Telecoms Outlook 2023

February 2023

From game-changing advancements in 5G technology to high levels of volatility in energy markets, the telecoms industry has stood firm through the turbulence felt across all sectors in 2022. On the path towards creating a greener economy, new windows of opportunity could be opening up for yet another interesting year ahead.

Jan Frederik Slijkerman
Sector Strategist, TMT
jan.frederik.slijkerman@ing.com

How telecom companies are weathering the impact of rising energy prices

The exposure to high and volatile energy prices is relatively low for telecoms compared to many other sectors. As costs rise, however, many are looking towards alternative and often greener ways to keep the cost base stable for longer

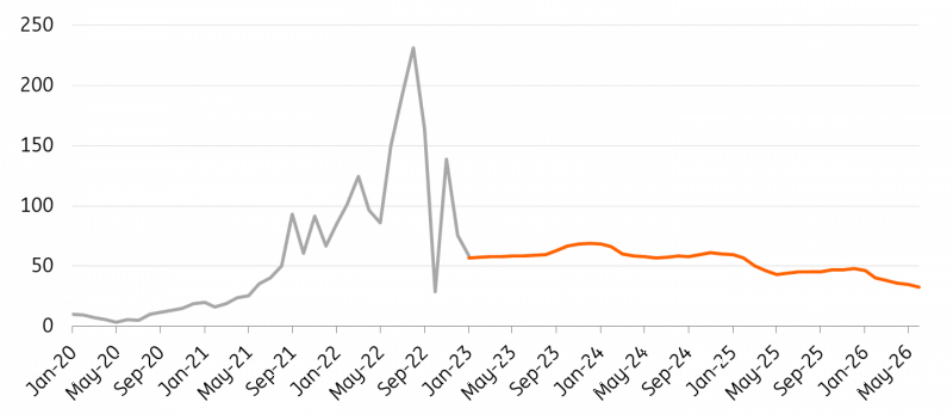
The cost of volatile energy markets

Few sectors emerged unscathed by rising energy prices in 2022. Most telecom operators, however, had largely hedged the cost of their energy needs so this wasn't so much of a big deal. But given that energy charges have remained above their historical levels for some considerable time, it's worth considering how telecom operators could be affected.

The topic dominated telecom companies' earnings calls throughout last year. Historically, wholesale electricity prices have been around €40/MWh, on average. Electricity is frequently generated from natural gas, with an average historical price of around €20/MWh. The recent price history for the benchmark European natural gas price can be found in the chart below. We depict European energy price developments through natural gas price developments because the regional electricity markets in Europe all have their specific characteristics, while European gas markets are relatively deep.

As you can see, energy was particularly expensive in the middle of 2022, resulting from gas supply problems given the war in Ukraine. Gas prices peaked above €250/MWh, while electricity prices traded on some days above €600/MWh. For the companies that had to purchase electricity on the spot markets, this became a costly affair.

Gas prices are now below the peak (€/MWh)



Source: Refinitiv, Endex

Energy costs are a relatively small cost component for telecom operators

Based on our estimates for the sector, energy costs were a relatively small part of the overall cost base, which includes depreciations. We estimate that around 2% of the total cost was energy-related. This implies that telecom operators should be able to handle a temporary increase in energy costs, not least given general cost reduction programmes and efforts to reduce need. Nevertheless, telecom companies often choose to purchase (hedge) their 2023 energy needs at elevated levels last year.

The price of natural gas with delivery in July 2023 was, on average, €106/MWh, which is somewhat more than twice the average spot price in 2021. We, therefore, estimate that energy costs will at least double for companies in 2023. So energy costs are becoming a larger part of the cost base. Nevertheless, it is not certain that total costs will increase because management teams are focussed on expenditure management.

We also expect that the impact of rising energy prices will be largely transient. As you can see in the chart above, the gas price has declined rapidly from the elevated 2022 levels. The futures curve indicates that companies can now procure their energy needs at prices around €60/MWh for natural gas. This is high compared to the long-term average but within the same order of magnitude as the 2021 price level.

Green energy procurement has offered some additional help

Many telecom companies have offered green bonds and are focussed on lowering their greenhouse gas emissions. To do so, companies can procure green energy from wind farms, besides efforts to reduce the energy needs through investments in energy-efficient networks, and we've looked at that in more detail here. As a case in point, Deutsche Telekom signed a large multi-year Purchasing Power Agreement (PPA) for green energy from an American wind farm.

The long-term commitment to this venture offered the additional benefit that exposure to rising energy prices was well contained. Given the substantial demand for green energy, as well as a desire to avoid volatility from energy prices, we think that more companies could look for such agreements.

More Europeans set to benefit from 5G networks in 2023

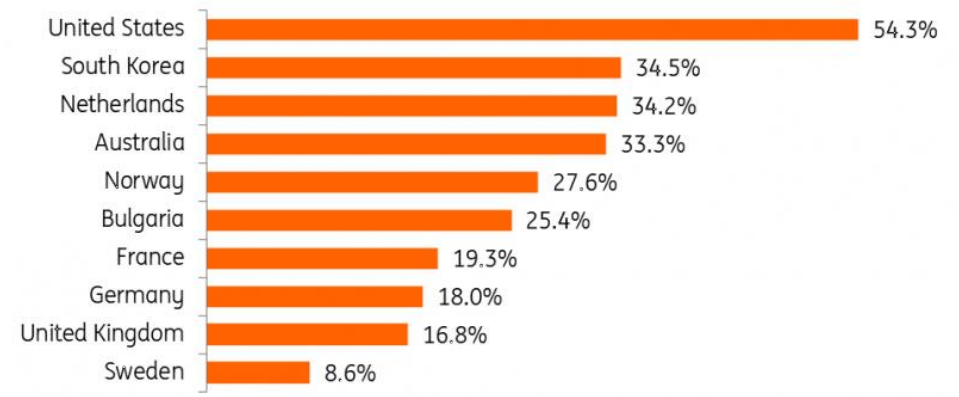
Five billion people are expected to be connected to 5G networks by 2028. But network coverage and speeds still vary, and higher spectrum frequencies are going to be a game-changer

More people are going to have a 5G handset

The use of 5G services is really starting to take off, mainly driven by the improved availability of handsets but also, off-course, by the 5G network roll-out. In its 2022 mobility report, Ericsson expected that by the end of 2022, there would be 1 billion 5G subscriptions globally (enabled by a 5G device). They expect this number to increase to 5 billion by the end of 2028. The market intelligence firm IDC expects that the global shipment of 5G devices rose by 23.6% in 2022 compared with the previous year. This implies that more than half of the 688 million devices shipped will be 5G-enabled.

Affordability is key for 5G adoption and we're now seeing relatively cheap 5G smartphones, such as the Samsung Galaxy A13 5G or the OnePlus Nord N200 5G smartphone, with a price tag of around $200. This implies that fast 5G connections are within reach of increasing numbers of customers. The high-end iPhone models that dominate, for example, the Dutch speed test, are prohibitively expensive for people with a lower income.

Users with 5G access



Based on coverage, 5G handset, 5G subscription, 3Q22
Source: OOKLA Speedtest

The number of people using 5G is increasing

Based on data from the network intelligence firm Ookla, we see that 54% of users in the USA with a 5G capable handset have a 5G network available to them. For the Netherlands, this percentage is 34%, while it is 19% for France and 18% for Germany. Their results are somewhat difficult to interpret because customers also need a 5G subscription to have access to a network. In some areas, there could be 5G network coverage, but customers do not have a 5G subscription.

Telecom equipment manufacturer Ericsson measures actual coverage figures. They report that in the USA, 95% of the population is covered with a 5G service, using a low band spectrum. In Europe, they estimate that by the end of 2022, 5G coverage would be available to around 65% of the population in the EU plus Norway, the UK, Iceland and Switzerland. They write that some operators in the region may reach 80% of the population.

The game changer comes from networks using a higher frequency spectrum as well as from a stand-alone network configuration. In the Nordics, Telia launched a 5G stand-alone network in Finland, which is a first for the region. It will be interesting to see in 2023 if they provide innovative services that could be enabled by 5G.

5G speeds are a differentiating factor for mobile network operators

According to Ookla, 5G download speeds (as experienced by users) stabilised in the third quarter of 2022 compared to last year, with a median global 5G download speed of 168.27 Mbps. However, there are many differences within countries. This is likely to give the market leaders a competitive edge. Although Ookla does not provide data for all countries, we think the following results could predict developments in other European countries as well.

In the Netherlands, the market leader KPN has a (weighted) average 5G download speed of 184Mbits, which is 81% faster than the third fastest network (Vodafone). Weighted average upload speeds for the market leader are 38Mbits, more than twice as fast as the third fastest network. When looking at ten per cent of those users with the slowest download speeds, speeds for KPN customers are 2.6 times faster than the slowest network.

In the UK, results are similar. The operator with the fastest network, Three UK, is 3.4 times faster than the operator with the slowest speed, O2. The difference is a factor of 1.5x for upload speeds. In Norway, the weighted average download speeds from the Telenor network are more than twice as fast as the download speed of Ice, while upload speeds are 40% faster. In Ireland, the average upload speeds for Three are 55% faster than those of the third fastest network, Vodafone.

So we conclude that 5G is not the same everywhere. Telecom operators may need to find ways to monetise this advantage, while the market leader is also better placed to offer the new services that come with 5G, such as network slicing and applications that require a low latency once they have fully upgraded the network to 5G technology.

Why telecoms operators can largely shoulder higher interest rates

While the telecom sector remains sensitive to swings in interest rates, we're expecting to see a relatively limited impact for 2023. Interest costs are a relatively small cost item and it will take time before the legacy debt is repriced at the prevailing market rate

Telecom operators can handle higher interest costs in 2023

As interest rates rose throughout 2022 and beyond, the tailwind from central banks buying corporate credit dissipated while borrowing rates for companies increased. We expect the impact on telecom companies to be limited in 2023. We do expect that an increase in borrowing costs will impact free cash flow over time, but the effect will be gradual and relatively limited for investment-grade companies.

Nevertheless, elevated leverage compared to other sectors justifies taking a closer look at this. At 2x Net debt/EBITDA, leverage in the telecoms sector is about twice as high in our sample as it is for the broader corporate sector. The stability over time in our sample surprises us somewhat, as we have shown previously that credit ratings are also under pressure – and there is some notable dispersion within the data. Some companies have been improving balance sheets over time, while others have been happy to take on a bit more debt.

There are two key reasons that we're not too concerned with higher interest rates for 2023. The first is that borrowing costs are a small part of the total cost base; the second is that there are relatively few debt redemptions in the near term. Based on calculations from four investment-grade companies, we estimate that net financial expenses make up around 3% of total costs (including Depreciation & Amortisation). This percentage is somewhat higher for investment-grade companies with a BBB+ rating, as the sample is a mix of A-rated and BBB-rated companies. The number is even smaller as a percentage of revenues (as opposed to costs). If interest rates increase over time, we will see an impact – although it should be a very gradual one, according to our analysis.

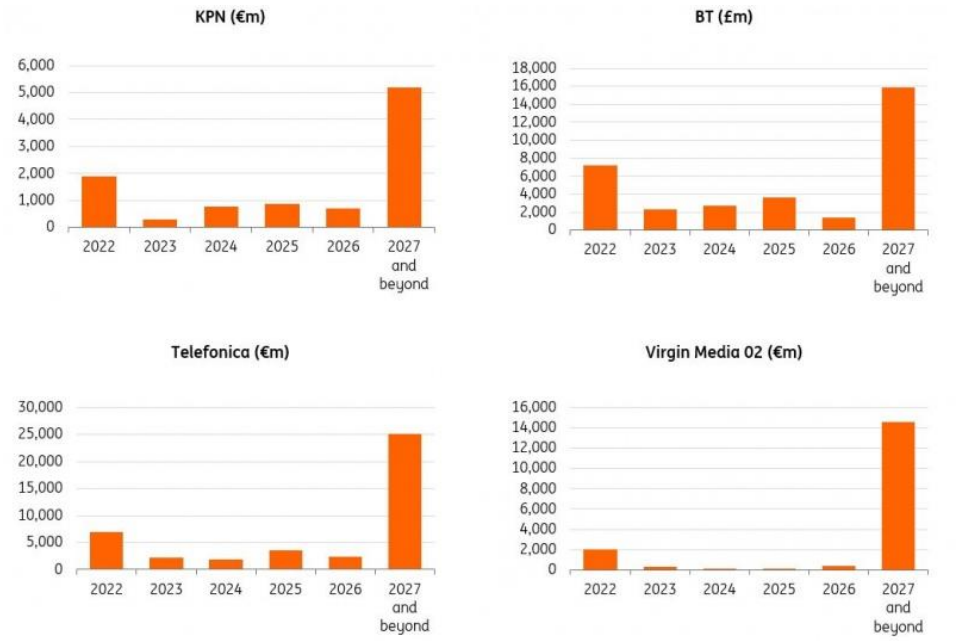
Relatively few near term debt redemptions

Telecom operators manage their debts in such a way that they have limited upcoming debt redemptions every year. While they typically redeem notes with the proceeds from newly issued bonds, they now have to pay a higher coupon. It will therefore take some time before companies have replaced all their debts with newer, more costly debts.

Based on our calculations of all telecom bonds that were outstanding at the beginning of 2023, only 7% should be refinanced this year. If funding costs were double the amount that they were in the past, it would take a couple of years for the full effects to be seen.

This effect is even more subdued when we look at the redemption profile of individual companies as opposed to the full European telecom bond market. Detailed in the graphs below are the debt amortisation profiles of four telecom companies, with a notable share of debt redemptions scheduled for 2027 and beyond. There is often a substantial amount of current debts, but this usually includes payables as opposed to bank debt or bonds. Telecom operators will therefore have time to adjust to the reality of higher interest rates. As can be seen in the graph below, high-yield companies (such as Virgin Media O2) have also pushed out debt redemptions.

No large debt redemptions in near term for many telecom operators



Source: Company reports, ING

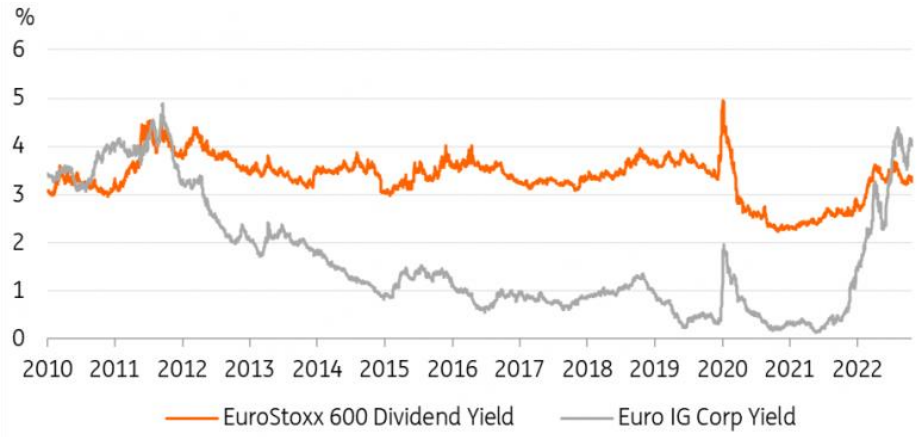
Nevertheless, interest rates are moving higher

Average corporate borrowing costs were substantially below 1% for most months from April 2019 until the start of 2022, as measured by the investment grade credit index. This provided a nice tailwind to corporates, as they were able to refinance legacy coupons with lower ones. The yield began rising in August 2021, as can be seen in the graph below. Current yields are just below 4% – a level last seen in 2012.

For benchmark telecom operators, these swings have been less turbulent. In October 2012, Deutsche Telecom issued a 12-year note with a coupon of 2.75%, while in July 2016, the coupon on a new 12-year note was 1.5%. Today, the company has a 2034 note outstanding that trades at a yield of 3.4%. The 4-year note has a 2.9% yield. These current yields are higher than the 2% that Deutsche Telecom has to pay on its existing euro notes (the average coupon). This example shows that funding costs will likely be higher.

However, the impact will come about gradually and will fit within a normal investment-grade credit profile. Given that the yield on corporate credit is now similar to the dividend yield of the broader equity universe (and relatively high given recent history), one could also argue that borrowing costs may have peaked. If investors allocate money to credit, funding costs could even decline. In that scenario, the challenge for telecom operators would be reduced even further.

Yield on investment grade bonds approaches the dividend yield in Europe



Source: Refinitiv

Startling differences in fibre connectivity across Europe

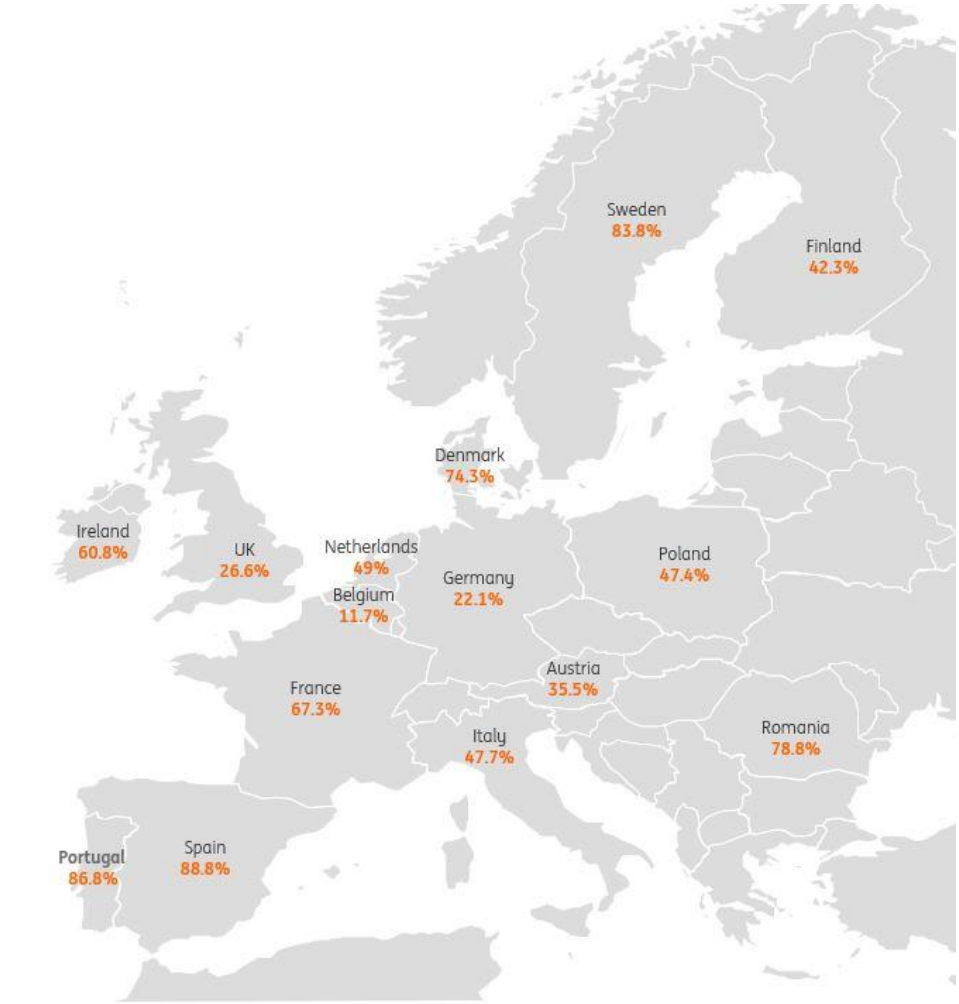
Good fibre connectivity makes economic sense, but some countries are far more advanced in their fibre rollout plans than others. But there's no 'one size fits all' solution and we could soon see more consolidation in this area

Italy, Germany and the UK are behind in the fibre network race

One of the key priorities for the EU is the digitalisation of our society. There are concrete objectives but also means available which should facilitate the transformation towards more digital service models in Europe by 2030. It's why the coming years are dubbed: “the digital decade”. A target is for all households to have access to a gigabit network by 2030.

On the back of this, member states have embarked on an ambitious fibre roll-out programme. Some countries, such as Spain and Portugal, already have excellent fibre networks which reach almost 90% of households. This partly explains why these countries are particularly popular with 'digital nomads', notwithstanding the better weather. The nomadlist.com ranking can be found here. This shows that digital connectivity can help economies to become more competitive over time. However, more still needs to be done elsewhere.

Many households in Europe have fibre connectivity



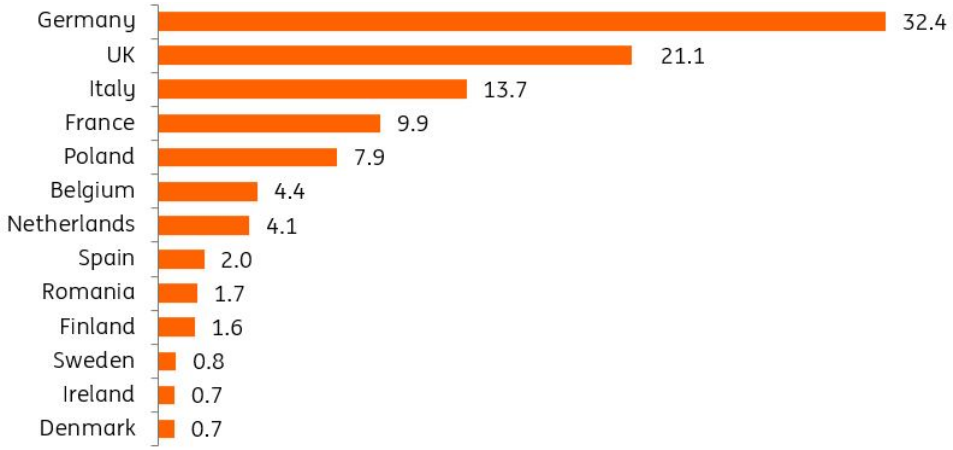
Homes passed/households
Source: FTTH Council Europe

Some large countries in Europe need to spend heavily to establish fibre connectivity

Although the span of fibre networks in Europe is progressing well, a lot still needs to be done, especially in some bigger countries such as Germany, the UK and Italy. According to a report by the FTTH Council Europe, operators still need to pass 32.5m houses with fibre in Germany, while the number is 21m for the UK and 10m for Italy (as of September 2021). This challenge is seen as an opportunity for new ventures and many have secured favourable financing conditions. Certainly, we're seeing progress in the UK, the Netherlands and Germany.

Of course, these companies need to make money and people need to be persuaded to upgrade to fibre connectivity.

A lot needs to be done to pass all households with fibre in many countries (m)

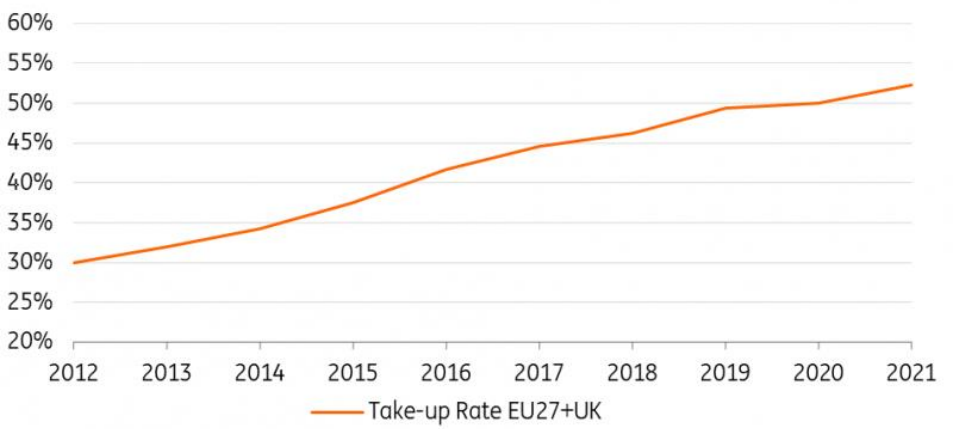


Source: FTTH Council Europe

Consumers make better use of fibre networks

Back in 2012, only 30% of the households connected or passed with fibre became fibre customers. This is particularly relevant for service providers since profitability increases with better usage. Once a network has been rolled out in a specific area, additional customers improve profitability. It is, therefore, a positive development that the pickup rate of fibre products has increased over time. In 2021, 55% of customers that had access to a fibre broadband product bought it. This provides for much better economics, but it also shows that there is a strong demand for fibre products.

Usage of fibre networks increases



Percentage of people that subscribe to fibre when available
Source: FTTH Council Europe, ING - Percentage of people that subscribe to fibre when available

It may not be efficient to cover homes with multiple fibre connections

Initially, incumbent fixed network operators were reluctant to roll out full fibre to the home in many markets. They did not see the need to upgrade since existing networks were relatively fast, and they could avoid additional expenses. It's worth noting that the cable operators in European markets were happy with an upgraded hybrid fibre coaxial (HFC) network technology. For most users, download speeds provided by these networks were good enough.

At the time, many greenfield fibre operators saw a market opportunity and started rolling out fibre in, for example, the UK and the Netherlands. These efforts got a tailwind from abundant and cheap capital. CityFibre in the UK rolled out a network that passes 2m homes, while DELTA Fiber in The Netherlands passes 1.2m homes. Today, incumbents are ramping up their roll-out plans quickly. In the UK, both Virgin Media and BT have announced substantial fibre plans. This happens at a time when there are

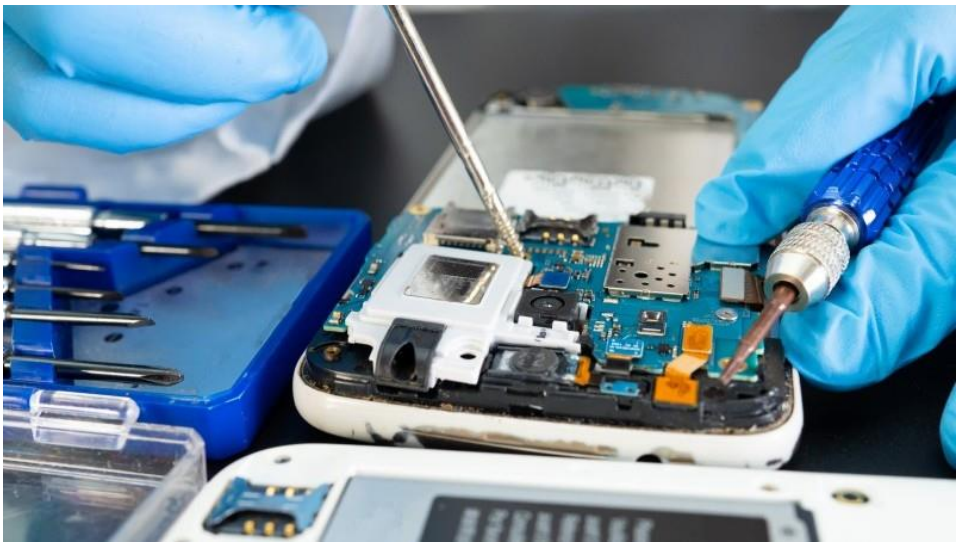
already alternative operators deploying fibre in London, where it can be completed in a relatively easy way. BT and Virgin Media O2 have the advantage that they can immediately transfer their existing customers to the new network, generating a swifter profit. Smaller operators, on the other hand, can bring fibre to areas that are of secondary interest to the market leaders.

For 2023, we expect the roll-out trends to continue, with all operators continuing their build-out plans. However, we think it is inefficient (from a cost perspective) to cover less dense regions with more than one fibre grid. It is more plausible that, at some point, operators will discuss reciprocal access and that the larger operators will scoop up the smaller ones –especially if there are difficulties with generating sustainable free cash flow. Similar structures have evolved in Spain, where operators rent lines from others, also supported by regulation.

There are also areas, of course, where it's prohibitively expensive to install fibre connectivity. Rolling out fibre in rural areas where farms are at a large distance from the main network usually requires subsidies. Innovative solutions, such as fixed-wireless access and satellite connections, also offer suitable alternatives. It would therefore be helpful for politicians to stick to speed and coverage targets rather than fibre roll-out requirements which focus on a specific technology.

In with the old: navigating the road to circular IT

Reducing the environmental impact of IT hardware production plays a crucial role in the path towards developing a circular economy. But what are the next steps? From the initial stages of product design to repairs and repurposing, renewed IT practices could provide a window of opportunity for telecoms operators



As part of the EU's plan to develop a circular economy, the European Green Deal has been created to mitigate a few major environmental challenges. Included in the EU's policy aim is a lower environmental impact from telecom equipment manufacturing. This objective is compounded by increasing awareness of the scarcity of the raw materials that are used to make semiconductors and other electronic equipment. The EU aims to:

- Increase the use of recycled materials in products
- Improve the ability to repair products
- Lower the environmental footprint of produced equipment and products
- Extend the life cycle of products through the restriction of single-use products

To do so, the European Commission (EC) has established a Circular Economy Action Plan for a cleaner and more competitive Europe.

Recycling

The collected waste from IT and telecom equipment averaged around 1.3kg per household in 2018 for countries such as Germany, France, Belgium and the Netherlands, according to Eurostat data. Around 39% of e-waste in the EU27 was recycled in 2018, while the share of material recycled and fed back into the economy (compared to overall material use) was only 11.7% in 2021. If Europe wants to reach strategic autonomy and develop a greener economy, these percentages must be lifted.

Produce more with same materials through recycling

Source: ING

Design and repair improvements

According to the EU, energy consumption over the lifecycle of the 2020 installed base of mobile phones, cordless phones and slate tablets was calculated at 39.5TWh. The EC aims to reduce the primary energy consumption of these devices by 33% and – together with the EU Council – is working on a 'right to repair' directive for smaller electronic devices such as phones and laptops.

While its main practical feature is the right for citizens to repair small electronic products, the draft directive also discusses a more fundamental requirement: improved design of products. According to the EU action plan for a circular economy, a large part of the environmental impact of products is determined in the initial design phase. The draft of the directive sets requirements with respect to the 'design for repair and reuse', including the availability of spare parts, access to repair and maintenance information, disassembly design and a function to reset products for reuse. Additional criteria have also been outlined for improved reliability and operating system updates, as well as recycling.

Interestingly, many new products have been created through environmentally conscious endeavours and are built from replaceable modules, which facilitate easy repairs and hardware upgrades. Fairphone, for example, produces a device based on parts that can be replaced easily and puts additional effort into sustainability requirements, including the use of materials. Framework, on the other hand, offers an option for buyers to create their own laptops from separate modules with the promise that parts can easily be replaced to upgrade or extend the life of their products. A higher number of mobile phone repair shops can also now be found in shopping centres, especially when compared with those for telephone companies. Consumer awareness is increasing, with websites like iFixit now providing extensive tutorials and tools to replace product parts. Apple also offers the option to repair products at home for consumers in the US. Nevertheless, EU institutions have not yet provided a clear roadmap signalling any new legislation.

Extend life with good product design including repair options

Source: ING

Updated regulation for charging cables and batteries

To reduce the waste from the myriad of cables and chargers that most households currently own, the EU requires a common USB Type-C charging cable from 2024. This

should allow consumers able to charge small electronic devices (such as phones, digital cameras, tablets, headphones and e-readers) through this cable. New battery regulations are also being prepared to replace the EU's current outdated legislation.

At the moment, 50% of the total battery weight is required to be recycled, which is set to increase to 70% by 2030 for lithium-ion batteries. The proposed legislation also sets additional reporting and collection requirements for manufacturers. This will likely help to make better use of raw materials and lower the environmental footprint of electronic devices.

Sustainable products: a new opportunity for telecom operators?

While we expect the demand for more sustainable IT products to remain something of a niche market in 2023, we do think there are opportunities for telecom operators to retain customers through sophisticated repair programs. In 2017, a study named “Smartphones are replaced more frequently than t-shirts” showed that an average lifespan of 5.2 years would be considered ideal for consumers, while the current average remains much lower at around 2.7 years. If telecom providers could help customers to extend the life of their smartphone at a reasonable price, some would likely be happy to stay with the provider beyond the contract tenor. In turn, telecom operators will lower customer churn, which is a key performance indicator in the telecom sector.

M&A activity slowly moving forward in the TMT sector

There are clear signs of life as far as possible mergers and acquisitions are concerned in the telecoms space

Given the low interest rate environment and the need to restore profitability for investments, we had high hopes for consolidation in 2022. The industry made some progress but it's a delicate process, not least given competition legislation. We did see some deals announced, predominantly in the tower space. And in the UK and Spain, where it could be argued the market was riper for more merger and acquisition activity, there were some notable developments, although it's worth saying that LBO activity - leverage buyouts - has been lacklustre.

LBO activity

In Europe, we saw no 'take private' deals with any telecoms company in 2022. Nevertheless, there has been market talk about LBO activity in the UK. Activist investors have pushed for change at BT and Vodafone, with the Vodafone CEO Nick Read leaving at the end of the year. Vodafone is not exactly the darling of the press either, with the Telegraph writing [paywall]: 'Vodafone is in need of a complete overhaul from top to bottom'.

They are trying to repair some difficult markets, however, and we'll come to that in a moment. Also, the LBO market faced headwinds during 2022 and will likely see a difficult start in 2023. Loans will become more expensive, given the increase in high-yield credit yields. They have risen from levels of around 3% at the beginning of 2021 to more than 7% today. It's also worth noting that Bloomberg reports that some large US investment banks have a historically large exposure to LBO transactions that they have underwritten but not yet sold onto the capital markets. During 2022 the sale of US high-yield bonds reached a 10-year low point. This inventory likely has to clear before we enter a new LBO cycle.

Consolidation in Spain and the UK possible if regulators focus on investment needs

In 2022, two promising transactions were announced. A merger between Masmovil and Orange Spain was announced in Spain. In the UK, Vodafone UK wants to merge with Hutchison 3G UK. Both transactions are pending regulatory approval. The market leaders in the UK (BT) and Spain (Telefonica) benefit from a scale advantage. Smaller operators may find it difficult to deploy leading fixed and mobile networks to beat these larger companies. To do so, they need deep pockets for necessary network investments. This is troubling on a stand-alone basis with relatively small market shares. M&A will help the smaller operators to gain scale, which enables investments in the networks needed to offer competitive products. Given the small scale of the fourth largest operators in Italy and France, we also think that consolidation in these markets would help stabilise revenues, which could aid necessary investments in new technologies.

Mobile telecom operators in European markets

Germany	· Deutsche Telekom · Vodafone · Telefónica Deutschland (O2) · 1&1 Drillisch
France	· Orange · SFR (Altice) · Bouygues Telecom · Free (Iliad)
Spain	· Telefónica · Vodafone · Orange · Masmovil
UK	· BT · Vodafone · Virgin Media O2 · Three UK (Hutchison)
Italy	· TIM · Vodafone · Wind Tre (Hutchison) · Iliad · Fastweb
Sweden	· Telia · Telenor · Tele2 · Three (Hutchison)
Norway	· Telenor · Telia · Ice
Denmark	· TDC · Telenor · Telia · Three (Hutchison)
Finland	· Elisa · Telia · DNA (Telenor)
The Netherlands	· KPN · VodafoneZiggo · T-Mobile
Belgium	· Proximus · Telenet · Orange Belgium · New network

Source: ING research

Infrastructure assets remain attractive

We were somewhat surprised that the industry did not pull off large-scale M&A between incumbent tower operators, such as Vantage Towers, GD Towers (Deutsche Funkturm) or TOTEM. Interestingly, Deutsche Telekom managed to sell a stake in GD Towers to private equity (with a repurchase option). This must have been a disappointment for Cellnex since they are lacking scale in Germany. Notably, Cellnex then, announced that it is no longer pursuing large-scale M&A when it closed the acquisition of the towers from Hutchison 3G UK. Interestingly, Bloomberg reported in January 2023 that Cellnex is now the subject of an acquisition rumour. The only large tower portfolio that did not engage in M&A activity is that of Orange, TOTEM. Will they surprise us in 2023?

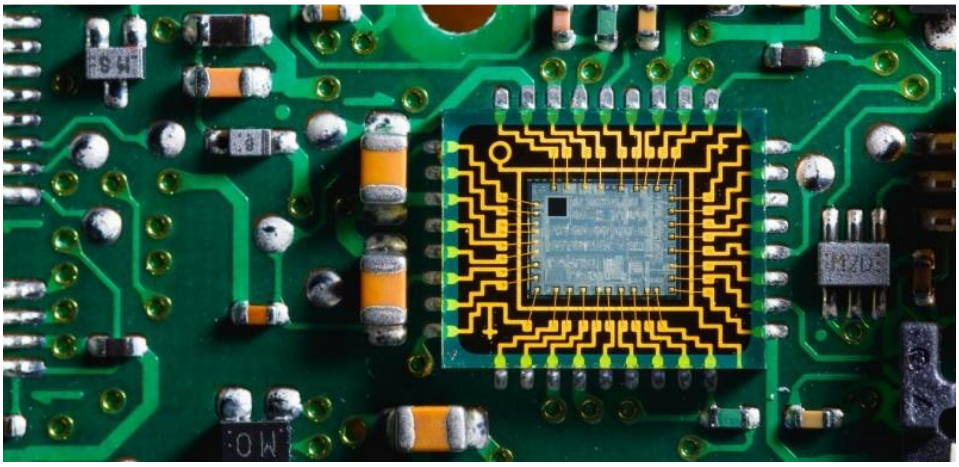
Apart from investments in mobile towers, there have also been large investments in the deployment of new fibre broadband infrastructure. For private equity firms, also legacy telecom network infrastructure may offer attractive investment prospects. For example, KKR has shown an interest to acquire the Telecom Italia network, something that is still a possibility.

Our M&A expectations for 2023

We expect few large transactions in the beginning of the year. However, tower M&A is not completely off the table. There is still an appetite to do these deals, something that was shown with the recent Vantage Towers transaction. With respect to industrial M&A, we expect that Vodafone will bring more focus to its conglomerate once a new CEO has had the time to evaluate the options. We also wouldn't be surprised by consolidation in France and Italy. Nevertheless, we probably have to await the outcome of the pending M&A transactions in Spain and the UK first. Should regulators decide to block those deals, the overall picture across Europe may well change.

Fibre technology and photonics are advancing at speed

The telecoms industry could be on the verge of taking another leap as far as technological advancement is concerned as it copes with ever-increasing demand for extra bandwidth



There always seems to be a strong demand for higher bandwidth capacity. And this trend has driven the need to use more optical components. In the past, most telecom networks were built with copper wires. Today, fibre cables are the backbone of the networks. These networks are much more enabled for higher bandwidth capacity and are more energy efficient. With new technologies, there is also the potential to upgrade the capacity of modern, existing fibre wires. Notably, this is an application of photonic technologies. The idea that photonic technology is more energy efficient can possibly also be said of new semiconductor designs and other electronic components, such as network switches.

Upgrades to capacity of fibre lines

The transition from copper to fibre networks can be seen as one of the most important changes for the industry in the last two decades, besides the application of new mobile technologies. What has gained less interest is the fact that not all fibre networks are the same; in fact, there are many different standards and applications. Since the turn of the century, the capacity of fibre networks has increased massively from less than a gigabit per second in the early 2000s to about 100Gb/s (over a single wavelength) today, according to Nokia.

Today, broadband providers for the consumer market often offer XGS-PON techniques, giving a 10Gps connection with symmetric upload and download speeds. This is a different technology than the previous point-to-point network technologies that, in the case of KPN, offered 2.5 Gbps downstream and 1.25 Gbps upstream speeds. KPN is today continuing the network rollout with XGS-PON technologies, while legacy fibre connections are now being upgraded. However, successors of the XGS-PON technologies are just around the corner, with 25G-PON being tested by KPN and Proximus. This looks to be good news for the prospect of the economic lifetime of existing glass fibres, although the technology is unlikely to be available in consumer markets in the near term.

Network upgrades

Consumer-focused upgrades also have implications for the core network. Strong growth in new applications involving 5G and cloud computing is contributing to a demand for high bandwidth. This bandwidth can be enabled through fibre cables which can transport up to 400 Gb/s. Within internet protocol networks, this traffic will be directed through routers and switches. In 2023, the 400G technology will be the dominant new technology for backbone networks.

Verizon, for example, will upgrade its core network using Juniper Networks' PTX series routers which support 400G interfaces. This router can handle 400Gb/s through a single port. You might think that such systems require a lot of energy, but they are more efficient than previous technologies. These developments require innovations within the router but also within the optical devices connecting the fibre with the router or switch. And here, other photonic innovations come into play.

Simplified network design - highest speeds at the network core

400G technology for backbone networks; last mile is on XGS-PON
Source: ING

Photonics and data communication

Our internet networks underwent a transition from copper to fibre. We may well see something similar, albeit on a smaller scale, in the world of microchips and, more specifically, photonic integrated circuits. As industry experts, PhotonDelta put it:

'Photonics is similar to electronics. However, instead of electrons, it uses photons to transfer information. Photonic technology detects, generates, transports and processes light. Current uses include lasers, sensors, and fibre-optic networks. Photonic Integrated Circuits (PICs) combine two or more photonic functions into a single chip to create new, faster, and more energy-efficient devices. Leveraging the power of light, PICs are highly effective at processing and transmitting data'.

New breakthroughs in the domain of photonics in 2023 could possibly make telecom equipment more energy efficient and cheaper. Google revealed that it has been using optic circuit switches in its data centres for five years.

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