Finnish Data Center Market Study and Impact Assessment Report

Final Report
12.09.2025

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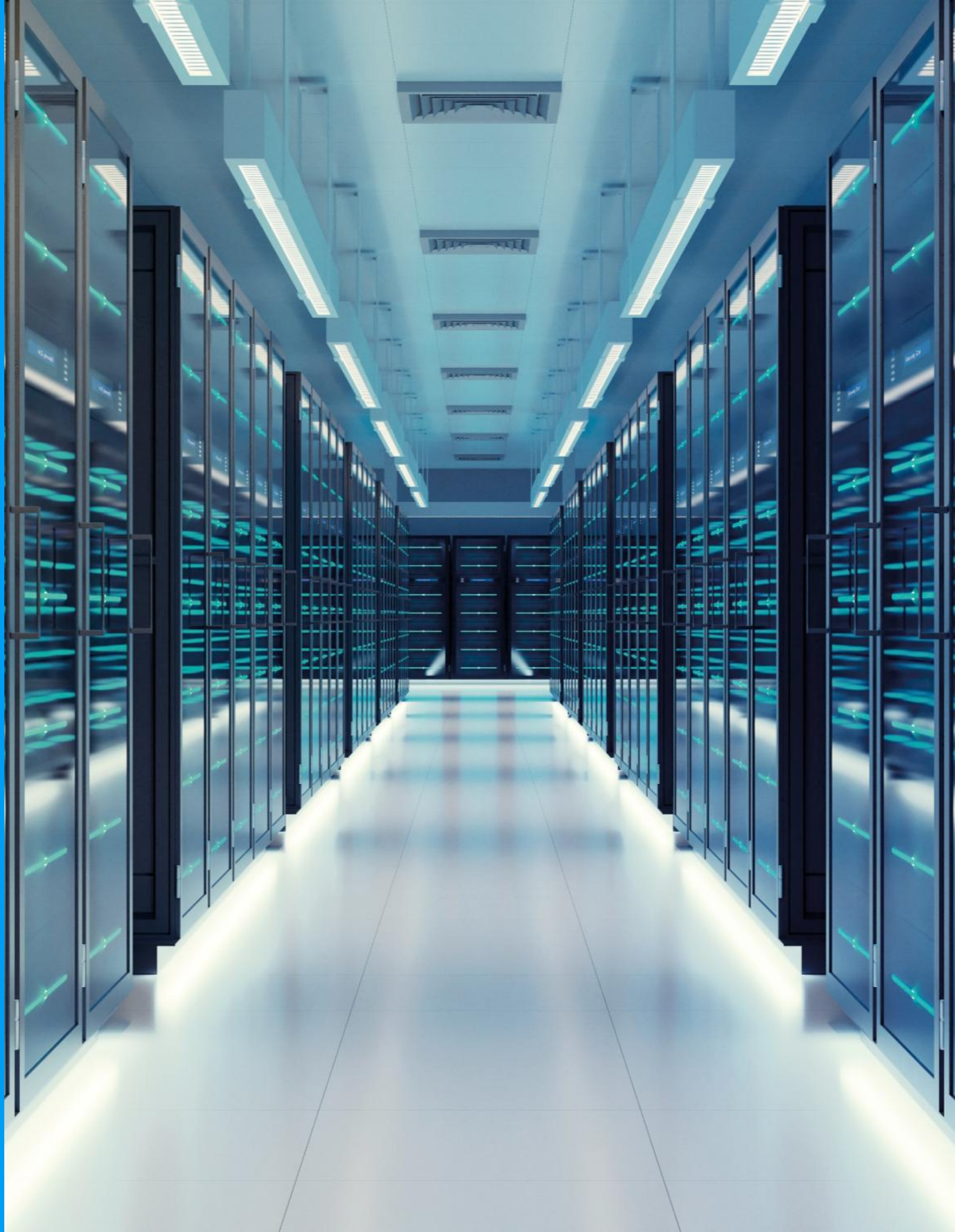

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Foreword

The world stands at the threshold of a new digital era. Artificial intelligence, cloud services, and automation are rapidly becoming more widespread, offering new opportunities for society, businesses, and citizens — innovations, productivity, efficiency, and sustainable growth. The use of digital services and data is increasing, and artificial intelligence will soon be accessible to nearly everyone.

Data centers are the core of digital infrastructure. We need energy-efficient data centers to unlock the full potential of AI. Data and the capacity provided by data centers are also globally important factors for Finland's competitiveness and resilience.

Investment plans related to data centers in Finland are significant. In addition to capacity, the realization of these investments would provide a substantial boost to our national economy. Data centers create direct and indirect jobs, strengthen the tax base, and support regional development — especially in former industrial areas and outside major growth centers.

This report has been prepared to meet the growing need for up-to-date information on the impacts and outlook of the data center industry in Finland. The need for this study is evident, and it offers businesses, investors, and decision-makers an analysis of the economic, social, and environmental impacts of the data center sector, as well as market development prospects.

Alongside the opportunities, the report also considers uncertainties affecting Finland and helps identify the actions through which Finland can strengthen its position as a pioneer in sustainable digital infrastructure and ensure that the growth potential of the sector is realized as a national benefit.

Ulla Heinonen

Director

Confederation of Finnish Industries EK

Foreword by FDCA

ChatGPT was launched 30th of November 2022 and hit 100 million active users in record time. This was also a starting shot for a new wave of AI adoption and accelerated demand for cloud computing and data center capacity. Over the past year, this momentum has clearly reached Finland: announcements for new data center plans and projects have appeared regularly. It seems that data centers are popping up everywhere like mushrooms.

As this report shows, the market signals are real and represent a unique growth opportunity for Finland. Today's pipeline of plans amounts to potential private-sector investment in the tens of billions of euros. Even a portion of this would provide a meaningful boost to national and local economies through construction activity, supply-chain demand, skilled operations roles, and growing tax base. Turning this opportunity into reality will require predictable and competitive operating environment. If Finland doesn't seize this opportunity now, it will be lost permanently. There are plenty of other countries willing to welcome these investments now and the future growth they provide.

The public conversation has intensified as well, with legitimate questions about electricity supply and grid integration, national security, and the distribution of economic benefits. A recurring challenge has been the absence of consolidated, trusted statistics for Finland's datacenter sector. This report helps close that gap by providing a fact base for decision-makers and communities, enabling a more informed dialogue about how to capture the benefits while addressing concerns.

Producing this first comprehensive view of Finland's datacenter market has required extensive collaboration. The study has focused mainly on the Finnish market and stakeholders across industry have contributed data and perspectives to rapidly build a shared evidence base. With future updates and more thorough data-collection methods, the quality and granularity of insights can be further improved.

FDCA wishes to thank Ramboll for leading the analytical work and conducting this study. FDCA also sincerely thanks our partners without whom this study would have been impossible. Special thanks go to our main partner, Confederation of Finnish Industries (EK), who provided valuable guidance and support throughout the whole project. Warm thanks also to the rest of the partners:

- atNorth
- Business Finland
- Equinix Finland
- Finnish Energy
- Fortum
- Google
- Microsoft
- Service Sector Employers Palta
- Sitra
- Tech Finland

As this the first Finnish data center industry report, we invite you to read this report with curiosity and open mind. The purpose is to support an informed, fact-based national conversation—one that maximizes Finland's economic, social, and environmental benefits from the datacenter sector, while maintaining a high bar for responsible, transparent operations. All feedback and suggestions for future improvement are welcome!

Executive Summary

Finland features high potential for data centers with total volume of announced investment plans amounting to 3,4 GW

Current situation and trends

- The data center capacity in Finland currently amounts to **ca. 285MW**.
- The overall **demand for data centers is expected to increase** driven by the adoption of generative AI and cloud services.
- The market structure has undergone change as **new actors, such as real estate developers, are attracted to the market.**

Market uncertainties

- The political enviroment in Finland is generally seen as stable and **continued predictable investment environment is essential** for attracting large-scale data center investments. Recent electricity tax debate has decreased predictability and casted doubt in the minds of investors.
- Fingrid has imposed temporary restrictions on new grid connections for large electricity users in areas around Helsinki, Turku and Tampere until 2027. Per Fingrid, **the limitations to grid connections are local and temporary** and future investments into the grid are expected to ease the situation.

Planned investment volumes

- The **total volume of publicly announced planned investments by data center investors amount to 3,4 GW** varying in development stage and in their prerequisites for success.
- Based on final investment decisions by data center investors (1,2GW of data center capacity by 2032), **capacity in operation is expected to grow by ~50% annually to 662MW by 2027**, effectively doubling the current level of reserved capacity in Finland. Capacity growth in Finland seems to be outpacing expected growth on wider EMEA level.

Data centers in all segments, excluding servers, cloud and networks, are a multi-billion-euro opportunity for Finland – creating jobs, revenues and competitiveness

Direct Economic Value

- The data center industry in Finland is already a **~€ 1 billion industry**, projected to grow by **300% to over € 4 billion by 2030.**
- Typical investment **~€ 1 billion per 100 MW facility**, making it one of the largest private infrastructure investments in Finland.
- **Annual turnover** for a 100MW facility can exceed **€ 350 million**, and a 300MW site can generate over **€ 1 billion**.
- Construction creates **strong domestic activity** and **jobs.** Long-term value comes from operations and services.

Employment

- The sector in Finland currently accounts **directly for over 300 full-time employees** and an additional **~2 000 indirect jobs** through multiplicative effects**.** Some of these indirect jobs mean in practice daily work at data center sites in areas such as installation, logistics, maintenance, operations, cleaning, and security. E.g. at Google site in Hamina ~100 employees are directly employed and ~300 employees work at site through sub-contracting.
- By 2030, the direct job impact is projected to reach **over 1 200 employees** and, through multiplicative effects, close to **9 000 employees** in the operational phase.
- **Temporary employment impact** in construction phase is estimated to be **~10 000 FTE by 2025** and **~45 000 FTE by 2030.**
- **Broad value chains** support employment in Finnish engineering, construction, ICT, and energy sectors. Data centers are vital for rural and industrial regions seeking new job opportunities.

Tax Contributions & Public Revenues

- Between 2019–2023, the five largest operators paid ~ € **105 M in corporate and property taxes** (avg. ~€ 21 M annually).
- In the **operation phase**, multiplicative effects are expected to generate **€ 100 million in tax revenues by 2025** and **over € 350 million by 2030**.
- Property tax is typically, **€ 0,5–1,5 M per 100MW annually**, but the actual level depends on the municipality, construction stage, and building age (with depreciation allowances reducing taxable value over time). The base grows as new buildings are completed but declines gradually as they age.
- Additional revenues from income, payroll, corporate tax and VAT generate funding for schools, healthcare and local infrastructure.
- Data centers provide municipalities with **predictable, recurring revenues** even in volatile economic cycles.

Broader Economic Footprint

- Growth fosters new competence clusters (energy efficiency, cooling, circular economy solutions) and accelerates innovation ecosystems.
- Data centers can bring **multi-billion-euro investments and thousands of jobs** over the next decade, if Finland capitalises on its locational advantages and policy environment.
- Positions Finland as a **leading European hub for sustainable digital infrastructure**, boosting its international competitiveness.

Data centers contribute positively to sustainability outcomes, but the sector has room to capitalise on its full sustainable business potential

Environmental Impact & Sustainability Opportunities

- **Data center industry** has **established voluntary sustainability standards** on key issues such as energy, climate and circular economy.
- Several global and domestic **operators with data centers in Finland have committed to net zero targets**.
- **Data centers generate circular economy opportunities for other sectors**. Resource-intensive **construction** and the significant amount of **electrical equipment** required in data centers can be turned into opportunities to reduce environmental impacts and optimize resource efficiency.
- **Reusing buildings and brownfield sites minimises emissions and land use change.**

Societal and Economic Value

- **Critical infrastructure** – Ensures continuity of essential national digital services and supports economic resilience.
- Finnish **rural and formerly industrial areas, as well as cities, attract data center** investments boosting local economies and connectivity.
- **Data center operators invest in good community relations** and inclusive planning, and concerns often ease once construction begins and local employment increases.

Energy and Heat as Strategic Assets

- **While data centers will increase electricity demand**, Finland's **planned** and potential renewable **capacity**—especially in onshore wind—**far exceeds projected needs**, ensuring ample power availability.
- **Heat recovery for communities** – Waste heat can supply Finland's district heating networks, providing low-carbon warmth to homes and businesses when the right conditions are met.
- **Catalyst for renewables** – Steady demand can unlock investment in large-scale renewable energy projects, especially onshore wind. Hyperscalers are **important participants in the PPA market.**
- **Grid support:** some data centers can help with electricity system stability by leveraging on-site batteries (UPS). If incentivised appropriately, data centers could develop demand response, including load shifting and other services that has a potential to enhance electricity system stability.

Regulatory Alignment & Market Recognition

- **Construction, ownership, and operation of data centers are recognized as activities that can generate sustainable (EU Taxonomy-aligned) revenue and capital expenditure**.
- The regulation is **incorporated into national accounting acts** across member states, including Finland, with a **limited number of data center companies** coming into scope **in 2025** and a broader application anticipated in 2028.
- Integrating these requirements into the planning and construction of new data centers would further facilitate alignment and help ensure that operations qualify as green revenue.

Market Study – Data Center Industry in Finland

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Market Study

1. Context for the study

Market Study – Data Center Industry in Finland

This report aims at creating an overview of data center market in Finland

Background

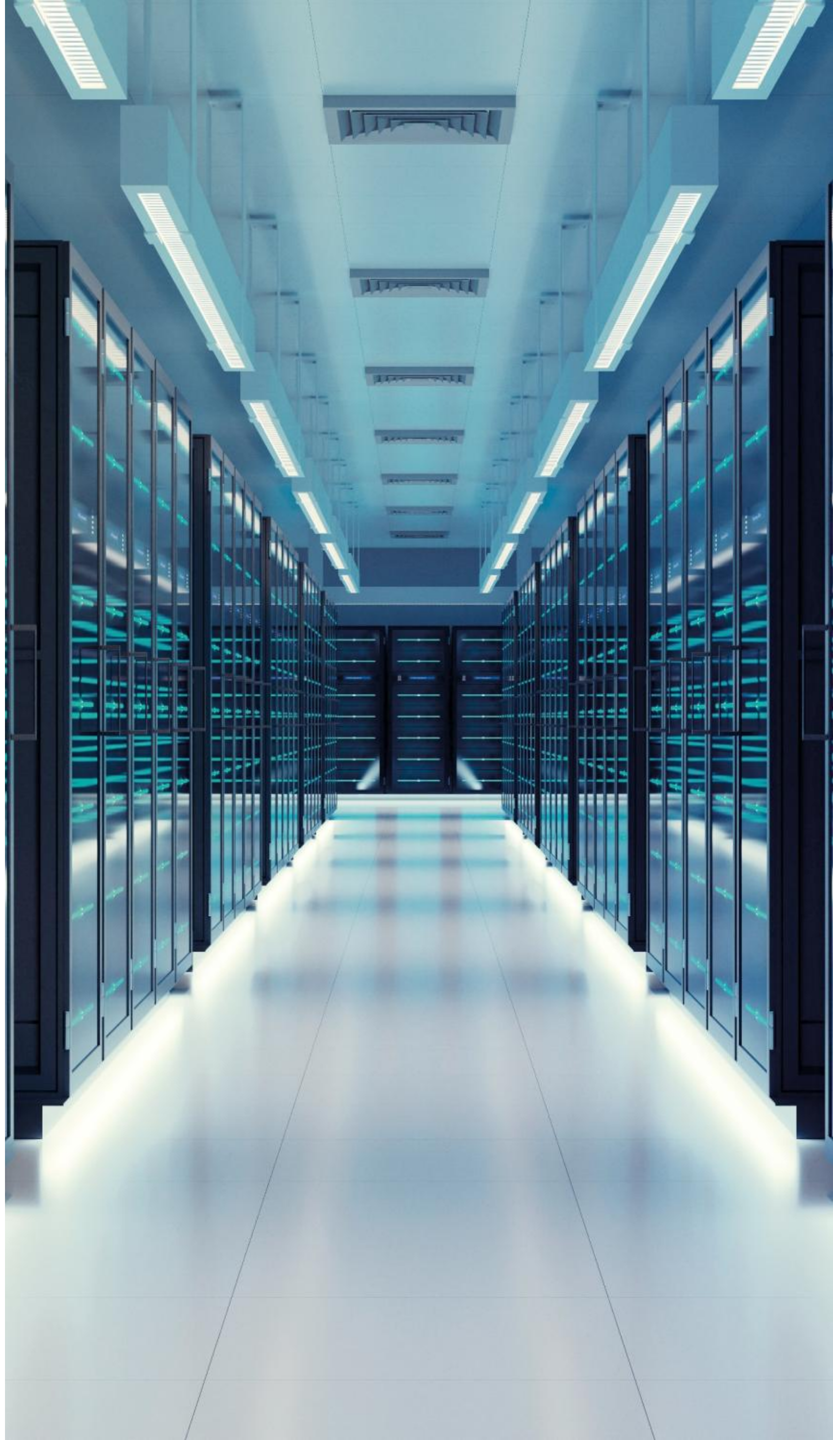
This report is part of a broader study commissioned by the Finnish Data Center Association to analyse the overall impacts of the data center industry in Finland. This part of the report focuses on the data center market outlook in Finland while the industry's economic, environmental and social effects, as well as its interdependence with the energy system are addressed in a separate publication.

Objectives

The main objective of this report is to create a fact-based overview of the current data center market situation in Finland as well as its future outlook.

This report covers:

- Most prominent current market, regulatory and technological trends
- Overview of current data center market situation in Finland
- Identified market uncertainties for data center market growth in Finland
- Future view of market based on final investment decisions and publicly known projects



The study is based on both quantitative and qualitative data from various sources

Methodology

Quantitative
- EK database for green transition industrial investments in Finland
- Market studies by other consultancies or industry organisations
- Market data collected by FDCA
- Media searches (e.g. YLE)
- Various data center databases for existing assets

Data used in market study

Qualitative
- Interviews Ramboll data center experts
- A total of 7 external interviews with market actors and interest groups
- Market studies by consultancies or industry organisations
- FDCA questionnaire to industry stakeholders
- Media searches (e.g. YLE)

Notes on methodology

- The study is based on various sources of qualitative and quantitative data sources.
- Quantitative data sources have been mainly used in estimating the current data center capacity and planned investments in Finland.
- Interviewed parties consist of data center market actors ranging from developers to providers of supporting services.
- Please find more detailed explanation of calculation methodology for current market capacity and future investments in the appendix.

2. Market trend overview

Market Study – Data Center Industry in Finland

Data center capacity is expected to grow driven by increased demand from generative AI and cloud services

Current market trends

AI driven demand
Generative AI requires exponentially more processing power and storage than traditional workloads. This is pushing demand for e.g. high-density server racks and enabling the rise of specialized GPU-first neocloud platform providers.

Sustainability in focus
As data centers become major energy consumers, operators are under pressure to cut carbon and water footprints. This is driving adoption of renewable energy, heat recovery systems, and innovative cooling solutions.

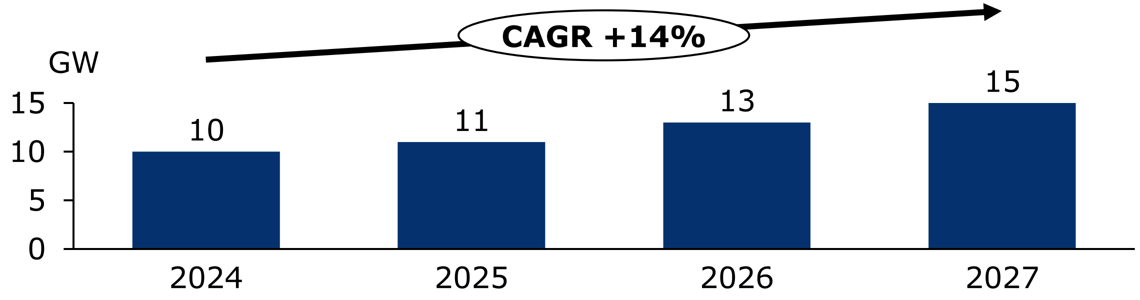
Increase in size
The average size of data centers is increasing considerably as computing power demands rise. Due to increasing demands for power, water and space, larger data centers can be expected to be located outside urban areas.

Change in market structure
Data center investment plans have increased considerably in the past few years. The increase is partly driven by players previously rare in the market such as real estate developers.

Customer demand

- Customer demand for data center services is expected to increase considerably in coming years driving an increase in capacity. The demand for data center capacity on EMEA level is expected to increase by 14% annually between 2024-2027[2]. Based on announced final investment decisions in Finland, Ramboll estimates local capacity to increase considerably faster, at the rate of ca. 50% annually until 2027.
- Generative AI is expected to drive demand while traditional use cases, such as file sharing and storage, will likely remain majority user of data center capacity in the short term due to wider usage of cloud services[1].
- Data centers are also on the agenda of the European Commission which has a target to triple the data center capacity in Europe within the next five to seven years due to the critical nature in EU based data centers[3].

EMEA data center capacity forecast, 2024-2027[2]



Note: EMEA denotes Europe, Middle-East and Africa. GPU stands for graphical processing unit.
Sources: [1]BCG, [2]JLL, [3]European Commission (AI Continent Action Plan), Ramboll analysis

Regulatory trends highlight energy efficiency, security and digitalization

Sustainability

- The **Energy Efficiency Directive** (EED) requires data center operators with over 500 kW of installed IT power to report data annually on EU level. Additionally, new or refurbished data centers over 1 MW of energy input must utilize waste heat or demonstrate that it is not technically or economically feasible to do so.[1]
- The EED encourages owners and operators to consider the **Code of Conduct on Data center Efficiency** (EU DC CoC), which is a voluntary initiative by the Joint Research Committee that encourages and guides operators to cost-effectively reduce energy consumption.[2]
- The planned **Water Resilience Strategy** aims to establish a path towards water security and resilience. Strategic sectors, including data centers must pay attention to water savings in the future.[3]

Security and Resilience

- The **European Union Cybersecurity Directive** (NIS2) requires companies providing essential services to bolster security. Organizations must maintain up-to-date cybersecurity risk management procedures, alongside obligations to report significant incidents.[4]
- The **Digital Operational Resilience Act** (DORA) requires disaster and recovery plans for the finance industry, ensuring that the data centers are robust and do not experience outages. This entails creating and testing continuity plans, conducting penetration tests, performing vulnerability scans and remediation, and reporting major incidents.[5]
- The **Critical Entities Resilience Directive** (CER) aims to strengthen the resilience of essential entities and infrastructure across Europe.[6]

Finland at the forefront AI

- The **Digital Decade Roadmap** and the **AI Continent Action Plan** emphasize European digital infrastructure, cybersecurity, and sustainability, driving investments and supporting digital transformation in Finnish data centers
- Finland has a competitive edge in reaching Europe's goals: several construction-ready sites, affordable energy and reliable grid, high data privacy and high-speed connectivity.[7]
- SMEs, innovation hubs, and domestic research will be key in creating expertise growth, increasing domestic knowledge and attracting international experts.[8,9]
- Finnish data centers can improve connectivity, and AI capabilities boosting innovation, economic growth, and competitiveness.[10,11,12]

Sources: [1]EU EED, [2] EU DC CoC, [3]Water Resilience Strategy, [4]Kyberturvallisuuskeskus, [5]DataCenter Knowledge, [6]Deloitte, [7]BusinessFinland, [8]Haaga-Helia, [9]FAIR, [10]Europe's Digital Decade, [11]Finland 2024 Digital Decade Country Report, [12]AI Continent Action Plan

Main technological trends include increasing hardware densities as power consumption needs grow

Hardware density

Hardware densities have been increasing, and will keep climbing to enable the performance required to accomodate the needs of today.

- As a result of increasing computational needs, the hardware densities in data centers have increased considerably.[1,2]
- Hardware density in data centers refers to the electrical power used in relation to floor space and number of servers. In essence, the higher the density of a data center, the more efficient it is.
- Higher densities are more efficient and make better use of available space. Still, higher density hardware is more prone to heating and requires more efficient cooling options.[1,2]

Direct-to-chip liquid cooling

As computing demands and hardware power density increases, traditional air-based cooling is not adequate for all workloads (e.g. AI & HPC). New data centers are opting for hybrid or closed-loop liquid cooling systems.

- Liquid cooling in closed circulation is water-efficient and more energy-efficient than air cooling, and offers cost savings, environmental sustainability and excellent scalability.[3,4]
- Liquid cooling also allows for more efficient heat recovery to be used in the district heating network.
- In addition to direct-to-chip liquid cooling, immersion cooling, where the hardware is submersed in water is emerging.[5]

Sector integration

Under certain conditions, data centers can be utilized in balancing the grid and supply excess heat to nearby district heating networks and industries.

- The high penetration of renewable energy in Finland can lead to greater frequency deviations in the electricity grid. Data centers that are designed to do so can play a key role in enhancing grid stability and resilience in the future.
- In cold climates energy efficiency improves as excess heat can be directed to the district heating network for reuse if a suitable offtaker is found. This can benefit the communities around data center and help local industries decarbonize.

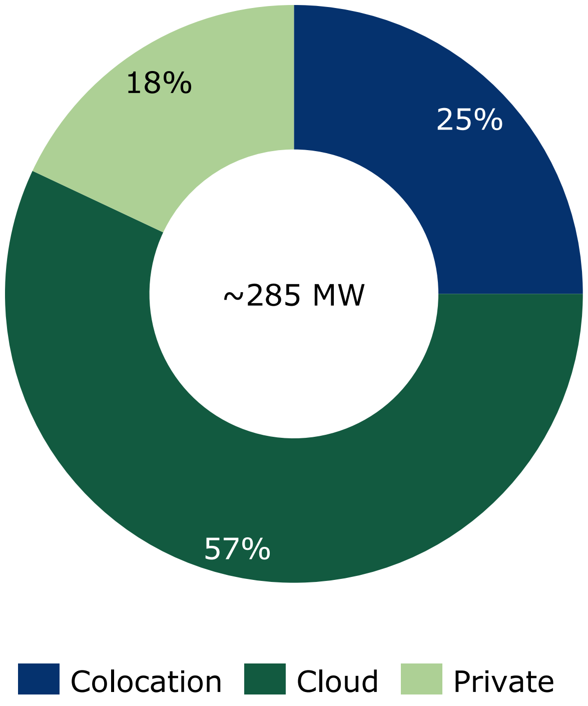
Sources: [1]Equinix, [2]TechTarget, [3]CBRE, [4]Forbes, [5]Forbes, Stakeholder interviews, FDCA questionnaire

3. Current data center market in Finland

Market Study – Data Center Industry
in Finland

Ca. 285MW of capacity has already been built in Finland mainly consisting of colocation and cloud data centers

Known data centers in Finland

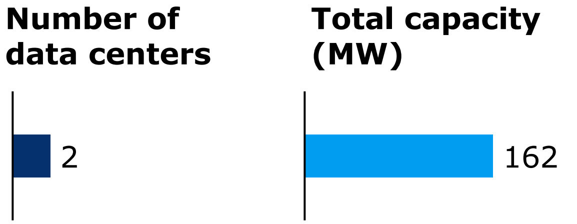


- Current data center capacity in Finland amounts to ca. 285MW. The majority of data centers in Finland are colocation and private centers but cloud data centers make up for the majority of total capacity as they are usually larger in size.
- Main players include mainly foreign players with some domestic exceptions in colocation data centers hosted by local telecom companies.

Data center statistics by segment

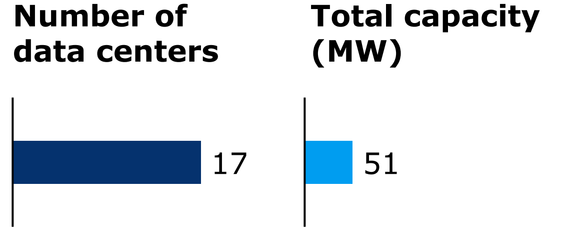
Cloud data centers

Larger data centers built by major cloud platform providers.



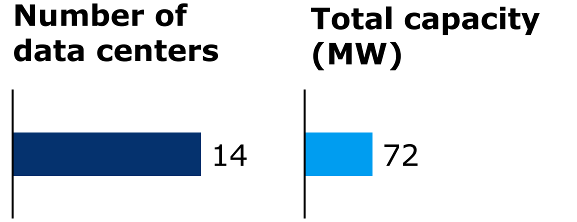
Private data centers

Facilities built by businesses for their own immediate IT needs.



Colocation data centers

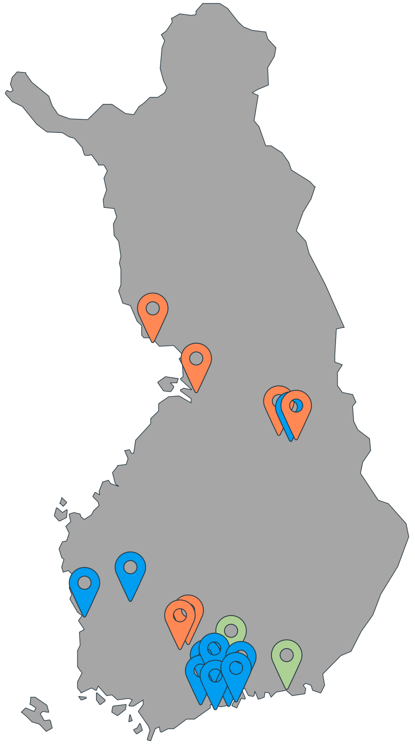
Data centers that rent out data center space.



Note: Only known data centers with capacity above 1MW are included. Per Datacenter Map, there were a total of 65 data centers in Finland during June 2025.
Source: EK, EUDCA, Ramboll analysis

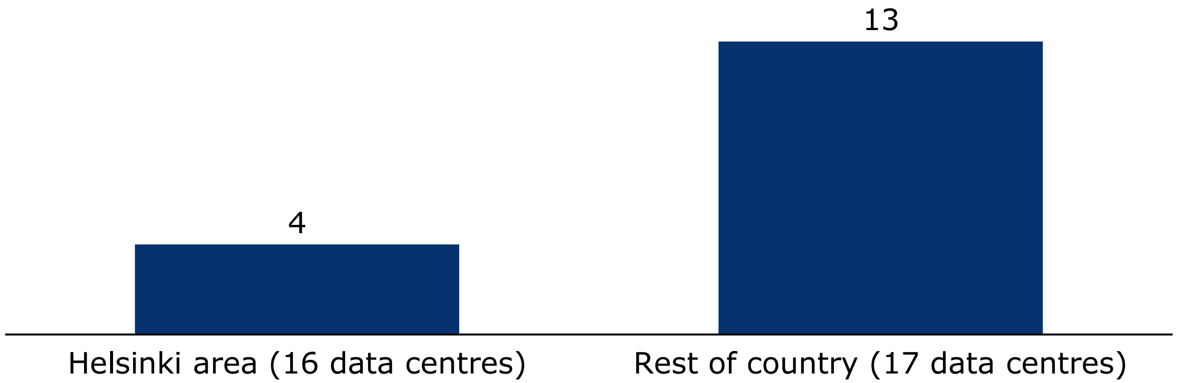
Helsinki area attracts smaller data centers with larger ones more prevalent in rest of country

Current data centers are located largely in Uusimaa



- So far, investments have been largely focused on the Uusimaa region with a cluster in the Helsinki area.
- The largest current centers include e.g. Google data center in Hamina, Verne colocation center in Helsinki and Nebius group data center in Mäntsälä.

Average size per data center, MW



- Around half of current data centers are located in the Helsinki area consisting of Helsinki, Vantaa and Espoo.
- On average, the data centers in the Helsinki region are smaller in size than the ones in the rest of the country. As data centers grow in size, space, transmission capacity and supply of water grow in importance increasing the attractiveness of locations in less densely populated parts of the country.

Note: Includes only known data centers with capacity above 1MW
Source: EK, Ramboll analysis

Finland’s reputation as a stable environment for investments is crucial

Traditionally reliable business landscape

Traditionally, Finland has been considered as a secure and transparent business environment, characterized by political stability, low corruption levels, and a robust legal system. The country offers a reliable and predictable operating environment for both domestic and international companies, with clear regulatory frameworks, consistent policymaking, and efficient public administration. Its legal system is robust, independent, and highly trusted, providing strong protection for property rights and ensuring fair enforcement of contracts.

Electricity tax

The datacenter industry has been subject to class 2 electricity tax (0,05c/kWh) in Finland (widely implemented for industry). The Finnish government has raised the issue of increasing the electricity tax for data centers, increasing operating costs. Per stakeholder interviews, the debate is already considered a negative signal by some investors even if the tax change would not be implemented. Data centers are long-term investments which require predictability in the investment environment. The proposal draft has received widespread resistance within the Finnish business sector.[1,2,3]

Debated economic benefits

As the electrification of industry is progressing and the capacity of the electricity grid is temporarily and locally limited, there is increasing concern about the electricity usage of industries against their benefits for the Finnish economy. Other concerns include data privacy and lack of employment opportunities. The concerns are subject to ongoing debate amongst experts in Finland.[4]

Attitudes in Europe

Finnish municipalities generally have a relatively positive mindset regarding data center investments.[5,6,7]

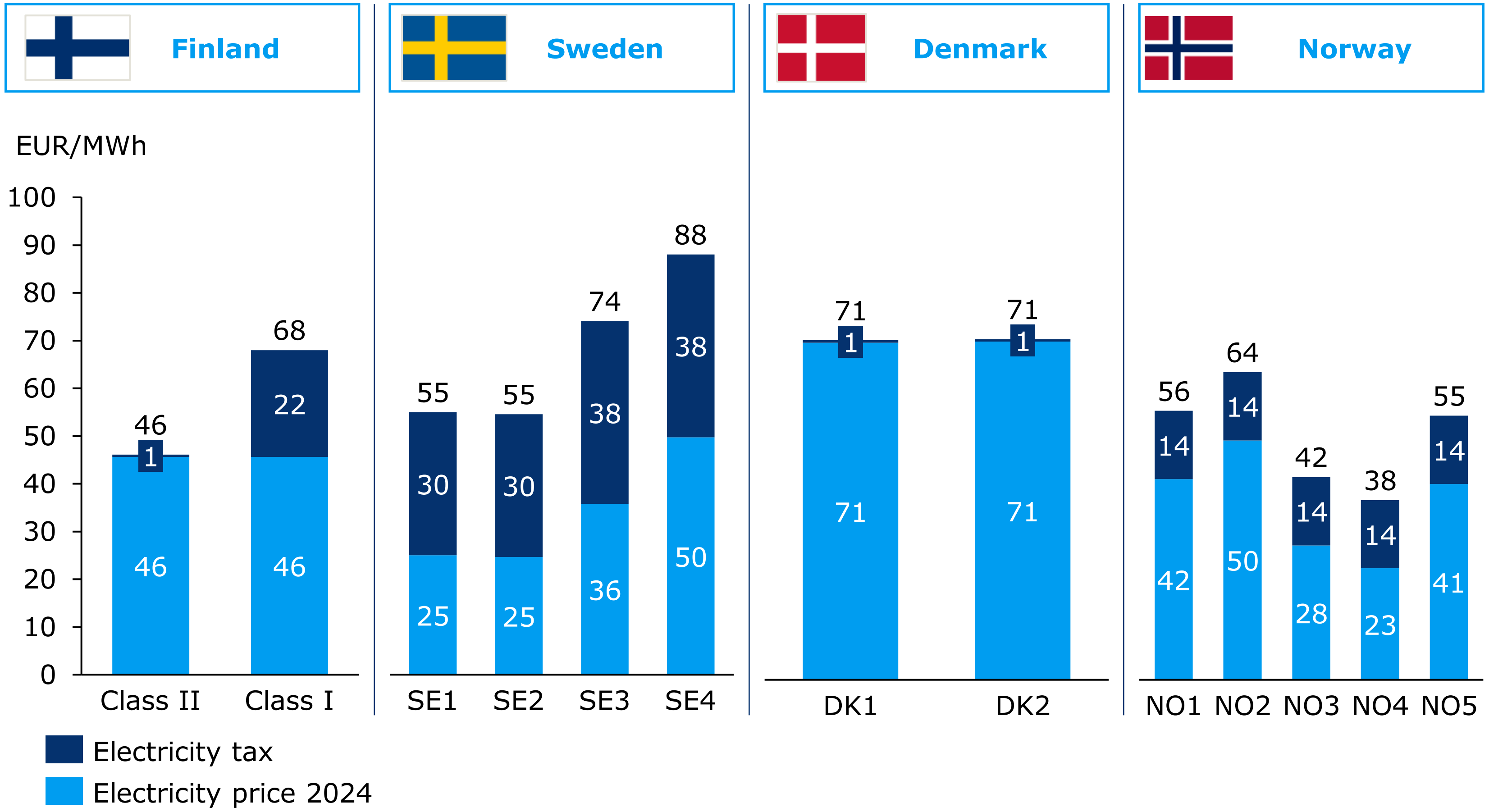
Amongst the general populace data centers have caused political debate and criticism across Europe. In Spain, “the data center has more power than the mayor”, and locals fear benefits are non-existent.[8] Elsewhere in Europe, Portugal’s prime minister resigned, the Netherland’s agricultural groups are fighting back, and there is backlash in drought-susceptible regions due to data centers.[9] A study showed that 51% of Europeans have a positive view on data centers.[10]

Sources: [1]Helsingin Sanomat, [2]Valtiovarainministeriö, [3]Lausuntopalvelu, [4]Helsingin Sanomat, [5]Yle, [6]Yle, [7]Yle, [8]Politico, [9]Raconteur, [10]Hosting Journalist, Stakeholder interviews, Ramboll analysis

4. Market uncertainties

Market Study – Data Center Industry in Finland

Electricity tax conventions vary between Nordic countries



Implications for the Finnish data center industry

- The current lower tax rate offers a competitive advantage for Finland relative to Nordic peers.
- Moving data centers to Class I in terms of electricity tax would increase operating costs of data centers in Finland and decrease attractiveness of Finland as a destination for data center investments.
- As some other Nordic countries have already abolished favourable tax treatment for data centers, an increase in electricity tax would likely not be a death blow for the industry in Finland but rather limit the volume of investments heading to Finland in favour of other competing countries.
- The European Commission has recommended member states to lower taxation levels on electricity for energy intensive industries in "The Clean Deal: Joint Roadmap for Competitiveness and Decarbonisation".

Note: Based on average electricity spot price in 2024 and June 2025 energy tax levels. Does not include transmission costs or other fees than energy tax. Summer energy tax rate (April-September) assumed for Norway. Discounted energy tax assumed in SE1 and SE2.
Source: VM, Skatteverket, Skat, SDIA, Skatteetaten, European Commission, energy-charts.info, Ramboll analysis

Transmission grid capacity may pose local, temporary delays to investments

Market challenges - Electricity

Grid Capacity

- Despite Finland having one of the strongest transmission grids in Europe, transmission capacity may pose local challenges to data center investments in areas with existing high demand relative to supply for electricity. Fingrid has already imposed temporary restricitions on new connections for large electricity users (>10MW) in areas around Helsinki, Turku and Tampere until 2027.
- Per Fingrid, the issues are local. Western, Northern and Eastern Finland have plenty of spare capacity for new investments.
- Fingrid has establised committees enabling dialogue addressing grid congestion between the TSO and its customers.
- Fingrid has emphasized that grid investments are underway in affected areas which will alleviate the congestion.

Electricity Price

- An increase in the usage of electricity is often argued to increase electricity prices in Finland as demand exceeds supply.
- The situation is more complex. Growing electricity consumption is increasing demand in the electricity market and accelerating investment in electricity generation, which are balancing the market. There are significantly more renewable energy generation capacity ready to be built than there are data center plans.

Implications for the Finnish data center industry

- Grid congestion issues may pose temporary and local delays to investments, limiting the potential of certain areas for investment purposes until congestion issues are solved. Investors may navigate the challenge by placing data centers in areas with spare grid capacity for new investments.

 Source: Fingrid, Ramboll analysis

Labour shortage may slow down data center investments

Shortage of employees

Global labour shortage

- Data center investments are booming across Europe and the rest of the world leading to a shortage of talent as the demand for professionals exceeds the supply.
- In a 2023 survey from the Uptime Institute, 58% of data center actors stated that they have had issues with finding qualified candidates for open jobs and 55% stated issues with retaining current staff.[1]
- The shortage of qualified employees across Europe has led to competition and poaching of talent. Difficulty in retaining talent creates further uncertainty for data center projects.

Potential for a labour shortage in Finland

- While Finland does posess know-how in building, desiging and operating data centers the current volume of planned investments is likely to exceed the capacity of qualified employees in the data center industry in Finland.
- The shortages in Finland can be expected to mainly impact larger investments in areas outside major growth centers where attracting and retaining educated talent is likely more challenging.
- Historically, Finland has been considered lagging behind many peer countries in its efforts to attract foreign talent.[2]

Implications for the Finnish data center industry

- Labour shortages may pose challenges to executing data center investments.
- The issues may be expected to mainly impact data center projects located in areas outside major growth centers. It may prove challenging to attract and retain talent in these areas.
- The severity of the labour shortage may be mitigated by focusing on training and education domestically.

Source: [1]Uptime Institute, [2]YLE Stakeholder interviews

5. Future view of the market

Market Study – Data Center Industry
in Finland

Finland is an interesting destination for data centers due to advantages in energy, climate and infrastructure

Clean affordable energy

- One of the main advantages of Finland in attracting data center investments is clean and affordable electricity.
- 56% of electricity in Finland was produced using renewable generation methods and up to 95% can be considered CO_2-neutral[1], providing an advantage amongst concerns for the climate impact of data processing.
- Finland features the third lowest average price for electricity in Europe in terms of average wholesale price. Electricity prices are an important factor in the investment decision due to their significance in operating expenses.

Climate

- Finland features a suitable climate for data centers and an abundance of clean water.
- The cool climate of Finland is beneficial for data centers as the cool air can be used for cooling down thereby decreasing cooling costs.
- Data centers using open-loop liquid cooling use a considerable amount of water in cooling which may cause issues in areas suffering from water scarcity. Finland features an abundance of clean water which could be used in data centers. Water demands may be decreased through the use of closed-loop liquid cooling which uses considerably less water.

Infrastructure

- The Finnish electricity transmission grid is strong in a European context. A stable transmission grid is paramount to data centers in enabling steady delivery of energy to keep servers running.
- Data centers produce considerable amounts of waste heat. In Finland, the waste heat can be used in district heating which improves the energy efficiency of data centers if a suitable offtaker is found.

Finland offers multiple strategic advantages for data center investments

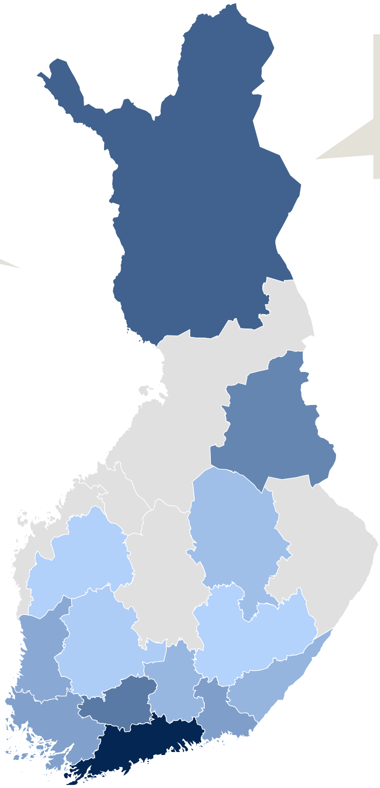
[1]Includes renewables, nuclear and biomass. Climate impact of biomass is reported in LULUCF, not electricity production.
Source: Energiateollisuus, Business Finland, Ramboll analysis

Data center investment plans are distributed across the country – areas outside growth centers offer opportunities

Publicly announced planned investments by region, MW

Besides Helsinki, clusters seem to forming around e.g. Kouvola and Kajaani.

While Uusimaa features the highest level of investment plans, only ca. 270MW of capacity is planned in the area consisting of Helsinki, Espoo and Vantaa



The high planned investment capacity in Lapland is mainly due to one large project.

In contrast to existing data centers, future investment plans are widely spread across Finland. As data centers grow in size, factors such as space, access to water and transmission capacity increase in importance.

Estimated capacity of publicly announced planned investments, MW

1 — 880

Abandoned industrial sites offer interesting opportunities for data centers

- While historically data centers investments have focused on the Helsinki region, this can be expected to change for larger data centers. As the size of the data centers grows, the need for high transmission capacity as well as an abundance of water and space increases which may be challenging to secure close to urban centers.
- Abandoned industrial sites, such as old paper mills, may offer interesting possibilities. These sites often already feature strong transmission connections, location close to a water source and plenty of space as they are important for traditional industries as well.
- As an example of reutilisation of old industrial sites, the Google data center in Hamina is located in the area of an old paper mill.

Note: Includes only announced data center investment plans with capacity above 1MW
Source: EK, YLE, Ramboll analysis

Projects driven by asset owners are further on in the development pipeline and considered likelier to materialize

Data center investors

Asset owners

- Asset owners, such as hyperscalers, construct data centers for their own needs.
- In general, known plans by asset owners are likelier to proceed faster to final investment decision as there is less need to align with stakeholders such as lessees. Projects where companies are building for the sake of their own purposes can be considered most likely to reach completion.

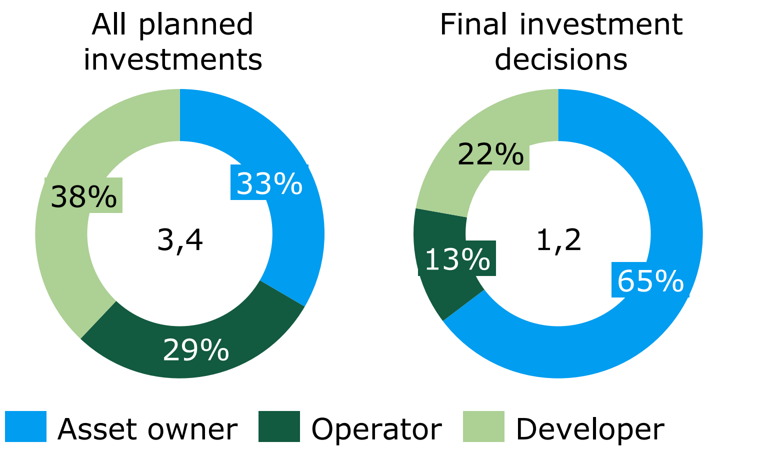
Operators

- Operators, such as colocation providers, develop data centers with the intention of running and managing the data centers by leasing the capacity to external customers.
- The customer pool may consist of only one large lessee or multiple.
- Operators may be experienced players within the data center field, but final investment decisions are dependent on finding end users for the data center which causes a degree of uncertainty in investment plans.

Development companies

- Development companies generally seek to sell the data center project after a certain point in development has been reached.
- Generally, investment plans driven by investment and development companies can be expected to take longer and are more uncertain to materialize as reaching final investment decision requires the developer to align with external stakeholders such as the final customer. In addition, some developers may have limited experience of data center investments.

Share of known planned investments by investor type, GW

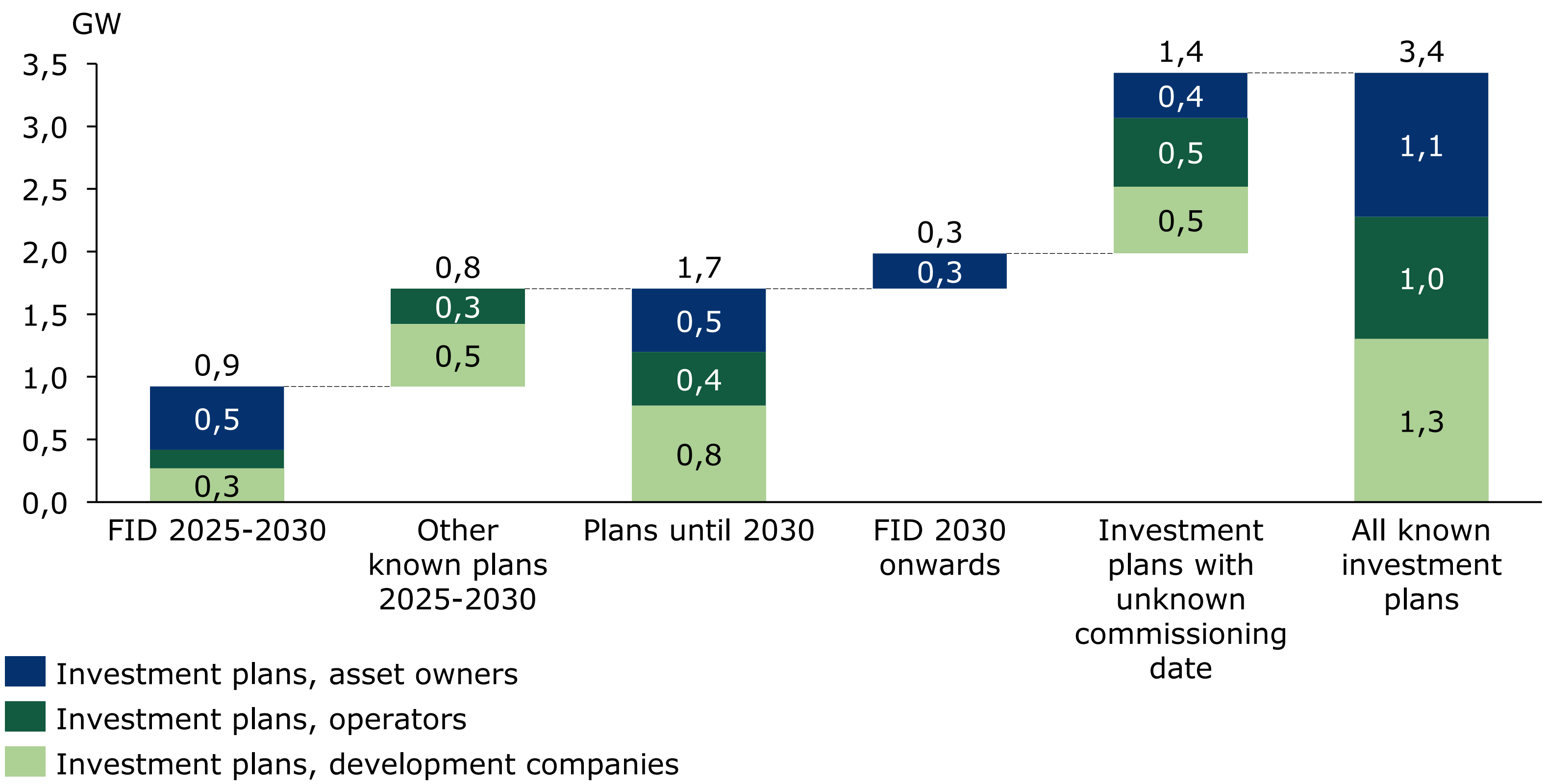


- Projects developed by asset owners are generally much further on in the development pipeline. In terms of announced investment decisions, ca. 65% of the projects are driven by asset owners.
- Considering all announced data center investment plans in Finland, the majority of plans are driven by operators and developers. The completion of these investments is uncertain as they may not have end users readily available.

Note: Includes only announced data center investment plans with capacity above 1MW
Source: EK, YLE, Ramboll analysis

Total investment plans amount to an estimated 3,4 GW but all plans are unlikely to materialize

Publicly announced data center investment plans in Finland



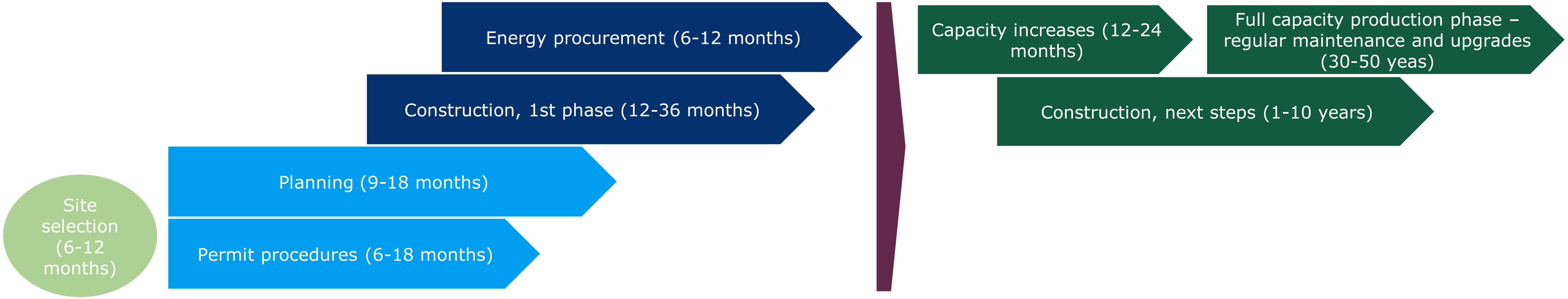
Long-term view

- There are currently an estimated 3,4 GW of announced plans for investment by data center investors across Finland of which 1,7 GW have expected commission date by 2030.
- Final investment decisions amount to 1,2 GW of which 0,9 GW are expected to be commissioned before 2030.
- Many of the announced projects are in very early stages and with differences in the the prerequisities for success. The figures should not be interpreted as forecast but as an indication of total amount of announced investment plans.
- The planned data centres vary considerably in size. For example, the two largest projects account for nearly 1GW of capacity indicating that cancellations of individual projects may impact the overall picture significantly.
- It should also be noted that Finland is not the only potential destination for the investment and they may materialize elsewhere.
- In addition, a total of 13 projects had publicly discosed neither investment size or capacity and have not been included in the estimation.

Note: Where complete data on capacity and investment size are unavailable, investment size and capacity has been estimated using an assumption of 10M€ investment per MW. Investment amounts exclude servers and other ICT-equipment. No ramp-up considered for FID projects. Includes known data centers and plans for investment above 1MW.
Source: EK, YLE, Stakeholder interviews, Ramboll analysis

Data center project life cycles are long spanning over multiple years

Illustrative timeline for a data center construction project



The underlying complexities of data centers stretches the development and construction timelines over multiple years. In addition, larger investments are usually constructed in phases which may span over even longer periods of time

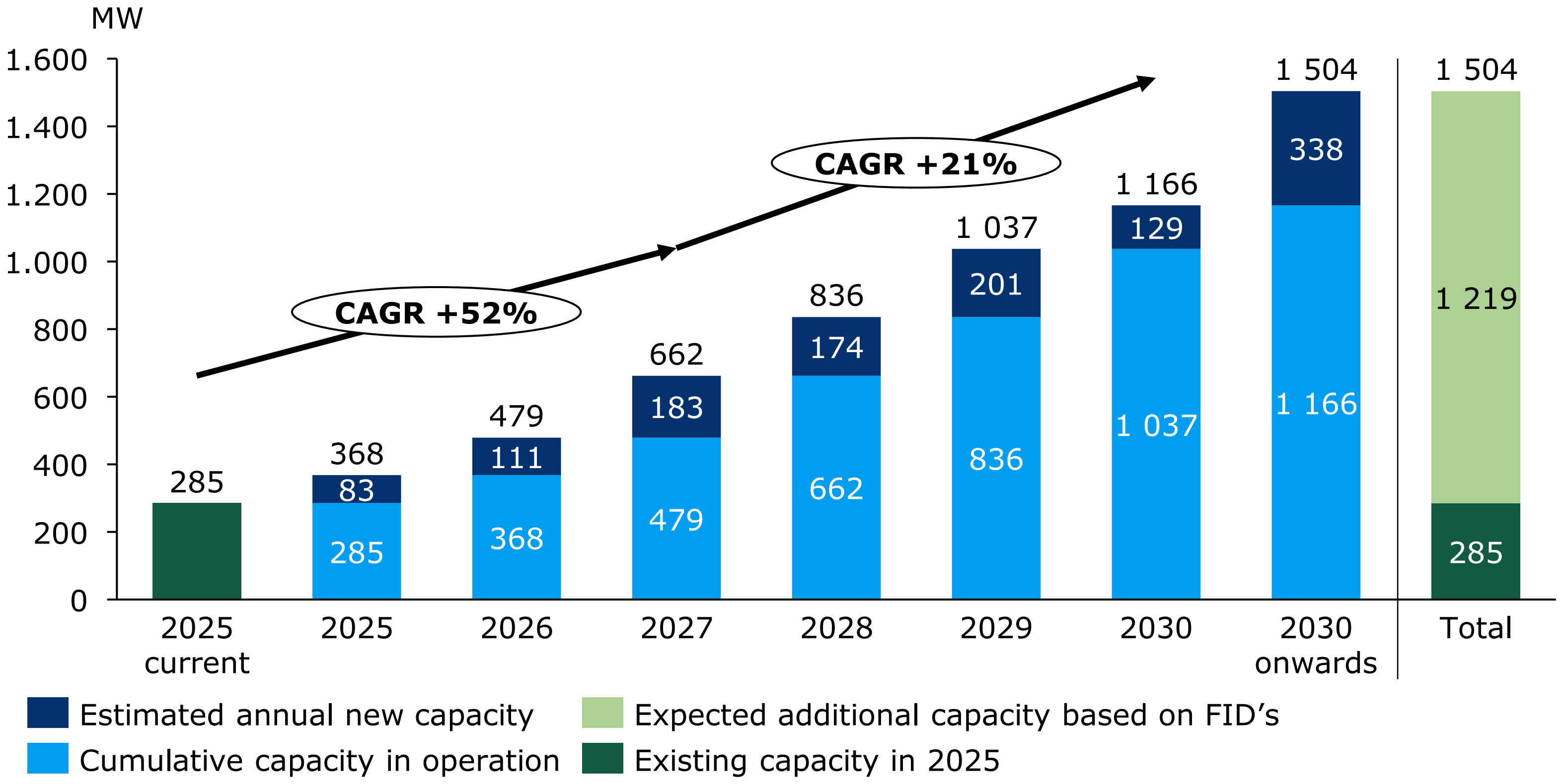
Site selection – Evaluating power availability, connectivity, local regulations and environmental stability
Permitting – Regulatory clearances, zoning permissions and utility connection approvals
Design – Architectural, mechanical, electrical and sustainability planning
Construction – Building the core structure, installing HVAC and electrical systems, and rack and cooling deployment

Energy procurement – Negotiating PPAs, securing grid connection and installing backup energy systems
Production ramp-up – Full capacity is usually not available right away for projects of larger scale. For these data centres, capacity is instead ramped up over an extended period.

Source: FDCA, Accutech Communications

Capacity in operation is set for strong growth based on announced final investment decisions

Growth estimation of data center capacity in operation based on announced final investment decisions in Finland



Short-term view

- Data center capacity in operation in Finland is expected to grow to 1,2GW by 2030 based on announced final investment decisions by data center investors. The plans indicate a compound annual growth rate of ca. 52% until 2027.
- A compound annual growth rate of 21% is expected between 2027-2030 but as the data center industry is constantly evolving, the volume of final investment decisions likely turn out higher in the latter years as new investments are announced.
- Investments are assumed to reach full capacity through a two-year gradual ramp-up period from commission. Actual data on the phasing on project basis for the currently planned data centers is limited and may vary according to the size of the investment.
- Besides phasing, construction and permitting timelines may impact start of operations.

Note: Includes known data centers and plans for investment above 1MW. CAGR between current situation and 2027 has been calculated assuming a two year period. Current data center capacity is assumed to be in operation.
Source: EK, Yle, Stakeholder interviews, Ramboll analysis

6. Appendix – Market Study

Market Study – Data Center Industry in Finland

The investment plan figures are based on publicly announced data center investment plans in Finland

Methodology

List of publicly known data center planned investments in Finland

EK database for green investments in Finland

+

Media searches on projects not included in the database (e.g. YLE)

List of all publicly known data center investment plans in Finland

Total investment capacity of publicly known planned data center investments in Finland

Capacities and investment cost figures from public sources

+

Assumption of 10M€ investment per MW for projects with annouced investment cost but no capacity. Projects with neither announced planned capacity nor investment cost have been omitted from analysis

Total planned capacity in Finland based on publicly known investment plans

Commentary

- The investment views presented in the report are based on publicly known data center investment projects in Finland.
- Crypto- and bitcoin mining data centers have been excluded from the scope of the study.
- As planned capacity has not been made available for all investments, an assumption of investment cost of 10M€ per MW has been applied. The assumption is based on discussions with market actors and data center experts in Finland and Europe. The amount excludes servers and other ICT-equipment.
- The analysis does not take a stand on the credibility of the investment plans and the final figures include plans with varying prerequisites for success.
- The data has been collected from sources such as EK and news sources such as YLE.
- Collected data has in part been validated through interviews and with FDCA data on data center investments.

List of known data centers in Finland

Owner	Type	Location
Vatajankoski Oy	Colocation	Kankaanpää
Google	Cloud	Hamina
Verne	Colocation	Vantaa
Nebius group (formerly Yandex)	Cloud	Mäntsälä
Telia	Colocation	Helsinki
Hetzner	Colocation	Tuusula
Verne	Colocation	Pori
Elisa	Colocation	Espoo
CSC	Private	Kajaani
Atnorth	Colocation	Helsinki
Atnorth	Colocation	Espoo
Equinix	Colocation	Helsinki
Mediam	Colocation	Helsinki
Equinix	Colocation	Helsinki
Datalahti	Colocation	Vantaa
Digita	Colocation	Helsinki

Owner	Type	Location
Borealis	Colocation	Kajaani
Nokia	Private	Multiple
TietoEVRY	Private	Espoo
CGI	Private	Helsinki
Fujitsu	Private	Helsinki
Enfo	Private	n/a
Tietokeskus	Private	n/a
DNA	Private	Multiple
KELA	Private	Multiple
Valtori	Private	Multiple
Erillisverkot	Private	Multiple
HUS	Private	Helsinki
TYKS	Private	Turku
TAYS	Private	Tampere
KYS	Private	Kuopio
OYS	Private	Oulu
Bilt Tek	Private	Kemi

Note: Includes only known data centers with capacity above 1MW. Crypto- and bitcoin mining data centers have been excluded from the scope of the study

Economic, Environmental, Social and Energy Market Impacts of the Data Center Industry in Finland

Final report
12.9.2025

Table of Contents - Impact Assessment Report

7. Introduction

Background and objectives

Background

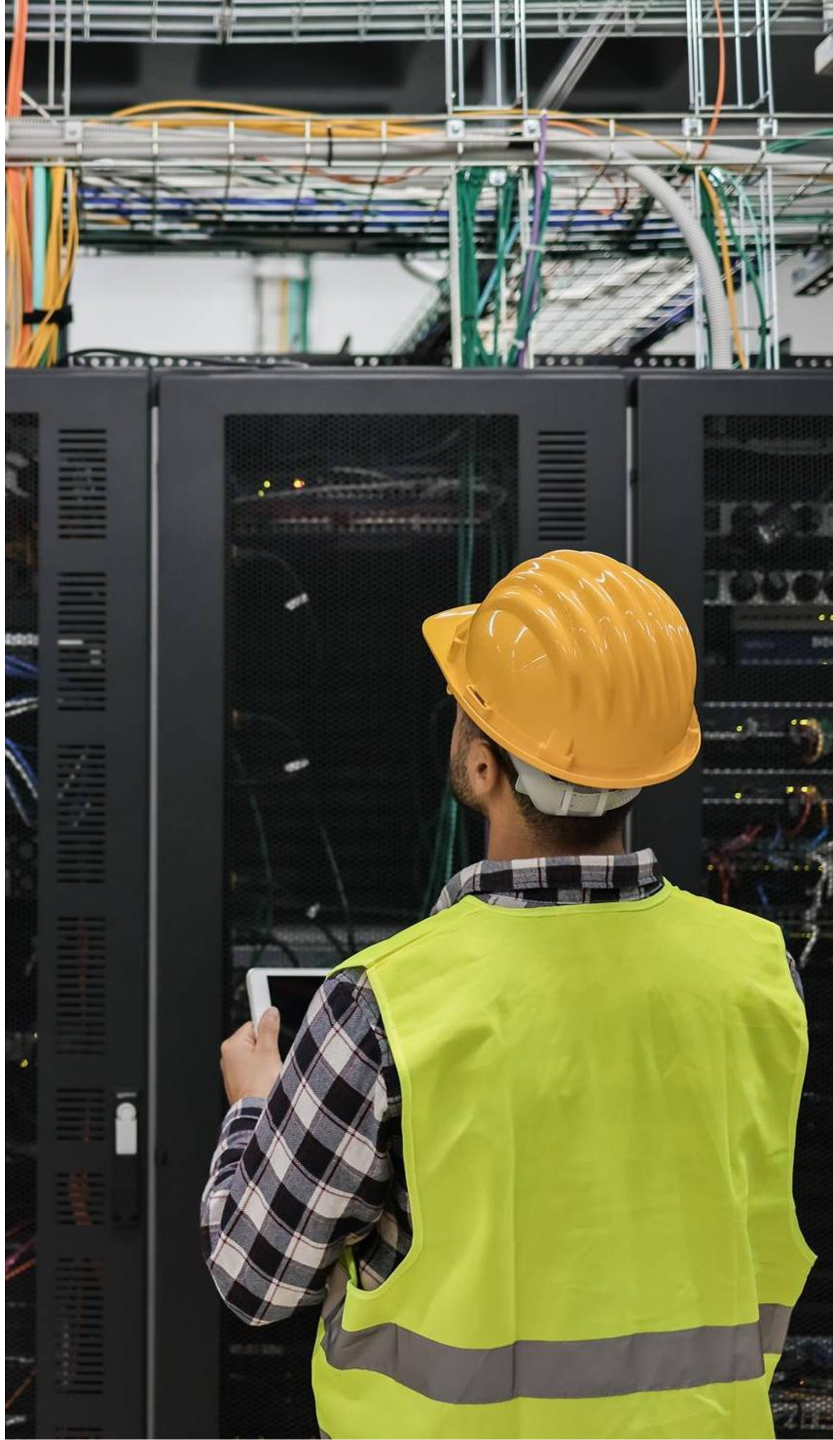
This report forms part of a comprehensive study commissioned by the Finnish Data Center Association to evaluate the overall impacts of the data center industry in Finland. This section concentrates on the industry's economic, environmental, and social effects, as well as its connections with the energy system.

Objectives

The primary aim is to assess the economic impacts of the Finnish data center industry and compare these findings with results from prior studies.

The report begins with a review of existing economic impact assessments and advances to a modelling-based analysis employing a resource flow framework to capture both direct and indirect (multiplicative) effects, including those along the supply chain.

The economic analysis focuses on the construction and operational phases of the data center lifecycle and extends temporal market analysis up to 2030. Beyond economic impacts, the report also emphasises key relationships with energy markets, environmental factors, and social outcomes, providing a holistic view of the industry's national importance



8. Economic impact analysis

Methods

Literature review

Direct impacts

Multiplicative impacts

Generalisation over the market trend

The assessment concentrates on an in-depth economic impact analysis of Finland's data center industry

Data center industry covers three different business segments: colocation, cloud and private. Main differences of these segments are presented in figure 1.

CAPEX and OPEX estimates of a typical data center in the segment provide the basis for economic impact modelling by Ramboll’s resource flow model. As this assessment focuses on the impacts of the data center infrastructure, investments into ICT-technology, specifically servers, are excluded from the scope.

Outcomes of the impact model provide inputs for generalising results over the industry in its current situation and in the future. Generalisation is made on the basis of megawatts in each segment.

To simplify data-collection, CAPEX and OPEX estimations of colocation segment are used as a basis to model construction phase. CAPEX and OPEX estimations of colocation and cloud segment are used as a basis for operation phase modelling.

The methods for impact modelling and generalisation are presented in detail in next slides.

Data center industry

Colocation

- Companies rent space within a colocation facility, providing their own servers and equipment.
- The facility provides services such as power, cooling, and security.

Cloud

- Operated by cloud service providers and offer computing resources, storage, and other services over the internet.
- The end users do not own the physical infrastructure.

Private

- Owned and operated by a single company for its own internal use.
- Are typically located on-site, within the company's premises.

Figure 1: Three segments of the data center industry

Ramboll's resource flow model is used to assess the key economic impacts and resource movements of an investment.

The resource flow model was developed by Ramboll Finland and the Natural Resources Institute Finland (Luke) for SITRA (The Finnish Innovation Fund) between 2013–2015. It is a regionalised, environmentally extended input–output (EEIO) model that maps the flow of monetary and material resources across regional production, inter-sectoral intermediate consumption, private and public consumption, and exports.

The model is rooted in input–output analysis, pioneered by Nobel laureate Wassily Leontief. This is a recognised tool for assessing the economic impacts of investments, policy measures, and tax reforms.

The resource flow model has been applied and validated in multiple projects and published in peer-reviewed literature. Ramboll regularly updates the model with the latest statistical datasets (e.g., Association of Finnish Municipalities, Statistics Finland, Finnish Customs, Tax Administration, 2024) to ensure accuracy.

The model provides a comprehensive overview of resource movements during both construction and operational phases of a project. It identifies the relative importance of different industries and stakeholders in the region, capturing:

- Direct and indirect effects through production and supply chains
- Multiplicative effects from inter-industry purchases and wage-induced consumption
- Full ripple effects across the value chain

Multiplicative effects occur when a company sources products and services from other firms to create its output. Those firms need inputs from additional companies, forming a network of interdependencies. Companies also distribute wages to employees, which re-enter the economy through consumption, triggering further cycles of demand and continuing the chain of economic impacts (see figure 2)

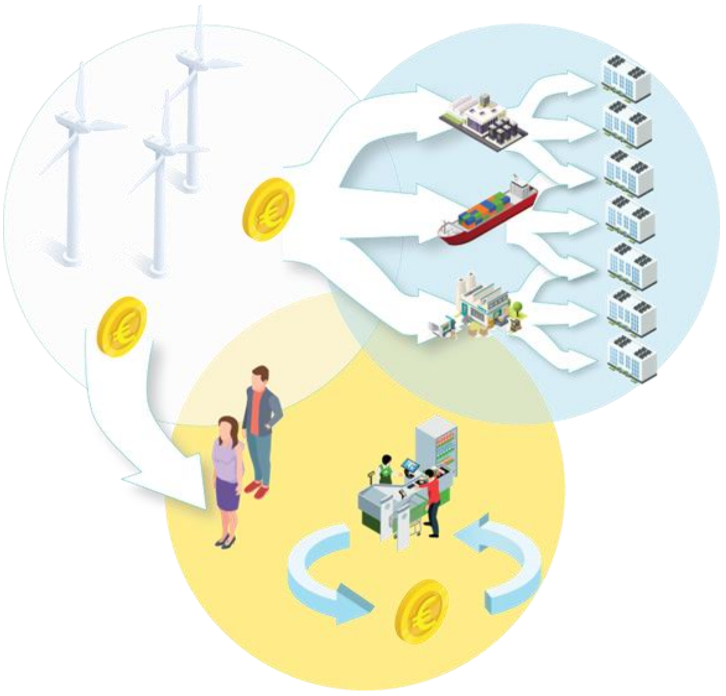


Figure 2: Descriptive image of multiplicative impacts from production and consumption. Purchases throughout the value chain generate additional demand for products and services.

The resource flow modelling can include multiple scenarios, allowing for the comparison of multiple projections.

The modelling process comprises two key stages: first, an analysis of the current state is performed, followed by scenario modelling that accounts for shifts in the economy and demand.

- Current state analysis – measures both the direct and indirect economic contributions of regional organisations, including metrics such as turnover, value added, employment, wages, investments, and tax revenues.
- Scenario analysis – evaluates economic and demand changes using the same set of indicators. The differences between the current and scenario results highlight the scale of change and can be further applied to variables like GDP impact.

Following this, the economic effects of the assessed scenarios are compared using selected indicators. This enables comparing outcomes between the current state and scenario projections to determine the magnitude of anticipated changes (Figure 3).

By integrating production, services, and consumption flows, the resource flow model effectively represents the full network of interconnections among industries and companies, providing solid evidence for regional economic impact evaluations.

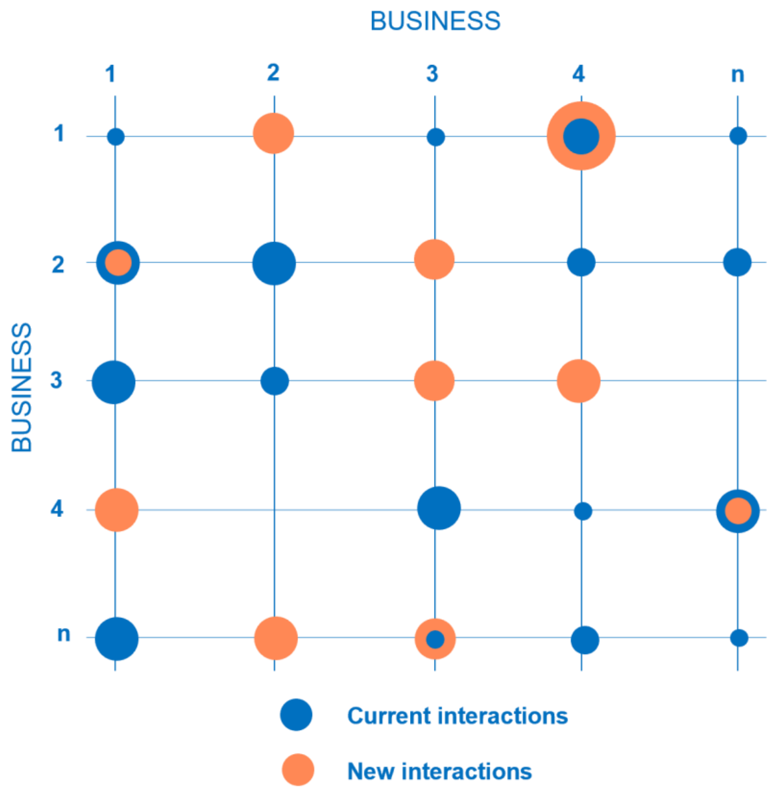


Figure 3: Basic element of the Resource Flow Model, where an empty node represents: no interaction between sectors. The size of the ball represents the magnitude of the interaction.

For generalising results of the economic impact analysis, industry’s market development was modelled based on the published investments

The economic impact analysis relies on Ramboll’s CAPEX and OPEX estimations for a 100MW data center in colocation segment and for a 100MW data center in cloud segment.

A simplifying assumption is that construction phase CAPEX and OPEX estimates of colocation segment also apply to cloud and private segments and that cloud segment’s CAPEX and estimates of operation phase apply to private segment’s operation phase.

The anticipated market development is modelled using published data center investments alongside Ramboll's projections for the period 2025 to 2030, as outlined in the Market Analysis report. This projection incorporates actual megawatt capacities for 2025 and forecasted capacities for 2030. The figures are taken from the Market Analysis –section of this report and are based on publicly announced investment decisions.

The overall market generalisation is derived by extrapolating from individual investments. This approach involves dividing the calculated economic impacts for a 100MW data center by capacity (MW) and then scaling the results to correspond with the megawatt values projected for 2025 and 2030. The comprehensive market evaluation addresses direct effects such as employment and turnover, as well as multiplier effects including output, gross value added, tax revenues, and employment.

Used extrapolation technique was chosen for its straightforwardness and aligns with common practice in reviewed studies that present economic impacts on a per-megawatt basis. A limitation of this method lies in the assumption that the analysed relationships, such as the employee-to-MW ratio, remain stable over time and scale. These relationships may, however, change due to e.g. learning and technological advancements.

Data center market development by segment

Segment	Total capacity in 2025 (MW)	Additional capacity by 2030 (MW)
Cloud segment Larger data centers built by major cloud platform providers such as the FAANG companies.	162	527
Colocation segment Data centers that rent out data center space.	71	260
Private segment Facilities built by businesses for their own immediate IT needs.	51	93
Total market development Total capacity of facilities in all assessed segments.	285	880

Note: Crypto- and bitcoin-mining data centers (estimated 30–40 MW in Finland) are not included in this modelling. Their economic and employment impacts are outside the scope of this study.

Uncertainties in data acquisition influence the scope and assumptions of the assessment.

The modelling makes some assumptions and generalisations. Data centers differ in design, size, and operations, so the results show a typical case, not a specific one. Domestic content and supply chain setups vary, so the modelling uses average estimates based on available data.

The evaluation relies on Ramboll's CAPEX and OPEX projections for 100MW colocation and cloud data centers. Data centers in private segment are assumed to follow the same investment patterns as cloud data centers. Since cloud investment levels are in turn considered equivalent to colocation investments, this approach enables a consistent comparison across all operator types. The only exception is the operational phase of cloud operators, which differs from colocation due to scale and business model.

It is important to note that this assessment does not include ICT equipment. In the input–output modelling, a domestic content share of approximately 40% has been applied for CAPEX (excluding servers), while OPEX has a considerably higher domestic share of 70–80%. This share is expected to increase in the future, further strengthening the overall economic impacts of data centers.

This study focuses specifically on the impacts of data center infrastructure, excluding investments into ICT technology. This exclusion allows comparability between colocation, cloud, and private operators, while keeping the scope limited to physical infrastructure.

Some data center operators were involved in modelling investment expenditures. However, obtaining accurate baseline data proved challenging, as many operators consider such information partially confidential, and gathering it is both time-consuming and complex. Furthermore, the sector's relative youth means that reliable statistical data remains limited. Due to these data collection challenges a simplifying assumptions were made as described previously.

The analysis concentrates on Finland's national-level direct and multiplicative effects, covering indirect and induced impacts across both construction and operational phases. Key metrics include output, gross value added, employment, and tax contributions. Results for construction phase describe the phase as a whole and not dependent on the construction time whereas results for operation phase are annual results. While construction phase impacts are higher in monetary or employment terms, operation phase impacts represent continuity, and are therefore important. However, input–output models are static by nature and do not capture dynamic changes in the rapidly evolving data center sector.

It is also important to note that Ramboll's model captures indirect effects across several stages of the value chain. It is possible that that some input–output models account for only a single stage. In our approach, only employees on company payroll are classified as direct effects, while all other employment impacts are treated as indirect effects. These methodological differences may explain why the indirect effects multiplier may appear higher than in some other studies, while still remaining consistent with many benchmarks.

Key definitions

Direct impacts
The direct impacts were assessed mainly for the operational period, where the impacts result from the immediate activities of data centers. These include turnover from the data center sales, employment, gross value added as well as taxes and tax-like payments resulting from the activities, including taxes withheld from employee wages and other tax-related charges.

Multiplicative impacts from production
The production multiplicative impacts are impacts on other industries that result from the project development, construction and operation of a data center. In practice, this means that to establish and maintain data centers, goods, services, and raw materials are required in the upstream value chain, creating new demand for other industries.

Multiplicative impacts from consumption
The consumption multiplicative impacts describe the new consumption arising from increased wage compensation as new economic activity is required to satisfy it.

Full-time equivalent
In the assessment, employment refers to gross employment, which is measured in full-time equivalents (FTE). This means that, for example, two half-time workers or two workers employed for half-year are counted as one full person-year. Full-time equivalents can be further calculated to obtain average employment (number of jobs) by dividing number of FTEs with the duration of the life cycle phase under consideration. In the assessment, FTEs are referred as both as cumulative number of FTEs accumulated during lifecycle phases and as yearly averages by lifecycle phase. The assessment does not take a stance on whether the labour demand (employment) is met to what extent by existing jobs and to what extent by new jobs.

Value added
Value added refers to the value created by a unit participating in production. In market production, it is calculated by subtracting the intermediate inputs (goods and services) used in production from the unit's output. In non-market production, it is calculated by summing up compensation of employees, consumption of fixed capital and any production and import taxes. Value added represents the portion of a company's production on which value-added tax is paid.

Output
Output represents the monetary value that businesses in the examined area have received from selling their products or services. In national accounting, the total value of production is referred to as output or while in business accounting, the equivalent term is revenue or turnover. For clarity, this report will also use both the term revenue and turnover to refer to output.

Taxes
1. Taxes on products and production, which are paid to the state
2. Municipal tax, which is paid to the municipalities where the employees reside
3. Value added tax, which is paid to the state
4. Corporation tax, of which approximately 1/4 are paid to the municipalities and 3/4 to the state in Mainland Finland,
5. Real estate tax, which is paid to the municipalities where the properties are located, and
6. Income tax, which are paid to the state.

Key definitions

Construction phase
Construction phase refers to the period during which a data center is planned and constructed. During this phase a variety of planning activities take place alongside with permitting, financing etc. activities. In this assessment results cover the construction phase as an aggregate.

Operation phase
Construction phase refers to the period during which a data center is operated. Operation phase of a single data center includes a ramp-up period during which a center gradually reaches full capacity. In this assessment operation phase results are presented on annual basis and results are not aggregated over time.

NACE
European statistical classification of economic activities (NACE) is a four-digit classification providing the framework for collecting and presenting statistical data according to economic activity in a wide variety of European statistics in the economic, social, environmental, and agricultural domains.

Primary activities
Primary activities are economic activities that directly utilize and extract natural resources from the Earth, including agriculture, mining, forestry, fishing, hunting, and gathering

Manufacturing and industrial activities
Manufacturing and industrial activities involve the transformation of raw materials, components, and parts into finished goods and products using tools, labour, and machinery.

Construction activities
Construction activities are the various tasks involved in building, altering, or dismantling structures, ranging from site preparation like excavation and grading, to structural work such as laying concrete and erecting frameworks, and finally to finishing touches like painting and landscaping.

Service and other activities
Service activity is the provision of assistance or an intangible product, such as advice, expertise, or a technical process, that does not involve the transfer of ownership of a tangible good. Unlike manufacturing, the customer receives the benefit directly, and the service is often produced and consumed simultaneously. Examples range from consulting and healthcare to personal care services like hairdressing and repairs. Other activities is a residual category.

Main categories of NACE
A. AGRICULTURE, FORESTRY AND FISHING
B. MINING AND QUARRYING
C. MANUFACTURING
D. ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY
E. WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES
F. CONSTRUCTION
G. WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
H. TRANSPORTATION AND STORAGE
I. ACCOMMODATION AND FOOD SERVICE ACTIVITIES
J. INFORMATION AND COMMUNICATION
K. FINANCIAL AND INSURANCE ACTIVITIES
L. REAL ESTATE ACTIVITIES
M. PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES
N. ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES
O. PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY
P. EDUCATION
Q. HUMAN HEALTH AND SOCIAL WORK ACTIVITIES
R. ARTS, ENTERTAINMENT AND RECREATION
S. OTHER SERVICE ACTIVITIES
T. ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS; U0NDIFFERENTIATED GOODS- AND SERVICES-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE
U. ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES

8. Economic impact analysis

Methods
Literature review
Direct impacts
Multiplicative impacts
Generalisation over the market trend

Literature review

The significance of data centers as part of the digital infrastructure has grown rapidly in recent years, prompting broader debate about their economic and societal impacts. To receive an understanding about these impacts, a systematic review on data center impact analyses was carried out.

This consisted of two parts. First, an inquiry into policy reports and other non-peer reviewed articles on the topic. Second, a search into peer-reviewed articles, in which the focus was on data-center economic impact.

To carry out the latter, a Scopus search was carried out. However, no peer-reviewed research on data center economic impacts could be identified. Therefore, the analysis concentrated on the policy reports. Missing peer-reviewed articles on the topic raises the question about why this is the case? Possible explanation is that in academic impact research significant emphasis is placed on robust research methods and because applying such methods is costly and demanding, researchers have not seen it worthwhile to conduct and publish academic economic impact research on data centers.

For policy report review possible studies were searched through database search (such as Scopus and Google Scholar), through Google search and through interviewing the representatives of the Finnish Data Center Association. In the end studies listed on next page were identified and included into the analysis.

It is also worth noting that the reviewed studies possibly apply input–output models in different ways. In some cases, it may be that only a single stage of the value chain is considered, while in others multiple stages are included. Moreover, in some studies subcontracting is classified as a direct effect, whereas in others it is treated as an indirect effect. These methodological differences can partly explain why results may vary between studies.

Reviewed articles

Article	Description of the article
The Mystery Impact of Data Centers on Local Economies Revealed (Area Development, 2015)	What are the local economic impacts of data centers? Based on economic modelling, not the actual impacts in eight US cities.
A study of the economic impact of data centers on the nation's growth and development, (Zhang, Shouchen, 2022)	What is the impact of data centers on economic growth? Based existing previous reports and data. No primary data collection.
Data Center Growth Has Economic Ripple Effects (CBRE, 2021)	What are the local economic impacts of data centers? Based on real employment and tax statistics in three states in the US (Virginia, Nebraska, Ohio)
The Local Economic Impact of a Proposed Data center Campus in London (Oxford economics, 2022)	What are the local and national economic impact of a data center, that was planned to Havering, London. Input-output modelling based on real economic data.
European data centrss: How Google's digital infrastructure investment is supporting sustainable growth in Europe (Copenhagen Economics, 2018)	How Google's data center investments influence European economy. Input-output modelling based on real economic data (e.g. CAPEX data from Google).
Digital Gateway to Europe & Pb7 Research. North Amsterdam Data Center Campus Economic Impact Study. (Development Agency Noord-Holland Noord, Agriport A7, 2018)	What are the local and national economic impacts of North Amsterdam Data Center Campus? Based on real economic data (e.g. capex data from Microsoft)
Data Center Supply Chain - Offering in Finnish market 15.1.2025 (Business Finland, 2025)	Market study on the value chain and players of the Finnish Data Center industry. Based on information from company data bases.
Rapportskitse: Datacenterindustriens Samfundsaftryk. (Implement Consulting Group, 2024).	How Danish data centers influence digitalization, economy and emissions? Based on secondary data, qualitative analyses and case analyses.
Economic impact analysis of a new data centre in Hamar. (Menon Economics, 2023)	The purpose of the study is to analyse the economic impact of a new data centre at the Heggvin site between Hamar and Elverum on the regional and national economy. Input-output method applied.
European Data Center Overview (European Data Center Associations, 2024)	Comprehensive review of the European data center market, highlighting social, environmental, and economic value. Covers topics such as employment, energy efficiency, heat reuse, and the role of data centers in the digital economy.

Comparable studies support validation of local findings

The literature review provides three key insights that guide and validate the methods and findings of the economic impact analysis.

1. Peer-reviewed impact analyses employing advanced (counterfactual) methodologies focused on data centers could not be identified.
2. Policy reports typically rely on input-output models, consistent with the approach used in this analysis.
3. The economic impact estimates from the reviewed studies serve as useful benchmarks, with particular attention to three studies utilising the input-output methods. However, inconsistencies in definitions and measurement approaches may restrict the comparability of these benchmarks.

Study	Investment	Economic impact - Gross value added in UK		Emloyment impact - Job years of employment in UK	
The Local Economic Impact of a Proposed Data Centre Campus in London (Oxford economics, 2022)	London Havering Years 2023-2027 € 6,65 billion 600MW	Construction phase **Direct effects** € 1 271 M total € 254 M annual **Indirect** € 1 361 M total € 272 M annual **Induced** € 1 009 M total € 201 M annual	Operation phase **Direct effects** - € 455 M annual **Indirect** - € 187 M annual **Induced** - € 214 M annual	Construction phase **Direct effects** 16 640 total 3 328 jobs annual **Indirect** 21 480 total 4 296 jobs annual **Induced** 13 370 total 2 674 jobs annual	Operation phase **Direct effects** - 1 200 jobs annual **Indirect** - 3 120 jobs annual **Induced** - 2 770 jobs annual
Study	**Investment**	**Economic impact - GDP in EU**		**Emloyment impact - Job years of employment in EU**	
European data centres: How Google's digital infrastructure investment is supporting sustainable growth in Europe (Copenhagen Economics, 2018)	Years 2007-2017 Four data centers: Ireland (30MW) Netherlands (120MW) Belgium (108MW) Hamina (81MW) In sum (339MW) Investment size € 2,3 billon € 200 million/a	Construction and operation phase combined **Direct effects** - € 130 M annual **Indirect** - € 200 M annual **Induced** - € 160 M annual		Construction and operation phase combined **Direct effects** - 1 300 jobs annual **Indirect** - 2 700 jobs annual **Induced** - 2 600 jobs annual	
Study	**Investment**	**Economic impact - GDP in Norway**		**Emloyment impact - Job years of employment in Norway**	
Economic impact analysis of a new data centre in Hamar. Menon Economics, 2023.	Hamar in Norway € 2 billion over two years 150MW	Construction phase Totally over construction period € 1 billion	Operation phase **Direct effects** € 12 M annual **Indirect** € 8 M annual **Induced** **-**	Construction phase **Direct effects** 5 500 total **Indirect** 2 800 total **Induced** **-**	Operation phase **Direct effects** 225 annual **Indirect** 75 annual **Induced** 55 annual

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Direct economic impacts of data centers in Finland

- Large-scale investments
    - A 100MW data center typically represents approximately € 1 billion total investment.
    - Most of the investment goes into electrical and cooling systems.
    - Construction and installation works generate domestic economic activity, though the impacts are largely temporary.
- Direct employment during operations
    - A 100MW facility typically employs 50–150 people directly.
    - Jobs are high-skilled jobs and well-paid, but the absolute number is limited.
    - Employees also generate significant income tax revenues, which constitute an important and recurring source of public finance. No quantitative estimates are provided here due to differences in wage structures and employment costs.
- Revenue and the domestic economic effect
    - Annual revenue for a 100MW facility can exceed € 350 million, and a 300MW site can generate over € 1 billion. These estimates are derived from public financial statement data.
    - The sector’s combined turnover in Finland is easily in the multi-billion-euro range.
- Most predictable and visible benefits
    - Property tax is a stable and significant revenue source for municipalities due to the size of the buildings.
    - As employment increases, municipal tax revenues grow, and wages drive higher consumption and demand, generating benefits for both local economies and Finland as a whole. The operations create jobs across the country and strengthen the sustainable vitality of the regions.
    - Waste heat can be fed into district heating networks, providing municipalities or local utilities with a recurring efficiency benefit.

The property tax is a stable economic effect for a DC, but rate depends on legislation

- The annual property tax for a 100MW facility is roughly EUR 0,5–1,5 million.
    - In property taxation, buildings accrue an annual age reduction, which reduces the amount of property tax over a 20-year period compared to a newly constructed building. The maximum depreciation allowance is 80%.
    - The accrual is not linear; it varies depending on the municipality where the project is located, the completion status of the buildings, and their age. The property tax base expands as new data centers are completed, and later, the taxable value gradually decreases as the buildings age.
- The tax amount has been estimated for completed buildings. During the construction phase, property tax is determined based on the degree of completion of the buildings.
- The estimate is based on the legislation and taxable values in force in 2025.
- The property tax rate ranges from 0,93% to 2,00%, and the municipality determines the exact rate annually.
- The pending legislative reform will affect the basis for property taxation* and the resulting tax revenue. For data center buildings, the property tax basis will shift from volume-based industrial building assessment to floor-area-based data center assessment. According to preliminary estimates, if implemented, the reform could reduce the amount of property tax.
- During the planning phase, property tax is also paid on the acquired land plots reserved for potential future construction.

*According to legal assessment (2022 government proposal and subsequent consultations), the planned reform could lower the property tax base for data centers by shifting the valuation method from volume-based industrial buildings to floor-area-based data center assessment. Final effects will depend on the exact law to be enacted, expected no earlier than 2027

Corporate income taxes are significant economic contributors

- Corporate income tax is a significant direct economic contribution from data centers, although it is subject to considerable fluctuation. Between 2019 and 2023, the five largest data center companies in Finland paid approximately € 96 million in corporate taxes, averaging around € 19,2 million annually. In 2023, these companies employed 254 of the sector's total 290 employees, indicating that smaller operators had a relatively minor impact on tax revenues.[1]
- Google's Tuike Finland Oy, which operates Google's Hamina data center, has been one of the largest contributors to public finances. While corporate income tax payments fluctuate due to the capital-intensive nature of the industry – with depreciation deductions and investment allowances reducing taxable income in certain years – Google's annual tax footprint in Finland, including payroll and property taxes, not just corporate income tax, averaged about €20 million between 2018 and 2023. This underlines both the significant long-term contribution of data centers and the potential for corporate tax revenues to increase as major investments mature.[2]
- Predictability in tax policy is essential for attracting new large-scale data center investments. A predictable framework enables long-term planning and can unlock billions in new investments, which in turn broaden the corporate tax base. While the timing of tax revenues depends on investment cycles and depreciation rules, the long-term potential for substantial corporate tax contributions is significant.
- Forecasting corporate tax revenue is thus challenging, due to the unprecedented growth in data centers. Although corporate tax revenues from data centers can be substantial, they also face three principal challenges:
  1. Revenue timing affected by depreciation schedules and investment cycles.
  2. Dependence on large-scale project completion.
  3. Sensitivity to tax policy changes that guide long-term investment decisions.
- In addition to corporate income tax, employees working in data centers also generate significant income tax revenues, further strengthening the overall tax footprint.

Source: [1]Kauppalehti [2] Google

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Multiplicative impacts in colocation segment

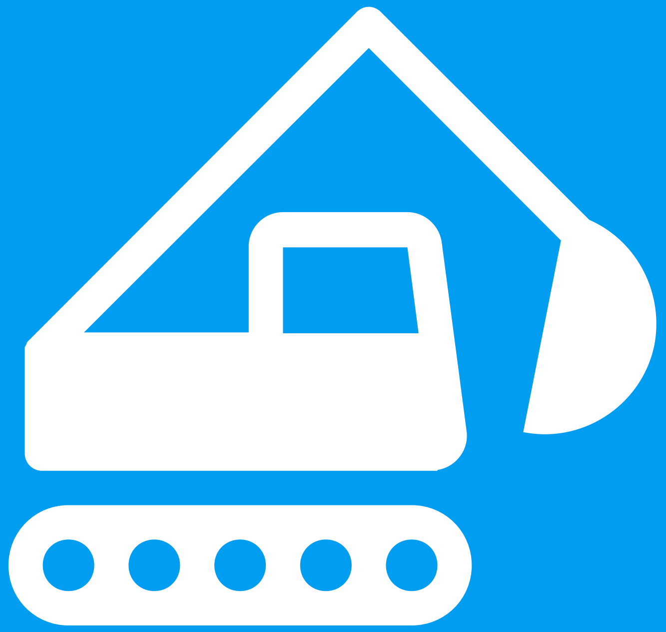
In this section multiplicate economic effects of colocation segment are presented both for construction and operational phase of 100 typical MW data center. Estimated variables include output, gross value added, tax and employment. Shown results include both multiplicate impacts that arise through changes in production and multiplicate impacts that arise through changes in consumption (induced impact).

For construction phase it is assumed in this assessment that the colocation segment's estimations apply also to cloud and private segments. Therefore, their results are not separately presented.

For operation phase, in addition to colocation segment, also cloud segment was estimated and cloud segment's estimation is assumed to apply to private segment. However, because, estimation of cloud segment differed only very little from colocation segment's estimation, results are not presented here but can be found in the appendix of the report.

Construction phase

Multiplicate impacts for a 100 MW data center in colocation segment



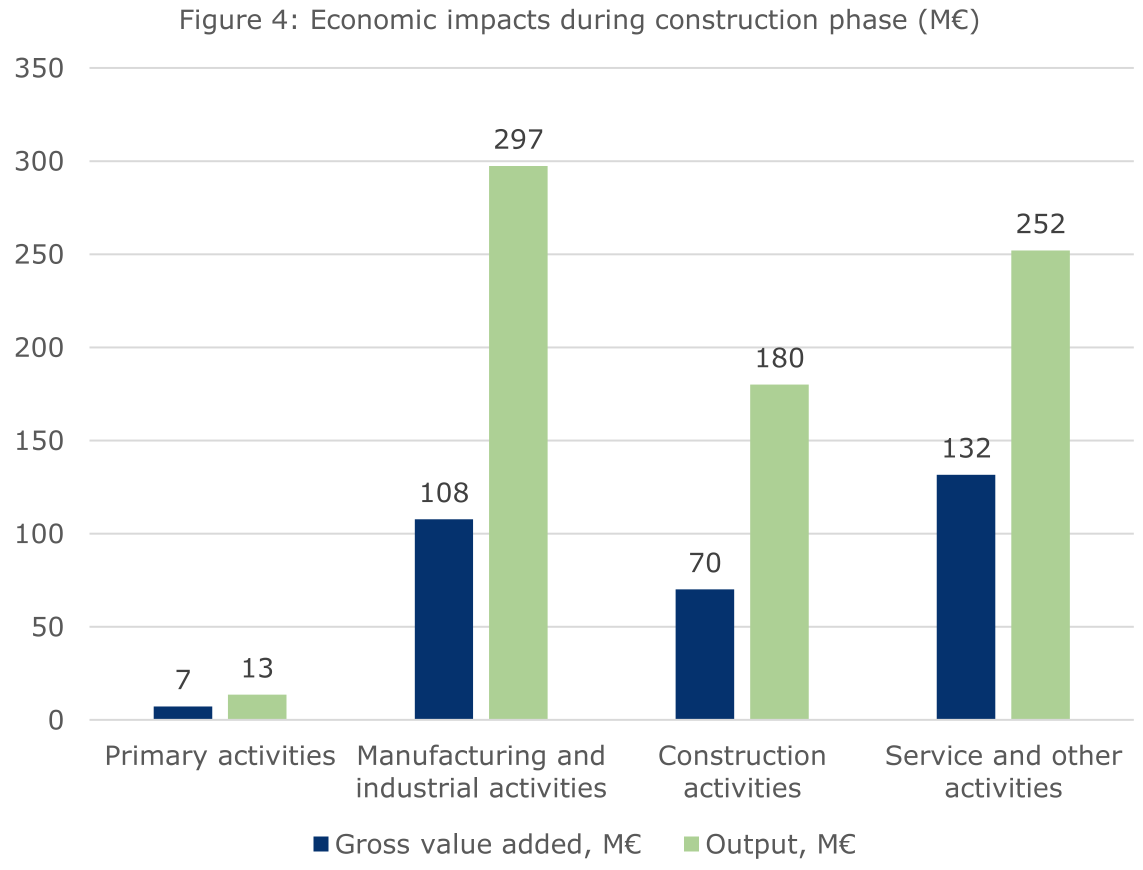
A 100MW colocation DC is expected to create € 317 million in gross value added and € 742 million in output during the construction phase

The multiplicative impacts **over the construction phase** on output and value added (including indirect and induced effects) from a 100MW data center investment are distributed across the economy, primarily affecting four key sectors as shown in figure 4.

In the construction phase, the **total output** increase attributed to the data center's construction is projected at € 742 million. The manufacturing and industrial activities sector experiences the largest output growth (€ 297 million), followed by the service sector (€ 252 million) and the construction sector (€ 180 million), all showing substantial increases.

Similarly, the rise in **gross value added** during this period is estimated at € 317 million, driven by the heightened output. The service sector leads with an increase of € 132 million, followed by manufacturing and industrial activities at € 108 million, and construction at € 70 million.

Note that Ramboll's methodology does not include additional construction or reinvestments (e.g. refurbishments), and therefore these impacts are not reflected in the results



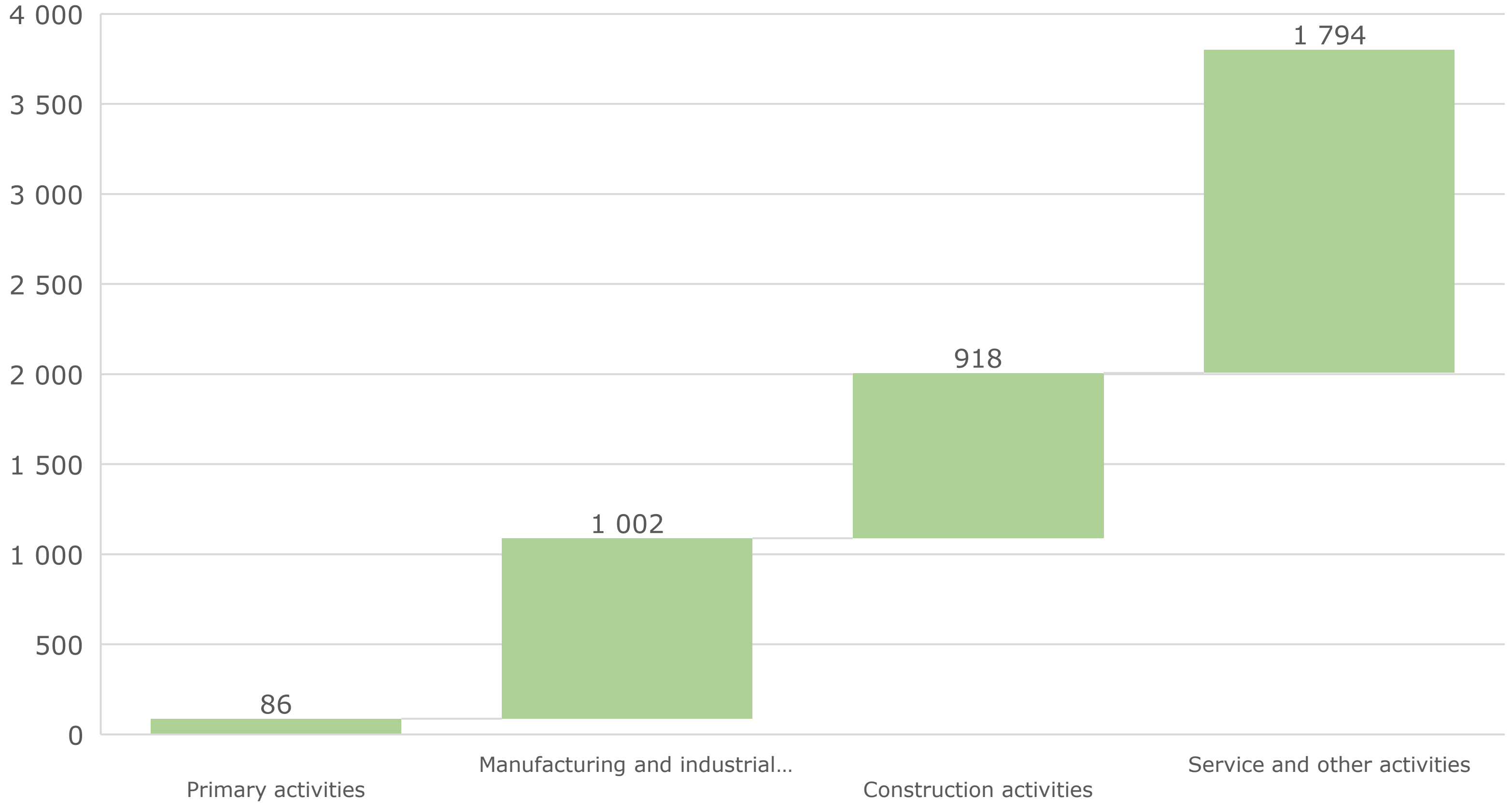
A 100MW colocation DC is expected to create 3800 FTE in labour demand during the construction phase

The multiplicative effects **during the construction phase** on labour demand (including indirect and induced effects) from a 100 MW data center investment are distributed across four main economic sectors, as shown in figures 5.

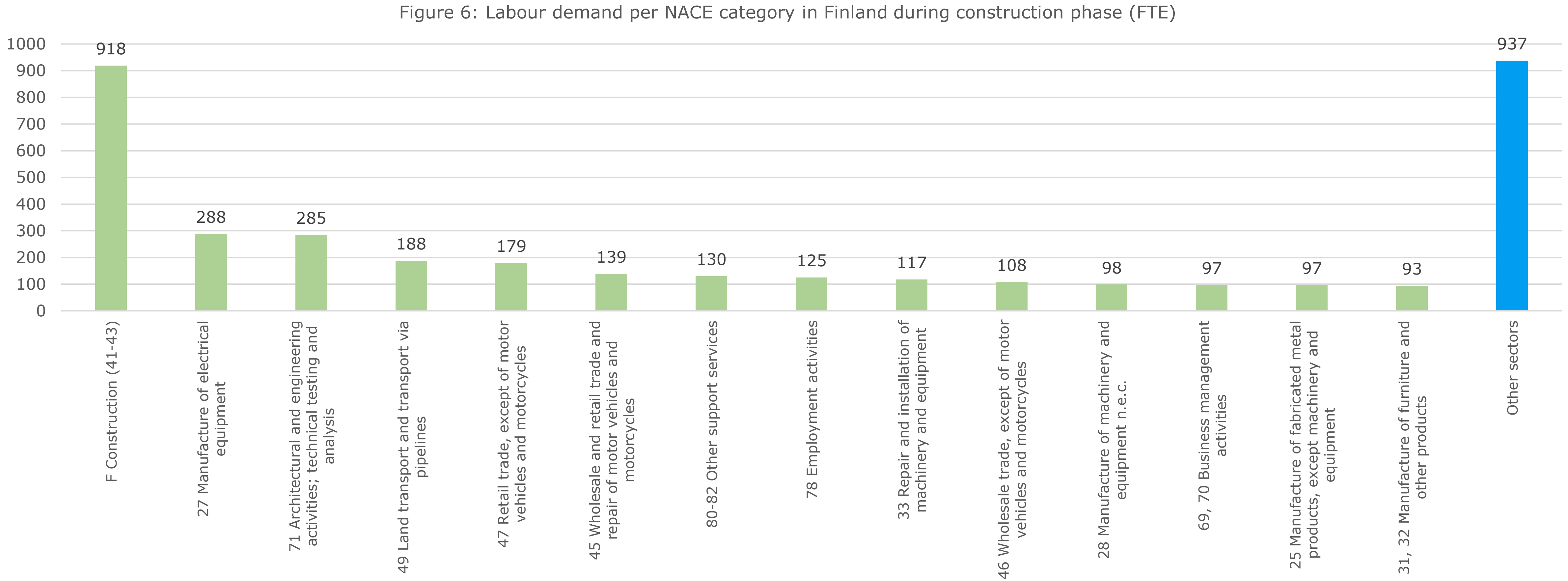
Overall, the construction phase generates an increase of 3 800 full-time equivalent (FTE) jobs. The service sector experiences the largest rise with 1 794 FTEs, followed by the manufacturing sector with 1 002 FTEs, and the construction sector with 918 FTEs.

Figure 6 (on the following page) provides a more detailed breakdown of the increased **labour demand** by sector. The most notable rise occurs in the construction industries (NACE 41–43), followed by manufacturing of electrical equipment (288 FTEs) and architecture and engineering services (285 FTEs). In summary, the growth in labour demand is distributed across a broad range of sectors.

Figure 5: Labour demand in Finland per sector during construction phase, (fte)



Labour demand is highest in the construction and manufacturing sectors during the construction phase of a 100MW colocation DC

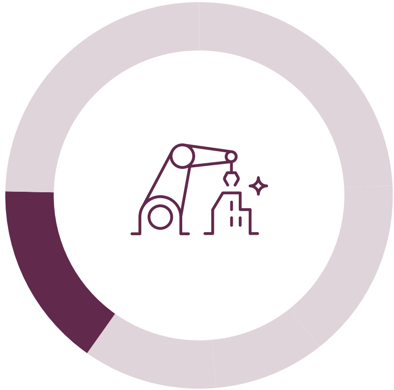


"Other industries" includes the remaining sectors beyond those explicitly shown in the chart. These sectors cover a wide range of economic activities, including agriculture, forestry, food and textile industries, chemicals, energy and utilities, ICT services, media, financial services, education, health, public administration, culture, and more. While their individual contributions are smaller, together they account for a significant share of labour demand during the construction phase, highlighting the broad economic footprint of data center investments.

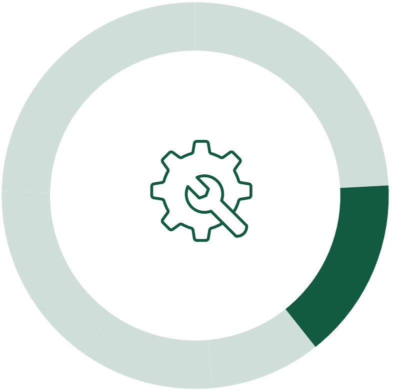
A 100 MW colocation DC creates total of ~3800 (FTE) jobs during its construction phase

Construction
~920 FTE (24%)

Retail and wholesale activities
~430 FTE (11%)



Transport, architecture, engineering, repair and installation
590 FTE (16%)



Manufacturing activities
~580 FTE (15%)

Employment, business management, supporting services
~352 FTE (9%)

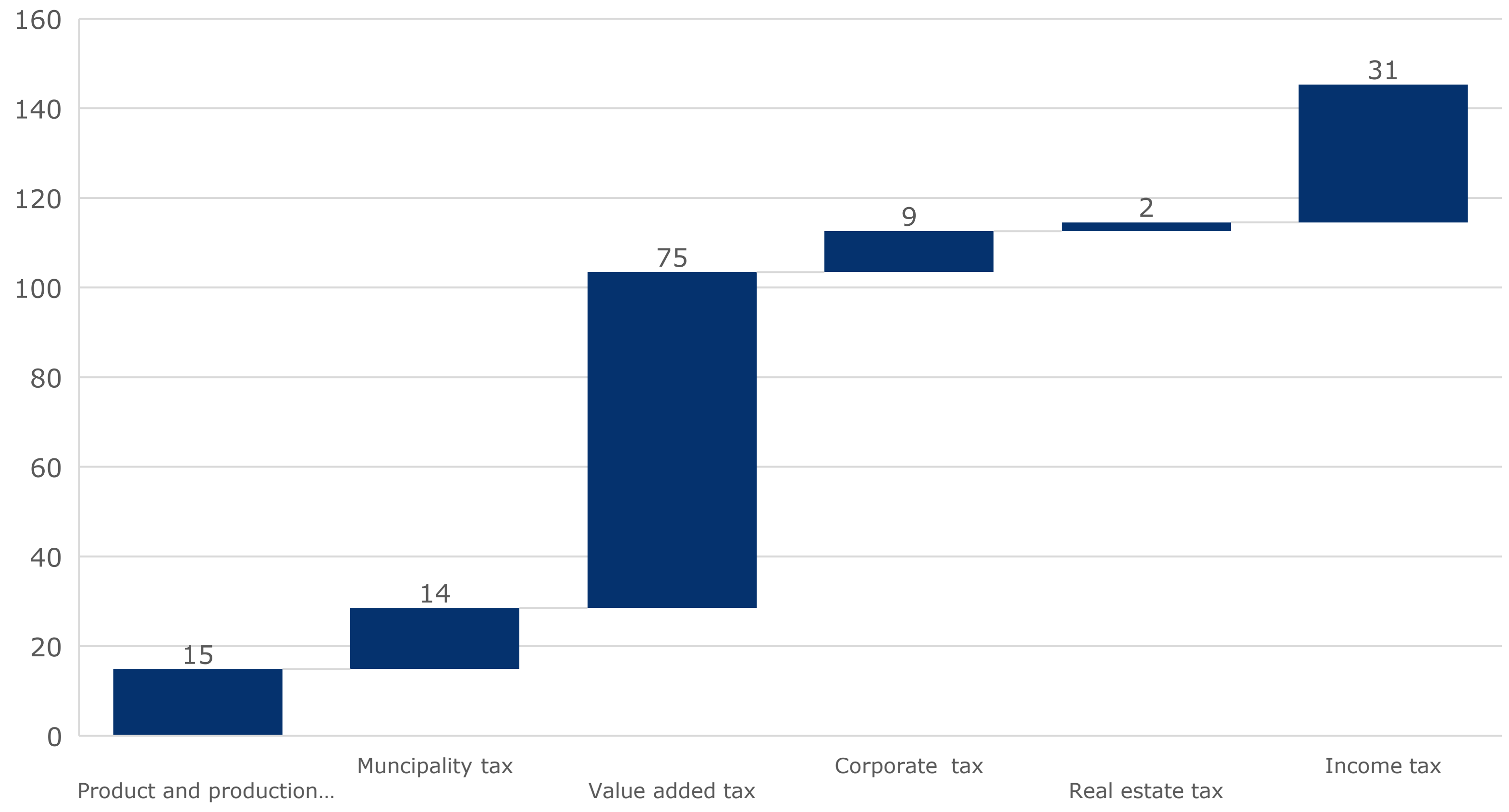
Other sectors
~940 FTE (25%), each sector with a small contribution

Values rounded, actual values on slide 61.

A 100 MW colocation DC is expected to create €146 million in tax revenue during the construction phase

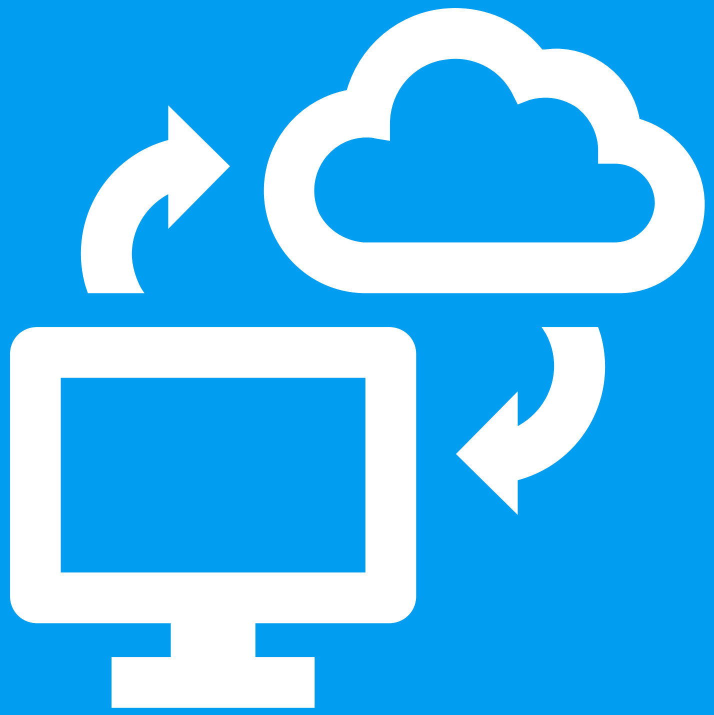
The data center investment also leads to a substantial increase in various **tax revenues** during the construction phase, totalling € 146 million, as depicted in figure 7. Among the tax categories, value-added tax (VAT) shows the highest growth of € 75 million, which is comparable to the combined increase in other taxes: income tax (€ 31M), production tax (€ 15M), municipal tax (€ 14M), corporate tax (€ 9M), and real estate tax (€ 2M).

Figure 7: Tax revenues in Finland during construction phase (M€)



Operation phase

Multiplicate impacts for a 100MW data center in colocation segment



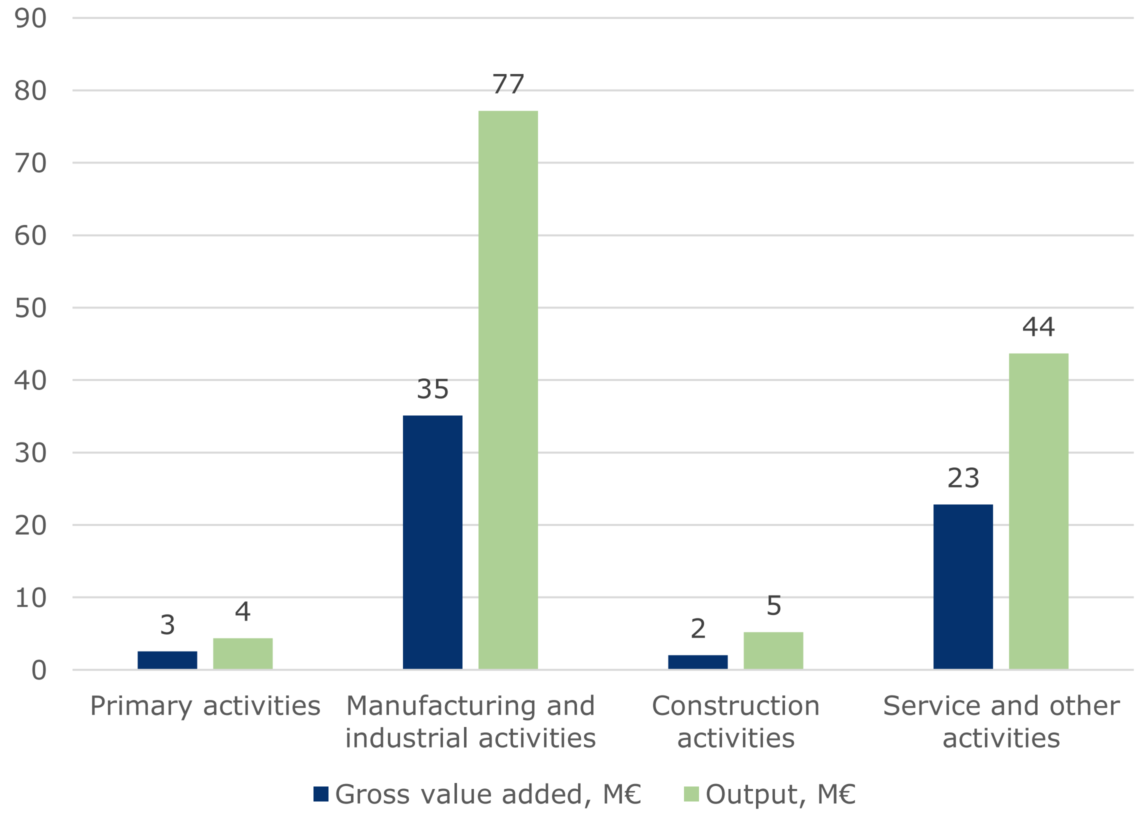
A 100MW colocation DC is projected to generate € 63 million in gross value added and € 130 million in output annually during its operation

During the operational phase, the **annual** multiplicative impacts on output and value added—including indirect and induced effects—stemming from a 100MW data center investment are distributed across four key economic sectors, as shown in Figure 8.

The total annual increase in **output** attributable to the data center's operation is projected at € 130 million. The manufacturing and industrial activities sector sees the most substantial growth (€ 77 million), followed by notable increases in the service sector (€ 44 million) and the construction sector (€ 5 million).

Similarly, the total annual increase in **gross value added** resulting from the data center's operation is estimated at € 63 million. The manufacturing and industrial activities sector leads with an increase of € 35 million, followed by the service sector with € 23 million. The construction sector and primary activities register only minor gains in gross value added during this phase.

Figure 8: Annual economic impacts during operation phase (M€)



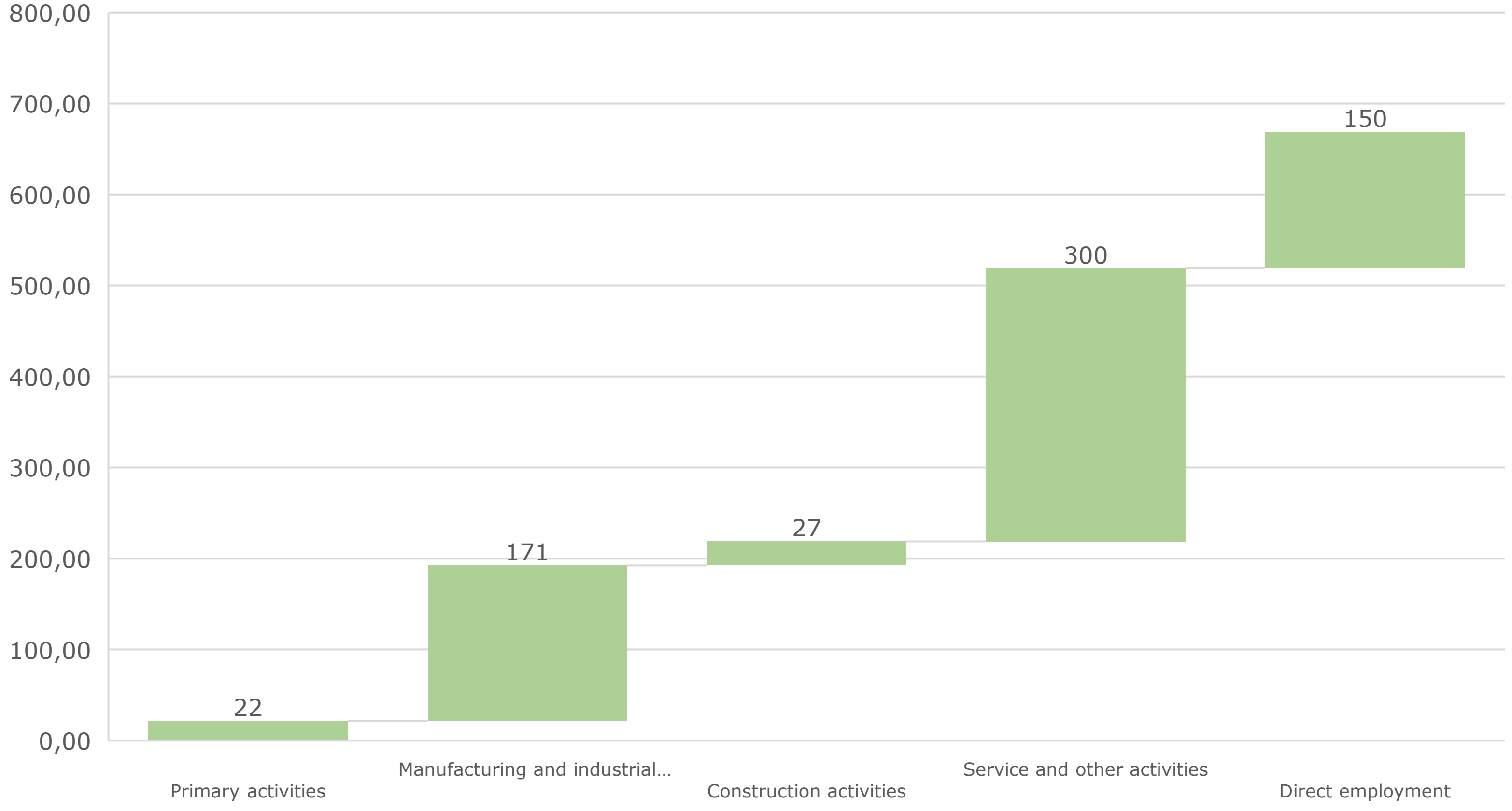
A 100MW colocation DC is expected to increase labour demand by 670 FTE annually during its operation

Annual multiplicative impacts on labour demand (including indirect and induced effects) resulting from the operation of a 100MW data center are distributed across the economy through four principal sectors, as depicted in 9.

Overall, during the operational phase, the total annual increase in **labour demand** amounts to 669 full-time equivalents (FTEs). The service sector experiences the largest growth with 300 FTEs, followed by manufacturing with 170 FTEs, and construction with 27 FTEs.

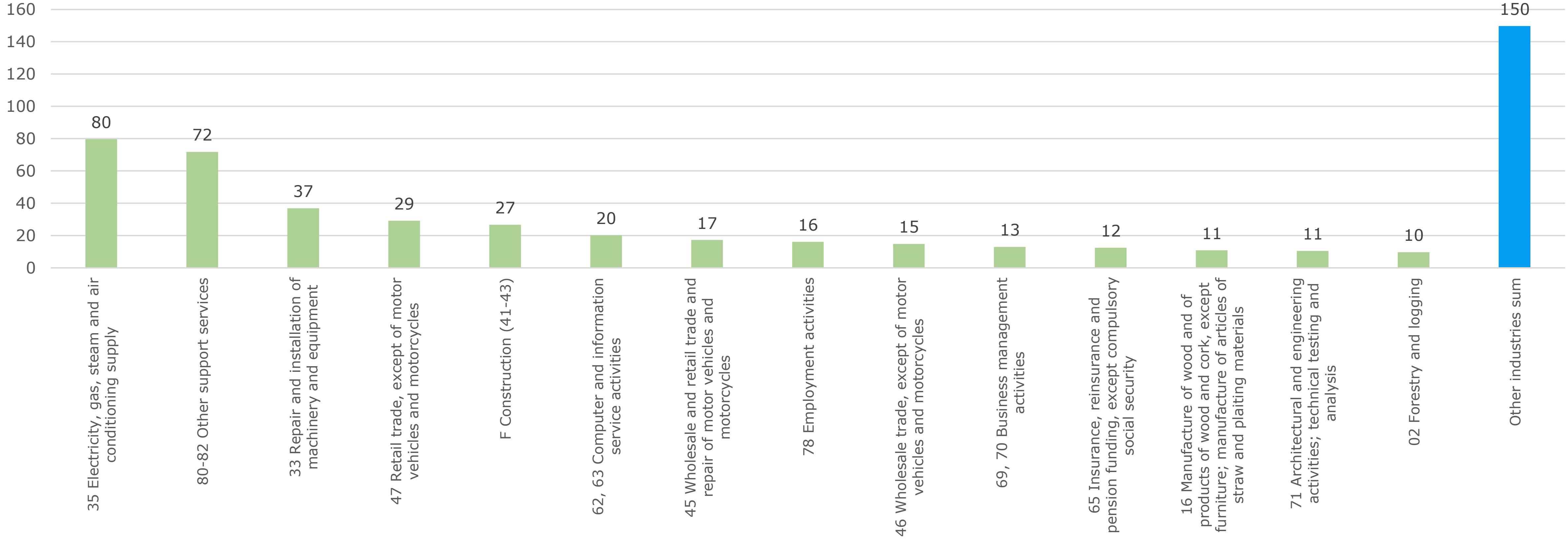
Figure 10 (next page) offers a more detailed breakdown of the increased annual **labour demand** by specific sectors. The most significant rises occur in electricity, gas, steam, and air conditioning supply (80 FTEs), other support services (73 FTEs), and computer and information services (44 FTEs). Smaller gains are observed in sectors such as machinery repair and retail trade. While the additional labour demand spans multiple sectors, it is predominantly concentrated in the energy and service industries.

Figure 9: Annual labour demand in Finland per sector during operation phase, (fte)



Labour demand is highest in the maintenance and other industry sectors during the operational phase of a 100MW colocation DC

Figure 10: Annual labour demand per NACE category in Finland during operation phase (FTE)

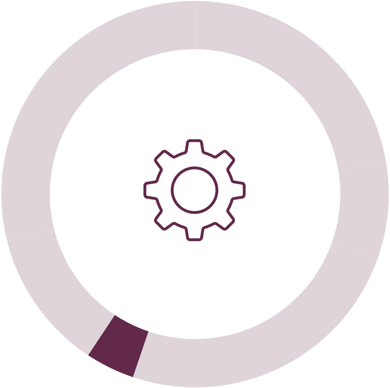


"Other industries" includes the remaining sectors beyond those explicitly shown in the chart. These sectors cover a wide range of economic activities, including agriculture, forestry, food and textile industries, chemicals, energy and utilities, ICT services, media, financial services, education, health, public administration, culture, and more. While their individual contributions are smaller, together they account for a significant share of labour demand during the construction phase, highlighting the broad economic footprint of data center investments.

In addition to ~150 FTE direct employment, a 100 MW data center will indirectly employ ~670 employees annually

Construction, transport and energy logistics
120 FTE (17%)

IT, computer, repair and installation and other support services
~130 FTE (19%)



Manufacture, engineering and architectural activities
~30 FTE (3%)

Employment, business management and insurance
~40 FTE (6%)

Wholesale and retail trade
~60 FTE (9%)

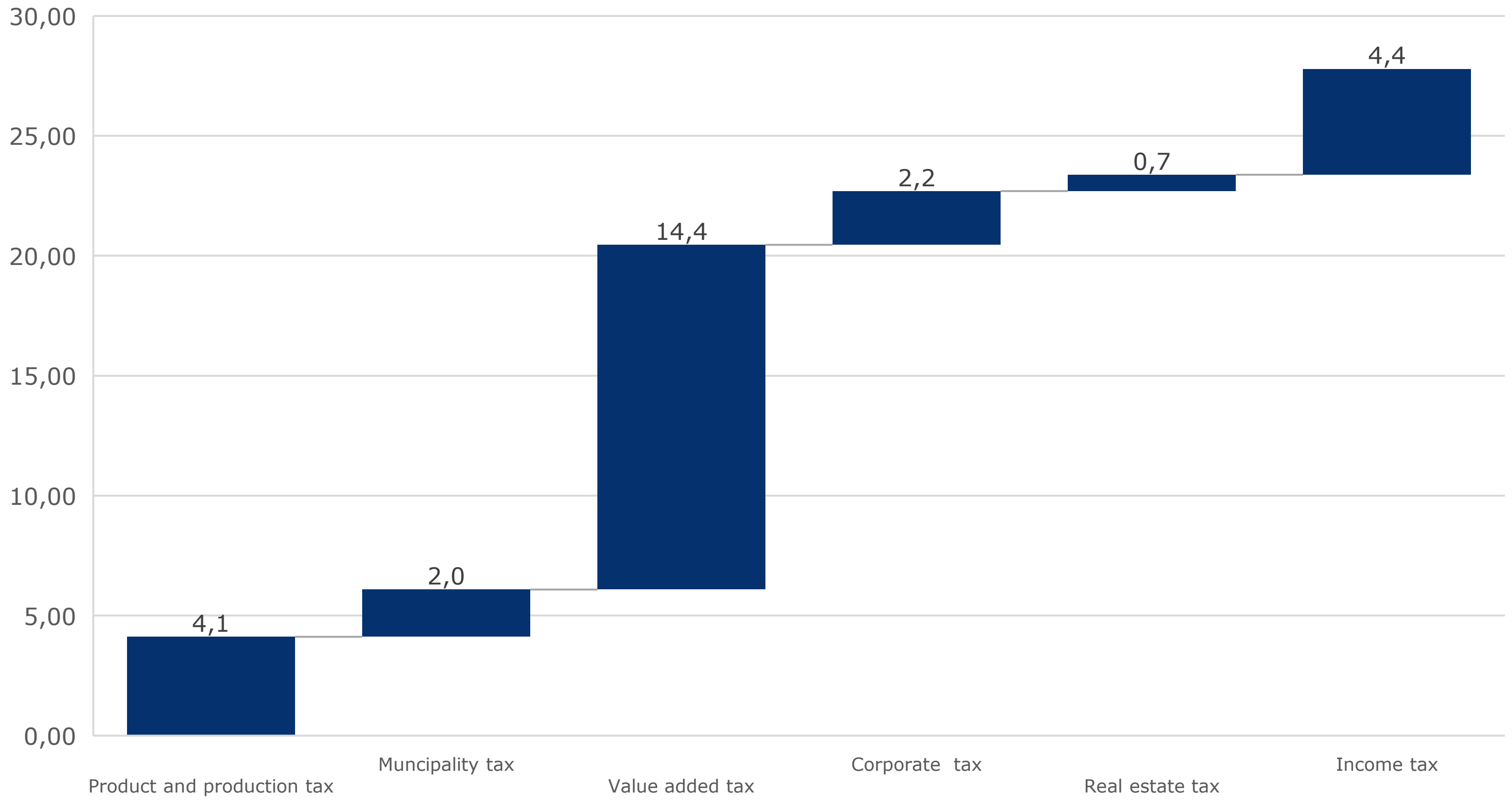
Other sectors
~150 FTE (23%), each sector with a small contribution

Values rounded, actual values on slide 67.

A 100 MW colocation DC is expected to generate €28 million in tax revenues annually during its operation

The data center investment also leads to a substantial rise in annual **tax revenues**, totalling € 28 million, as shown in figure 11. Among the various tax categories, value-added tax (VAT) sees the greatest increase of € 14 million, which is comparable to the combined increase in other taxes: income tax (€ 4M), production tax (€ 4M), municipal tax (€ 2M), corporate tax (€ 2M), and real estate tax (€ 1M).

Figure 11: Annual tax revenues per tax category in Finland during operation phase (M€)

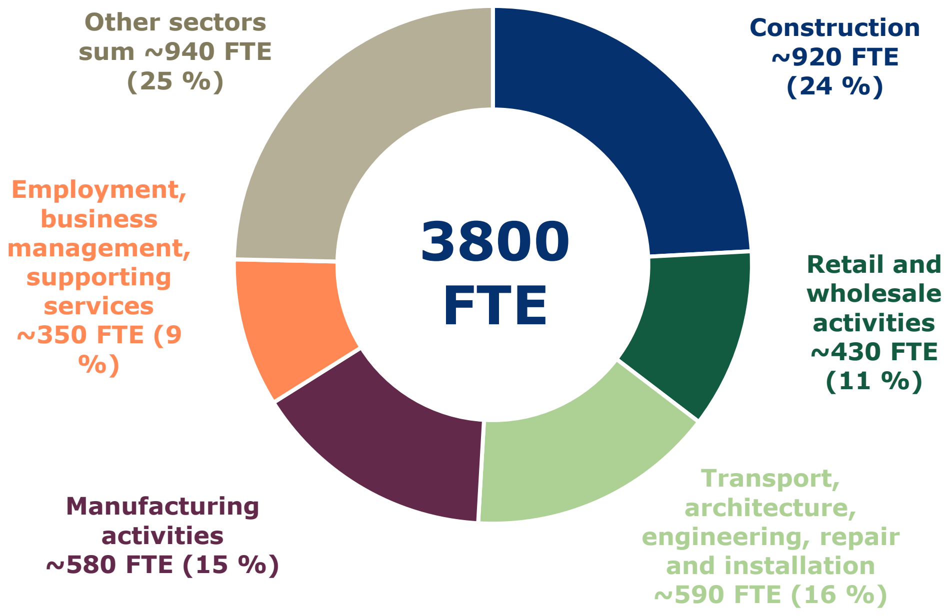


Summary

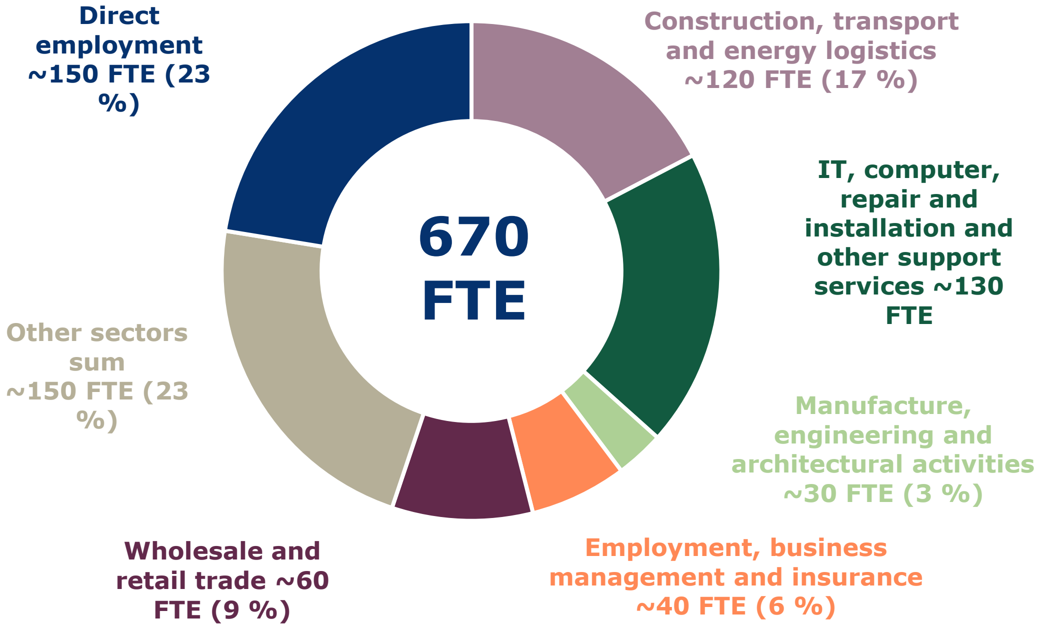
Employment impacts for a 100 MW colocation DC

A 100 MW colocation DC creates total 3800 (FTE) jobs during its construction phase and sustains annually 670 FTE throughout operations

Construction phase jobs are cumulative, representing total labour demand over several years of construction activity.



Operational phase jobs are annual, representing ongoing jobs sustained each year for as long as the facility remains in operation.



Values rounded, actual values on slides 61 and 67.

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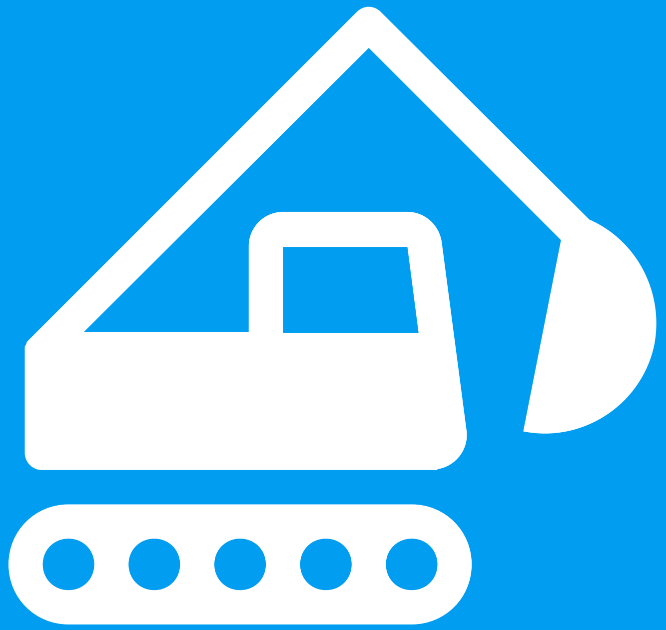
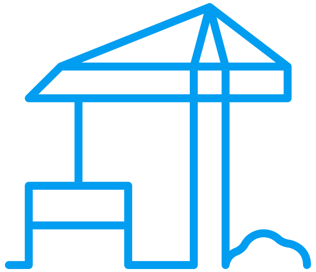
Economic impacts on industry level



Construction phase is expected to bring significant economic benefits in several areas

The impacts of the construction phase in the data center industry are expected to be temporary and cumulative. There are substantial economic benefits already visible but also projected effects by 2030.

The cloud segment is identified as the largest contributor to these effects in all scenarios. The impacts are significant but are not permanent annual effects.



Output
Multiplicative impact estimated at around € 2 billion by 2025 and over € 8 billion by 2030, linked to planned investment projects.

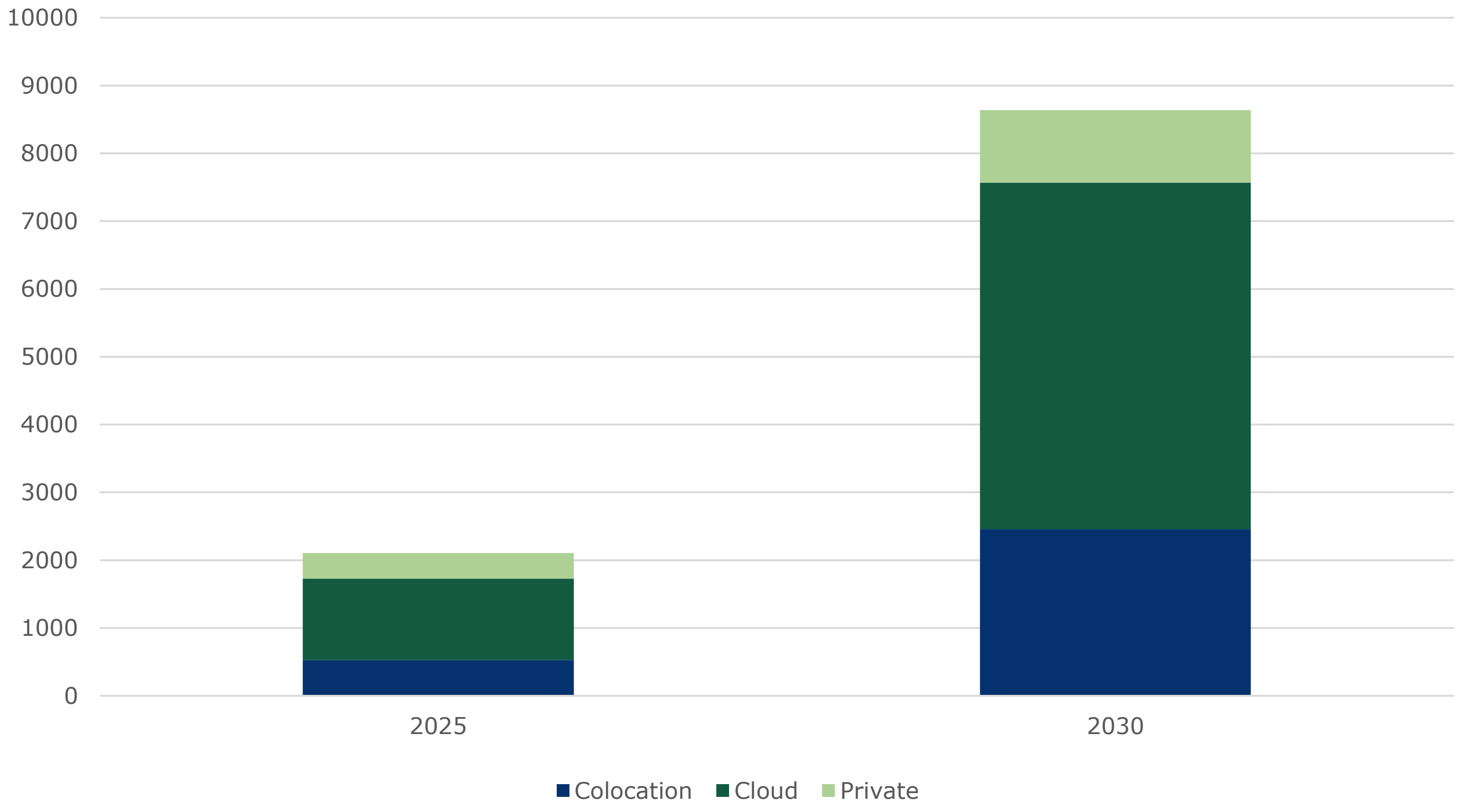
Gross Value Added
Multiplicative impact predicted to be close to € 1 billion by 2025 and over € 3,5 billion by 2030, reflecting planned construction activity.

Tax Impact
Multiplicative impact forecasted at nearly € 400 million by 2025 and over € 1,6 billion by 2030, stemming from various taxes like product, municipal, VAT, corporate, real estate, and income taxes.

Employment
Multiplicative impact anticipated to amount to approximately 10 000 FTE by 2025 and nearly 45 000 FTE by 2030, linked to construction projects.

Construction phase is expected to generate a cumulative output of € 2 billion by 2025 and over € 8 billion by 2030

Figure 12: Output, M€, construction phase



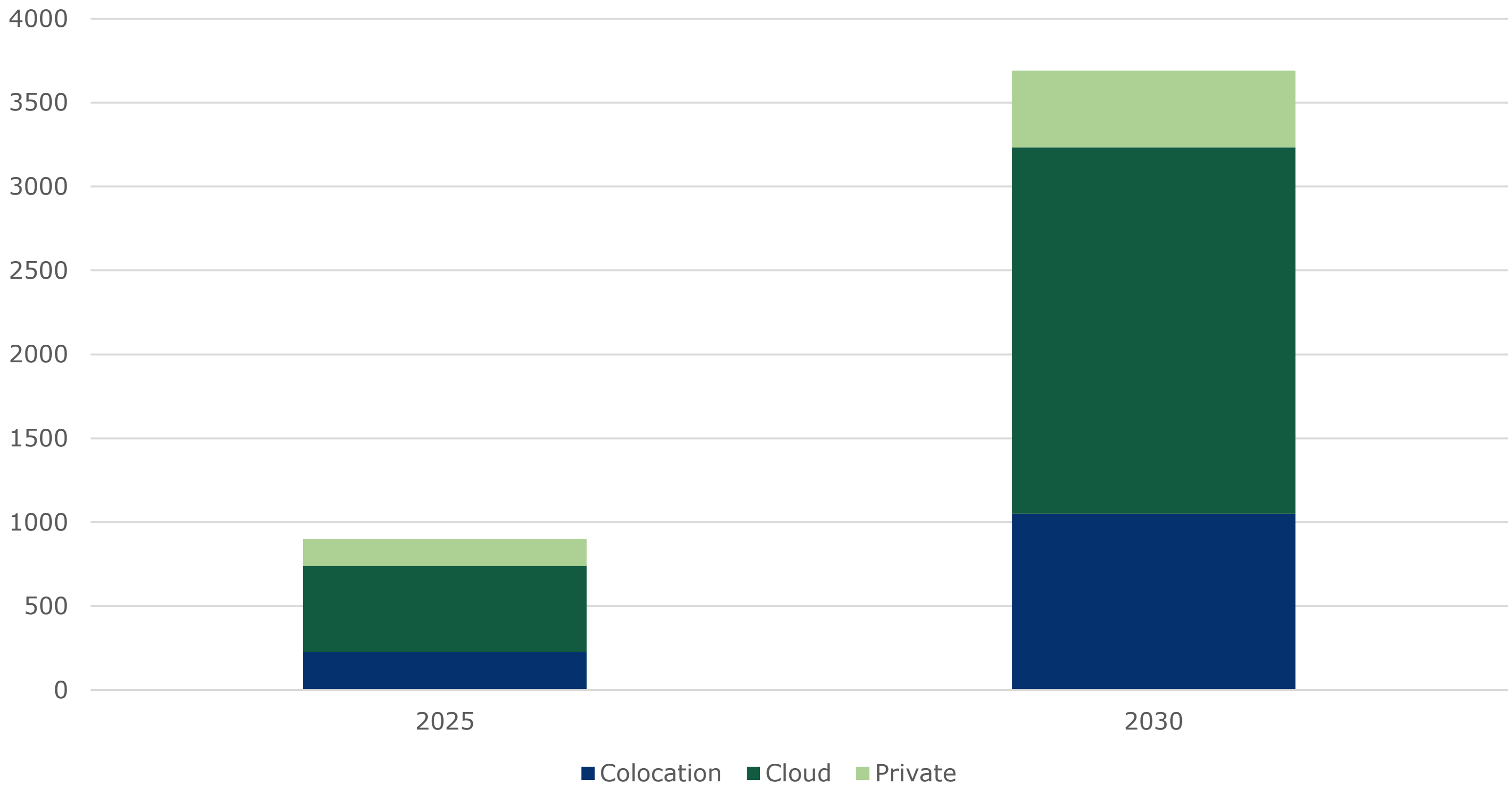
Construction phase multiplicate effects on output

The multiplicative impacts over the construction period on output in the industry are estimated to be temporary and cumulative, amounting to around € 2 billion by 2025 and over € 8 billion by 2030. These impacts are directly linked to planned investment projects and reflect the scale of construction activity during these years, but do not represent permanent annual effects.

The largest segment in terms of generating multiplicative effects during construction phase on output both in year 2025 and in 2030 is the cloud segment.

Construction phase is expected to generate a cumulative GVA of € 1 billion by 2025 and over € 3,5 billion by 2030

Figure 13: Gross value added, M€, construction phase



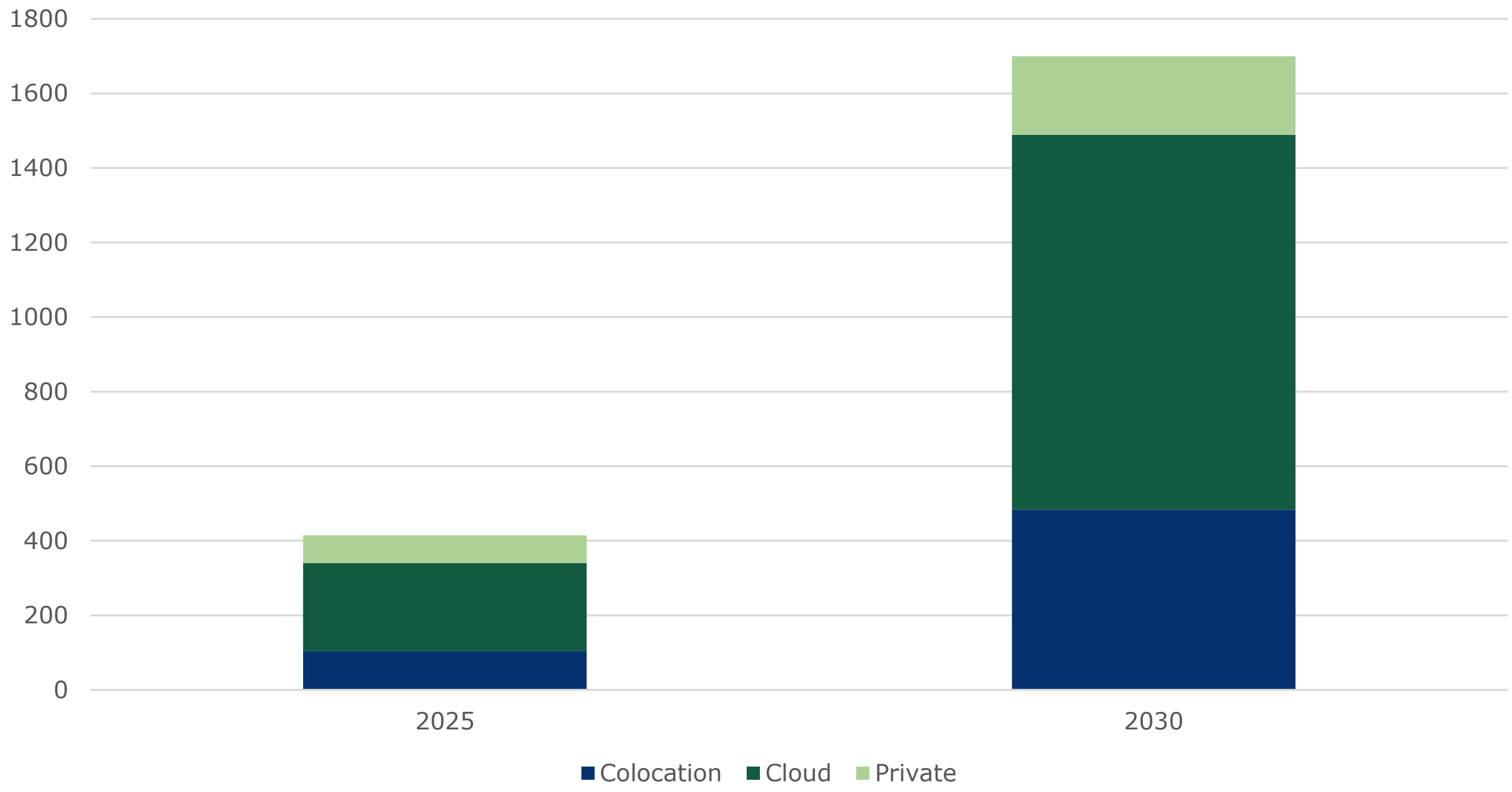
Construction phase multiplicate effects on GVA

The multiplicative impacts over the construction period on gross value added in the industry are estimated to be temporary and cumulative, amounting to close to € 1 billion by 2025 and over € 3,5 billion by 2030. These figures reflect the scale of planned construction activity and are not permanent annual effects.

The largest segment in terms of generating multiplicative effects during construction phase on gross value added both in year 2025 and in 2030 is the cloud segment.

Construction phase is expected to generate cumulative tax revenues of € 400 million by 2025 and over €1,6 billion by 2030

Figure 14: Tax, M€, construction phase



Construction phase multiplicate effects on tax

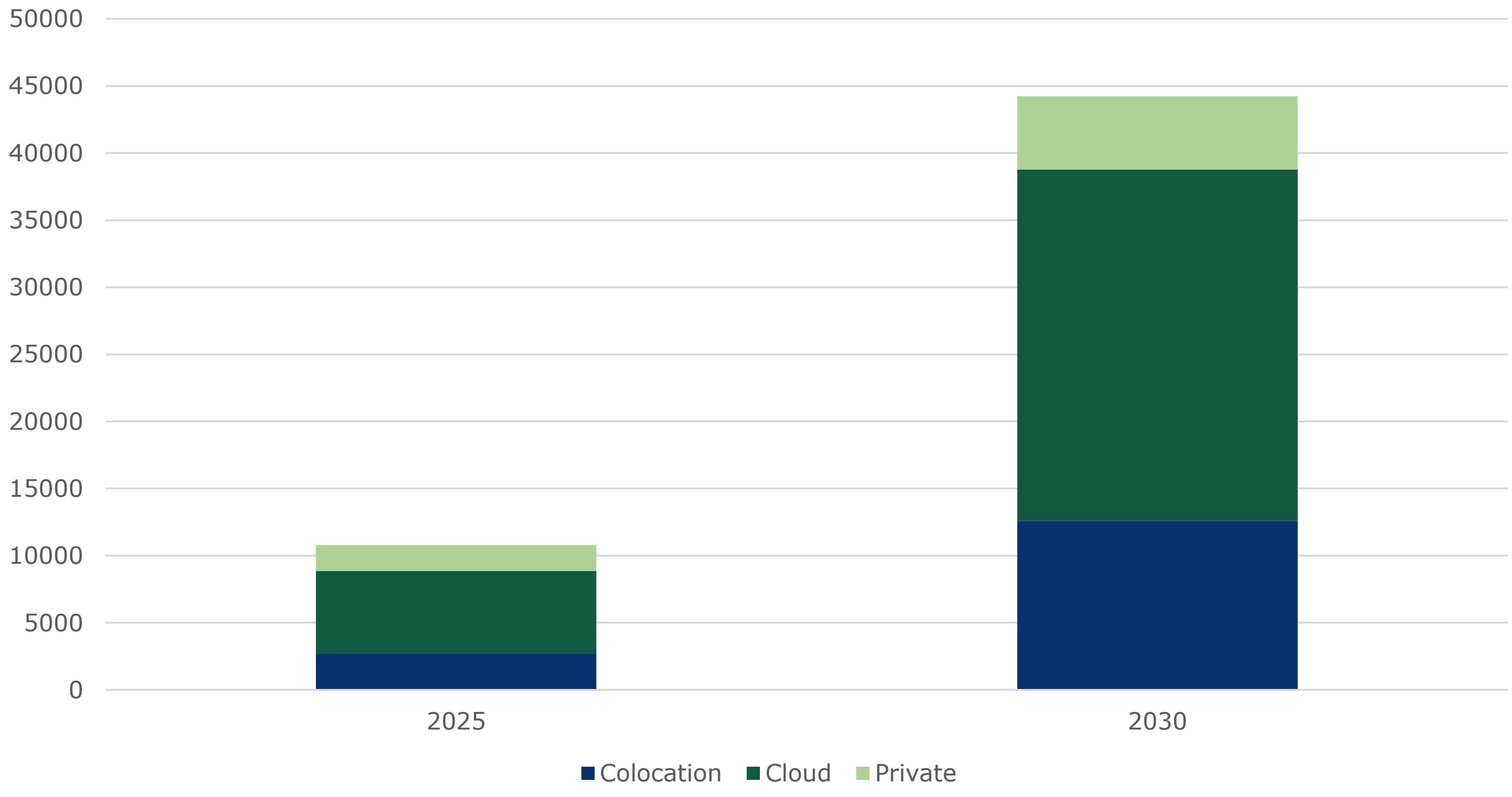
The multiplicative impacts over the construction period on tax in the industry are estimated to be temporary and cumulative, amounting to close to € 400 million by 2025 and over € 1,6 billion by 2030. These impacts are directly linked to planned investment projects and do not represent permanent annual effects.

The largest segment in terms of generating multiplicative effects during construction phase on tax both in year 2025 and in 2030 is the cloud segment.

In this context, tax refers to several types of taxes generated through the multiplicative impacts, including product and production taxes, municipal tax, value added tax (VAT), corporate tax, real estate tax, and income tax.

Construction phase expected to generate cumulative 10 000 FTE by 2025 and nearly 45 000 by 2030

Figure 15: Employment, FTE, construction phase



Construction phase multiplicate effects on employment

The multiplicative impacts over the construction period on employment in the industry are estimated to be temporary and cumulative, amounting to over 10 000 FTE by 2025 and nearly 45 000 FTE by 2030. These figures reflect the total employment effects linked to construction projects up to the given year and are not permanent annual jobs.

The largest segment in terms of generating multiplicative effects during construction phase on employment both in year 2025 and in 2030 is the cloud segment.

Operation phase

Economic impacts on industry level

Operation phase is expected to bring significant benefits – direct impacts are set to be more visible

The forecasted annual impacts of the data center industry's operational phase highlight significant growth in employment, turnover, output, gross value added, and tax contributions by 2025 and 2030.

The cloud segment stands out as the biggest contributor across all metrics.

The multiplicative impacts on tax include various types such as product and production taxes, municipal tax, VAT, corporate tax, real estate tax, and income tax.

Direct employment
Directly impacting over 300 FTE by 2025, rising to over 1 200 employees by 2030.

Direct turnover
Estimated at approximately € 1 billion by 2025, increasing to over € 4 billion by 2030.

Output
Predicted annual multiplicative impacts close to € 400 million by 2025, growing to over € 1,6 billion by 2030.

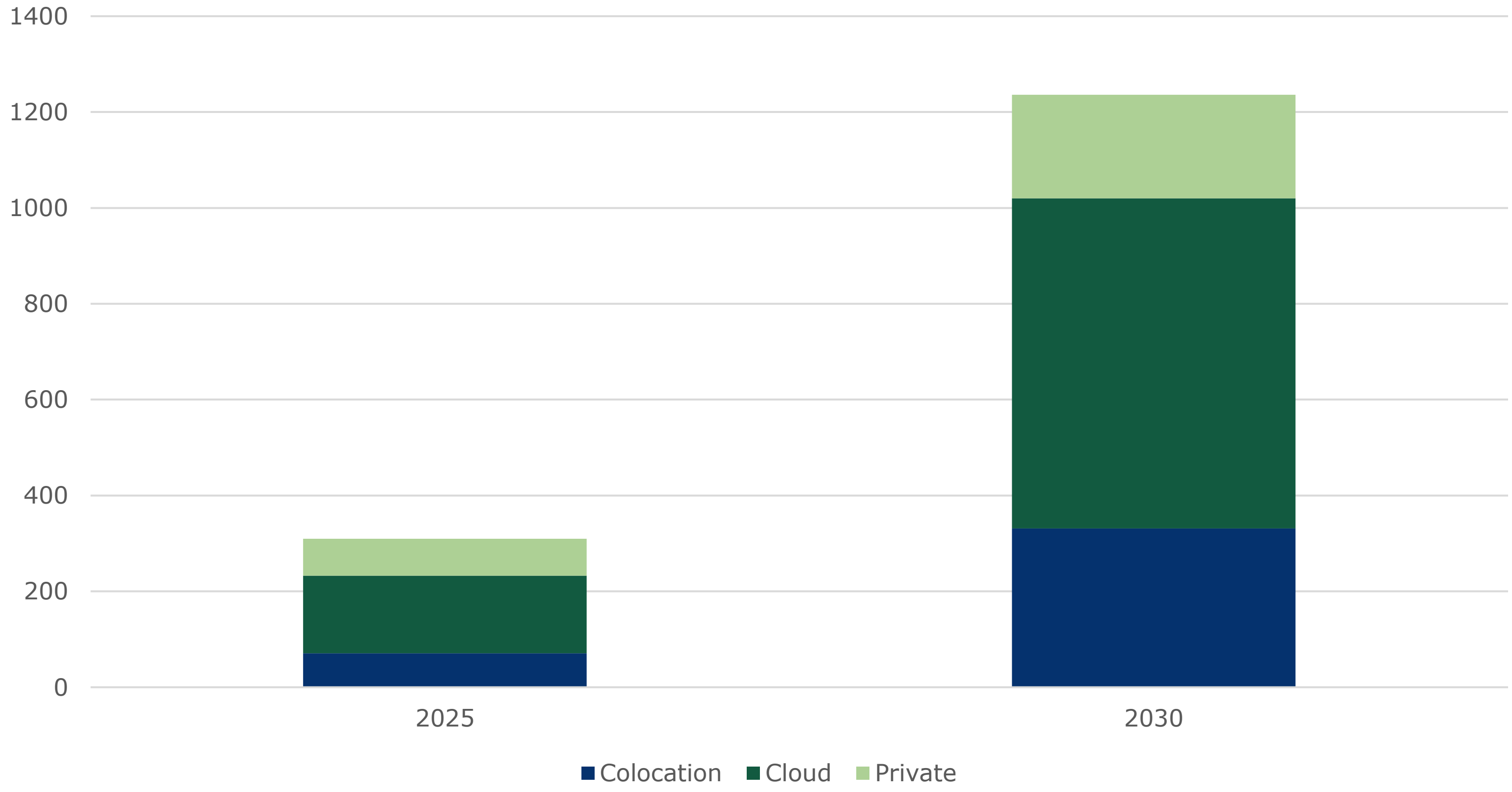
Gross Value Added
Forecasted multiplicative annual impacts near € 200 million by 2025, reaching over € 800 million by 2030.

Tax
Annual multiplicative impacts around € 100 million by 2025, expanding to over € 350 million by 2030.

Employment
Multiplicative annual impact estimated at close to 2 000 FTE by 2025, increasing to nearly 9 000 FTE by 2030.

Operation phase expected to sustain over 300 direct FTE annually by 2025 and over 1 200 by 2030

Figure 16: Direct employment, operation phase, FTE



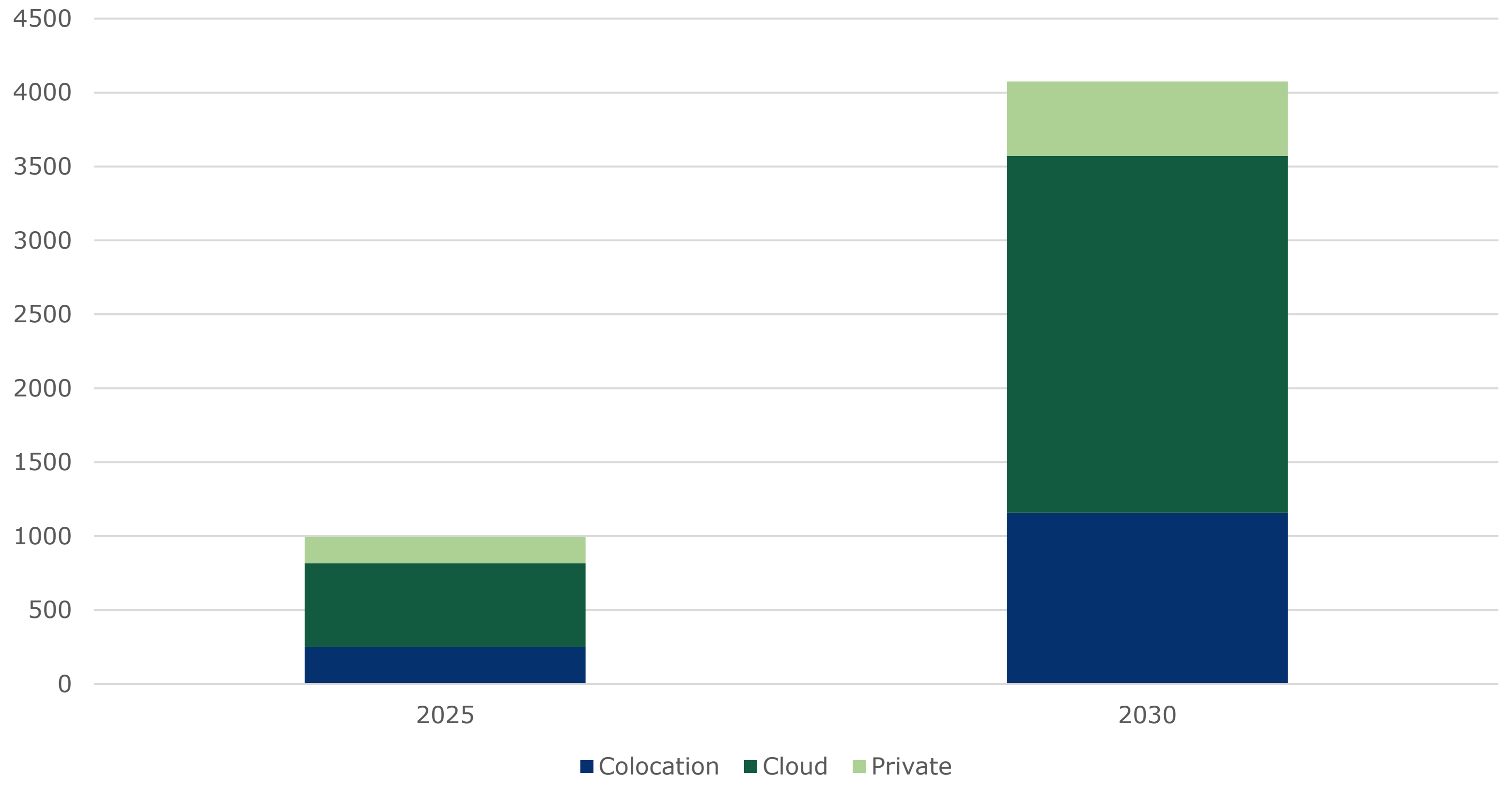
Operation phase direct effects on employment

The direct annual employment impact in the industry is estimated to be over 300 FTE by 2025. This is expected to increase to over 1 200 employees in year 2030.

The largest employer segment both in year 2025 and in 2030 is the cloud segment.

Operation phase expected to generate direct annual turnover of around € 1 billion by 2025 and over € 4 billion by 2030

Figure 17: Direct turnover, operation phase, M€



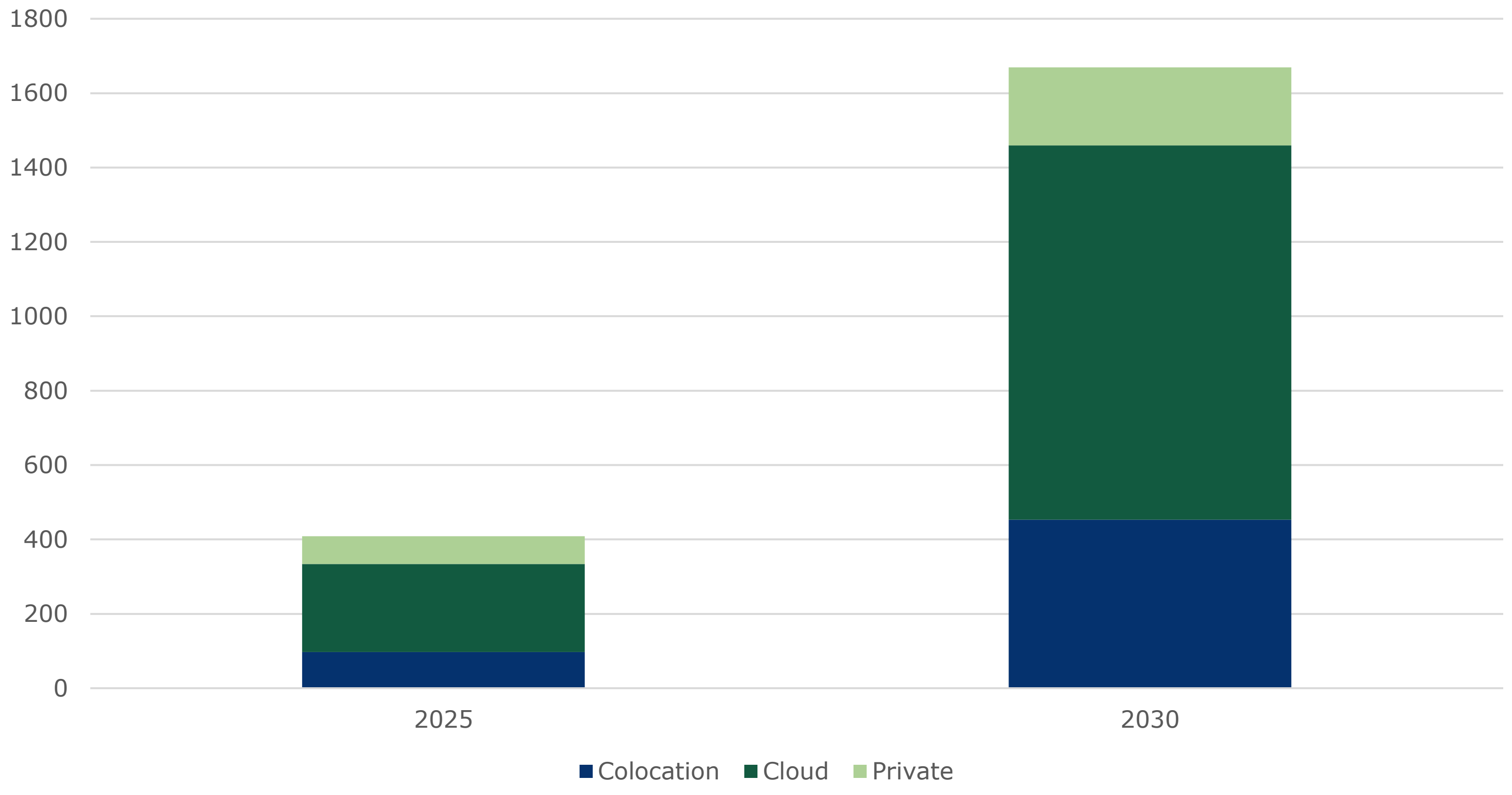
Operation phase direct effects on turnover

The direct annual turnover impact in the industry is estimated to be close to € 1 billion by 2025. This is expected to increase to over € 4 billion in year 2030.

The largest segment in terms of turnover both in year 2025 and in 2030 is the cloud segment.

Operation phase expected to generate annual multiplicative output of around € 400 million by 2025 and over € 1,6 billion by 2030

Figure 18: Output, M€, operation phase



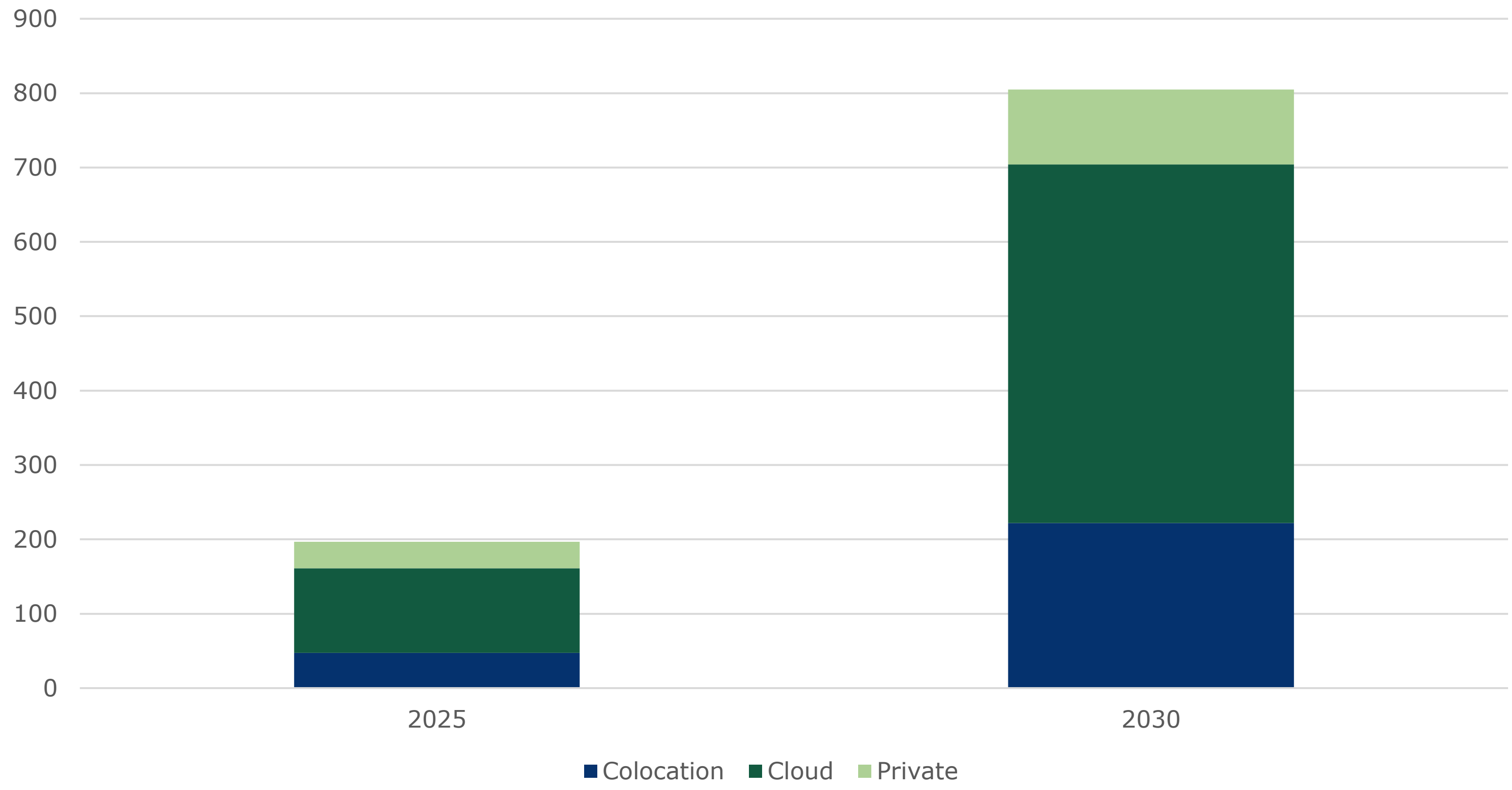
Operation phase multiplicate effects on output

The annual multiplicative impacts during the operation period on output in the industry are estimated to be close to € 400 million by 2025. This is expected to increase to over € 1,6 billion in year 2030.

The largest segment in terms of generating multiplicative effects during operation phase on output both in year 2025 and in 2030 is the cloud segment.

Operation phase expected to generate gross multiplicative value added of € 200 million by 2025 and over € 800 million by 2030

Figure 19: Gross value added, M€, operation phase



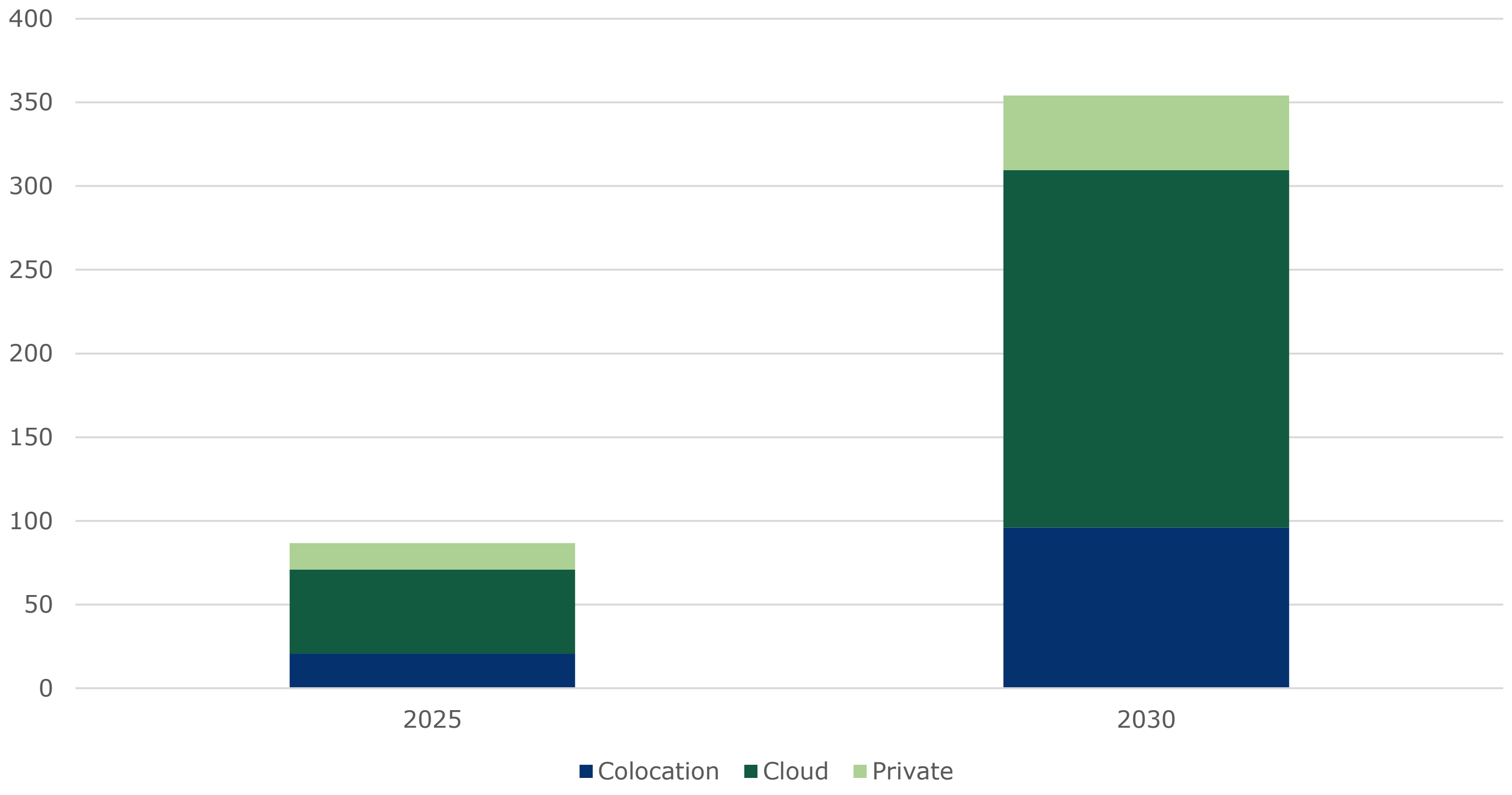
Operation phase multiplicate effects on gross value added

The annual multiplicative impacts during the operation period on gross value added in the industry are estimated to be close to € 200 million by 2025. This is expected to increase to over € 800 million in year 2030.

The largest segment in terms of generating multiplicative effects during operation phase on gross value added both in year 2025 and in 2030 is the cloud segment.

Operation phase expected to generate multiplicative tax revenues of €100M by 2025 and over €350M by 2030

Figure 20: Tax, M€, operation phase



Operation phase multiplicate effects on tax

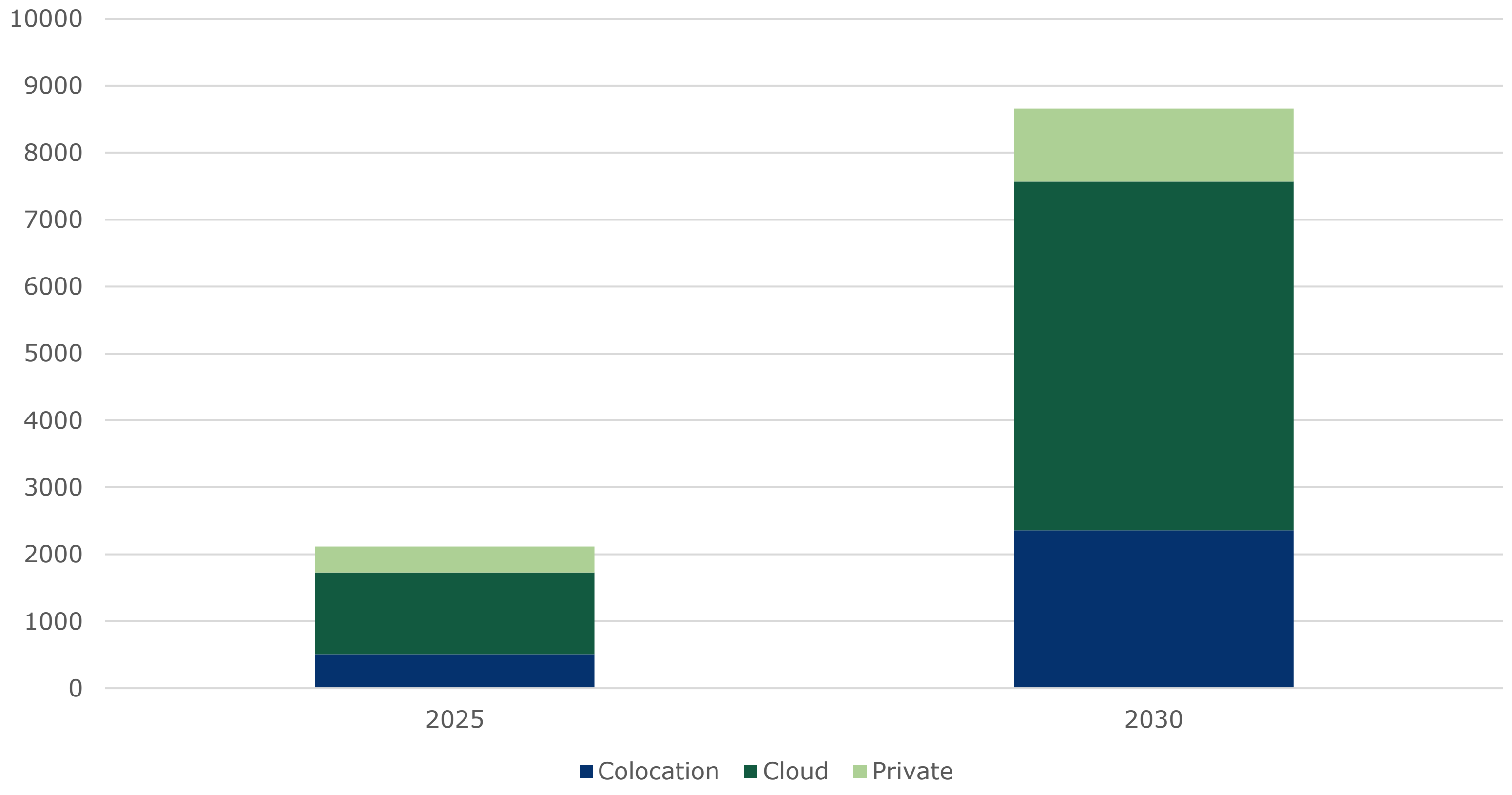
The annual multiplicative impacts during the operation period on tax in the industry are estimated to be close to € 100 million by 2025. This is expected to increase to over € 350 million in year 2030.

The largest segment in terms of generating multiplicative effects during operation phase on tax both in year 2025 and in 2030 is the cloud segment.

In this context, tax refers to several types of taxes generated through the multiplicative impacts, including product and production taxes, municipal tax, value added tax (VAT), corporate tax, real estate tax, and income tax.

Operation phase expected to sustain around 2 000 multiplicative FTE by 2025 and close to 9 000 FTE by 2030

Figure 21:Employment, FTE, operation phase



Operation phase multiplicate effects on employment

The annual multiplicative impacts during the operation period on employment in the industry are estimated to be close to 2 000 FTE by 2025. This is expected to increase to close to 9 000 in year 2030.

The largest segment in terms of generating multiplicative effects during operation phase on employment both in year 2025 and in 2030 is the cloud segment.

Some of these indirect jobs mean in practice daily work at data center sites in areas such as development, design, logistics, installation, maintenance, operations, cleaning, and security. For example, Google's data center in Hamina directly employs 105 people, but around 400 people work regularly full time at the site when subcontracted staff are included. Data centers broadly employ people from multiple industries both locally and nationally through multiplier effects.

Summary

Economic impacts on industry level

Summary

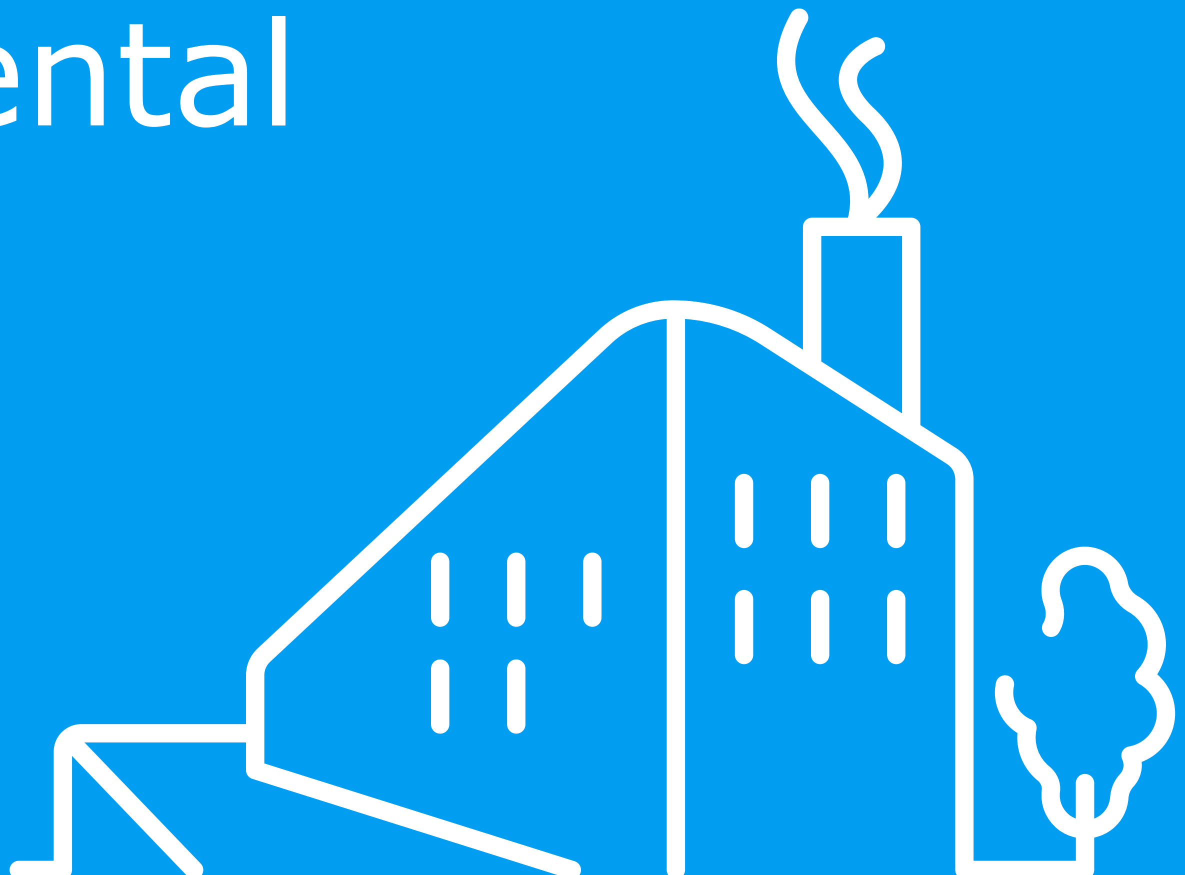
In summary results of the economic impact analysis show that data center industry has significant economic impacts on Finnish economy. Effects materialise through two distinct channels: direct effects that arise directly from operating data centers (turnover, employment, taxes) and multiplicative effects that arise through increased economic activity in other sectors, because of data center investments and their operations (output, gross value added, taxes and employment).

To validate findings, it is worthwhile to check how results compare to other studies that have applied same methodology than what was used in this study. Due to ambiguities in definitions and measurements all three studies listed in the literature review section cannot be compared. Available comparison, however, provides confidence in this study's results, as reported impacts are of the same magnitude as in benchmark studies.

The multiplicative effects on gross value added were estimated to be € 3,95 million per MW for construction phase and € 0,67 million per MW for operation phase for a data center investment in Havering London. These compare to our study's findings which are € 3,17 million per MW for both colocation and cloud segments during construction phase and € 0,67 million per MW for colocation segment and € 0,70 million per MW for cloud segment during operation phase. Concerning employment, London Havereing investment is reported to have construction period impact of 58 FTEs per MW and Norway Hamar investment 55 FTEs per MW. In this analysis the estimate was 38 FTEs per MW. Although benchmark studies report higher impacts, they still are in the same magnitude. For operation phase London Havereing investment is reported to have annual impact of 9,8 FTEs per MW and Norway Hamar investment annual impact of 2,4 FTEs per MW. From these one is higher and one lower that this study's estimates (7,13 for colocation and 7,56 for cloud). Average 6,1 from benchmark studies, however, is close to this study's estimates, thereby providing confidence in the results.

Study	**Economic impact, GVA (multiplicative effects)**		**Employment impact, FTE (multiplicative effects)**	
	Construction phase	Operation phase	Construction phase	Operation phase
London, Havering, 600MW, € 6,65 billion investment	3,95 M€/MW	0,67 M€/MW	58 FTE/MW	9,8 FTE/MW
Norway, Hamar, 150MW, € 2 billion investment	NA	NA	55 FTE/MW	2,4 FTE/MW
FDCA impact analysis, colocation segment, 100MW, € 1 billion investment	3,17 M€/MW	0,67 M€ /MW	38 FTE/MW	7,13 FTE/MW
FDCA impact analysis, cloud segment, 100MW, € 1 billion investment	3,17 M€/MW	0,70 M€ /MW	38 FTE/MW	7,56 FTE/MW

9. Environmental impacts



Data centers have both positive and negative environmental impacts

	Data centers in general	Notes on data centers in Finland
Positive impacts and opportunities	• The data center industry has established voluntary sustainability initiatives that go beyond regulatory requirements, driving sector-wide improvements in energy efficiency, resource management, and overall environmental performance. • Regulatory and voluntary frameworks, such as the Climate Neutral Data Centre Pact and the EU's Energy Efficiency Directive (EED), guide the sector towards climate neutrality and internationally recognized green building certification programs incentivizes data centers to adopt energy-efficient practices. • The ICT sector's carbon handprint—emission reductions enabled in other sectors—can outweigh its footprint when implemented sustainably. • Many data center companies have already introduced circular economy programs, including material recovery and recycling. Further progress could enable a gradual shift away from primary raw materials in hardware and other electronic components. • Construction, ownership, and operation of data centers are recognized as activities that can generate sustainable (EU Taxonomy-aligned) revenue and capital expenditure. The regulation is incorporated into national accounting acts across member states, including Finland, with a limited number of data center companies coming into scope in 2025 and a broader application anticipated in 2028. • While only a small share of facilities currently fall under the environmental criteria, integrating these requirements into the planning and construction of new data centers would further facilitate alignment and help ensure that operations qualify as green revenue.	• Several global and domestic operators with data centers in Finland have committed to net zero targets. Thanks to Finland's low carbon electricity mix , several data centers already run fully on renewable electricity. Net zero efforts are also supported by extensive waste-heat recovery integration. • Data center demand (through PPAs) is a significant driver of new wind power deployment in Finland. The scale of PPA contracts from major tech players has helped de-risk projects and provide stable demand. • Finland's climatic conditions support energy efficiency and lower PUE values through longer free cooling season. • District heating networks enables reuse of recovered waste heat. Assessing the possibility to use waste heat recovery is mandated for data centers with a total rated energy input exceeding 1MW by the EU Energy Efficiency Directive. • Environmental load from the construction phase can be reduced by reusing existing buildings or choosing previously developed sites. • Data center projects meeting certain criteria in the Act on the Environmental Impact Assessment Procedure (252/2017) and Government Decree on the Environmental Impact Assessment Procedure (277/2017) require throughout environmental impact assessment procedure during a project planning phase. • Development of the electrical and electronic equipment recycling and reuse together with WEEE recycling industry may create a potential new business opportunities in Finland and support EU target to develop critical raw materials value chains. • Finland has plenty of different water sources and water bodies are not as stressed as they might be in drier regions enabling more responsible cooling water alternatives when different cooling options are evaluated.
Common concerns and risks	• The data center construction phase causes natural resources use and emissions from materials like concrete and steel, as well as land use and local ecosystem effects. • Resource-intensive production of data center hardware (servers, data storage, network equipment) consumes natural resources and creates emissions. • Data centers generates substantial amount of electronic waste, which is the one of the fastest growing waste streams in Europe. Data center operators are extending service life where feasible, combined with circular-economy programs for refurbishment, resale and component re-use. However, the electronic waste amounts are expected to increase due to the significant expansion of data center capacity. • Water use in cooling can create a trade-off between energy and water efficiency, particularly in warmer and drier regions outside the Nordics, where evaporative systems may place pressure on local water resources.	• Many of the common concerns can be observed in the general debate in Finland as well. • It should be noted that many of these concerns are not specific for data centers but apply to many electricity intensive industrial activities. • The SERKut project, which aims to improve the recycling process for machinery and equipment materials (WEEE) in Finland, recognizes that electronic waste amounts are increasing in Finland as well. It can be expected that data center with significant capacity growth contribute to the waste amounts, however the industry is working towards minimizing the waste amounts.

Sources: EUDCA, Helaimia, LVM, VM, Vaisala, CircHubs, European Commission, Directive (EU) 2023/1791, EU Taxonomy Compass, Stakeholder interviews, Ramboll analysis

10. Social impacts

Social impacts key points

	Data centers in general	Notes on data centers in Finland
Positive impact and opportunities	• Data centers play a critical role in increasing connectivity and digitalization of society • Data centers are integral to the functioning of modern economies, housing critical applications and services across various sectors, including finance, healthcare, and government. Their uninterrupted operation is vital for national security and economic stability. • Critical Entities resilience Directive (CER) identifies data centers as critical infrastructure, on which EU Member States should take specific measures to ensure maintenance of vital societal functions or economic activities can be provided in an unobstructed manner. • Data centers generate employment opportunities. Data centers may offer employment opportunities especially in formerly industrialized areas outside major growth centres. • Increased sector coupling may offer opportunities for e.g. affordable heating to local population.	• Data centers play a critical role as a part of Finnish critical infrastructure enabling provision of critical services in Finland. Finland is also seen as an attractive location due to safety and security. • Data centers are expected to generate jobs both in the construction and operational phases in Finland contributing to increased employment. Finnish cities as well as formerly industrial areas outside major growth centres are attractive for data center companies. • Data centers typically attract other organizations and the demand for B2B and B2C services increases in the area. • Due to widespread district heating networks in Finland, recovered heat can be effectively used to heat Finnish homes.

Common concerns and risks	• The general public and the community in which data centers are built in have concerns, which are typical to any electricity intensive industrial activity, such as:
	  ◦ Common concerns about data centers relate to property values, visual aesthetics, noise and land use.
	  ◦ Local populations often express concern about data center impact on electricity prices and the environment.
	• The human rights impacts of most data centers are unknown. According to surveys and assessment of publicly available information, only a handful of companies with data centers being planned, constructed or operated have assessed project level human rights impacts and thus fulfilled duties to be aware of potential impacts.
		• Many of these concerns can be observed in the general debate in Finland as well. Data center companies want to be good neighbours in the communities and put significant effort into realising positive relationships. According to the interviews, many of the concerns begin to dilute once the construction starts and provides local employment opportunities. Similarly, the concern for electricity availability tend to dilute as the construction starts.
		• Most data centers have not yet undertaken formal human rights impact assessments, as such reviews remain voluntary at this stage. Only a limited number of companies report having completed them. As human rights due diligence becomes embedded in sustainable finance frameworks, conducting these assessments will support alignment with forthcoming EU Taxonomy requirements and strengthen overall compliance and risk management.

Sources: Stakeholder interviews, Ramboll analysis, EU Taxonomy Compass

11. Data centers on Energy markets

Data centers drive renewable energy projects and have opportunities in heat reuse and electricity grid support when the right conditions are met

	Data centers in general	Notes on data centers in Finland
Positive impact and opportunities	• Major data center operators invest in renewable energy projects by signing long-term renewable energy power purchase agreements. • Data centers can become platforms for local heat-requiring services or industrial processes, supporting regional circular economy by recycling heat when the right conditions are met. • Data center integration into wider electricity system is an ongoing process and market rules may need to be reformed to better support integration of large energy consumers like data centers.[1] • Data centers designed for this purpose can utilize their backup power equipment (UPS) services that can support the stability of the power system. • Hyperscalers are important participants in the PPA market, driving the development of new renewable electricity production.	• Some of the data centers can help with electricity system stability by leveraging on-site batteries (UPS). If incentivised appropriately, data centers can develop demand response, load shifting and other services that has a potential to enhance electricity system stability. • In cold regions, excess heat may be fed into district heating networks when there is district heating network nearby, and cold climate reduces cooling energy demand - improving overall energy efficiency.
Common concerns and risks	• Data centers usually procure electricity with fixed fee contracts. Despite the fixed fee contracts, data centers carry their share of potentially increasing balancing costs and electricity market prices as those are always included in the fixed prices.	

Sources: Stakeholder interviews, FDCA questionnaire, Ramboll analysis, [1]Fingrid KJV 2026 draft

Perspectives on energy usage of data centers

Energy usage perspectives

Demand/Production

- The increasing number of data centers is raising the overall electricity consumption in Finland. This increase in electricity consumption is currently being met primarily by onshore wind.
- On the other hand, growing demand from data centers and other sector can accelerate investments in electricity production, at a pace compatible with the speed at which data centres can be built.
- There are significant production opportunities waiting for increased electricity consumption to trigger investment decisions.
- According to Renewables Finland (January 2025)[1]:
  - Onshore wind projects in identified/pre-design phases: Over 7 000 MW.
  - Projects in permitting phases: About 50 000 MW.
  - Permitted capacity: 3 800 MW.
  - Capacity under construction: 1 200 MW.
- These numbers are significantly larger than any plans for data center electricity needs, even when considering the lower capacity factor (according to 3000 – 4000 hours full load utilisation rate per year) of onshore wind compared to base load.
- There is more than enough generation capacity available to be built.
- Investments in renewable energy support the transition to cleaner electricity production, as large data center operators finance projects and enter into long-term power purchase agreements for renewable energy.

Electricity grid support

- The high penetration of renewable energy in Finland can lead to greater frequency deviations in the electricity grid. Those data centers that are designed to do so can play a key role in enhancing grid stability and resilience in the future.
- Some of the data centers can help with electricity system stability by leveraging on-site batteries (UPS, emergency power systems). If incentivised appropriately, data centers may develop demand response, load shifting and other services that has a potential to enhance electricity system stability.
- The Fingrid FFR (Fast Frequency Reserve) market is a daily auction where Fingrid procures automatic, high-speed reserve capacity to quickly counteract frequency drops caused by low system inertia and generation losses. Some data centers are already taking part to this market and thus helping to stabilize frequency and supporting the ongoing integration of renewable energy sources.

Heat re-use – extra efficiency in cold locations

- In cold climates, energy efficiency improves, as excess heat can be directed to the district heating network for reuse where the right conditions are met (availability of heat off-taker, or a district heating network nearby). This can benefit the communities around data centers and help local services and industrial processes in their decarbonization pathway.
- 45% of heating in Finland is district heating. It supports large-scale heat reuse from data centers.

Future development

- As we look toward the future, some of the data centers are developing flexibility when the market rules, regulation and reserve market instruments evolve suitably. Network operators need to collaborate with data center operators to design products that incentivise flexibility. This can help data centers efficiently adapt to evolving electricity market requirements.[2]
- The next decade will see substantial advancements aimed at enabling the electricity balance to become more robust, thus creating stability in increasingly fluctuating markets.
- The foundational value of data processing provided by data centers, much like other essential utilities, will underscore their importance in a sustainable energy landscape.
- In conclusion, despite their energy consumption, data centers can be harmonized with our energy systems through innovative strategies and adherence to regulatory frameworks, sustaining essential data processing capabilities and paving the way for greener energy solutions.

Sources: Stakeholder interviews, FDCA questionnaire, Ramboll analysis, [1]Renewables Finland, [2]The Register

Data centers in Finland are energy efficient, utilize fully renewable electricity production, have a high rate of energy reuse, and exhibit low water consumption.

Finland's position in the EU data center efficiency and sustainability metrics is as the top performer

Finland is a top performer in the EU regarding data center efficiency and sustainability, which can be seen in the metrics in the table below.

Metric	FI result	EU average	FI position
Ratio of total renewable energy consumption (REF)	100%	86%	EU Number One
Energy Reuse Factor (ERF) (Only DC:s with heat reuse)*	45,7%	20,8%	EU Number One
Water Usage Effectiveness (WUE)	0,07	0,58	EU Number One
Power Usage Effectiveness (PUE)	1,17	1,36	EU Number Two

*Data centers that did not report any heat reuse are excluded from this indicator.

Finland is an optimal place for heat reuse

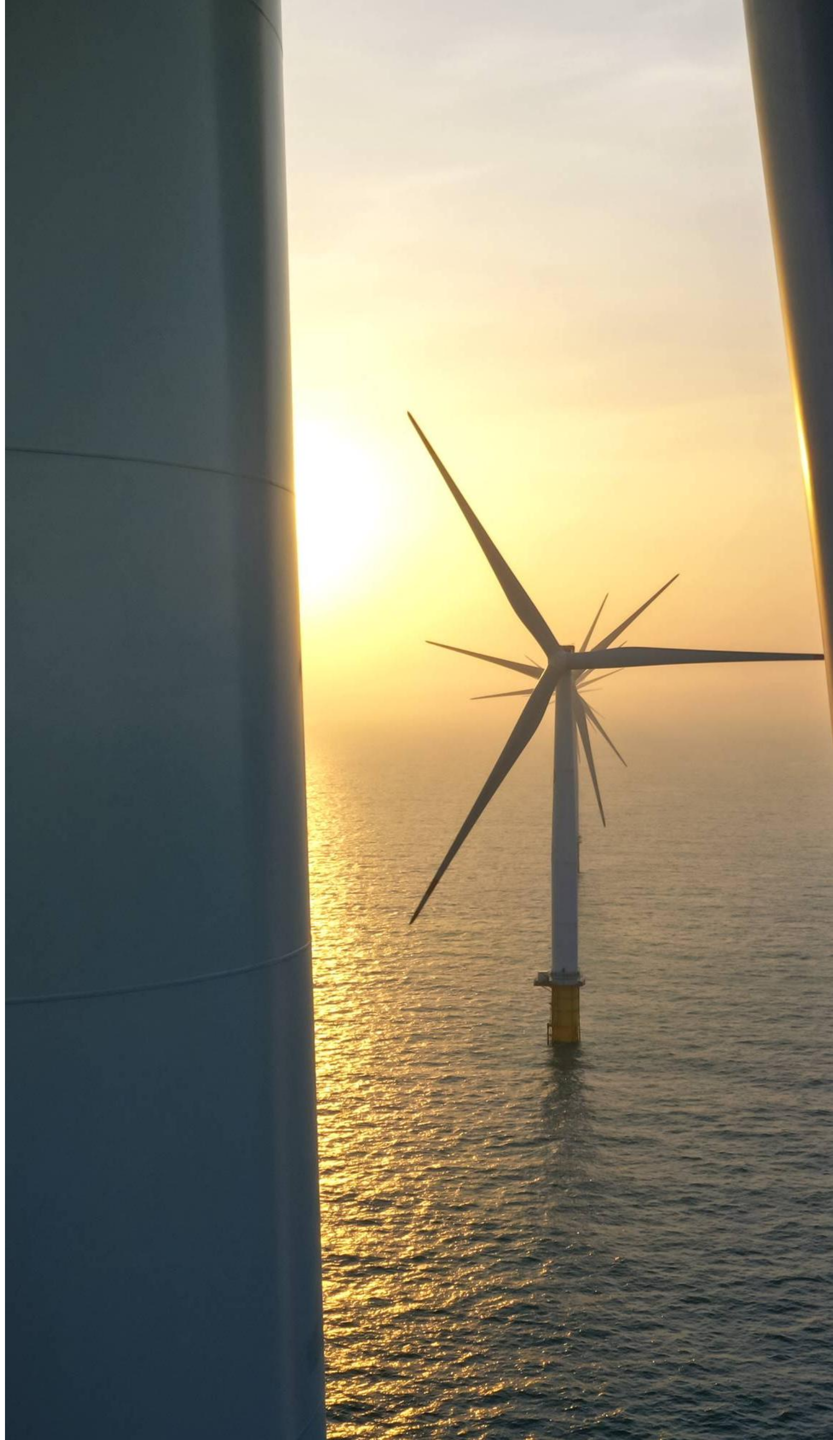
Finland is especially suitable for heat reuse due to the existing extensive district heating infrastructure and higher heating demand in the colder climate. Below are some new data center heat reuse capacity projects coming online during the heating season 2025-2026:

Data center	Some new data center heat reuse capacity coming online during the heating season 2025-2026:
Google Hamina	A heat pump plant to cover 80% of Hamina's district heating needs
Telia Pitäjänmäki	Heat reuse capacity increase from 60% up to 90% of the data center heat

Sources: European Commission, Ramboll analysis, Nohewa, Datacenter Forum

Hyperscalers are important participants in the PPA market, driving the development of new renewable electricity production

- New data centers are increasing electricity consumption in Finland
- PPAs are a common method for securing renewable electricity supply for data center growth
- New PPAs are triggering the construction of new renewable projects, increasing renewable electricity production
- Hyperscalers have been significant drivers of the PPA market in Finland with several published contracts



Sources: Ramboll analysis

12. Appendix – Impact Assesment Report

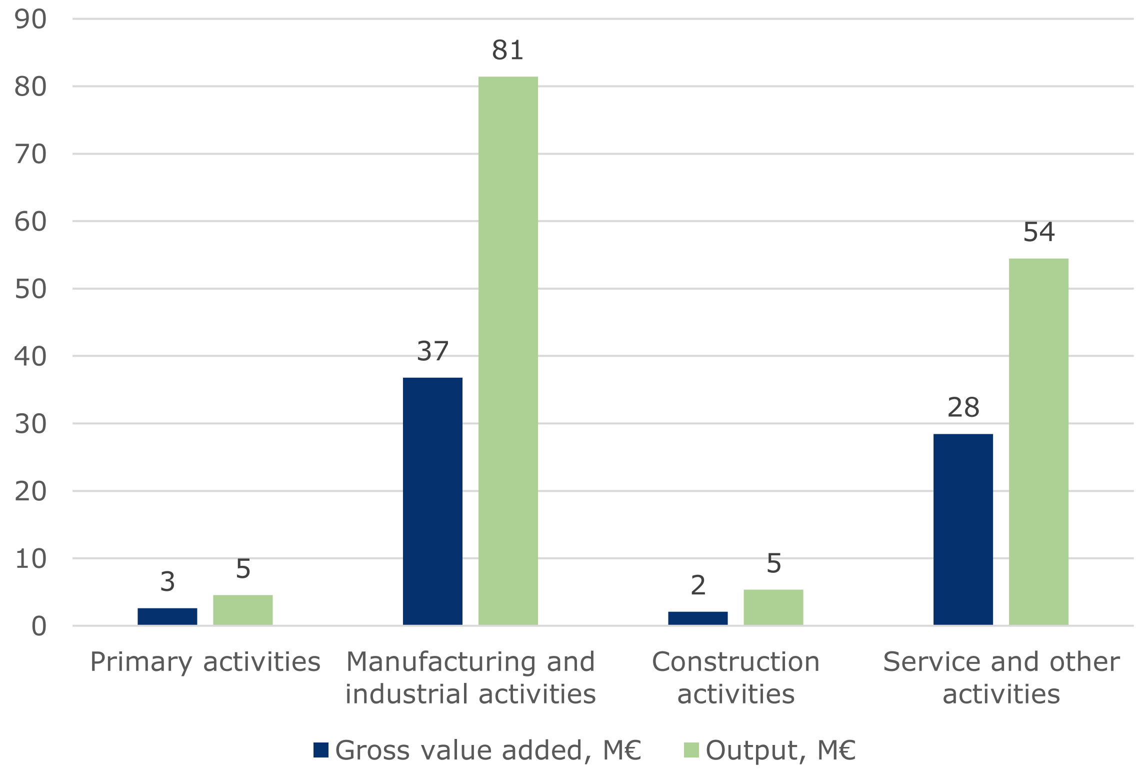
A 100MW colocation DC is projected to generate € 70 million in gross value added and € 146 million in output annually during its operation

During the operation phase, the annual multiplicative effects on **output and value added**—including indirect and induced impacts—from a 100MW data center investment are distributed across four key economic sectors, as depicted in Figure 22.

The total annual increase in output attributed to data center operations is estimated at € 146 million. The manufacturing and industrial activities sector accounts for the largest share with € 81 million, while the service sector and construction sector also see notable growth, contributing € 54 million and € 5 million, respectively.

In terms of gross value added, the total annual increase resulting from the data center's operation is estimated at € 70 million. The manufacturing and industrial activities sector leads with an increase of € 37 million, followed by the service sector at € 28 million. The construction and primary sectors experience only marginal growth in gross value added during this phase.

Figre 22: Annual economic impacts during operation phase (M€)



A 100MW colocation DC is expected to increase labour demand by 756 FTE and generate € 31 million in tax revenues annually during its operation

Annual multiplicative impacts on labour demand and tax revenues (including indirect and induced effects) resulting from the operation of a 100 MW data center are distributed across four main economic sectors, as illustrated in figures 23 and 24.

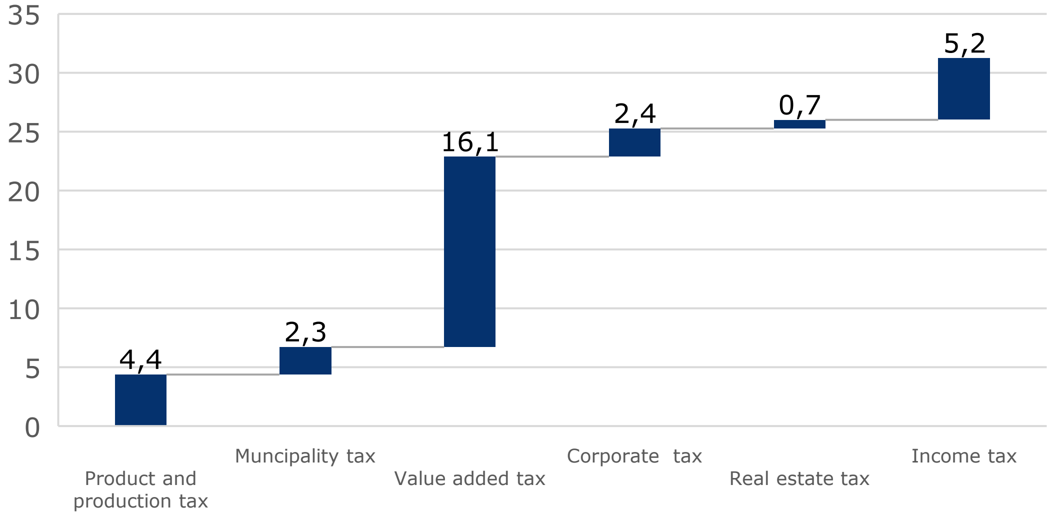
During the operational phase, the total effect on **labour demand** reaches 756 full-time equivalents (FTEs). The service sector accounts for the largest portion with 367 FTEs, followed by manufacturing with 188 FTEs, and construction with 27 FTEs.

The data center's operation also generates a significant increase in various **taxes**, amounting to 31 million euros, as demonstrated in figure 19. Value added tax experiences the greatest rise at 16 million euros, equalling the combined total of other tax categories including income tax (5 million euros), production tax (4 million euros), municipal tax (16 million euros), corporate tax (2 million euros), and real estate tax (1 million euros).

Figure 25, presented on the next page, offers a detailed sectoral breakdown of the increased **labour demand**. The largest expansions occur in electricity, gas, steam, and air conditioning supply (NACE 35) with 80 FTEs, other support services (NACE 80-82) with 74 FTEs, and computer and information services (NACE 62, 63) with 56 FTEs. In summary, the additional labour demand is widespread but is particularly concentrated within the energy and service sectors.

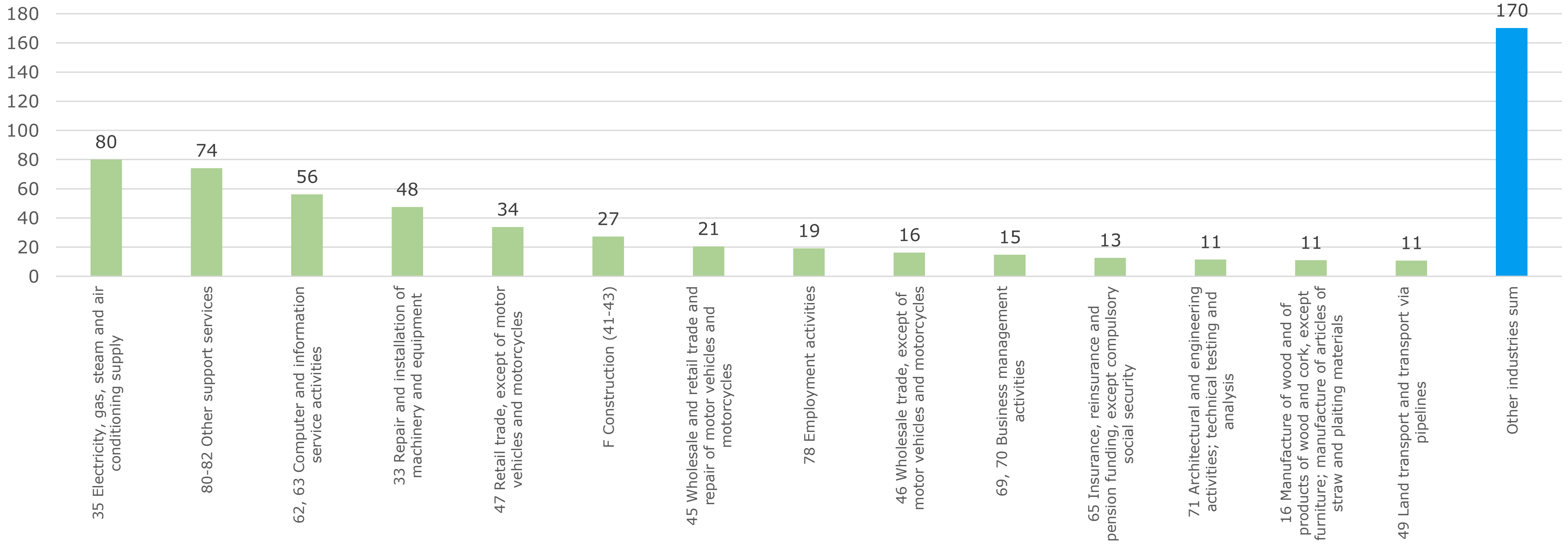
Figure 23: Annual labour demand in Finland per sector during operation phase, (FTE)

Figure 24: Annual tax revenues per tax category in Finland during operation phase (M€)



Labour demand is highest in the maintenance and other industry sectors during the operational phase of a 100MW cloud DC

Figre 25: Annual labour demand per NACE category in Finland during operation phase (FTE)



"Other industries" includes the remaining sectors beyond those explicitly shown in the chart. These sectors cover a wide range of economic activities, including agriculture, forestry, food and textile industries, chemicals, energy and utilities, ICT services, media, financial services, education, health, public administration, culture, and more. While their individual contributions are smaller, together they account for a significant share of labour demand during the construction phase, highlighting the broad economic footprint of data center investments.

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