The dematerialization path to profitability and sustainability

The future of enterprises

Figure 1: Coverage map
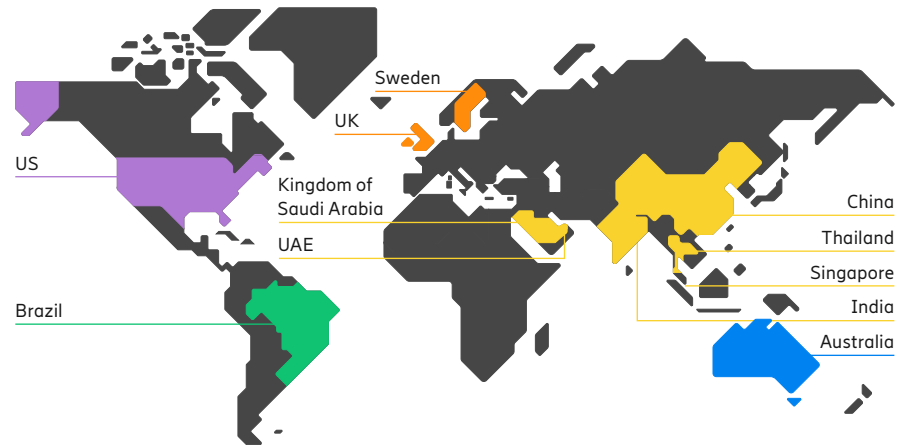
Contents

Acronyms used throughout this report

AI	Artificial intelligence
AR	Augmented reality
EV	Electric vehicle
GDP	Gross domestic product
ICT	Information and communications technology
VR	Virtual reality
XR	Extended reality

The workplace of the future

Imagine walking through the doors of a typical enterprise in the year 2030. You quickly realize most white-collar employee tasks are aided or automated using artificial intelligence (AI) and data mining. Employees mostly work from home or from locations closer to home, so company premises are smaller and fewer. Businesses have transformed into agile enterprises with global customers and workforces. Many enterprises are showing significant CO_2 reductions driven by increased renewable energy usage, reduced commuting and travelling and dematerialization efforts, such as moving data and applications to the cloud or switching from producing and selling physical products to digital products and services.

These predictions are based on insights from our IndustryLab research, which examines the future of enterprises, white-collar work and the role of ICT in the next 10 years.

This research was conducted during the COVID-19 pandemic. The report reflects on its lasting effects and the future impact on white-collar work.

Methodology

Quantitative data was collected from 11 markets, through 5,059 online interviews held with respondents aged 18 and older, in Australia, Brazil, China, India, the Kingdom of Saudi Arabia, Singapore, Sweden, Thailand, the UAE, the UK and the US. Of these respondents, 2,026 were white-collar information and communications technology (ICT) decision-makers, in enterprises with 5 or more employees. The remaining 3,033 respondents were white-collar employees, also in enterprises with 5 or more employees.

These respondents are estimated to represent only around 175 million of the roughly 384 million white-collar employees active in the surveyed markets. However, we believe the early adopter profile of many of these respondents makes them important when it comes to exploring the changing nature of white-collar work 10 years from now. All industry branches, except for telecom, non-governmental and not-for-profit organizations, were included in the scope of this study. The online survey was conducted during September 2020.

Qualitative insights were gathered through telepresence interviews with 10 subject matter experts and academic researchers in the US and the EU, as well as with 8 ICT decision-makers in enterprises with 5 or more employees in the US. The interviews were conducted between June and November 2020.

About Consumer & IndustryLab

Ericsson Consumer & IndustryLab delivers world-class research and insights for innovation and sustainable business development. We explore the future of connectivity for consumers, industries and sustainable society by using scientific methods to provide unique insights on markets and consumer trends.

Our knowledge is gained from global consumer and industry research programs, including collaborations with renowned industry organizations and world-leading universities. Our research programs cover interviews with over 100,000 individuals each year, in more than 40 countries — statistically representing the views of 1.1 billion people.

All IndustryLab reports can be found at: www.ericsson.com/industrylab

Key findings

01

Dematerialization is a key step towards higher profitability and improved sustainability

Today, almost 7 in 10 of the surveyed enterprises have already reached halfway or beyond in their dematerialization journey. Productivity and profitability are named among the key dematerialization benefits by almost half of white-collar decision-makers and close to 4 in 10 say the same for sustainability.

02

By 2030 almost 60 percent of white-collar work is expected to happen outside company premises

With less work taking place at company premises, enterprises must be able to provide their employees with full access to processes and tools regardless of the device they use or whether they are at home or out and about. A decrease in both commuting and CO2 emissions will likely be a result of this shift, as seen during the COVID-19 pandemic.

03

Enterprise usage of extended reality (XR) and 5G is expected to grow by more than 50 percent in the next decade

More than 6 in 10 enterprises expect to use 5G devices, and almost as many will use augmented reality (AR) and virtual reality (VR) devices, by 2030. Increased usage of mobile immersive video technology regardless of location is expected to further drive the need for secure, high-speed, low-latency cellular connectivity.
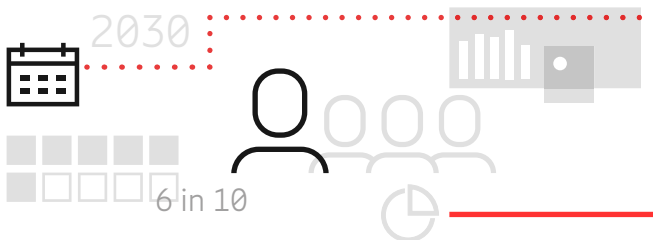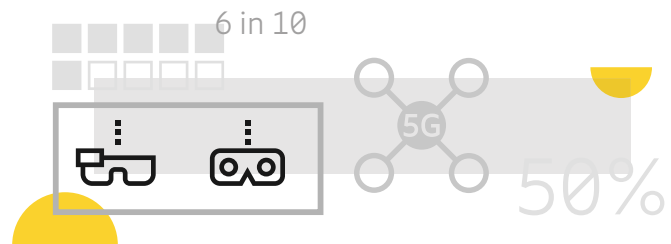
04

The gig economy comes to the office

Of white-collar decision-makers, 6 in 10 believe the share of temporary employment will increase significantly within their companies by 2030, in a shift from mainly being a blue-collar phenomenon. However, this evolution is not without its challenges, as 44 percent of white-collar employees fear it could make life more difficult.

05

Despite worldwide trade conflicts, enterprises continue to grow internationally

While roughly half of all decision-makers agree that trade conflicts and pandemics will continue to be barriers to international trade, currently 6 in 10 domestic enterprises expect to have an international customer base by 2030 and 4 in 10 agree that the ability to hire employees globally will be key by 2030.
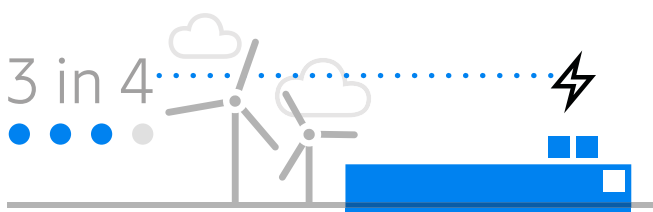
06

Almost three in four enterprises expect their electricity to come from renewable sources by 2030

The switch to renewable energy is a key component in the journey towards a net-zero enterprise. No less than 8 in 10 decision-makers expect to make significant energy savings through the move towards cloud solutions.

A brief history of white-collar work

White-collar work has evolved over the years and the trends of today are forcing enterprises to change their business models, strategies and operations.

You may think that white-collar work is a modern phenomenon, yet as far back as in ancient Greece and Rome, offices often formed part of a palace complex or a large temple. However, it was not until the industrial revolution that the number of white-collar employees began to significantly increase, leading to a need for more office space. We saw the birth of open-plan offices when Frederick Winslow Taylor's ideas to enhance industrial efficiency began to take shape.

In the 1980s the "cube farm" emerged, with modular walls making up offices around the world. Back then, an office desk might have had a fixed-line telephone and perhaps a typewriter. It was also around this time that the personal computer started making inroads into the life of a white-collar employee.

Nowadays, the need for cables and desktop computers has diminished dramatically and staff spend more and more time away from their desks using laptops, mobile phones and mobile connectivity. Open-plan, multifunctional offices are back, allowing workers to break out of the isolation of cubicles and interact and collaborate more freely. As of today, many white-collar workplaces contain different areas designed for varying types of work, from concentration to collaboration.

Driving forces for change

Today there are several trends affecting enterprises, forcing them to change their business models, strategies and operations.

Technological innovation has a significant impact on enterprises. It enables access to new markets, bringing opportunities for new business models and empowering new ways of operating, such as virtual international teamworking and remote working. Digital technology also encourages the trend of globalization, as it allows enterprises to effortlessly transcend geographical boundaries and national borders.

An additional challenge in many countries can be found in their changing demographics. Stagnant population growth and rising aging numbers are leading to a declining working population, meaning fewer people with the right skills. These competitive challenges can be and are already to some extent being counteracted by enterprises through upskilling their current workforce, by attracting new employees with the right skillsets and through increased automation. As the urgency of mitigating climate change is ever increasing, enterprises will need their future strategies and investments to be based on sustainable technological improvements to ensure there is a future for them at all.

"We have identified five global trends that are drastically changing the enterprise landscape. Technological innovation, global economic integration, demographic and generational shifts, a global shortage of skilled labor, and climate change and sustainability."

Tugschimeg Sanchir,
Bureau for Employers' Activities, Senior Advisor, ILO

Open-plan offices might soon be a thing of the past

The dematerialized enterprise

The future will see more dematerialized enterprises leverage cloud and mobile technology, allowing them to become more adaptable.

As outlined in a previous IndustryLab report,[1] office work is under significant pressure to evolve (not least due to the ongoing COVID-19 pandemic) and part of that evolution is likely to happen with the help of immersive XR technology. This report's focus is wider — enter the dematerialized enterprise.

Dematerialization leads to increased value and less consumption of resources, enabling enterprises to "create more with less". In this report, we have defined the dematerialization front-runner enterprises as the top one-third of all surveyed enterprises that have reported the most progress in their dematerialization efforts. It may not be surprising that they are more environmentally sustainable than other enterprises, but they also show higher profitability, are better at innovating and are more agile when it comes to responding to a changing world. In fact, the surveyed ICT decision-makers agree dematerialized enterprises capable of adapting to the evolving needs of customers will be the norm by 2030.
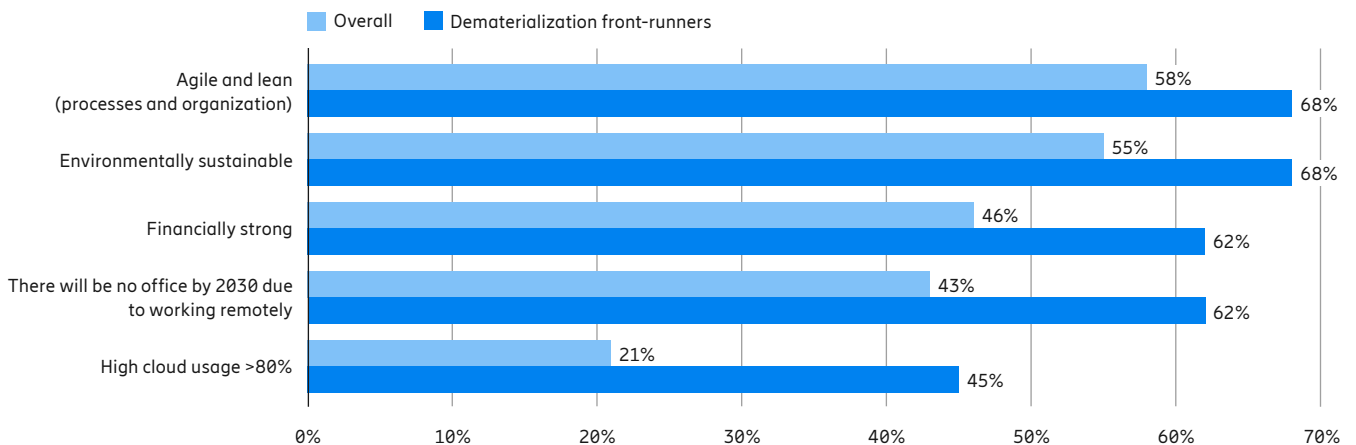
Of the decision-makers surveyed, 68 percent agree the willingness to transform is of very high importance to the success of companies by 2030. In addition, 68 percent believe access to powerful data analytics and data mining capabilities will also be very important by 2030. This data analytics capability is key for companies to learn from experiences, make adequate decisions and experiment and "fail fast" in order to become innovative as the pace of work life and business increases.

> "You have to adapt to whatever it is that the situation calls for... [Enterprises] need to evolve, become more fluid, more agile. They need to be able to turn on a dime. They need to address a changing landscape."
>
> **Rick Lievano,**
> Worldwide Director of Industry Technology Strategy, Microsoft

Research from Forrester has shown that companies which harness digital insights to optimize products, services and operations will grow at least eight times faster than global gross domestic product (GDP).[2] Therefore, in the future we will see greater numbers of dematerialized enterprises leverage cloud, AI and mobile technology to become more adaptable.

Figure 2: Share of decision-makers that agree each statement is true for their respective enterprises (self-reported)

Legend: Overall — Dematerialization front-runners

Statement	Overall	Front-runners
Agile and lean (processes and organization)	58%	68%
Environmentally sustainable	55%	68%
Financially strong	46%	62%
There will be no office by 2030 due to working remotely	43%	62%
High cloud usage >80%	21%	45%

[1] Ericsson, The Dematerialized Office: www.ericsson.com/en/reports-and-papers/industrylab/reports/the-dematerialized-office
[2] https://go.forrester.com/press-newsroom/insights-driven-businesses-will-take-1-2-trillion-a-year-by-2020

Figure 3: Enterprise dematerialization maturity spread today (self-reported)

No dematerialization at all (not even started)   Full dematerialization (no more steps to take)
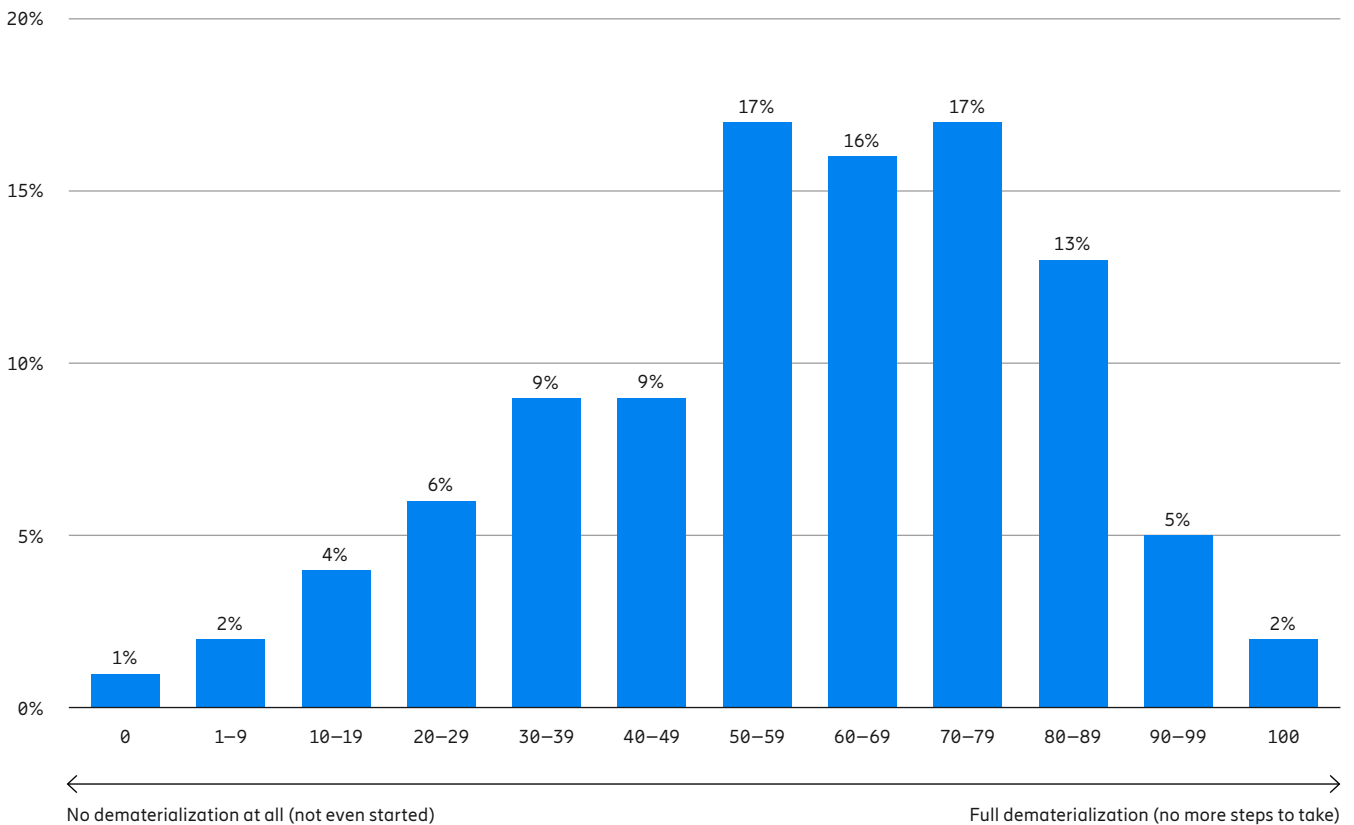
Decarbonization through dematerialization

The Paris Agreement's goal is to limit global warming to well below 2 and preferably to 1.5 degrees Celsius, compared to pre-industrial levels. In accordance with this goal, the 2019 Exponential Roadmap[3] focuses on how to halve global emissions by 2030, becoming net-zero by 2050 (halving every decade). A plethora of solutions to cut industry emissions have already been identified but further actions will be needed.

One approach to reduce the environmental impact, including CO_2 emissions, is to decrease material usage through dematerialization. ICT solutions have the potential to lessen the need for material by substituting physical products with services and digital products within both the ICT sector itself and other sectors. It is estimated that ICT solutions on a global level could lead to CO_2 reductions of as much as 15 percent.[4]

When ICT white-collar decision-makers were asked about how far their respective companies have come in their dematerialization efforts – on a scale where 0 means no actions have been taken and 100 means there are no more steps to take – the surveyed enterprises are spread widely across the scale, with almost 7 in 10 enterprises having reached halfway or beyond on their dematerialization journeys. However, given that the surveyed enterprises are over-represented by technologically advanced businesses, it is important not to generalize too widely based on these results. In other words – the journey to the dematerialized enterprise will not be over any time soon.

Approximately 6 in 10 decision-makers agree that cloud infrastructure, selling software and services rather than physical products, and using online training courses and documents, are key contributors to dematerialization at their respective enterprises.

Nearly half of decision-makers believe that improved productivity and profitability are key benefits of dematerialization and around 40 percent say the same for sustainability. This should be seen as a win–win situation that benefits both enterprises and the environment.

[3] https://exponentialroadmap.org/
[4] Malmodin, J et al. (2015) "Exploring the effect of ICT solutions on GHG emissions in 2030".
   Paper published and presented at ICT for sustainability (ICT45), Copenhagen, Denmark, 7–9 September 2015.

Remote working

The COVID-19 situation and social distancing during 2020 has had a profound effect on many enterprises.

The views of ICT decision-makers and white-collar employees alike have shifted due to their experiences of working remotely. More than 6 in 10 employees agree their respective enterprises have become more positive about remote working during the pandemic and they believe these habits are here to stay. In fact, they expect that almost 60 percent of their work will happen outside company premises by 2030.

This shift will be driven not only by changing employee expectations but also by the opportunity to save on office space, as 60 percent of decision-makers are very satisfied with the ability to cut back through remote working. Only 34 percent of white-collar employees are very satisfied with fewer desks at the office, while a full 62 percent are undecided, which indicates that they see a risk of not having a desk if and when they need to visit the office. At the same time, 66 percent of decision-makers strongly believe the vast majority of all meetings will be virtual by 2030.

> "Most people are going to be like me and they will have kind of a hybrid office situation where they'll choose to work in the office a few days, and they'll choose to work from home a few days."
>
> **Male, 36,**
> IT Technical Manager,
> Manufacturing

With less work taking place at company premises, enterprises must be able to provide their employees with full access to processes and tools regardless of the device they use or whether they are at home or out and about. Using thin clients[5] coupled with cloud services would enable this transition, which almost 6 in 10 decision-makers agree would be quite beneficial for their employees.

A decrease in both commuting and CO_2 emissions is also a likely result of the shift towards remote working, as seen during the COVID-19 pandemic.

This is important not only from a sustainability perspective but also for job satisfaction. The potential to work from home and have a sustainable commute actually represents one-quarter of overall job satisfaction. Satisfaction is also impacted by employees' and companies' general views on distance working and by the tools at their disposal (both communication devices suitable for remote working and virtual collaboration software and services). Of course, a job where it is possible to work remotely is a precondition in this context. Even though remote work has predominantly been a white-collar phenomenon, the evolution of technology — such as for remote control and surveillance of machines and vehicles — is likely to enable more of the workforce to do so in the future.

43%

By 2030, 43 percent of decision-makers strongly believe there will be no office at all due to employees working remotely.

Figure 4: White-collar employees' estimated share of work time across locations during 2019 and expectations for 2030 (self-reported)

2019 — 42%

2030 — 59%

■ Outside company premises
■ At company premises
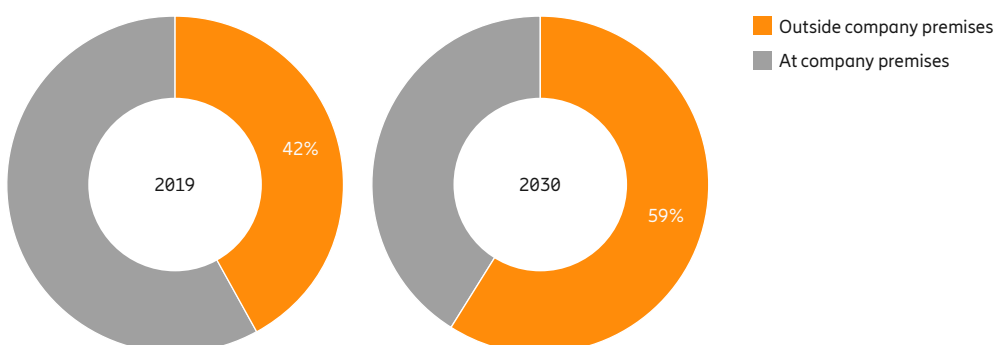
[5] Computing devices with limited hardware specifications that rely on cloud services and good connectivity to give the user a high-performance experience

Figure 5: Share of white-collar employees that agree each factor is a barrier to working remotely (self-reported)

Legend: Overall / Dematerialization front-runners

Factor	Overall	Dematerialization front-runners
My need of social interaction with e.g. colleagues	35%	36%
Too much distraction when working from home	30%	37%
Risk of lower productivity	30%	35%
Lack of suitable communication tools	24%	31%
My company does not allow it (policy)	22%	21%
Lack of good connectivity at home	21%	29%
Lack of suitable workplace (desk, chair etc.) at home	20%	23%
Company culture and negative attitudes to remote working	19%	22%
Lower security	18%	24%
Too many disturbances when working at cafés/restaurants/during commuting (e.g. noise)	16%	23%
I don't have a suitable place to work from	11%	14%
Other	5%	3%
None of these	9%	7%

However, working remotely is not without its challenges. The need for social interaction with colleagues, the risk of potential distractions and lower productivity when working from home are mentioned by more than one in three white-collar employees of dematerialization front-runner enterprises. A lack of suitable communication tools and good connectivity at home are also named. A solution may be to establish co-working spaces and remote working hubs close to employees' homes. In fact, 6 in 10 ICT white-collar decision-makers agree that co-working spaces for their employees would be a good idea — both from a work-life balance perspective and for the environment.
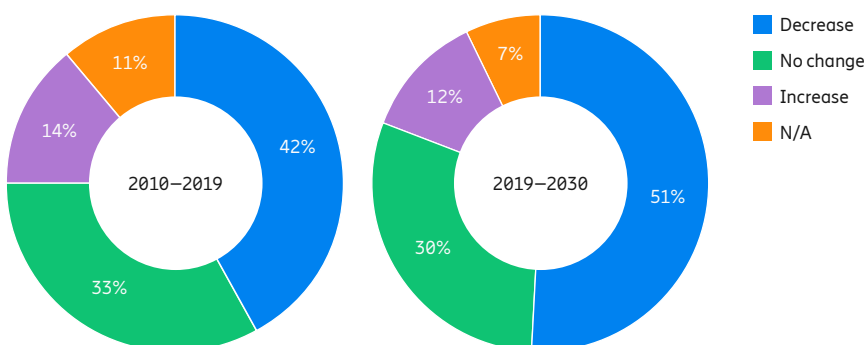
Travel takes a hit
Information technology can further enable remote working. This has been shown during the pandemic, with 60 percent of decision-makers reporting less business travel and commuting. By 2030 half of white-collar workers believe their need to commute, and for business travel in general, will be lower than before the pandemic. Perhaps even more interestingly, 4 in 10 white-collar employees said their commuting had decreased during the past 10 years. For the next decade, 22 percent more white-collar employees expect reduced commuting, compared to the past decade.

It's hardly surprising that decision-makers and employees alike expect decreased environmental impact as a consequence. They also anticipate that the environmental impact of the remaining commuting will be lessened, driven by the evolution of more efficient and environmentally friendly modes of transportation.

Approximately half of all decision-makers are satisfied with how their enterprises are offering employees subsidized electric vehicles (EVs) as well as EV charging using renewable energy at the company parking lot. Satisfaction within dematerialization front-runner enterprises is even higher — well over 6 in 10 decision-makers today.

Figure 6: Share of white-collar employees that agree with each statement regarding the change in their commuting habits since 2010 and the expected change by 2030 (self-reported)

2010–2019: Decrease 42%, No change 33%, Increase 14%, N/A 11%

2019–2030: Decrease 51%, No change 30%, Increase 12%, N/A 7%

Legend: Decrease / No change / Increase / N/A

The XR- and 5G-enabled enterprise

Cellular connectivity is a key enabler for the transition to remote working, with 5G set to be an important innovation platform.

After a long period of remote working, white-collar employees today feel something needs to be added to the remote experience to make it more immersive, enabling some of the traditional way-of-working benefits. White-collar ICT decision-makers and employees alike see the need for immersive online collaboration and meeting tools going forward. In fact, more than 6 in 10 enterprises expect to use 5G devices and almost as many expect to use AR and VR devices by 2030 — an increase of more than 50 percent on today.

Furthermore, almost half of all surveyed white-collar employees, and nearly 8 in 10 among dematerialization front-runners, are interested in a virtual desktop (keyboard, screen, mouse and so on) that can be projected on any surface, enabling you to turn any location into a workplace. Almost as many show interest in an AI assistant that could help with repetitive tasks, for example. The interest in a hologram where you can see meeting participants as a 3D image attracted somewhat less interest — 39 percent overall and 66 percent amongst dematerialization front-runners.

More than 2 in 3 decision-makers agree that their employees will work everywhere, using cellular and cloud technology, by 2030. As a consequence, their increased usage of mobile immersive video technology will further drive the need for high-speed, low-latency connectivity, not only in the residential domain but also in other urban and rural locations. This may also lead to further dematerialization through decreased usage of expensive and power-hungry, high-end devices, such as laptops and desktop computers, and increased usage of more power-efficient thin clients, mobile devices and easily managed, or even self-managed, digital workplaces.
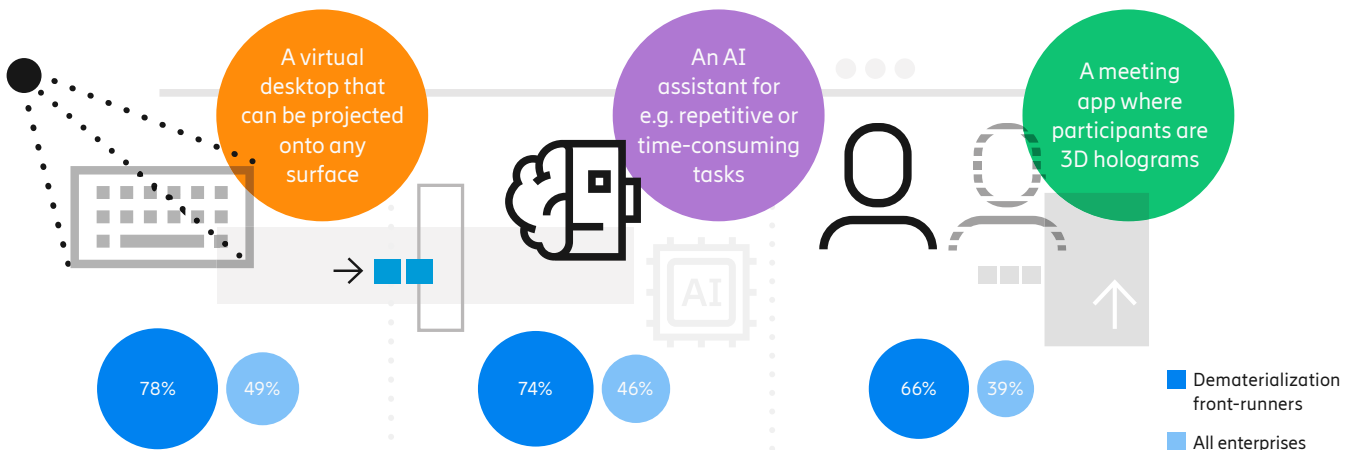
Connectivity is crucial

Connectivity is deemed to be at the center of future work life. Residential broadband is expected to grow in importance as enterprises scale down company premises due to increased remote working. In fact, today almost 2 in 3 white-collar employees state that being able to remotely connect to the work environment is very important, or even business critical.

"I think security is really our main concern, especially everybody working from home. You don't want individuals working from home if their network's not secure."

Male, 45,
IT Technical Manager, IT products

Figure 7: Share of white-collar employees expressing high interest/value in each concept (self-reported)

A virtual desktop that can be projected onto any surface

An AI assistant for e.g. repetitive or time-consuming tasks

A meeting app where participants are 3D holograms

78%　49%　　74%　46%　　66%　39%

■ Dematerialization front-runners

■ All enterprises

Note: Top two answers on a seven-graded scale

The vast majority of meetings will be virtual in the future

Cellular connectivity is also seen as a key enabler for this transition. Two-thirds of decision-makers believe 5G will be an important innovation platform, as its security, low latency and high data speeds enable a more mobile workforce. From a decision-maker perspective, reliability and the ability to handle complexity are key attributes of connectivity. Security is also high on the agenda for many ICT decision-makers, as there are challenges in handling threats, such as unauthorized access to corporate data, malware and computer viruses, when employees work outside company premises. However, the fear of high costs is a key barrier, particularly if cellular is to be used as the only form of connectivity.

Managed ICT environments
Of the surveyed decision-makers, 60 percent say that their enterprises prioritize investments in IT and communications today. At the same time, they acknowledge the many advantages in outsourcing their ICT environment. The main reasons for this are access to skilled personnel, sustainability and turning capital expenditure (capex) into operating expenditure (opex). Today, 8 out of 10 decision-makers already have managed ICT environments and almost 9 in 10 expect to outsource in the future. However, 4 in 10 perceive security issues as the number one barrier to outsourcing.

A key part of this type of outsourcing is the transition to cloud-based solutions. By moving applications, workloads and storage to the cloud, users receive immediate access to data and applications, enabling them to work from any device or location.

The transition to the cloud is not new — on average 61 percent of surveyed enterprises' business applications and IT infrastructure are already running on cloud solutions today. It is estimated that by 2030 this number will grow to 72 percent. When looking at dematerialization front-runners, the numbers are even higher — a staggering 76 percent today and set to reach 82 percent by 2030.

Figure 8: Share of decision-makers that agree with each factor being a driver and/or barrier for ICT outsourcing (self-reported)
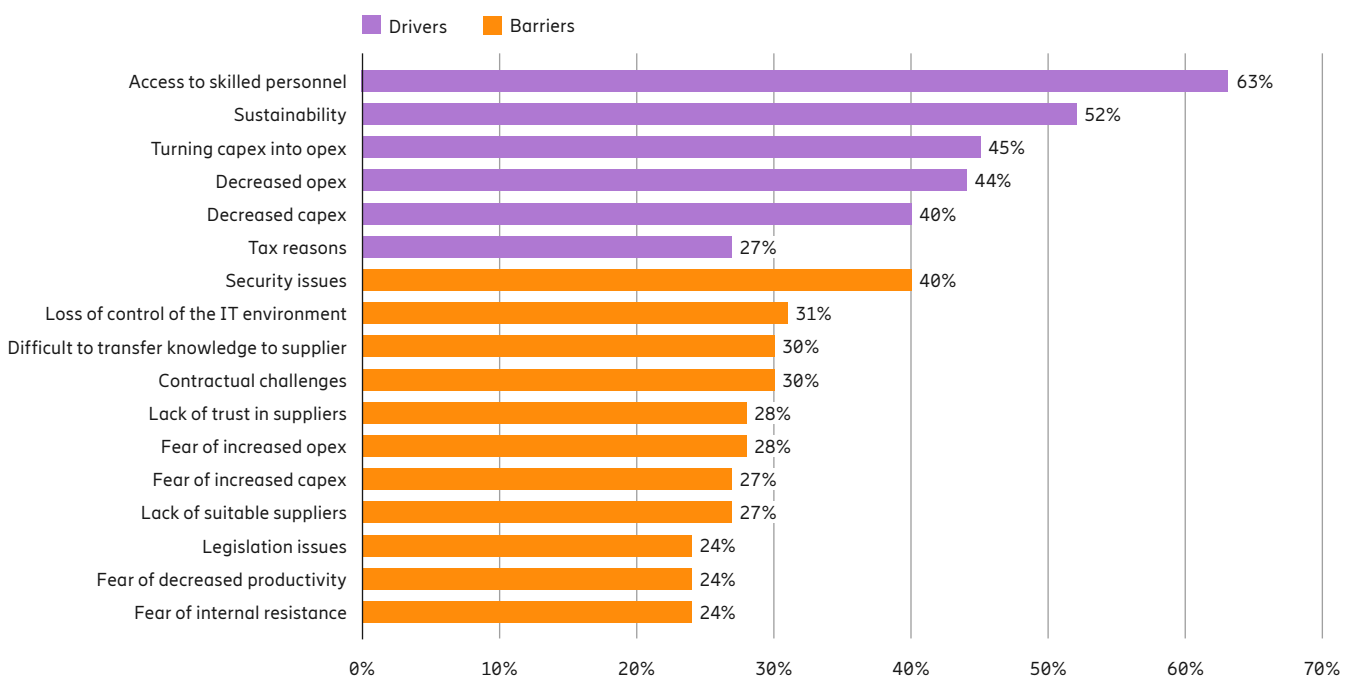
The white-collar gig economy

The changing business landscape could mean a shift towards task-based organizations rather than today's job-based structure.

As a result of globalization and changing demographics, many enterprises are experiencing a skills gap. Our study found that 71 percent of decision-makers believe that access to the right employees will be highly important to their companies' success by 2030, and almost 2 in 3 agree that the local market will not be enough when it comes to finding the right talent — be it specialists or entry-level employees.
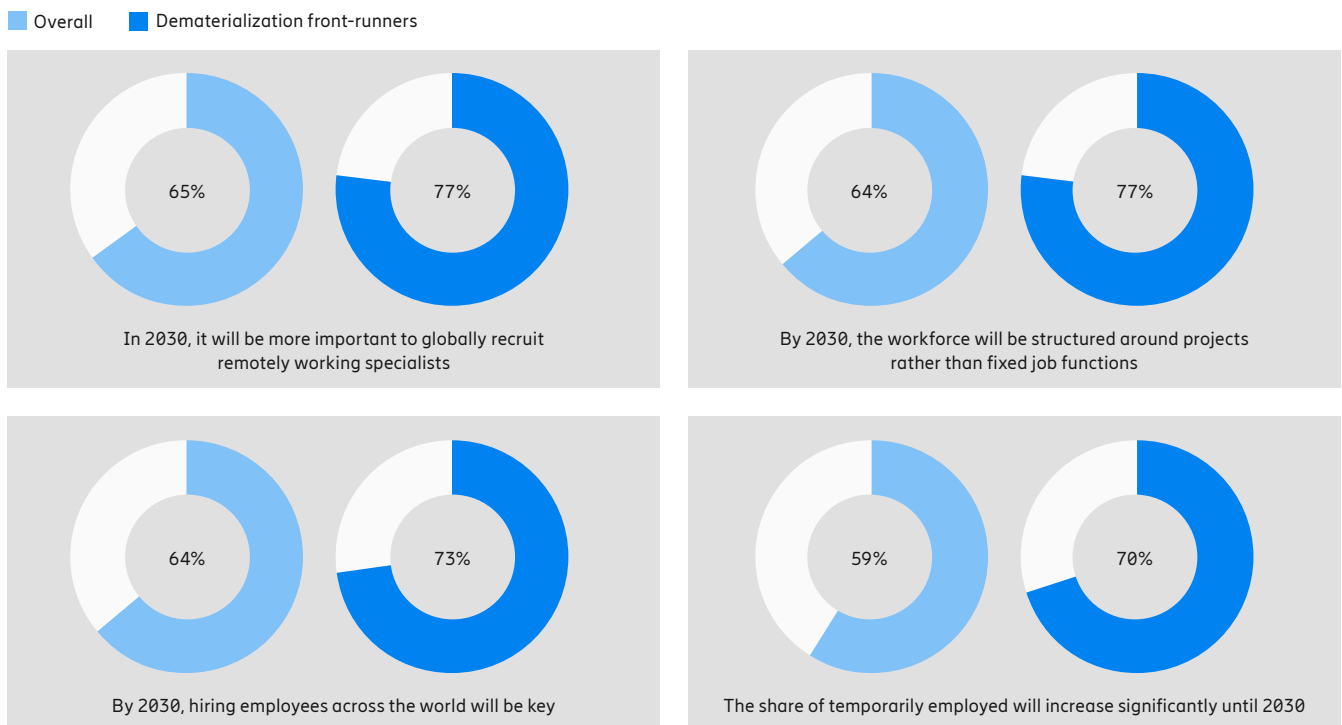
One solution for enterprises is to automate work processes. Overall, surveyed decision-makers estimate that the level of automation within their respective companies will increase from an average of 47 percent today to 60 percent by 2030.

Another way forward is to go global. A relatively well-qualified workforce is rapidly becoming more easily available across the world, aided by digital cloud-based tools, social media platforms and collaboration services. It is reasonable to assume more companies will reach out beyond their own national borders to tap into this potential.

This evolution will likely lead to enterprises hiring people to do jobs without taking them on as employees. This, in turn, could drive a shift towards a task-based organization rather than today's job-based structure. According to OECD statistics, temporary jobs have already increased by 8 percent within the EU during the past 20 years.[6]

In a shift from mainly being a blue-collar phenomenon, 6 in 10 white-collar decision-makers believe the share of temporary employment will increase significantly within their companies by 2030. However, 44 percent of white-collar employees think that replacing long-term positions with short-term assignments and project-based employment will make life more difficult. As employments become more flexible, but also uncertain, enterprises might also experience the drawbacks and vulnerability of not having a loyal workforce. There could also be an adverse effect on company culture and social cohesion, which may counteract the evolution towards dematerialized enterprises.

Figure 9: Share of decision-makers that agree with each statement about the future workforce (self-reported)

■ Overall   ■ Dematerialization front-runners

65%   77%

In 2030, it will be more important to globally recruit remotely working specialists

64%   77%

By 2030, the workforce will be structured around projects rather than fixed job functions

64%   73%

By 2030, hiring employees across the world will be key

59%   70%

The share of temporarily employed will increase significantly until 2030

Note: Top two on a seven-graded scale

[6] https://data.oecd.org/emp/temporary-employment.htm

International expansion

Despite trade wars, enterprises continue
to expand internationally.

As shown in Figure 10, there is no shortage of barriers when an enterprise wants to reach an international audience. Roughly half of all decision-makers agree future pandemics and trade conflicts will continue to be key obstacles to international growth. While many barriers have a similar share of mentions, future pandemics most likely gained its top position due to the trying times we are currently living in. It is also interesting to note that a significantly larger share of dematerialization front-runners, who already have more exposure to international markets today, see the challenge these barriers bring.

Going international, particularly for small and medium-sized enterprises, can be a daunting undertaking. In the past, setting up in a new market required both financial muscle and in-depth local competence. Nevertheless, even among enterprises with no, or very limited, international customer exposure today, as many as 6 in 10 expect an increase in their international customer activities by 2030. In addition, 4 in 10 agree that the ability of domestic companies to hire employees globally will be key by 2030.

Technology is seen to have a determining role for this internationalization by helping enterprises smoothly set up new branches, contract personnel overseas, run a worldwide cloud-based e-commerce business or even remotely operate equipment without the need for increased international traveling. In fact, 7 out of 10 decision-makers agree that cloud solutions contribute to their company's international activities and among dematerialization front-runners this reaches almost 8 in 10.

An almost equal share of overall decision-makers, as well as dematerialization front-runners, recognize 5G as an important contributing technology in internationalization activities.

The higher results for dematerialization front-runners are hardly surprising, as they typically have significant experience of using technology as a way of achieving more with less, such as reaching a global market without any physical presence in different regions.

This internationalization will further contribute to stronger global economic integration. Competition and consolidation will likely increase as companies are required to compete with a rich variety of globalized companies which, to an increasing degree, will be dematerialized.

Figure 10: Share of decision-makers globally that agree each aspect is a barrier to expanding their company's international activities (self-reported)
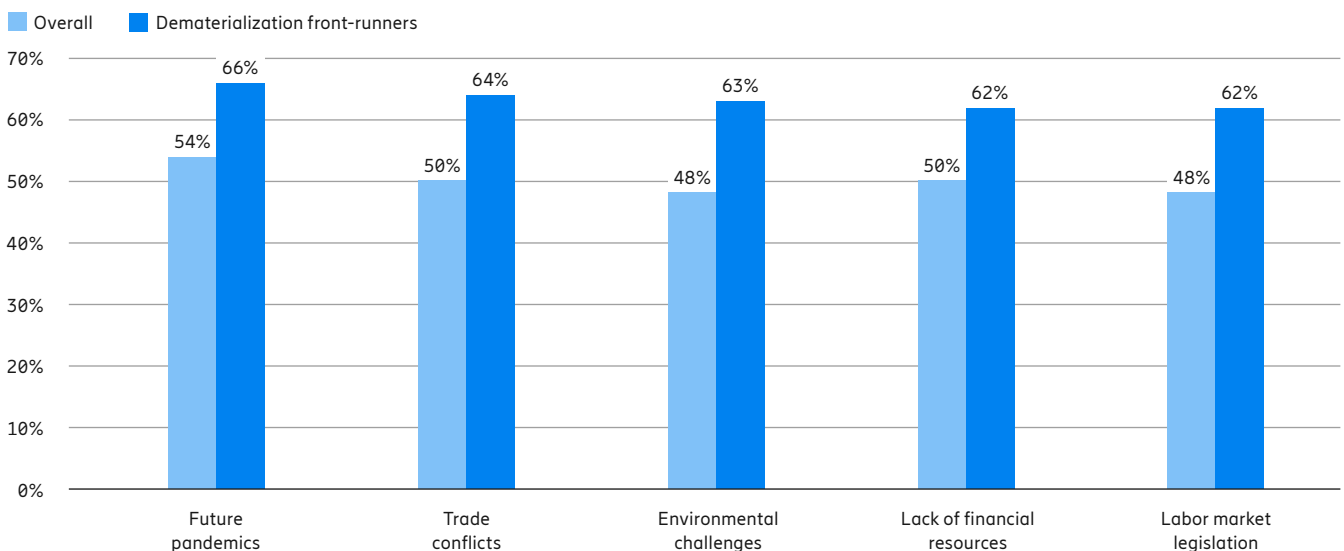
Note: Top two on a seven-graded scale

Towards net-zero

No stone can be left unturned on the journey towards
net-zero carbon emissions.

Different strategies must be taken by
enterprises attempting to become
sustainable. In addition to decreased
commuting and increased dematerialization,
as covered earlier in this report, a switch
to more renewable energy and
energy-efficient solutions, such as cloud
architectures, can aid the journey to
becoming a net-zero enterprise.

The power of renewable
Today, more than half of the surveyed
enterprises already use renewable energy
for most, if not all, of their energy needs.
By 2030, this is expected to increase to
almost 3 in 4 and only 2 percent think they
will not use any renewable energy at all.
For dematerialization front-runners, a
staggering 8 in 10 say the same.

Overall, 45 percent of white-collar
employees are at least somewhat satisfied
with their employers' support in the
transition to renewable energy at home.

Furthermore, 46 percent expect to
commute to and from work only using
fossil fuel-free transport, or to not
commute at all, by 2030.

The transition towards renewable
energy has its own set of challenges and
barriers, with one in four decision-makers
expecting that economic barriers will be
too significant. Other barriers mentioned by

> "Some of our buildings we've started
> putting solar panels on... We can't
> run a wind farm on our central
> campus because there are buildings
> all around. But some of our higher
> buildings and our library, it's larger,
> they could put a solar panel there."
>
> **Male, 34,**
> Central IT Service Level Manager,
> Education

one in five decision-makers were the lack
of necessary technology and the lack of
incentives and tax breaks.

No less than 50 percent of surveyed
enterprises are already investing in
renewable energy production of their
own; for example, by installing solar
panels. When moving in this direction,
it is important to have a strategy for
handling the excess energy. If connected
to the power grid, renewable excess
energy can be sold back to the grid
during the day and energy can then be
purchased at night when the solar panels
do not generate any power. However,
if the power grid is not 100 percent
renewable then neither is the enterprise.[7]

**Figure 11: Decision-makers' expectations for the use of renewable energy
in their enterprises by 2030 (self-reported)**

[7] https://earth.stanford.edu/news/when-100-renewable-energy-doesnt-mean-zero-carbon#gs.i64wkv
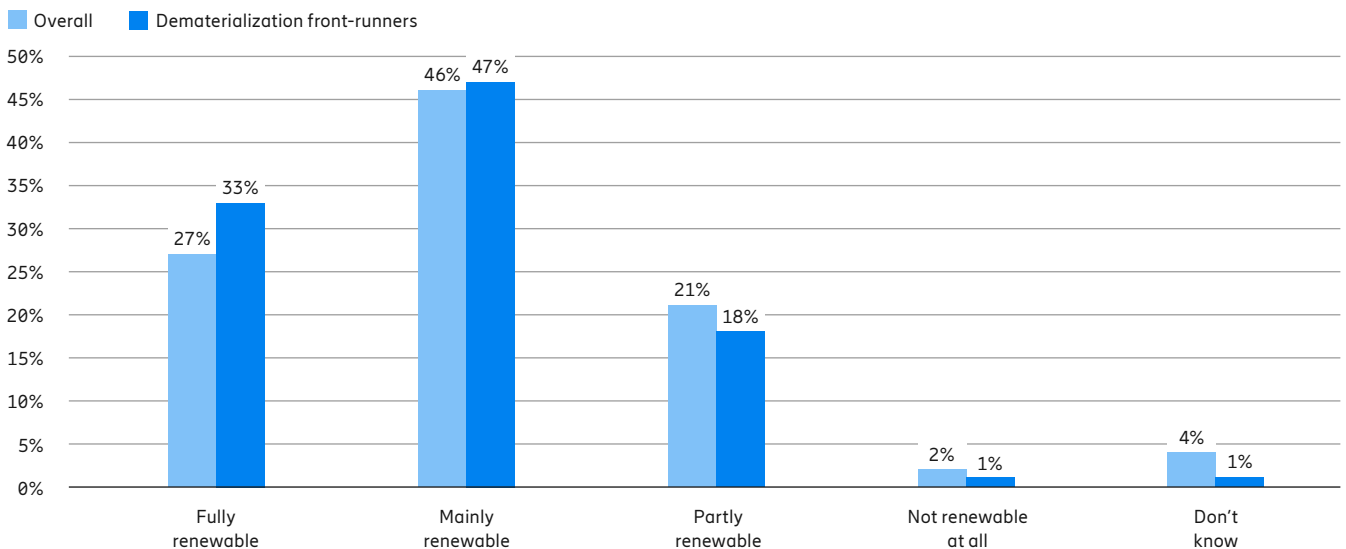
Optimizing data center energy efficiency is crucial

Cloud data centers and their carbon emissions

It has previously been argued that the carbon footprint of data centers would increase significantly over time as data traffic growth leads to a similar increase in electricity consumption. However, this theory was debunked when a report found that data traffic between 2005 and 2015 increased about 30 times while a typical server could show a hundredfold increase in computing capacity per amount of energy over the same time period.[8] The efficiency improvements could thereby harness the impact relating to the increased data usage.

When looking at a data center's carbon footprint from a cradle-to-grave perspective, the largest portion of the footprint is related to the electricity used to run the data center.

This electricity usage relates both to powering the servers themselves and to the cooling system needed for the servers. This means using renewable energy sources and optimizing data center energy efficiency will be key to significantly minimize the carbon footprint.

Cloud technology, used the right way, can actually be another important enabler of reductions in both energy consumption and environmental impact.

Overall, 8 in 10 ICT decision-makers expect significant energy savings due to the usage of multi-cloud solutions by 2030, not only for their own enterprises but for society as a whole. Amongst dematerialization front-runner enterprises, the consensus is almost unanimous, with 9 out of 10 agreeing.

Enterprises have a long journey ahead towards a net-zero future, and as indicated earlier in this report, an overwhelming majority of decision-makers agree there is no turning back.

Figure 12: Cradle-to-grave carbon footprint

| Materials acquisition | Production | Use | End-of-life treatment |
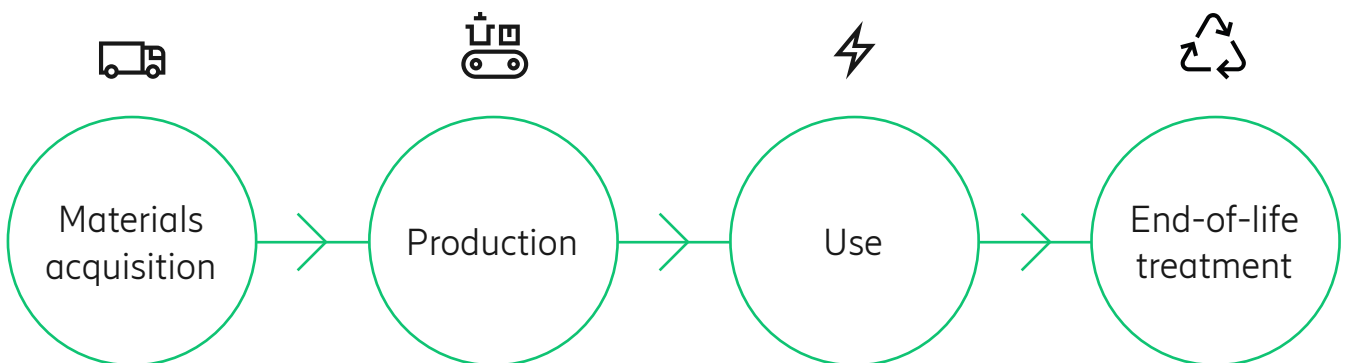
[8] Jens Malmodin and Dag Lundén, "The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015" (2018)

Enterprises without borders

With the future involving remote working and increased international ambitions, enterprises will act both locally and globally at the same time.

The pandemic, in all its tragedy, has led us to ask: how can enterprises be better prepared for, and resilient towards, future disruptive events? It has given us a glimpse into the future of enterprises; one that is highly digital, more sustainable and increasingly global. Even though the sudden increase in remote working was not based on any strategic effort to decarbonize enterprises, it may have been the springboard society needed to set a new direction. Social distancing policies implemented to limit the pandemic have transformed white-collar work in terms of both attitudes and ways of working. The use of digital meeting tools has exploded and is expected to endure in a post-pandemic situation.

Considering how decision-makers and white-collar employees alike expect the future to include both remote working and increased international ambitions, we are led down a paradoxical path where enterprises will simultaneously act both locally and globally. They will be more local in the sense that their workforce will spend less time traveling and commuting and instead spend most of their work and life in their own residential areas. In parallel, enterprises will act globally from the perspective that an employee's residential area could actually be anywhere in the world. Another, perhaps more obvious, global aspect is the expansion of e-commerce and cloud-based tools to reach a global customer base.

This transition will certainly put new requirements on digital and physical infrastructure. While today's technology already provides an opportunity for remote working, there is definitely room for significantly enhanced experiences, such as XR-based immersive meetings and multi-device work environments powered by cloud solutions. Connectivity infrastructure will face new challenges as the need for lower latency, higher security and end-to-end capacity increases throughout fixed and mobile networks. Non-office-related remote work, such as remote control and surveillance of machines and vehicles, will add further complexity and requirements to this infrastructure.

Increased remote working will also make city planners rethink the ways our cities are built. A more local life may very well fulfill the vision of the "15-minute city",[9] creating a renaissance for our residential areas with a rich set of services, catering to a remote working lifestyle. This could even contribute to a closing of the gap between rural and urban areas while further lowering the need for transportation services.

This report has outlined several approaches that enterprises can take to reduce emissions and move towards carbon neutrality, while becoming smarter, more agile and internationalized. ICT has the potential to continue its key role in this journey.

Perhaps now is the time to reflect on what kind of society we want to be part of in the future. There is a collective insight that we need to build enterprises that are both sustainable and better prepared for tomorrow's challenges. Decarbonization and dematerialization are key components in this evolution.
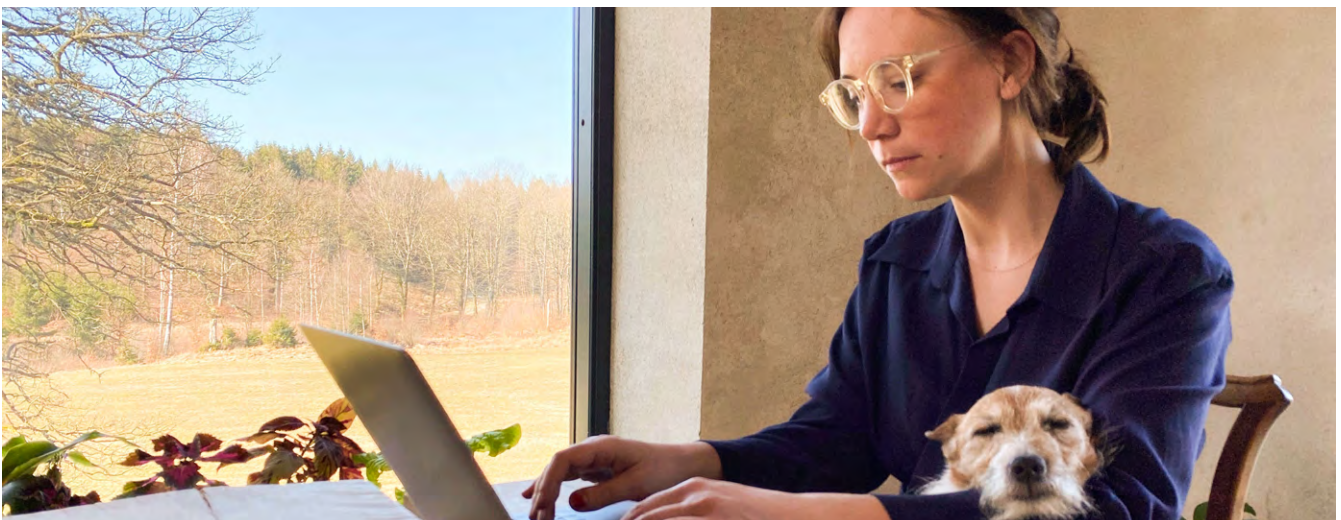
Future enterprises are set to simultaneously act locally and globally

[9] In a "15-minute city", everyone can meet most, if not all, of their needs within a short walk or bike ride from their home

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