European Data Centre Association

Political Vision

Enabling the twin green and digital transition with the positive contribution of data centres

EUROPEAN DATA CENTRE ASSOCIATION

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Executive Summary

In 2025, the Digital Decade Programme will pass its halfway mark. Digitalisation has delivered a widely recognised positive contribution to the EU's economy, society, and sustainability. However, some of the region's more ambitious targets are lagging behind.

Data centres are the backbone, and only visible, presence of the internet. As such they have a key role to play in supporting the European Union's twin green and digital transition.

This paper outlines the vision of the European Data Centre Association (EUDCA) for the future role of the data centre industry in Europe. It comprises a **roadmap** of the steps the industry has either already undertaken or could take as a future pathway towards climate neutrality by 2030. It also includes **recommendations** for policymakers on how data centres can make a positive contribution and support the EU's twin green and digital transition. The EUDCA's recommendations are divided across five main areas: sustainability, energy, targets and standards, critical infrastructure and security, and skilled workforce.

Sustainability encompasses many areas for data centre operators, from energy efficiency to the circular management of resources and equipment, to the replacement of chemicals with natural alternatives. As a relatively underregulated and unknown sector in the policy discourse, data centres are increasingly attracting attention and have become the subject of policy measures to improve their efficiency and sustainability.

To achieve this goal, the data gap has been filled with reporting requirements and data collection efforts across many EU policies and industry-based initiatives. In using this data, **targets** should be realistic and based on industry practices or existing standards to avoid burdensome reporting requirements. As a complex ecosystem, data centres are working towards the conscious use of valuable limited resources, with the development of circular practices for energy, water, equipment, and buildings, transitioning away from harmful ones.

Energy is critical to data centre operations. Without an uninterrupted and stable supply of energy, data centres cannot perform their function as an essential part of society's digital infrastructure. Access to electricity and clean energy across borders, as well as using this energy efficiently, is crucial to supporting data centres' servers, operations and business.

Data centres are recognised as **critical infrastructure**. However, they often lack sufficient protection against the risk of outages or cybersecurity attacks. As many of society's essential functions become digitalised, data centres have a vital role. Their protection and security should be at the forefront of any future policy initiatives.

Finally, as the industry and technology constantly evolve, data centres will require more **skilled talent** in the next few years. Data centres are helping to achieve the EU's goals for a skilled digital workforce, enabling new ways of working.

Contents

Foreword by the President and Secretary General of EUDCA

Europe depends on a matured digital industry

The European colocation data centre industry has grown significantly in the last decade and its sustainability efforts are the result of its maturity. It will now be crucial to continue this path to sustainability. As a pioneer in sustainability efforts, the data centre industry is spearheading the developments of climate neutrality targets and constantly evaluating its efforts against technical feasibility to stay ahead of the curve. The goal of industry initiatives must always be to facilitate a fully sustainable and digital European Union by providing the necessary knowledge and expertise.

The Future is digital, green and cooperative

At the start of the Fit-for-55 Agenda, the data centre industry has arrived at an impasse, where an important decision was taken by the industry. Instead of building up walls and raising to arms against the upcoming legislation, the colocation data centre industry has embarked on a journey of collaboration and concerted effort between its industry stakeholders. Over the years, this cooperation has increased to include politicians and related industries to ensure a green and digital future for all. Continuing its previous work, the European Data Centre Association aims to support the development of Europe's green digital infrastructure by addressing the core issues obstructing the goals of the Twin Green and Digital Transition in the EU.

EUDCA Mission and Vision

The **European Data Centre Association** (EUDCA) represents the interests of the European colocation data centre operators. The association is a platform for member companies based all over Europe to collaborate with National Trade Associations and equipment manufacturers, for the definition of future-proof and sustainable policies for the data centre industry in the EU. As a co-founder of the **Climate Neutral Data Centre Pact** (CNDCP), EUDCA is taking concrete steps for achieving climate neutrality by 2030 by setting ambitious targets to improve the energy efficiency and sustainability across all its members' operations.

A. Introduction

Data centres are an essential part of the digital infrastructure that underpins our modern economy. Hospitals, airports, power plants, government services, and financial services vitally depend on them. At a time of geopolitical insecurity, a European data centre infrastructure is crucial to the region's sovereignty and prosperity. According to the "Shaping Digital Transformation in Europe report" (2020), by 2030, the digital market in Europe could amount to €22 trillion. As more turnover is generated digitally, data centre infrastructure is the foundation for ensuring Europe's renowned status within the global economy.

The global dimension of IT infrastructure cannot be underestimated. In the wake of Russia's invasion of Ukraine, the EU's critical infrastructure has seen more attacks than ever. The recent energy crisis, as well as the advancement of climate change further threaten the provision of critical services. While complex global value chains still bind our continent closely with non-European vendors, Europe's dependency on external resources can be reduced through digitalisation.

Digital solutions not only support thriving economies but are at the forefront of sustainability and efficiency developments when utilised correctly.

The upcoming European elections will spur on further implementation off Europe's Digital Decade vision. Despite optimism, its first report uncovered major shortcomings in progress. The EU's connectivity targets fall far behind expectations. The necessary infrastructure is not receiving the appropriate support. Data sovereignty has not yet been adequately addressed at the European level. Digitalisation is still in its early stages. New technological innovations such as artificial intelligence (AI), quantum computing and widespread cloud services that are revolutionising our society through innovation need data centres to function.

The 2024 election is a chance to ensure that our IT infrastructure flourishes and prevents "digital leakage" out of Europe.

New digital technologies have already entered the lives of many European citizens. Be it digital healthcare, digital educational tools, or a digital Euro. Digital technology is an opportunity to ensure no member of society is left behind, even in times of major societal shifts.

Critical to mitigating climate change, data centres are the backbone of the European twin green and digital transition. As a result of digital infrastructure like data centres, Europeans are lowering their emissions through virtual meetings over flights or working from home rather than daily commuting.

High emitting sectors like manufacturing or aviation can reduce emissions by employing making their data processing technologies and operations more efficient. Through innovative solutions, data centres are

actively enabling the greening of the economy. According to GeSI, ICT solutions can help cut 9.7 times more CO_2 than they emit. Their analysis forecasts that the industry will decrease its footprint over time from 2.3% of global emissions in 2020 to 1.97% by 2030. In 2015, it was estimated that digital solutions have the potential to contribute a 20% reduction in global CO_2 emissions. Similarly, GeSI argues that 15% of global emissions can be saved by 2030 through digitalisation, especially in the agricultural and transport sectors.

In addition, data centres are key investors in renewable energy worldwide. This paper lays out the vision and roadmap of the European Data Centre Association (EUDCA) for the role and contribution of the data centre industry in Europe.

B. Sustainability

B.1. Sustainability Reporting

As of the early 2020s, the EU started addressing sustainability in the data centre industry through an initial set of EU legislation introducing mandatory reporting requirements for the sector.

First, the **Energy Efficiency Directive** (EED) sets annual reporting requirements for data centre operators in the EU. Starting in September 2024, operators will start reporting on sustainability indicators such as energy efficiency, renewable energy use, energy usage, water usage, and heat reuse. The EED scope covers data centres of 500 kW of IT capacity and higher but fails to include smaller on-premises enterprise data centres, which are often less energy efficient than larger data centre facilities. This means the EED enables the public to compare large data centres with other large data centres, but not with less efficient smaller facilities[1]. To put this into perspective, most data centres are still on-premise, and smaller than 100 kW, operating with high energy demands and inefficiencies[2]. To aggravate the burden, national transpositions may lead to a patchwork of different reporting platforms and requirements, which makes it harder for companies to report efficiently.

Second, the **European Sustainability Reporting Standard** (ESRS) of the **Corporate Sustainability Reporting Directive** (CSRD) introduces new and partly overlapping reporting requirements for data centre operators. Operators will be required to report on energy usage and the share of renewable energy, estimated greenhouse gas emissions from scope 1, 2, and 3, and other information, including water usage and water usage targets among others.

Third, the **EU Taxonomy** establishes specific Climate Mitigation and Adaptation criteria for data centres. The objective is for energy savings to be demonstrated through compliance with practices already set out in the European Code of Conduct for Energy Efficiency and similar standards. However, the auditing and evidence gathering required adds a disproportionate burden on companies. These best practices are already implemented through general data centre standardisation schemes and therefore lead to double auditing. From an administrative and climate mitigation point of view, the easiest and most effective criterion would be to set a target of energy efficiency, rather than requiring a complex audit of best practices. All in all, the Taxonomy should focus on real mitigation benefits. Similarly, rather than requiring the use of refrigerants with a certain global warming potential to incentivise emission reduction, a metric could be set as a criterion to measure actual

[1] Eureca Data Centre Prokect - Grant Agreement Number: 649972. More information: [Datacenter EURECA Project | EURECA | Project | Fact sheet | H2020 | CORDIS | European Commission (europa.eu)]

[2] S&P Global Market Intelligence, 451 Research, Kelly Morgan - Improving datacenter efficiency in Europe – the role of PUE, 2022

scope 1 emissions, including those from back-up generation.

Despite these regulatory endeavours, current sustainability reporting adds a large burden to the daily operations of data centres, without significantly improving the sustainability efforts of the industry. The costs and resources allocated for reporting are counterproductive to the goal.

The European Commission has started to utilise application programming interface (API) driven systems to collect data in other domains. To build a durable approach to sustainability reporting, such systems should be used in every existing and future sustainability reporting scheme.

Climate Neutral Data Centre Pact

The recent legislation has left a gap between the regulatory needs and the reality of data centre business. The **Climate Neutral Data Centre Pact** (CNDCP), an industry-led self-regulatory initiative co-founded by EUDCA and Cloud Infrastructure Services Providers Europe (CISPE) - developed with help of the European Commission's Directorate-General for Communications Networks, Content and Technology (DG CNECT), aims to close this gap. Based on qualitative targets for energy efficiency, renewable energy, water use, circular economy, and circular energy, the CNDCP covers the most important indicators for off-premise data centres from 50kW upwards.

With over 90 signatories, the CNDCP covers 80% of the off-premise data centre market in Europe. This makes the CNDCP the most ambitious trendsetter in data centre efficiency, unmatched by other sectors. Its signatories commit themselves to high sustainability standards that on-premise data centres cannot meet as they are not designed for at-scale operations and efficiency. In July 2023, the first round of signatories certified their adherence to the initiative's goals.

Voluntary and private reporting initiatives develop much faster than legislation. Therefore, the EUDCA encourages policy makers to recognise industry initiatives that are widely complied with, such as the CNDCP and iMasons Climate Accord. As official benchmarks or minimum standards, they are well positioned to be drivers of new reporting schemes.

B.2. Circular Energy

The policy discourse has started to focus more attention on how to harness industrial heat for applications that have traditionally run on fossil fuel energy. The heat produced by data centres, usually around 30°C, can be used for multiple purposes. Although applications of excess heat are not yet the norm in Europe, there are some existing solutions that can decarbonise other heat-related industrial processes, heat domestic water, heat swimming pools, support electricity generation, agriculture processes, and many more. In this way, data centres can make a significant contribution to decarbonising Europe's heating sector. Excess heat applications make de-facto data centres net-negative in their CO_2 emissions.

While heat utilisation is still in its infancy, it is expected to improve over time. Higher rack densities to support AI, greater liquid cooling deployments, together with standardisation of processes, are expected to lead to more excess heat reuse offers in the coming years. Nevertheless, there are still multiple factors that need to be addressed:

- *Temperature*: The heat from data centres is usually around 30°C, which limits the application of heat to certain processes only. Heat pumps can be deployed to increase the heat. However, if the heat pumps are electrically powered or are part of the remit of the data centre, they might increase the energy usage and thus lead to a higher PUE[3], contradicting energy efficiency targets.
- *Regional and seasonal differences*: While data centres can provide waste heat throughout the year, the demand for waste heat varies significantly depending on the season and application.
- *Proximity*: Data centres are usually a significant distance from potential clients which increases the cost of heating infrastructure. Proximity to clients is limited by public interest (e.g., not having a data centre in a city centre) or by limited availability of land.
- *Demand*: While data centres are the supply source of waste heat, an incentivising policy is also necessary to encourage demand, as waste heat schemes generally require anchor off-takers to be successful. Such an incentivising regime would improve the economic feasibility of waste heat schemes.

The Energy Efficiency Directive requires data centres with a total rated energy input exceeding 1 MW to utilise their waste heat if it is technically and economically feasible.[4] Furthermore, the Renewable Energy Directive (RED) considers waste heat as a sustainable alternative to phase out heat sources relying

[3] PUE = Power usage effectiveness is a ratio that describes how efficiently a computer data center uses energy; specifically, how much energy is used by the computing equipment.

[4] EED, art 26.6

on fossil fuels and data centres as a potential source for it.[5] Under RED, Member States must develop stakeholder engagement to facilitate waste heat projects. With planning procedures for new data centres taking up to 5 years, the process from RED is expected to bear fruit only after 2030. However, with the right regulatory framework, data centre heat can be a valuable carbon-free energy source for Europe's energy transition, especially in the hard-to-decarbonise building sector.

To this end, heat pumps will be vital in upgrading the temperature of residual heat for various applications. While this brings the risk of data centres failing to meet energy efficiency targets due to heat pump usage, potential off-takers like district heating networks could install the necessary equipment to increase heat quality, thereby enhancing economic feasibility and reducing the carbon footprints of heating providers. The success of waste heat projects will depend entirely on the cooperation between the different stakeholders, to ensure their longevity and sustainability.

[5] RED, art 26(6b)

B.3. Circular Economy

Sustainable digitalisation is only achievable by reducing waste production and resource demand.

Data centres are complex ecosystems hosting various equipment to support internet operations. They not only host servers, network, and storage equipment but also diverse equipment that supports the operation of servers, such as switchgear, main and backup power supplies, security and monitoring systems, and cooling equipment. These technologies are all part of the infrastructure equipment that ensures optimal work for the servers hosted and the reliability delivered by data centres. While colocation operators cannot control the circular management of their customers' IT assets, as the customers retain full ownership over their servers, they have full ownership over supporting equipment which accounts for a significant percentage of the data centre's carbon footprint. Many data centre operators already offer third-party recycling services to their customers, but they still cannot directly influence or track the asset management of their clients.

Generally, colocation data centres generate very low levels of operational material waste compared to in-house data centres. Operators adhere to stringent decommissioning protocols for supporting equipment, disposing of units when they no longer meet energy efficiency, security, and reliability standards or when warranty coverage expires. In a bid to curtail waste generation and material losses, data centre operators prioritise the procurement of energy-efficient and durable equipment, as well as products designed to be reused or easily repaired. Thanks to the new **Ecodesign for Sustainable Products Regulation** framework, procuring sustainable equipment by design will be easier because their availability in the EU market is expected to increase.

Collaboration with recyclers and repairers as well as original equipment manufacturers (OEMs) is integral to the sustainable and circular management of data centre assets. Well-established extended producer responsibility (EPR) agreements ensure that when the equipment reaches its end-of-life, valuable materials are recovered and reused to produce new equipment. This collaborative effort ensures these critical resources remain in the loop for as long as possible while minimising the production of waste.

A prime example of sustainable procurement practices and OEM collaboration lies in the circular management of batteries within data centres. Batteries and energy storage solutions contain many critical raw materials. To recover these materials after the batteries reach their end-of-life depends on proper recycling practices and sustainable designs. To achieve both goals, many data centre operators are transitioning from lead acid towards lithium-ion UPS systems with extended lifespan expectancy (15 years) and higher recyclability rates. They are also collaborating with manufacturers to achieve a more than 50% recycling rate for their batteries.

B.4. Construction (Scope 3 emissions and LCA)

Construction planning and design are paramount in shaping the sustainability of data centres, influencing their environmental impact from inception to operation. A well-executed design can significantly reduce waste generation and carbon emission throughout the data centre's lifecycle.

Repurposing existing buildings for expansion while increasing the data centre's capacity, for instance with in-place upgrades to the installed equipment, can cut embodied carbon emissions by approximately 88%compared to new construction. However, due to increasing demand, data centres are typically new built.

The choice of construction materials for the core and shell is a critical factor in determining the sustainability of a new data centre project. Approximately 30% of a data centre's carbon footprint is attributed to the production and construction phase. This involves the use of materials such as concrete, metals, wood, and plastics, which are inherently carbon intensive. Hence, careful consideration of construction materials becomes imperative to ensuring the long-term sustainability of data centres.

There needs to be a careful evaluation of what construction materials can be reused, using materials with high recycled content and prioritising low-carbon materials, like low-VOC paints and adhesives.

From a circular perspective, selecting sustainable building materials, such as wood, and maximizing the reuse and recycling of materials during construction can effectively mitigate greenhouse gas emissions.

Modular design can reduce the materials required, but decisions hinge on factors like location, supply chain and availability. Operators are increasingly prioritising recyclable materials and those with a high recycled content, aligning with global sustainable building standards such as LEED, BREEAM, EDGE, and initiatives such as the Science Based Targets initiative (SBTi). Moreover, many collaborate with contractors, providing off-site manufacturing to reduce waste consumption and carbon emissions on site.

Life cycle assessments (LCAs) should be integral to new data centre designs, ensuring that they are optimised for efficiency. Once built, retrofitting existing data centres to host new equipment may potentially be costly, increase embodied carbon, and disruption of service.

B.5. Water

According to the World Economic Forum, water crises are among the biggest threats facing the planet over the next decade. Data centres can sometimes consume high amounts of water. The advantage of water-based cooling technologies is that they require less energy compared to air-cooling technologies powered by electricity. The choice of cooling technology depends on many factors, for instance local water availability. Some emerging technologies such as AI, high-performance chips and circular energy systems may increase the need for water-based cooling solutions. Therefore, data centre operators are looking more carefully at regions with a high risk of water stress.

Many countries in Europe face high water risks. Belgium and Greece in particular have an extremely high risk, with Spain, Portugal, and Italy facing a high risk of water stress.

Data centres can deploy an array of solutions to lower their water footprint, to the benefit of communities at risk of water stress. These include reducing their consumption, becoming more efficient, using non-potable water, reusing water, collecting rainwater and replenishing groundwater.

While the Energy Efficiency Directive introduces requirements for the monitoring of water usage efficiency (WUE), a quantitative target has so far only been set by the private sector.

Through the Climate Neutral Data Centre Pact, data centre operators commit to a WUE target of 0.4 litres per kilowatt hour in cool climates with water stress, adjustable for other climatic conditions, for new data centres after 2025. Existing data centres will meet this target by 2040.

The CNDCP's quantitative target has enormous potential for enabling the considerate and better integration of data centres within local environments. Data centres can be part of the solution and contribute to water access in many communities. We encourage the EU to follow this trend and adopt the CNDCP as a benchmark.

Measuring WUE across the EU will help create a level playing field, but most water management measures on the spot are inherently local. They are best managed by national, regional, and local authorities in cooperation with industry. As data centre design and the water needs of other sectors vary greatly across Europe, this approach allows practical solutions that match the demands of all stakeholders alike.

B.6. Chemicals

Data centres rely on chemicals for various operations. For instance, they can be used as fuel for back-up power generators (e.g. HVO, Hydrogen and biodiesel, etc.). This produces various emissions such as CO_2, NOx or SOx.

A significant amount of chemicals within data centres can be found in cooling systems. The most commonly used refrigerants are Fluorinated Greenhouse gases (F-gases). Due to their global warming potential (GWP), when they are released into the atmosphere, they can contribute to global warming. However, leakage from data centres is typically very low compared to other industries. This is due to their reliance on closed and sealed cooling equipment. Even in older data centres where equipment still relies on the use of hydrofluorocarbons (HFCs) with a particularly high GWP, leaks occur only in controlled situations during permitting and regular investigations.

While there are natural refrigerant alternatives to F-gases, such as ammonia and propane, they come with severe drawbacks including high flammability and toxicity, or dangerous pressurisation levels (as is the case for CO_2). These factors, combined with their unsuitability for inside use, can increase safety risks for data centre personnel. Conversely, newer data centre facilities are already equipped to use very low GWP refrigerants such as Hydrofluoroolefins (HFOs), although some of them may qualify as per- and polyfluoroalkyl substances (PFAS).

An outright ban on the use of F-gases and PFAS in existing data centres could have unintended consequences, such as less efficient air-conditioning (AC), higher energy consumption (due to an increased usage of less efficient cooling systems), and increased water usage (by adding evaporative systems to offset less efficient AC).

While transitioning towards natural refrigerants is a desirable option from a sustainability standpoint, it must be implemented after careful consideration. This includes evaluating the transition time needed to replace older equipment with new equipment, and assessing the technical and economic feasibility for existing facilities.

New data centre facilities are already built with cooling systems that can use low GWP gases. Retrofitting older data centres entails a complete reconstruction of facilities' cooling and electrical systems, including critical equipment such as high/medium-voltage switchgear, cooling equipment and heat pumps. This could potentially lead to an increase in embodied carbon and disrupt service provision. Additionally, there is often insufficient clarity on the suitability of more sustainable refrigerants and whether they are covered by insurance.

C. Energy

C.1. Energy Efficiency

From the early days of the data centre sector, energy efficiency has always been high on the agenda. Despite significant increases in computing and storage rates, energy usage has remained relatively stable, thanks to advancements in cooling systems and server capacities. Besides new technological developments, it is also sensible for data centre operators to design and operate data centres in a way that uses as little energy as possible from a cost perspective. This principle applies to all data centres independent of their cooling technology.

The large-scale operations of data centres enable high energy savings compared to on-premises facilities in enterprises or public services. The power usage effectiveness (PUE)[6] of public sector facilities varies between 1.5 and 7.0 with smaller server rooms generally at the higher end of the scale.[7] Other estimations show that moving from enterprise data centres to professional data centres could save up to 80% of energy with a PUE of 1.4 and lower, compared to higher PUE of 2.0 and upwards.[8]

However, there are limiting factors to further reductions. Colocation operators face a particular issue: The servers they house belong to their customers and the operators do not own or control them. This limits their ability to optimise energy usage in comparison to cloud providers that own the servers themselves.

Indeed, it is estimated that 60 to 70% of energy consumption is linked to the servers, and the remaining 30-40% to the infrastructure, where colocation operators can directly improve efficiency. In any case, significant energy savings have been observed when moving from on-premise data centres to professional data centres.

The Climate Neutral Data Centre Pact addresses these issues by committing operators to a low PUE of 1.3-1.4. With signatories representing over 75% of the data centre industry in Europe, most operators have committed to an audited initiative to bring down their energy usage.

The Energy Efficiency Directive requires data centre operators of 500 kW and higher to report on their energy efficiency. However, this only covers the biggest, already efficient data centres. Therefore, we encourage policy makers to make data centre reporting within the sector more transparent and inclusive, to harness the untapped potential of energy efficiencies which are right in front of us.

[6] PUE 1.6 has approx. 63% of energy usage by the IT systems
PUE 1.4 has approx. 71% of energy usage by the IT systems
PUE 1.2 has approx. 83% of energy usage by the IT systems

[7] Results from EU-funded EURECA Project
[8] S&P Global Market Intelligence, 451 Research, Kelly Morgan - Improving datacenter efficiency in Europe – the role of PUE, 2022

C.2. Access to energy

A liquid cross-border electricity market of long-term contracts

As one of the biggest off-takers of Power-Purchasing-Agreements (PPAs), small and large data centre operators rely on a liquid market with competitive prices. However, insufficient cross-border capacity limits the development of PPA markets significantly.

To address this issue, the EU has set an **interconnection target** of at least 15% by 2030 to encourage EU countries to interconnect their installed electricity production capacity.[9] This means that each country should have electricity cables in place that allow at least 15% of the electricity produced on its territory to be transported across its borders to neighbouring countries. Research by Ember Climate shows how **interconnectors** are vital for achieving net zero in the most cost-efficient manner. They facilitate the integration of renewables and improve power system efficiency across the continent. This decreases reliance on fossil gas, bringing flexibility without compromising on the reliability of supply.

Today's interconnectivity capacity must be doubled by 2030. Therefore, there is no room for bottlenecks, and fast action is needed to achieve the necessary capacity in 10-15 years' time.[10] The EU's **REPowerEU** program plans to inject an additional €29 billion into power grids, but current plans only meet three-quarters of the growth needed between 2025 and 2030.[11]

Furthermore, the **convergence of PPA prices in Europe** is essential to foster cross-border trade and incentivise investments in renewable energy. Securing cross-border electricity flow among member states can play an important role in increasing investment into PPAs across the Union. Besides that, we believe that as renewable energy becomes cheaper, a **free market allocation** of its use is the best choice to both incentivise renewable energy production and keep prices competitive.

Transmission rights for cross-border electricity exchange need to match the contract durations. For example, power purchase agreements which can last up to 20 years need the stable conditions delivered by long-term transmission rights. This is essential to avoid additional transport costs which risk disincentivising cross-border PPAs. The EUDCA recommends transmission rights can be purchased for 10 years or longer.

Backup energy generation

During energy shortages, data centres, could become energy providers to the market once their own critical supply is secured, using surplus energy stored in batteries or hydrotreated vegetable oils (HVO) from generators. The process of selling energy to the market in these circumstances should be

[9] EU Electricity Interconnection Targets
[10] (IEA, p. 315)
[11] ENTSO-E TYNDP 2022 High-Level Report – Final Version May 2023 (windows.net)

simplified to unlock more sustainable energy at times when supply is low and demand high.

Data centres can, to some extent, balance grids with UPS'. However, this should be explored cautiously, as not all data centres run on battery storage systems alone.

And as is known, data centres and customers providing critical services within society, cannot risk having insufficient access to backup electricity. Thus, only a limited amount of data centres will be able to offer grid balancing services.

D. Future industry targets and standards

The ICT sector has matured. From its original unregulated state, the EU has seen an immense upswing of regulatory measures to balance out the sector's large energy imprint. The data centre industry has been at the forefront of energy efficiency as a core principle of their business model. With Energy Efficiency Directive reporting starting in 2024, transparent information about the data centre sector will become accessible to the public and policymakers.

For the data centre sector, ISO has established various standards, defining data centre practices, which are also being recognised in EU legislation alongside EU-based standards. The EU Code of Conduct for Data Centres' assessment framework references a large number of these standards to define practices in the ICT sector which will improve and measure data centres' sustainability performance. In an initial step in defining the ICT sector's performance, the EU Code of Conduct lays out guidelines on best practices for a sustainable data centre development but does not address target goals that the sector would be required to achieve.

The Climate Neutral Data Centre Pact (CNDCP) is the first target-setting self-regulatory initiative. Developed by industry representatives, the initiative has defined targets for its five pillars: Energy Efficiency, Water Usage, Clean Energy, Circular Economy, and Circular Energy Systems. To define the target for each pillar, the initiative combines industry standards, such as ISO/IEC 30134-2:2016 or EN50600-4-2 for its PUE measurements or EU definitions for renewable energy, to ensure the coherence of its targets. This approach has resulted in highly ambitious sustainability targets, backed by the industry itself. Recognising the CNDCP as a standardised programme would allow it to be referenced in EU legislation and therefore facilitate the sustainability transformation through an easily implementable process.

E. Data centres as critical infrastructure

E.1 Data centres as critical digital infrastructure

Like the electrical grid, data centres are meta-infrastructures that overarch and interconnect many other critical sectors. These buildings run the systems that are now essential to the functioning of global logistics, government services and all major organisations. However, their contribution to daily activities remains largely unknown to the public and to many policymakers. No one is inclined to think of data centre services when processing financial payments, visiting a website or communicating via text or email.

Data centres are playing a key role in achieving the digitalisation goals of the Digital Decade Programme. Critical functions of society, such as access to medical records and public government services, will be primarily accessed online. If the digital decade objectives are achieved, this might be the only option for these services and records. The role of data centres in securing resilient digitalisation developments in Europe should therefore be recognised and protected against potential threats.

In a 2023 report on future shocks, the European Parliamentary Research Service identified the collapse of the internet as one of four risks over the next five to ten years.

According to the report, the vulnerability of the internet lies in the growing centralisation of the internet infrastructure. This inherently decreases its resilience and increases the danger of major network collapse, caused by problems with one single infrastructure provider.

Colocation data centres already provide a solution to this risk. As a decentralised system of small and large European operators spread across the EU, they provide secure and reliable network and storage solutions alongside the more centralised public cloud. Given data centres' critical role in supporting the internet and wider economy, the EU needs to consider how to safeguard the uninterrupted provision of essential services to society during a crisis.

To strengthen the resilience of the EU, data centres should have primary access to energy (both the electricity grid and fuel supplies) during crises, as well as essential worker status for data centre operations staff. Similarly, the EU should encourage European governments to invest in the stability and reliability of grid connections. This is crucial for securing the provision of essential and critical services.

E.2. The backbone of Europe's secure data space

The European Network and Information Security Agency (ENISA) reported an increase in cyberattacks and their consequences in their 2023 Threat Landscape report. Public administration sectors are especially targeted. As more sectors become progressively digitalised, these threats have the potential to disrupt essential operations within Europe, if data is not appropriately secured. The General Data Protection Regulation (GDPR) was a milestone in integrating European values into the digital space. However, to guarantee the Europe's data security, this principle must be supported by the necessary infrastructure.

The digital infrastructure sector has now been recognised as a sector of high criticality (NIS 2 Directive). Amongst the subcategories, data centre service providers, and in particular colocation data centres, are considered part of this critical ecosystem. ENISA is required to create and maintain a registry of entities, including data centre service providers, tracking cybersecurity incidents.

In addition, the Directive will lay out product requirements via multiple legislative proposals to ensure critical infrastructure implements the highest level of security within its facilities. This will address some of the attack vulnerabilities in older data centres.

As providers of essential services, the off-premise data centre sector has been complying with the highest security standards, providing a secure environment for their customers from the financial and health sectors to public administration.

As threats continue, cybersecurity measures will need to be adopted more uniformly across Europe. The experience and lessons learned from colocation data centre providers could be leveraged to fill the gaps in the cybersecurity strategy across Europe's digital infrastructure.

F. Skilled workforce in data centres

The data centre industry faces a challenge shared with other players in the digital sector.

The Commission reported that by 2030, 9 out of 10 jobs will require highly qualified digital skills. With new technologies, the digital skills gap is bound to increase by 2030 unless drastic measures are taken. Already today, 30%of companies say that candidates' lack of digital skills prevents them filling entry-level positions. Reskilling 21 million workers and upskilling 94 million could represent a cost of €350 to 490 billion, a significant portion of which would likely require new funds beyond existing education and training budgets. With the increasing relevance of areas such as AI, quantum computing and cybersecurity, the situation is destined to worsen.

According to a recent report, skills gaps are present across all levels of data centre operations, most prominently in technical and specialist roles. Currently, data centre operators are trying to fill these gaps by educating their employees in the necessary areas, creating a secondary education environment for the specificities of the field and new technologies, such as AI. However, this does not solve the issue of gender balance, as university graduate level education in technical subjects is often skewed towards men.

This puts the responsibility both on the industry to promote change from within, and for legislators to create an accessible education pathway for women. Attracting more women and professionals from minority groups will open up previously untapped talent pools. Improved diversity and gender equality in the sector are levers of efficiency and competitiveness.

Despite the shortage of a skilled workforce, data centres are proving to be a potential career path for a new wave of workers. As proven during the Covid-19 pandemic, data centres provide the reliable, constant and fast connectivity that supports remote working and the demand for online collaboration tools. Due to the invisible and often taken-for-granted provision of constant data, the sector is the primary and one of the most critical enablers of a more digitally educated population and will continue to facilitate the digital evolution of Europe's workforce.

Many data centre operators have both a local and international workforce. Establishing European apprenticeship programmes in the clean tech industry would enable more young people to become versatile in an international tech-environment as well as defining the spirit of European-wide digitalisation.

G. Conclusion: 2030 and beyond

Data centres are the backbone of the digital economy. Together with telecommunication networks, data centres provide the infrastructure necessary to suppport a new industrial revolution with services and digitalisation at its core. With more demand for data and digitalisation, comes the responsibility to provide the same services more efficiently and sustainably.

Over the last 10 years, data centres have managed to significantly meet an increasing demand for computing capacity, without compromising on constant energy efficiency and sustainability improvements. As data shows,[12] despite an increasing number of data centres, their overall energy demand has remained consistent throughout the years thanks to the data centre industry's continous investment in improving their operational efficiency.

The data centre industry is already on a pathway towards climate neutrality by 2030. To support this industry-driven progress, data centres would benefit from a higher degree of ambition from European policymakers, with clear objectives for the long and short term.

Clear guidelines and recommendations from European policymakers, based on the best practices of the industry, could stimulate investments into sustainable technology solutions, benefitting the whole data centre sector as well as the digital economy in Europe.

Digital society is entering a new revolution. This could drastically change the data centre sector and its impact. The increasing expansion of AI and its applications pose significant questions and challenges for data centre operators and policymakers alike.

The data centre sector is ready to maintain its pathway to providing essential support to new technologies while prioritising sustainability. To keep pace with increasing computing demand from new applications, the industry is ready to invest in technologies and necessary improvements. However, without clear policy guidelines, effective actions and changes in governance at the EU level, the industry alone may be unable to support this fourth revolution, and compete with external competitors, while mitigating the potential negative impact on the environment.

[12] Data centres & networks - IEA

H. The Path to 2030

B. Sustainability

B.1. Sustainability Reporting

- Adjust the EU Taxonomy criteria for refrigerants in data centres to attract green investments.
- Improve the EU Taxonomy criteria by establishing energy efficiency goals as an alternative to focusing only on auditing processes.
- Reporting should utilise API-driven process for security and a lower administrative burden.

Reporting policies should:

- Be coherent and use a single European database based on the "only once" principle.
- Accommodate different business models like colocation, which may have limited or no access to required data.
- Avoid fragmented reporting schemes in different member states and establish harmonised frameworks.
- Incorporate existing internationally recognised standards and industry initiatives for future reporting regimes.

B.2. Circular Energy

- Increase access to public and private green financing for the development of heat reuse infrastructures.
- Develop a sector-specific standardized methodology for cost-benefit analysis across the EU.
- Create incentivisation programmes for customers and providers of waste heat, e.g., in form of tax cuts for the carbon cost savings.
- Facilitate waste heat projects by developing tools and practices for all involved stakeholders.

B.3. Circular Economy

- Promote investments towards safer and sustainable energy storage technologies like sodium ion batteries, molten sand, or cryogenic solutions for enhanced lifespan and repairability.
- Encourage Member States to offer financial incentives for decommissioning legacy equipment and adopting technologies and equipment designed for reuse, repair and refurbishment.
- Establish a certification process for data centres to track and recognise responsible recycling efforts of own equipment.
- Encourage OEMs to design durable equipment, implement take-back schemes and encourage the refurbishment and resale of equipment into secondary markets and uses.

B.4. Construction (Scope 3 emissions and LCA)

- Implement an EU-wide sustainability certification based internationally recognised schemes like LEED BREEAM and EDGE for green data centre construction.
- Set targets for low-carbon construction materials, and support research and development in this area.
- Enforce eco-design requirements, including reusability and recyclability, for concrete and other construction materials.
- Develop a unified European methodology on Life Cycle Assessment (LCA) and promote its use into the design of new data centres.

B.5. Water

- Focus on reporting targets aligned with the CNDCP Water Usage Effectiveness target.
- Maintain the principle of subsidiarity and let administrations in member states coordinate with the industry on the best approach.

B.6. Chemicals

- Implement new substance restrictions after an assessment based on an holistic approach balancing all associated efficiency and sustainability impacts, including operator safety, energy use and embodied carbon.
- Establish a feasible transition period for compliance and adaptation to new restrictions.
- Clearly define timelines and scopes for implementation
- Apply restrictions only to new equipment; allow existing equipment to reach its end of life unless there are serious safety or health concerns for its continued use.
- Support the development of sustainable, affordable, reliable, safe, and efficient alternatives to F-gases and PFAS refrigerants through dedicated funding for R&D.
- Review the cooling equipment restrictions under the F-gases regulation by 2027 if there are no sufficient efficient, reliable, safe, and cost-effective replacements available on the market.

C. Energy

C.1. Energy Efficiency

- Reduce the threshold of the Energy Efficiency Directive to 100 kW to increase transparency on less efficient data centres.
- Encourage data centres to align their PUE target to the Climate Neutral Data Centre Pact (CNDCP) when they report on the EED key performance indicators.
- Align the upcoming EED labelling scheme for data centres with the CNDCP.

C.2. Access to energy

- Accelerate the interconnector roll-out significantly.
- Enable data centre operators to provide ancillary services to the grid by lowering bureaucratic hindrances.
- Ensure the option for operators to purchase long-term transmission rights +10 years across borders.
- Provide more storage capacity for electricity where applicable.
- Roll out domestic renewable energy generation faster and attract more capital by supporting the development of a truly European competitive PPA market

D. Future industry targets and standards

- Ask standardisation authorities to adopt the CNDCP as an official data centre standard for climate neutrality.
- Encourage the development of third-party audited self-regulatory initiatives which are faster and more efficient.

E. Data centres as critical infrastructure

E.1. Data centres as critical digital infrastructure

- Provide data centre operators with privileged access to the grid and to fuel, and give them essential worker status, to protect essential services (banking, governmental services, hospitals and patient information) during large power outages and other crises.

E.2. The backbone of Europe’s secure data space

- Take different business models such as colocation data centres into account when developing cyber security measures.
- Harmonise the fragmented legislative landscape of cybersecurity measures in EU Member States to increase the protection and security of European data centres.

F. Skilled workforce in data centres

- Increase public funding opportunities for training or graduate programmes designed for the digital infrastructure workforce.
- Provide a solid Erasmus framework with sufficient funding and easier access for apprentices, with a focus on the digital infrastructure sector.