Menon Economics

REPORT

Economic aspects of the Norwegian data centre industry

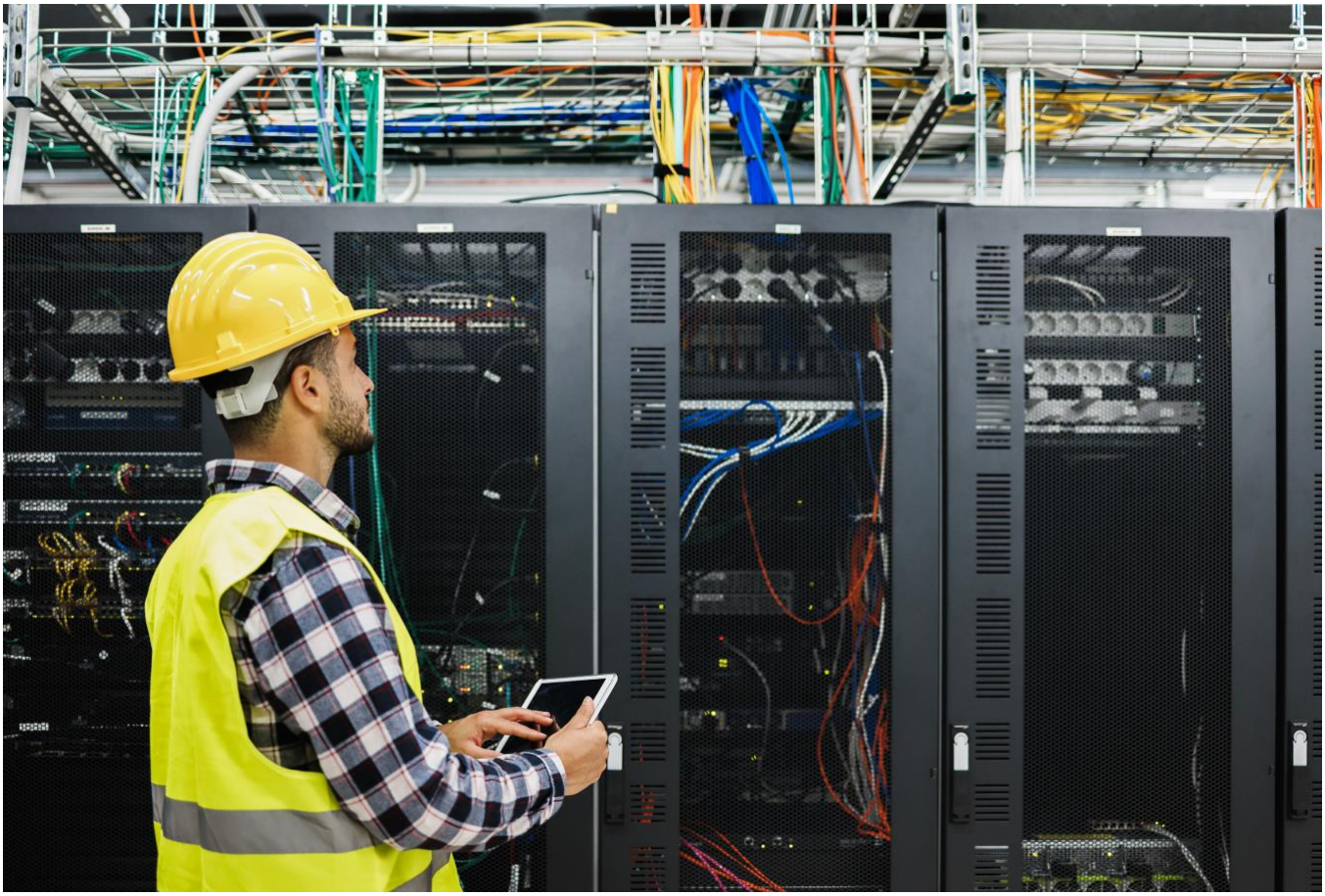


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Preface

On behalf of the Ministry of Digitalisation and Public Governance (DFD), Menon Economics has analysed the economic aspects of the data centre industry in Norway. The aim of the assignment has been to map the industry and to estimate and compare value added and employment effects, both historically and going forward, and in both the operational and construction phases. In addition, we assess the power situation, climate and environmental impacts, developments in Europe and whether developments are in line with the data centre policy. The report is the final deliverable in the project and builds on two interim deliverables from August and September 2026.

The project team has consisted of Jonas Erraia (partner in charge), Aljoscha Schöpfer (project manager), Caroline Wang Gierløff, Even Winje (quality assurance), Bjørnar Volden, Kristine Engelhardt Pedersen, Henrik Motrøen Foseid and Falk Johannes Behrens. Multiconsult, represented by Mette Kristine Kanestrøm, Sigrid Sunde, Johnny Andreas Sannes and Hanna Birgitte Sletta, has been a subcontractor in the project.

The analyses, assessments and recommendations in this report have been prepared by Menon's consultants, and we take full responsibility for the content. Artificial intelligence (AI) is part of our toolbox, alongside other analysis and support tools. We use AI where it strengthens the quality and efficiency of our work. This includes transcription of interviews, collection and processing of data and documents, language editing of our own texts and support for visualisation.

We thank DFD for an exciting assignment.

September 2026

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Summary

Within the last few years, the data centre industry has become one of the fastest-growing electricity consumers globally, and interest in new establishments across large parts of the world is enormous. At the same time as the industry is growing, however, criticism of data centres is also mounting. In recent months, a number of European countries and US states have introduced relatively strict regulatory regimes, either directly or indirectly through adjacent legislation. Demand for grid capacity from the industry is also high in Norway, and several players are calling for similar measures in Norway. To improve the general knowledge base on the industry, the Ministry of Digitalisation and Public Governance (DFD) has asked Menon Economics to map existing and known planned data centre establishments in Norway, and to analyse what the industry means for the Norwegian economy, the power system and a range of other societal aspects.

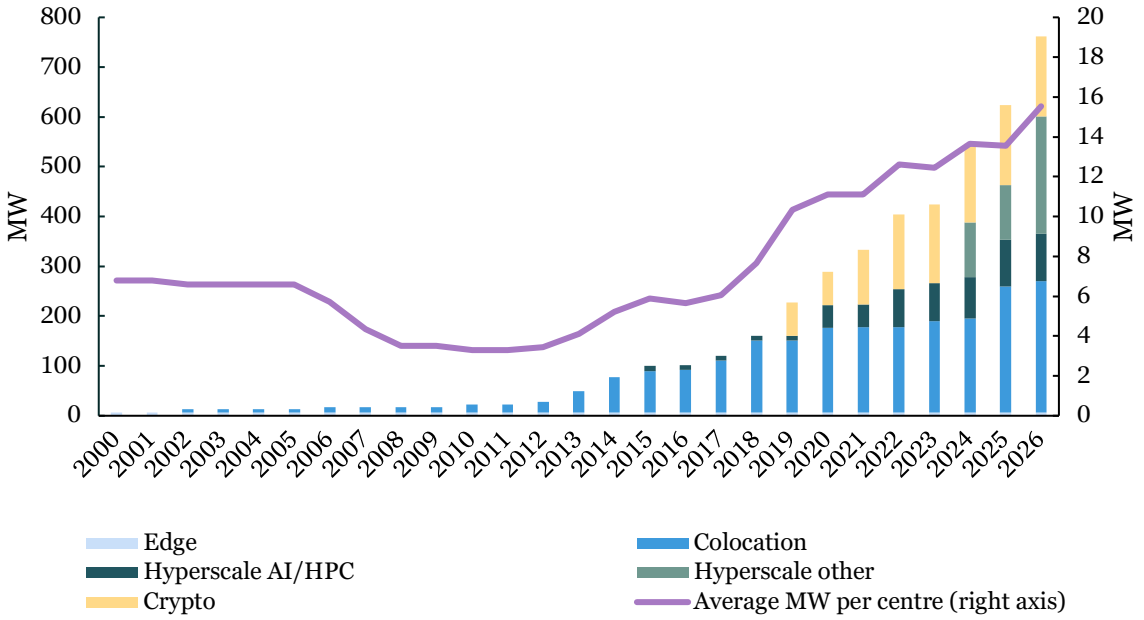
The report estimates the contribution to gross domestic product (GDP) and employment effects from the operation and construction of the current industry, and compares the industry with power-intensive industry. We have developed three scenarios for developments towards 2035, which form the basis for the analyses of future economic impacts, electricity consumption and electricity prices. Finally, the report also considers Norway's position within the Nordic countries and Europe, and assesses developments in the industry against the government's data centre strategy from 2025.

The data centre industry is growing rapidly, and its electricity consumption with it

The data centre industry in Norway has gone from being dominated by small, in-house facilities to becoming one of the largest data centre markets in the Nordic countries. As of mid-2026, there are 87 active data centres in Norway. Of these, 49 commercial facilities with a combined capacity of 761 MW are included in the analysis. The remainder are small facilities linked to businesses whose main activity is not data centres. Colocation data centres dominate in number, while large hyperscale establishments account for most of the capacity growth in recent years. Norwegian data centres' electricity consumption was 3.2 TWh in 2025, equivalent to around 2.3 percent of total Norwegian consumption. Consumption has quadrupled in three years.

Figure A shows total installed capacity at commercial data centres and the average installed capacity per data centre over time.

Figure A: Development in the average size of commercial data centres and total installed capacity (MW) in Norway. Source: Menon Economics.



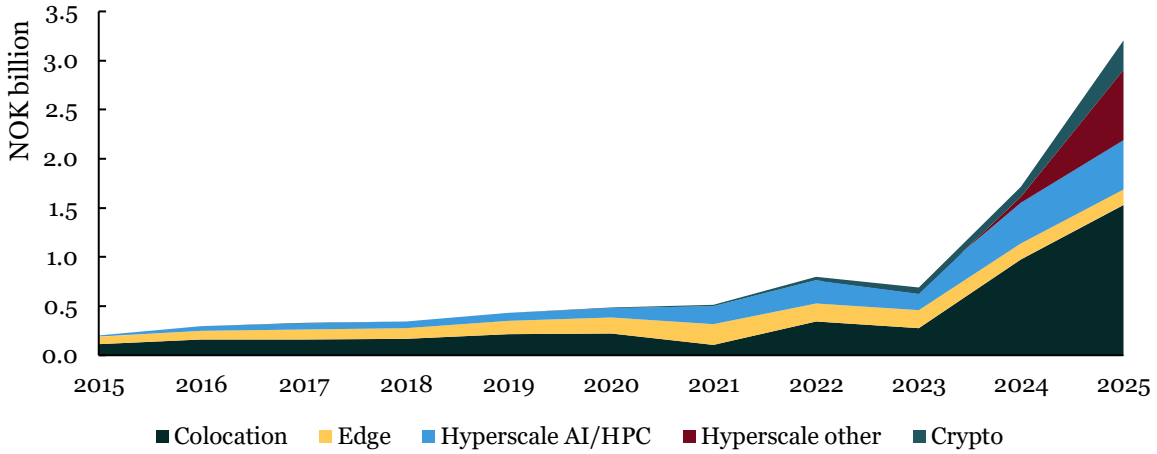
Interest in further establishments exceeds the size of the current industry many times over. Data centres account for around half of the roughly 22,600 MW that have been granted capacity reservations or are in the capacity queue at Statnett. Neither reservations nor requested capacity are forecasts, and it is highly uncertain how much will be realised.

The industry's direct contribution to GDP was around NOK 3.2 billion in 2025

We estimate that the data centres in the population of active facilities had combined revenue of around NOK 6.9 billion and direct value added of around NOK 3.2 billion in 2025. The operators had around 600 employees. Value added per employee is therefore high, around four times the average for the mainland economy, and higher than in all other major Norwegian industries apart from the petroleum sector and the financial industry. We estimate that operations supported tax revenues of around NOK 700 million in 2025.

Figure B shows how direct value added has developed in line with the build-out of the industry.

Figure B: Direct value added in the data centre industry over time. Source: Menon Economics.



Value added has grown most in recent years, as more large facilities have come into operation. Employment has grown less than capacity and value added, because the largest facilities have few employees per MW.

The industry is characterised by foreign ownership. Around 94 percent of value added in 2025 is linked to companies with foreign ultimate owners. This is considerably higher than for manufacturing as a whole, where foreign ownership is just above 50 percent. Measured by direct ownership, the picture is somewhat different: Norwegian companies own 75 percent, because many operators are organised through Norwegian companies with foreign owners further up the ownership chain. We emphasise in the report that foreign ownership does not mean that all value accrues to foreign owners. Norwegian employees are paid out of the value added, tax is paid on both wages and profits, and part of the profits is reinvested in Norway.

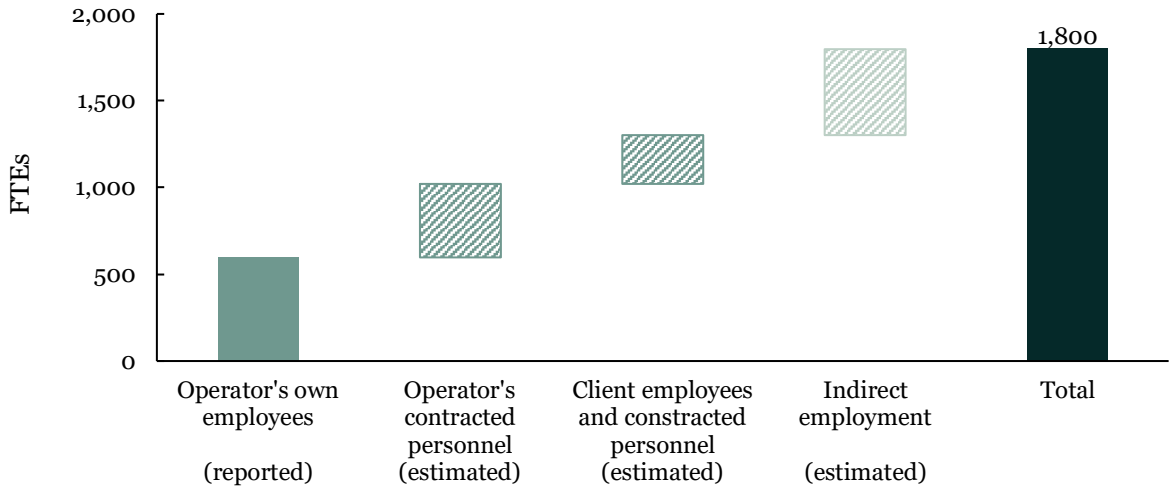
The construction of today's facilities has produced large but temporary effects in the investment phase. We estimate that construction has in total contributed around NOK 56 billion in investments accruing to Norwegian private companies, and supported NOK 39 billion in value added and 30,000 full-time equivalents (FTEs). We emphasise that these figures are accumulated through the construction phase to date. In Ireland and other countries that attracted many data centres early on, supply industries have emerged that now export substantially to data centre projects in other countries. Whether the same happens in Norway depends, among other things, on the pace of construction here and in other countries. Some Norwegian suppliers have already begun delivering to projects in other European countries.

Including the supply chain, the operation of Norwegian data centres supported around 1,800 FTEs

The operation of data centres also generates activity among the operators' suppliers. Contracted personnel and clients' own employees work at the facilities. The operators' intermediate consumption also supports employment among subcontractors and further up the value chain. The structure differs somewhat from traditional manufacturing. First, the industry has a large share of permanently contracted personnel. Second, there are few other industries where clients' own employees are present on site in the way we see in the data centre industry. To capture the full picture of the industry's economic footprint, we include these quantities in the analysis.

Including these, the operation of the current industry supported around 1,800 FTEs and value added of around NOK 4.3 billion in 2025. Figure C shows how the FTEs are distributed between the operators, contracted personnel, clients' employees and indirect employment.

Figure C: Combined direct and indirect employment in operations in 2025, including estimates of contracted personnel and clients' employees. Source: Menon Economics.



The operators' own employees account for around 600 of the FTEs. Contracted personnel account for around 420 FTEs, clients' employees at the facilities for 280 FTEs, and indirect employment among suppliers for 500 FTEs in 2025. Around two out of three FTEs are thus not employed by the operators themselves.

The estimates of the indirect effects are based on actual transaction data from six Norwegian data centre facilities, with historical payments to around 1,500 unique Norwegian supplier companies matched against Menon's company database. This ensures high precision in the estimates for these facilities, which cover around 20 percent of capacity in the operational phase and around a third in the construction phase. For the rest of the industry, the estimate is scaled up from the ratios in this sample.

Data centres have high value added per employee, but lower employment per MW than power-intensive industry

Data centres are often compared with power-intensive industry, because both industries use large amounts of electricity and electricity is a scarce resource. We have compared the data centre industry with three parts of power-intensive industry: the metals industry, the paper industry and the chemical industry. We mainly consider value added, productivity and employment.

Overall, the data centre industry scores higher than the three sub-industries on two of our three measures of value added, while the outcome on the third is more even. Value added per person employed was above NOK 5 million in the data centre industry in 2025, compared with just over NOK 2 million in each of the three power-intensive sub-industries. This has varied over time, but our expectation is that an industry increasingly dominated by large data centres will continue to have higher productivity than power-intensive industry. Measured per GWh of electricity consumption, however, the picture is considerably more mixed. At just under NOK 900,000 per GWh in 2025, data centres are on a par with the metals and paper industries, but clearly below the chemical industry. The figures have fluctuated historically for both the data centre industry and the three sub-industries. Value added per tonne of CO_2e emissions is around 75 times higher than in power-intensive industry as a whole.

Employment per unit of electricity is lower than or on a par with power-intensive industry, depending on the type of data centre. Counting only the operators' own employees, the data centre industry has 0.15 persons employed per GWh, less than half the level in the metals industry. Including contracted personnel and clients' employees, the industry is roughly on a par with the metals industry, but below the paper industry and the chemical industry. Looking at different types of data centres, the large facilities, which account for much of the new capacity, have the lowest employment intensity. Medium-sized data centres lie just below the metals industry, while small data centres lie above it. All types of data centres have lower employment per unit of installed power than the paper industry and the chemical industry.

At the same time, we consider that the comparison is of limited use as a basis for assessing what the electricity should be used for, and we point to several reasons for caution in interpreting it. The data centre industry is in a scaling-up phase with lower margins than at full operation, while value added in power-intensive industry in recent years has been far above the historical average owing to high commodity prices. The latter's need for new electricity consumption and grid capacity is also driven more by electrification measures than by investments in new production capacity. These measures will be important for long-term competitiveness as the allowance price in the EU Emissions Trading System (EU ETS) rises, but there is no reason to believe that the effect measured in jobs per MW will equal the industry's current average. In addition, there are other societal effects (for example downstream effects or contributions to European self-sufficiency) that are relevant but much harder to measure.

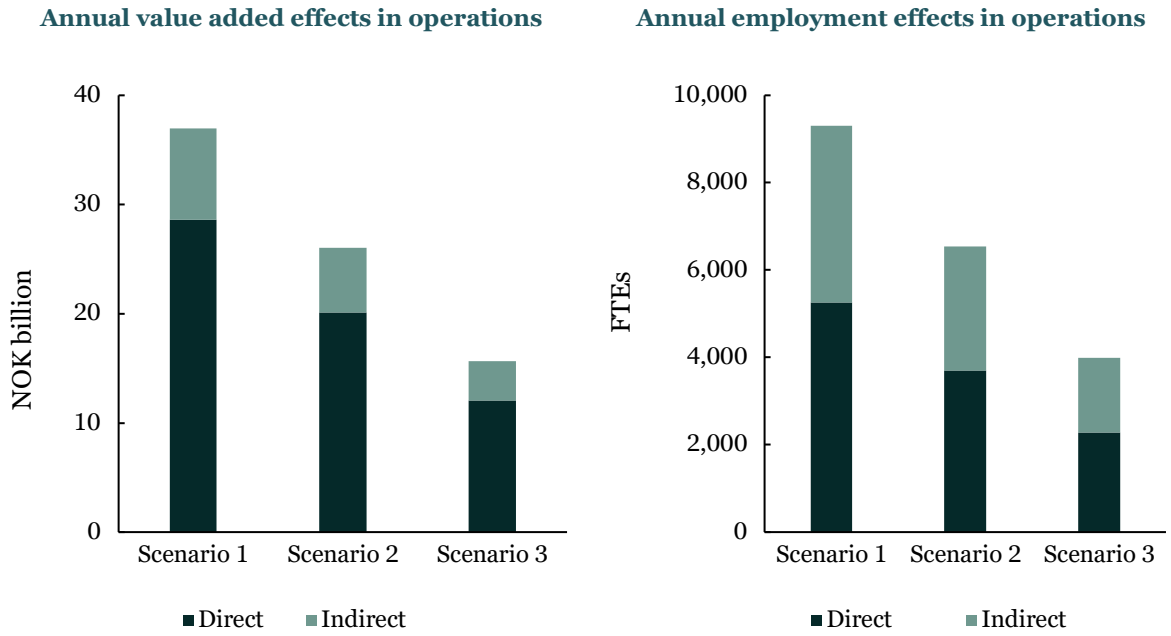
The economic impact of the future industry depends on how many of the planned projects are realised

We have developed three illustrative scenarios for the development of the data centre industry towards 2035, based on different realisation rates for projects with reserved grid capacity and projects in the capacity queue. *The scenarios are not forecasts,* but analytical development paths that make it possible to analyse the consequences of different trends in the data centre industry. The projects vary considerably in maturity, and the timing of access to grid capacity, both at home and in competing markets, may be of great importance for the realisation rate. Since grid capacity is allocated on a first-come, first-served basis, many industrial companies apply for grid access even though it is uncertain whether the project will be realised at the respective locations. Over the next five years, we expect growth to come mainly from projects that have already been granted reserved capacity and an estimated connection date. For the projects in the queue, further developments are more uncertain. Actual developments may therefore lie both above the highest and below the lowest scenario we have established.

In the scenarios, data centres' electricity consumption grows to between 17 and 37 TWh in 2035. We estimate that the operation of the future industry could support between NOK 16 and 37 billion in annual value added and between 4,000 and 9,300 FTEs, equivalent to 0.3 to 0.9 percent of today's mainland GDP. Construction requires investments in Norway of between NOK 150 and 350 billion towards 2035.

Figure D shows employment from the operation of the industry in the three scenarios in 2035.

Figure D: Value added and employment in operations under different establishment scenarios. Source: Menon Economics.



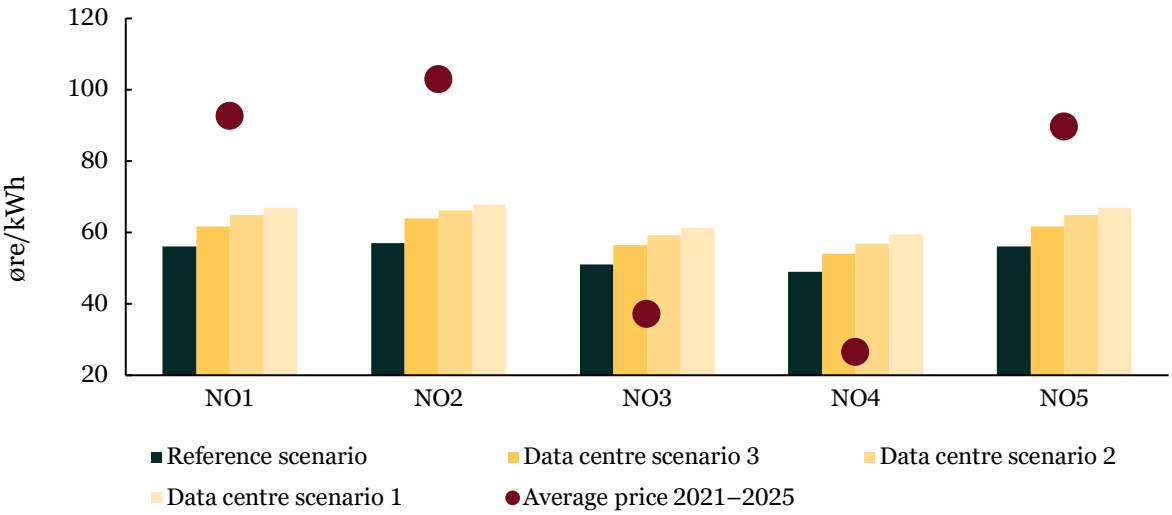
Economic impacts are gross effects. Labour and other inputs are scarce, and displacement of other economic activity means that net effects are lower than gross effects. Without large-scale expansion of the grid and power production, and without a larger available workforce, it will be difficult to realise the highest scenarios. It is at the same time worth underlining that the industry's high labour productivity indicates that it will raise total value added almost regardless of which other industries the labour is drawn from.

Increased consumption from data centres will lift electricity prices, but grid capacity constrains growth in the coming years

Growth in electricity consumption in itself weakens the power balance, all else being equal. In the highest scenario it turns negative if the pace of new power production is not increased. We have estimated the effect on electricity prices using the FRAM modelling framework from the Norwegian Water Resources and Energy Directorate (NVE). Compared with the reference scenario, the establishment scenarios we apply produce electricity prices that are 5 to 11 øre/kWh higher in 2035, equivalent to an increase of 10 to 22 percent.

Figure E shows the estimated electricity prices in 2035 in each of the scenarios.

Figure E: Electricity prices in 2035 in different scenarios. Source: Menon Economics.



It is important to point out that in this analysis we assume that everything other than consumption from data centres is as in the reference scenario. This is a relatively strong assumption. Increased consumption, and thus higher electricity prices, will strengthen the profitability of new power production. Increased production capacity will help to dampen the price effects, but this effect is not captured in the analysis above. As of today, however, all relevant technologies face barriers that limit investment volumes, and these must be addressed if the current pace of development is to increase.

In the short to medium term, it is grid capacity, not electricity prices, that constrains growth. Demand for grid capacity is growing far faster than the grid can be expanded, and data centres account for around half of the power consumption awaiting connection. It can take up to 15 years to realise new grid capacity, and for many projects it will take a long time before construction can begin. Conditional grid connection, under which consumption can be disconnected when the grid is strained, has therefore become more common. The arrangement is well suited to data centres with their own backup power.

Developments are essentially in line with the data centre strategy, but the gap between the strategy, the policy instruments and industry developments varies between the pillars

The data centre strategy from 2025 is essentially a statement of objectives, focusing on three pillars: value added and jobs; security and preparedness; and power, climate and the environment. In our assessment, the distance between objectives and policy instruments is greatest when it comes to **value added**. The instruments here are essentially advisory. The objective that establishments should strengthen local communities has not been followed up with instruments that distinguish between establishments with high and low societal benefit, with the exception of the announced crypto ban. Which economic impacts are realised in Norway is thus determined by market outcomes. This is not problematic in itself, and there are sound economic reasons why market developments should dominate the development of the industry.

On the **security and preparedness side**, the use of policy instruments is most extensive. Since 1 January 2025, the Electronic Communications Act and the data centre regulations have required registration and adequate security, and provide a legal basis for imposing national autonomy in a crisis. From 1 July 2026 the requirements have been tightened, including a duty to disclose information to the authorities and a requirement for a physical representative in Norway. The regulation covers the data centre facility and the data centre service, that is, the housing and operation of clients' equipment,

while the cloud services produced on the equipment are covered by the Digital Security Act. The fundamental national function for data centres was identified in June 2026, and the basis for subjecting individual data centres to the Security Act is thus in place. Its reach for the industry now depends on how many data centres are designated.

In the **power, climate and environment area**, the direction is clear, but the most central instruments have recently been introduced or are still under consideration. The requirement for a cost-benefit analysis of surplus heat is in force, and in spring 2026 the Storting adopted an obligation to utilise surplus heat where profitable. There are already examples of such solutions being realised, but whether the requirement now introduced will increase their prevalence is as yet uncertain. The data centre strategy is also clear that further measures will be introduced to ensure faster grid expansion and more efficient utilisation of the grid. The Government followed this up by introducing a broad range of measures in August 2026, but here too it is too early to say anything about the effect. No requirements are imposed that link grid connection to flexibility, own production or coverage of grid costs.

Regarding competitiveness, we find that Norway is well positioned to attract new data centres. Norway has low electricity prices, a high share of renewables and a cold climate compared with most European markets. Several countries, including Ireland, Denmark, the Netherlands, Spain and Finland, have in recent months also introduced relatively restrictive regulations on connection to the power grid. Our mapping suggests that regulation in these countries is to a limited extent based on social cost-benefit analyses. This increases the risk that it will be poorly targeted, and that it may prevent investments that are socially profitable from being carried out. If the data centre industry is to be regulated in Norway, and/or the grid regulation is to be changed, the measures must be based on thorough assessments of the benefits and costs for all those affected.

1 Introduction and methodology

1.1 Background and mandate

Within the last few years, artificial intelligence has gone from being a research field to being part of everyday life for millions of people. Every time someone puts a question to a language model, generates an image or trains a new model, the calculations take place in large halls filled with servers, cooling systems and power supply. The rise of artificial intelligence, and large language models in particular, has led to a sharp increase in global demand for computing power and thus for data centre capacity. This demand comes on top of the steady growth in traditional data centre services, including cloud services. Globally, thousands of billions of dollars have been invested in the industry in recent years.

Norway has been highlighted as an attractive location. Good access to renewable power and a cold climate that reduces the need for cooling have made the country an interesting location for many players, and the industry has grown rapidly here as well. Data centres have been established in everything from former mines and mountain halls to new facilities on industrial sites. Today we find data centres both in major cities and in rural districts. The lightning-fast growth, both in Norway and globally, has at the same time made data centres a contested topic. The debate concerns, among other things, the industry's electricity consumption and the pressure on the power balance, how large the local and national economic impacts of establishments are, and whether certain establishments, cryptocurrency mining in particular, are socially desirable. This comes in addition to concerns about the environment, climate and land use.

The rapid growth has also prompted the authorities in several European countries to tighten their approach. In Denmark and Finland, the system operators have restricted access to the power grid for large new consumption, and Finland has in addition removed the reduced electricity tax for data centres. In Ireland, where data centres accounted for 22 percent of electricity consumption in 2024, new data centres must provide their own production or storage capacity and cover at least 80 percent of annual consumption with new renewable production. In the Netherlands, data centres are not among the prioritised groups when scarce grid capacity is allocated, and in Spain a proposal with requirements similar to those in Ireland has been put out for consultation.

In response to the rapid growth and the ongoing debate, the Storting has asked the Ministry of Digitalisation and Public Governance to commission a report analysing existing and known planned data centre establishments in Norway. In the report, we have mapped establishments by price area and data centre type, and described the main features of the industry, including developments in the operator segment, the emerging Norwegian supply industry and the industry's role for digital sovereignty. We have estimated direct and indirect value added, employment and tax revenues from the industry, and assessed the contribution to Norwegian GDP and exports. We have compared the value added and employment effects with power-intensive industry. On the power side, we have reviewed current electricity consumption, reserved volumes and volumes in the capacity queue, developed scenarios for developments towards 2035, and analysed the consequences for the power balance, electricity prices, the grid and greenhouse gas emissions. We have also assessed Norwegian competitiveness in a Nordic and European context and how the industry has developed relative to the data centre strategy from 2025. The calculations have been made where methodologically possible and verifiable, and we account for methodological choices, data and uncertainty throughout the report.

1.2 Data, methodology and delimitations

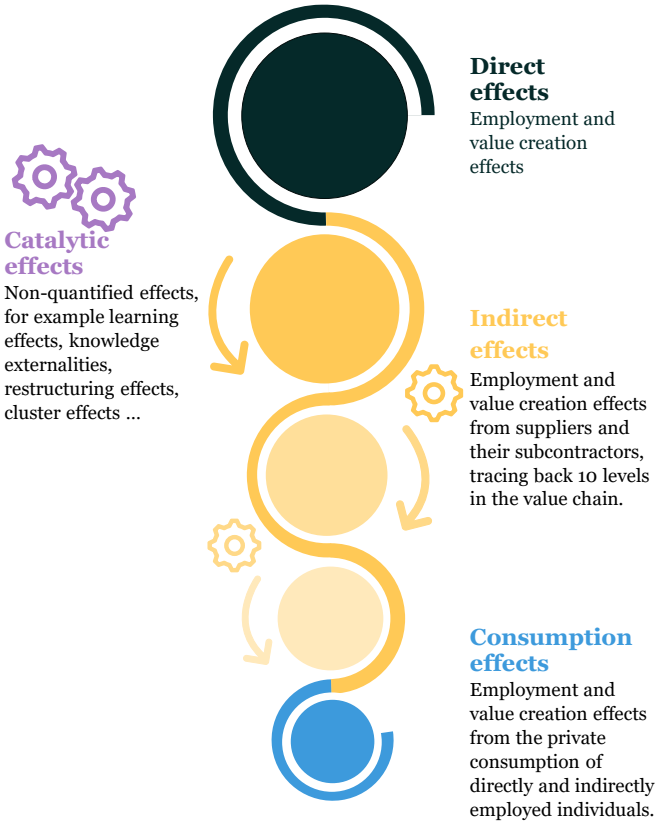
The mapping of the industry is based on, among other things, registration data from the Norwegian Communications Authority (Nkom), consumption data from Elhub, data from Statnett on reserved volumes and the capacity queue, and accounting data from Menon's company database, supplemented with interviews with data centre operators and other players in the value chain. For developments towards 2035, we have developed three illustrative scenarios with different realisation rates for projects with reserved capacity and projects in the capacity queue. The scenarios are used throughout the report, both in the estimation of future economic impacts and in the power analyses, but they are not forecasts. They are intended to illustrate different development paths, and actual developments may lie both above the highest and below the lowest scenario.

The economic impact analysis draws primarily on three data sources: Menon's company database, which covers all Norwegian enterprises subject to accounting requirements; statistics from Statistics Norway (SSB), including the national accounts and the input–output tables; and firm-level transaction data from six data centre facilities for which Menon has previously conducted economic impact analyses. These facilities are Green Mountain's data centres SVG-Rennesøy[1], TEL-Rjukan[2], OSL-Enebakk[3], OSL-Hamar[4] (construction phase only), together with Lefdal Mine Datacenter's data centre in Nordfjord[5] and Bulk's N01 data centre campus in Vennesla[6]. These six facilities make up the comparison group in the report and cover around a third of installed capacity in Norway in the construction analysis and around 20 percent in the operations analysis. The reason we build on precisely these facilities is the level of detail in the data. For each facility we have received actual historical transactions with suppliers in Norway, in total around 1,500 unique direct supplier companies. The transactions are matched to the company database, allowing us to calculate the actual value added and employment they supported among the suppliers.

The effects further up the supply chains have then been calculated with **Menon's economic impact model** ITEM, which builds on input–output relationships between industries and a gravity model that distributes the impacts geographically. The economic impacts from the comparison group are thus largely observed, not merely modelled. In this analysis, we estimate the direct effects on the basis of accounting data for the data centre operators, while the indirect effects are estimated using ratios from the analyses of the comparison group, scaled up to cover the whole industry. Consumption effects (induced effects) are not included in this report. The figure below illustrates the economic impact concept.

[1] Menon Economics (2024). Ringvirkninger av Green Mountain sitt datasenter på Rennesøy. Available here.
[2] Menon Economics (2024). Ringvirkninger av Green Mountain sitt datasenter på Rjukan. Available here.
[3] Menon Economics (2025). Ringvirkninger av Green Mountain sitt datasenter i Enebakk. Available here.
[4] Menon Economics (2025). Ringvirkninger av OSL-Hamar i byggefasen. Available here.
[5] Menon Economics (2026). Ringvirkninger av Lefdal Mine Datacenter. Available here.
[6] Menon Economics (forthcoming). Ringvirkninger av Bulk sin N01 Campus i Vennesla.

Figure 1-1: Conceptual illustration of economic impacts – direct effects at the operator, indirect effects through the supply chain in several tiers. Source: Menon Economics.



The power analyses are based on consumption data from Elhub and NVE and on Statnett's overview of grid connection cases. The reference scenario for developments in the power system follows NVE's long-term power market analysis, and the difference between the scenarios is driven solely by consumption from data centres. We estimate the effect on electricity prices with a power market model based on NVE's modelling framework FRAM and the power market model JulES, in which the consumption scenarios are entered on the demand side while other assumptions are held constant. In this way we isolate how much of the price change is attributable to consumption growth from data centres alone. The modelling framework is described in more detail in Chapter 5.

The greenhouse gas calculations follow the classification of the GHG Protocol (Greenhouse Gas Protocol) into Scope 1, 2 and 3. We calculate emissions from own operations (Scope 1) on the basis of the operation of backup generators, which are by far data centres' most important direct emission source. Emissions from electricity consumption (Scope 2) are calculated using both the location-based and the market-based method. We calculate emissions in the supply chains (Scope 3) with Menon's emissions database, which contains estimated emissions for all Norwegian enterprises subject to accounting requirements and builds on data from the Norwegian Environment Agency, company annual reports and statistics from Statistics Norway, combined with an environmentally extended input–output analysis. The methods are documented in text boxes in Chapter 5.

Within the scope of the assignment, we have made certain delimitations. The analysis covers commercial data centres in Norway. In-house facilities and very small facilities where data centre operation is not the main activity are excluded. With this delimitation, 49 facilities with a combined capacity of 761 MW are included in the analysis. Throughout, we distinguish between the operational phase and the construction phase, which have different economic profiles. The economic impacts we estimate are gross effects. They show the activity the industry supports, but do not take into account

that labour and other inputs could alternatively have been used in other activities. The power section analyses current electricity consumption, together with scenarios for the future, effects on the power balance and prices, and the power grid. The climate and environment dimension is limited to overall system effects on emissions, together with land use and environmental impact at an overarching level.

The report is structured as follows: In Chapter 2 we map the data centre industry today. Chapter 3 estimates the industry's current economic footprint, in both the operational and construction phases, and describes the supply industry. Chapter 4 presents scenarios for further development and shows the economic impact of the future industry. Chapter 5 deals with electricity consumption, the power balance, electricity prices, the grid, greenhouse gas emissions and the environment. Chapter 6 places developments in Norway in a Nordic and European perspective. In Chapter 7 we assess developments against the data centre strategy from 2025. Appendices contain, among other things, a separate review of cryptocurrency mining in Norway, methodological documentation and a sensitivity analysis.

1.3 Definitions

This section defines key analytical terms used in the report, relating to economic activity and economic impacts, power, and greenhouse gas emissions.

Terms relating to economic activity and economic impacts:

- **(Gross) value added** in a company is defined as the sum of labour costs and the company's operating profit, adjusted for depreciation and write-downs. In other words, value added can be understood as the sum of the company's returns accruing to employees (wages), capital owners (profits), creditors (interest) and central, county and municipal government (taxes). This is also known as gross product and constitutes a company's share of gross domestic product (GDP). In this report, (gross) value added is equivalent to the contribution to GDP: since a company's contribution to GDP is its gross product, the two terms are interchangeable and are both used. Value added is one of the most central economic quantities, because it is what provides the basis for welfare through consumption and taxes.
- **Employment** is another word for people in work. It is the number of registered jobs, regardless of the percentage of a full-time position each job represents.
- **Full-time equivalents (FTEs)** take the number of persons employed as their starting point, multiplied by how much an average employed person works in the course of a year. Since the number of persons employed does not reflect how much each person works, we control for this by using FTEs as the measure of employment effects.
- **Productivity** is a measure of how much value added each employed person generates. We obtain this quantity by calculating value added per person employed or per FTE.
- **Economic impacts** are a calculation of how a demand impulse from an industry or company spreads through the rest of the economy via purchases from subcontractors in several tiers. We distinguish between two types of effects, which can cover both employment and value added:
    - **Direct effects** are the value added and employment generated by the data centre itself in its operations. For value added, this means wages to own employees plus EBITDA (operating profit before depreciation and amortisation) from the operation of the data centre. For employment, it means everyone whose working day is spent at the data centre, including own employees, contracted personnel and clients' employees.
    - **Indirect effects** are all the effects in the data centre's supply chain relating to operations and maintenance, together with their further subcontractors. Economic impacts during construction are counted as indirect effects, because they are essentially linked to activity in the supply chain.

- **Input–output tables** provide an overview of all industries' purchases from other industries at the national level.
- **Supports** means that the purchase from one company by another provides the basis for value added and employment in the selling company.

Terms relating to power:

- **Power** (kW/MW/GW) describes the instantaneous load on the power system, that is, how much electricity is drawn or fed in at a given point in time. Power is particularly important for grid dimensioning and grid challenges, such as winter peaks and capacity constraints. A data centre with a power of 10 MW can use up to 10 MW of electricity at any given time.
- **Peak load** is the highest simultaneous power draw in an area (typically on cold winter days). It can constrain new connections even if annual energy use does not increase much.
- **Electricity consumption** (kWh/MWh/GWh/TWh) is the total amount of energy used over a period of time. A data centre that uses 10 MW continuously throughout a year (8,760 hours) uses 87,600 MWh. On average, a Norwegian household used around 14.7 MWh of electricity in 2024.[7]
- **Price areas** are the five geographical areas into which the Norwegian power market is divided: NO1 (Eastern Norway), NO2 (Southern Norway), NO3 (Central Norway), NO4 (Northern Norway), NO5 (Western Norway). Each price area has its own electricity prices.
- **Grid connection cases**, **reservations** and **capacity queue** concern cases queuing at Statnett for connection to the power grid. Reservations are cases that have been allocated grid capacity but have not yet been realised. Cases in the capacity queue have not been allocated capacity, but are waiting for available capacity to be freed up or for the grid to be reinforced so that capacity increases. Grid connection cases is a collective term for the two.

Terms relating to greenhouse gas emissions:

- **CO_2 equivalents (CO_2e)**. One CO_2 equivalent corresponds to the warming effect of one tonne of CO_2. The other greenhouse gases are converted to CO_2e according to their warming potential.
- **Direct emissions** are emissions a business itself is responsible for, for example from its own vehicles, machinery or heating installations.
- **Indirect emissions** are emissions linked to a business's economic activities beyond direct emissions. Indirect emissions are divided into Scope 2 and Scope 3 in the GHG Protocol:
    - **Scope 2** (indirect emissions from energy) are emissions from the production of electricity, district heating or cooling purchased by the business.
    - **Scope 3** (other indirect emissions) are emissions arising in the production and transport of the business's purchased goods and services (excluding Scope 2), or from the use of the business's products and services after sale.

[7] SSB (2025). Hva er gjennomsnittlig strømforbruk i husholdningene? Available here.

2 Overview of the data centre industry

Within the last few years, the data centre industry in Norway has gone from an industry dominated by small, in-house facilities to one of the largest data centre markets in the Nordic countries. As of mid-2026, there are 87 active data centres in Norway, of which 49 commercial facilities with a combined capacity of 761 MW are included in this analysis. Colocation dominates in number, but growth in recent years has been driven by large hyperscale establishments, and measured by capacity, hyperscale is now the largest segment.

In this chapter, we map data centre establishments in Norway. In Section 2.2 we describe the industry today by data centre type, capacity and geography.

2.1 Data centre value chains in general

The terms data centre, data centre operator and data centre client are often used interchangeably in the debate on data centres, even though they denote different things. The distinction between them is, however, central to understanding the data centre industry and its economic impacts.

A data centre is a facility, a building or a collection of buildings designed for computers (including chips and servers) to be connected and operated. The purpose is usually the processing, storage or transfer of data. A data centre operator is a natural or legal person who either offers data centre services for remuneration, or who operates a data centre above a certain size for their own use.[8]

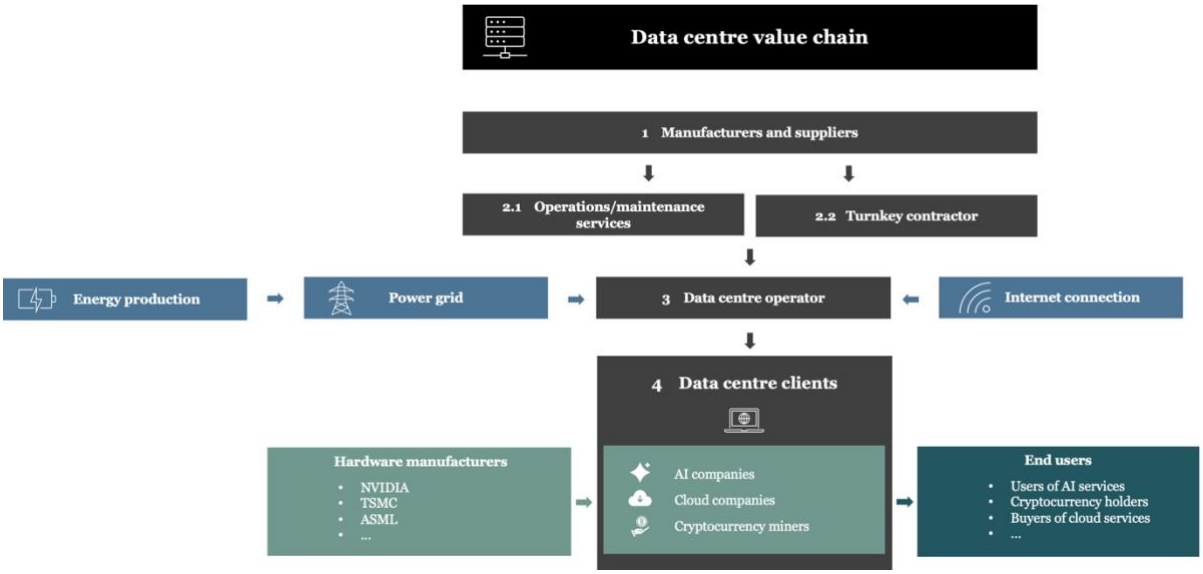
In this report, we distinguish between data centre operators and data centre clients. Data centre clients own or lease IT equipment and need space and capacity in a data centre. They obtain this either by renting space from a data centre operator, or by taking on the operator role themselves and housing the hardware in their own data centres. TikTok, for example, leases capacity in Green Mountain's data centre in Hamar, while Google owns its own data centre in Skien through the subsidiary WS Computing.

Data centre operators mainly provide buildings, electricity, internet connectivity, cooling and security, together with the day-to-day operation and maintenance of these. The actual hardware run in the data centres is mainly owned by the data centre clients, and the value created through its use, that is, the services produced on servers and chips, is not part of the operators' delivery. The data centre operators and the services they deliver are the main object of analysis in this report. Data centre clients and their activity relating to the services the hardware delivers are thus excluded from the analysis, unless otherwise stated.

Figure 2-1 shows an illustrative layout of the value chain in the data centre industry, with the tiers most important for the analysis in this report. The real value chains are more complex and extensive, and the figure is a simplification.

[8] Nkom (2026). Hva er et datasenter? Available here. Data centre operators offering data centre services for remuneration are referred to as commercial, as opposed to in-house data centre operators serving their own purposes.

Figure 2-1: Simplified illustration of value chains linked to the Norwegian data centre industry. Source: Menon Economics.



The first tier in the data centre value chain consists of manufacturers and suppliers of key components and services for the construction, operation and maintenance of data centres. These deliver to the second tier: the contractors responsible for constructing the data centres, and the companies delivering operation and maintenance services directly to the data centre operators. The data centre operators make up the third tier and have overall responsibility for construction and operations. They deliver data centre services to the data centre clients in the fourth tier, which includes artificial intelligence companies (AI companies), cloud companies and cryptocurrency miners.

The data centre clients are in turn part of their own value chains, in which they buy hardware from manufacturers and suppliers in the previous tier and sell services to end users in the next. Hardware production is concentrated among a few key companies: for the AI companies, the most critical hardware is graphics processing units (GPUs), where companies such as Nvidia, Taiwan Semiconductor Manufacturing Company (TSMC) and ASML each dominate their part of the value chain. Crypto miners today make little use of GPUs, because ASIC chips (Application-Specific Integrated Circuits), which are made specifically for crypto mining, are far more efficient. For cloud service companies, the most important hardware is server components for data processing and storage.

The data centre clients run the hardware in data centres they rent space in or own themselves. For AI companies, this largely happens in one of two ways: either the AI company owns the hardware itself and uses it for training or inference of its models, or so-called neocloud companies buy hardware and data centre capacity and rent out computing power via cloud services. Although the neocloud companies constitute an extra tier between data centre operators and end users, the logic is the same: commercial data centre operators rent out capacity to clients who own hardware, and the clients sell the products they produce with the hardware in a global market. The largest player among the neocloud companies is CoreWeave, which mainly leases its data centre capacity. Some neocloud companies also own and operate their own data centres and then simultaneously act as data centre operators.

The end users of the services are users of AI services, owners of cryptocurrency and buyers of cloud services. The revenues from the services produced on the hardware in the data centres accrue mainly to the businesses that own the hardware and sell the end products, regardless of where the data centre is located. For Norway, value added therefore arises in principle in the first three tiers of the data centre value chain, through construction, the sale of data centre services, and operation and maintenance. The

report concentrates on the data centre operators and their suppliers (the upstream value chain). The data centres' clients and the downstream value chain are in principle not included unless explicitly stated otherwise.

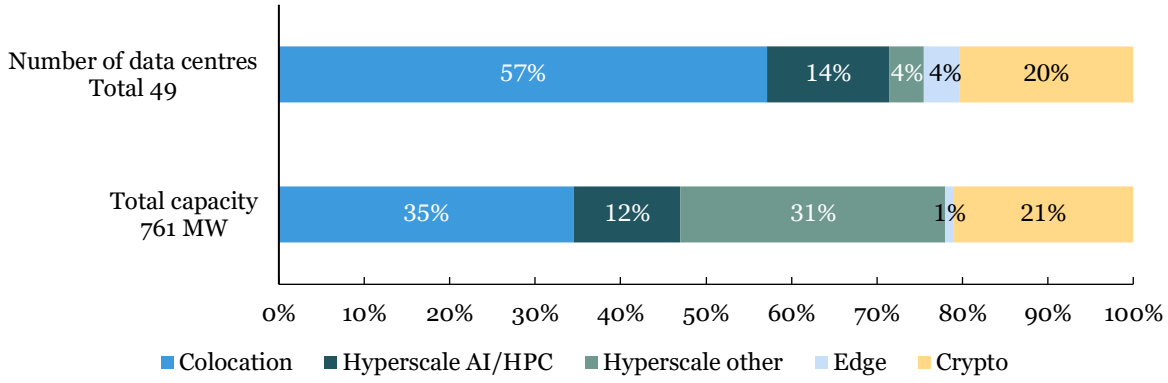
2.2 The data centre industry today

Recent years have been marked by major changes in the data centre sector, both in Norway and internationally. New technologies and digital services such as AI, advanced global online platforms and cryptocurrency have led to a sharp increase in global demand for computing power. This has brought a corresponding increase in demand for data centre capacity, and Norway has been highlighted internationally as a potentially attractive location owing to good access to sustainable energy, a high level of technological expertise and a sound geopolitical reputation.

We have mapped the data centre industry in Norway, and for the analysis we have defined a population of data centres. The population is established on the basis of the data centres and operators registered with Nkom[9], combined with other publicly available information, our own data and assessments. As of mid-2026, we observe 87 active data centres in Norway, of which 49 are included in the population for this analysis. The 38 excluded centres are mainly small (below 1 MW) data centres run by companies or other organisations whose main purpose is not commercial data centre operation. In establishing the population, we have also categorised the data centres by type, adjusted power figures and corrected for obvious errors and duplicates.

There is no universally established framework for categorising data centres. For illustrative purposes, we divide the sector into five main categories based on size, operational purpose and ownership: colocation, hyperscale AI/HPC, other hyperscalers (termed hyperscale other), crypto and edge. From Figure 2-2 we see that more than half of the 49 included data centres in Norway are colocation, while crypto accounts for 21 percent and hyperscale AI/HPC for 14 percent. Other hyperscalers and edge make up the smallest groups by number, at 4 percent each.

Figure 2-2: Distribution of data centre types. Source: Menon Economics' population of data centres, based on data from Nkom.



If we instead consider size, the picture changes. Measured as a share of total capacity at active data centres in Norway (761 MW), other hyperscalers account for 31 percent through the two centres Green Mountain Innlandet at 110 MW and WS Computing at 126 MW. The former has TikTok as its client, while the latter is owned by Alphabet (Google). Measured by capacity, colocation accounts for 35

[9] Nasjonal kommunikasjonsmyndighet (2026). Registrerte datasenteroperatører og datasentre. Available here

percent, crypto for 21 percent and edge for 1 percent. Hyperscale AI/HPC remains at around 13 percent, largely because these centres are still under construction.

Text box 2-1: Categorisation of data centres.

Edge refers to small data centres whose main function is to offer connectivity at strategically important hubs. This largely means either proximity to major cities or to important long-distance internet cables. In Norway, Oslo and locations in Western and Southern Norway are reportedly the most important such hubs. "Edge capacity" is therefore often used when a data centre offers strategic location as one of its advantages, even if the centre is not necessarily a pure edge centre.

Colocation is typically medium-sized centres of around 10 to 50 MW where the data centre operator rents out space to several different clients per centre. This largely takes place through a combination of renting out space in standardised racks (often referred to as *"retail"* colocation) or renting out *"whitespace*", where the client can be offered more tailored solutions with a higher degree of security and privacy (often called *"wholesale*" colocation).

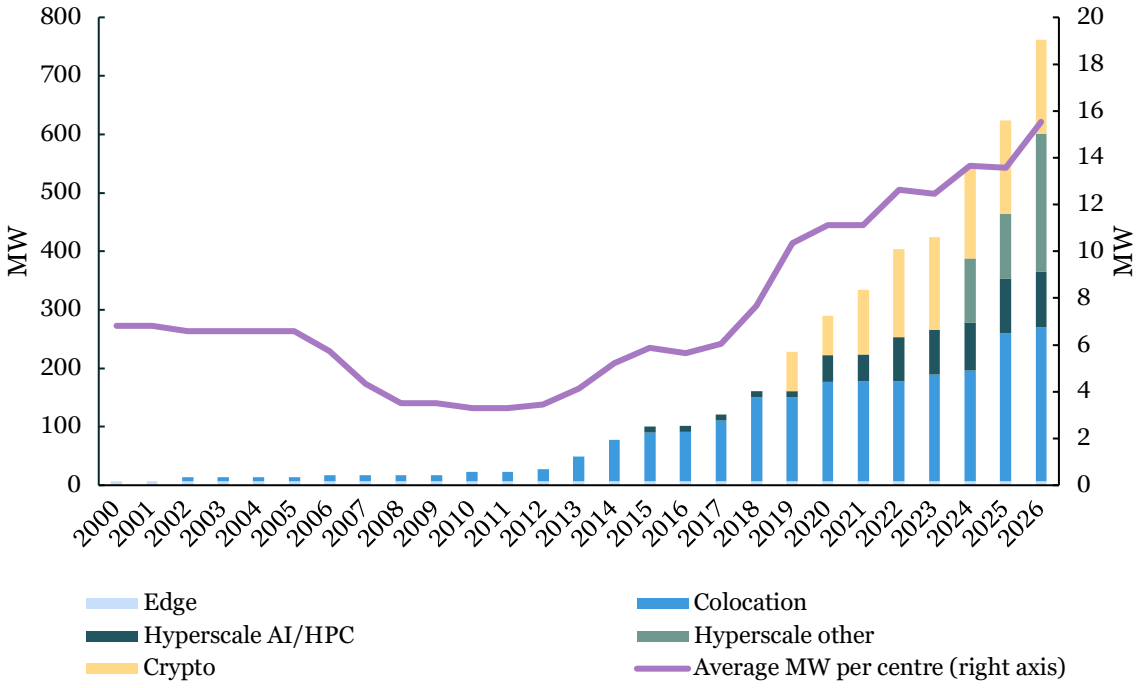
Hyperscale AI/HPC refers to larger data centres of typically more than 50 MW where the main use is artificial intelligence and High Performance Computing (HPC). So-called "neocloud" centres are also included in this category, as these are companies running AI hardware in the data centres combined with a cloud platform that lets other customers use their AI systems online (GPU as a service). Hyperscale AI/HPC data centres can typically have one or several clients, which creates overlap with the colocation categorisation. The distinction is therefore not always clear-cut, and our classification has accordingly been made on a discretionary basis.

Other hyperscalers (hyperscale other) refers to similarly large data centres, but ones used to run the cloud services of large data and technology companies (Google, Meta, Amazon, etc.). These data centres typically have only one dedicated client and are in several cases also owned by the client itself, such as WS Computing AS in Skien, which is owned by Alphabet (Google).

Crypto refers to data centres dedicated to the mining of cryptocurrency, for example Bitcoin. Such data centres vary greatly in size, from small semi-professional local players to large international producers. Data centres that have historically mined cryptocurrency but now report being in the process of shifting their operations towards AI and HPC are still classified as crypto in this report. Of the relevant companies that report cryptocurrency mining in Nkom's register, all are categorised as crypto with the exception of Bluefjords, which is classified as colocation owing to its low share of total power used for crypto mining.

Looking at developments over time, there is a clear trend towards larger data centres, as shown in Figure 2-3. The figure also shows that growth over the past three years has been driven by hyperscale establishments. The sample includes only data centres that are active as of today, and centres that have been closed down or gone bankrupt are therefore not included. This applies, among others, to Kryptovault, a crypto-focused data centre operator that entered bankruptcy proceedings in 2023 and which at the time, with a total of around 70 MW of active power across two centres, was one of Norway's largest players.

Figure 2-3: Development in installed power in Norway over time. Source: Menon Economics' population of data centres, based on data from Nkom.

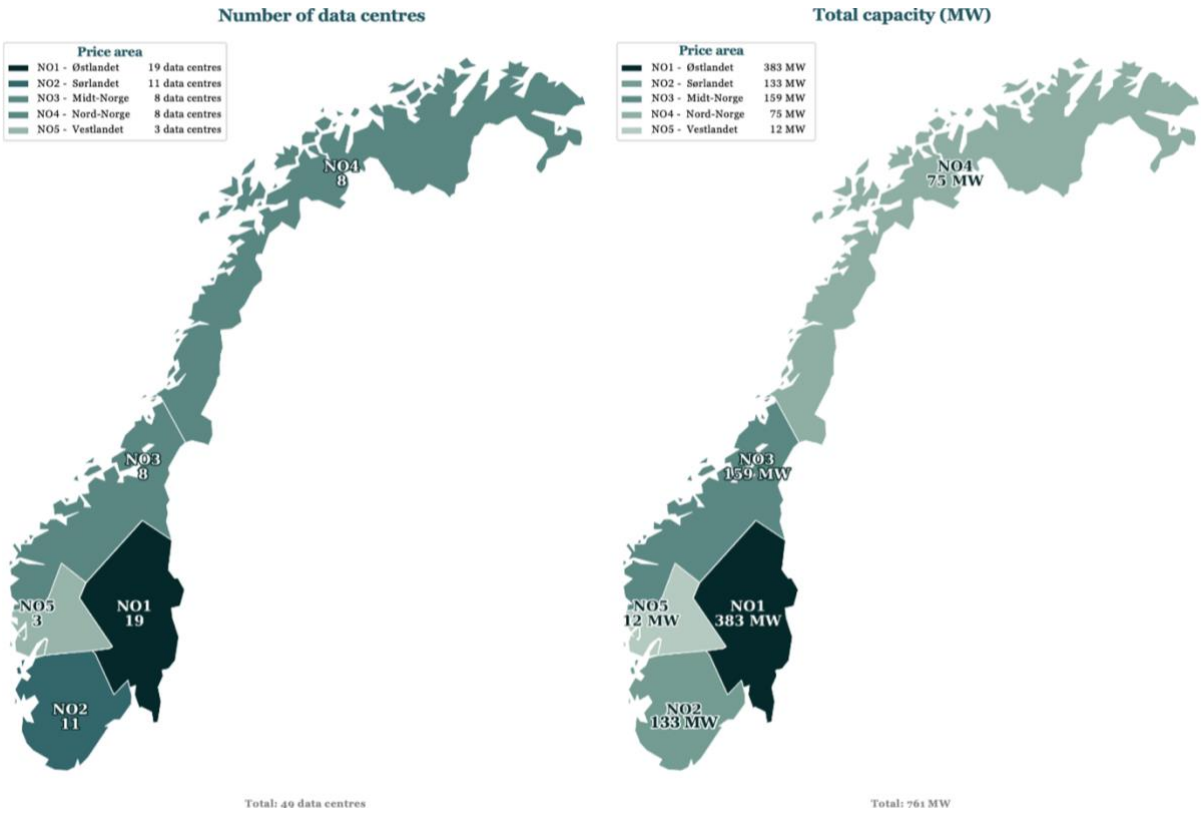


It should further be noted that profitability in the crypto sector has been variable in recent years as a result of highly fluctuating prices for electricity and cryptocurrencies. Cryptocurrency mining is a volatile business. Increased input costs, whether in the investment phase through IT equipment or in the operational phase through electricity costs, can quickly turn projects from profitable to unprofitable, particularly when cryptocurrency prices fall. Combined with the recent increase in global demand for data centres supporting AI and HPC, several Norwegian crypto centres have therefore begun to shift their operations towards this sector, away from crypto. The picture of a development towards more hyperscale AI/HPC data centres will thus probably be reinforced, as Tydal Data Center and Troll Housing, two of Norway's largest active data centres, are currently in such a process. See Appendix A for a more detailed account of cryptocurrency mining in Norway.

As for the geographical distribution of data centres, Figure 2-4 shows that by far the most data centres, both in number and in MW, are located in Eastern Norway in price area NO1.[10] There, a number of relatively small data centres sit alongside two large hyperscale centres. The fact that NO3, NO4 and NO5 do not have a larger share of total MW may suggest that electricity prices have historically not been as decisive for location choices within Norway as one might have thought, since these price areas have had lower electricity prices than NO1 and NO2.

[10] Norway's power system is divided into 5 price areas. Prices vary between the areas owing to the capacity of the power grid and the supply of and demand for power. NO1 covers Eastern Norway, NO2 covers Southern Norway, NO3 covers Central Norway, NO4 covers Northern Norway and NO5 covers Western Norway.

Figure 2-4: Data centres by price area in Norway. Source: Menon Economics' population of data centres.



3 The industry's economic footprint

In recent years, the data centre industry has grown into an industry of economic weight. We estimate that the operators in the population of active facilities in 2025 had combined revenue of around NOK 6.9 billion and direct value added of around NOK 3.2 billion. Including the supply chain, operations supported total value added of around NOK 4.3 billion and around 1,800 FTEs, of which 600 are the operators' own employees and the rest are contracted personnel, clients' employees at the facilities and indirect employment among suppliers. In addition, we estimate that operations supported tax revenues of around NOK 700 million in 2025. We estimate that the construction of today's facilities has in total contributed an estimated NOK 56 billion in investments with Norwegian private companies, NOK 39 billion in value added and 30,000 FTEs. Value added per employee in the sector is high, around four times the average for the mainland economy and well above power-intensive industry, while employment per MW is, overall, below that of power-intensive industry.

In this chapter, we quantify the economic impacts of the data centres in the population (defined in Section 2.2). Economic impacts here cover all value added and employment effects supported by the data centres, in both the operational and construction phases. In Section 3.1 we estimate direct and indirect effects in the operational phase, including employment, productivity, ownership structure and tax. In Section 3.2 we compare the direct effects of the data centre industry with power-intensive industry. Section 3.3 quantifies the economic impacts in the construction phase, and in Section 3.4 we map the supplier segment and the degree of data centre specialisation among the suppliers. The method used in Section 3.1 and Section 3.3 is described in more detail in Appendix B.

3.1 Operations

The data centre industry in Norway has grown rapidly over the past 10–15 years, from in-house facilities to an industry of economic weight. In this part of the analysis, we consider the size of the industry in the most recent available accounting year, which is 2025. Of the 49 facilities included in the analysis population (see Section 2.2), 43 were active at the end of 2025. These facilities have a combined installed capacity[11] of just above 600 MW today, and form the basis for the analysis of direct effects, ownership structure and tax.[12] As of mid-2026, the total size of the population is 761 MW.

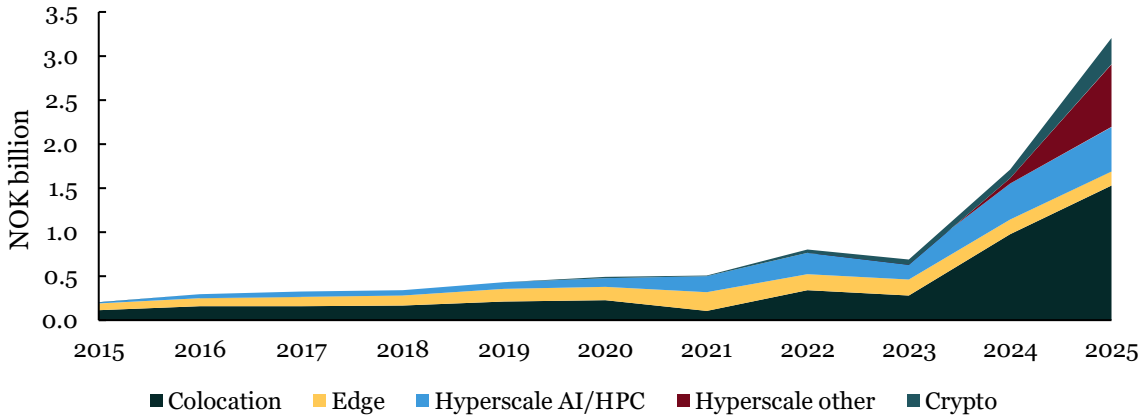
3.1.1 Economic activity in the operator segment

Among the companies with active data centres in 2025, we find combined revenue of around NOK 6.9 billion and value added of around NOK 3.2 billion. Revenue is the companies' top line and shows the annual income the companies behind the data centres have earned from operations. Value added adjusts for the companies' intermediate consumption, and therefore illustrates how much of the industry's activity directly benefits the Norwegian economy, in the form of wages, profits and tax revenues. Value added is the industry's direct contribution to GDP.

[11] Nkom reports "subscribed electrical capacity". We consider installed capacity more precise, since it includes only capacity in operation. The term "subscribed electrical capacity" has in some cases been misinterpreted as reserved capacity at Statnett.
[12] Installed power of just over 600 MW refers to total capacity at centres registered with Nkom as of mid-2026 linked to companies with activity in 2025. Actual capacity in operation at these facilities in 2025 may therefore deviate from the installed capacity.

The companies' value added has increased from NOK 201 million in 2015, corresponding to annualised growth of just above 30 percent. The figure below illustrates the development in value added across data centre types in Norway since 2015.

Figure 3-1: Value added in the data centre industry, by centre type. Source: Menon Economics.

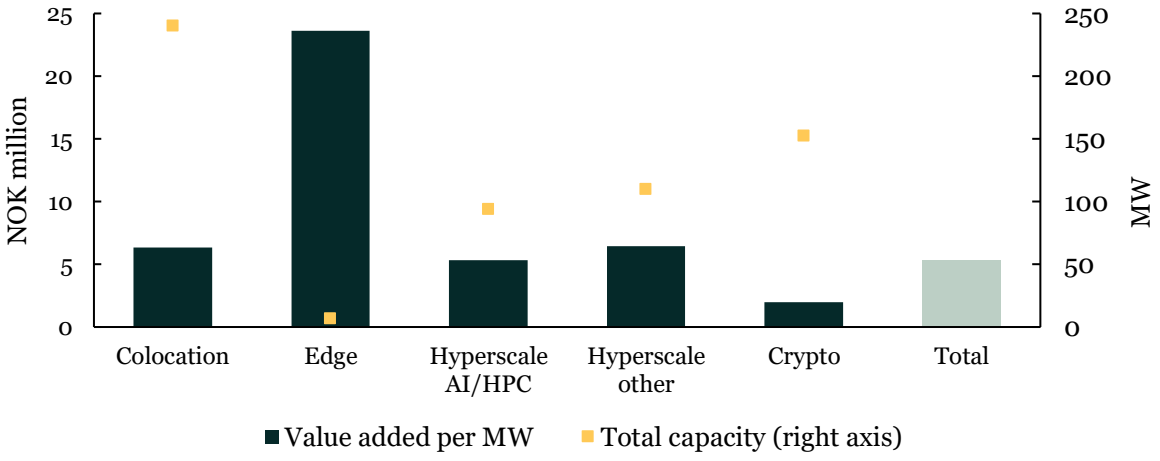


Growth in the data centre industry has been uneven. Until 2020, developments were relatively stable, with growth in both colocation and edge. Value added then fluctuated sharply, mainly driven by colocation, which fell by around 55 percent in 2021 and more than tripled in 2022, before the industry as a whole fell by 14 percent in 2023. From 2024, growth accelerated, with an increase of almost 150 percent that year and almost 90 percent in 2025. Growth in 2025 came mainly from other hyperscalers, with Green Mountain's facility in Hamar as the central driver. In 2025, value added in colocation exceeded NOK 1 billion, while for each of the two hyperscale categories it was around NOK 500 million.

The fluctuations have thus changed the composition of the industry. In 2015, colocation and edge accounted for 94 percent of value added. In 2025 alone, other hyperscalers increased their share from 4 to 22 percent, while hyperscale AI/HPC also had a share of just above 20 percent in 2025. The industry is thus more diversified than before.

The distribution of installed capacity does not follow the distribution of value added across data centre types. The figure below shows value added per MW across the different data centre types in 2025.

Figure 3-2: Average value added per MW of installed capacity by data centre type in 2025. Source: Menon Economics and Nkom.



The figure above shows that value added per MW of installed capacity varies widely between the segments. On average, the data centres had NOK 5.3 million in value added per MW of installed capacity in 2025. Colocation and other hyperscalers were somewhat above the average, while hyperscale AI/HPC was roughly at the average. The increase in the value added share attributable to other hyperscalers suggests that the capacity in operation is largely being put to use.

The cryptocurrency mining segment accounts for around 25 percent of installed capacity, but only 9 percent of value added. Crypto also has the lowest value added per MW, at NOK 2 million. This probably reflects the segment's cost structure rather than maturity. We therefore do not expect the same catch-up for crypto as for hyperscalers, where part of the capacity is still being phased in.

The figure also shows that the edge segment has by far the highest value added per MW of installed capacity, at NOK 23.6 million. The figure must be interpreted with caution, because the segment in the sample is run by few operators, led by Stack Infrastructure's SI OSL01 facility at Ulven in Oslo. The facility has been in operation for many years, having been established in the early 1980s as a data centre and communications hub. The high value added per MW is therefore probably primarily due to the facility being mature, with an established client base and high capacity utilisation. In addition, the facility is a carrier-neutral hub for more than 25 fibre operators, with direct connections to, among others, Microsoft Azure and Amazon Web Services. These generate revenue from interconnection and services that do not increase with electricity consumption.[13]

Value added per MW is, as of 2025, an uncertain measure. The industry is growing strongly, and few or no operators have yet reached full, stable operation. Much of the capacity is new and is being taken into use gradually, so that revenues are still low relative to installed capacity. If current prices for computing power do not fall significantly, revenues will increase more than costs as the capacity fills up, since a large share of data centre costs are fixed. Value added per MW may therefore be considerably higher when the facilities reach full operation. We therefore expect both the levels and the distribution between segments to change in the years ahead.

Text box 3-1: Comparison of our mapping with that of Statistics Norway (SSB). Source: Menon Economics and SSB.[14]

Statistics Norway (SSB) carried out a mapping of the data centre industry earlier in 2026, limited to 26 commercial data centres across 15 operators in 2024.[1] With this sample, SSB finds 344 persons employed (excluding an estimate of contracted personnel) and NOK 1.2 billion in value added in the industry in 2024. These figures are somewhat lower than the results in this report. The difference between Menon's and SSB's value added figures is mainly due to our data covering more facilities and operators. In addition, we do not believe that SSB has rolled back the group structure of the data centre operators, which means that the full extent of the activity is not captured. The table below summarises our mapping and SSB's.

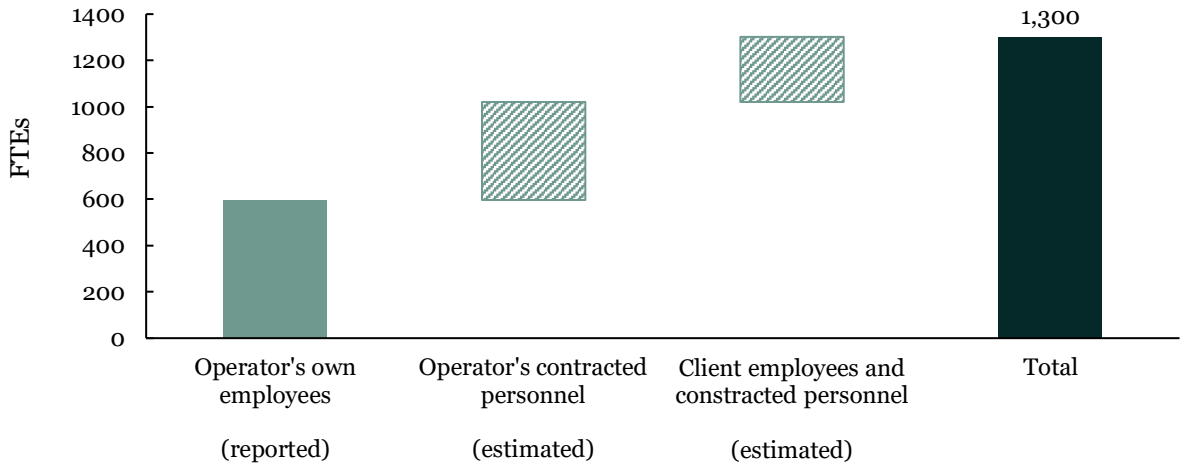
	Menon	Menon	SSB
Data	36 facilities	43 facilities	26 facilities
Year	2024	2025	2024
Value added	NOK 1.7 billion	NOK 3.2 billion	NOK 1.2 billion

[13] Stack Infrastructure (n.d.). Available here.
[14] SSB (2026). Datasentrene vokser raskt – men hvilke verdier skaper de for Norge? Available here.

Persons employed	559 employees at operators (accounting data)	597 employees at operators incl. group structure (accounting data)	344 employees at operators (accounting data)

In addition to the value added, we find that around 600 persons were employed in the enterprises with active facilities in 2025. In addition to the operators' own employees, some of the clients' employees typically have their workplace at the data centre, and there is also a certain amount of contracted personnel. The 600 persons employed refer only to the operators' own employees, as reported to the Brønnøysund Register Centre (but include the whole group structure). Figure 3-3 provides an estimate of the total number of FTEs at data centres in Norway in 2025, including clients' employees and all contracted personnel.

Figure 3-3: Estimated number of employees at data centres in Norway in 2025, including the operators' contracted personnel, together with clients' employees and contracted personnel. Source: Menon Economics.



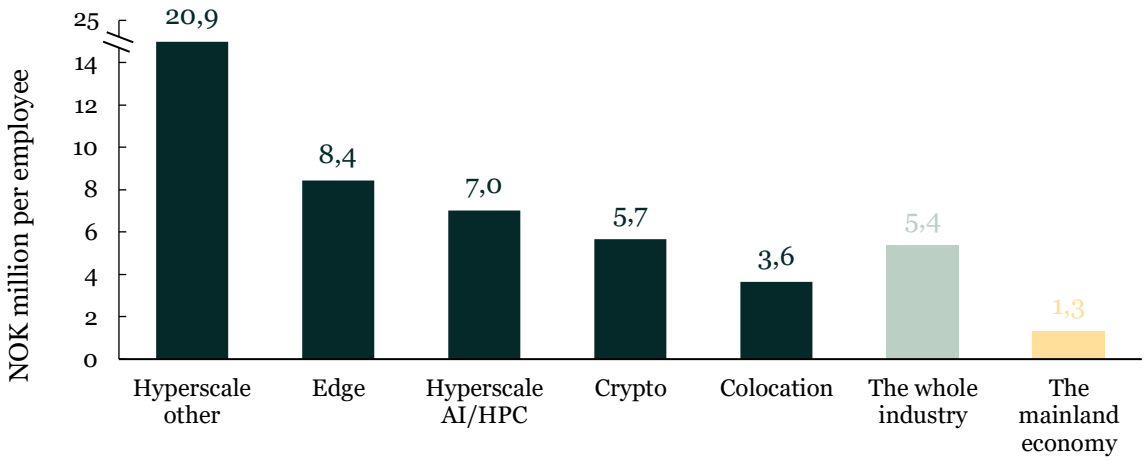
We estimate that in total around 1,300 FTEs had their workplace at data centres in Norway in 2025 when all contracted personnel and clients' employees are included. See Appendix B.a for a description of the method. The total is thus considerably higher than the number reported to the Brønnøysund Register Centre. The reason is that the majority of the larger data centres operate with a model in which parts of the operating organisation are outsourced to subcontractors. This personnel nevertheless spends its regular working day at the data centre facility. Moreover, the clients often own the IT equipment in the facility themselves, and therefore have their own employees at the data centre operating and maintaining the equipment.

In addition, our preliminary mapping shows that there are currently around 50–100 employees in data centre companies that are in the process of building data centres or have plans to build data centres. These are excluded from the analysis.

The ratio of value added to the operator's number of own employees is the definition of labour productivity. The data centre industry creates relatively high value per employee compared with the average for the Norwegian mainland economy. We estimate that the data centre industry had average value added per employee of around NOK 5.4 million in 2025. That approaches four times the mainland

economy, which in 2025 was around NOK 1.3 million.[15, 16] The figure below illustrates productivity by data centre type, for the data centre industry as a whole and for the mainland economy.

Figure 3-4: Labour productivity across data centre types, the data centre industry as a whole and the average for the Norwegian mainland economy in 2025. Source: Menon Economics.



Other hyperscalers are by far the most productive segment, with NOK 20.9 million in value added per employee, around 16 times the mainland economy. The very high productivity is mainly driven by Green Mountain's activity in Hamar, which in 2025 was the country's largest data centre. The figure thus in practice rests on a single operator, and we cannot simply take it as the basis for the segment's productivity in the years ahead. There is in general considerable variation within the data centre types. Over time this will probably stabilise, and we expect that going forward it will essentially be size that determines productivity for the different centre types: economies of scale will result in higher productivity at the largest centres.

[15] SSB (2026). Statistikktabell 09170: Produksjon og inntekt, etter næring og år. Available here.
[16] SSB (2026). Statistikktabell 09174: Lønn, sysselsetting og produktivitet etter næring og år. Available here.

Text box 3-2: Does the operation of data centres constitute service exports?

Exports linked to the operation of data centres are more complex than traditional exports, where goods are produced in one country and shipped to another. The complexity has several sources: no goods cross the border when computing power is sold abroad, the exports arise in different tiers of the value chain depending on the business model, and the value is largely determined by intra-group agreements rather than by the market value of the computing power. The international standards for national accounts and the balance of payments, the UN's 2025 SNA national accounts standard and the IMF's balance of payments manual BPM7, only received explicit guidelines for data centres in 2025, and practice is still being clarified.

The main principle in the standards is that production is recorded in the country of the economic owner of the capital. Fixed capital such as buildings, power infrastructure and cooling systems is always counted as Norwegian, and investments in it are included in Norwegian gross fixed capital formation regardless of who owns it. Computing equipment, by contrast, follows the owner, regardless of where the equipment is physically located. This is the same principle as for ships and aircraft, which are recorded with their owner wherever they are. If the chips are owned by a foreign enterprise with no Norwegian entity, both the investment and the production of computing power are recorded in the owner's country, while Norway exports data centre services in the form of hosting and colocation. In practice, foreign chip owners with permanent operations in Norway will almost always have a Norwegian subsidiary or branch, for tax reasons among others. The chips are then counted as Norwegian investments and the computing power as Norwegian production.

Today's industry is dominated by colocation, in which the operator sells space, electricity and cooling to Norwegian and foreign clients, and the large planned facilities follow the same model with a Norwegian operator and foreign clients owning the equipment. When the client has a foreign owner and a Norwegian entity, the exports normally arise in the client segment: the operator's sales are domestic revenue, while the client's Norwegian company exports computing power to the group or to customers abroad. Where the operator itself owns the chips, as some neocloud operators considering establishing themselves in Norway do, the operator's invoices become direct service exports.

In the typical cases where the client is foreign, the group structures determine the size of the exports. The client's Norwegian entity typically invoices the group at transfer prices under the arm's length principle, often cost plus a mark-up. For an entity with purely operational functions, this yields a limited margin, while the market value of the services is realised in sales companies in other countries. The payments into the Norwegian entity may moreover be classified as service sales, group contributions, interest or licence payments, and only the service sales count as exports and enter Norwegian GDP.

This is our understanding of the situation as it stands today, but several issues remain unresolved. First, it is unclear which business models will come to dominate. Second, we do not yet know how the transactions will be treated by the statistical agencies in different countries. Third, estimates of this type of service exports, as with much other service exports, will be more uncertain than estimates of traditional goods exports, because the exports are harder to measure.

It is likely that the coming years will bring more clarity on how the exports should be treated and estimated. A working group under the auspices of the European Central Bank (ECB) and Eurostat is examining the classification of digital transactions in the balance of payments, and Statistics

Norway is working on better identification of data centres in the statistics. Estimates of service exports from data centres should therefore be interpreted with caution.

3.1.2 Ownership structure

The data centre industry in Norway is characterised by a high degree of foreign ownership. We have used Menon's ownership database, which provides an overview of both direct and ultimate owners of all enterprises operating in Norway as of 2024. We distinguish here between Norwegian private individuals, the public sector (central government, counties or municipalities) and foreign companies and private individuals. Foundations, institutional investors and funds are grouped in the category "other ownership".

Based on the ownership database, we find that 94 percent of value added in the data centre industry in 2025 is linked to companies with foreign ultimate owners. Around 4 percent of value added can be traced back to Norwegian private individuals, while the remaining 2 percent is linked to other forms of ownership. The figures relate to the ultimate ownership of the operators with active centres in 2025, that is, ownership traced to the top of the ownership chain, and are weighted by the companies' value added. [17]

If we instead count each company's ultimate ownership shares equally, that is, regardless of the company's revenue or value added, a rather different picture emerges. Foreign ownership then accounts for 66 percent of the companies, while Norwegian personal ownership accounts for 28 percent. Only 2 percent of the companies' shares can be linked to the public sector, and the remaining 4 percent to other forms of ownership. The difference between the measures indicates that Norwegian personal ownership is more widespread among the smaller companies in the industry, but that these owners rarely hold stakes in the really large hyperscale and colocation facilities that drive most of the value added in the industry today.

The direct ownership of the companies in the data centre industry differs from the ultimate ownership distribution. If, in the same way as for ultimate ownership, we weight direct ownership by the companies' value added in 2025, we find that Norwegian companies own 75 percent. The gap arises because many operators are formally owned by Norwegian holding companies, which themselves have foreign parent companies further up their ownership chains. The direct ownership formally votes at the operators' general meetings, but it is ultimately the ultimate owner who controls the ownership chain and collects the profits.

The finding that a significant share of the companies have foreign ultimate owners is consistent with findings from an earlier Menon mapping of ownership in critical digital communications infrastructure.[18] There, data centres stood out as the segment with the highest share of foreign ownership among the various types of digital infrastructure, such as fibre cables and mobile networks. Of the six data centre companies mapped, all but one were wholly or majority owned by foreign owners, including Green Mountain, Infrastructure Nordics 4 and Lefdal Mine Datacenter. The report found no seriously problematic ownership arrangements relating to these companies. The foreign ownership is

[17] We take ultimate owners as our starting point here. This means that we trace the companies' ownership structures until we reach someone no longer owned by anyone else. Typically this is a private individual, the public sector, a foundation/self-owned entity, or a foreign ownership link where the chain stops.
[18] Menon Economics (2024). Eierskap i kritisk digital kommunikasjonsinfrastruktur. Available here.

mainly traced to investors in EU/EEA and NATO countries. The exception to these country groupings is Green Mountain, which has Israeli owners in the Azrieli Group.

Text box 3-3: Explanation of value added in companies with foreign owners. Source: Menon Economics.

What does value added in foreign-owned companies mean?

Foreign ownership means that foreign companies or private individuals have the final say in the companies' operational and investment decisions. It is also foreign owners who hold the ultimate financial claim on profits after tax.

Foreign ownership in an industry does not, however, mean that the industry makes no economic contribution to the national economy. Wages to employees in the Norwegian operating companies accrue to Norwegian workers regardless of who owns the company. The profits accruing to foreign owners must also be nuanced on two important points. First, part of the profits is reinvested in the companies, including in further capacity expansion in Norway, rather than being paid out as dividends. Second, tax liability is in principle the same regardless of ownership. Independent tax liability means that Norwegian subsidiaries of foreign groups pay corporate tax in Norway on the same footing as Norwegian-owned companies, provided the profits are earned in the Norwegian business.

While wages and corporate tax largely remain in Norway, foreign ownership differs from Norwegian ownership in certain respects. This applies in particular to tax at the owner level. Norwegian personal owners pay dividend tax and wealth tax, while foreign owners in many cases pay little or no Norwegian tax on dividends. Furthermore, international groups have the opportunity to influence the profits of Norwegian companies through internal transactions within the group, such as interest, rent and service purchases (even though the transfer pricing rules are intended to counteract this to some extent). In addition, strategic head office decisions are often located outside Norway. This is particularly important for the data centre industry, where a fairly large share of value added ends up as profits (after tax).

A high share of foreign ownership is not unusual in Norway. Weighted by value added in 2024, we find that industries such as ICT, petroleum and the process industry have less than 50 percent Norwegian private ultimate ownership. What these industries have in common is that they are capital-intensive and globally oriented. Petroleum and the process industry attract foreign capital and technology around Norwegian natural resources, while ICT is part of global ownership structures. The profits accrue to foreign owners, in return for which companies in Norway gain access to capital and technology that very few could have obtained on their own. The economic literature points in principle to a positive relationship between foreign investment in high-income countries and economic growth.[19,20]

3.1.3 Indirect effects

In Section 3.1.1 we analysed direct effects, that is, the value added and employment occurring at the data centre facilities themselves. In this section we take a closer look at indirect effects, that is, the value

[19] Meyer & Sinani (2009). When and Where does Foreign Direct Investment Generate Positive Spillovers? A Meta-analysis. Available here.
[20] Bénétrix, Pallan & Panizza (2023). The Elusive Link Between FDI and Economic Growth. Available here.

added and employment arising among the data centres' suppliers. The mechanism is as follows: data centres receive revenue from their clients. Part of this revenue becomes value added, that is, labour costs plus operating profit (before depreciation). The rest of the revenue is spent on intermediate consumption, that is, purchases of goods and services from Norwegian or foreign suppliers, who in turn buy goods and services from their suppliers. The sum of the effects in the supply chain is what we call *indirect effects*.

Figure 3-5 shows typical ratios of direct effects, intermediate consumption and indirect effects for the data centre industry. The estimate builds on Menon's earlier analyses of the five data centres in the comparison group in operation, which together cover 140 MW of capacity, around 20 percent of all capacity at active Norwegian centres.

The estimates of the indirect effects are based on actual transaction data from the facilities in the comparison group, with historical payments to around 1,500 unique Norwegian supplier companies matched against Menon's company database. The indirect effects for these facilities are thus largely observed, not merely modelled. This ensures high precision in the estimates for the facilities in the sample. For the rest of the industry, the estimate is scaled up from the ratios in this sample.

Figure 3-5: Average economic impacts in operations based on the comparison group. Source: Menon Economics.

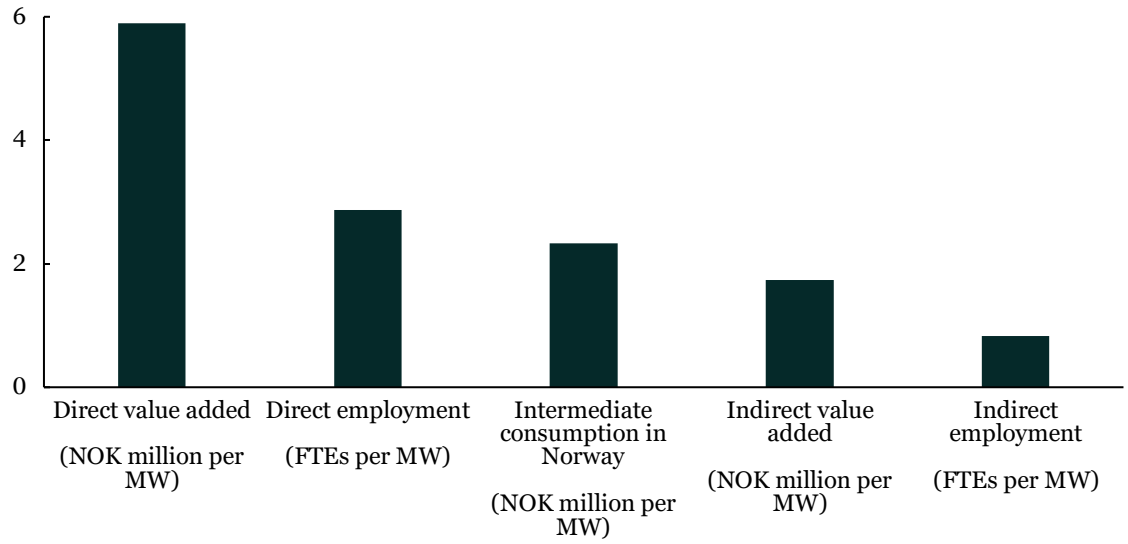


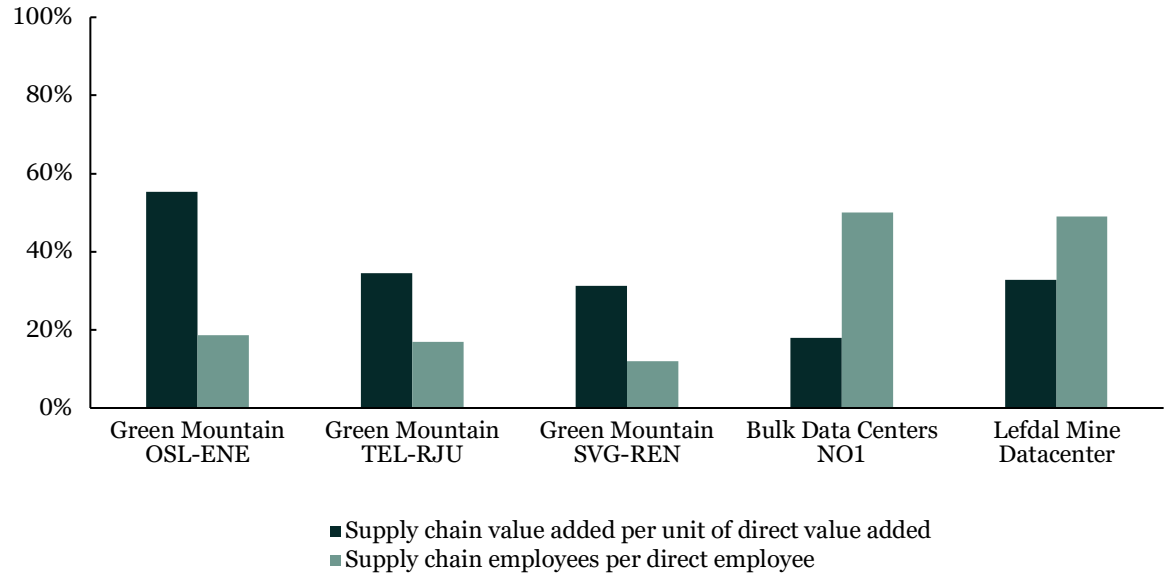
Figure 3-5 shows that the data centres in the sample have had around NOK 5.9 million in direct value added and around 2.9 direct FTEs per MW.[21] Intermediate consumption has amounted to NOK 2.3 million per MW. It is this intermediate consumption that becomes revenue for the supplier companies, and which thus supports the indirect economic activity in the supply chain. The indirect effects have on average amounted to NOK 1.7 million and 0.8 FTEs per MW.

The direct effects are larger than the indirect effects at all the facilities, for both value added and employment, as shown in Figure 3-6. Green Mountain's data centres have nevertheless had a higher share of indirect value added (value added further up their supply chain) than the others. This is mainly

[21] For value added this is in line with overall figures for the industry, while it is somewhat higher for employment. This is because employment in this graph includes own employees, contracted personnel and clients' employees permanently based at the data centre.

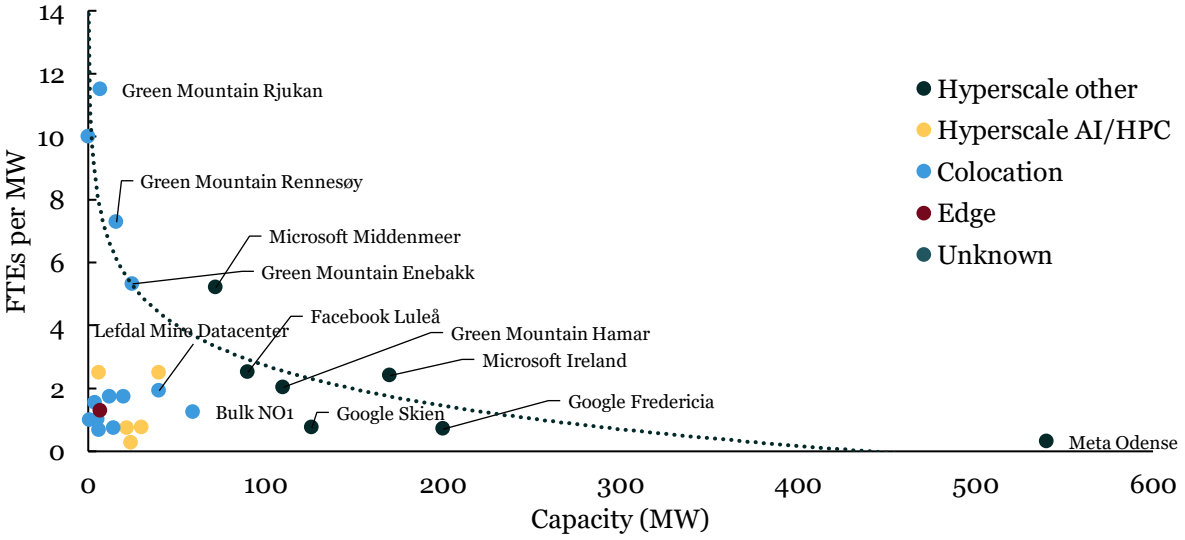
because EBITDA at Green Mountain's facilities has been somewhat lower than at Lefdal Mine Datacenter and Bulk's NO1 campus.

Figure 3-6: Ratio of direct to indirect effects in operations at selected data centres. Source: Menon Economics.



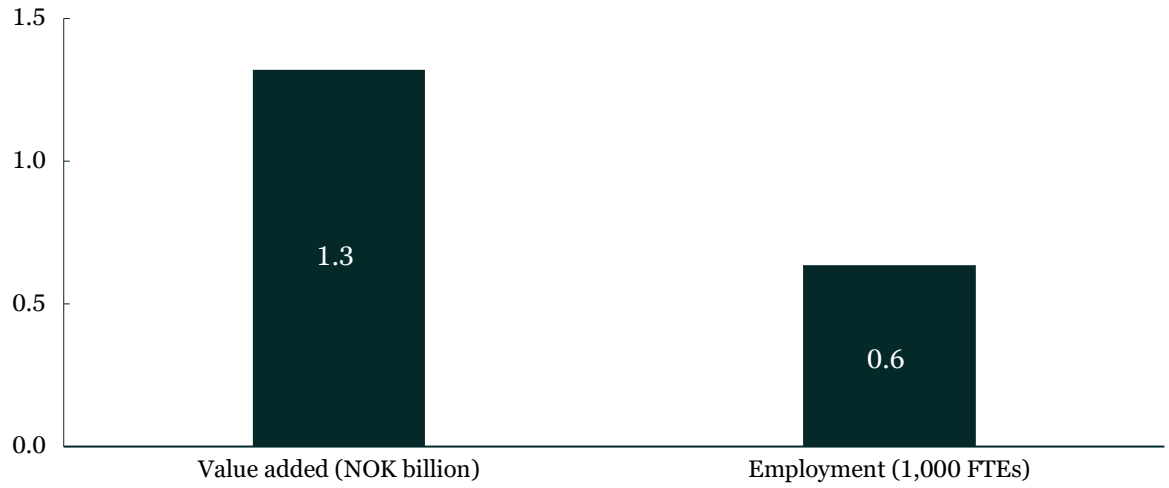
For employment, the picture is the opposite: Green Mountain's facilities have had a lower share of indirect employment. The explanation is a scale effect. Direct staffing at these facilities has grown less than capacity, while intermediate consumption grows roughly in proportion to it. Green Mountain's facilities were smaller and growing, with relatively high direct staffing and lower intermediate consumption. We expect the same scale effect at other data centres. Direct employment grows less than capacity, so that direct FTEs per MW is a decreasing function of facility size, see Figure 3-7. At larger data centres, the indirectly employed in the supply chain will thus account for an ever larger share of the total employment effect.

Figure 3-7: Ratio of direct employment to capacity. Source: Menon Economics.



Scaled to the whole industry, the ratios presented in this chapter imply that the data centre industry in operation supports in the order of NOK 1.3 billion in indirect value added and around 600 indirect FTEs in the supply chain. The estimate is based on a total capacity of around 761 MW and assumes that the ratios from the sample are representative of the rest of the industry.

Figure 3-8: Indirect economic impacts from the operation of the current data centre industry in Norway. Source: Menon Economics.



A possible objection to the assumptions above is that large international players use Norwegian suppliers to a lesser extent than the operators in the comparison group. The literature describes a trend in which the largest players move procurement of critical equipment from the main contractors to their own centralised procurement functions, which buy directly from one or two regular manufacturers per equipment category.[22] We nevertheless consider that this trend is of limited significance for Norwegian suppliers. The centralised procurement mainly concerns technical equipment such as generators, uninterruptible power supply (UPS) systems, cooling systems and switchgear. Little of this equipment is produced in Norway, and it is imported regardless of who procures it, and therefore does not provide a basis for economic impacts in Norway in any case.

Nor does the empirical evidence support the notion that hyperscale facilities produce lower local effects in operation. A recent American study of around 1,500 data centres compares labour market effects at county level and distinguishes explicitly between hyperscale and colocation facilities.[23] The study finds that both facility types generate growth in local data processing activity, but that only hyperscale facilities additionally generate growth in the local telecoms sector. The explanation is that the hyperscale campuses in the US have created local demand for fibre capacity and network operations, while colocation facilities have to a greater extent rented out capacity to clients without a local presence. The findings relate to American conditions and employment and cannot be transferred directly to Norwegian conditions, but they provide no grounds for adjusting the ratios for hyperscale facilities downwards.

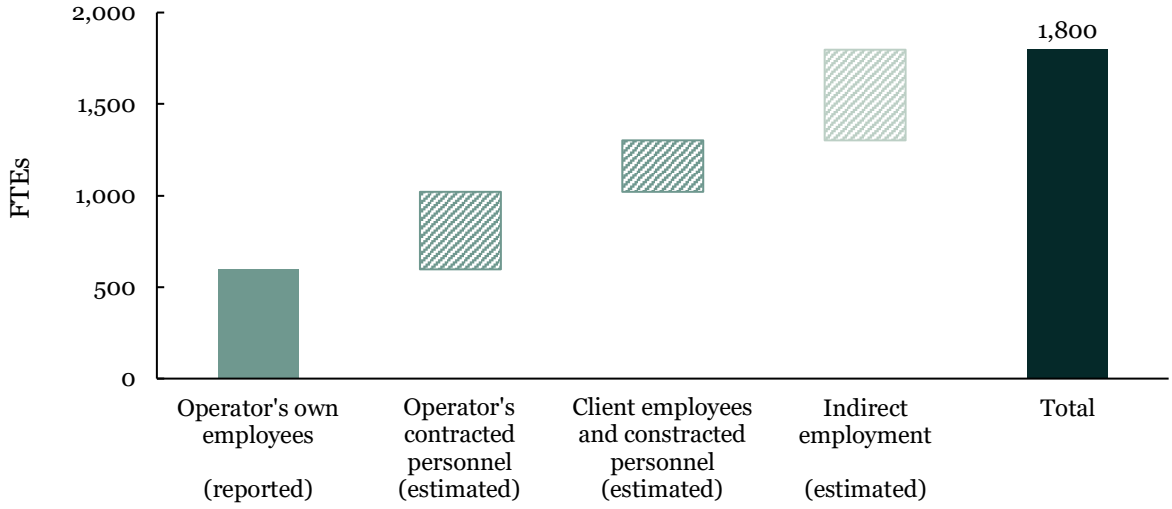
3.1.4 Combined effects (direct and indirect)

In this section, we combine the direct and indirect effects from the preceding sections. In total, we estimate that the data centre industry supported around 1,800 FTEs in 2025. The operators had around 600 own employees, as reported to the Brønnøysund Register Centre. In addition, we estimate around

[22] KPMG (2024). Data centre supply chain. Available here.
[23] Brookings (2026). Data Centers and Local Labor Markets. Available here.

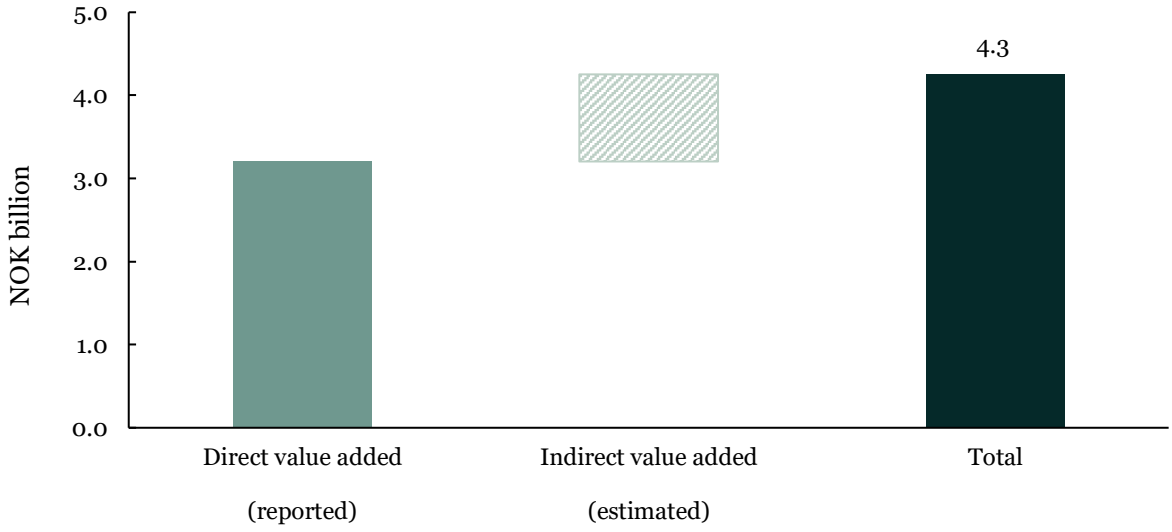
420 FTEs of contracted personnel at the operators and around 280 FTEs relating to clients' employees and contracted personnel at the facilities. The estimates are based on installed capacity in 2025 excluding crypto. We estimate indirect employment in the supply chain at around 500 FTEs in 2025, based on the capacity of the whole industry in 2025.[24] Figure 3-9 shows the combined picture.

Figure 3-9: Combined direct and indirect employment in operations in 2025, including estimates of contracted personnel and clients' employees. Source: Menon Economics.



Based on our model and assumptions, total value added, including suppliers and subcontractors, is estimated at around NOK 4.3 billion in 2025.[25] This is shown in the figure below.

Figure 3-10: Combined direct and indirect value added in operations in 2025. Source: Menon Economics.



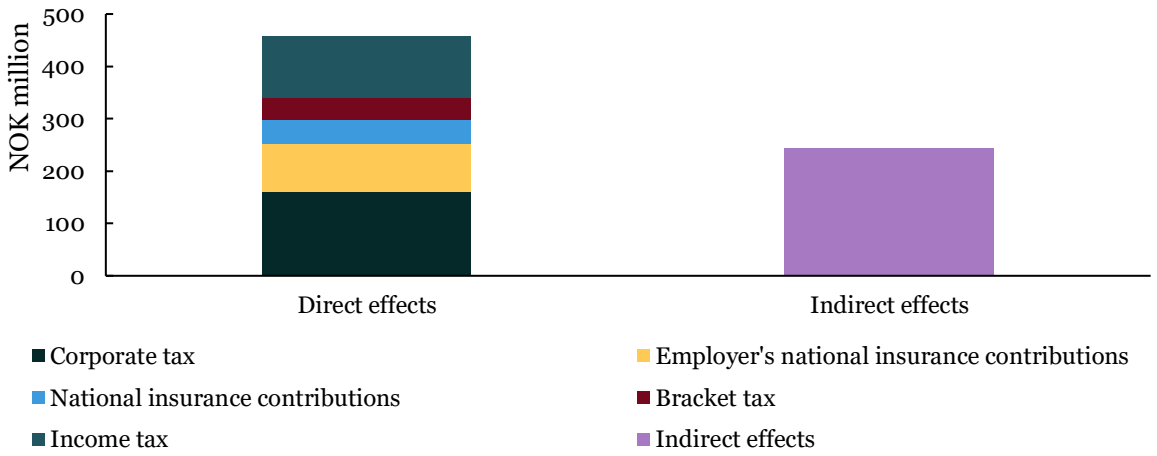
[24] Indirect effects in Section 3.1.3 (Figure 3-8) include the whole industry as of mid-2026, and are therefore higher than the estimate for 2025.
[25] As with indirect employment, the indirect value added figure has been adjusted down to cover only capacity in operation in 2025. The indirect value added here is therefore somewhat lower than in Section 3.1.3 (Figure 3-8).

We emphasise that only the direct figures for the operators' own employees and value added are taken from reported accounting and register data. The other components are estimates, based on the ratios and assumptions described in Sections 3.1.1 and 3.1.3.

3.1.5 Tax

The operation of the data centres supports, through the value added effects, tax revenues for the public sector. We estimate that the data centre industry's activity in 2025 supported public tax revenues of around NOK 700 million. 65 percent comes directly from the industry itself, while around 35 percent of this amount relates to companies in the value chain who deliver goods and services to the data centre sector. The figure below shows how the tax effects are distributed between tax types at the operators (direct effects)[26] and in the value chain (indirect effects).[27]

Figure 3-11: Direct and indirect tax effects arising from the data centre industry's operations in 2025. Source: Menon Economics.

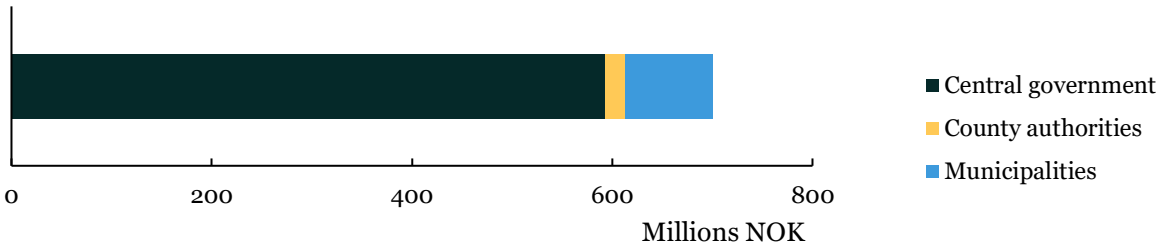


The public revenues can also be broken down by recipient group. The figure below illustrates how the total tax revenues are distributed across recipient groups.

[26] It is important to note that the calculation does not include property tax, wealth tax or levies such as the electricity tax. Property tax is particularly relevant locally, since it accrues to the host municipality in full and is not included in the income equalisation system. The calculation of these varies between municipalities, however, and they therefore cannot be estimated with any great precision. A back-of-the-envelope calculation suggests municipal property tax of around NOK 5–30 million for a 100 MW data centre. This figure is subject to considerable uncertainty.

[27] The tax effects are calculated separately for direct activity in the data centre industry and indirect activity in the value chain. Direct and indirect tax effects build on a combination of reported accounting figures and estimates. For direct activities, we take corporate tax from the accounts of the companies making up the industry. Employer's national insurance contributions, national insurance contributions, bracket tax and tax on ordinary income are calculated on the basis of the same accounting figures. For indirect activity in the value chain, no corresponding accounting figures exist, and the tax effects are therefore estimated in three steps. First, we calculate average value added and employment based on average figures per MW of installed capacity, drawing on previous Menon analyses of the data centre industry. We then distribute this value added and employment across the industries in the value chain, using the same industry distribution as in the previous analyses. Finally, we calculate the tax contribution for each industry by combining the distributed value added and employment with average wage statistics and company profits for each individual industry.

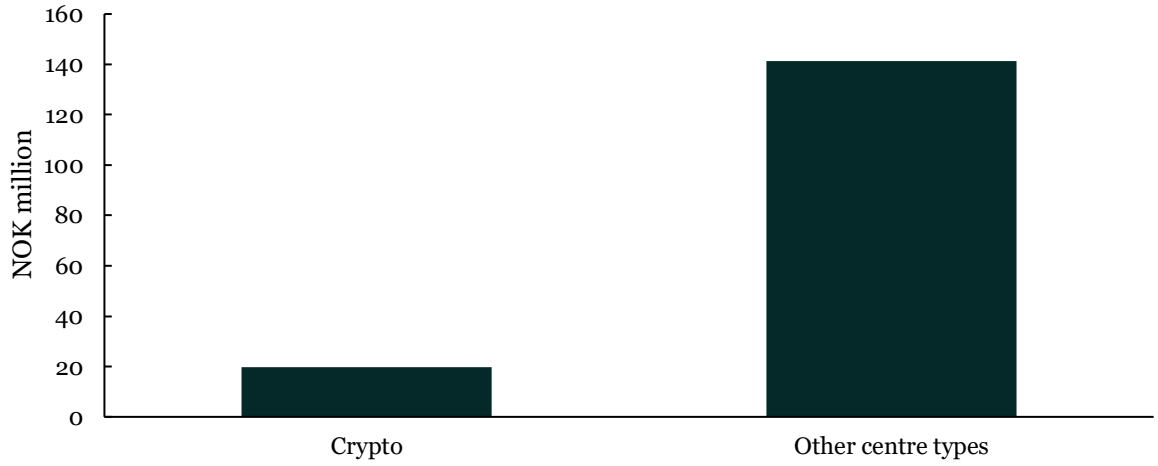
Figure 3-12: Direct and indirect tax effects arising from the data centre industry's activity in 2025, by recipient group. Source: Menon Economics.



Bracket tax, employer's national insurance contributions, employee national insurance contributions and corporate tax accrue to central government in their entirety, regardless of where in the country the activity takes place. Personal tax, that is, tax on ordinary income, is shared between central government, the county authorities and the municipalities, and thus depends on where in the country the employees live. The figure above shows that the majority of the tax revenues accrue directly to central government, at a total of NOK 593 million in 2025. The county authorities and municipalities (as groups) receive a relatively smaller share of total public revenues, at NOK 19 million and NOK 87 million respectively in 2025. It is nevertheless important to note that large parts of the central government budget are used to fund Norwegian municipalities and county authorities. This means that a share of these funds will accrue to the counties and municipalities indirectly.

As shown above, the data centre industry had a total tax expense of around NOK 160 million in 2025. There is wide variation across data centre types. For example, hyperscalers other than AI/HPC had a total tax expense of almost NOK 255 million, while colocation had a negative tax expense of NOK 95 million and hyperscale AI/HPC a negative tax expense of NOK 35 million. The crypto centres had a tax expense of around NOK 20 million, while the remaining industries in total had around NOK 140 million in tax expense. This is illustrated in the figure below.

Figure 3-13: Total corporate tax in the data centre industry in 2025, split between crypto and other centre types. Includes tax payable and changes in deferred tax. Source: Menon Economics.



The wide variation across data centre types is more a matter of accounting mechanics than of the companies' real, long-term tax capacity. The tax expense in the companies' annual accounts shows the sum of tax payable and changes in deferred tax, that is, not only the tax actually paid during the year. Among the companies in the data centre industry, we find two different mechanisms explaining the

swings. Some of the companies made losses in 2025, which produces a negative tax expense. A negative tax expense can be carried forward and is settled against future profits.

We have previously also analysed tax revenues from the data centres in the comparison group. Over time, these have together supported close to NOK 1 billion in tax revenues in their respective analysis periods (illustrated in the table below). The revenue comes from the corporate tax paid by the operators, tax on the income of the directly employed (including income tax and bracket tax, together with national insurance contributions) and employer's national insurance contributions. In addition, the economic activity the data centres support in the supply chains is taxed (indirectly), with the same components. The tax effects in the operational phase are the most relevant, as they are lasting and can therefore be included in the budget planning of central government, counties and municipalities.

The table below summarises the results of the tax analyses we have carried out. Note that the analysis periods vary between the facilities, from two to eleven years, and that the centres differ greatly in size, so the figures are not directly comparable across facilities.

Table 3-1: Overview of earlier analyses of tax revenues from selected data centres. Source: Menon Economics.

Data centre	Period	MW	Estimated tax to central government (NOK million)	Estimated tax to the counties (NOK million)	Estimated tax to the municipalities (NOK million)
Green Mountain Rjukan	2014–2023	6.7	63	3	14
Green Mountain Rennesøy	2012–2024	16.5	177	5.5	27
Green Mountain Enebakk	2018–2024	26.8	130	5	25
Lefdal Mine Datacenter	2023–2025	40	123	4	18
Bulk Infrastructure No1	2020–2025	59	270	15	60

The industry is marked by being in a scaling-up and/or construction phase, and what the full tax picture will look like when the industry reaches an "equilibrium phase" will depend on how the industry develops. For example, continued foreign ownership will in itself result in lower tax (particularly through wealth and dividend tax), while the entry of neocloud companies (which, as already described, sell computing power rather than server space) could result in higher tax paid. Finally, internal group structures, settlements between companies and intra-group debt structures will also affect the tax accruing to the Norwegian public sector.

Text box 3-4: Data centres and the concession power scheme.

Until recently, data centres were regulated as general supply under the concession power scheme, and electricity consumption from data centres thus affected how much concession power the host municipalities were entitled to. The scheme has met with criticism because municipalities were given a financial incentive to facilitate data centre establishments over other industry.[28] For example, Lars Sørgard of the Norwegian School of Economics (NHH) has argued that this scheme has contributed to an over-establishment of data centres in power municipalities.[29]

There are no statistics on how many host municipalities have received an increased concession power quota as a result of data centre establishments, but individual cases have been reported in the media.[30] From spring 2026, the scheme was changed so that data centres are no longer included in the basis for calculating concession power.[31] The change entails new conditions for both existing and future host municipalities, which in some cases may lose significant amounts in lost concession power revenues.[32]

It is, however, important to understand that the concession power does not go to the data centres, but to the municipality. As we understand it, *the municipalities may* sell concession power to individual buyers, but they normally sell it in the market. However the municipalities choose to sell concession power on, this must be in line with the EEA Agreement and the state aid rules. This means that "giving away, selling or buying power at a price below the ordinary market price may [...] be caught by the state aid rules".[33] Concession power is thus not to be sold below the market price. If municipalities choose to sell the power to a data centre (crypto centres or other types), this would, as we understand it, constitute price hedging for data centres on market terms, not a subsidy, provided the power is actually sold at market price. The same reasoning therefore implies that concession power should essentially be seen as revenue for the municipality (from power companies, not from the data centre industry itself), rather than support for the industry.

The fact that municipalities can sell concession power to data centres has in principle not been affected by the Ministry of Energy's change in the categorisation of data centres. In theory, they can thus still sell concession power to data centres, but host municipalities of data centres now have smaller volumes of concession power available for resale.

3.2 Comparison of operational economic indicators with power-intensive industry

In the public debate, and in a number of recent reports[34], data centres' economic footprint is compared with power-intensive industry. The comparison is probably raised because both use large amounts of electricity, which is a scarce resource. In this section we compare the two industries along three dimensions: employment, value added and tax, and finally discuss the extent to which the comparison is useful as a basis for assessing what the electricity should actually be used for. In principle, we do not regard the comparison as particularly informative in an economic context, but given the considerable

[28] NRK (2025). Datasenter-boom skaper ufred blant naboar. Available here.
[29] Sørgard (2026). Konsesjonskraft forsterker knappheten på kraft. Available here.
[30] DN (2026). Kommunen selger strøm til krypto: - Fullstendig parodi. Available here.
[31] Regjeringen, Energidepartementet (2026). Tar datasenter ut av definisjonen av alminnelig forsyning i konsesjonskraftordningen. Available here.
[32] E24 (2026). Datasenter-grep: - Dramatisk. Available here.
[33] LVK (2021). Forbudet mot statsstøtte. Available here.
[34] See, among others, SSB (2026). Datasentrene vokser raskt – men hvilke verdier skaper de for Norge? Available here.

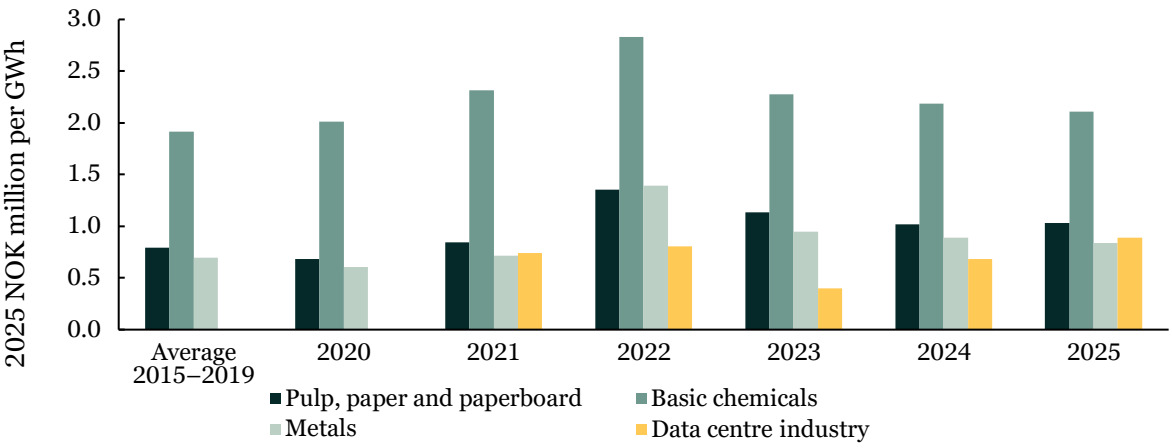
media attention around the topic, we nevertheless wish to indicate what the results in this report say about it.

3.2.1 Value added

The first comparison concerns value added. Value added is one of the most important economic quantities, because through wages, profits and tax it provides the basis for economic welfare. Total value added in power-intensive industry has over recent decades ranged between NOK 23 and 49 billion, far higher than value added in the data centre industry. The difference in levels is, however, relatively uninteresting in itself. It is the ratio of value added to other scarce or undesirable quantities that interests us. In this section we therefore present figures on value added relative to electricity consumption, employment and greenhouse gas emissions respectively.

We begin by considering value added relative to electricity consumption. In contrast to a recent analysis from Statistics Norway[35], we dig into different parts of power-intensive industry, which is important in order to capture variation between sub-segments. Furthermore, we include only electricity in the denominator (and not total energy use) as in SSB's analysis. This helps to lift the figures for power-intensive industry, but has been chosen because it is electricity, not energy, that dominates the debate.[36] The figure below shows the results of the exercise.

Figure 3-14: Value added per GWh in different power-intensive industries[37] compared with data centres[38]. Source: Menon Economics, SSB and Elhub.



The figure shows that the comparison with power-intensive industry yields no clear-cut answer. The data centre industry's value added per GWh is just under NOK 900,000. This is marginally lower than the paper industry (NOK 1 million) and marginally higher than the metals industry (NOK 800,000). All three sub-industries, however, score far lower than the chemical industry, which had value added of more than NOK 2 million per GWh in 2025.

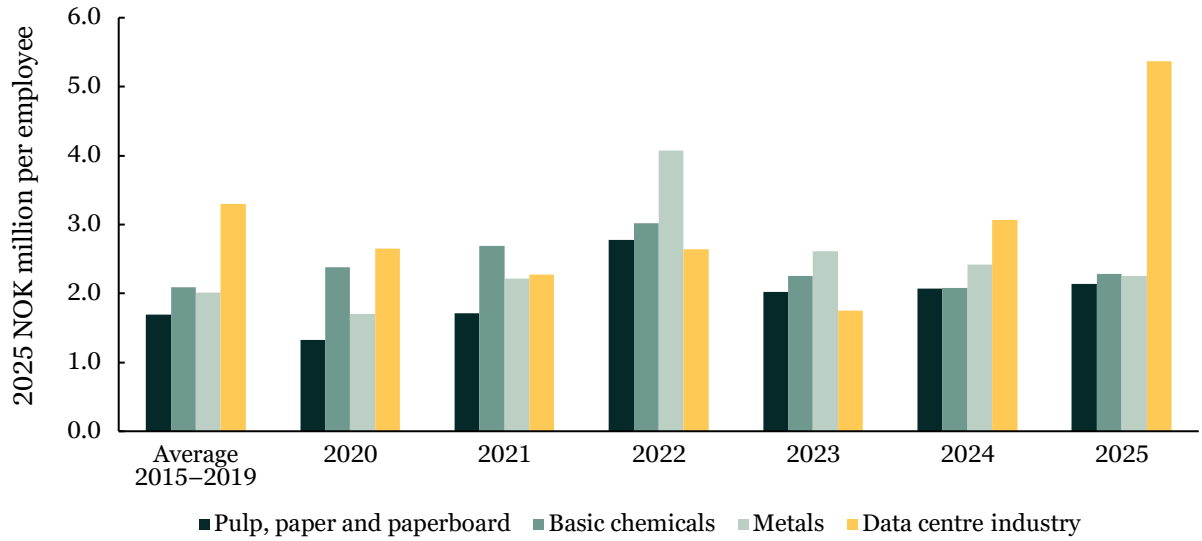
We also see that there have historically been large differences in value added per unit of electricity consumption in power-intensive industry. It is particularly clear that high commodity prices in the wake of Russia's invasion of Ukraine in 2022 led to high value added in the industry. The historical

[35] SSB (2026). Datasentrene vokser raskt – men hvilke verdier skaper de for Norge? Available here.
[36] Later in the report we show that it is in fact access to power via the grid that is scarce.
[37] All figures for the power-intensive industry are taken from Statistics Norway. The exception is value added for basic chemicals, which we have taken from Menon's company database. This was done because Statistics Norway does not publish these figures for reasons of anonymity.
[38] For this comparison we have only used data centres with industry code 63.110, because Elhub only reports electricity consumption for these. This is the greater part of the industry.

figures are somewhat lower. For example, the metals industry had value added of NOK 0.7 million (2025 prices) per GWh in the period between 2015 and 2019. In Text box 3-5 we describe the fluctuations in power-intensive industry in more detail, and what they mean for the expected development going forward.

We now move on to labour productivity in data centres and the power-intensive industries. Labour productivity is calculated as value added per person employed (or per FTE). Since Norway has had structurally low unemployment for many years and companies consistently report labour shortages[39], it is in itself attractive for new jobs to arise as far as possible in industries with high labour productivity.

Figure 3-15: Labour productivity in different power-intensive industries compared with data centres. Source: Menon Economics, SSB.

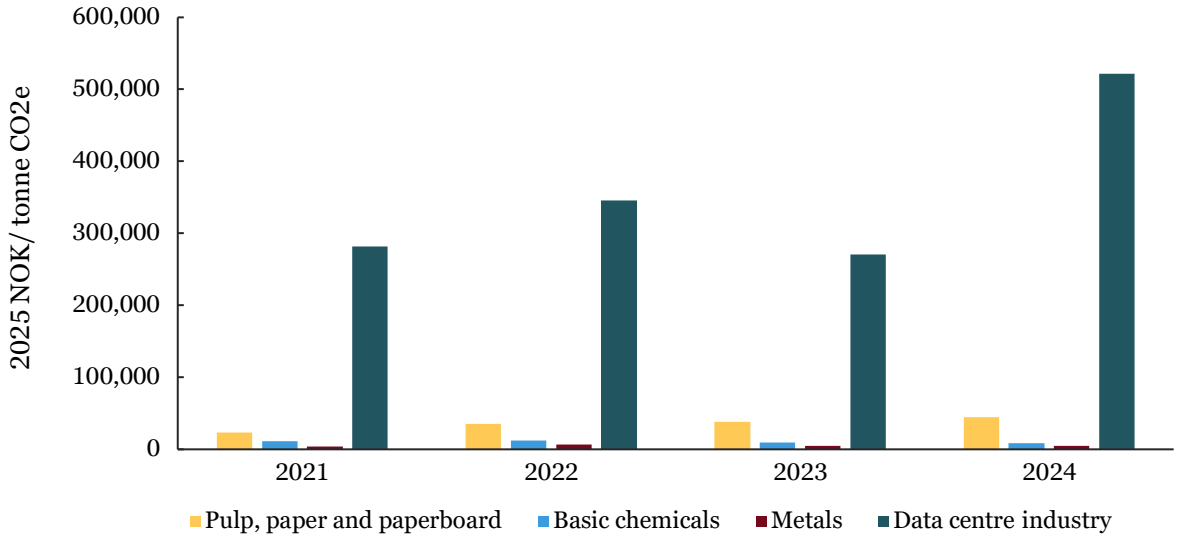


The figure shows that the data centre industry's productivity of more than NOK 5 million is somewhat above the level of the three parts of power-intensive industry, which in 2025 all stood at just above NOK 2 million per person employed. In the peak years for power-intensive industry, 2021, 2022 and 2023, productivity there exceeded the level of the data centre industry, but before and after this period the opposite was the case. Menon's analyses of individual data centres (discussed in the data section in the report's introduction) suggest that productivity once larger data centres are in full operation will remain somewhat above the current productivity level in power-intensive industry.

The final ratio we consider in relation to value added is greenhouse gas emissions. In itself, if we want to bring down Norwegian greenhouse gas emissions while maintaining economic growth, it is more attractive to channel resources (capital, labour and electricity) towards industries with high value added relative to greenhouse gas emissions.

[39] For the most recent analyses, see for example Nav's enterprise survey (available here), and NHO's competence barometer (available here).

Figure 3-16: Value added in NOK per tonne of CO_2e in different power-intensive industries[40] compared with data centres. Source: Menon Economics, SSB.



As the figure shows, there are large differences between power-intensive industry on the one hand and data centres on the other. While value added per tonne of CO_2e emissions in power-intensive industry ranges between NOK 5,000 (the metals industry) and NOK 45,000 (the paper industry), for data centres in 2024 it was above NOK 500,000. Value added relative to greenhouse gas emissions is 75 times higher in the data centre industry than in power-intensive industry as a whole. Greenhouse gas emissions for data centres are estimated in Chapter 5. We emphasise here, however, that we do not have access to actual emissions from data centres, which means the figures must be interpreted with particular caution. That value added relative to greenhouse gas emissions in the data centre industry is many times higher than in power-intensive industry is beyond much doubt.

The comparison of our three value added measures shows wide variation both across the data centre industry and within power-intensive industry. Measured by value added per unit of electricity, data centres score roughly on a par with the metals industry, but considerably lower than, for example, the chemical industry. If we instead consider labour productivity and value added per tonne of CO_2e, the data centre industry scores best. There are nevertheless several reasons why the findings must be interpreted with caution, and there are too many uncertainties to support the categorical conclusions presented in the media. First, power-intensive industry is a fairly mature industry, with relatively low investments in new production capacity compared with existing production. The opposite is true of the data centre industry, which is in a strong scaling-up phase. This means that the latter will generally have lower margins, lower profits and thus lower value added than would be expected at full operation. Second, the ratios for power-intensive industry in particular are affected by value added in recent years having differed considerably from the historical trend, driven by very high commodity prices as a result of the COVID-19 pandemic, Russia's invasion of Ukraine and, most recently in 2026, the US and Israel's war against Iran. There is also uncertainty about the long-term equilibrium level in the data centre industry, since neither supply nor demand has stabilised in the global market. This is described in more detail in the text box below.

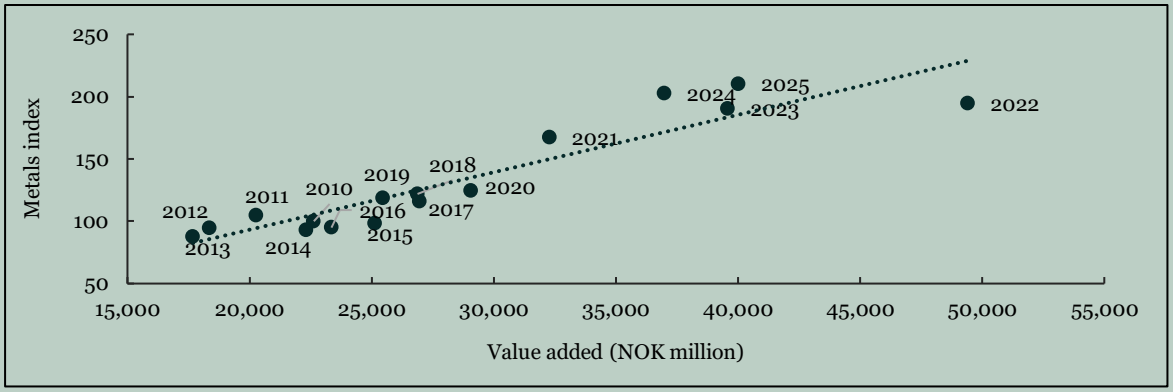
[40] Power-intensive industry is delimited according to Statistics Norway's definition (SN2007: 17.1, 20.1, 24.1 and 24.4). The emissions are taken from Statistics Norway table 13931, which distributes emissions by source rather than by industry. Pulp and paper is assigned to 17.1, petrochemicals, fertilisers and carbides to 20.1, and metal production including stationary combustion in the metals industry to 24.1 and 24.4. Figures in 1,000 tonnes of CO2 equivalents (AR5). No emissions data are available for 2025.

Text box 3-5: Drivers of value added in the data centre industry and power-intensive industry.

What drives value added in the two industries?

Value added fluctuates far more than employment. This means that one should avoid comparing quantities in individual years. For example, power-intensive industry had between 18,000 and 20,000 persons employed every year from 2015 to 2025, equivalent to a max-min difference of around 11 percent. In the same period, value added ranged between NOK 23 and 49 billion, a difference of more than 110 percent. To understand the extent to which the value added ratios are representative, we briefly review what drives value added and its relationship to installed capacity and electricity consumption.

For **power-intensive industry**, electricity is a key input, but much of the consumption is covered by long-term contracts, and volatility is therefore considerably lower than in the spot market. Since 2012, the standard deviation of the annual electricity price excluding taxes has been 8 øre per kWh for power-intensive industry, against 34 øre per kWh for households. In 2012, prices in the two segments were roughly equal, while in 2022 households paid around three times the industry's price. At the same time, the electricity price is strongly correlated with the prices of the products the industry sells, such as metals and fertiliser, because both are affected by European energy and commodity prices. When energy prices rise, revenues therefore increase while the electricity cost remains stable, and value added in the industry increases. The relationship between metal prices (measured by the World Bank's metal price index converted to NOK) and value added in the industry is strong and shown in the figure below. A simple linear model explains more than 85 percent of the variation in the industry's value added.



The figure also shows that value added in the period 2022–2025 has been well above the historical level. The growth in value added in power-intensive industry over the past decade is essentially a price effect. In fixed prices, gross product fell between 2015 and 2025, and employment was virtually flat.

For **the data centre industry**, the most important factor is the price of computing power, that is, the rental price for GPU capacity and server services. The data on this price is so far limited. As mentioned earlier, the electricity price matters less for data centres' value added, both because electricity is a smaller cost share than in manufacturing and because many contracts make it possible to pass this cost on to the client. At the same time, it is important to underline that demand for data centre services is now reported to far exceed supply. Over the next few years, we may therefore see a situation in which the price of computing power, and thus value added in the industry, falls. Nevertheless, as long as investments in the industry are profitable, operations will be characterised by high productivity owing to the capital intensity of the investments. In the longer term, chips are also expected to continue becoming more efficient, which will probably increase value added per unit of electricity.

What does this tell us about the comparative ratios between the two industries? It confirms that interpretation calls for great care. For 2025, the ratio for the two industries as a whole is quite close. Whether this is representative of developments going forward depends on what we expect for the two markets. Will turmoil in world markets continue to keep commodity prices high? Will AI development continue to create a shortage of computing power? If the answer to these questions is no, there is reason to believe that we will see large fluctuations in value added per GWh going forward. Given that power-intensive industry has in recent years been far above the historical average, and that the data centre companies are still in a scaling phase that has not yet achieved the full economies of scale of hyperscale sizes, we consider it most likely that the ratio of value added per GWh will move in favour of the data centre industry going forward. This is, however, subject to considerable uncertainty.

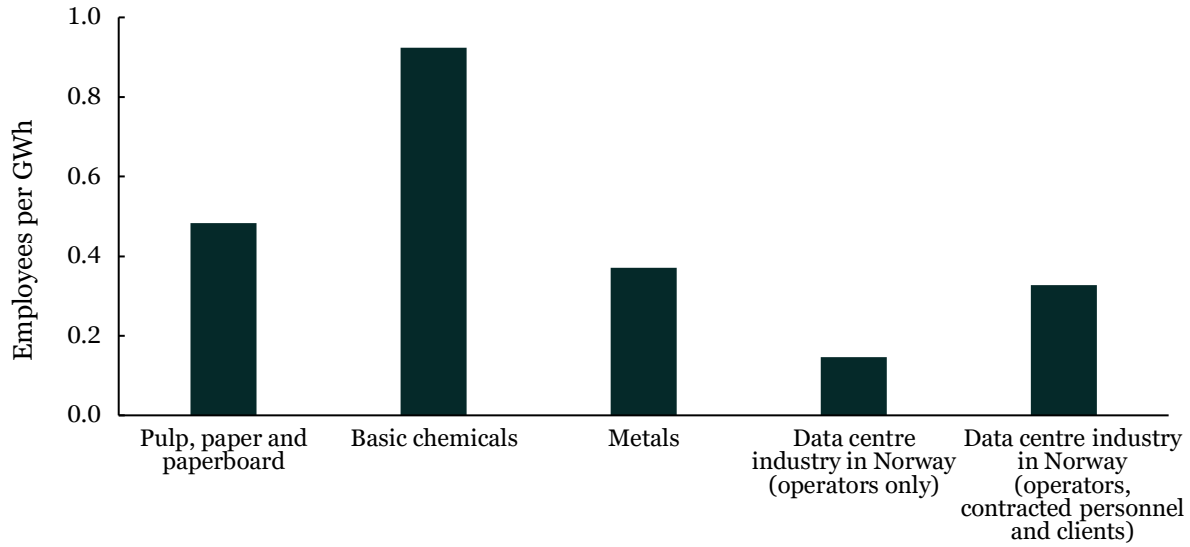
3.2.2 Employment

The second comparison concerns employment. As with value added, the difference in levels between the industries is of little interest in itself. We therefore consider employment relative to electricity, in two steps. First, we compare the number of persons employed per GWh of electricity consumption in Norway, with the same industry classification as in Section 3.2.1. We then compare FTEs per MW of installed capacity at facility level, where we additionally include a number of data centres abroad to obtain a broader basis for comparison.

Who is counted matters greatly for the employment figures in the data centre industry. A significant share of the employees whose regular workplace is at a data centre are not employed by the operator, but consist of contracted personnel and employees of clients whose regular place of work is at the facility. In the first comparison, we therefore show the data centre industry with two delimitations: only the operators' own employees, and a broader delimitation that also includes an estimate of the number of contracted personnel and clients' employees at the facilities.

The manufacturing figures cover persons employed in the industries as reported by Statistics Norway. Contracted personnel are thus not included in the manufacturing figures. The difference in delimitation in itself pulls the data centre figures up, and one should therefore be careful about interpreting small differences between the industries. That contracted personnel are not included in the employment figures for power-intensive industry is probably not a major source of error. Contracted labour accounted for less than 2 percent of FTEs in Norwegian working life as a whole in 2019, and the process industry is among the parts of manufacturing with the lowest use of contracted labour (Nergaard, 2021)[41]. In the data centre industry, we estimate that contracted personnel account for around 50 percent of the permanent FTEs at the facilities. If one wants to estimate how many local jobs the operation of a new data centre gives rise to, the broad delimitation is therefore the most relevant, since contracted personnel and clients' employees also constitute real jobs at the facility.

Figure 3-17: Persons employed per GWh of electricity consumption in the Norwegian data centre industry and in sub-industries of power-intensive industry (2025 figures). Source: Menon Economics, SSB.

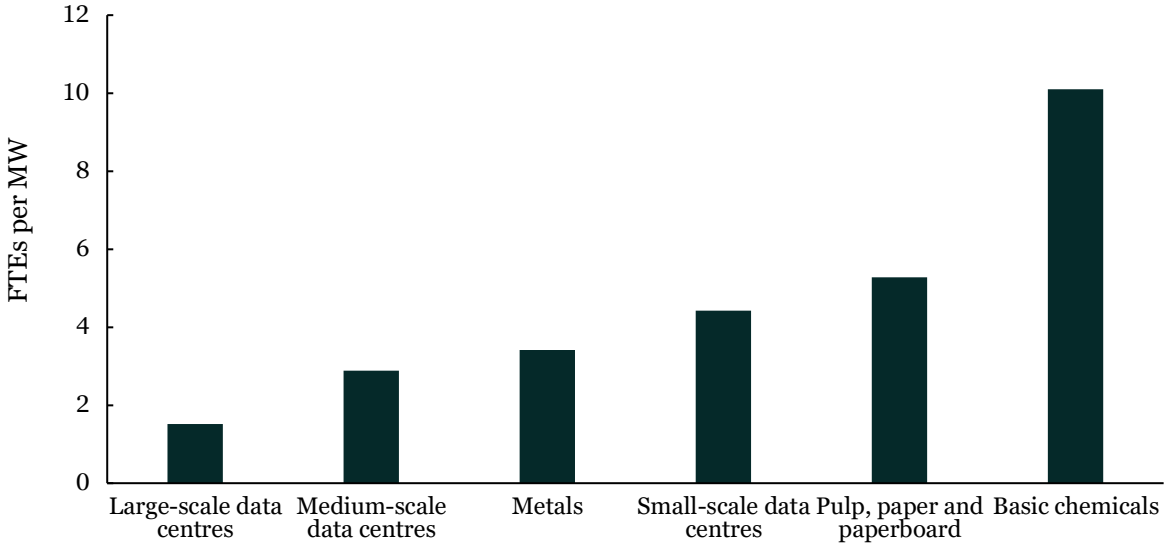


[41] Available here.

Overall, employment intensity in the data centre industry is lower than in power-intensive industry, but there is considerable variation within both industries. The data centre operators alone have 0.15 persons employed per GWh, less than half the level in the metals industry at 0.37. With the broad delimitation, the data centre industry has 0.33 persons employed per GWh and is thus roughly on a par with the metals industry, but below the paper industry at 0.48. The chemical industry has by far the highest employment intensity, at 0.92 persons employed per GWh.

Employment intensity at data centres varies considerably with facility size, however. In the second comparison, we have therefore calculated FTEs per MW of installed capacity for large-, medium- and small-scale data centres.[42,43] Here we include both Norwegian and foreign facilities to obtain a broader data basis, since so far there are few large data centres in operation in Norway.[44] The sample consists of data centres that report staffing both for the operator's own employees and for contracted personnel and clients' employees, so that the figures are comparable across facilities.

Figure 3-18: Direct FTEs per MW of installed capacity at large-, medium- and small-scale data centres in Norway and abroad and in sub-industries of power-intensive industry (2025 figures). Source: Menon Economics, SSB.



The figure shows that large-scale data centres have the lowest employment intensity, at 1.5 FTEs per MW, less than half that of the metals industry at 3.4. Medium-scale data centres, at 2.9 FTEs per MW, lie just below the metals industry, while small-scale data centres have 4.4 FTEs per MW owing to their relatively large base staffing.[45] The paper industry and the chemical industry have higher employment intensity, at 5.3 and 10.1 FTEs per MW respectively.

[42] Large data centres are defined as facilities with installed capacity of 100 MW or more, medium-sized as facilities with installed capacity between 50 and 100 MW, and small data centres as facilities with capacity below 50 MW.
[43] We use installed capacity (MW) rather than electricity consumption in this comparison because we do not have access to the electricity consumption of the foreign centres. Both data centres and power-intensive industry have high and stable utilisation times, however, and the ranking would probably have been roughly the same measured by electricity consumption. For the industrial sectors, MW is calculated by converting GWh figures for energy use from Statistics Norway into power. In the conversion, we have assumed a utilisation time of 95 percent for the metals industry and 80 percent for the paper industry and the chemical industry.
[44] The centres outside Norway do not report value added and are therefore not included in the value added calculations in Section 3.2.1.
[45] Some data centres are probably in a scaling-up phase, and staffing may be dimensioned to handle more capacity than was registered when the data were collected. If so, we somewhat overestimate the number of FTEs per MW, compared with what would be representative of a facility not in a scaling-up phase.

The figures suggest that power-intensive industry has equal or higher employment per unit of electricity and power than the data centre industry. How large the difference is depends on which sub-industries and which size classes of data centres are compared. Unlike value added, the employment figures are relatively stable over time, cf. Text box 3-5, and the ratios are thus less sensitive to the choice of measurement year. The low employment intensity of modern large-scale centres means that we will probably not see data centres employing as many workers as the largest smelters in Norway. A data centre can nevertheless become a workplace the size of a medium-sized industrial plant. A 200 MW facility with 1.5 FTEs per MW yields around 300 direct FTEs. That is enough to constitute a cornerstone business in a smaller municipality.

Finally, it is worth repeating that a new job in either industry does not necessarily mean that more people enter work. Norway has in recent years had close to full employment and labour shortages. Total employment therefore increases only if people outside the labour force enter work, or if workers move to Norway to take the jobs. New jobs can nevertheless be valuable for individual municipalities, particularly in rural districts, even if they do not increase national employment.

3.2.3 Tax

A comparison of tax between the two industries falls outside the scope of this assignment, but we provide here a brief overview of important similarities and differences between the two industries when it comes to tax. Much of the taxation is the same for the two industries. Both data centres and power-intensive industry pay ordinary corporate tax of 22 percent on profits and employer's national insurance contributions under the same rules. Both are liable for VAT with the right to deduct input VAT. In municipalities that have introduced property tax, the facilities are taxed under the same rules for commercial property, where production equipment and installations are exempt.

The tax system nevertheless also contains elements designed differently for the two industries, and we mention the most important. Data centres pay electricity tax at the ordinary rate, 7.13 øre per kWh in 2026. The reduced rate for data centres introduced in 2016 has been abolished. Manufacturing still pays a reduced rate of 0.60 øre per kWh, and some power-intensive processes are fully exempt. Power-intensive industry additionally receives CO_2 compensation for the allowance price mark-up in the electricity price. The appropriation is NOK 7.3 billion in 2026.

Ownership also affects how much of the profits is ultimately taxed in Norway. As shown earlier, 94 percent of value added in the data centre industry is linked to companies with foreign ultimate owners. Corporate tax on the profits of the Norwegian operating companies is paid in Norway regardless of ownership, while tax on dividends and wealth largely falls away with foreign ownership (Text box 3-3). Part of the profits from the services produced on leased capacity, for example at a hyperscale client leasing entire facilities, is in principle taxed where the client is tax resident, not in Norway, but this depends on internal company decisions. In many cases, these companies will also pay tax in Norway if their assets are recorded in Norway. High foreign ownership is not unique to data centres either. Foreign owners accounted for 36 percent of value added in Norwegian business in 2021, and in manufacturing as a whole just under half of value added was Norwegian privately owned.[46] In power-intensive industry, the largest companies are either partly state-owned, such as Hydro and Yara, or foreign-owned, such as Alcoa, Eramet, Elkem and Boliden. The degree of foreign ownership is nevertheless higher in the data centre industry than in any other major industry.

[46] Menon (2023). Privat eierskap i Norge 2021. Available here.

3.2.4 Is the comparison relevant?

The comparison between data centres and power-intensive industry provides a snapshot of the two industries as they are today, but it says little about the choices society faces. Power-intensive industry has had flat employment since 2015 and electricity consumption of between 35 and 40 TWh per year in the same period. The data centre industry, by contrast, is in a scaling-up phase, with high demand for grid capacity and considerable uncertainty about how large the industry will become. There is little to suggest that the grid capacity currently reserved for data centres is displacing major investments in new production capacity in traditional manufacturing. What may be displaced in the short and medium term is emission-reducing electrification of existing plants. With rising CO_2 prices, such electrification can secure jobs that would otherwise have disappeared, but there is no reason to believe that the effect measured in jobs per MW will equal the industry's current average. The average figures are therefore suited to describing the industries as they are, but not to estimating how many jobs an additional GWh yields in one alternative or the other.

In addition, there are many aspects that such a comparative analysis does not capture. We could, for example, have weighed value added against land use, environmental pressure, CO_2 emissions in the value chain or returns before depreciation. This has not been possible owing to limitations in data access. Nor does such an analysis capture other important societal effects. Norwegian data centres support Norwegian and global IT services that, for example, help to raise productivity in the business sector. In the same way, Norwegian power-intensive industry is an important global industry which, in addition to having low CO_2 emissions relative to its global competitors, helps to secure European production of a number of critical materials. It is difficult or impossible to compare the importance of such aspects in any systematic way.

We therefore consider it of little relevance in an economic assessment to set new establishments in the two industries against each other in this way.

3.3 Construction

The strong growth in the data centre industry in recent years has entailed substantial investments by the data centre operators in new and expanded facilities. This creates value and employment during the construction phase that must be assessed separately from the value added from the operation of the centres themselves. The data here are from all six data centres in the comparison group, which together amount to around 250 MW and thus around a third of total installed power in Norway.[47] These data form the basis for the analysis of the whole industry in this chapter. Here too, the calculations are based on actual transaction data, with the facilities' historical payments to Norwegian suppliers in the construction phase matched against Menon's company database. The economic impacts from the construction of these facilities are thus largely observed, not merely modelled, which ensures high precision in the estimates for the sample. For the rest of the industry, the figures are scaled up.

A large share of the investments concerns imported server equipment installed in the server halls. These investments naturally do not generate economic impacts in Norway, apart from anything linked to the installation work. The server equipment is also, in most cases, owned and operated by the data centre operators' clients. Such investments are not included in the analysis of the construction effects.

At the same time, the operators themselves account for substantial investments. Groundwork must be carried out, one or more buildings erected, offices established, and cooling systems, technical and

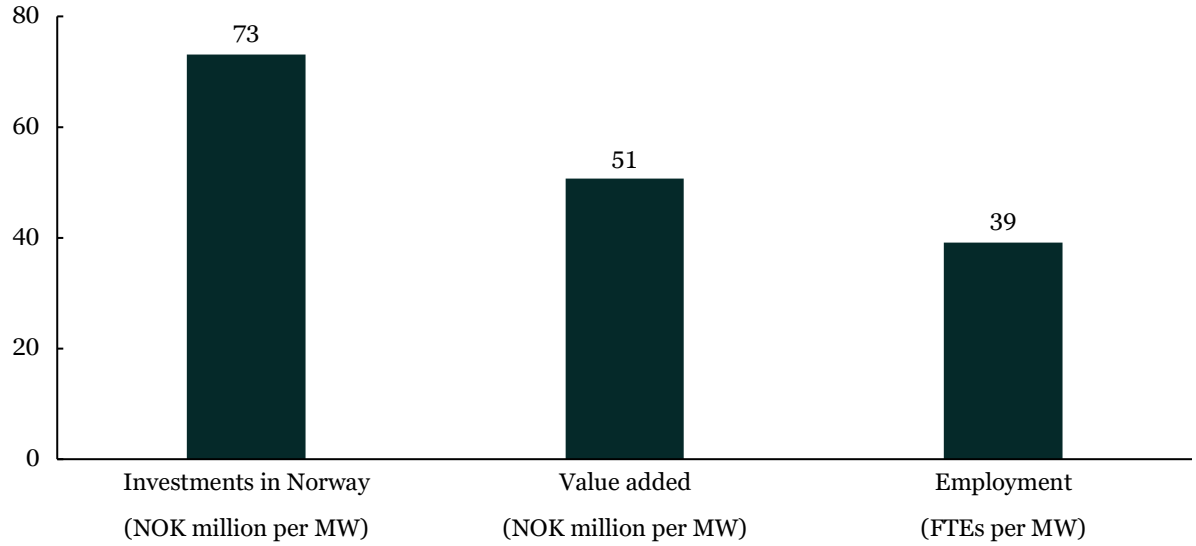
[47] For construction, we also have access to detailed transaction data for OSL-Hamar.

electrical infrastructure and other facilities designed and installed. This is work that can be carried out wholly or partly by Norwegian companies, as we have also observed in the completed projects.

Figure 3-19 shows average economic impacts from the six centres in the comparison group per MW. Investments in Norway correspond to around 80–90 percent of the data centres' total investments in the construction phase (excluding investments in server equipment), with the remaining investments mainly going to foreign companies, and some to public bodies.

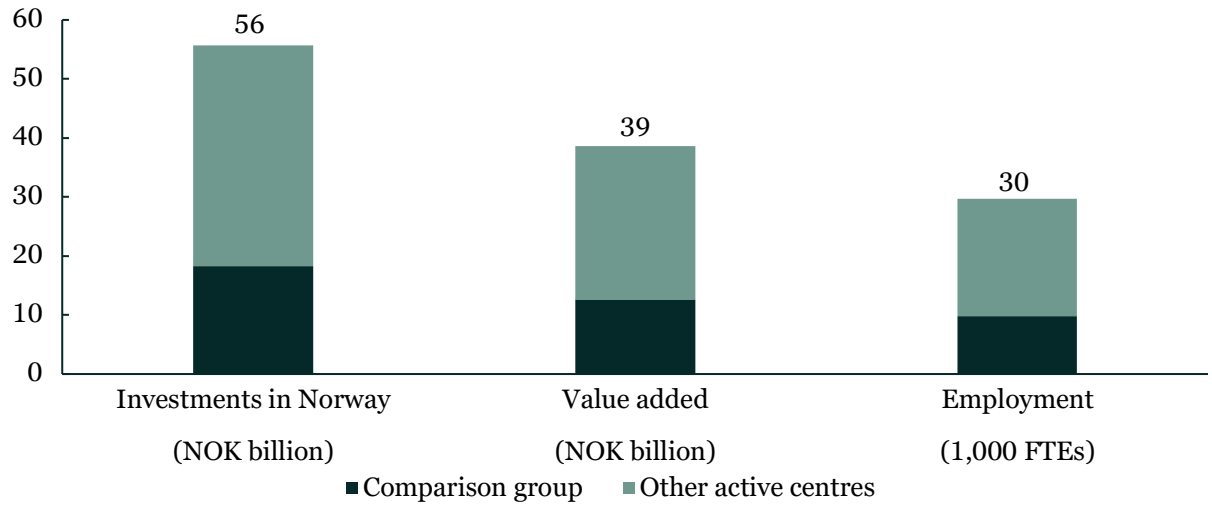
The high share of investments going to Norwegian companies indicates that the data centre operators have so far apparently been able to meet most of their needs from Norwegian business.

Figure 3-19: Average economic impacts during construction at the data centres in the comparison group. Source: Menon Economics.



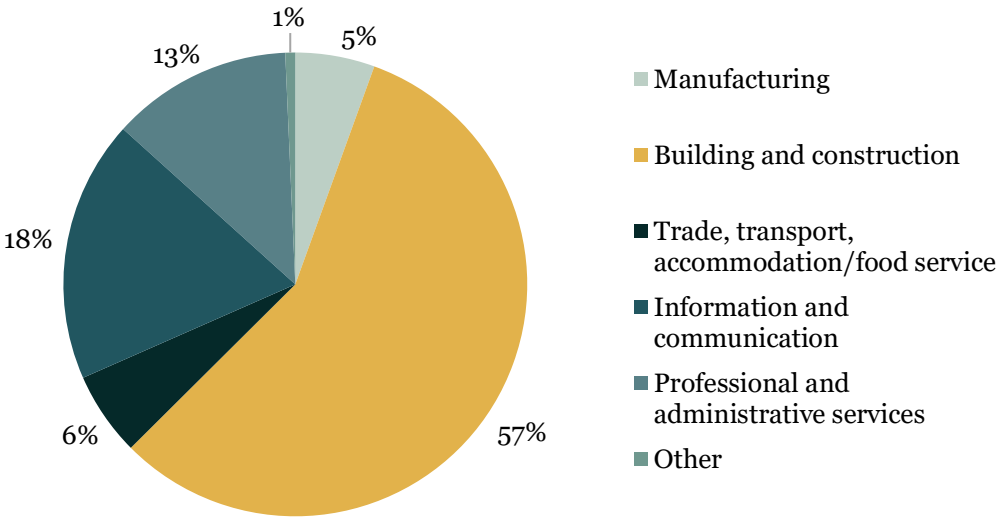
If it is assumed that these ratios from Figure 3-19 are representative of the whole data centre industry, today's active centres will through the construction phase have contributed a total of NOK 56 billion in investments in Norway going to private companies, and supported NOK 39 billion in value added and 30,000 FTEs. This is shown in Figure 3-20. This is a simplified estimate and implies, among other things, an assumption that costs per MW have remained stable throughout the period. In addition, the estimate assumes that per-MW costs scale linearly with data centre size.

Figure 3-20: Total estimated economic impacts from construction, active centres.



As shown in Figure 3-21, just over half of the investments go to the construction industry. The information and communications sector receives around 18 percent, while around 13 percent goes to professional and administrative services.

Figure 3-21: Distribution of investments in Norway to private companies by sector during the construction phase at the data centres in the comparison group. Source: Menon Economics.



3.4 Supplier overview and specialised data centre suppliers

As data centre capacity was built out and brought into operation, the industry's supplier segment was also scaled up. More and more contracts were awarded, and the suppliers expanded their capacity to deliver on them. This section looks more closely at the structure of the supplier segment in Norway. We map the suppliers and their geographical distribution, and highlight important suppliers and selected cases. This analysis is not intended to cover the whole industry, but to provide more detailed insight into the supplier segment of the operators in the comparison group.

Through the analyses we have carried out for the data centres in the comparison group, we have built a unique database of firm-level transaction data that forms the basis for this analysis. We have received

these data for all six centres. Figure 3-22 shows how much the six data centres have spent on suppliers in connection with the construction and operation of the centres from the start of the construction phase up to and including 2025.

Figure 3-22: Accumulated intermediate consumption paid to private suppliers in Norway by the data centres in the comparison group up to and including 2025, split between operations and construction. Source: Menon Economics.



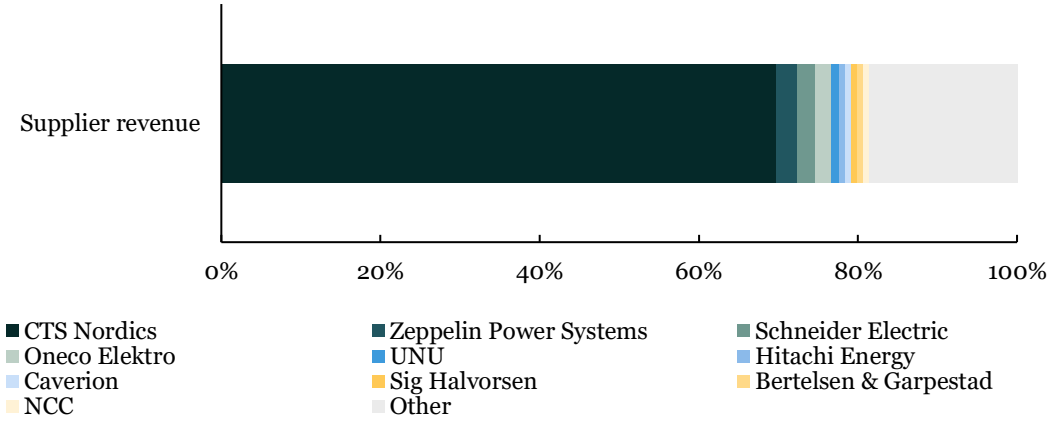
The operators in the comparison group have in total paid around NOK 19 billion in intermediate consumption to their suppliers. Most of this relates to the construction of the centres; in operations, around NOK 1 billion has been transferred to suppliers since start-up.

The two quantities are not directly comparable and should not be read against each other: operating costs run for as long as the facilities are in operation, while construction costs are temporary but large per year of active construction. The accumulated operating costs in Figure 3-22 therefore do not represent the whole life cycle, but only the few years the data centres have been in operation.[48] When accumulated operating costs from centres that have been in operation for a short time are compared with the total construction costs of the same, completed centres, it is natural that the distribution is so skewed towards construction.

Through the projects we have carried out for the six data centres in the comparison group, we have obtained precise data on which companies have delivered goods and services to the data centres, in both construction and operations. The six data centre projects have together used around 1,500 unique direct supplier companies. Figure 3-23 shows which companies have been the largest suppliers to the projects.

[48] The lifetime of different components at data centres varies. The building itself typically has a long lifetime, while certain technical installations, such as power and cooling infrastructure, have a shorter lifetime.

Figure 3-23: Combined share of intermediate consumption in Norway by the six data centres, by the most important suppliers. Source: Menon Economics.



CTS Nordics stands out as by far the largest supplier across the projects. Around two thirds of the total revenue the data centres generated among the suppliers accrued to CTS Nordics. The company is a turnkey contractor in the data centre sector and has carried out the construction at several of the facilities. CTS Nordics itself has a large network of Norwegian subcontractors used in carrying out the turnkey contracts.[49] The concentration at CTS Nordics in Figure 3-23 thus reflects the revenue of CTS Nordics and its Norwegian subsidiaries, not only *CTS Nordics AS*.

To describe the supply industry and the potential in the Norwegian supply chain, we have categorised the ten largest suppliers by degree of data centre specialisation. We distinguish between three categories: data centre specialists, generalists with dedicated data centre expertise, and generalists. The categorisation is based on three operational characteristics: the share of revenue coming from data centre customers, whether the company has documentable data-centre-specific expertise, and the extent to which the delivery requires adaptation to the data centre's requirements. See Appendix D for a detailed description of the categorisation. Table 3-2 provides an overview of the ten largest suppliers to the six data centre projects, measured by the revenue they have received from the data centres.

Table 3-2: Overview of the ten largest suppliers, which industry they belong to, and whether they are data centre specialists (from largest to smallest). Source: Menon Economics.

	Company	Industry	Supplier category
1	**CTS Nordics (and subsidiaries)**	Turnkey contractor for data centres	Data centre specialist
2	**Zeppelin Power Systems**	Sales and servicing of backup generators	Generalist with dedicated data centre expertise
3	**Schneider Electric**	UPS, switchboards, power distribution, cooling, control systems	Generalist with dedicated data centre expertise
4	**Oneco Elektro**	Electrical installation	Generalist with dedicated data centre expertise
5	**UNU**	Contracting and development services	Generalist with dedicated data centre expertise
6	**Hitachi Energy**	Transformers, switchgear, grid connection	Generalist with dedicated data centre expertise
7	**Caverion**	Multidisciplinary technical installations	Generalist with dedicated data centre expertise
8	**Sig Halvorsen**	Plumbing/HVAC contractor	Generalist
9	**Bertelsen & Garpestad**	Civil engineering contractor – groundwork	Generalist
10	**NCC**	Building and construction contractor	Generalist

[49] CTS Nordics typically uses subsidiaries as subcontractors in carrying out the turnkey contracts. Subsidiaries' revenue is thus included under "CTS Nordics" in the figure and does *not* come in addition.

CTS Nordics is the only pure data centre specialist among the ten largest suppliers. The company is the Norwegian unit of CTS Group, a turnkey contractor in the data centre industry headquartered in Switzerland. The CTS group has built up a number of subsidiaries in Norway covering different tiers of the value chain for data centre construction.

Text box 3-6: NordicEPOD – from local supplier to European manufacturer.

An example of one of the CTS group's Norwegian subsidiaries is NordicEPOD, which is part of CTS Nordics Holding AS. NordicEPOD was founded in 2022 as part of CTS Group and is today a joint venture between CTS and Eaton. The company was established to meet Bulk's need for power modules in the construction of the N01 campus, and delivered its first product to Bulk in 2023.

Power modules are cost-heavy components in a data centre facility. The modules convert power from medium voltage to low voltage and are delivered as prefabricated containers placed outside the data centre building itself.

NordicEPOD's revenue increased from NOK 18 million in 2022 to more than NOK 800 million in 2023 and NOK 1.8 billion in 2025. To meet demand, the company invested several hundred million kroner in a new production plant in Holmestrand, which opened in autumn 2024. NordicEPOD is today one of the largest private employers in Holmestrand, with 250 permanent employees and plans to increase to 350.

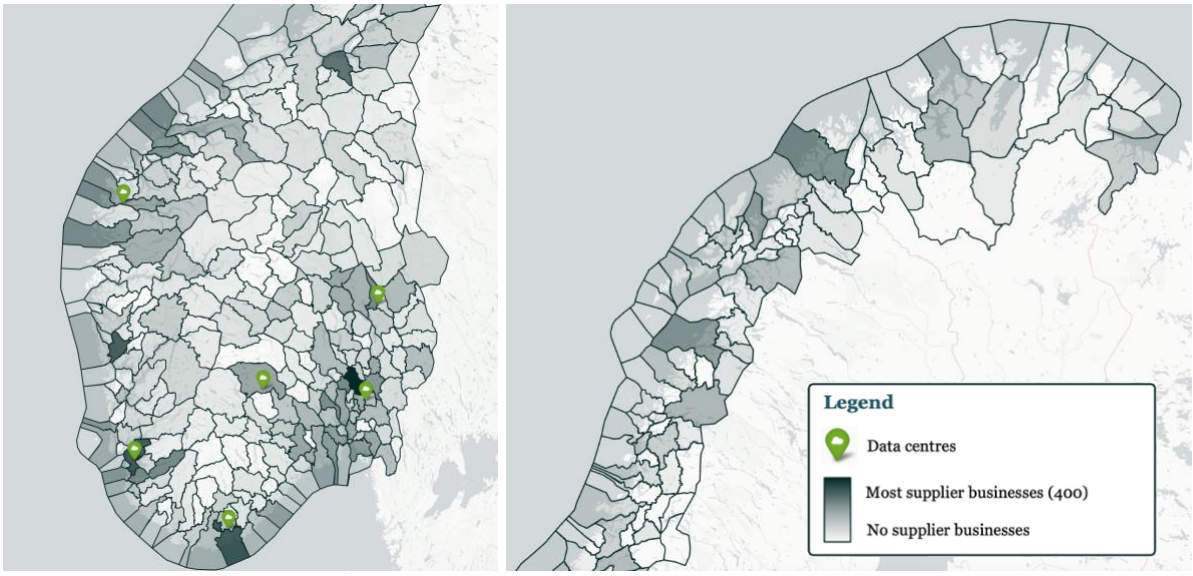
The company states that it is now among the three largest manufacturers of power modules for data centres in Europe, with annual capacity to cover 30 percent of the European market, and a new plant is being established in Portugal.

Six of the other suppliers in Table 3-2 are generalists with dedicated data centre expertise. Zeppelin Power Systems Norway and Schneider Electric deliver goods and services to a range of industries, but both have built up a specialised business area aimed at the data centre industry. Oneco, UNU, Hitachi and Caverion have been important suppliers with dedicated data centre expertise. The last three suppliers on the list are generalists in various segments of the building and construction industry.

The supplier segment, however, consists of far more than the ten largest companies. As mentioned in the introduction, around 1,500 unique enterprises were involved in the construction or operation of the six data centres. The supplier companies with direct deliveries are partly national companies with branches across the country. We estimate that around 5,200 branches have been involved in construction or operations deliveries to the data centres.[50] Figure 3-24 shows the geographical distribution of the branches, together with the locations of the six data centres.

[50] The estimate builds on a categorisation of transaction data received from the data centre operators. If the operators categorised a business as "local", its entire revenue was attributed to the local branch. If the business was categorised as "regional", the revenue was distributed across all branches in the region, in proportion to the branches' size. If the business was categorised as "national", the revenue was distributed in the same way across all branches in the country.

Figure 3-24: Geographical distribution of suppliers and associated data centres. Source: Menon Economics.



The largest number of branches is found in Oslo (around 400) and in the other large cities of Bergen, Stavanger, Trondheim and Kristiansand. There are two main explanations. First, several of the data centres have established themselves close to larger cities, partly because of proximity to expertise, suppliers, airports and infrastructure, and it is then natural to choose suppliers geographically close to the facility. Second, both construction and operations require specialised services that are more readily available in the cities. This means that data centres located in rural districts also depend on suppliers in the cities.

At the same time, the map shows that the data centres have also used many suppliers from rural municipalities. The TEL-Rjukan data centre is located in a sparsely populated area, but has nevertheless used around 60 suppliers from the host municipality. Across the construction and operational phases combined, around 35 percent of the data centre's intermediate consumption has gone to companies in Tinn municipality, largely to a local contractor (A til Å Entreprenør) and the local branch of the engineering company Bilfinger Engineering & Maintenance.

Lefdal Mine Datacenter in Nordfjord is also located outside the large city regions. The facility has used 60 suppliers from the host municipality and 80 from the neighbouring municipality. In total, around 65 percent of Lefdal Mine Datacenter's intermediate consumption has accrued to local companies.[51] The largest recipients have been UNU, Caverion, Eid Elektro and Ulvesund Elektro. All these companies state in interviews that the contracts from Lefdal Mine Datacenter helped to build up professional communities within the data centre industry. UNU, which is on the list of the ten largest suppliers in the sample, is today categorised as a generalist with dedicated data centre expertise. This suggests that expertise and capacity to deliver to the construction and operation of data centres also exist, or can be built up, outside the larger cities.

Note that there is probably some selection bias in the examples above. It is possible that precisely those data centres most concerned with local procurement have wished to demonstrate this by commissioning an economic impact analysis and sharing detailed procurement data with us. The

[51] In Stad or Kinn municipality.

results are real for these facilities, but one should be careful about assuming that the same pattern applies to all data centres in Norway.

Text box 3-7: Norwegian and foreign deliveries in a large data centre construction project: the example of OSL-Hamar.

The construction of the OSL-Hamar data centre illustrates how deliveries in a large Norwegian data centre project are distributed between Norwegian and foreign suppliers. According to information Menon has received from the project, imported deliveries amounted to around NOK 1 billion of a total investment of around NOK 9 billion. The figures do not include the IT equipment, such as servers and other hardware. The IT equipment is a separate item for which the client (TikTok) itself is responsible, and which is essentially imported.

The NOK 1 billion of imports was concentrated on specialised goods and services for which Norwegian suppliers are largely lacking. This included steel structures, ceiling systems, components from international manufacturers such as Vertiv and Eaton, and commissioning. For the construction of the transformer station too, large parts of the equipment, including special cables, were ordered from suppliers outside Norway.

The Norwegian and regional deliveries were mainly linked to groundwork and building works and parts of the installation work. The engineering design, by contrast, was mainly carried out by specialist teams in Portugal and other EU countries, and the management structure on the construction site was limited and mainly staffed from the EU. Local service purchases beyond building and construction were thus limited.

In our assessment, the picture from OSL-Hamar is illustrative of the industry. Norwegian suppliers are competitive in building and construction works and parts of the installation, which account for the largest share of the investment, while specialised technical equipment and engineering services are largely sourced from European and global supply chains. If the economic impacts of the construction phase are to be strengthened, it is therefore particularly within technical equipment and engineering that there is untapped potential for the Norwegian supply industry.

3.5 Other economic effects of data centres

Data centre establishments can produce broader societal effects than the direct and indirect effects on value added and employment estimated in this chapter. In this section, we show examples from Norwegian data centre projects of two such effects: collaboration with educational institutions and competence building in the supply chain. These effects do not arise by themselves. They require active, essentially voluntary, measures by the individual data centre operator, and the examples below are therefore not representative of the industry as a whole.

Text box 3-8: Downstream effects of the data centre industry.

In the public debate, it is often assumed, explicitly or implicitly, that data centres on Norwegian soil give Norwegian companies and research communities better access to computing power, and thus more research, development, model building and use of AI. The operating model of, and value chain around, AI data centres means, however, that this effect is probably quite marginal (outside times of crisis). The servers and GPUs are in most cases owned by the data centre operator's clients, and

the client is often the same company that owns the AI model being trained. A normal scenario is that an AI model is developed in one country and trained in a data centre in Norway, on chips owned by a company in a third country. The model can be used by customers in many countries and invoiced via a fourth. The host country for the computing power then receives no share of the value added in the services tier beyond what is captured in the economic impact analysis, together with potentially the return on the hardware located on Norwegian soil (cf. Section 2.1 and the text box in Section 3.1.1). Here there is in principle no difference between training AI models and a hyperscaler running its own software.

Computing power for AI is moreover in principle a globally traded good, with virtually no transaction costs. For training and most inference, latency matters little. Norwegian location therefore does not in itself give Norwegian companies or research communities easier, cheaper or better access to computing power. If Norwegian companies strengthen their competitiveness by using AI services, the services can just as well be bought from a data centre in Sweden or Spain, and the model may be American or Chinese.

In our assessment, downstream benefits essentially arise if Norwegian players actually gain easier, cheaper or better access to computing power than they would otherwise have had. There is no automatic link between this and the data centre being located in Norway. Such effects require active measures, for example conditions requiring that a share of the computing power be set aside for Norwegian users, or that Norwegian users be given discounted access.

3.5.1 Collaboration with educational institutions

Several Norwegian data centre companies have entered into collaboration with universities and upper secondary schools on competence development. Aker Nscale, which is building the data centre in Narvik, signed a ten-year cooperation agreement in November 2025 with UiT The Arctic University of Norway to develop the AI expertise communities in Narvik and Northern Norway.[52] Aker Nscale guarantees NOK 100 million over the agreement period, and the agreement is the largest UiT has entered into with a private company. Under the agreement, UiT will establish an interdisciplinary innovation centre for AI in Narvik and a new research centre bringing together the university's AI research across disciplines.

Lefdal Mine Datacenter is the main initiator of a new study programme at Eid upper secondary school, "AI, data centres and ICT", scheduled to start in autumn 2027.[53] The programme is the first in Norway targeted at data centre operations. The suppliers at the facility also have apprentices at all times in electrical trades, cooling technology and automation. Bulk, for its part, states that the company has an established collaboration with the University of Agder on competence development, research and innovation, and that through UiA, the Eyde cluster and Agder Symbiose it contributes to interdisciplinary knowledge development in the region.[54]

3.5.2 Competence building in the supply chain

The data centres place high demands on their suppliers, and the contracts thus help to build expertise among Norwegian suppliers. At Rennesøy, Oneco initially had to send employees on courses in Sweden

[52] UiT (2025). UiT og Aker Nscale sammen om storsatsing på kunstig intelligens. Available here.
[53] Menon Economics (2026). Ringvirkninger av Lefdal Mine Datacenter. Available here.
[54] Menon Economics (forthcoming). Ringvirkninger av Bulk sin N01 Campus i Vennesla.

and Germany because the specialist expertise did not exist in Norway.[55] Green Mountain's procurement has since helped to build up a Norwegian professional community for data centre disciplines. At Lefdal, Eid Elektro was certified for switchboard production for data centres, and Simona Stadpipe has built up a specialist team in water cooling that the company is carrying over to land-based aquaculture.[56]

The deliveries can also provide a basis for growth and exports among the suppliers. Bulk's commitment to NordicEPOD as an unestablished supplier was decisive in enabling the company to grow in two years into a major manufacturer of power modules for data centres, with 250 employees and exports to the European market.[57] Suppliers to the data centre in Rjukan state that the contracts have provided skills upgrading and references that strengthen their competitive position with new customers.[58]

[55] Menon Economics (2024). Ringvirkninger av Green Mountain sitt datasenter på Rennesøy. Available here.
[56] Menon Economics (2026). Ringvirkninger av Lefdal Mine Datacenter. Available here.
[57] Menon Economics (forthcoming). Ringvirkninger av Bulk sin N01 Campus i Vennesla.
[58] Menon Economics (2024). Ringvirkninger av Green Mountain sitt datasenter på Rjukan. Available here.

4 Economic impact of the future industry

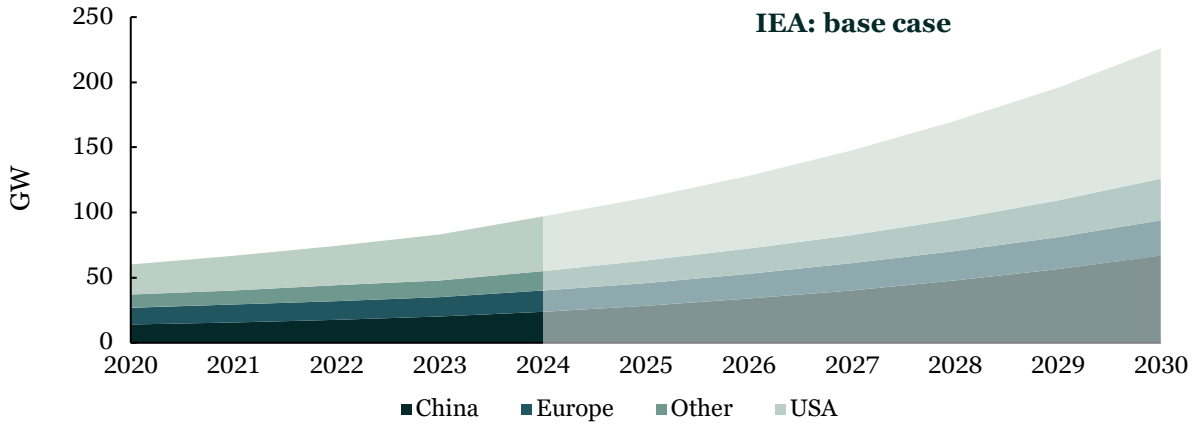
Data centres account for more than half of the roughly 22,600 MW that have reserved capacity or are in the capacity queue at Statnett. Requested capacity is nevertheless not a forecast, and how much is realised is highly uncertain. We have therefore developed three illustrative scenarios for developments towards 2035, which are used throughout the report. In all the scenarios, the scale of new data centre establishments is extensive, and even with moderate realisation the economic impacts will be large enough to be felt in the macroeconomy. We estimate that the operation of the future industry could support between NOK 16 and 37 billion in annual value added and 4,000 to 9,300 FTEs, equivalent to 0.3 to 0.9 percent of today's mainland GDP, depending on the scenario. We estimate the construction required at investments in Norway of between NOK 150 and 350 billion towards 2035, with value added effects of NOK 100 to 250 billion and between 72,000 and 165,000 FTEs accumulated over the period. These are gross effects: labour and inputs are scarce, and displacement of other economic activity means that the net effects will be lower.

In Section 4.1 we consider expected developments based on reservations and the capacity queue at Statnett, discuss how the figures should be interpreted, and present the three scenarios for further development. In this light, it is important to understand the economic impacts of the future data centre industry. The chapter therefore presents estimates of the impacts in the operational and construction phases separately, given different scenarios for development. The estimates build on the scenarios presented in Section 4.1.1 and the economic impact analysis in Chapter 3. In Section 4.2 we estimate the annual value added and employment effects in the operational phase, and in Section 4.3 the accumulated effects in the construction phase.

4.1 Expected developments in the data centre industry

Developments in the data centre industry have moved from small, decentralised facilities towards larger and more specialised centres with high requirements for security and infrastructure. Particularly since the introduction of large language models, developments in the AI sector have led to strong growth in demand for data centre services. Figure 4-1 shows historical growth in the global data centre industry together with forecasts.

Figure 4-1: Global growth in demand for data centre services. Source: IEA.[59]



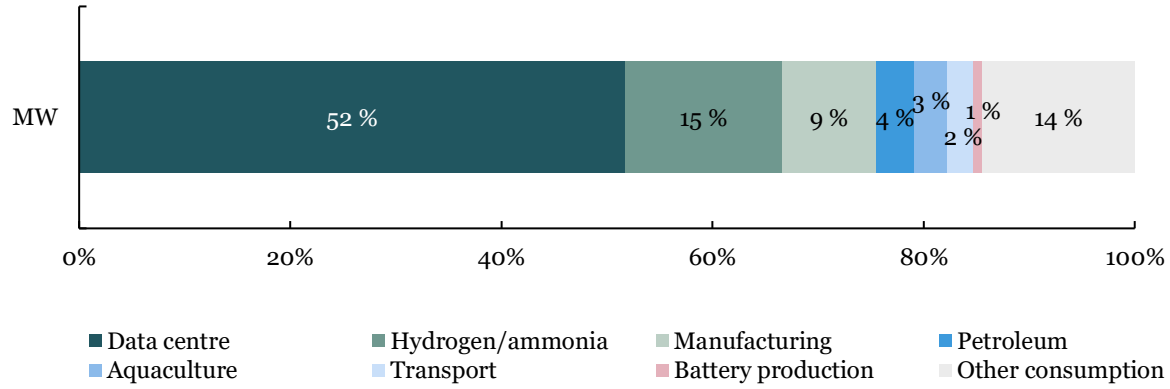
Growth is expected to continue in the years ahead, driven in particular by the need for computing power for artificial intelligence. Training and running large language models require extensive and stable computing capacity, which puts further pressure on global capacity. The International Energy Agency (IEA) expects total global data centre capacity to grow by 15 percent annually (CAGR) towards 2030, up from annualised growth of 13 percent in the period 2020–2024. The US is today the largest data centre market, with roughly as much installed capacity as Europe and China combined. Towards 2030, the US is expected to retain its dominant position. China will close some of the gap, while Europe is expected to lose market share.

In Norway, the increased demand for data centre services has become visible through a number of projects applying to Statnett for grid capacity. The power grid, however, has little spare capacity for large new consumption loads, and most new projects have therefore not been granted immediate access. They have instead been granted reserved capacity in the grid or been placed in the capacity queue.[60] Figure 4-2 shows the distribution of industries that have either been granted reserved power or been placed in the capacity queue.

[59] IEA (2024). Energy and AI. Available here.

[60] **Reservation**: When it is clear how the customer's grid connection can be established and the necessary grid projects have started (coordinated project development), the customer may be offered a reservation of capacity. Reservation then means that the customer can be confident that once the measure (or measures) is completed, the customer's operations can start as planned.
Capacity queue: If there is no capacity in the existing or planned grid, customers who have ordered capacity and are sufficiently mature for reservation must queue for capacity that becomes available in the future. This is referred to as the "capacity queue". Where investments in various grid installations may be needed to meet a customer's order, there may be separate capacity queues for each individual measure. A customer is in the capacity queue while the grid companies are assessing or studying possible measures but have not yet decided which measure(s) is most rational for connecting the customer. *The definitions build on Statnett's description of reservation and capacity queue and are taken from here.*

Figure 4-2: Overview of reserved capacity and capacity in the queue at Statnett. Source: Statnett.



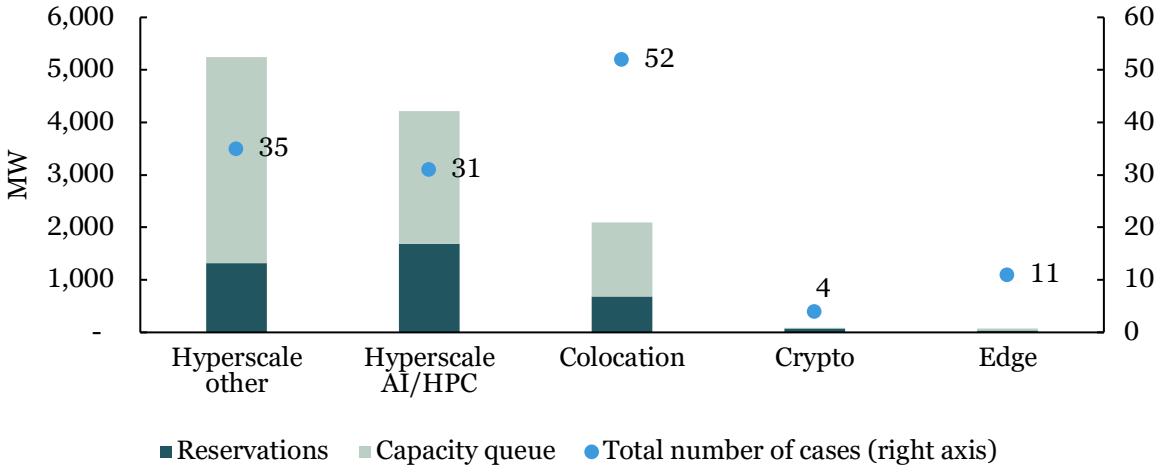
Both the number of data centre projects awaiting grid access and their average size have increased in recent years. Today, requested grid capacity from data centres accounts for more than half of total requested capacity of around 22,600 MW.[61] The total requested capacity corresponds to around 90 percent of today's maximum load of around 25,000 MW in the Norwegian power grid.[62]

Requested capacity is, however, no forecast of how much will actually materialise. Reservations and the queue are rather a measure of the scale of desired projects. It costs a data centre operator little to apply for connection and wait in the queue. Since grid capacity is also allocated on a first-come, first-served basis, it is rational to apply for grid access as quickly as possible, even if it is uncertain whether the project will be realised at the respective locations. How much is realised will depend on a range of factors, including developments in global demand for data centres, developments in global supply from other operators, whether the operators in the queue choose another location abroad where they can be connected earlier, and other company-specific assessments made when the grid capacity becomes available.

We have further attempted to categorise future data centre establishments by type. There is greater uncertainty in categorising future data centres than existing centres. Less information is available about the companies, and plans may change along the way. We have therefore used the same categories as in Section 2.2 (edge, colocation, hyperscale AI/HPC, hyperscale other and crypto), but with a somewhat different approach. The method is described in Appendix C. Figure 4-3 shows the overview of the different types.

[61] Statnett (2026). Statistikk om tilknytningsaker. Reservations available here and capacity queue available here. Retrieved 17.06.26.
[62] NVE (2024). Orientering om kapasitet i transmisjonsnettet. Available here.

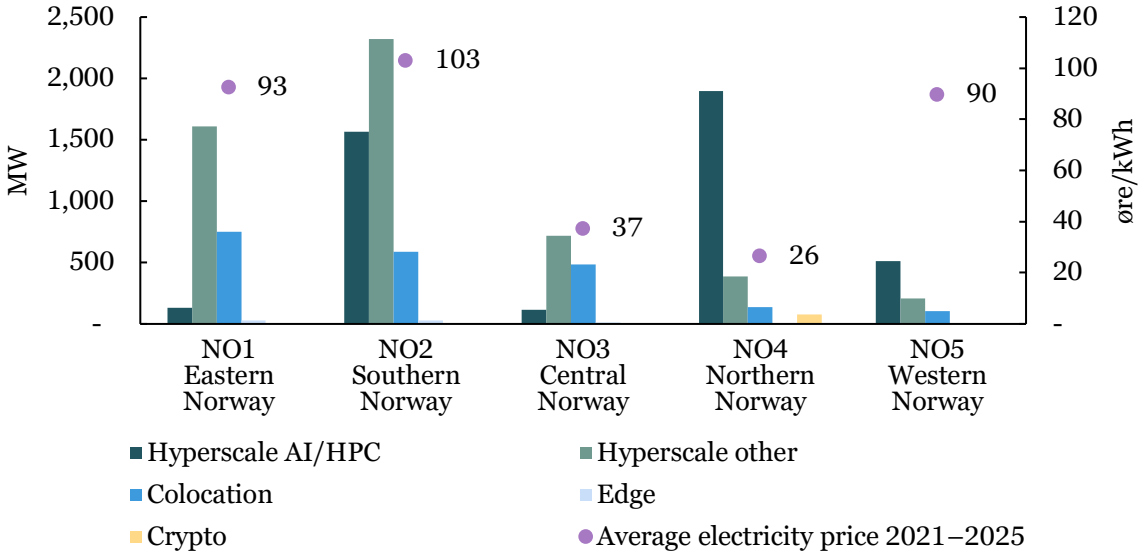
Figure 4-3: Data centres' reservations and capacity in the queue by data centre type. Source: Statnett, categorisation by Menon Economics.



Hyperscale centres other than AI/HPC form the largest category at around 5 GW, followed by hyperscale AI/HPC at around 4 GW. Colocation also accounts for substantial requested capacity. Crypto and edge make up a small share of total capacity in the queue.

Different types of data centres may have different location preferences. If so, this can be expected to be reflected in where they apply for grid connection. A data centre developer emphasising connectivity will apply for connection where the fibre infrastructure is best (primarily in the southern part of the country), while a developer emphasising electricity costs will apply in areas with lower electricity prices (particularly the northern part of the country). Figure 4-4 shows requested grid capacity by data centre type and price area. The figure also shows the average electricity price per price area.

Figure 4-4: Data centre reservations and queue by category and price area. Source: Statnett, categorisation by Menon Economics.



The figure shows that most of the requested grid capacity is in price areas NO1 (Eastern Norway), NO2 (Southern Norway) and NO4 (Northern Norway). Hyperscalers as a group have the largest requested capacity in Southern Norway (NO1 and NO2), despite electricity prices being highest there. This suggests that the electricity cost is not decisive for the establishment of this type of project. Other

factors weigh more heavily, such as connectivity and latency, fibre infrastructure, security of supply, proximity to urban centres and international airports, access to larger supplier companies, expertise and educational institutions.

The hyperscale AI/HPC segment has applied for substantial grid connection in NO4 and NO2, where particularly in NO4 it clearly exceeds other hyperscale centres. One hypothesis is that such projects are less dependent on low latency when the data centres are used for training and inference of language models. Low electricity prices can then make Northern Norway attractive: the electricity cost is not necessarily decisive for these players, but still an advantage. At the same time, the good connectivity in NO1 around Oslo and in NO2 will not necessarily be as strong a selling point as for other hyperscalers, colocation and edge. NO4 is moreover the only price area where data centres for cryptocurrency mining are seeking grid connection. This is due to the low prices, which are decisive for profitability.

4.1.1 Scenarios for further development

Reservations and the capacity queue give an indication of future developments, but cannot be translated directly into scenarios or forecasts. In the coming years, the power grid is essentially fully utilised, and there is little room for large new consumption loads beyond those that have already been granted reserved grid capacity. In the longer term, Statnett and the regional grid companies will implement measures to connect new consumption customers to the grid, provided demand persists. The grid companies have a connection obligation towards customers who meet the criteria, as long as the connection is operationally sound.[63]

For many data centre operators, time-to-market (the time it takes before the data centre is operational) is a decisive factor. If the project is delayed by long waits for power, the data centre clients may choose another operator that comes into operation faster. The economic rationale behind the project can then fall away, and the project be halted. To reduce this risk, some projects apply for grid access in several places simultaneously and choose the location where grid capacity becomes available first, a practice seen in the US.[64] Such duplicate applications mean that the same project can appear in several places in the queue[65], and are another reason to interpret requested grid capacity with caution.

We expect growth in the data centre industry over the next five years to be driven mainly by projects that have already been granted reserved capacity. Some of these will be shelved, and freed-up capacity will be allocated to projects currently in the capacity queue, both data centres and others. We have developed three illustrative scenarios based on different realisation rates for data centre projects with reserved capacity and projects in the queue, together with the desired connection date. Actual developments will deviate from the scenarios and depend on a range of factors. Table 4-1 describes the scenarios. The shares in the table apply to each year towards 2035. Of the grid connection cases with desired connection in a given year, the scenarios thus assume that the stated percentages are realised. For cases in the capacity queue, it is assumed that nothing is realised before 2030.

Table 4-1: Overview of the three scenarios for realisation of grid connection cases in reservations and the capacity queue.

Name	Description	Share of reservations realised	Share of capacity queue realised*
Scenario 1	Large share of grid connection cases realised	100%	70%

[63] Statnett (2026). Tilknytningsplikt og introduksjon for tilknytningsprosessen. Available here.
[64] CNBC (2025). Available here.
[65] This can be either several locations in Norway or several countries.

Name	Description	Share of reservations realised	Share of capacity queue realised*
Scenario 2	Medium share of grid connection cases realised	70%	50%
Scenario 3	Small share of grid connection cases realised	50%	10%

**Nothing from the capacity queue is realised before 2030.*

We emphasise that the scenarios are not forecasts. We have not assessed which individual projects will be realised. The scenarios are intended to illustrate different development paths rather than to establish the likelihood of one particular development. Nor should they be understood as a kind of minimum, medium or maximum development. Actual developments may lie above scenario 1 or below scenario 3.

The realism of the scenarios is difficult to assess. It depends to a large extent on whether grid capacity remains a bottleneck, and on how scarce other inputs in the value chain are, such as labour and electricity. Without large-scale expansion of grid and power infrastructure, and without a sufficient expansion of the available workforce, whether through increased net immigration, the freeing-up of labour from other sectors or increased labour force participation, it will be difficult to realise the highest scenarios.

4.2 Operations

As shown earlier, the scale of planned projects is substantial. When these, or parts of them, enter operation, they will employ people and create value. In addition, they will buy goods and services from Norwegian and foreign suppliers, and will in this way contribute economic impacts further up the value chain. Economic impacts in the operational phase are continuous economic quantities: both the direct and the indirect value added and employment effects run for as long as the data centres are in operation.

We have estimated the annual economic impacts in three establishment scenarios (see Section 4.1.1 for a description of the scenarios). The calculation is based on Statnett's overview of reserved capacity and capacity in the queue, together with ratios between economic impacts and capacity. All the projects in Statnett's overview are divided into new establishments and expansions. The distinction matters for the direct employment effects, which decline with increasing facility size. The average size is 85 MW for new establishments and 91 MW for expansions. For new establishments, we assume direct employment of 1.5 FTEs per MW, and for expansions 0.5 FTEs per MW in the main scenario. The values are based on empirical data and take account of declining employment effects at larger facilities (see Figure 3-7).

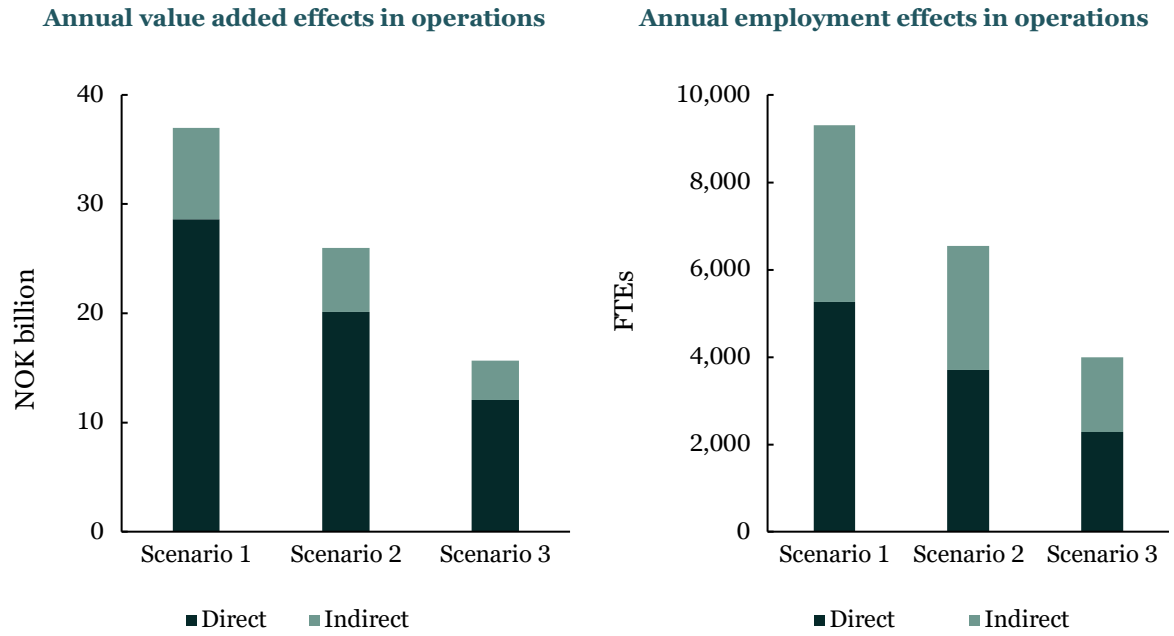
We have also carried out a case study in which we assessed whether it is appropriate to use different ratios for different types of data centres. We find no basis for adjusting the figures by type, but we do adjust by size (which is correlated with type), which we do in this section. See Appendix E for a more detailed description of the case study. In Appendix F we additionally show sensitivity calculations, in which for new establishments we assume 1 and 2 FTEs per MW respectively, and for expansions 0.25 and 0.75 FTEs per MW, in the three scenarios.

For direct and indirect value added and indirect employment, we scale using the ratios from Figure 3-5. These are historical ratios, calculated on the basis of the six data centres in the comparison group. The industry may change, which will also affect the ratios. In just the past three to four years, the industry

has changed considerably, and today we face a different industry from before the AI wave, with considerably larger volumes and different client segments. Efficiency in the data centres may also increase through technological development, which increases value added per MW. At the same time, it may mean that data centres can be operated with fewer employees per MW. The ratios are thus representative of the industry today, but will not necessarily remain stable throughout the period towards 2035. Developments may also go the other way: increased security requirements may pull staffing per MW up, and falling revenue in the industry will reduce value added per MW.

Based on the scenarios described in Section 4.1.1, in scenario 1 we assume that 4.8 GW of data centre capacity is realised by 2035, against 3.4 GW in scenario 2 and 2.0 GW in scenario 3. Figure 4-5 shows the results for the three establishment scenarios.

Figure 4-5: Value added and employment in operations under different establishment scenarios. Source: Menon Economics.



We estimate that the value added effects could amount to between NOK 16 and 37 billion annually. Most of this, around three quarters, is direct effects, that is, value created at the facility itself. The rest is value added supported in the Norwegian supply chain through ongoing intermediate consumption for operations and maintenance.

We estimate the annual employment effects in Norway at between 4,000 and 9,300 FTEs. Employment is split roughly equally between direct and indirect effects. That the distribution is more even than for value added is because labour productivity at the data centres is higher than in the supply chain.

In these scenarios, value added will thus begin to be large enough to have macroeconomic significance. Norwegian mainland GDP was around NOK 4,400 billion in 2025.[66] The value added effects from the data centre industry could thus correspond to between 0.3 and 0.9 percent of today's mainland GDP annually. We emphasise that these are gross effects: some of the activity will displace other economic activity, partly because labour and inputs are scarce, so that the net effect on GDP will be lower.

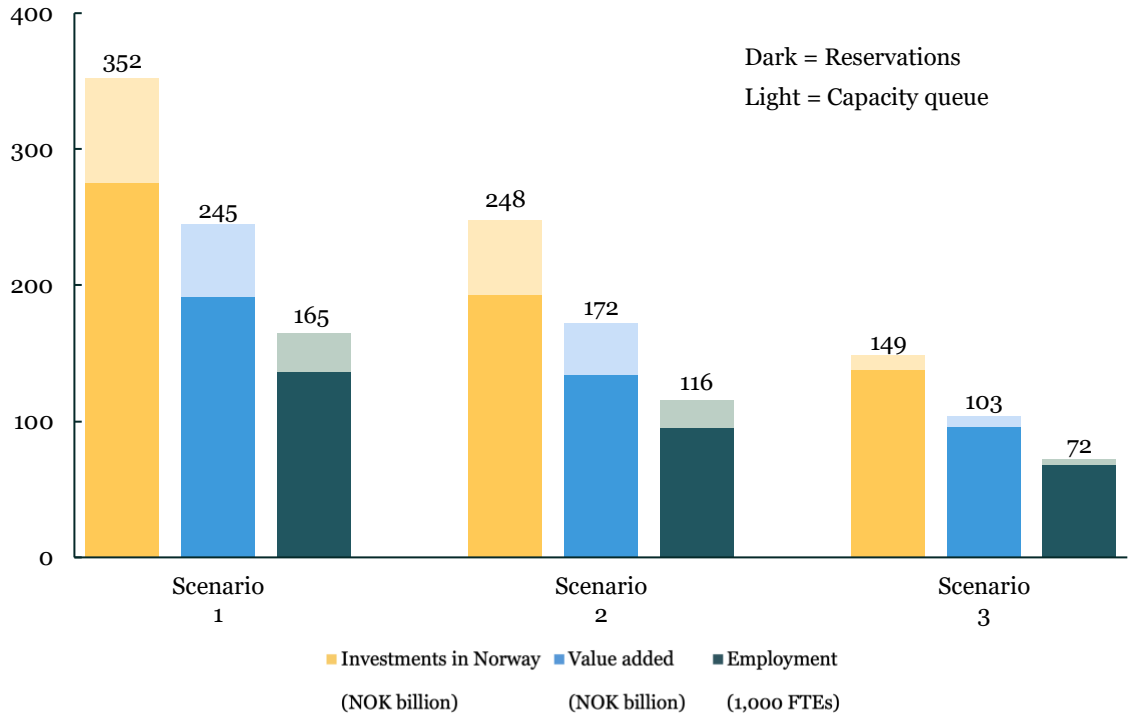
[66] SSB (2026). Nasjonalregnskap. Available here.

4.3 Construction

The various establishment scenarios analysed in the previous section will entail substantial construction activity before the data centres come into operation. In this section we estimate the economic impacts in the construction phase based on the same scenarios.

The calculation is based on the ratios in Figure 3-19 and is thus an estimate based on observed economic impacts from data centres in the comparison group. Implicitly, we assume that the import share is at roughly the same level as in these projects. The calculations cover the entire construction of the assumed realised capacity and are accumulated over all the years. For the calculation of employment effects, we assume productivity growth of 2.5 percent per year in the sector, which is used to adjust down the employment effects of future projects. The results are shown in Figure 4-6.

Figure 4-6: Future economic impacts in the construction phase under different scenarios. Source: Menon Economics.



The expected Norwegian data centre investments in the three scenarios range between NOK 150 and 350 billion. We estimate the value added effects linked to the investments at around NOK 100–250 billion over the whole period. This corresponds to the investments less (direct and indirect) imports, and is the investments' gross contribution to Norwegian GDP. As discussed in the previous section, the gross figures do not take account of the displacement of other economic activity. The net contribution will therefore be lower. We estimate the employment effects of the same investments at 72,000–165,000 FTEs in Norway.

These quantities cover a period of around ten years. With a steady build-out of data centre capacity towards 2035, this corresponds to an annual gross GDP contribution of around NOK 10–25 billion, or around 0.2–0.6 percent of mainland GDP. Whichever scenario is applied, the investments will thus be large enough for an effect on mainland GDP to be noticeable towards 2035. Here too, the net effect will probably be lower, as other economic activity is likely to be displaced by the data centre investments.

Under the same assumptions, the annual employment effects will range between 7,000 and 17,000 FTEs. By comparison, there are around 226,000 persons employed in the building and construction industry in Norway.[67] This comparison is illustrative. Not all the employment effects arise in the building and construction industry. Experience suggests that around 25 percent of the FTEs in the whole value chain are linked to the building and construction industry, around 25 percent to professional expertise such as consultants, engineers and architects, and the rest is spread across other industries.

Text box 4-1: The development of the supply industry at home and abroad.

The estimates in this chapter build on ratios from the projects completed up to and including 2025. We thus implicitly assume that Norwegian suppliers' share of the investments remains at today's level. This share is uncertain, and its development will matter for how the economic impacts evolve.

The starting point is that a large share of the investments goes to Norwegian companies. In the projects we have mapped, more than 80 percent of the investments in the construction phase went to Norwegian companies when server equipment is excluded. In other words, the operators have been able to meet most of their needs in the Norwegian supplier market. This figure may both rise and fall in the years ahead.

The need for imports may increase. If the pace of construction picks up without supplier capacity keeping pace, or pressure in the Norwegian economy makes labour even scarcer than it is today, a larger share of the goods and services will have to be sourced from abroad. This also applies to specialised engineering and construction expertise, part of which is already imported today. In that case, the employment effects in the supplier segment will be lower than estimated.

The effects may also turn out higher. The more specialised the supply industry becomes, the more complex parts of the construction projects Norwegian companies can deliver, and the larger the share of the investments that remains in Norway. We already see signs of such specialisation. NordicEPOD, which grew out of the turnkey contractor CTS Nordics, produces prefabricated power modules for data centres and has built a new plant in Vestfold.

Nor do the estimates capture the fact that a specialised supply industry can export to data centre projects in other countries. Experience shows that such exports follow the build-out in the home market (just as in other industries such as petroleum, offshore wind and seafood). Ireland is an illustrative example: the rapid build-out of data centres in the Dublin area from 2010 gave Irish contracting and engineering communities specialised expertise that later became an export product. In 2024, data centre construction in Europe by Irish-owned companies accounted for an estimated EUR 2.1 billion in exports, around 40 percent of construction exports from the companies in Enterprise Ireland's portfolio.[68] The largest player, Mercury, had revenue of EUR 2 billion in 2025, of which less than 10 percent in Ireland.

[67] SSB (2026). Tabell 07203. Available here.
[68] KPMG (2026). The value of data centres to Ireland. Available here.

5 Power, climate and the environment

Electricity is the data centre industry's most important input, and the industry's further growth will be felt in the power system. Data centres' electricity consumption was 3.2 TWh in 2025, around 2.3 percent of total Norwegian consumption, but has quadrupled in three years. In our scenarios, consumption grows to between 17 and 37 TWh in 2035. This weakens the power balance, which in the highest scenario turns negative, and lifts electricity prices by between 5 and 11 øre/kWh in 2035 compared with the reference scenario. In the short to medium term, however, it is grid capacity, not electricity, that is the limiting factor for growth. Greenhouse gas emissions from Norwegian data centres are dominated by the indirect emissions from electricity consumption and supply chains, while direct emissions are small. The direct land take is limited, in the order of 1 decare (0.1 hectares) per MW, but the total impact on land depends on the need for new power production and grid infrastructure.

In this chapter we analyse the data centre industry's effects on the power system, climate and the environment. In Section 5.1 we describe developments in electricity consumption, historically and in the three scenarios. In Section 5.2 we analyse the consequences for the power balance, and in Section 5.3 the effects on electricity prices in the five price areas. Section 5.4 deals with grid capacity and operational challenges and opportunities for the power grid. In Section 5.5 we estimate greenhouse gas emissions in Scope 1, 2 and 3 for the data centres in the population (defined in Section 2.2). In Section 5.6 we assess land use, pollution and other environmental impacts.

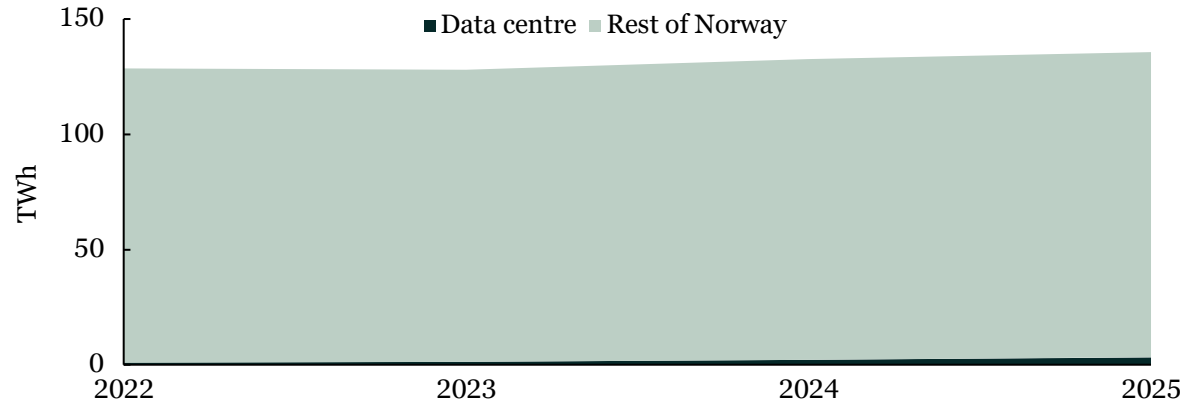
5.1 Developments in electricity consumption

Data centres' electricity consumption has been a contested topic in Norway in recent years, both as regards current consumption and future developments. The discussion has at times been marked by misunderstandings, particularly in the interpretation of capacity that is reserved or in the capacity queue. In this section we provide an overview of data centres' historical electricity consumption and present three scenarios for developments going forward.

Since 2022, temperature-corrected[69] electricity consumption in Norway has been relatively stable at between 128 and 136 TWh, see Figure 5-1. Data centres' electricity consumption stood at 3.2 TWh in 2025.[70] At around 2.3 percent, this is still a small share of total consumption, but the share has grown from 0.6 percent in 2022. Both absolute consumption and the share of total electricity consumption in Norway have thus roughly quadrupled in three years, equivalent to an annualised growth rate (CAGR) of more than 50 percent.

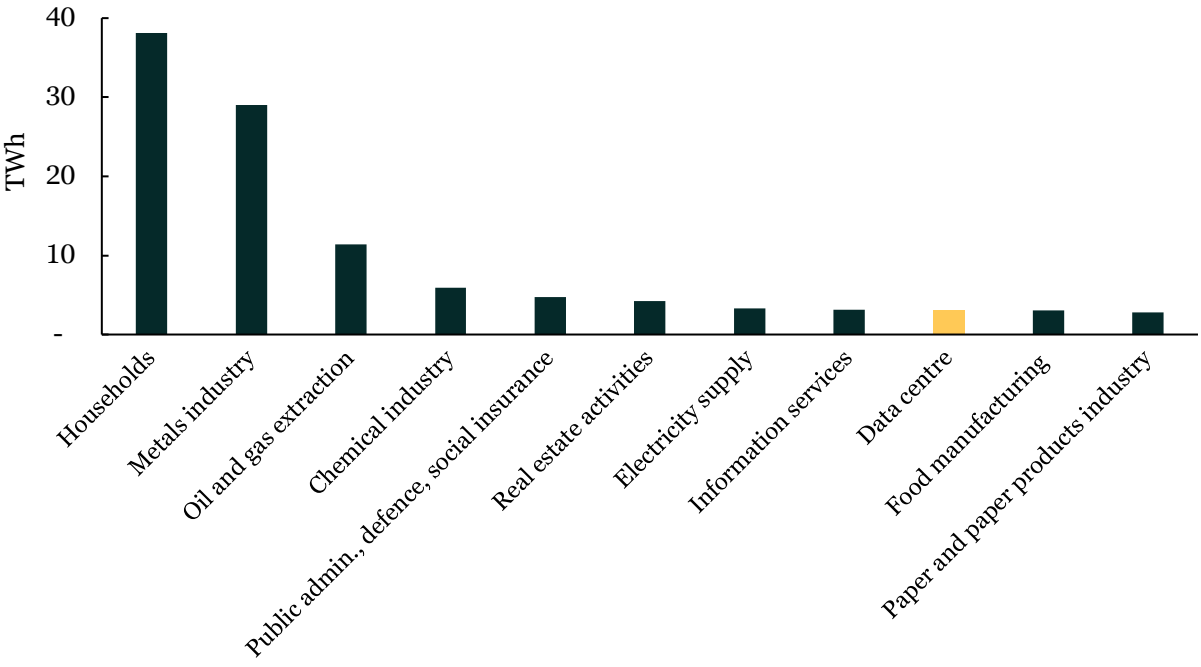
[69] Temperature-corrected electricity consumption is actual consumption adjusted for outdoor temperature, making consumption comparable between years. The correction is made using the degree-day method per month and price area. Source: NVE (2025). Strømbruk i Norge. Available here.
[70] Elhubs datakatalog, available here. Dataset: Forbruk i datasentre per dag og prisområde. Retrieved 24.06.26. The figure is calculated from Elhub's daily reported electricity consumption in data centres. Elhub also shows hourly reported electricity consumption; if this is used instead, annual electricity consumption in data centres in 2025 is calculated at 3.1 TWh.

Figure 5-1: Electricity consumption in Norway, split between data centres and other consumption. Source: Menon Economics based on data from NVE and Elhub.



Although growth in electricity consumption from data centres has been strong in recent years, other consumer groups still dominate with the highest consumption. As shown in Figure 5-2, households are the largest group, followed by the metals industry.[71] Together, these two groups account for around half of electricity consumption in Norway. The metals industry alone accounts for more than 20 percent, and consumption here has varied little in recent years. The industry has relatively few plans for new production capacity and is more focused on electrifying existing plants, but few such plans have been realised in recent years, which means consumption has been virtually flat.

Figure 5-2: Electricity consumption of the largest consumer groups in 2025. Source: NVE and Elhub.



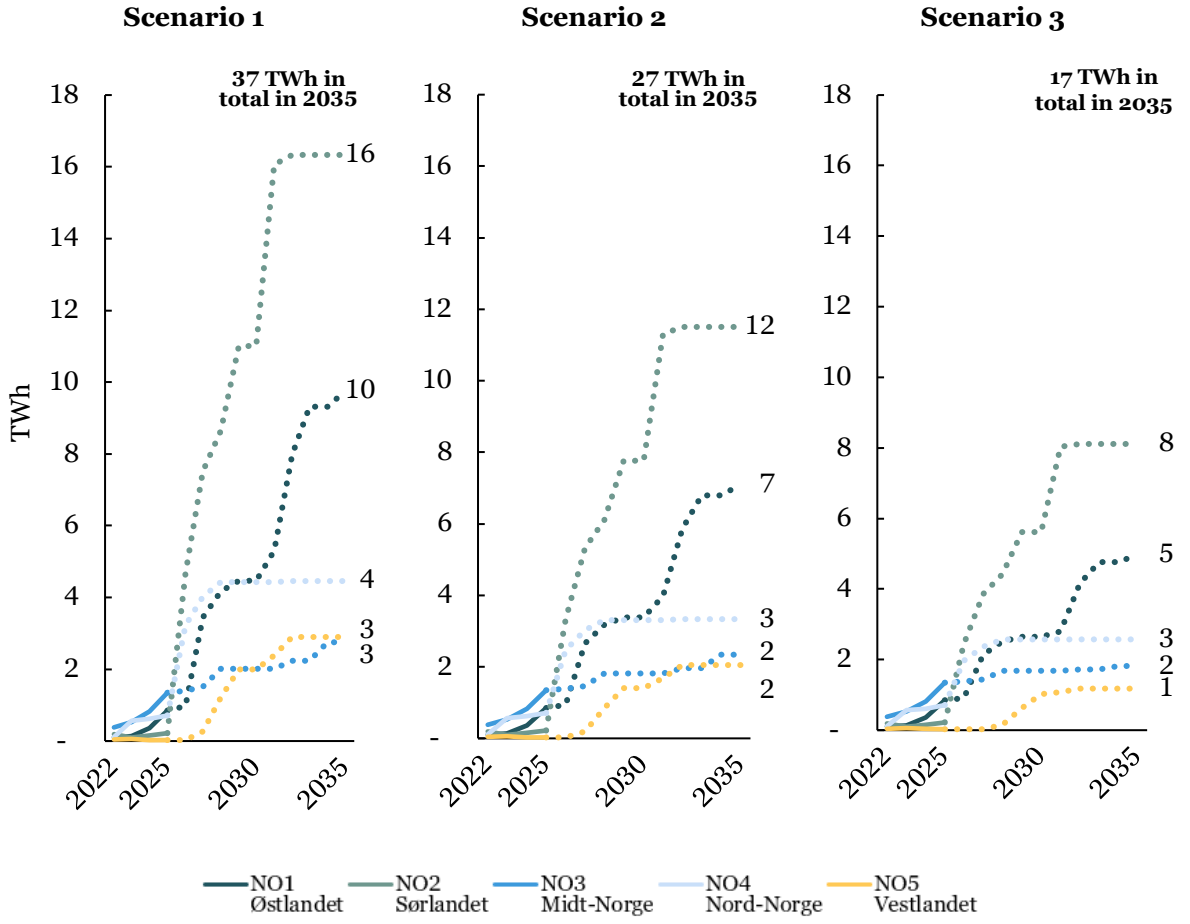
As shown in the figure, consumption from data centres in 2025 was on a par with several of the ten largest consumer groups in NVE's categorisation. The potential is, however, large, and depending on developments, consumption from data centres may grow considerably in the years ahead.

[71] NVE (2026). Energibruk i kommuner. Available here.

We have chosen to analyse how developments continue on the basis of the three scenarios presented in Section 4.1.1. Figure 5-3 shows the different development paths for electricity consumption from data centres, by price area. In scenario 1, 100 percent of the reservations and 70 percent of the cases in the capacity queue are realised. In this scenario, total consumption in the data centre industry grows from 3.2 TWh in 2025 to 37 TWh in 2035. That corresponds to more than a tenfold increase, or an annualised growth rate (CAGR) of 27 percent. In scenario 2, 70 percent of the reservations and 50 percent of the cases in the capacity queue are realised. In this scenario, consumption from data centres grows to around 27 TWh in 2035. Scenario 3 represents the lowest degree of realisation of the grid connection cases; here, 50 percent of the reservations and 10 percent of the cases in the capacity queue are realised. In this scenario, consumption grows to 17 TWh in 2035.

In all the scenarios, consumption from data centres grows most in NO1 and NO2, that is, in Southern Norway. This follows directly from the requested grid capacity from data centre projects in the different price areas, as discussed in Section 4.1.[72] Northern Norway is somewhat less attractive for most project types owing to lower connectivity, with the exception of training of large language models, which is less time-critical, and of crypto, which depends more on the lowest possible electricity cost.

Figure 5-3: Future electricity consumption from data centres by price area in three scenarios. Source: Elhub and Statnett, scenarios defined by Menon Economics.



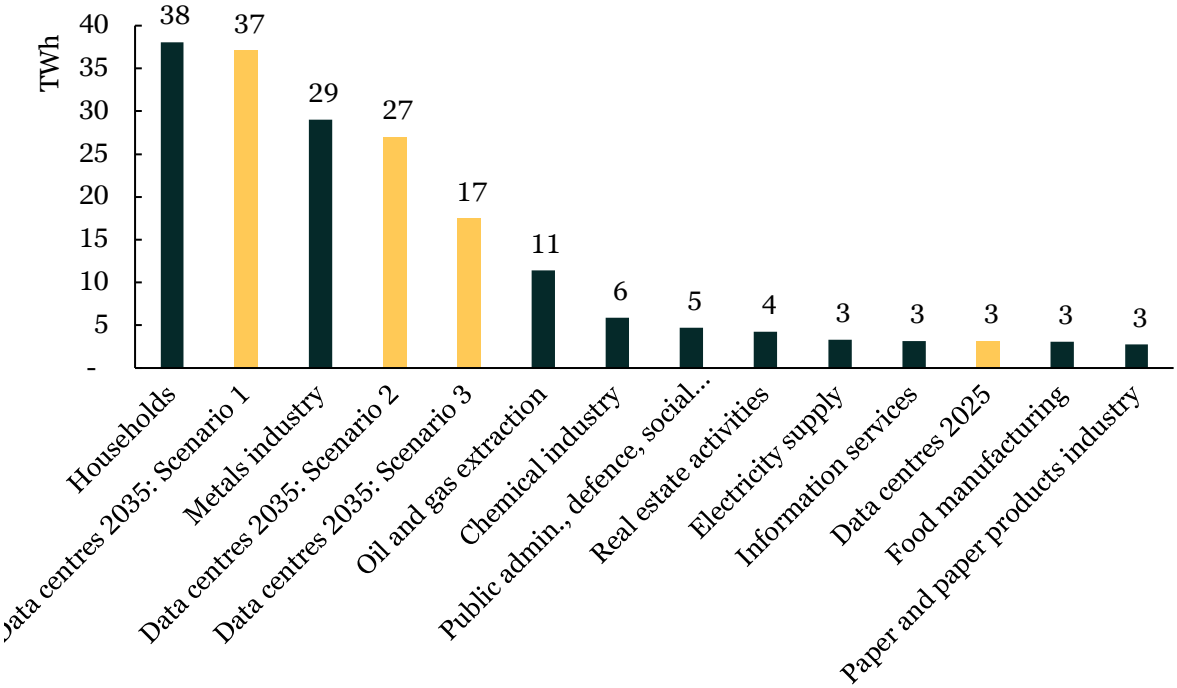
[72] We thus assume that the projects' locations take account of constraints in the grid.

THEMA (2025) last year prepared, on behalf of Norsk Datasenterindustri, forecasts for data centres' electricity consumption.[73] THEMA estimates that consumption grows to around 15 TWh by 2035. There are three reasons why all our scenarios are higher than THEMA's forecast:

- We assume a utilisation rate of 90 percent, against THEMA's 70 percent. We consider 90 percent more realistic for future projects: data centre investments are so large that operators will maximise utilisation time to earn the most efficient possible return on the investment.
- Several data centre projects have applied for grid connection after the date of THEMA's analysis. Total requested power has increased by around 40 percent in reservations and around 85 percent in the capacity queue.
- We take the planned connection date as registered with Statnett as our starting point, while THEMA assumes a delay of five years. THEMA refers to "industry feedback" but otherwise gives no further explanation. We therefore consider it best to stick to Statnett's public connection dates. Our approach in any case focuses on the scenarios showing the range of outcomes at different realisation rates. The time profile of a specific scenario is therefore of lesser importance.

To put data centres' future power needs in perspective, Figure 5-4 compares the data centre industry's estimated consumption in 2035 in the three scenarios with consumption in the ten largest sectors in 2025.

Figure 5-4: The data centre industry's future electricity consumption compared with the ten largest sectors in 2025. Source: NVE, Elhub and Statnett. Scenarios established by Menon Economics.



Today, the data centre industry is on a par with information services and the food manufacturing industry, at around 3 TWh. In scenario 3, the industry grows to a consumption well above today's level in oil and gas extraction, in scenario 2 to a level just below the metals industry, and in scenario 1 to a level approaching households' total consumption. Even with a more moderate realisation of today's

[73] THEMA Consulting Group (2025). Long-term power consumption development for data centers in Norway. Available here.

grid connection cases, the data centre industry could thus become one of the very largest consumer groups in the Norwegian power system within ten years. We stress, moreover, that the sectors are measured at today's consumption. In reality, their consumption will also change towards 2035, including through electrification.

5.2 Data centres' impact on the power balance in different scenarios

As shown in Section 5.1, there is a considerable range of outcomes for future consumption growth from data centres. Here we analyse this in more detail by combining the three scenarios with a reference scenario for other developments in the power market. The scenarios are not forecasts, but analytical development paths that make it possible to analyse the consequences of different developments in the data centre industry, including how they will affect the power balance.

All the scenarios take as their starting point developments in the power system in Norway and the Nordic countries, in NVE's long-term power market analysis.[74] The difference between the scenarios is driven solely by developments in electricity consumption from data centres, based on different realisation rates for grid connection cases in the reservation and capacity queues. Other consumption and production developments are the same in all scenarios, in both the reference scenario and the three alternative scenarios. Developments in the power balance in the reference scenario are presented first, as a basis for comparison, before we account for the three alternative scenarios.

5.2.1 Reference scenario

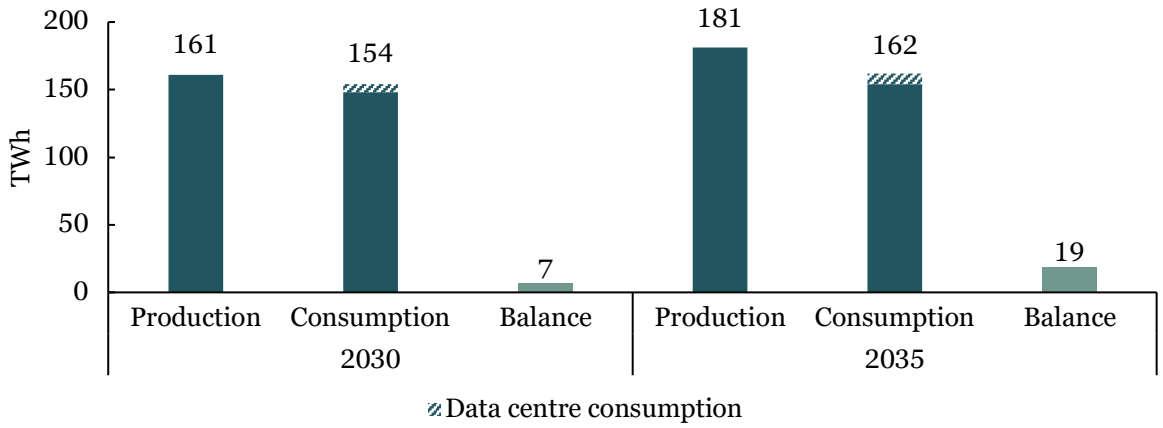
The reference scenario follows NVE's assumptions for future electricity consumption, as they appear in the base path of its long-term power market analysis.[75] In the reference scenario, electricity consumption in Norway increases gradually from the 2025 level of 141 TWh to 162 TWh in 2035. Data centres are highlighted by NVE as one of the largest contributors to the growth, together with electrification of transport and production of green hydrogen. NVE assumes consumption from data centres of 6 TWh in 2030 and 8 TWh in 2035. This is based partly on known projects in the short term, including Google's facility in Skien, Telenor and Hafslund's new centre in Oslo and Green Mountain's facility in Hamar, and partly on analyses of future data storage needs in the longer term. The electrification of transport is based on a continuation of today's tax and support policies and continued technological development, so that a high share of road traffic is battery-electric by 2050, while shipping and aviation are electrified more slowly. Growth in hydrogen production has at the same time been revised down compared with NVE's previous power market analysis from 2023, because the market for emission-free fuels has developed more slowly than expected and several projects have been put on hold.

The reference scenario also assumes growth in power production, but this is mainly between 2030 and 2035, when new power production from wind comes into operation. In total, power production in Norway increases by 20 TWh between 2025 and 2035, of which only 0.4 TWh is realised by 2030. Onshore wind grows from 16 TWh in 2030 to 23 TWh in 2035. The growth comes exclusively from facilities that have already been granted licences, since licensing and construction have historically taken a long time. Today there is no power production from offshore wind, but the projects Sørlige Nordsjø 2 (phase 1) and Utsira Nord are assumed to be connected to the grid between 2030 and 2035. Offshore wind development provides 9 TWh of production by 2035.

[74] NVE (2025). Rapport nr. 15/2025. Langsiktig kraftmarkedsanalyse 2025.Available here
[75] NVE (2025). Rapport nr. 15/2025. Langsiktig kraftmarkedsanalyse 2025. Available here

In 2025, Norway had a positive power balance of around 20 TWh. In the reference scenario, this weakens to 7 TWh in 2030 owing to strong consumption growth without a corresponding increase in production. The alternative development scenarios for electricity consumption from data centres will thus come on top of a strained power balance in the short term. In the longer term, through the 2030s, the increased production from wind power is expected to help strengthen the power balance again. In 2035, the reference scenario assumes a positive power balance of 19 TWh. The figure below shows power production, consumption and balance in 2030 and 2035 in the reference scenario. The shaded area in the consumption column highlights the part of consumption that comes from data centres.

Figure 5-5: Power production, consumption and balance in 2030 and 2035 in the reference scenario.

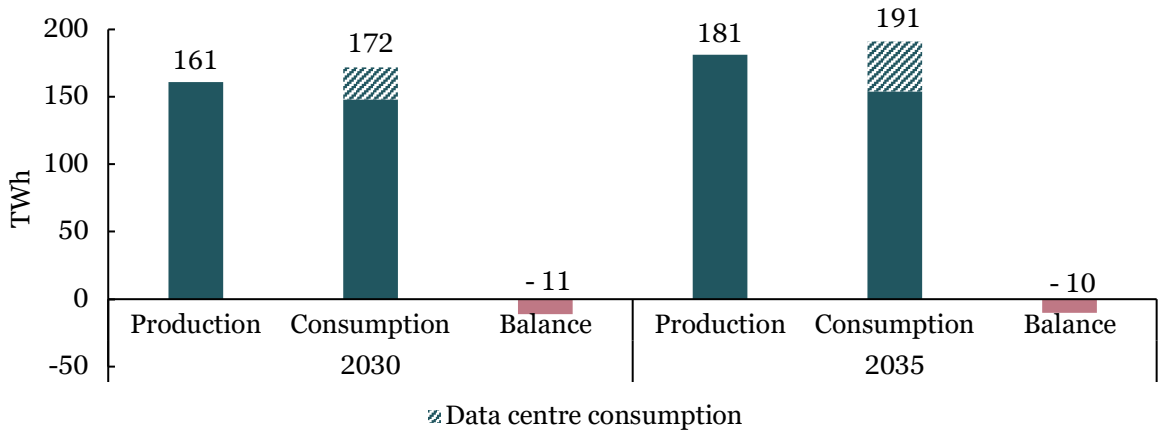


5.2.2 Scenario 1

Scenario 1 is the most aggressive scenario with regard to data centre establishments. As described in Section 4.1.1, it assumes that 100 percent of reservations and 70 percent of the capacity queue are realised. Electricity consumption from data centres is estimated to increase from around 3 TWh today to 24 TWh in 2030 and 37 TWh in 2035. This is considerably higher than the level in the reference scenario. Since other developments in the power system are held unchanged from the reference scenario, this entails a direct weakening of the power balance, resulting in a deficit of around 11 TWh as early as 2030. Towards 2035, the data centre growth is offset by increased power production from wind, so that the power balance strengthens somewhat overall. Compared with the reference scenario's power surplus of 19 TWh in 2035, however, the difference is large. The power balance in scenario 1 is therefore somewhat less negative in 2035 than in 2030, but at roughly the same level (negative by 10 TWh).

The figure below shows power production, consumption and balance in 2030 and 2035 in scenario 1. The shaded area in the consumption column highlights the part of consumption that comes from data centres.

Figure 5-6: Power production, consumption and balance in 2030 and 2035 in scenario 1.

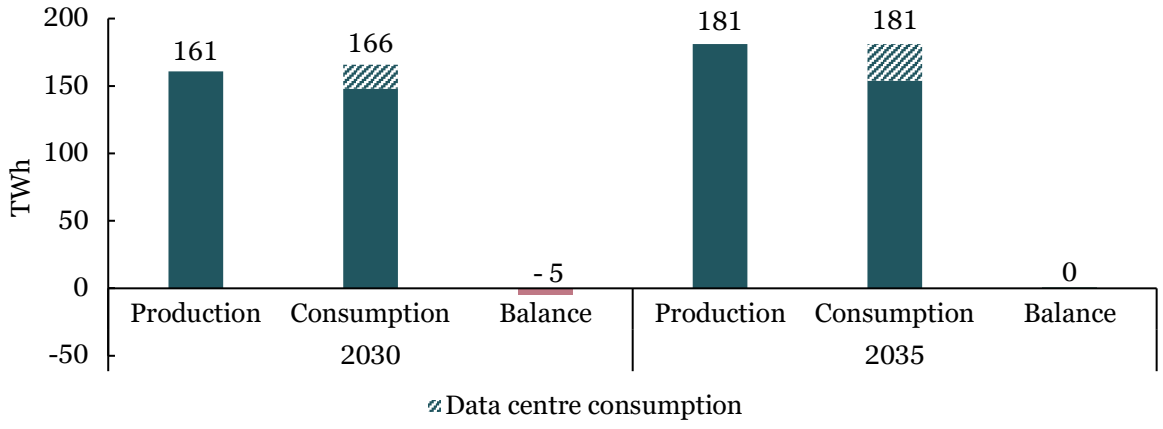


5.2.3 Scenario 2

This scenario represents a medium level of realisation of the data centres' grid connection cases in the reservation and capacity queues. As described in Section 4.1.1, it assumes that 70 percent of reservations and 50 percent of the capacity queue are realised. Electricity consumption from data centres is estimated to increase from today's level of around 3 TWh to 18 TWh in 2030 and 27 TWh in 2035. In 2030, this results in a negative power balance of 5 TWh. Towards 2035, the increased production brings the power balance to roughly zero. This is still considerably weaker than the reference scenario.

The figure below shows power production, consumption and balance in 2030 and 2035 in scenario 2. The shaded area in the consumption column highlights the part of consumption that comes from data centres.

Figure 5-7: Power production, consumption and balance in 2030 and 2035 in scenario 2.



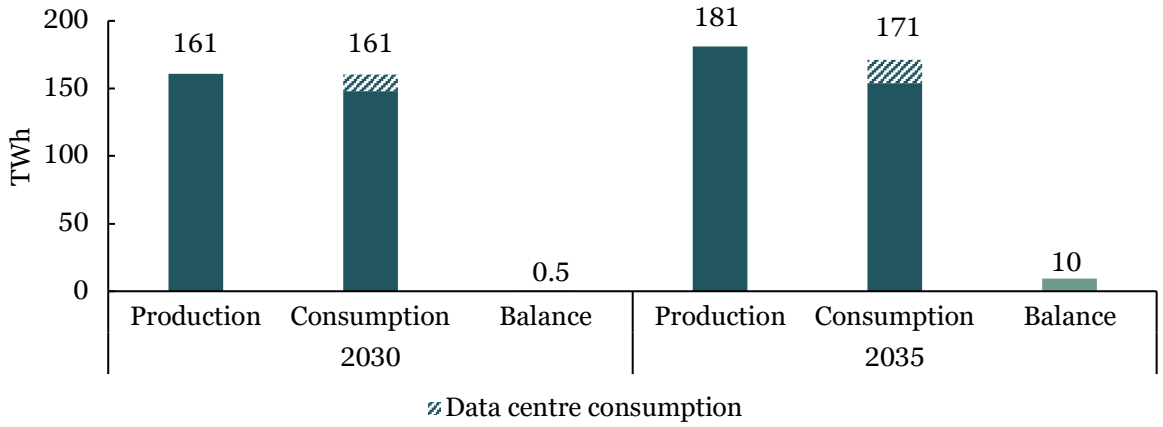
5.2.4 Scenario 3

This scenario assumes the lowest realisation rate of grid connection cases in the reservation and capacity queues. As described in Section 4.1.1, it assumes that 50 percent of reservations and 10 percent of the capacity queue are realised. These assumptions nevertheless result in consumption from data centres above the reference scenario. Electricity consumption from data centres is estimated to increase from today's level of around 3 TWh to 13 TWh in 2030 and 17 TWh in 2035. In 2030, this results in a

power balance of roughly zero, before it strengthens to 10 TWh towards 2035, 50 percent lower than in the reference scenario.

The figure below shows power production, consumption and balance in 2030 and 2035 in scenario 3. The shaded area in the consumption column highlights the part of consumption that comes from data centres.

Figure 5-8: Power production, consumption and balance in 2030 and 2035 in scenario 3.



5.3 Analysis of data centres' effects on electricity prices

Different future levels of electricity consumption from data centres can affect the electricity price. In the reference scenario, presented in Section 5.2.1, total electricity consumption in Norway is 154 TWh in 2030 and 162 TWh in 2035. Electricity consumption increases in the three alternative scenarios, solely from increased consumption from data centres, and the increase per scenario is shown in the table below.

Table 5-1: Consumption in Norway under different scenarios. Source: NVE and Menon Economics.

	2030	2035
NVE reference scenario[76]	154 TWh	162 TWh
Data centre scenario 1	+ 18 TWh	+ 29 TWh
Data centre scenario 2	+ 12 TWh	+ 19 TWh
Data centre scenario 3	+ 7 TWh	+ 9 TWh

To estimate the effect of the increased consumption on electricity prices, the four scenarios are combined with the other factors affecting the electricity price in a power market model. The model calculates the electricity price as the price that balances supply and demand in each price area in Norway. The modelling framework is described in more detail in the text box below.

[76] In NVE's reference scenario, consumption from data centres of 6 TWh in 2030 and 8.1 TWh in 2035 is already assumed. In the three alternative scenarios, only what comes in addition to consumption in NVE's reference scenario is analysed.

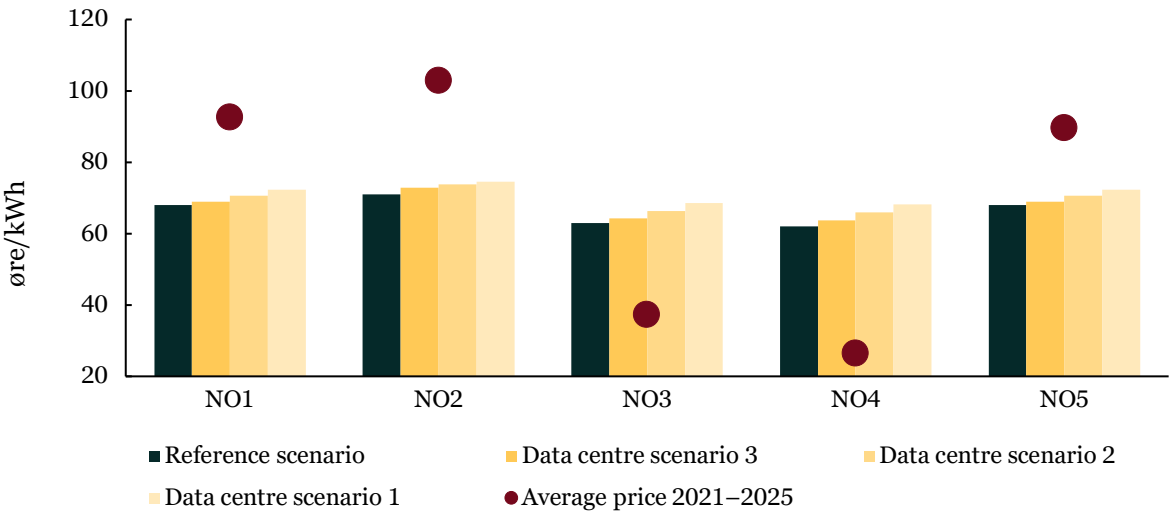
Text box 5-1: Method for power market modelling.

To analyse how different scenarios for electricity consumption from data centres may affect national electricity prices, we use a power market model based on NVE's open modelling framework FRAM and the power market model JulES. FRAM is a framework for modelling the energy system that links together different models and datasets to analyse developments in the power system under different assumptions. Within this framework, JulES is used to simulate the power market and calculate electricity prices given assumptions about production, demand, transmission capacity and other system conditions. The model runs are carried out for several weather scenarios, and the results are reported as average prices across these. We have chosen the weather scenarios from the period 1993–1995, which represent different levels of inflow to the hydropower system. The years were chosen to illustrate high (1995), medium (1993) and low (1994) inflow respectively. These are drawn from the period 1990–2020.

The three consumption scenarios for data centres are entered as one of several elements on the demand side, while the other assumptions about developments in the Norwegian and Nordic power system follow NVE's long-term power market analysis. In this way we isolate how much of the price change is attributable to consumption growth from data centres alone.

The figure below shows estimated electricity prices in the five price areas in 2030 in all scenarios. The future electricity prices in the scenarios are compared with average electricity prices for 2021–2025.

Figure 5-9: Electricity prices in 2030 in different scenarios. Source: Menon Economics.

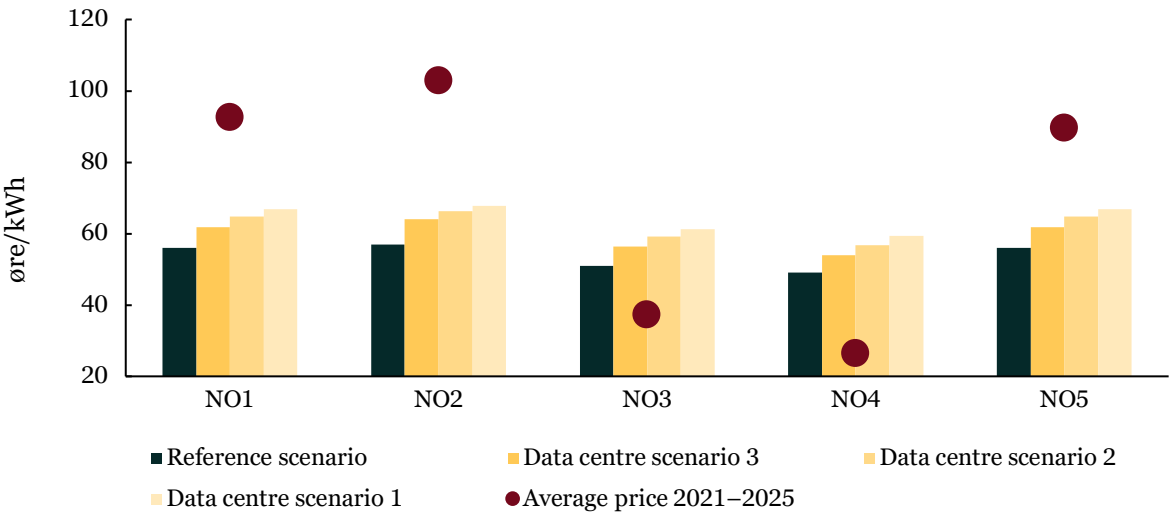


As the figure shows, the difference in electricity prices between the price areas will narrow going forward, compared with historical figures. The price areas with the historically lowest electricity prices, NO3 and NO4, will see the largest growth. At the same time, the areas with the historically highest electricity prices will experience a reduction. This development also underlies the reference scenario, and is due to consumption growth in NO3 and NO4, together with the development of better transmission capacity in the transmission grid. At the same time, it is the same price areas (NO3 and NO4) that see the largest additional price increase from data centre consumption in the scenarios. The price increase resulting from the additional consumption is, in scenario 1, 9 percent in NO3 and 10 percent in NO4, both equivalent to 6 øre/kWh. The lowest price increase from increased data centre

consumption in scenario 1 is found in NO2, with an increase of 5 percent over the reference scenario, equivalent to 3 øre/kWh.

Towards 2035, electricity prices fall again in all price areas compared with 2030. This is linked to the power balance strengthening through the 2030s as new power production comes online. The figure below shows estimated electricity prices in the five price areas in 2035 in all scenarios. The future electricity prices in the scenarios are compared with average electricity prices for 2021–2025.

Figure 5-10: Electricity prices in 2035 in different scenarios. Source: Menon Economics.



The largest relative price reduction between 2030 and 2035 comes in NO4. The price reduction is due to the power balance in the price area strengthening again as wind power production comes online during the period. Note that NO4 remains the area with the highest price growth when comparing the historical average for 2021–2025 with 2035. In 2035, the difference between the reference scenario and the other scenarios is larger than in 2030, because the difference in consumption levels between the scenarios increases as more data centre consumption is connected to the grid. Even though the power balance strengthens through the 2030s in all scenarios, the increased consumption from data centres thus has a larger effect on electricity prices in the long term. This is because part of the increased power production that strengthens the balance in the reference scenario instead goes to covering the increased data centre consumption in the other scenarios.

In scenario 2, which represents a medium level of realisation of the data centres' grid connection cases, the resulting price increase is relatively even across the price areas. Compared with the reference scenario, the increase in NO1, NO2 and NO5 is 9 øre/kWh, and in NO3 and NO4 it is 8 øre/kWh. This corresponds to 16 percent above the reference scenario in all price areas. Even though the increase in electricity consumption resulting from data centre establishments is largely concentrated in price areas NO2 and NO1, as shown in Figure 5-3, the price increase is thus roughly equal in all price areas. This suggests that increased electricity consumption from data centres spreads through the entire Norwegian power system.

Overall, the modelling shows that data centre consumption can raise the price by between 1 and 6 øre/kWh in 2030 and between 5 and 11 øre/kWh in 2035 relative to the reference scenario, depending on price area and scenario. By comparison, the average electricity price in Norway in the reference scenario is 66 øre/kWh in 2030 and 54 øre/kWh in 2035. It is also important to point out that even though data centre establishments have a large impact on the price level, other developments still weigh more heavily, including the development of new power production and not least price developments in

surrounding power markets. This is reflected, among other things, in the price fall between 2030 and 2035 in the reference scenario. Other important drivers of electricity price developments include both changed consumption from other areas, for example electrification of transport, and changes on the production side, in addition to developments in gas and CO_2 prices. On the production side, it is in particular wind power development that contributes to a stronger power balance, and planned grid reinforcements between north and south that help to even out differences.

The price effects above must be interpreted in light of the fact that everything other than data centre consumption is held unchanged from the reference scenario. This also applies to the development of new power production. In a well-functioning power market, higher prices will in themselves strengthen the profitability of new production and thus provide incentives for increased investment, which over time will dampen the price effects. How quickly such investments can be realised, however, depends to a large extent on energy policy decisions at national and local level, since all relevant technologies currently face either economic, land-related or technological barriers.[77] If today's price differential with continental Europe is to be maintained in the face of consumption growth of the kind the scenarios illustrate, the pace of investment in new power production must be increased.

5.3.1 A brief note on uncertainty in NVE's analyses and other factors affecting Norwegian electricity prices

NVE emphasises that there is great uncertainty about further developments in the power market, and the uncertainty grows over the time horizon.[78] In the short term (up to 2030), the scenario is largely based on known projects and adopted policy. The long-term estimates rest to a greater extent on assumptions about policy design, technology costs and geopolitics, which makes the uncertainty considerably greater after 2030. The uncertainty in the reference scenario's assumptions means that the range of outcomes for electricity prices is also wide. NVE illustrates the uncertainty by establishing a high and a low price path in its long-term power market analysis, in which the price level in Europe and the strength of the power balance in Norway change simultaneously and reinforce each other. In 2030, the difference between the electricity price in the high and low paths is 68 øre/kWh, while in 2035 it is 56 øre/kWh.[79] According to NVE, the paths have low probability and are mainly intended to test the robustness of the power system and illustrate a range of outcomes. The most important price drivers in the power market, such as consumption elsewhere, production growth, the price of fossil energy and emission allowances, also affect each other, so that deviations in one assumption can amplify or dampen the effect of the others. How data centre growth will actually affect electricity prices will in other words depend on other market developments both in Norway and in surrounding markets. NVE's base path nevertheless represents the development path the directorate considers most likely, and thus constitutes a robust starting point as a basis for comparison for our three scenarios.

5.4 The grid

This section deals with the relationship between data centres and the power grid in three steps. First, we consider the challenges relating to connection capacity. These are in reality not specific to data centres, but apply to all large new consumption seeking access to the grid. We then consider challenges that may arise in the operational phase and that stem from particular features of data centres' activity.

[77] See, among others, Menon Economics (2025). Scenarioer for norsk kraftbalanse – konsekvenser av norsk klima- og energipolitikk mot 2040. Available here.
[78] NVE (2025). Rapport nr. 15/2025. Langsiktig kraftmarkedsanalyse 2025. Available here
[79] The electricity price in the high and low paths in 2030 is 102 øre/kWh in the high and 34 øre/kWh in the low. In 2035 it is 85 øre/kWh in the high and 29 øre/kWh in the low.

Finally, we account for the potential added value data centres can bring to the power system in the form of increased flexibility.

5.4.1 Limited grid capacity

The queue to get onto the power grid has become long. This is not due to a lack of power, but to demand for grid capacity growing far faster than the grid can be expanded. Electrification of industry, transport and petroleum activity, together with new data centres, has produced a sharp increase in connection applications. At the same time, establishing new power lines is time-consuming. In addition, the queue principle, under which the timing of the application determines one's place, has given developers an incentive to register projects as early as possible. As of June 2026, a total of around 22,600 MW of new consumption was awaiting connection, and data centres account for around half of this. They are also the consumer group that has grown the most over the past year. A report from ENTSO-E (European Network of Transmission System Operators for Electricity) from May 2026 states that grid connection is regarded by data centre operators as the single greatest challenge for establishing data centres in Europe.[80] According to NVE, this means that many planned data centres depend on new grid being built, and it is available grid capacity that becomes the limiting factor for growth in the short to medium term.

How long it takes to build more grid capacity varies widely between the three grid levels: the distribution grid, the regional grid and the transmission grid. Development in the distribution grid is usually fastest, while it takes longest in the transmission grid. The Electricity Grid Committee (Strømnettutvalget) in NOU 2022:6 estimated that it can take up to 14 years to realise a new power line.[81] For projects awaiting grid connection now, new grid capacity therefore often lies several years ahead, depending on when the planning work started and the complexity of the grid project.

Conditional grid connection has therefore become an increasingly common tool for consumers needing large amounts of power. Conditional grid connection means that the customer is given grid access in return for consumption being reducible or disconnectable when the grid is strained. The arrangement is particularly well suited to customers with their own backup power, where disconnection for a few hours on the coldest winter days in practice does not affect operations. The arrangement is already in use. In March 2025, Tydal Data Center was granted a licence[82] for the expansion of electrical installations linked to further capacity development, where the connection is subject to conditions allowing disconnection until Tensio has carried out the necessary grid measures, and where 80 of 180 MW remain on conditional terms thereafter.

5.4.2 Potential challenges for the operation of the power grid

Large electricity consumers have traditionally had relatively stable and predictable consumption. Data centres, however, challenge this notion. Consumption is determined by software and can therefore change dramatically within milliseconds. These variations occur on the facility's own terms, without regard to the needs of the power grid, and give rise to challenges even when the power grid is in normal operation. The contours of operational challenges linked to data centres are already emerging elsewhere in the world, as more and larger facilities are connected to the power grid. Individual or smaller data centres pose no challenge in themselves; the problem arises only when data centres' share of consumption grows and many facilities are clustered in the same area, so that the load patterns

[80] ENTSO-E (2026). Data centres and the power system: expected trends, challenges and opportunities. Available here.
[81] NOU 2022: 6. Nett i tide – om utvikling av strømnettet. Available here.
[82] NVE (2026). NVE gir konsesjon til elektriske anlegg til forsyning av til utvidelse av Tydal datasenter i Tydal kommune. Available here.

together become large enough to affect the power system. Three such operational challenges are described in more detail below.[80]

- The first challenge is **rapid load fluctuations**, so-called load-driven disturbances. Large AI workloads can produce very rapid changes in power draw, in some cases of several megawatts within milliseconds. To the power system, this appears as frequent and unpredictable connection and disconnection of load, and can cause voltage deviations and frequency imbalances. The changes occur faster than several conventional regulation resources can respond.
- The second challenge is **sustained periodic load patterns**, which can arise during AI training because the processors in the data centres compute and wait in step, so that consumption oscillates regularly between high and low load. If this rhythm coincides with the power system's own oscillation modes, it can in theory amplify oscillations in the grid. Unlike a transient disturbance, where the system's damping brings it back to rest, such oscillations persist for as long as the load pattern lasts. This is a topic receiving growing attention internationally. [80]
- The third challenge relates to how **data centres respond to disturbances in the grid**. In such situations, they behave differently from traditional consumers. UPS systems can switch to battery operation at the first sign of a voltage dip and thereby remove the entire load from the grid instantaneously, and can in some cases amplify the event by drawing increased current during voltage dips, before the load is moved from the power grid to the batteries. The problem is amplified when several data centres are concentrated in the same area, so that a local event can grow into a system-wide frequency disturbance. The consumption must then return to the power grid. There is no standard for how this reconnection should take place. UPS systems can return the load to the grid within seconds, but the sudden change in consumption can push the frequency back towards the disconnection threshold and produce repeated disconnections and reconnections. Conversely, a prolonged absence of consumption can leave the power grid with a sustained production surplus to handle.[80]

These issues are the reason why connection requirements for data centres are now being considered across Europe. Among the measures being discussed are requirements to remain connected through voltage dips, to withstand rapid frequency changes, and limits on how quickly consumption can change.[80] Whether similar requirements are relevant in Norway has not yet been clarified. The Norwegian power system has considerable inertia[83] owing to large amounts of hydropower, and the number of data centres has so far been limited.

5.4.3 Potential benefits for the operation of the power grid

The same characteristics that create the challenges, however, make data centres a potentially valuable flexibility resource.[80]

The most obvious opportunity lies in the workload itself. Model training, batch processing and analysis jobs have deadlines, not real-time requirements, and can therefore be scheduled for hours that suit the grid better. This is a mechanism that mainly applies to AI and HPC data centres. Unlike power-intensive industry, where production sets the pace (and disconnection is very costly), they can move the core activity itself in time or geographically.

[83] Inertia refers to rotating masses in the power system, such as turbines. High inertia helps to counteract frequency drops in the power grid in the event of a loss of production or imports.

How realistic this is, however, depends entirely on the business model. For the hyperscale operators it is a real possibility, since they usually control both the facility and the workload, and the client generally chooses a region rather than a specific facility. In colocation, which is the most common type in Norway, it is by contrast not possible, because the operator only runs the infrastructure and has no control over the clients' workloads. It is also worth noting that for the most demanding training jobs, the flexibility is smaller than it may appear, because hardware scarcity means the facilities are kept at very high utilisation.

Another opportunity relating to consumption lies in the cooling, which is probably the simplest route to flexibility. The thermal inertia means that the facility can be cooled down in advance and the cooling output then reduced for a period, without the temperature exceeding the limits. Because this happens without affecting IT operations, and essentially with existing equipment, the threshold for adopting it is low.

A third opportunity lies in the UPS system, which is dimensioned for maximum load. Actual utilisation is almost always lower, and the remaining capacity can be used for system services without weakening the level of protection. Combined with flexibility in their own consumption, data centres can thus deliver both upward regulation, by supplying the load from the batteries or reducing consumption, and downward regulation, by charging the batteries or increasing consumption when there is a power surplus in the grid. The response comes within milliseconds and is therefore well suited to fast frequency reserves.

Text box 5-2: Data centres as a flexibility resource, experience from practice.[84]

Data centres as a flexibility resource for the power grid have already been demonstrated in practical operation through the Basefarm pilot in Statnett's fast frequency reserve (FFR) project. Together with Fortum and Eaton, Basefarm made the batteries in two data centres available as a reserve for the power grid, without affecting operations. The solution was given a real test when a major production outage pulled the frequency down on 18 July 2018. The actual delivery deviated somewhat from Statnett's specification, but the pilot confirmed that data centres can contribute this type of flexibility.

5.5 Climate

Greenhouse gas emissions from data centres have received growing attention. In Norway, the focus has been particularly on how they can increase individual municipalities' greenhouse gas emissions.[85, 86] Under the GHG Protocol, which is the established international framework for greenhouse gas accounting, emissions are divided into three categories referred to as Scope 1, Scope 2 and Scope 3.[87] Scope 1 covers emissions from the business's own activity, for a data centre mainly linked to emissions from fossil-fuelled backup generators. Scope 2 covers emissions linked to purchased electricity, together with heating and cooling.[88] Scope 3 covers emissions elsewhere in the value chain, both upstream among subcontractors and downstream among the data centre's clients. We can also

[84] Statnett (2018). Fast Frequency Reserves 2018 – pilot for raske frekvensreserver. Available here.
[85] NRK (2026. Datasenter økte kommunens klimautslipp med fem prosent. Available here.
[86] E24 (2026). Datasenter vil bruke like mye diesel som 1600 biler. Available here.
[87] The Greenhouse Gas Protocol. A corporate Accounting and Reporting Standard. Available here.
[88] An alternative method is to treat emissions from electricity linked to IT load at the clients as downstream Scope 3 emissions. In this analysis, all emissions from electricity consumption are treated as Scope 2.

distinguish between emissions arising in data centres' construction phase and emissions resulting from subsequent operations, and between emissions occurring in Norway and those occurring abroad.

To our knowledge, there are no good data or estimates of total emissions from Norwegian data centres. This means they must be estimated. In the rest of this section, we document the calculations of greenhouse gas emissions from data centres within the three scopes. The Scope 3 emissions in particular are subject to considerable uncertainty. *The calculations presented below must therefore be regarded as illustrative calculations rather than exact estimates*. The order of magnitude is nevertheless interesting for understanding data centres' total greenhouse gas emissions. The emissions are calculated for the 49 data centres included in the analysis population (defined in Section 2.2), with a combined installed power of 761 MW. The figures show estimated annual emissions based on the scale of the industry as of mid-2026, and are not reported emissions for a specific year.

5.5.1 Direct emissions from data centres (Scope 1)

Data centres in energy systems with a high share of renewable energy normally have low emissions from their own operations. This is because data centres in ordinary operation run on electricity and have no other emission-generating processes. Since most data centres are critically dependent on high uptime and security of supply, data centres usually have backup generators in case of power outages. These generators are typically diesel-based. Such generators must be test-run regularly and typically operate 200–500 hours a year, which produces greenhouse gas emissions.[89, 90] There may also be smaller direct emission sources at some data centres, for example fossil-fuelled vehicles at the facility. Experience from Norwegian data centres suggests that most vehicles at the facilities are electric, and it is assumed that emissions from the backup generators cover by far the greater part of total Scope 1 emissions. The text box below shows the method underlying the calculation of Scope 1 emissions.

Text box 5-3: Method for calculating Scope 1 emissions.[91]

The emissions from the diesel generators are too low to trigger reporting obligations, and actual emission figures are therefore not available. The emissions can be estimated on the basis of installed power, assumed operating hours and fuel consumption for diesel generators. We assume that total installed generator power equals the installed power of the data centres, giving a total generator power of 761 MW for the industry. With an assumed 300 operating hours a year and an empirical figure of around 5.9 litres of diesel per installed MW per operating hour, this gives total diesel consumption of 1.35 million litres a year. The empirical figure reflects the fact that the generators are test-run at reduced load and not simultaneously. This diesel consumption is multiplied by the emission factor of 2.66 kg CO_2e per litre of diesel.

The annual direct emissions from the data centre industry are estimated at approximately 3,600 tonnes

[89] E24 (2026). Datasenter vil bruke like mye diesel som 1600 biler. Available here.
[90] NRK (2026). Datasenter økte kommunens klimautslipp med fem prosent. Available here.
[91] Source for annual operating hours: Data centres report different expectations for the generator's annual operating hours, for example Green Mountain in Hamar with 220 hours (here) and Edgeconnex in Fyresdal with 449 hours (here). The figure of 300 hours a year is set as a midpoint between the data centres' own estimates.
Source for diesel consumption per MW and operating hour: The empirical figure is derived from Edgeconnex's expectations of 449 operating hours a year and total diesel consumption of 968,000 litres, at a 365 MW data centre. Taken from: E24 (2026). Datasenter vil bruke like mye diesel som 1600 biler. Available here
Source for emission factor per litre of diesel: Miljødirektoratet (2026). Utslippsfaktorer i klimagassregnskap for Norge. Available here.

of CO_2e, or approximately 5 tonnes of CO_2e per MW of installed power. The table below summarises this.

Table 5-2: Annual direct emissions from data centres (Scope 1).

Scope 1 (tonnes of CO_2e)	Operations	
	Total for the industry	Per MW
Fossil combustion in backup generators	3,600	5

Using renewable diesel, such as HVO (hydrotreated vegetable oil), to run backup generators could reduce this type of greenhouse gas emission from data centres. Combining them with batteries can have a similar effect, with batteries for example covering the first minutes of a power outage and thus reducing how often and for how long the backup generators must run.

The estimated direct emissions from data centres correspond to far less than 1 percent of Norway's total emissions in 2025, which were approximately 44 million tonnes of CO_2e.[92] Compared with individual companies in power-intensive industry, data centres have low direct emissions. For example, Alcoa in Mosjøen had emissions of 978 tonnes of CO_2e per MW in 2025.[93]

5.5.2 Emissions from data centres' electricity consumption (Scope 2)

Scope 2 covers the emissions arising from electricity consumption in data centres. These emissions can be calculated using two different methods, location-based or market-based, each serving different purposes.[94] The location-based method builds on the regional electricity mix. The market-based method distinguishes between electricity use covered by guarantees of origin and electricity use that is not, and these parts are multiplied by different factors. The two methods are often reported in parallel to show that estimated emissions from electricity consumption can vary depending on the underlying method. The text box below summarises the method underlying the calculation of Scope 2 emissions.

[92] Statistisk Sentralbyrå (2026). Statistics on emissions to air. Available here
[93] Alcoa's emissions in 2025 were 397,037 tonnes of CO_2e (taken from the Norwegian Environment Agency here). The facility's power is calculated based on electricity consumption of 3.2 TWh in 2025 (taken from the Norwegian Environment Agency here) and an assumption of 90 percent operating time. This gives a power of 406 MW.
[94] The Greenhouse Gas Protocol. GHG Protocol Scope 2 Guidance. Available here

Text box 5-4: Method for calculating Scope 2 emissions.[95]

In the **location-based** method, NVE's emission factor for Norwegian electricity consumption is used, which is 9.4 g CO_2e/kWh. This is multiplied by total electricity consumption.

For the **market-based** method, we first identify the share of electricity consumption covered by guarantees of origin. This share is secured as renewable electricity and regarded as emission-free, and is therefore given an emission factor of 0. The share without guarantees of origin is multiplied by the residual mix factor from the Association of Issuing Bodies (AIB), which is 430.93 g CO_2e/kWh for Norway. The residual mix factor is multiplied by the share of data centres' electricity consumption for which guarantees of origin have not been purchased. We assume a share of electricity consumption with guarantees of origin of 23 percent. Only data centres stating that their electricity consumption is emission-free are included here. The share is calculated based on the installed power of the data centres.

Data centres' electricity consumption is the starting point for both methods. As shown in Section 5.1, this was approximately 3.2 TWh in 2025. Using the location-based method, we find emissions from data centres' electricity consumption equivalent to approximately 30,000 tonnes of CO_2e, or approximately 39 tonnes of CO_2e per MW of installed power. If the market-based method is applied, emissions are estimated at approximately 1,043,000 tonnes of CO_2e, or approximately 1,370 tonnes of CO_2e per MW. The table below summarises the Scope 2 emissions under both methods.

Table 5-3: Annual emissions from data centres' electricity consumption (Scope 2).

Scope 2 (tonnes of CO_2e)	Operations	
	Total for the industry	Per MW
Location-based	30,000	39
Market-based	1,043,000	1,370

The wide gap between the two methods is because the Norwegian electricity mix (used in the location-based method) is far less emission-intensive than the European residual mix applied after purchases of guarantees of origin are taken into account in the market-based method. Norwegian power production is almost exclusively hydropower and some wind power, while the residual mix for Europe has a far higher share of fossil power, which is reflected directly in the emission factors. For the two methods to give the same result, around 98 percent of electricity consumption would have to be covered by guarantees of origin, far above the 23 percent share assumed in this analysis.

5.5.3 Emissions from data centres' supply chains (Scope 3)

Scope 3 emissions cover the other indirect emissions in the value chain, and we distinguish between upstream and downstream emissions. The upstream emissions are those linked to the production and delivery of the goods and services the data centre purchases, such as building materials, cooling technology, operations and maintenance, servers and GPUs. The downstream emissions are those arising because clients' use of the data centre capacity creates further economic activity further out in the value chain. These are subject to great uncertainty because they vary considerably depending on

[95] Source for the emission factor for Norwegian electricity consumption: NVE (2026). Strømdeklarasjoner. Available here
Source for the residual mix emission factor for Norway: AIB (2026). European Residual Mixes. Available here
Source for the share of electricity consumption with guarantees of origin: Data centres stating that all their electricity consumption is emission-free comprise all Green Mountain's data centres (more information here) and Bulk's data centre near Oslo, OS-IX (more information here)

how emission-intensive the clients' further use of the data centre capacity is. Most data centre operators do not publish client lists, and we therefore have no basis for estimating the client composition or the emissions resulting from it. We therefore calculate only upstream emissions in the supply chain here, and not downstream emissions among clients. The text box below summarises the method underlying the calculation of emissions from the supply chains in both the construction and the operation of data centres.

Text box 5-5: Method for calculating Scope 3 emissions.

Both the construction and the operation of data centres involve a range of suppliers, and the value chains cover both domestic and foreign economic activity.

The emission calculations for the supply chains build on Menon's emissions database, for both the Norwegian and the foreign supplier shares, and in both the construction and the operational phases. The database contains estimated emissions in Scope 1, Scope 2 and Scope 3 for all Norwegian enterprises subject to accounting requirements. In the database, the Scope 1 and Scope 2 emissions build on data from the Norwegian Environment Agency, companies' own annual reports and Statistics Norway's statistics on emissions and electricity consumption. The Scope 3 emissions are calculated through an environmentally extended input–output analysis, in which sector-specific emission intensities are linked to the Norwegian and European input–output tables to capture emissions in the value chain. See the description of Menon's emissions database for more details.[96]

Based on the established database, we have calculated ratios of emissions to revenue for all scopes of emissions for all industries. These are multiplied into data centres' supplier structures. The supplier structures underlying the emission calculations differ between the construction and operational phases, and between the Norwegian and foreign shares.

In the **construction phase**, 77 percent of intermediate consumption goes to Norwegian suppliers and 23 percent to foreign ones. The distribution is based on empirical data from completed construction projects. For the Norwegian share, we apply a supplier structure based on transaction data from the construction of the six Norwegian data centres in the comparison group. It is assumed that the composition is representative of the industry as a whole. The largest supplier groups are building and construction (35 percent) and computer programming and infrastructure (35 percent).[97] For the foreign share, no corresponding information on supplier composition exists, and here we assume that the purchases are split equally between manufacturers of electronic equipment and the production of general-purpose machinery and equipment.

In the **operational phase**, the Norwegian share is somewhat higher, with 85 percent going to Norwegian suppliers and 15 percent to foreign ones. The distribution is based on empirical data from data centres in operation. For the Norwegian share, we apply a supplier structure based on transaction data from the operation of the five Norwegian data centres in the comparison group that have been in operation. It is assumed that the composition is representative of the industry as a whole. The largest supplier groups are real estate activities (26 percent), security services and other services (18 percent) and wholesale trade (13 percent). Note that electricity supply is the largest supplier group to data centres in operation, but for the purpose of calculating emissions this falls under Scope 2 and is excluded from the supplier composition here. For the foreign share, no

[96] Source for emission intensities: Menon (2024). Menons utslippsdatabase. Available here. *The database was updated in 2026, and we have used the updated figures.*
[97] The shares presented here apply to the whole supply chain and therefore deviate from figures presented in Figure 3-21.

corresponding information on supplier composition exists, and here we assume that the import structure is the same as for real estate activities.

For the industry as a whole, annual emissions in the supply chain are estimated at 13,000 tonnes of CO_2e, of which 31 percent are Norwegian emissions. In total, this corresponds to approximately 17 tonnes of CO_2e per MW. The table below summarises emissions from data centres' supply chains in the operational phase, and how they are split between Norwegian and foreign emissions.

Table 5-4: Annual emissions from data centres' supply chains in the operational phase (Scope 3, upstream).

Scope 3 (tonnes of CO_2e)	Operations	
	Total for the industry	Per MW
Total	13,000	17
Norwegian emissions	*4,000*	*5*
Foreign emissions	*9,000*	*12*

In the construction phase, total emissions in the supply chain are estimated at 849,000 tonnes of CO2e, of which 31 percent are Norwegian emissions. In total, this corresponds to approximately 1,115 tonnes of CO_2e per MW. This represents an average emission per MW for the construction of data centres. Depending on the construction period, the number of years over which these emissions are spread will vary. The total figure for the industry shows estimated construction emissions for the scale of the industry as it stands as of mid-2026, with 761 MW of installed power.

Table 5-5: Emissions from data centres' supply chains in the construction phase for the industry as of mid-2026 (Scope 3, upstream).

Scope 3 (tonnes of CO_2e)	Construction	
	Total for the industry	Per MW
Total	849,000	1,115
Norwegian emissions	*267,000*	*350*
Foreign emissions	*582,000*	*765*

5.5.4 Total greenhouse gas emissions from data centres

Direct emissions account for only 8 percent of the total emissions from a data centre in operation. The bulk of emissions from data centres stems from their substantial electricity consumption, together with the activity triggered in the supply chains. The largest share of total emissions comes from electricity consumption[98] (64 percent), while emissions in the supply chain account for the remaining 28 percent.

Emissions from construction appear considerably larger than operational emissions, but the emissions in the two phases cannot be compared directly. Construction takes place over a short and limited period, while operational emissions recur year after year for as long as the data centre is in operation. After around 18 years of operation, the accumulated operational emissions reach the same level as the emissions from construction. If the data centre has a longer operating life than this, operational emissions will exceed construction emissions.

[98] In the assessment of total emissions, we include emissions from electricity consumption calculated with the location-based method, at 39 tonnes of CO_2e per MW.

5.5.5 The significance of the data centre's location for emissions

The emission calculations above are made for data centres in Norway. When data centres are established in other countries, emissions may be higher or lower. Whether location affects the size of emissions can vary across the three scopes.

Direct emissions from data centres (Scope 1) will probably be at roughly the same level regardless of location. The need for backup generators follows from uptime requirements irrespective of where the data centre is located. Operating hours and fuel consumption can be expected to be at a similar level in most countries. The share of vehicles at the facilities running on fossil fuel may vary across countries. In this analysis we assume that the vehicles at data centres in Norway are electric, but in other countries the fossil share may be higher. This would increase Scope 1 emissions for the individual data centre, but is expected to make up a small part of total emissions.

Emissions from electricity consumption (Scope 2) can potentially vary widely by location. The location-based calculation reflects the electricity mix of the host country. Norway has a high share of renewables (98 percent) compared with other countries that may have a more emission-intensive electricity mix. By comparison, countries such as Germany, Ireland and Finland, with renewables shares of 56 percent, 46 percent and 56 percent respectively, will have higher emission factors for their location-based electricity consumption.[99] For the market-based calculation, the picture is more complex. The share of consumption covered by guarantees of origin is given an emission factor of zero regardless of where the data centre is located, since guarantees of origin are not tied to physical location. The share without guarantees of origin, by contrast, is priced using the country's own residual mix, which varies considerably between countries. The emission factor of a country's residual mix depends on the production mix of the country's power generation, and on how large a share of the guarantees of origin is sold out of the country. Countries with either a high fossil share in their own production mix, or large net sales of guarantees of origin abroad, will have a high emission factor in the residual mix.

Emissions from the supply chains (Scope 3) will probably be at roughly the same level regardless of location. The supply chains for servers, GPUs, cooling technology and building materials are largely global, and the same suppliers and price levels apply whether the data centre is built in Norway or elsewhere.

5.6 Environment

5.6.1 Land

Data centres affect land use both directly through the establishment of data centre sites and indirectly through the need for energy infrastructure. When assessing environmental impacts, it is therefore relevant to distinguish between land occupied by the data centre itself and land attributable to power production, grid development and other associated infrastructure.

Data

There is currently no comprehensive national dataset providing an overview of data centres' total land use. One important reason is that data centres have historically not been regulated or registered as a separate category. Many existing data centres today fall within areas zoned for commercial or industrial purposes, or for combined building and construction purposes. Data centres have therefore often been

[99] Eurostat (2026). Production of electricity and derived heat by type of fuel. Available here

permitted through planning provisions alongside other power-intensive commercial or industrial activity.

From 2025, "data centre" has been introduced as a separate land use category in the planning and building legislation. The aim was to obtain a better overview of land set aside for data centre purposes. At the same time, many existing and recently adopted plans were prepared before the introduction of the new category. Experience from zoning work relating to data centres also suggests that municipalities and developers have often preferred more flexible land use categories, such as commercial purposes or combined building and construction purposes. By zoning the area broadly and instead specifying permitted activities in the planning provisions, the plans can more easily be adapted to changing needs over time. If a data centre establishment does not materialise, the area can still be used for other types of commercial or industrial activity without new zoning. As a result, many existing and planned data centres will continue to fall within general commercial or industrial purposes, even though data centre is now established as a separate land use category. It is therefore demanding to establish an overall picture of data centres' land use based on public planning and register data alone. The analysis in this section therefore builds on internally available project data, site plans and input from industry players.

Direct land use

A data centre consists of far more than the server halls alone. In addition to the data halls, land is required for cooling, power supply, backup power (depending on the type of data centre), high-voltage installations, administration buildings, internal roads and security zones. The review of several data centre projects shows that technical support infrastructure accounts for a significant part of the total land requirement.

Available project data indicate that modern data centres have a land intensity in the order of 0.8–1.2 decares per MW of computing capacity. This is also consistent with historical rules of thumb in the industry, where around 1 decare per MW has often been assumed in high-level land assessments. Such estimates have typically assumed a site utilisation of around 70 percent, with data centre buildings of two to three storeys and associated technical infrastructure. Larger facilities, however, often achieve economies of scale because certain functions, such as administration buildings, internal roads and switchgear, increase only to a limited extent in proportion to the data centre's power draw. Large facilities can therefore be expected to have a more limited land requirement per unit of computing capacity than smaller facilities.

Land intensity is further affected by technological developments in the data centre sector. Internationally, increasing power density and higher cooling requirements are reported as a result of growth in artificial intelligence and high-performance computing. Modern computing equipment has considerably higher energy consumption and heat generation than earlier generations, placing ever greater demands on cooling and power supply. At the same time, recent studies point out that traditional air-cooled solutions are approaching both practical and economic limits at very high power densities, which has increased interest in more advanced cooling solutions, including various forms of liquid cooling.

Increasing power density makes it possible to install more computing capacity within a given building area. At the same time, the higher loads entail increased requirements for load-bearing systems, foundations and technical installations. This can make multi-storey solutions more costly than before and reduce the incentives to build upwards. While older data centres could often achieve high site utilisation through relatively light structures and several storeys, newer facilities may to a greater extent depend on larger building footprints to handle high loads, cooling requirements and logistics.

The further development of land intensity is therefore affected by both technological and economic factors. On the one hand, higher power density points towards better land utilisation. On the other, increased structural and cooling requirements can make it more cost-effective to build across larger areas rather than higher. The choice between compact multi-storey solutions and more land-intensive facilities will therefore largely depend on the ratio of land costs to construction costs at the individual location. Technological development will therefore not necessarily lead to a continuous reduction in land use per MW, since increased power density can also pull in the opposite direction through increased structural requirements.

It is also important to underline that data centres are not a homogeneous group in this respect. Land requirements and design vary between different types of facilities and the services they deliver. Data centres with high requirements for security, uptime and robustness will often have a greater need for redundant power supply, cooling and support infrastructure than facilities primarily used for the mining of cryptocurrency. Crypto centres are typically designed with a strong emphasis on low investment and operating costs, and are often established in simpler buildings or container solutions. Differences in function and operating model can thus produce considerable variation in land use, building design and local environmental impacts.

Indirect land use

Data centres' total impact on land is greater than the area within the site boundaries. Large data centres have a substantial power requirement and may entail a need for new energy infrastructure in the form of transformer stations, grid reinforcements and transmission lines.

To put data centres' indirect land use in perspective, land intensity can be compared with, for example, power production. Ground-mounted solar power plants have an average land intensity of around 12 decares per MW of installed capacity, while onshore wind power can be estimated at around 40 decares per MW based on the planning area, drawing on sizes from NVE licences and empirical data. By comparison, data centres stand at around 1 decare per MW. This shows that data centres' direct land take is often relatively limited compared with the land requirements that may be linked to the energy system supporting the activity. This type of land requirement is, however, not specific to data centres, but applies to all activity dependent on large power supplies, including traditional power-intensive industry.

In addition to power supply, data centres may trigger a need for other associated infrastructure. Efficient cooling is crucial to operations, and access to cooling infrastructure and any water resources is therefore an important siting criterion. Local climate also matters, since cooler areas can reduce the energy needed for cooling.

When assessing impacts on land, it may therefore be useful to distinguish between:

- direct land use on the data centre site
- land linked to grid and transformer infrastructure
- land linked to any new power production
- land linked to cooling and water infrastructure

The total impact on land will largely depend on the system boundary applied in the analysis.

5.6.2 Pollution

Beyond the greenhouse gas emissions discussed in Section 5.5, data centres can also be a source of local air pollution. Combustion, for example from data centres' diesel generators, produces nitrogen oxides

(NOx).[100] The formation of NOx stems from the combustion process, and it matters little whether the fuel is fossil diesel or biodiesel. Inhaling these gases can have negative consequences for people from both short- and long-term exposure. Short-term exposure to NOx can, among other things, irritate the airways and worsen asthma and other respiratory diseases. Long-term exposure has been linked to an increased risk of certain diseases, including respiratory diseases, cardiovascular diseases and type 2 diabetes.[101] Local communities being exposed to these gases has been a source of local opposition to data centre establishments in other countries.[102] The exposure will be limited to periods when the diesel generators are running. In principle, this is intended to be only in emergencies and during regular testing of around 200–500 hours a year.[103]

The process involving EdgeConneX in Fyresdal is a clear example of this issue. The company has applied for an emission permit for generators at its data centre that would produce NOx emissions of 826 mg/Nm^3.[104] This exceeds the legal limit of a maximum of 190 mg/Nm^3, but an exemption is available if the engines are to be operated for less than 500 hours a year.[105] EdgeConneX argues that the emissions will not affect the local environment because the gases are rapidly diluted in the air when released from 30-metre chimneys. A climate scientist interviewed in connection with the case in E24 points out that the emissions could be significant, and has calculated emissions of 25 tonnes of NOx a year.

In addition, data centres can emit F-gases from the cooling processes. F-gases is a collective term for fluorinated, synthetic gases developed because they are well suited to, for example, cooling.[106] The cooling systems in data centres where these gases are used are in principle closed systems, but leaks can nevertheless occur. Even small leaks of F-gases can produce significant emissions measured in CO_2e. F-gases are regulated under several sets of rules, and a number of requirements are imposed on companies with equipment containing the gases to prevent leaks.[107]

5.6.3 Other consequences for the environment

Other environmental consequences of data centres can include noise, water consumption and potential impacts on biodiversity.

Data centres run at near-constant operation around the clock, which can cause noise in nearby areas. Noise arises primarily from the operation of the cooling systems' fans and compressors, and from periodic testing of diesel generators. The consequences for the local environment have in some places been highlighted as problematic.[108] The continuous "humming", together with construction traffic, lighting and large building volumes, can affect the surroundings.[109]

The servers in a data centre generate heat continuously, and this heat must be cooled away to ensure stable operation of the facilities. Internationally, evaporative cooling is a widespread cooling technology. The method involves using water for cooling, with heat being extracted as water evaporates. In the process, large quantities of water can be lost without being reusable.[110] Particularly in areas

[100] Miljødirektoratet (2025). Nitrogenoksider (NOx). Available here
[101] Folkehelseinstituttet (2024). Nitrogendioksid. Available here
[102] EPRI (2026). Partnering for Progress: Understanding Community-Centered Data Center Development. Available here
[103] Datasentre oppgir ulike forventninger til årlige driftstimer for aggregatet, eksempelvis Green Mountain i Hamar med 220 timer (here) og Edgeconnex i Fyresdal med 449 timer (here)
[104] E24 (2026). Datasenter vil bruke like mye diesel som 1600 dieselbiler. Available here
[105] Limit values are set out in Part 7, Chapter 27, Annex 2 of the Pollution Regulations. The exemption is set out in Section 27-12 of the same regulations. The regulations are available here
[106] Miljødirektoratet (2026). Fluorholdige gasser (f-gass). Available here
[107] Miljødirektoratet (2026). Fluorholdige gasser (f-gass). Available here
[108] NRK (2022). Naboer reagerer på støy fra kryptoanlegg: - Folk blir gale, forbannet og fortvilt. Available here
[109] EPRI (2026). Partnering for Progress: Understanding Community-Centered Data Center Development. Available here
[110] Digital Economy and Environment Program (2026). Data Centers and Water Fact Sheet. Available here

where water resources are under high pressure, or where drinking water is used to cool data centres, this has been a source of local opposition.[111] Compared with other parts of the world, Norway has both a colder and a wetter climate, which is more conducive to natural cooling of data centres. Some Norwegian data centres describe how they exploit local conditions for cooling. This applies, for example, to Lefdal Mine and Green Mountain, which both use the fjords right next to their facilities as a source of cooling.[112] [113] In Enebakk, Green Mountain contributed financially to the expansion of the waterworks, which was under pressure even before the data centre was established.[114]

The impact on biodiversity relates mainly to the land take for the facilities, both the buildings themselves and associated infrastructure such as power lines and access roads. This is discussed in more detail in Section 5.6.1. How large the impact on biodiversity becomes depends largely on location. Facilities established in existing commercial areas or on former industrial sites naturally have less negative impact on nature than facilities requiring the development of untouched nature. Beyond land take, data centres can affect the surrounding natural environment. If seawater or freshwater is used for cooling, the heated water is released back into the fjord or watercourse. It is uncertain whether this affects biodiversity in the water, and if so how. Green Mountain itself states that the return of the water has no negative environmental impacts.[115] How the withdrawal and return of water in connection with data centre cooling may affect biological diversity is nevertheless an area in need of further research.[116]

[111] EPRI (2026). Partnering for Progress: Understanding Community-Centered Data Center Development. Available here
[112] Lefdal Mine Data Centers. Cooling. Available here
[113] Green Mountain. Cooling. Available here
[114] Menon Economics (2025). Ringvirkninger av Green Mountain sitt datasenter i Enebakk. Available here
[115] Green Mountain. Cooling. Available here
[116] Jager, H. and Yoon, H. S. (2026). Data centers: an emerging threat to freshwater biodiversity in the United States. Available here

6 Data centre developments in the Nordic countries and Europe

Within the last few years, Norway has become one of the largest data centre markets in the Nordic countries measured by installed capacity, on a par with Sweden and clearly larger than Finland and Denmark. At the same time, the drivers of where data centres are established are changing: the business ecosystem and electricity prices are becoming less important, while *time-to-market*, in practice access to grid capacity, matters more and more. Demand for grid connection far exceeds available capacity in both Europe and the Nordic countries. Finland and Denmark have tightened access to the grid for large new consumption, and countries such as Ireland, the Netherlands and Spain have introduced or proposed similar conditions. At the same time, EU regulation pulls in two directions, with requirements for energy efficiency and reporting on the one hand and a goal of at least tripling capacity by 2030 on the other. How large a share of further growth comes to Norway thus depends only partly on Norwegian competitiveness, and at least as much on regulation in both Norway and abroad and on how access to the grid is organised.

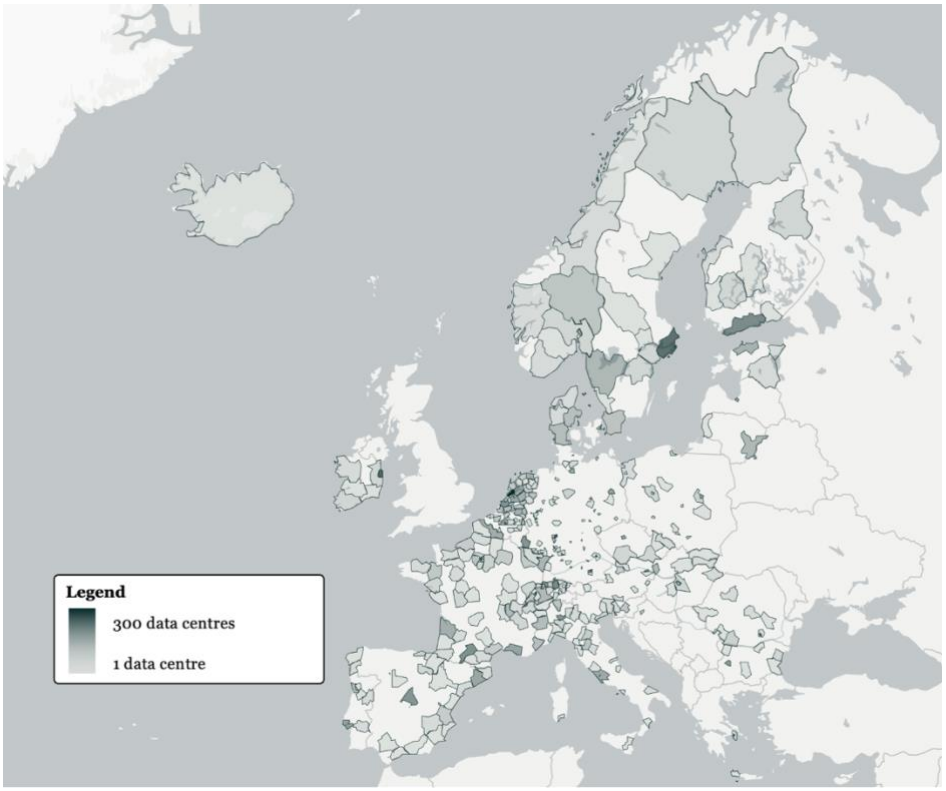
In this chapter we place the Norwegian data centre industry in a Nordic and European perspective. In Section 6.1 we describe the industry in Europe today and compare the size and structure of the Nordic markets. In Section 6.2 we review the regions' competitive advantages and how the drivers of location choices have changed over time. Section 6.3 describes expected developments in Europe and the Nordic countries, and in Section 6.4 we consider how authorities and transmission grid operators in the Nordic countries have responded to the growth by tightening access to the grid. Section 6.5 describes regulation in other selected countries in Europe, while Section 6.6 looks at regulation at EU level.

6.1 The data centre industry today in a European perspective

As of 2025, Europe had around 4,100 data centres. By comparison, there are 87 data centres in Norway, of which 49 are included in the analysis here.[117] [118] Total installed data centre capacity in Europe is around 16 GW, of which around 11 GW is installed IT capacity. Data centres in Europe used around 70 TWh of electricity in 2024. This corresponds to just under 2 percent of total European electricity consumption, which is roughly the same as the Norwegian data centres' share of total consumption in Norway.[119] Figure 6-1 shows the number of data centres in different NUTS3 regions (the EU's level 3 statistical regions) in Europe.

[117] DIGIREG (2026). Datacenter density by NUTS3 regions, 2025. Available here. Data for the United Kingdom are not available. Data for Møre og Romsdal are missing from this dataset.
[118] Nkom (2026). Registrerte datasenteroperatører og datasentre. Available here.
[119] IEA (2024). Energy and AI. Available here.

Figure 6-1: Number of data centres in Europe, by NUTS3 region. Source: DIGIREG.[120]



The map shows that data centres in Europe are concentrated in a few regions. In particular, the markets around Dublin (140 data centres), Frankfurt (190), Amsterdam (294) and the Paris metropolitan area[121] (154) stand out as attractive for data centres.[122] These are large both in absolute terms and relative to population. In the Nordic countries, Stockholm, with 120 data centres in operation, and Helsinki, with 78 data centres, stand out in particular. Below we briefly review the status in the Nordic countries.

Sweden has a total installed capacity of around 800 MW, spread across 186 data centres.[123] [124] The market in Sweden is thus roughly the same size as the Norwegian market measured by capacity, even though Sweden has almost twice as many inhabitants as Norway and a gross domestic product around 50 percent larger than that of mainland Norway. The average size of the data centres is, however, somewhat smaller than in Norway. Among the largest facilities are Meta's data centre in Luleå[125] and Microsoft's facilities in Sandviken, Gävle and Staffanstorp[126]. New capacity aimed at AI is also being built. EcoDataCenter and Mistral AI are building a 250 MW facility in Borlänge, with the possibility of expansion to 600 MW, scheduled to come into operation in 2027.[127] [128]

[120] DIGIREG (2026). Datacenter density by NUTS3 regions, 2025. Available here.
[121] The NUTS3 regions Paris, Seine-Saint-Denis and Hauts-de-Seine.
[122] Data for the United Kingdom are not available. London is also an important data centre market.
[123] Radar Group (2026). Den ekonomiska och strategiska betydelsen av datacenter i Sverige. Available here.
[124] No standardised data are available on installed data centre capacity, and the figures have therefore been collected from different sources in the different countries. If the sources base their estimates on different methods, this will affect the comparability of the figures.
[125] Meta. Meta Luleå Data Centre. Available here.
[126] Microsoft (2024). Microsoft tillkännager en investering på 33,7 miljarder kronor under två år i moln- och AI-infrastruktur och ett AI-kompetenslyft för en kvarts miljon människor i Sverige. Available here.
[127] EcoDataCenter (2026). Mistral AI and EcoDataCenter Partner to Build AI-focused Data Center in Sweden. Available here.
[128] Data Centre Dynamics (2026). French AI firm Mistral signs $1.2bn deal to build EcoDataCenter facility in Sweden. Available here.

In **Finland**, around 360 MW of data centre capacity is in operation, spread across 104 data centres, giving an average capacity of around 3.6 MW per facility.[129] The Finnish market is thus considerably smaller than the Norwegian one. By far the largest facility is Google's data centre in Hamina, which has been in operation since 2011 and delivers surplus heat to the district heating network. The market is, however, facing strong expansion. In September 2026, Google announced investments of EUR 13 billion in Finnish AI infrastructure over two years, with an expansion in Hamina and three new facilities in Kajaani, Muhos and Vaala.[130] In addition, Microsoft is building data centres in the capital region with heat recovery for district heating.[131]

Denmark has around 400 MW of installed capacity and 80 facilities in operation. That corresponds to an average size of 5 MW per facility, considerably lower than in Norway. The data centres in Denmark are also less geographically concentrated. Most facilities are evenly distributed between East Jutland, South Jutland and the Copenhagen area. The largest facilities in Denmark are run by the American hyperscalers Meta in Odense[132], Google in Fredericia[133] and Apple in Viborg, where the surplus heat is delivered to the district heating network[134]. In Denmark too, considerably larger facilities than today's are being planned. The German developer GARBE has signed an agreement for a data centre of around 350 MW in Guldborgsund, which would then become the country's largest.[135]

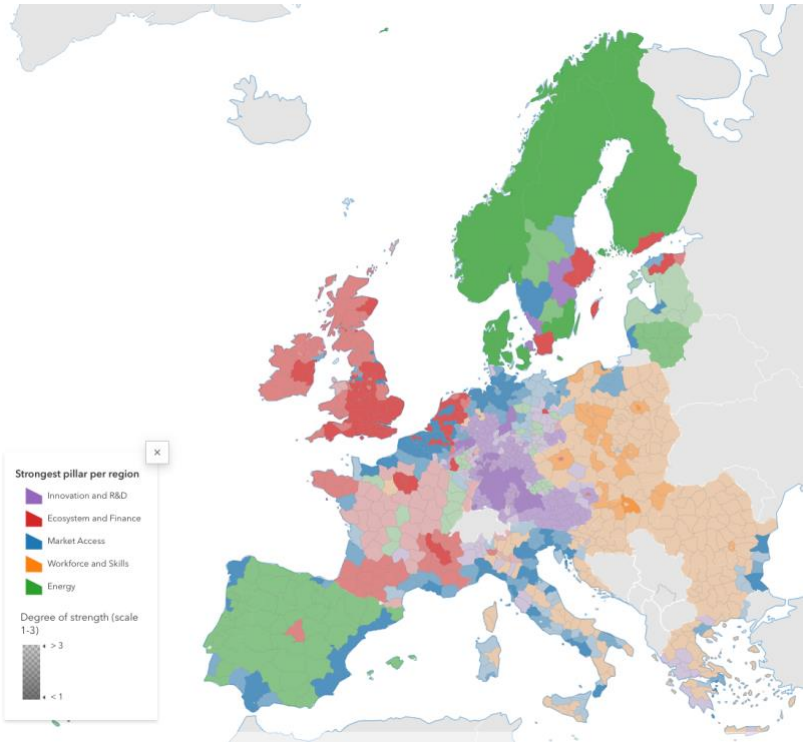
The lower average size in the other Nordic countries is probably linked to these markets having been established earlier. The facilities built earlier are generally smaller than those established in the past three years. Much of the capacity in Norway has been added in the past couple of years, including Google's data centre in Skien, Green Mountain's facility in Hamar and the expansion of Bulk Infrastructure's N01 campus in Vennesla. These are large compared with those already established and have increased total capacity in Norway considerably.

6.2 Regions' competitive advantages and drivers of location choices

Different regions in Europe have different relative competitive advantages in the competition for data centre establishments. For data centres, connectivity, proximity to clients, access to affordable and renewable power, and expertise and labour are among the most important location factors. The map below shows the strongest competitive advantage of each NUTS3 region in Europe.

[129] FDCA (2026). Datakeskukset haastavat sähkömarkkinoita, mutta haaste on ratkaistavissa. Available here.
[130] Google (2026). Google Deepens Commitment to Finland with Two-Year €13 Billion investment in AI Infrastructure. Available here.
[131] Fortum (2026). Fortum has started heat production at two large data centre sites in Finland. Available here.
[132] Invest in Denmark (2021). Meta announces expansion of data center in Odense. Available here.
[133] Google. Fredericia, Denmark. Available here.
[134] Datacenter Forum (2022). Apple to expand its Viborg (Denmark) data center; will capture excess heat energy. Available here.
[135] Ingeniøren (2025). Kæmpe datacenter til Falster: 350 megawatt til 20 milliarder. Available here.

Figure 6-2: The strongest competitive advantage of each NUTS3 region. Source: Menon Economics, Spatial Foresight, MDI and Ottosson Consulting.[136]

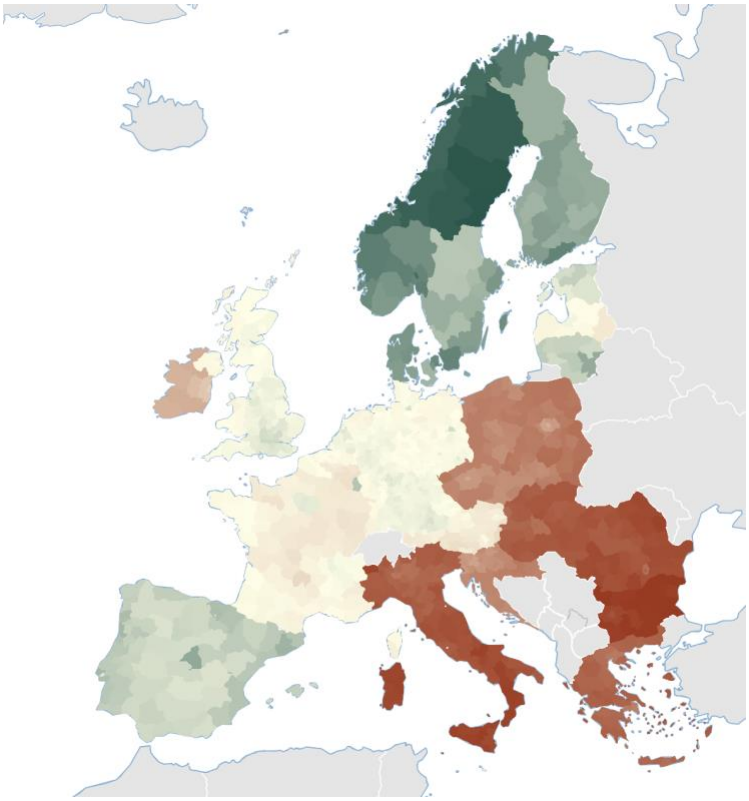


Today's data centre industry is mainly concentrated around large cities in Europe: Dublin, London, Frankfurt, Amsterdam and Paris, closely followed by Stockholm and Helsinki. With the exception of Frankfurt, whose main strength lies in innovation and R&D, all these cities have their business ecosystem and financial industry as their most important competitive advantage. The pattern suggests that the strength of the regional business ecosystem has historically been an important driver of where the data centre industry established itself. Connectivity has also been important[137], which has typically been better in regions with an established business ecosystem. The establishments have probably produced self-reinforcing cluster effects, which have further built up the regions' competitive advantages.

In recent years, however, access to power has become an increasingly important location factor, probably owing to the increased size of the facilities, where electricity costs matter more and more. Operators increasingly emphasise access to renewable power and price levels. Large parts of the Nordic region score strongly on this criterion. Other factors, such as connectivity and expertise, still matter. The map below shows the competitiveness of different regions in Europe. The index is a weighted average of the most important factors for data centres.[138]

[136] Menon Economics with Spatial Foresight, MDI and Ottosson Consulting (2026). Reindustrialising Europe's regions. Available here.
[137] Nkom (2016). Kartlegging og vurdering av infrastruktur som kan nyttiggjøres av datasentre. Available here.
[138] The factors are energy, business ecosystem and finance, workforce and expertise, market access, innovation and R&D

Figure 6-3: Attractiveness of NUTS3 regions in Europe for data centres. Source: Menon Economics, Spatial Foresight, MDI and Ottosson Consulting.[139]



Going forward, it is above all time-to-market that determines where data centres are established, that is, how long it takes before a facility can come into operation. Growth is driven mainly by the AI segment, and the need for computing power is so great that it cannot be fully met in the short term, given physical bottlenecks.[140] In practice, time-to-market is largely a question of available grid capacity, which is the most binding bottleneck for the development of data centre capacity globally.[141] The other location factors, such as the business ecosystem, expertise and access to renewable power, still matter, but with today's excess demand, a short time-to-market can largely compensate for relative differences along these factors. This is an important part of the explanation for why more and more data centres are being established outside the traditionally important hubs.[142]

6.3 Expected developments in Europe and the Nordic countries

The EU has set a goal of at least tripling capacity over the next five to seven years.[143] Developments in Europe, as in Norway, are marked by demand for large amounts of planned data centre capacity. This has produced substantial demand for grid capacity in both Europe and the Nordic countries. European grid companies have received requests for 280 GW of grid capacity from data centre developers, equivalent to 90 percent of today's consumption capacity.[144] Access to grid capacity has not increased correspondingly, which has produced long connection queues in many countries. The figures probably

[139] Menon Economics with Spatial Foresight, MDI and Ottosson Consulting (2026). Reindustrialising Europe's regions. Available here.
[140] IEA (2026). Key Questions on Energy and AI. Available here.
[141] Ancillary equipment such as transformers is also mentioned as a major bottleneck, but this is less of a location-specific constraint than access to grid capacity.
[142] IEA (2026). Key Questions on Energy and AI. Available here.
[143] European Commission (2026). Cloud and AI Development Act. Available here.
[144] GridReadiness (2026). European Utilities Have Received 280 GW of Datacenter Grid Requests — 90% of EU Total Power Demand. Available here.

also contain some overlap. Some of the requests may be speculative, with developers applying for grid connection in several places and selling the access on to data centre operators where they are connected first.

Demand is also high in the Nordic countries. In Finland, data centres have requested around 50 GW of grid capacity[145], in Sweden around 7 GW[146], and in Denmark around 14–15 GW of data centre capacity is in the capacity queue[147]. In Norway, the requests amount to around 12 GW. Together, the requests in the Nordic countries exceed 80 GW, just under a third of total requested grid capacity in Europe. That is far more than the size of the Nordic economies would suggest, given that the Nordic region accounts for only around a tenth of Europe's GDP and around 6 percent of its population.

The figures say little about how much data centre capacity will actually be built, but they illustrate how great the need for grid capacity is, and how quickly demand is growing. The pattern across the Nordic countries shows that data centres are establishing themselves broadly. The establishments are driven by the macro trends in AI and migration to cloud services, together with grid availability and, to a somewhat lesser extent, the region's relative competitive advantages.

6.4 Regulation in the Nordic countries

The rapid growth in demand for grid capacity has triggered new regulation in several Nordic countries. Finland and Denmark are the clearest examples. In both countries, the system operators have tightened access to the grid for large new consumption, and in Finland the authorities have in addition removed a tax advantage for data centres.

In Finland, the system operator Fingrid announced in January 2025 that the capacity to connect large new consumption facilities to the main grid in Southern Finland has temporarily been exhausted. The restrictions apply to the regions of Uusimaa, Varsinais-Suomi and Häme in the period 2025 to 2027, and are due to consumption having grown faster than expected while regional production capacity has been decommissioned.[148] New data centres in the southern parts of the country must therefore wait until the grid is reinforced, or establish themselves elsewhere in the country. In addition, the Finnish authorities have decided to remove the reduced electricity tax for data centres. From 1 July 2026, the tax increased from 0.05 to 2.24 euro cents per kilowatt-hour, which is the ordinary rate.[149] The change is justified by budgetary considerations and by the industry employing relatively few people in the operational phase.

In Denmark too, access to the grid has been tightened. In November 2025, the system operator Energinet abandoned the first-come, first-served principle for grid connection in favour of a prioritisation model that entered into force on 1 February 2026. The model imposes requirements on project maturity, including secured access to land and progress in the planning processes, and ranks projects by how efficiently they utilise the existing grid.[150] In March 2026, Energinet additionally

[145] YLE (2026). The electricity grid in Southern Finland cannot handle all data center projects – there is electricity, but in the wrong places. Available here.
[146] Svenska Kraftnät (2026). Information om pågående anslutningsärenden. Available here.
[147] Danish Data Center Industry (2026). New report: Data center growth continues in Denmark, but grid constraints and queue data distort the picture. Available here.
[148] Fingrid (2025). The connection of electricity consumption facilities to the main grid is temporarily tight in southern Finland. Press release 30 January 2025. Available here.
[149] Det finske finansdepartementet (2025). Datakeskusten ja kaivosten verotukea ehdotetaan poistettavaksi. Press release. Available here.
[150] Energinet (2025). Væk med «først til mølle»: Prioritering skal sikre hurtigere grøn omstilling. Press release 27 November 2025. Available here.

introduced a temporary halt to all new connection agreements.[151] The halt has since been extended to autumn 2026, and Energinet has announced that projects will henceforth be processed in batches rather than individually.[152] The background is that requests for new consumption amount to around 60 GW, more than eight times Denmark's maximum electricity consumption. Data centres are a major driver of the growth, together with battery facilities and Power-to-X (hydrogen and derivatives). In the Government's emergency plan for the electricity grid from 2026, however, consumption is divided into priority categories, with socially critical functions and ordinary consumption growth prioritised first, while large and geographically flexible consumers, in practice data centres, are placed in the lowest category.[153] Data centres with no link to socially critical functions thus risk both longer waiting times and rejection where grid capacity is scarce. When access to the grid is tightened in Finland and Denmark, it affects where new projects end up, and thus the competition for establishments between the Nordic countries.

The regulatory developments show that future location choices will depend on both market and regulatory conditions. The Nordic region, and Norway, score highly on the market-based competitive factors, particularly access to renewable and affordable power. At the same time, it is access to grid capacity, and the way the queue of grid connection cases is organised, that in practice determines time-to-market. How large a share of future growth ends up in Norway and the Nordic countries will therefore partly be determined by how quickly new grid capacity is made available, and by how authorities and system operators prioritise between projects. Regulation in neighbouring countries is at the same time changing rapidly, and to our knowledge there is no systematic compilation of how different models for connection and prioritisation affect data centre establishments. If the Norwegian authorities are to be able to assess their own policy instruments against developments in neighbouring countries, more knowledge is therefore needed about the regulatory frameworks and their effects.

6.5 Regulation in other European countries

Outside the Nordic countries too, several countries have introduced or proposed stricter conditions for grid connection. In Ireland, data centres accounted for 22 percent of the country's total electricity consumption in 2024, and the share is expected to grow.[154] In December 2025, the Commission for Regulation of Utilities (CRU) adopted a new connection policy for data centres. As before, new data centres must provide their own production or storage capacity corresponding to their maximum consumption from the grid. What is new is the requirement that at least 80 percent of annual consumption must be covered by new renewable production in Ireland, and that applications are to be assessed on whether the facility connects where the grid has capacity constraints.

The Netherlands also has capacity constraints in large parts of the power grid. Since January 2026, the grid companies have allocated available capacity according to a prioritisation framework set by the Authority for Consumers and Markets (ACM).[155] Projects that relieve the grid, security functions such as hospitals, defence and police, and basic needs such as housing construction and education go first in the queue. Data centres are not among the prioritised groups. In areas where the grid in the Netherlands is full, data centres therefore stand behind the prioritised projects in the queue.

[151] Energinet (2026). Energinet indfører midlertidig pause i nye nettilslutninger og sætter turbo på akutpakke. Press release 2 March 2026. Available here.
[152] Produktion Danmark (2026). Energinet forlænger pause for nettilslutninger og varsler ny model. Available here.
[153] Klima-, Energi- og Forsyningsministeriet (2026). Fakta om Akutplanens prioriteringsmodel. Available here.
[154] CRU (2025). The CRU Publishes its Decision on New Electricity Connection Policy for Data Centres. Available here
[155]ACM (2025). ACM: giving priority to projects that contribute to major social objectives remains possible with the new prioritization framework. Available here

In Spain, there are currently no specific rules for connecting data centres. In August 2026, however, a proposal for specific requirements for data centres was put out for consultation.[156] The proposal entails that data centres of at least 1 MW must cover at least 80 percent of consumption with new renewable production, and meet requirements for energy and water efficiency. Data centres that do not meet the requirement may lose the right to connection. The consultation deadline was in September, and the proposal has not been adopted.

6.6 Regulation at EU level

The regulation of data centres at EU level concerns energy efficiency, transparency, capacity building and digital sovereignty.

The Energy Efficiency Directive from 2023 established the first pan-European reporting regime for data centres. Under Article 12 of the directive, data centres with an installed power demand of at least 500 kW must annually report key figures on energy use and water consumption to a common European database, and a delegated act from 2024 specifies which indicators are to be reported.[157] The European Commission published the first assessment of the reported data in July 2025.[158]

The regime is now being expanded. In September 2026, the Commission presented a proposal for a common labelling scheme to make data centres' energy and water consumption more transparent and easier to compare, and it has at the same time started work on a proposal for minimum standards for data centres' energy performance, planned for presentation in the second quarter of 2027.[159] The directive has been assessed as EEA-relevant, but as of September 2026 has not been incorporated into the EEA Agreement. Norwegian data centres are thus not covered by the reporting obligation, although the registration obligation under the Electronic Communications Act covers part of the same information need nationally.

The proposed regulation on cloud services and artificial intelligence (the Cloud and AI Development Act, CADA) was presented by the European Commission on 3 June 2026 as part of the EU's technology sovereignty package.[160] The proposal is intended to strengthen the EU's digital autonomy and aims for data centre capacity in the EU to at least triple by 2030. Articles 10 to 15 concern the data centre industry directly. Member states are required to designate at least one acceleration zone for data centres within six months of the regulation entering into force, in which access to power, infrastructure and sustainability considerations are to be emphasised (Article 10). Developers in the zones are entitled to assistance from a single point of contact coordinating permits and environmental assessments (Articles 11 and 12), and the total processing time must not exceed twelve months in the zones and 18 months outside them (Article 13). Projects can in addition be designated as strategic, in which case they receive priority treatment and a combined basic permit covering the most common permits (Article 14). The Commission is at the same time given responsibility for monitoring capacity developments and mapping the need for data centre capacity in the Union (Article 15). Beyond the capacity provisions, the proposal contains a framework for assessing cloud services' sovereignty, with four graded trust levels to be applied in public procurement in the EU.

[156] The Spanish ministry for energy and climate (2026). El Gobierno plantea impulsar los centros de datos sostenibles, eficientes y soberanos. Available here
[157] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency, Article 12, and Commission Delegated Regulation (EU) 2024/1364. Available here.
[158] European Commission (2026). Energy performance of data centres. Available here.
[159] European Commission (2026). Commission enhances energy efficiency and sustainability of data centres in the EU. Available here.
[160] European Commission (2026). Proposal for the Cloud and AI Development Act (CADA). Available here.

As part of the same package, the Commission presented a strategic roadmap for digitalisation and artificial intelligence in the energy sector.[161] The roadmap covers, among other things, the sustainable integration of data centres into the power system. Under the Commission's leadership, 14 European industry organisations, including the European Data Centre Association (EUDCA), ENTSO-E and Eurelectric, have committed to developing a common EU model for tripartite agreements between data centre operators, power companies and public authorities. The model is to build on good practice from the member states and facilitate data centres contributing flexibility and utilisation of surplus heat in the power system. The initiative is voluntary and without binding requirements, but it shows that both the EU and the Nordic countries increasingly want to treat data centres as an integrated part of the power system rather than as mere end users of power.

[161] European Commission (2026). Strategic roadmap for digitalisation and AI in the energy sector. Available here.

7 Developments in the data centre industry viewed against the Norwegian data centre strategy

In the assessment made in this chapter, it is important to remember that the data centre strategy from 2025 is essentially a statement of objectives. The extent to which it is linked to policy instruments varies considerably between the strategy's three pillars. In the security and preparedness area, the objectives have been followed up in part with binding regulation that is already in force. In the power, climate and environment area, the direction is clear, but the most important instruments have recently been introduced or are still under consideration. The distance between objectives and instruments is in our assessment greatest when it comes to value added, where the instruments are essentially advisory, so that the economic impacts realised in Norway are in practice determined by market outcomes. Developments in the industry are at the same time essentially in line with the strategy's objectives, but growth is driven by global conditions and would largely have come regardless of the strategy.

In this chapter we assess developments in the data centre industry against the Government's data centre strategy. In Section 7.1 we give a brief overview of the strategy and its three main focus areas. Section 7.2 explains how we assess the strategy. In Section 7.3 we review the policy instruments that have been introduced, announced or are under consideration within each pillar, and assess whether they are sufficient to realise the strategy's objectives. Section 7.4 provides an overall assessment.

7.1 The Norwegian data centre strategy in brief

In 2025, the Ministry of Digitalisation and Public Governance presented an updated strategy for the data centre industry[162] as a follow-up to the National Digitalisation Strategy 2024–2030. The strategy has three overarching main focus areas:

1. Value added and jobs
2. Security and preparedness
3. Power, climate and the environment

Value added and jobs[163]: The Government's objective is that it should be attractive to establish data centres in Norway, and that the establishments should produce positive economic impacts locally and nationally. The industry is market-driven with large commercial players, and the strategy emphasises predictable framework conditions that provide good conditions for growth and facilitate investment. The data centre industry with its associated value chains is also to support the Government's objective of increasing Norwegian exports excluding oil and gas by 50 percent by 2030.

The municipalities retain the decision on establishment through their role as planning authority, and the strategy points out that some municipalities have experienced smaller economic impacts than

[162] Digitaliserings- og Forvaltningsdepartementet (2025). Datasenternæringa. Available here.
[163] Value added here includes the broader economic benefit to society, not only the sum of EBITDA and labour costs.

expected, particularly with establishments that have turned out to involve cryptocurrency mining. This underscores the objective that establishments consuming important resources should strengthen the local community. At the same time, emphasis is placed on access to skilled labour, orderly working conditions and provision for skilled workers and apprentices.

The strategy, however, says little about how these objectives are to be achieved. The measures on the value added side are mainly knowledge and coordination measures, such as updating the municipal guide, cooperation with KS (the Norwegian Association of Local and Regional Authorities) and mapping of competence needs, while no instruments are specified that link establishment or grid access to expected economic impacts. We return to this in Section 7.3.

Security and preparedness: The Government's objective is that data centres and data centre services should contribute to Norwegian security and preparedness in peace, crisis and war. The most critical digital services are to be delivered from data centres in Norway or with allies, and the total defence is to have access to capacity under national technical and legal control. The strategy described the capability to support data storage, data processing and data transfer in Norway as a provisionally identified fundamental national function, and the identification was completed in April 2026. Section 2-1 of the Security Act requires the ministries to identify and keep track of such functions, while Section 1-3 of the Security Act is the legal basis for subjecting individual undertakings to the Act. Some data centres are already subject to the Act, and more will be considered going forward.

To secure the authorities' ability to prevent, avert, stop and investigate crime and to handle the loss of data centre services of importance to society, amendments have been made to the data centre regulations giving the justice and electronic communications authorities access to necessary information and better scope to implement necessary measures. The purpose of the amendments is to facilitate crime fighting and the safeguarding of national security in data centres.

At the same time, the industry's need for appropriate and predictable framework conditions is to be safeguarded. Data centre services are necessary for all sectors of society. For certain services, such as the processing of health data and other personal data, it is important that production takes place in Norway. In addition, having sufficient computing and cloud capacity nationally may matter in a crisis situation. Other services used in Norway can be produced here or in allied countries. Reference is also made in this connection to the Storting's consideration of Act No. 76 of 13 December 2024 on electronic communications (the Electronic Communications Act), cf. Recommendation 28 L (2024–2025) page 8, where the majority of the Standing Committee on Transport and Communications is positive to requirements for security and transparency being imposed, but holds that the requirements must be proportionate and unbureaucratic. The amendments to the data centre regulations require data centre operators to keep updated information available on their clients' names and contact details and, where relevant, information on where in the centre the various clients' physical equipment is located.

There are further requirements to disclose this information to the Norwegian Communications Authority (Nkom), the Norwegian National Security Authority (NSM), the Norwegian Police Security Service (PST) and the police and prosecuting authorities more broadly. The power to order disclosure of client information is intended, among other things, to strengthen the work of preventing, averting and stopping offences linked to a data centre, and to safeguard preventive security, robustness and incident management. The Government will also introduce a new legal basis in the Energy Act to allow grid connection to be prioritised on grounds of national security interests, since the current Act does not allow for this.

The data centre strategy links ownership in the data centre industry to security. The strategy points out that the data centres process and store some of the most sensitive and strategically important data we

have, and that both ownership and where the data centres are located are therefore central to security interests. It also points out that ownership structures in digital communications infrastructure matter for national control. The Government will ensure that the functions society depends on most are delivered from data centres in Norway or with allies and partners, and will consider the need for more data centres in Norway with Norwegian majority ownership. The strategy does not, however, say how ownership is to be measured, and the choice of measure is decisive for how the industry appears. Weighted by value added, 75 percent of the industry is linked to companies with Norwegian direct owners, while around 94 percent is linked to companies with foreign ultimate owners.

Power, climate and the environment: The objective is a sustainable industry with a low climate and environmental footprint. Electricity is the main input in the data centre industry, and demand is growing rapidly. The strategy includes, among other things, three instruments that have either been introduced or announced. Large undertakings are required to carry out an energy audit containing a description of energy use, including possible efficiency measures, the potential for heat reuse and opportunities for producing renewable energy, with the first deadline in autumn 2026.[164] When planning new data centre facilities above a certain size, a cost-benefit analysis of the opportunities for utilising surplus heat must be carried out, and the analysis must be approved by NVE before construction starts.[165] The Government has since consulted on a proposal extending the requirement to more facilities and introducing an obligation to utilise the heat where the analysis shows it is profitable.[166] For cryptocurrency mining, a central government planning provision is being considered, with a temporary and limited ban on the establishment of data centres mainly engaged in power-intensive cryptocurrency mining.[167]

The strategy further sets objectives for sustainable development, use of renewable energy, energy efficiency, utilisation of surplus heat and reuse or recycling of hardware. Among other things, data centres are as far as possible not to be planned in areas with climate and environmental values of national or significant regional interest, and development is to take account of nature and differentiated land management.

7.2 Assessment of the strategy against political and industry developments

A strategy can be assessed in two ways. One is to measure developments in the industry against the objectives the strategy sets. The other is to assess whether the policy instruments are suited to realising the objectives where market outcomes and objectives may diverge. The first assessment presupposes that the strategy has operationalised objectives and a baseline for comparison, and that developments can be attributed to the strategy. Neither of these conditions is met here, and we return to this in Section 7.4. The main part of this chapter is therefore devoted to an assessment of suitability.

We apply three criteria for whether a policy instrument is justified. The first is whether there is a market failure that the objective responds to. Without a market failure, the market produces an efficient outcome, and an instrument moves resources without increasing total value added. The second is whether the instrument targets the failure itself, and not a symptom of it. The third is whether the instrument is proportionate to the size of the problem, including the costs of compliance and reduced willingness to invest.

[164] NVE (2024). Energikartlegging i store foretak. Available here.
[165] NVE (2025). Kost-nytteanalyse av mulighetene for å utnytte overskuddsvarme. Available here.
[166] Stortinget (2026). Innst. 277 L. Available here.
[167] Digitaliserings- og Forvaltningsdepartementet (2025). Datasenternæringa. Available here.

The criteria have different implications for the three pillars of "value added and jobs", "security and preparedness" and "power, climate and the environment". This explains much of the difference in the use of instruments. On the security side, the market failure is clear: national security is a collective good, and a commercial operator has no self-interest in bearing the cost of maintaining capacity for the total defence. On the power and climate side, the emissions are an externality, but the effect is already priced through the emissions trading system for most of the emission sources relevant here. On the value added side, the question requires clarification, which we provide in Section 7.3.1: economic impacts are not in themselves an externality, while the allocation of scarce grid capacity may involve a genuine allocation failure.

7.3 Policy instruments for achieving the objectives

As mentioned, the strategy is essentially a statement of objectives. To assess developments in the industry against the strategy, we have examined which policy instruments have actually been introduced to realise the objectives, and which are still only announced or under consideration.

Table 7-1 summarises the use of instruments per pillar. The status column reflects what applies as of September 2026, while the final column gives our assessment of whether the instrument targets the objective.

Table 7-1: Use of policy instruments per pillar in the data centre strategy. Source: Menon Economics.

	Objective in the strategy	Policy instrument	Status as of September 2026	Our assessment
Value added	Local and national economic impacts	Municipal guide (2023, update announced), cooperation with KS, mapping of competence needs	Guidance, not binding	Does not affect which establishments are realised
	Supply industry and exports	No data-centre-specific instruments	No data-centre-specific instruments	Referred to the general policy apparatus
Security	Registration and supervision	Section 3-7 of the Electronic Communications Act and the data centre regulations: registration obligation with Nkom and requirements for adequate security and preparedness.	In force from 1 January 2025, threshold 0.5 MW	Provides an overview of the industry and a basis for further regulation
	National autonomy in a crisis	Section 2-9 of the data centre regulations: Nkom can in a crisis require operation with personnel and technical solutions in Norway	In force	Applies to the operation of the data centre service, not the cloud services produced on the equipment in the facility
	Prioritisation during restoration	Section 2-10 of the data centre regulations: Nkom can require prioritisation of important societal actors when normal operation is to be restored	In force	Applies to restoration after an incident, not to reallocation of capacity
	Crime fighting	The data centre regulations (amended 2026): obligation to keep updated client information, disclosure to Nkom, NSM, PST and the police, physical representative in Norway	In force from 1 July 2026	Targets the misuse problem the strategy describes
	Prioritised grid connection on security grounds	Section 3-8 of the Energy Act: the King may require licensees to prioritise grid connection or capacity increases for a specific offtake customer when necessary to safeguard national security interests	In force from 1 July 2026	Data centres are not mentioned specifically. A data centre can be prioritised if the King finds it necessary to safeguard national security interests.
	Usage restrictions	Section 3-8, first paragraph, of the Electronic Communications Act: the ministry may, on grounds of national security or other important societal interests, require the data centre operator to implement usage restrictions in the data centre service	In force	Halting, not steering. Applies to the data centre service and does not allow capacity to be reallocated
	Preventing activity that threatens national security interests	Section 2-5 of the Security Act: the King in Council may make the decisions necessary to prevent activity that may entail a not insignificant risk of national security interests being threatened	In force	Targets the activity, and thus also reaches the owner and the services. Halting, not steering
	National control	Fundamental national function "the capability to support data storage, data processing and data transfer in Norway", identified under Section 2-1 (a) of the Security Act. Individual undertakings are made subject to the Act by decision under Section 1-3 of the Security Act	Identified June 2026, designation of undertakings in progress	The basis for subjecting individual data centres to the Act is in place, and its reach for the industry now depends on how many data centres are designated.
Power, climate	Energy efficiency	Requirement for energy audits for large undertakings	In force, first deadline autumn 2026	Provides a knowledge base, not an obligation to act.
	Reducing the time it takes to establish grid installations	The Government has presented several measures to reduce lead times in the power grid	Presented August 2026	Addresses factors limiting the pace of development, but not yet introduced.

	Objective in the strategy	Policy instrument	Status as of September 2026	Our assessment
	Utilisation of surplus heat	Cost-benefit analysis approved by NVE before construction; proposal for a lower threshold and an obligation to utilise heat where profitable	Analysis requirement in force; tightening has been consulted on.	Some data centres have made provision for the use of surplus heat, but it is unclear whether this is attributable to the policy instruments
	Limiting cryptocurrency mining	Central government planning provision with a temporary ban on new power-intensive crypto centres	Under consideration; proposal announced for consultation	The justification rests as much on economic impacts as on climate

7.3.1 Value added and jobs

The policy instruments on the value added side are essentially advisory. The municipal guide from 2023[168], the announced cooperation with KS and the mapping of competence needs are knowledge and coordination measures.[169] In February 2026, the Storting considered a private member's motion for a national licensing system for data centres with requirements for societal benefit, transparency about ownership and utilisation of surplus heat, but the motion did not win a majority.[170,171]

The absence of binding instruments is consistent with the strategy's premise of market-driven development. The consequence, however, is that the economic impacts realised in Norway are determined by the same factors as in other countries: the type of data centre, the phase (construction or operations) and the degree of local supplier use. This is also what we find empirically. As shown in Figure 3-7, employment intensity at Norwegian data centres does not differ systematically from what we observe at comparable data centres in other countries, and in our assessment there is no reason to expect such differences either. The strategy's objective that establishments should "strengthen local communities" is thus in practice dependent on market outcomes, with the announced crypto ban as the only targeted exception.[172] A similar finding, which applies to both this pillar and the one below, is that there are few instruments or regulations that ensure that one attracts the type of data centres one wants, whether in terms of client, technology, consumption of other resources (such as water, etc.) or ultimate owner.

The largest deviation from the stated objectives is found in the power grid. As mentioned earlier, time-to-market is the most important establishment factor for data centres today. Even though this pillar does not directly address the power grid, grid capacity, and the queue developers face, is a real barrier for many wishing to establish themselves in Norway. The Government has recently launched measures aimed at reducing lead times for grid investments, but it is too early to say anything about their effect. Since grid is a scarce resource, it is also possible to introduce regulation to ensure that the projects with the greatest economic value are realised first. Today, grid connections are prioritised by application date, adjusted for the projects' maturity and progress. Changes to the regulation of natural monopolies such as grid infrastructure must, however, be sector-neutral and cannot be designed as a direct instrument aimed at the data centre industry. Whether such a change would indirectly support the strategy, and whether it is socially rational compared with the current arrangement and alternative designs, would require further study.

At the same time, the economic gains, regardless of sector, lie in using scarce resources, including capital and labour, where they yield the highest returns. Local value added, understood as value added

[168] Kommunal- og distriktsdepartementet (2023). Rettleiar for kommunane: etablering av datasenter. Available here.
[169] Digitaliserings- og Forvaltningsdepartementet (2025). Datasenternæringa. Available here.
[170] Representantforslag (2025-2026). Representantforslag om konsesjonsordning for etablering av datasentre. Available here.
[171] Stortinget (2026). Innst. 140 S. Available here.
[172] Digitaliserings- og forvaltningsdepartementet (2025). Prop. 1 S. Available here.

where the establishment takes place rather than at national level, is merely a distributional effect. Such effects can be important for local communities, but do not change national value added. If, on the other hand, an increased local or national share of the total economic impacts contributes to higher productivity, economic gains will be realised that strengthen Norway's gross domestic product.

7.3.2 Security and preparedness

The security and preparedness pillar stands out in that the objectives have largely been followed up with concrete policy instruments. The Electronic Communications Act and the data centre regulations introduced, from 1 January 2025, a registration obligation, requirements for adequate security and a legal basis for imposing national autonomy in a crisis or preparedness situation.[173, 174] From 1 July 2026, the regulations have been tightened with an obligation to keep updated client information, a duty of disclosure to Nkom, NSM, PST and the police and prosecuting authorities with response time requirements, and a requirement for a physical representative in Norway.[175] On the same date, the new provision in the Energy Act, Section 3-8, entered into force, giving the King the power to decide that licensees under Chapter 3 of the Energy Act shall prioritise grid connection or capacity increases for a specific offtake customer when necessary to safeguard national security interests.[176] Together with the identification of the fundamental national function in June 2026, all the announced measures in this area have thus been implemented just over a year after the strategy was presented.

The Electronic Communications Act distinguishes between the data centre as a facility, cf. Section 1-5 No. 36, and the data centre service, cf. No. 37, defined as the provision of space, connection and operation for IT and network equipment, with physical security, power and cooling. The data centre service thus covers colocation and housing, but not cloud services or data processing services. The subject of the obligations in the Electronic Communications Act and the data centre regulations is the data centre operator, cf. No. 38.

A policy instrument not directly addressed in the strategy is also relevant in this context. Section 2-10 of the data centre regulations gives Nkom the power to require operators to prioritise important societal actors when normal operation is to be restored after outages or disturbances.

The fundamental national function for data centres was identified in June 2026, formulated as the capability to support data storage, data processing and data transfer in Norway.[177] What remains is the designation of which data centre operators support the function to such a degree that they should be made subject to the Act by decision under Section 1-3 of the Security Act. The reach of the Act for the industry is thus determined by designation practice.

How far the Norwegian regulation reaches follows from this distinction. Under Section 3-7, second paragraph, of the Electronic Communications Act, a data centre operator must offer and maintain data centre services with adequate security for users in peace, crisis and war, maintain adequate preparedness and prioritise important societal actors when needed. The fourth paragraph gives the ministry the power to make individual decisions or enter into agreements on measures to secure national needs for security, preparedness and functionality in data centres beyond what follows from the second paragraph, in return for the state compensating the additional costs. This provision too is

[173] Lovdata (2025). Lov om elektronisk kommunikasjon (ekomloven). Available here.
[174] Lovdata (2025). Forskrift om datasenter. Available here.
[175] Lovdata (2026). Forskrift om endring i forskrift om datasenter. Available here.
[176] Lovdata (2026). Lov om produksjon, omforming, overføring, omsetning, fordeling og bruk av energi m.m. (energiloven). Available here.
[177] The identification follows from Section 2-1 (a) of the Security Act, and the function has been reported to NSM under letter (d). It is an administrative decision in the Ministry of Digitalisation and Public Governance and is neither a legislative or regulatory amendment nor an individual decision. The wording follows NSM's overview of reported fundamental national functions.

directed at the data centre operator and applies to measures in the data centre and the data centre service. Within the Electronic Communications Act, this is the legal basis that gives the state the greatest room for action vis-à-vis a data centre operator, and to our knowledge it has not been used against data centres.

The limitation lies in the fact that the subject of the obligations is the operator, and that the data centre service is the provision of facilities for operating the clients' equipment, not the operation of the equipment. The services produced on the equipment therefore fall outside, regardless of whether the client rents space from a Norwegian operator or owns the facility itself. For a foreign-owned hyperscale facility, this means that the legal powers reach the facility and the data centre service, while the capacity is typically dedicated to the owner's own customers globally. The owner may in addition be subject to third-country legislation with disclosure obligations or restrictions beyond the control of the Norwegian authorities.

It is the services produced on the equipment that must be reached if capacity is to be reallocated to national purposes in a crisis. The strategy itself assumes that the most critical functions are to be delivered from data centres in Norway or with allies, and that the total defence needs capacity under national technical and legal control. In practice, this points towards facilities with Norwegian ownership or contractually secured national control.

The cloud services are nevertheless regulated. The Digital Security Act, which entered into force on 1 October 2025, covers providers of cloud services, cf. Section 9. The requirements concern security levels and notification, and provide no power to reallocate capacity. The state nevertheless has instruments that can restrict use. Under Section 3-8, first paragraph, of the Electronic Communications Act, the ministry may, on grounds of national security or other important societal interests, require the data centre operator to implement usage restrictions in the data centre service. Under Section 2-5 of the Security Act, the King in Council may make the decisions necessary to prevent activity that may entail a not insignificant risk of national security interests being threatened. The provision is directed at the activity and not at a specific subject of obligations, and has been used against undertakings not subject to the Security Act.[178] It thus also reaches the owner of the facility and the services produced in it. What the instruments have in common is that they are halting rather than steering: the Norwegian authorities can restrict use, including of the services produced on the equipment, but cannot require computing power to be made available.

Beyond Section 3-7, fourth paragraph, of the Electronic Communications Act, which is limited to the data centre and the data centre service, public procurement is in our assessment the only channel that can currently ensure that computing power and cloud services are made available for national purposes, through the conditions the state itself sets as a client. At the same time, we note that assessments are still ongoing with a view to specifying the content of the concepts of *digital room for manoeuvre* and *national digital sovereignty*.[179]

7.3.3 Power, climate and the environment

In the power, climate and environment area, the picture is mixed. The requirement for a cost-benefit analysis of surplus heat before construction is in force,[180] and the requirement for energy audits for large undertakings has its first deadline in autumn 2026.[181] In spring 2026, the Storting adopted

[178] The provision was used in 2021, among other instances, to halt the sale of Bergen Engines to a Russian-controlled owner.
[179] Altinget (2026).Arbeidsgruppa for digitalt handlingsrom har levert sine råd. Available here.
[180] NVE (2025). Kost-nytteanalyse av mulighetene for å utnytte overskuddsvarme. Available here.
[181] NVE (2024). Energikartlegging i store foretak. Available here.

amendments to the Energy Act lowering the threshold for the analysis obligation and introducing an obligation to utilise the surplus heat where the analysis shows it is profitable.[182]

There is, however, reason to expect that these requirements alone will have limited effect. Profitable utilisation of surplus heat presupposes an offtaker nearby, and the district heating networks in Norway are few and concentrated in the larger cities, while the largest data centres are sited according to access to grid and land, often far from established heat demand. The alternative is for new heat-demanding industry to establish itself next to the data centre. The challenge is that the industry will not invest until the heat supply is secured, and the data centre will not dimension for heat delivery until the offtaker exists. An analysis obligation, and even a utilisation obligation conditional on profitability, does not solve this coordination problem, since the profitability condition will rarely be met where the offtaker is missing. There are nevertheless some examples where such cooperation between data centre operators and industry has succeeded, such as the data centre in Rjukan, which delivers heat to Hima Seafood.[183]

The data centre strategy is also clear that more measures are to be introduced to secure faster grid development and more efficient use of the grid. As mentioned, the Government followed up the action plan with a broad range of measures in August 2026. It is, however, still uncertain what effect the measures will have, and whether the necessary legislative changes will be adopted by the Storting.

The most discussed instrument, the ban on new power-intensive crypto centres, has as of September 2026 not been introduced. The measure is placed under power, climate and the environment in the strategy, but the justification is equally linked to economic impacts: cryptocurrency mining ties up power and grid capacity while providing few jobs and little local value added. The Government has concluded that a general ban on cryptocurrency mining is difficult to reconcile with the EEA Agreement, and is instead considering a central government planning provision under the Planning and Building Act with a temporary and limited ban on new establishments.[184] Through the budget agreement for 2026, the Storting has asked the Government to put a proposal out for consultation as soon as possible.[185] In the meantime, the registration obligation is the only operational instrument aimed at cryptocurrency mining, and it provides oversight rather than control.

Beyond this, no specific requirements are imposed on greenhouse gas emissions or greenhouse gas accounting for Norwegian data centres. There is nevertheless room for using instruments in all three emission categories. A requirement for renewable diesel in backup generators would reduce Scope 1 emissions. The effect for Scope 2 depends on how binding a requirement would be and which emission perspective is applied. In a location-based perspective, where emissions are calculated from the physical electricity mix, Norwegian data centres' operational emissions are very low, and a requirement for emission-free power would in practice be of little consequence. In a market-based perspective, where consumption without guarantees of origin is assigned the emissions of the Nordic residual mix, the picture is different: our calculations show that the market-based Scope 2 emissions from Norwegian data centres are substantially higher than the location-based ones (see Section 5.5.2). A requirement to cover all electricity consumption with guarantees of origin would thus have been genuinely binding for operators who do not currently purchase such guarantees (or for the operators' clients, to the extent that they are themselves responsible for purchasing electricity). Whether such an arrangement would help change the physical composition of power deliveries is, however, uncertain. Guarantees of origin are only a financial instrument, and the market is dominated by existing power plants, including

[182] Stortinget (2026). Innst. 277 L. Available here.
[183] Green Mountain (2026). Green Mountain og Hima Seafood markerer oppstarten av banebrytende varmegjenbruksprosjekt på Rjukan. Available here.
[184] E24 (2025). Vil utfordre EØS-avtalen om kryptoforbud. Available here.
[185] Stortinget (2026). Innst. 2 S (2025-2026). Available here.

Norwegian hydropower plants. Finally, requirements relating to suppliers in operations and construction, which dominate the industry's total footprint, would target Scope 3. Today, no requirements are imposed beyond the strategy's general principle of reuse and recycling of hardware. Possible instruments are known from other areas: requirements for emission accounting for purchased equipment, minimum requirements for equipment lifetime and reuse, or climate requirements in public procurement of data centre services.

7.4 Overall assessment

Developments in the industry are essentially in line with the strategy's objectives: the industry is growing, it is market-driven, and growth is driven by demand for AI and cloud capacity. These developments are, however, essentially determined by conditions outside Norwegian policy. Demand for data centre capacity is global, and the investment decisions are made by international companies based on access to power, grid and land. The growth cannot be attributed to the strategy, and it would largely have come regardless of it. The question is therefore less whether the industry "follows" the strategy, and more whether the policy instruments are sufficient to realise the strategy's objectives where market outcomes and objectives may diverge.

In our assessment, the distance between objectives and instruments is greatest when it comes to value added. The objective that establishments should strengthen local communities and produce large economic impacts is not accompanied by instruments that distinguish between establishments with high and low societal benefit, with the exception of the announced crypto ban. The same applies to the objective of a Norwegian supply industry: the strategy draws parallels with the petroleum industry and links the supply industry to the export objective, but specifies no instruments beyond the general policy apparatus. The most important constraint on growth relates to access to grid capacity. Time-to-market is becoming an increasingly important location factor, and the queue developers face is a real constraint for many wishing to establish themselves in Norway. The Government has recently launched measures to address this, but it is too early to say anything about their effect.

On the security and preparedness side, the use of instruments is most extensive. The Electronic Communications Act and the data centre regulations regulate both the data centre facility and the data centre service, that is, the provision of space, connection and operation for IT and network equipment with associated power, cooling and physical security. Under Section 3-7, second paragraph, of the Electronic Communications Act, the data centre operator must maintain adequate security in peace, crisis and war and prioritise important societal actors when needed, and the fourth paragraph gives the ministry the power to make individual decisions or enter into agreements on measures in data centres beyond this, with state compensation of the additional costs. To our knowledge, however, this legal basis has not been used against data centres. The data processing and cloud services produced on the equipment in the facility lie outside the scope of this legislation. The Digital Security Act covers providers of cloud services, cf. Section 9, but imposes requirements on security levels and notification and provides no power to reallocate capacity for national purposes. Section 3-8 of the Electronic Communications Act and Section 2-5 of the Security Act nevertheless provide the power to impose usage restrictions and halt activity that threatens national security interests, including on the part of the facility's owner. The instruments are thus halting rather than steering. The Norwegian authorities can restrict use, including of the services produced on the equipment, but cannot require computing power to be made available.

On the power and climate side, the direction is clear, but the most important instruments have recently been introduced or are under consideration, and their effects cannot yet be evaluated. Two issues should nevertheless be clarified before the instruments are developed further: the requirements for assessing surplus heat do not solve the coordination problem between data centre and heat offtaker,

and measures aimed at Scope 2 emissions have distributional effects rather than emission effects as long as power production is subject to emissions trading. The review also brings out a goal conflict. Section 3-8 of the Energy Act provides the power to prioritise grid connection or capacity increases when necessary to safeguard national security interests. This is a direct claim on capacity that could otherwise have been used for projects that could have increased value added in the data centre industry, or other sectors. Every prioritised connection granted on security grounds is a connection not granted to another project. Whether there is a need to revise the remaining regulation to strengthen the efficiency of the allocation mechanisms requires a separate study before it could be introduced, and any changes would have to be sector-neutral. A similar goal conflict is found in ownership: a requirement for Norwegian ownership or contractually secured national control, as the security objective points towards, reduces the circle of players willing to establish themselves, and pulls against the value added objective that it should be attractive to establish data centres in Norway.

An assessment of developments measured against the strategy cannot, however, be carried out in full, because the strategy lacks operationalised objectives. It specifies neither indicators, a baseline nor an evaluation date. If the strategy is to be followed up over time, a small set of indicators should be established. Based on the data in this report, such a set could consist of installed capacity in operation, employment per MW by data centre type, the share of Norwegian supplier content in construction and operations, the realisation rate for capacity in the connection queue, and the share of facilities with utilised surplus heat.

If the authorities wish to strengthen the economic impacts of the industry, as the assignment requests input on, the review points towards three categories of possible instruments: following up the adopted measures to reduce development times in the power grid and studying regulatory changes for the prioritisation of grid connection cases[186], as well as considering targeted requirements for establishments with relatively smaller local economic impacts. A systematic review of such instruments, including the EEA legal framework and experience from other countries, lies, however, outside the scope of this assignment. For the other objectives, we would particularly point out that questions relating to the use of public procurement to support security and preparedness objectives, and the specification of the content of the concepts of *digital room for manoeuvre and national digital sovereignty*, remain unresolved. On the climate side, the most important instruments have recently been introduced or are under consideration. We believe, however, that it should be assessed whether the instruments that have been established actually target real market and coordination failures linked to the ongoing climate transition in Norway and Europe.

[186] Provided this has a positive effect on the data centre industry

Appendices

A. Cryptocurrency mining in Norway

Cryptocurrency mining is the process by which new units of a cryptocurrency are created and transactions are validated. This takes place through processes requiring computing power and is usually concentrated in dedicated data centres. Ten data centres in Norway are currently registered for cryptocurrency mining, all located in the areas with the lowest electricity prices. These have a combined installed power of 161 MW. Several Norwegian crypto centres are now converting their operations towards AI and HPC, and crypto centres are expected to account for a small share of further growth in data centre capacity in Norway. Crypto centres differ from ordinary data centre types in several respects. They operate in a competitive market that makes them more sensitive to electricity prices and fluctuations in revenue (the bitcoin price). The economic impacts are typically lower than for ordinary data centres, and value added is volatile. The IT equipment used is often specialised and inflexible. Finally, they have a different operating pattern that affects their role in the power system: they can in principle be disconnected at short notice and thus offer some potential for flexibility in the power grid.

Cryptocurrency is a digital currency transferred and validated in a decentralised network. The mining of cryptocurrency (*crypto mining*) is the process by which new units of the currency are created and transactions are validated. The technology behind this mining is blockchain (*blockchain*), a database technology that records and stores information in blocks of data that are linked together.[187]

Different cryptocurrencies are mined in different ways, and the energy requirements vary between methods.[188] The most widespread cryptocurrency, bitcoin, is mined using the proof-of-work (PoW) method. This method involves computers in the network competing to be first to find the correct solution to a mathematical problem. The solution can only be found through trial and error across a large number of attempts, and the method therefore requires a great deal of computing power.

Mining today takes place almost exclusively with specialised hardware in the form of purpose-built chips (ASICs). This computing power is today mainly concentrated in dedicated data centres. ASICs are more energy-efficient than general-purpose graphics processors (GPUs), but cannot be used for anything other than mining one specific cryptocurrency.[189] GPU-based mining was mainly linked to Ethereum and in practice disappeared when this cryptocurrency switched from PoW to proof-of-stake (PoS) in 2022.[190] PoS does not require computing power in this way and is therefore not power-intensive. The discussion in this appendix therefore concerns PoW mining only.

The reward for the resource-intensive PoW process is a fixed number of bitcoin received by whoever finds the solution. The size of this reward halves every four years (most recently in April 2024), and the difficulty is adjusted automatically every other week so that the network as a whole produces roughly the same number of bitcoin regardless of how much computing power is deployed. Mining is thus a competition for a fixed, globally priced reward. The largest profit from this activity will naturally accrue

[187] Clark, Corrie E., Congress.gov, (2026). Cryptocurrency Mining and the Electricity Sector. Available here
[188] Proof-of-stake (PoS) and proof-of-authority (PoA) are examples of mining methods that are less energy-intensive than proof-of-work (PoW). More information available here
[189] Cambridge Centre for Alternative Finance (2025). Cambridge Digital Mining Industry Report. Available here
[190] EIA (2024). Tracking electricity consumption from U.S. cryptocurrency mining operations. Available here

to the players with the lowest costs. Since electricity accounts for over 80 percent of miners' running operating costs[191], bitcoin mining is in practice a competition for the cheapest possible power.

A.a. Electricity consumption of data centres mining cryptocurrency in Norway

Total electricity consumption from data centres was 3.2 TWh in 2025.[192] Electricity consumption from crypto centres is estimated at 1.5 TWh.[193] This thus accounts for roughly half of total electricity consumption from data centres, even though crypto centres make up only around 20 percent of all data centres (measured both in numbers and in MW). Crypto centres are a type of data centre where flexible operating hours are more feasible. Cryptocurrency mining becomes less profitable at high electricity prices or a low bitcoin price, and the work can be paused temporarily in such cases. This contrasts with, for example, colocation and hyperscale, which are critically dependent on continuous operation. At the same time, we do not know to what extent crypto centres make use of this possibility.

Data centres and the concession power scheme

Until recently, data centres were classified as general supply in the concession power scheme, and electricity consumption from data centres thus affected how much concession power the host municipalities were entitled to. The scheme has been criticised because municipalities were given a financial incentive to facilitate the establishment of data centres rather than other industry.[194] Lars Sørgard of NHH argues that this scheme has contributed to over-establishment of data centres in power municipalities.[195]

There are no statistics on how many host municipalities have received an increased concession power quota as a result of data centre establishments, but some cases have been covered in the media.[196] From spring 2026, the scheme was changed so that data centres are no longer included in the basis for calculating concession power.[197] The change entails new conditions for both existing and future host municipalities, which in some cases may lose significant amounts in lost concession power revenue.[198]

As we understand it, the municipalities can sell concession power to individual buyers, but they normally sell it in the market. However the municipalities choose to sell concession power on, this must comply with the EEA Agreement and the state aid rules. This means that "giving away, selling or buying power at a price below the ordinary market price may [...] be caught by the state aid rules".[199] Concession power is thus not to be sold below the market price. If municipalities choose to sell the power to a data centre (crypto centres or other types), this would, as we understand it, constitute price hedging for data centres on market terms, not a subsidy, provided the power is actually sold at the market price.

The fact that municipalities can sell concession power to data centres has in principle not been affected by the Ministry of Energy's change in the categorisation of data centres. In theory, they can therefore

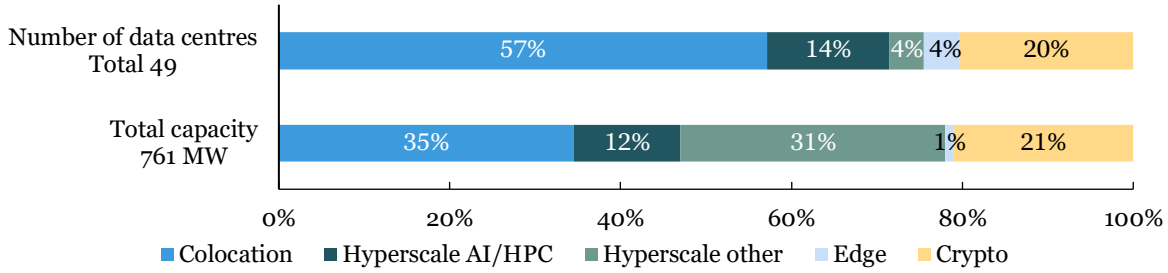
[191] Cambridge Centre for Alternative Finance (2025). Cambridge Digital Mining Industry Report. Available here
[192] Elhubs datakatalog, available here. Dataset: Forbruk i datasentre per dag og prisområde. Retrieved 24.06.26. The figure is calculated from Elhub's daily reported electricity consumption in data centres. Elhub also shows hourly reported electricity consumption; if this is used instead, annual electricity consumption in data centres in 2025 is calculated at 3.1 TWh.
[193] Elhub (2026). Hvordan bruker datasentre strøm? Available here. The annual consumption from crypto centres is calculated based on the average hourly consumption stated in the report of 176 MWh, multiplied by the year's 8,760 hours.
[194] NRK (2025). Datasenter-boom skaper ufred blant naboar. Available here
[195] Sørgard (2026). Konsesjonskraft forsterker knappheten på kraft. Available here
[196] DN (2026). Kommunen selger strøm til krypto: - Fullstendig parodi. Available here
[197] Regjeringen, Energidepartementet (2026). Tar datasenter ut av definisjonen av alminnelig forsyning i konsesjonskraftordningen. Available here
[198] E24 (2026). Datasenter-grep: - Dramatisk. Available here
[199] LVK (2021). Forbudet mot statsstøtte. Available here

still sell concession power to data centres, but host municipalities of data centres now have a smaller volume of concession power available for resale.

A.b. Cryptocurrency mining in Norway

There are currently ten data centres registered for cryptocurrency mining in Norway. In 2026, crypto centres account for around 20 percent of data centres in Norway, measured both in numbers and in capacity (MW).

Figure A-1: Types of data centres in Norway, measured in numbers and MW. Source: Menon Economics' population of data centres, based on data from Nkom.



Today's crypto centres are located in the two price areas with the lowest average electricity prices in recent years, with six crypto centres in NO4 and four in NO3. This indicates that crypto centres are more sensitive to electricity prices than ordinary data centres[200]. Most of today's crypto centres are moreover located near smaller towns and villages, such as Tydal, Trones and Sunndalsøra. This suggests that crypto centres are sited where affordable power and grid connection are available, and that proximity to large pools of expertise and digital infrastructure is not decisive in the choice of location.

Over the past couple of years, several crypto operators have been converting their business away from crypto and towards hyperscale AI/HPC. Troll Housing, Tydal Data Center and Exanorth are crypto centres of 67 MW, 40 MW and 38 MW respectively, all of which state that they are actively working to convert their operations to AI.[201] [202] Nordland Data (a data centre not registered on Nkom's list of data centre operators) is also converting its operations to AI.[203] This trend is also visible internationally, where several crypto centres are experiencing squeezed margins and are increasingly building out AI infrastructure.[204] The drivers of the trend include a lower bitcoin price and higher expected profitability in the AI segment.

Going forward, crypto centres are expected to account for a small share of the total increase in data centre capacity in Norway. Looking at the connection requests at Statnett, 75 MW is reserved for crypto (2 percent of total reserved capacity) and 7 MW is in the capacity queue (0.1 percent of the total in the capacity queue).[205] Almost all crypto centres want to establish themselves in NO4, which is the area with the lowest average electricity prices in recent years.

[200] In this note, "ordinary data centres" are defined as all types of data centres other than crypto centres. This thus includes colocation, hyperscale AI/HPC, other hyperscalers (called hyperscale other), and edge.
[201] Digi (2026), Vil omgjøre norsk bitcoin-fabrikk til et av Europas største KI-datasentre. Available here.
[202] Bitzero (2026). Bitzero Holdings Inc. Marks First Week of Trading on Nasdaq, Highlights Advanced Pipeline of AI and HPC Infrastructure Assets Across Nordic Markets. Available here.
[203] NRK (2025). Planlegger nytt AI-datasenter i Rana – kan koste opptil 5 milliarder. Available here.
[204] CoinShares (2026). Bitcoin mining report, Q1 2026. Available here
[205] Statnett. Statistikk om tilknytningssaker. Available here. The categorisation of data centre types was carried out by Menon.

Beyond this, some areas are experiencing high demand for connection from smaller data centres. In Finnmark in particular, there has been a large influx of smaller crypto centres. These stayed within the 5 MW limit that allows direct connection to the existing grid without the connection having to be cleared with Statnett.[206] [207] According to Minister of Energy Terje Aasland, all the requests came from the same company.[208] The large influx of this type of request in Finnmark follows the pattern of crypto centres wanting to establish themselves in areas with low electricity prices. Since the grid in Finnmark is fully utilised, the demand for power from crypto centres created challenges for the operation of the power grid. Statnett assessed that this growth was no longer "operationally sound", and therefore lowered the limit for direct connection of ordinary consumption from 5 to 1 MW, so that no more crypto centres can be connected to the power grid.[209] [210]

A.c. Summary of differences between crypto centres and ordinary data centres

Crypto centres operate in a competitive market and are more sensitive to electricity prices

Actors in cryptocurrency mining face squeezed margins in a highly competitive market. Low electricity prices are absolutely crucial for profitable operation.[211] Ordinary data centres are driven to a greater extent by a necessary scaling-up resulting from digitalisation, increased use of cloud-based solutions and rapid developments in artificial intelligence. Demand for computing power for artificial intelligence and cloud-based services is expected to grow strongly going forward as well. The market is as yet unmet, and rapid development is necessary to keep pace with demand. For data centres such as colocation and hyperscale, rapid establishment and connection to the power grid (*time-to-market*) will therefore be decisive factors.

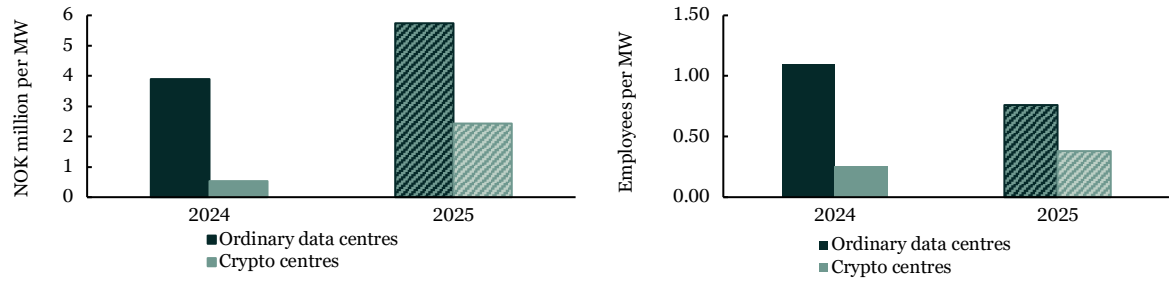
That crypto centres position themselves to a greater extent on the basis of electricity prices is also visible in the connection requests at Statnett. All future crypto centres are seeking connection in the two price areas with the lowest prices (NO3 and NO4), while most other hyperscalers and colocation facilities have sought connection in NO1 and NO2, which are the two price areas with the highest electricity prices in recent years.

Economic impacts linked to crypto centres are probably somewhat lower than for other centres

The assessment of economic impacts is based on an accounts analysis of Nkom-registered operators using Menon's company database, full data for 2024, preliminary figures for 2025, and our own assessments. The figure below shows direct value added per MW and the number of employees per MW at crypto centres and ordinary data centres respectively. Employees of clients at the data centres and any contracted personnel are not included.

[206] The limits on grid companies' obligation to set aside capacity are regulated in Section 3-2a of the Regulations on grid regulation and the energy market (NEM)
[207] E24 (2025). Krypto-advarsel for Øst-Finnmark: - Eksplosiv økning. Available here.
[208] Stortinget (2025). Skriftlig spørsmål fra Sofie Marhaug (R) til energiministeren. Available here.
[209] Statnett (2025). Reduserer grensen for vanlig forbruk inn til Sør-Varanger i Øst-Finnmark til 1 MW. Available here
[210] Statnett (2026). Endrer grensen for vanlig forbruk i Øst-Finnmark. Available here
[211] Cointelegraph (2025). Bitcoin Mining's 2026 reckoning: AI Pivots, Margin Pressure and a Fight to Survive. Available here

Figure A-2: Direct value added and (own) employees at crypto centres compared with ordinary data centres. 2025 figures are preliminary. Source: Menon Economics.



Ordinary data centres had direct value added of just under NOK 4 million per MW of installed capacity in 2024. Crypto centres had value added of NOK 0.5 million per MW in the same year. Preliminary figures for 2025, however, indicate considerably higher value added of around NOK 2.5 million per MW for crypto, both because the bitcoin price has been higher and electricity prices lower. The corresponding figure for ordinary data centres has been over NOK 5.5 million per MW in 2025. Even though crypto centres had considerably higher value added in 2025 than the year before, this does not change the picture that value added (per MW) at crypto centres is both more volatile (depending to a large extent on both electricity and bitcoin prices) and has at the same time been lower than at other centres.

Regarding employment, preliminary figures suggest that crypto centres employ fewer FTEs per MW. In 2024 there were 0.25 FTEs per MW and in 2025 0.38 FTEs (preliminary figures) at crypto centres. Ordinary data centres had 1.1 and 0.76 FTEs per MW (preliminary figures) in the same period. The decline from 2024 to 2025 is mainly because installed capacity has grown faster than staffing, and because new centres are larger than existing ones. The number of FTEs per MW falls with facility size, since the base staffing is largely independent of installed power. Part of the lower employment intensity at crypto centres is because they were on average slightly larger, but most of it is explained by a real difference in labour requirements between the different centres. In addition, ordinary data centres often also have clients and contracted personnel at the facility. This is employment that comes in addition to the figures above.

It is not difficult to understand why the employment effects are higher at ordinary data centres. Colocation and hyperscale facilities deliver contractually guaranteed uptime to clients dependent on continuous operation, and are therefore built with redundant power and cooling supply to standardised requirements (Uptime Institute's Tier III and IV). Such uptime requires round-the-clock staffing of operations, security and customer support. Since one round-the-clock post corresponds to around four to five FTEs, even small facilities acquire a substantial base staffing. Cryptocurrency mining, by contrast, has no clients dependent on uptime, and the only cost of a shutdown is lost mining during the period. The facilities are therefore built with less focus on redundancy, UPS or certification requirements, and are run with smaller teams.

While we have good data on the economic impacts of ordinary data centres, we have little data from companies engaged in crypto. Our clear assessment is nevertheless that the indirect value added and employment effects (the economic impacts) are also lower for crypto centres than for ordinary data centres. Simpler buildings and the absence of redundant systems mean less need for purchased services in maintenance, security, cooling and connectivity from Norwegian suppliers in the operational phase. The same applies to the investment phase: crypto centres are often container-based, modular facilities, with less need for investment in Norway. We therefore also expect the economic impacts linked to the establishment phase to be lower for crypto centres than for ordinary data centres.

Crypto centres mostly operate with specialised and inflexible IT equipment

As described above, cryptocurrency miners depend on the most efficient equipment, which is specialised chips (ASICs) that perform only one task. This specialisation means that crypto centres can hardly be used for other purposes without substantial investment in new IT equipment, cooling, power and network infrastructure and more professional buildings. Tydal Data Center in Norway states that it made provision for an AI data centre early on and can therefore convert to AI at a lower cost.[212] Even so, the conversion of Tydal Data Center costs around NOK 40 million per MW.[213] In our assessment, what primarily makes crypto centres attractive for AI/HPC is their existing grid access, which is one of the biggest bottlenecks for the development of data centre capacity.

Crypto centres can be a source of flexibility in the power grid

Cryptocurrency mining can in principle contribute flexibility to the power grid, which is a need according to Statnett.[214] Mining can be fully disconnected within seconds and resumed at no cost other than the lost mining during the period, because the calculations carried out are independent of each other.[215] This contrasts with ordinary data centre types, which are more dependent on continuous operation.[216] In this way, crypto centres are the type of data centre that allows the most flexible adaptation to the power system. Whether disconnection actually pays off depends on the electricity price or revenue from flexibility markets[217]. If neither the electricity price nor the flexibility revenue is high enough to outweigh the lost mining, there is no economic reason to disconnect, even though it is technically possible within seconds. Some therefore point out that the flexibility crypto centres can contribute to the power grid should not be overestimated.[218] The grid must in any case be dimensioned for consumption peaks. Unless the crypto centres' disconnection is secured through sufficient financial incentives or through connection agreements with disconnection conditions, the grid company cannot count on this flexibility when dimensioning the grid.

B. Method for calculating direct and indirect effects of the industry today

B.a. Direct effects

The analysis of direct effects takes the population of Norwegian data centres as its starting point. These data are linked with Menon's company database, which makes it possible to calculate the economic activity associated with the data centre industry in Norway.

We have narrowed the data on all data centres in Norway down to 42 relevant data centres in 2025. The data centres vary in nature and relevance for this analysis. The filtering of data centres rests mainly on three delimitations. First, we include only data centres that have been operational during 2025. Second, we exclude all in-house data centres, that is, centres operated for own use and not as a commercial service to clients. Third, we have filtered out other centres that for various reasons are

[212] Digi (2026), Vil omgjøre norsk bitcoin-fabrikk til et av Europas største KI-datasentre. Available here
[213] Bitdeer (2026). Bitdeer Announces $4.7 Billion, 16-Year AI/HPC Data Center Lease for Tydal, Norway Campus. Available here
[214] Statnett (2023). Økt behov for fleksibilitet gir nye muligheter til store og små aktører. Available here.
[215] N. Carter, S. Connell, B. Jones, D. Porter, M. A. Rudd (2023). Leveraging Bitcoin Miners as Flexible Load Resources for Power System Stability and Efficiency. Available here
[216] Adaptation to the power grid may also be possible for other data centre types. Google, for example, has entered into agreements with two American grid companies to reduce or postpone data processing during periods of high grid load; read more here
[217] Access to the various flexibility markets depends on size (capacity), and varies from 0.1 MW for FCR (primary reserves) to 5 MW (fast frequency reserves flex).
[218] Utility Dive (2022). Bitcoin mining as a grid resource? "It's Complicated.". Available here

irrelevant to the analysis, based on a discretionary assessment Menon has made across all centres in the sample.

Where an operating company has several data centres, we distribute the company's economic activity across the centres weighted by installed power. The distribution assumes that revenue, value added and employment within an operating company are distributed in proportion to installed power per centre.

For two large and established industry players, we have adjusted the contribution to data centre operations specifically, because these companies have substantial activity outside the data centre industry. A distribution based on the companies' total accounting figures would have overestimated their contribution to the industry. We have therefore instead applied the industry's average revenue, value added and employment per MW of installed power, and used these ratios as the basis for estimating the two companies' data-centre-related activity.

For a few companies with activity in the industry, accounts for 2025 were not available when we prepared the dataset. We have estimated the relevant accounting figures for these companies, so that they do not drop out of the statistics or create noise in the data. The estimate builds on the average of the companies' accounting figures for the three preceding years, since the data centre industry is marked by high volatility and growth. The approach probably underestimates the companies' actual accounting figures for 2025, but since it concerns only a few companies, we consider the method sufficiently precise for the purpose.

The employment figures in the direct effects cover only the operators' own employees, taken from the Brønnøysund Register Centre's official figures. Clients and tenants in many cases have their own employees present at the centres. Contracted labour and clients' own employees are not included in the employment figures for direct effects, and will therefore come in addition to the employment figures presented in this report.

As a supplement, we have estimated contracted labour using ratios from the six data centres. From these we see that on average 0.94 FTEs of contracted personnel are employed per MW. Clients' employees and contracted personnel together average 0.62 FTEs per MW. We have used this ratio to estimate the total number of people ordinarily working at data centre facilities in Norway. Capacity from data centres mining cryptocurrency is excluded from this estimate.

B.b. Indirect effects

The indirect effects cover the value added and employment supported among the data centres' Norwegian suppliers and further up the supply chain. The starting point for the calculation is the data centres' intermediate consumption. For the suppliers, these purchases are revenue, which partly becomes value added (labour costs and operating profit before depreciation) and employment at the supplier, and is partly spent on purchases from subcontractors. The sum of the effects at all stages of the supply chain constitutes the indirect economic impacts. Purchases from foreign suppliers and the import content of Norwegian deliveries are deducted, so that only activity accruing to the Norwegian economy is included in the effects.

The calculations have been carried out with Menon's economic impact model ITEM. The model builds on accounting data for all Norwegian enterprises and input–output relationships between industries, and calculates how one krone of purchases is distributed across value added, imports and further purchases from subcontractors, stage by stage up the value chain. The employment effects are derived from the value added at each stage using industry-specific ratios between value added and FTEs. For the data centre industry, the model is calibrated against actual firm-level transaction data from the six

facilities discussed in Section 3.1.3. The data identify around 1,500 unique direct suppliers and provide precise information about the first stage of the supply chain, including which industries the suppliers belong to and how large a share of the purchases accrues to Norwegian companies. The effects further up the chain are calculated using the model's general input–output relationships.

When scaling up to the whole industry, we apply the ratios between intermediate consumption, indirect value added and indirect employment per MW from the facilities in the sample, which cover around 20 percent of installed capacity in operation. The estimate thus assumes that purchasing patterns, Norwegian shares and supplier structure in the sample are representative of the rest of the industry, and that the ratios are stable across facility size and data centre type. The calculations cover upstream supplier effects only. Consumption effects, that is, activity resulting from employees in the value chain spending their wages, are not included in the estimates.

C. Categorisation of data centre types for future establishments

Here we describe the method we have used to categorise the data centres in Statnett's reservations and capacity queue. The categorisation distinguishes between five types of data centre: edge, colocation, hyperscale other, hyperscale AI/HPC and crypto.

The categorisation follows two rules, in order of priority:

1. If publicly available information shows what type of data centre the developer is planning, this is applied.
2. If no such information exists, the data centre is categorised by planned power:

a. below 10 MW gives the category edge
b. 10 to 50 MW gives colocation
c. above 50 MW gives hyperscale other

The categories crypto and hyperscale AI/HPC are never assigned based on power. These categories are used only where the developer itself has stated as much.

D. Categorisation of suppliers

Data centre specialists are companies whose core business is data centres, and whose business model would essentially not exist without the data centre industry. The category covers companies delivering products or services that are primarily used in data centres, for example turnkey contracting for data centre facilities, critical power infrastructure such as UPS and busbars, precision cooling, raised flooring, leak detection in data halls and commissioning of data centre facilities. Operationally, the specialists are characterised by a dominant share of revenue (over 75 percent) coming from data centre customers, and by the company marketing itself with the data centre segment as its main market.

Generalists with dedicated data centre expertise are companies serving several markets, but which have developed a dedicated offering, a certification, a specialist team or a documented delivery track record aimed at data centres. The category captures two variants of the same phenomenon. One is equipment and service suppliers with a defined data centre product in their portfolio, such as generator sets, transformers, battery systems, racks and security technology. The other is contractors and technical installers who, through repeated data centre assignments, have built specialised expertise that distinguishes them from industry peers, for example certification for data centre switchboards, specialist teams in liquid cooling or experience with data centres' uptime and redundancy requirements. Operationally, the category is characterised by a significant but not dominant share of

revenue from data centres (roughly 10–75 percent), deliveries to several facilities or repeated construction stages, and documentable data-centre-specific expertise in the form of certifications, references or dedicated teams.

Generalists are companies delivering standardised goods and services where the data centre is one customer among many, and where the delivery requires no data-centre-specific expertise or adaptation. The category covers, among other things, ordinary building and construction services, wholesalers, transport and logistics, power and grid deliveries, legal and financial services, rental, cleaning, catering and other support services. Operationally, the generalists are characterised by the delivery being virtually identical for any other industrial or commercial customer, and by data centres accounting for a small share of the company's revenue (below 10 percent).

E. Comparison of data centre types

While Norwegian data centres over the past ten years have mainly been colocation facilities, with elements of crypto and edge, developments going forward will be marked by hyperscale establishments (see Section 4.1). To be able to say anything about economic impacts going forward, it is therefore important to understand whether hyperscale facilities differ from the colocation centres that make up most of the data and experience we rely on. Such differences could, for example, be different investment needs, different staffing structures, different purchasing patterns, different import shares or different facility lifetimes.

Our hypothesis is that there are no systematic differences *per MW* between colocation and hyperscale data centres. The main difference between the two types is the sheer size of the facilities: hyperscale data centres typically have an installed IT capacity of 50 MW or more, while colocation centres can be anything from 1 MW upwards. Controlling for size, most of the differences between the types disappear.

Below we account for employment at different types of facilities. We do not yet have a basis for assessing purchasing patterns, import shares and lifetimes.

E.a. Employment: colocation and hyperscale

To assess whether direct employment varies between data centre types, we have carried out a case study of three international, listed data centre companies, each operating several facilities.[219] See the text box below for a description of the companies. These cases support our hypothesis that the size of the data centres is a main driver of the declining employment per MW as total capacity increases. At the same time, business models can give rise to differences in employment. We do not, however, find sufficiently robust relationships to make it appropriate to adjust for this in the calculation of direct employment.

Text box E-1: Three international data centre operators.

Equinix is a global market leader in colocation with around 2 GW of total capacity and over 13,000 employees globally. It specialises particularly in colocation facilities with good interconnection opportunities (edge capacity), where clients can connect directly to each other within the data centre, for example to gain direct access to cloud services for better speed and security.

[219] The employee figures for the listed companies cover the whole group, including sales, marketing and other group functions. The colocation model involves more clients per facility and thus more client-facing staffing than hyperscale, so some of the difference in employees per MW may reflect the business model rather than facility size. The facility-based pattern in Figure 3-4, where employment intensity declines with installed capacity, is however independent of this source of error and supports size being the main driver.

Digital Realty is a comparable global market leader in colocation with almost 3 GW of total capacity and over 4,000 employees globally. It differs from Equinix in focusing more on wholesale colocation, which in recent years has increasingly been aimed at AI and HPC. It thus has larger centres on average than Equinix.

Core Scientific is a large player in cryptocurrency mining that has recently been in the process of shifting its operations towards AI and HPC. It has ambitions to engage in colocation, but currently uses all its colocation capacity on one client, CoreWeave, which is a global market leader in the neocloud sector. It has on average much higher capacity per centre than Equinix and Digital Realty, but a lower total capacity of around 920 MW.

Equinix, which mainly runs colocation data centres, has far more employees than the other two companies, both in absolute terms and per MW. At the same time, it also has by far the lowest capacity per centre. Digital Realty, which runs colocation aimed more at AI and HPC, has on average higher capacity per data centre and considerably fewer employees per MW. Similarly, Core Scientific, which focuses on crypto, AI and HPC, has clearly the highest MW per centre, and somewhat lower employment per MW than Digital Realty. This is the same pattern as in Figure 3-7, where employment intensity declines with installed capacity.

The difference in employment between Equinix and Digital Realty also shows how much variation there can be between different colocation centres, as Equinix's distinctive offering of local interconnections between clients within its data centres drives employment up owing to an increased need for administrative staffing and customer service. There is nothing to suggest that this difference can be attributed to Digital Realty's larger share of AI and HPC; it is probably linked instead to a strategic choice of less hands-on customer service, larger centres, and more wholesale colocation and thus fewer, larger clients. Similarly, most of the lower employment per MW at Core Scientific can be explained by its centres being on average 10 times larger than Digital Realty's, and by it currently having only one client.

Based on these cases, together with experience from previous work with Norwegian data centre operators, we do not find it appropriate to distinguish direct employment effects by data centre type, and we expect that with a larger data population, such as our other analyses, variations like those between Equinix and Digital Realty will even out.

The difference in employment between data centre types is primarily due to size, which is correlated with type. In other words: colocation data centres are typically smaller than hyperscale facilities, and smaller data centres have more employees per MW. Colocation data centres therefore typically have more employees per MW of installed capacity than hyperscale facilities. The implication is that, for both investments and employment, we scale the ratios for investments per MW and employees per MW by developed capacity, regardless of whether it concerns colocation or hyperscale.

F. Sensitivity analysis for future economic impacts in operations

Table F-1: Value added effects in operations under different establishment and value added scenarios, NOK billion, 2025 prices. Source: Menon Economics.

	Low value added per MW	Medium value added per MW (today's)	High value added per MW
Establishment scenario 1	27	37	47
Establishment scenario 2	19	26	33
Establishment scenario 3	12	16	20

Table F-2: Employment effects in operations under different establishment and employment scenarios, FTEs. Source: Menon Economics.

	Low employment per MW	Medium employment per MW (today's)	High employment per MW
Establishment scenario 1	7,400	9,300	11,200
Establishment scenario 2	5,200	6,500	7,900
Establishment scenario 3	3,200	4,000	4,800



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