition to existing or new sites, with or without batteries (without lowers the implementation complexity)	Cellnex, Google, Phoenix Towers
	Wind turbines	Installing wind turbines as a modular addition to existing or new sites. Market research indicates that battery units are necessary. Some units may be installed without the need for additional electricity lines	Vodafone, Westfalen Wind-Group
	Lithium-ion batteries	Lithium-ion batteries act as universal power supplies (UPSs) to replace diesel generators. They can also act as a dynamic energy source, turning on when prices are highest and storing energy when prices are low	Google, China Telecom
	Aluminium batteries	Aluminium batteries are a new concept for low-cost, renewable energy storage. The technology uses relatively low-cost materials to develop a low cost, rechargeable, fire-resistant, and recyclable battery (according to the developers)	MIT / Peking University (research project)
	Heating /cooling recycling	Recycling the heat generated from data centres into underground water systems running below cities and towns to create 'eco-districts'	Stockholm Data Parks, Amazon, Interxion (data centres)
	Smart chip management	Using smart-chip management, telecoms networks can be more flexible and adjust equipment activity to network demand	Ericsson, Nokia, VodafoneZiggo



Partnerships



Energy production



Energy storage



Operational efficiency

Figure 1: Examples of investment options [Source: Analysys Mason, 2023]

Separately (but complementary to the above), companies must monitor their progress to provide the data which will enable them to then demonstrate their achievements.

Strategies to adapt to the changing world

Analysys Mason recommends four strategies that companies can adopt now to adapt to the changing world:

- operational efficiencies (short term)
- local energy storage (medium term)
- local energy production (medium term)
- partnerships (long term).

Operational efficiencies

In the short term, companies should focus on optimising operational efficiencies. For operators, Analysys Mason research¹ indicates that the parallel deployment of multiple generations (mobile or fixed) significantly increases energy consumption. Operators could advance sunset dates for legacy systems to reduce their energy usage.

Other examples of operational efficiencies include optimisation of energy usage or performance through a “smart chip” management solution. This software enables a network unit to direct traffic to the most energy-efficient bands or deactivate network equipment during low-traffic hours.

Data centre operators can utilise liquid-cooled server technologies (as opposed to air cooling) to increase cooling efficiency and increase rack density without increasing the site size.

Local energy storage

Localised energy storage allows TMT players to store energy when prices are low and use it or sell it back to the grid when prices are high. In addition, the energy stored might come from times of day when the grid uses low-carbon sources (such as nuclear or renewables), and there can also be the opportunity to make the system more resilient to temporary interruption in the grid supply, whether that be mobile operators or data centre providers.

Local energy production

TMT players can reduce energy purchases through localised energy production. Solar cells or small wind turbines can be co-located on-site, e.g., mobile base station tower or data centres, to directly power the infrastructure and/or to store power in a battery for future usage. In areas with intermittent or unreliable grid access, there has often been little alternative to expensive and inefficient diesel generators. Local, renewable generation can reduce or remove reliance on diesel generators.

Generating energy onsite can also provide an opportunity to sell excess energy into the grid at times when local production exceeds demand and local storage capacity. That way “energy consumers” can transform into producers AND consumers (referred to by the European Energy Agency as “energy prosumers”).²

Partnerships

In the long term, companies should focus on partnering with energy providers to secure their supply and price.

“ The adoption of new energy strategies is critical to enabling growth for TMT companies, who face acute pressures as energy prices continue to rise

They are distinct from traditional electricity contracts for several reasons. Companies partner directly with energy producers (rather than local utility companies), which allows for certainty of sourcing. Secondly, companies can make PPAs prior to site development. This can lead to more favourable terms for the energy consumer while providing the energy producer a guarantee of demand which can support financing.

The EU sees PPA as one of the pillars of a reformed electricity market and are supporting the adoption of PPAs to encourage development of renewable projects throughout the continent.

Key insights

Companies must act now to meet the immediate and future energy challenges.

Analysys Mason strongly believes that there is not a one-size-fits-all strategy. We develop bespoke approaches to help our clients to achieve long-term, sustainable, competitive advantages that are consistent with the company’s overarching goals and envisaged positioning.

Analysys Mason offers strategic support to TMT players on key commercial, technical, and operational decisions. We have an intimate knowledge of the TMT market and a long-term view on its evolution. In-house technical expertise, coupled with the commercial understanding of the business and our growing operational capabilities make us an ideal partner throughout the sustainability journey. This article has focused on energy investment opportunities that exist for all companies, but this Quarterly also includes an article focusing on specific environmental, social, and governance (ESG) challenges for towercos.

Questions? Please feel free to contact Anurag Dey, Manager, at anurag.dey@analysismason.com or Maria Tunberg, Partner, at maria.tunberg@analysismason.com



¹ Analysys Mason (2022), Driving down energy usage across telecoms networks: 5G RAN and beyond available at <https://www.analysismason.com/research/content/reports/reducing-telecoms-energy-rdnt0-rdfil/>

² European Energy Agency (2022), EEA Report No 1/2022 Energy prosumers in Europe: Citizen participation in the energy transition available at <https://www.eea.europa.eu/publications/the-role-of-prosumers-of>



Interactive entertainment: capturing value at the convergence of telecoms, media and technology

After two decades of sustained growth, the interactive entertainment industry is now bigger than movies

Interactive entertainment is a complex ecosystem or value chain that spans the conception, development, distribution, sale and now increasingly hosting and operation of what used to be called video games. It is an inherently multiplatform industry: development, distribution and hosting are big drivers of cloud computing demand, servicing players who use PCs, consoles, smartphones and tablets, more and more fluidly. With more than ~3 billion players worldwide,¹ gaming's player base has been extending beyond children and young adults to reach a diverse demographic (as seen in Figure 1).

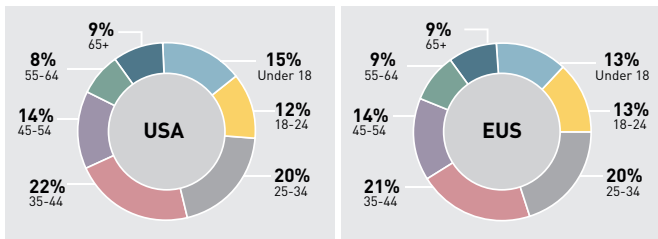


Figure 1: Breakdown of gamers in the USA and EU5 by age range²
[Source: Analysys Mason Research Consumer Survey 2022³]

As a result of this expanding user base, gaming revenues are forecast to reach USD184 billion in 2022⁴, up from USD149 billion in 2019 (7.4% average annual growth). For comparison, the global movie production and distribution industry generated USD78 billion in revenue in 2022⁵. The gaming industry's growth was undoubtedly accelerated by the Covid-19 pandemic and the demand for in-home entertainment during lockdowns. Growth has since decelerated, but recently announced transactions in the gaming space shows how dynamic the industry remains. Recent transactions include Microsoft's proposed acquisition of Activision Blizzard for USD68.7 billion and Take-Two Interactive's acquisition of Zynga for US12.7 billion in 2022. This is comparable to Disney's acquisition of 21st Century Fox, which was completed in 2019 for USD71.3 billion.

Interactive entertainment and the TMT ecosystem are coupled in a virtuous circle of demand for technology, content and connectivity

There is a virtuous circle at play between gaming, technology and digital infrastructure. Devices and connectivity are key to the gaming experience, driving new types of games and business models. At the same time, Analysys Mason Research's Consumer Survey shows

that gamers are early adopters of new technologies and better connectivity. Many in the TMT sector understand this well and are working to harness gamers' demand for better technology, content and connectivity.

The complex value chain of the gaming industry spans all three pillars of the TMT ecosystem (see Figure 2):

- **Technology:** the software (game engines, operating systems, cloud platforms, and in future AI capabilities such as ChatGPT) and hardware (CPUs, GPUs, SSDs, controllers and sensors, displays and other input/output peripherals, which include VR headsets and haptics) required to run games are in continuous evolution – innovation that fuels creativity in game development and vice versa (and beyond, in hardware supporting HPC and AI, where the gaming community largely funded the GPU industry for many years before the rise and fall of crypto mining).
- **Media:** interactive entertainment is increasingly transmedia (e.g. Esports, live streams and in general content creation), and gaming itself is becoming more and more the subject of media content, as illustrated by the recent box office success of the Super Mario Bros. movie.
- **Telecommunications:** networks are now at the core of the interactive entertainment industry, providing the infrastructure for development, distribution and running/hosting of games (including online gaming).

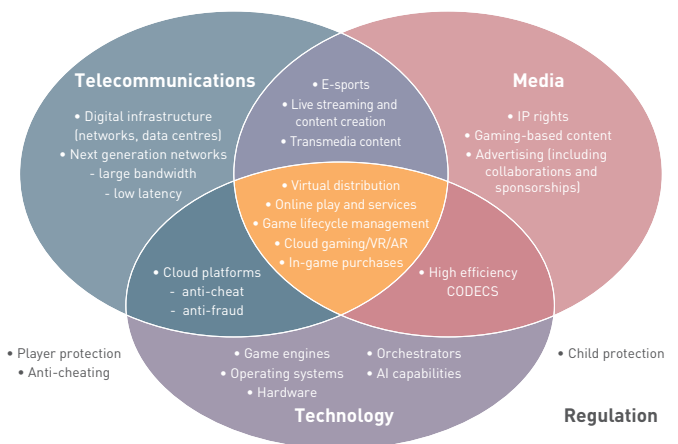


Figure 2: High-level overview of the interactive entertainment industry from the TMT ecosystem perspective [Source: Analysys Mason, 2023]

Digital infrastructure, including networks and cloud platforms, is becoming increasingly central to the gaming industrial ecosystem. Once purely offline (people would buy a console and physical games from stores for at-home play), gaming is now highly connected:

- **Virtual distribution is now the norm:** game distribution has become increasingly rich and sophisticated, with the largest distribution channels being online libraries such as Steam, Epic Games Store, Xbox Live and PlayStation Store. With AAA games⁶ titles reaching typical sizes in range of 25–60GB in 2022⁷ and even up to 100GB (which is only going to increase as 4K games become commonplace), demand on networks can be significant: downloading a 50GB game can saturate a 30Mbit/s connection for almost 4 hours (as a means of comparison streaming on Netflix in 4K consumes up to 7GB per hour of data in a web browser⁸) – moreover, the increased ease of access to vast libraries and limited local storage space on devices prompts users to download and unload games, for just a trial or to install an OS update, increasing network loads.
- **Online play and services is either central to games or an expected add-on for many players:** online play services include games where players interact with each other in real time, for which very rapid responsiveness of the system is often crucial to guarantee an enjoyable gaming experience (with processes often managed in the cloud through orchestration software) – network, computing and storage (e.g. for saving gameplay progress) requirements can be significant, especially for those games that tend to have hundreds or even thousands of concurrent players on the same server. Real-time events in games and metaverse-type experiences, such as Fortnite concerts, also fall under this category, and may result in infrastructure overload should it not be adequately dimensioned.

In addition, emerging use cases, both in the B2B and B2C sectors, should amplify the cross-reliance of digital infrastructure and interactive content:

- **Game lifecycle management** includes the development and production of a game, which encompasses a variety of CPU- and GPU-intensive workloads, such as compiling, rendering or testing. Cloud platforms offer a convenient and scalable way to address evolving computing requirements across the lifecycle of games. Post-sale game management includes updates and support, along with measures to prevent cheating and fraud (which are increasingly cloud-based) and the usage of cloud AI to produce NPCs⁹ which may be adopted across permanent gaming universes (with one of the earliest examples being Microsoft Forza's Drivatar,¹⁰ where virtual AI players are trained based on data from real ones). All these processes are most often managed through orchestrators.
- **Cloud gaming** offloads the computing (including rendering) of games to the cloud, allowing users to play technically demanding games on a low-spec machine, with the paramount requirement being a stable, high-bandwidth, low-latency connection (as well as very responsive cloud computing infrastructure).
- Gaming is also one of the core early use cases for **virtual and augmented reality (AR/VR)**. The computing needed for these experiences may be offloaded to the cloud. One example of a cloud gaming player that is currently offering a cloud VR product is Shadow (Shadow VR).¹¹

- **In-game purchases**, made with real currency to acquire in-game perks or other type of virtual benefit, require transaction security and assurance, and must comply with regulatory requirements associated with the protection of children and, in some countries, gambling regulations.

This last example shows the growing importance of regulation, beyond the well-established age guidance system that organisations like PEGI handle. Hot regulatory topics currently include competition law, wholesale pricing of games and vertical contracts, player protection, anti-cheating, micro-transactions, child protection and gambling addiction (e.g. issues surrounding 'loot boxes') among others, and are just examples of such challenges.

Interactive entertainment is evolving fast, with the potential to generate high-value opportunities at the crossroads of content and digital infrastructure

The gaming sector's growth and significant impact cannot be overlooked, especially in light of the expected expansion and widening reach. Two recent examples of transmedia content rooted in gaming are informative: Netflix's hit series *'The Witcher'* was originally a book series and then a game, and HBO's *'The Last of Us'* was based on a successful game. Both are testament to how the world of gaming has been extending its impact beyond the original medium, and proving a lucrative source of innovation and original ideas for TV and movie concepts.

The industry as a whole is large and chiefly anchored on digital infrastructure, with intensifying dependence on these systems stemming from ongoing technological improvements. Therefore, TMT stakeholders and investors hunting for areas with the potential to generate high-value opportunities should look at:

- Increasing their awareness of the technology and gaming value chain in order to anticipate key trends that shape the industry – as in most maturing markets, a degree of consolidation is expected in the space, especially in relation to the technology stack and IP creation.
- Developing an understanding of the needs of the industry for digital infrastructure, from networks to data centres and their implications for the player base (e.g. bandwidth, latency to specific servers, potential gaming traffic prioritisation).
- Grasping the key regulatory issues the industry faces, given their complexity and impact on the player base, in light of the high level of interactivity both with the product (game) and between players themselves.

Undoubtedly, gaming offers remarkable prospects for value creation at the intersection of content and digital infrastructure. At Analysys Mason, we have spent the last 35 years working with clients across the TMT space tackling some of the sector's most challenging issues, from digital infrastructure to regulation, and we very much look forward to hearing your thoughts on this burgeoning space and its longer term implications.

Questions? Please feel free to contact Sylvain Loizeau, Principal, at sylvain.loizeau@analysismason.com or Andrea Betteto, Consultant, at andrea.betteto@analysismason.com

¹ Source: NewZoo

² All age brackets have been included in data illustrated

³ <https://www.analysismason.com/what-we-do/practices/research/consumer-services/consumer-survey/>

⁴ Source: NewZoo

⁵ Source: IBISWorld

⁶ AAA games are high-budget, high-profile games mostly developed by major publishers, and are the equivalent of blockbuster movies in this industry

⁷ Source: GamesRadar

⁸ Source: Netflix

⁹ Non-player characters i.e. characters in a game which are not under the player's control ¹⁰ Source: Forza

¹¹ <https://www.analysismason.com/cloud-vr-investment-rma08/>



Global leaders in TMT management consulting

Analysys Mason is the world's leading management consultancy focused on telecoms, media and technology (TMT). We give clarity and confidence in answering our clients' biggest commercial questions: What strategy will best enhance value? What implementation plan will be most successful? What is the optimal positioning for five years' time?

We bring together commercial and technical expertise across four interconnected consultancy practices strengthened by globally respected research:

- **Strategy**

We cover all aspects of strategy development and review based on a highly analytical and data-driven approach. Our propositions include corporate growth strategy (organic and inorganic), business unit strategy (including consumer and enterprise products), and infrastructure strategy (including capex optimisation through data analytics).

- **Transaction support**

We provide robust commercial and technical due diligence support for TMT debt and equity financing, M&A and IPO processes. We support the full M&A cycle from opportunity scouting through to post-merger integration.

- **Transformation**

We help structure and operate major IT, digital and business transformation programmes. We also have deep expertise around what it takes to avoid the pitfalls of and maximise the success of complex change programmes.

- **Regulation and policy**

We play a leading role in helping to formulate and examine policy and regulation related to TMT. We support governments, regulators and the whole telecoms sector in a rapidly changing world increasingly shaped by digitalisation.

- **Subscription research**

We evaluate the key topics driving the TMT industry and quantify the impact on operators and vendors worldwide. Clients rely on our research as an essential resource for strategic planning, investment and benchmarking.

Global reach, local insight

Our advice is rooted in deep domain knowledge that combines global reach and local insight into markets to help our clients achieve their goals. Our service offerings are fully integrated across all five key strengths. This allows us to make sense of a complex TMT landscape and create valuable insights in ways that cannot be matched by narrower domain specialists or generalist consultants that lack our depth of experience.

Working with private- and public-sector clients in 140+ countries, we are committed to advancing TMT's role as a critical enabler of global economic, environmental and social transformation – and to contributing to a world where technology delivers for all.



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