

## Connecting 5G hype with ESG reality

It's a technology that promises faster connectivity for all devices. An enabler for the 'internet of things'. It's also part of a continuous growth story in data storage, cloud computing and semiconductors. But will 5G merely provide an accelerant to these trends? And how ESG-friendly is the implementation of 5G technology and infrastructure?

**Louise Schreiber**, SRI Analyst at Mirova, looks at the investment potential of 5G today and assesses its future uses and limitations in the context of ESG.

### How would you describe the investment potential of 5G today?

A report made for the European Commission estimates that the value creation of 5G will be huge by 2025, somewhere around 110 billion euros per year<sup>1</sup>. As a responsible investor, our concern is whether this growth is sustainable. That's what drives our investment decisions.

Many companies are notably using the energy efficiency argument to qualify 5G as a solution to address sustainable development goals. At this point, we think 5G has many challenges to confront before we can genuinely consider it a green or socially beneficial solution.

We understand that many sustainable opportunities are expected in the future, whether that's in terms of deploying a smart grid, enabling smart cities, connecting access to health, and so on. But these solutions will need to be developed on a large scale before their benefits can compensate for the immediate negative environmental and social impacts of 5G.

To oversimplify, the industry identifies three successive phases for 5G. The first step will be providing more broadband to users, because 3G and 4G are at full capacity. This new capacity is necessary for telecommunications companies to provide more services.

The second step would be industrial application, for example, connecting manufacturing robots to improve the efficiency of the production processes. This scenario is likely to happen soon.

Then, the final scenario would be the large scale IOT, with some applications such as city or countrywide smart grids, where most environmental benefits are expected. But that's still some way off yet.

### What are the negative environmental and social impacts of 5G?

First, 5G will be deployed as a new and additional network. So, while it might be super-efficient, any additional environmental footprint will be added to its existing 3G and 4G footprint.

There's also likely to be a major rebound effect in terms of internet data traffic which might have a significant environmental cost. Global IP traffic doubled between 2016 and 2019 and is projected to double again by 2022, with 4G and 5G networks carrying around 60% of this traffic<sup>2</sup>. We also know that this increase is notably linked to video streaming, as videos are data heavy.

By 2025, new broadband capacities are expected to support a further 15 points increase of video – streaming services, video contents in online medias, increasing size ►



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<sup>1</sup> Source: <https://ec.europa.eu/digital-single-market/en/news/5g-deployment-could-bring-millions-jobs-and-billions-euros-benefits-study-finds>

<sup>2</sup> Source: <https://www.iea.org/reports/data-centres-and-data-transmission-networks>

and definition of screens, and so on. In other words, 5G's efficiency is more likely to encourage a rapid growth of data traffic than to reduce the footprint of the current data traffic. Due to this rebound effect, efficiency gains could be cancelled out by the increase in data consumption.

The International Energy Agency data shows that data centres' energy consumption has remained flat over the years at 1%, despite the increase in terms of internet traffic and infra workloads<sup>1</sup>. This is linked to the fact that we've been able to enhance the energy efficiency of the data centres and the networks, but it doesn't mean that we will be able to deliver the same energy efficiency gains.

The semiconductor industry is at a point where it's challenging the limits of physics. Innovation is still possible, but maintaining energy efficiency trends at a constant trend will be a huge challenge and there is no guarantee there that the rebound effect will be compensated by these gains. So the overall footprint might increase significantly.

Aside from the climate issue, we should also keep in mind that any new telecommunications technology comes with significant biodiversity impact and social risks. We will have to produce a lot more semiconductors for the deployment of the 5G networks, whether it's just an upgrade of the existing antennas or a full additional network, and to equip consumer electronics – smartphones, watches, smart-house devices, connected cars, and so on.

We're talking about billions of electronic components. And we're talking about large amounts of minerals mined in high risk areas, treated with toxic chemicals and, ultimately, tons of electronic waste that are difficult and rarely properly recycled.

And finally, there's another type of risk that could arise from 5G technology: hyper-connectivity can lead to human rights abuses through data privacy – specifically, in certain countries where freedoms are comparatively more at risk.

Of course, we understand that the connectivity can bring great opportunity. Smart grids will help increase the share of renewable sources in countries' energy mix, in addition to generating efficiency gains.

The question is, at what point does hyper-connectivity become more of a risk than it

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is an opportunity? Right now, we're more concerned about whether the whole value chain addresses this risk properly.

### **As an analyst, how do you balance the positive and negative externalities of a new technology like 5G and apply it to the companies that you are looking at?**

Information and telecommunications companies are exposed to a wide variety of risks. Due to their nature and the penetration of technologies in our day-to-day life, these risks can have major negative impacts if left unaddressed.

To that extent, grave insufficiencies or severe/ repeated malpractices cannot be compensated by positive externalities and companies in these situations would not be eligible to our funds.

However, most companies now implement sustainability strategies and show progress on most of their key risks. In these cases, my focus is on areas of progress and improvement delivered.

With those companies, we try and develop materialization criteria that illustrate the benefits generated or forecasted on a life-cycle approach. Here, it is more about promoting a life-cycle approach than about balancing positive and negative externalities: all negative externalities should be reduced as much as possible and the overall net impact should be positive.

That is why I haven't yet valued any tech company's sustainability profile for their exposure to 5G. The picture is too unclear at this point.

The only evident benefit of 5G right now would be on the social pillar, in countries where 5G is deployed to provide high-speed internet to underserved populations and hereby provides access to information and

supports the development of SMEs. In the US for example, where fibre-optic hasn't been massively rolled-out.

Anyway, just like any other company, 5G companies would have to prove that their risk management is robust to be eligible. And 5G is no different than other technologies in that regard – the focus is on the limitation of environmental and social risks at suppliers' level, electronic waste management, eco-design, energy efficiency, renewable energy sourcing, data privacy, and so on.

In terms of investment impact, we've mainly considered the enablers of 5G, such as equipment manufacturers and semiconductor companies.

### **Why do you see equipment manufacturers as having more investment potential than network providers?**

Telecommunications companies are mostly deploying an additional network to provide more services to their current users, which induces major costs but is unlikely to generate additional revenue per user at this point. Essentially, service providers will not market 5G phone subscriptions at a significantly higher price.

Component and equipment providers, on the other hand, are most exposed to this trend and that is where we have applied our focus, to determine whether these companies have the right technology and whether their sustainability approach is robust. We're challenging them, because we want them to progress – to look closer along their supply chain to tier two and tier three suppliers notably.

They are European companies, so they have the rather stringent regulatory framework. Of course, areas of improvement remain, but their sustainable strategies are promising. Therefore, we decided to start investing in two equipment manufacturers – Nokia and Ericsson.

We also chose to invest in some semiconductors companies. Soitec, for example, is a very small company, but it's growing because of its innovation on radio-frequency semiconductors. And we've ►

<sup>1</sup> Source: <https://www.iea.org/reports/data-centres-and-data-transmission-networks>

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always been investors of ASML, which develops machines to produce the wafers for the semiconductor industry. When it comes to sustainability practices, all these companies are heavily screened, and there are equally many challenges to address as well as being lots of areas of potential remaining.

### **To what extent does nationality impact your analysis of tech companies?**

Well, one of the issues when looking at companies based in China, for instance, is that we're talking about how investors and stakeholders in general are defiant regarding China's governance and the state of human rights in this country. All the network providers face the same risks: their equipment can be turned into abusive tools – for governments to suppress freedoms, for companies to spy on their competitors, and so on.

The question is, do we believe that those companies have strong governance and sound practices to avoid such abuses? Are they able to resist governmental pressure and are their track records convincing to that regard? Telecommunications companies have always been major assets for countries and states have historically been involved in related companies' businesses. China is no different.

### **As people begin to swap their existing equipment and providers for things that are 5G enabled, how do you address the issue of obsolescence to the companies you are researching?**

The ICT industry is facing a major challenge: it will see its footprint increase significantly in the coming years, whereas other industries – those that represent a larger global footprint right now – are already on the path to reducing theirs. While carbon assessments vary and can be criticized, telecommunications only represent a marginal share of global GHG emissions right now.

A study by Ericsson estimate this share at 1.4% only<sup>1</sup>. However, consumer electronics – and mostly their fabrication and end-of-life – are already the main cause. A quicker turnover of consumer electronics is certainly a major issue, notably because it will increase the issue of electronic waste.

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For decades, ICT companies have re-exported their electronic wastes to Asia, a region which is also the biggest producer of these very hazardous waste and where it's rarely properly handled. As an illustration, in 2012, approximately 70% of global e-waste was located in China<sup>2</sup>.

It's a major sustainability issue because of all the toxic substances released in the soil and water such as mercury or beryllium, in addition to inflammable lithium-ion batteries and greenhouse gases released during the degradation process. In the landfills, local people living in dire conditions are often in direct contact with those substances as they try to find scrap metals they can resell, like brass, iron, and so on.

This is particularly frustrating as most of us will not see the difference between streaming Netflix on 4G and 5G, specifically on a small mobile-phone screen. There is definitely no rush to upgrade consumer devices. On the contrary, there is a need for smartphone and telecommunications companies as well as for public authorities to appeal to users to adopt responsible consumption practices, but we can see how this is not in the interest of all parties.

In that regard and considering all the challenges we have just mentioned, companies in consumer electronics have a hard time implementing a sustainable business model that notably promotes longer lifespan and appropriate take-backs.

Rather, they are based on offering multiple new generations of devices each year, which implies that their suppliers are required to produce large amounts of new and complex devices in a very short period of time.

This creates the ideal situation for abuses: excessive overtime, underage work and so on. We have been pushing these companies to offer services such as upgrading your smartphone rather than changing it. But right now, we're not seeing it.

We are also pushing telecommunications companies to deploy recuperation programs across the globe and build stronger relationships with recyclers and up-cyclers. That's where the circular economy can really happen, because the minerals that are used in the chips are costly and they come with massive environmental footprints and great social risks.

It's a huge opportunity for the ICT industry and a great leverage to significantly reduce sustainability risks related to new technologies. We hope that a larger number of companies will seize it in the coming years because we cannot solely rely on the positive externalities that technological solutions can potentially enable.

*Written in December 2020*

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<sup>1</sup> Source: <https://www.ericsson.com/en/reports-and-papers/research-papers/the-future-carbon-footprint-of-the-ict-and-em-sectors>

<sup>2</sup> Source: [http://www.china.org.cn/environment/2012-05/24/content\\_25461996.htm](http://www.china.org.cn/environment/2012-05/24/content_25461996.htm)

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