FarrPoint

Scottish Enterprise

Green Data Centre Study

Initial Baseline Report



Contents

1.	Introduction	3
1.1	Background	3
1.2	Document Structure	3
2.	What is a Green Data Centre?	4
2.1	What is a Data Centre used for?	4
2.2	What makes a Green Data Centres 'green'?	5
2.3	What are the drivers of data centre demand growth?	6
2.4	What are the key location considerations for data centre?	6
3.	What role do data centres play in the economy?	9
3.1	Overview of the role of data centres in the economy	9
3.2	What is the short-term impact of a new data centre?	9
3.3	What is the medium to long-term impact of a new data centre?	9
4.	How large is the International Data Centre Market?	11
4.1	Global Data Centre Market	11
4.2	European Data Centre Market	11
4.3	UK Data Centre Market	12
5.	What is the situation in Scotland?	13
5.1	What is the current data centre market in Scotland?	13
5.2	What are the opportunities for growth in the Scottish data centre market?	13
5.3	What would the potential impact be of a new data centre in Scotland?	14
6.	Initial Conclusions and Next Steps	18
6.1	Key Initial Findings from Market Assessment	18
6.2	Next Steps	19

1. Introduction

1.1 Background

The aim of the Green Data Centre study is to develop a strategy to promote the establishment of green data centres in Scotland, both in the near term (2025), and for the longer term (2030). The context of the study is that the market opportunity for establishing green data centres in Scotland, particularly aspirations around attracting hyperscale facilities, has never been stronger.

This Initial Baseline Report is the first element of the strategy and includes an economic baseline with a review and commentary on previous modelling of the sector, and where available, a scorecard evaluation of performance based on previous reports and assumptions.

1.2 Document Structure

The structure of this initial report is based around answering several key questions:

- What is a Green Data Centre? In this section we will identify what a green data centre is and consider some of the drivers of the growth in data centre demand as well as what considerations data centre operators make in deciding an ideal location.
- What Role do Data Centres play in the economy? This considers the economic impact of data centres – both in the short and medium-to-long term.
- How large is the International Data Centre Market? An assessment is made of the data centre market, looking at key regions globally, within Europe, and within the UK.
- What is the situation in Scotland? With this background, we review the current Scottish market and make an initial assessment of the type of impact that a new green data centre could have on the Scottish economy.
- Finally, what are the initial conclusion and next steps? This final section summarises the key findings of the report and establishes the key next steps in this project.

2. What is a Green Data Centre?

2.1 What is a Data Centre used for?

Data centres are buildings (or part of buildings) that house the IT equipment that store, manage, and disseminate data and information systems. They comprise servers and storage equipment, with application software which processes data and content. They are connected to the Internet via high bandwidth international and domestic digital connectivity networks. Data centres can be categorised into several key types, as set out in Table 1.

	Single Tenant	Colocation Data Centre			Single Tenant
Type	Private/ Enterprise	Regional	National	International	Hyperscale
Customer	SME Enterprise Public Semi-public	SME Enterprise Semi-public	SME Enterprise Cloud Public Semi-public	SME Enterprise Cloud SaaS	Cloud SaaS
Space	Small (> 10m^2)	Small (> 200m^2)	Medium (> 2000m^2)	Medium (> 5000m^2)	Medium/ Large (> 5 ha)
Energy	Small (0.01-10 MW)	Small (0.5-10 MW)	Medium (1-10 MW)	Medium (>5 MW)	Large (>20 MW)

Table 1: Type of Data Centre Summary (Source: Dutch Data Centre Association)

2.1.1. Private/Enterprise Data Centre

These smaller data centres are used for housing an organisation's own IT equipment which is used for either internal purposes or to deliver services to customers.

A sub-category within these are micro data centres, which are small single tenant facilities which have typically between 2 and 15 server racks fused for computing, storing, and connecting close to the edge. The energy consumption of these micro data centres would typically range from 3-50kw.

2.1.2. Colocation Data Centres

Colocation data centres rent data centre space in either a regional, national, or international market. Many data centres let out space to customers, but the focus can vary, with there being two key subcategories:

- Retail colocation data centres - within these centres, colocation is focused on renting to customers with a contracted capacity of less than 1 MW.
- Wholesale colocation data centres - within these centres, colocation is focused on renting to customers with a contracted capacity of 1 MW or more. This group can include the 'built-to-suit' data centres which are built for and/or let to a single customer.

2.1.3. Hyperscale Data Centre

These are very large single tenant data centres which can be greater than 100MW. These tend to be run by major cloud providers or tech company (e.g. Alibaba, Amazon, Apple, Google, Meta, Microsoft, etc.), who offer digital services to their end customers.

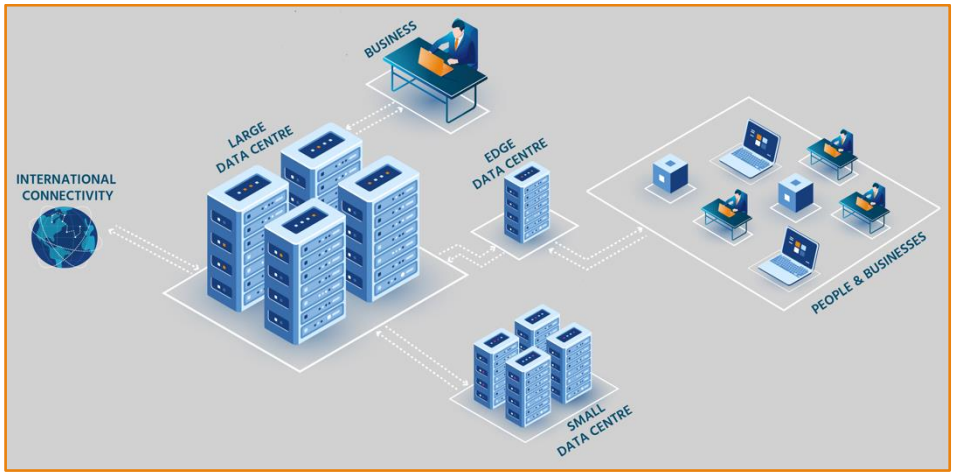


Figure 1: Digital Connectivity Network

2.2 What makes a Green Data Centres 'green'?

A green data centre is a conventional data centre that draws its power requirements from renewable energy sources. They also tend to be designed (infrastructure, location, fittings, equipment, etc.) for maximum energy efficiency and lowest contribution towards environmental impact.

Given the role digital connectivity can play in achieving Net Zero, over recent years the data centre market has been at the forefront of innovation and technological breakthroughs in greening energy use. This has focussed on three key areas:

- Green Power - Typically, data centres have relied on operational efficiencies to reduce the running costs and improve energy sustainability. However, with the rapid growth in demand for services, they have begun to innovate around renewable power procurement models.
- Waste Recycling - Any excess heat dissipated in the data centres can be recycled to other energy systems for utilisation, for example in colder climates the excess heat can be transported to nearby buildings.
- Modelling Energy and Water Usage - Leading technology players have been successful in deploying a combination of Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML) to forecast, model and use advanced cooling techniques to reduce Power Usage Effectiveness (PUE) of datacentres. Improving efficiencies around using water within the cooling systems is also key.

It is important to remember that data centres are private enterprises and decisions remain largely driven by commercial models and cost. Although greening a data centre will incur some considerable upfront capital costs, in the long run it will reduce operational expenditure and improve efficiency. In addition to these operational advantages and improved ESG (Environment, Social and Governance) rating, switching to green data centres will have other tangible benefits such as improving the data centre's ESG investment rating, enhancing its brand image, and offer a compelling value proposition to clients. Therefore, given these innovations within the sector, targets set by the operators, and most importantly the demand of the customer, it is widely assumed by the market that all new data centres will, in effect, be green data centres.

Scotland's supply of renewable energy sources (including wind, wave, marine, hydro, biomass, and solar) means that Scotland already produces close to 100% of its electricity demand via renewable sources with an expectation that this 100% target will be met in the coming years. This is well in advance of any new data centre construction on the horizon, with the UK expected to reach this mark by 2030. Therefore, any data centre created in Scotland could obtain its energy from 100% renewable sources. Given the availability and location of renewable energy sources

in Scotland, a data centre could also directly connect into a renewable energy source, an attractive option which will be further examined through the stakeholder engagement stage of the study.

2.3 What are the drivers of data centre demand growth?

- Cloud Computing - The rise of cloud computing has been a major catalyst for the growth of the data centre market. Cloud service providers such as Amazon Web Services (AWS), Microsoft Azure, Apple iCloud, and Google Cloud, require extensive data centre infrastructure to deliver their services. The shift from on-premises IT infrastructure to cloud-based solutions has resulted in increased demand for data centres.
- Big Data and AI Analytics - The proliferation of 'big data' generated by digital interactions, social media, connected devices, and Internet of Things sensors has created a need for advanced data analytics. Businesses are increasingly relying on data-driven insights to make informed decisions, optimize operations, and gain a competitive edge. Processing and analysing these massive datasets require robust data centre infrastructure.
- Household Demand - The rapid growth of e-commerce platforms, online streaming services, social media networks, and other digital services has significantly increased the demand for data centre infrastructure. Also, the shift to remote working practices and the transformation of many public sector services online also continues to drive more and more households to require access to the Internet.

2.4 What are the key location considerations for data centre?

Figure 2 outlines the key considerations for data centre location. It is important to note that each location decision will likely be down to a range/ mix of these causes, and these are not in order of importance.

	Established Market: Current existing clustering of data centres
	Connectivity: A country's international and domestic digital connectivity infrastructure
	Utilities: Given significant power and water requirements to cool the data centre, both availability and cost of electricity and water is key
	Cost: Whilst electricity has long been the main operating cost, other elements such as labour and land costs can also play a deciding role
	Government: a country's regulatory and fiscal regime alongside any short- or longer-term initiatives can also attract investment
	Key Sectors: Whether the location is home to established key markets of the data centre
	Skills Base: digital and data science skills to take advantage of the opportunities afforded by the data centre ecosystem
	Security: Increasing concerns about data security/ privacy mean ensuring location is secure/ data protection compliant regulations is key.
	Hazard suitability: the location has to be a suitable site free from natural and manmade hazards.

Figure 2: Key Considerations in Data Centre Location (source: FarrPoint)

At this stage it is worth exploring a number of examples from the data centre market:

- Firstly, North Virginia, the geographic region near to Dulles International Airport, including the community of Ashburn and its surrounding area, is home to the largest concentrations of data centres anywhere in the world - and it's still growing. Geographically speaking, Ashburn is essentially right in the middle of the eastern seaboard making it optimally placed in terms of access to local companies and internationally across the Atlantic. In particular the area surrounding the Capital Beltway is home to many established organisations who have a large demand for hyperscale data centres (e.g. Government agencies, defence contractors, emerging and large tech firms, as well as finance services) all of which pre-dated the data centres themselves. The location is also low environmental risk and given the importance of the uptime of data centres, building them in areas unlikely to be affected by natural disasters (e.g. flooding/ forest fires or rising sea levels) is essential. Northern Virginia also has good digital connectivity and reliable power. On the connectivity side this is through a diverse network of fibre and dark fibre routes as well as internationally with access to multiple subsea cables from across the Mid-Atlantic region. With power the local utility service operator has a strong history in reliable affordable energy and is now increasingly providing renewable sources.
- London has long been a centre for global trade and commerce and ever since the days of the telegraph, trans-Atlantic cables have landed in the UK before reaching mainland Europe. London is the 4th largest City Economy in the world, (1st in Europe), with a large dynamic business base there to serve. Consequently, London has naturally emerged as a meeting point for digital connectivity networks and a primary data centre hub. The distance from Ashburn in Northern Virginia to New York City is c300 miles, and to Boston it is a further 200 miles. Applying these distances to London (as shown in Figure 3), it is evident that large data centre hubs can help service a wide geographical area of businesses. This is especially important given we know that the UK benefits from good subsea international connectivity, making it an attractive location for datacentre investments, with multiple submarine cable landing stations, enabling high-speed connectivity with Europe, the United States, and other global destinations.



Figure 3: Comparison of distance covered by data centre region (Source: FarrPoint)

- In Dublin, the history with data centres goes back to the 1960s/70s where, with a struggling economy, there was a drive from the government to do whatever was necessary to attract foreign companies to locate within Ireland. The regulatory and fiscal regime helped to drive this growth in multinationals (e.g., Google, HP, Apple, IBM, Facebook, LinkedIn, Twitter, Pfizer, and GSK) locating parts of their operations in the country. Ireland benefits from good international connectivity with a diverse network of subsea connections to the UK, Europe and west to the United States. This strong history and connectivity picture has been key to growth in the local data centre market in Dublin.

- In comparison Norway, is a reasonably under-developed, but growing market – which reflects the growth across much of the Nordic region. Over recent years, the Norway data centre market has experienced robust growth largely due to strong government support, focused incubation programs alongside proactive promotion of the country as an attractive data centre destination. Norway's government initiatives, such as producing 30 GW of offshore wind energy by 2040, significantly meet the country's energy needs and supports green data centre operations. Leading multinational corporations like ByteDance (parent company of TikTok) and Volkswagen AG, partner with Norwegian operators to achieve their carbon neutrality goals by running data centres exclusively on 100% renewable energy, primarily sourced from hydropower. Norway's location, utilising its extensive coastline to proactively expand the number of international subsea cable networks (funded in part by Norway's Sovereign Wealth Fund), has significantly improved connectivity and eliminated latency disadvantages. As a result, data centres in Norway can more easily connect with global networks, enabling efficient data transfer and communication with other regions and continents. It is notable that there has been a drive by the strong public sector to move its digital ambitions (e.g. government cloud) onto Norway based data centres.

When considering the market for green data centres in Scotland, it is important to review all the contributing factors for why a data centre locates in a certain region. These examples highlight some of the different drivers and history behind these established and growing markets.

3. What role do data centres play in the economy?

3.1 Overview of the role of data centres in the economy

In general, it is widely recognised that improved domestic and international digital connectivity plays an important role in growing the economy, creating jobs, and achieving social and environmental objectives. This is through increasing productivity, enabling access to larger markets, supporting innovation, and improving the quality of, and access to, public services etc. Data centres are a key part of the global digital connectivity network, however, the economic role a new data centre plays within a specific location is less certain.

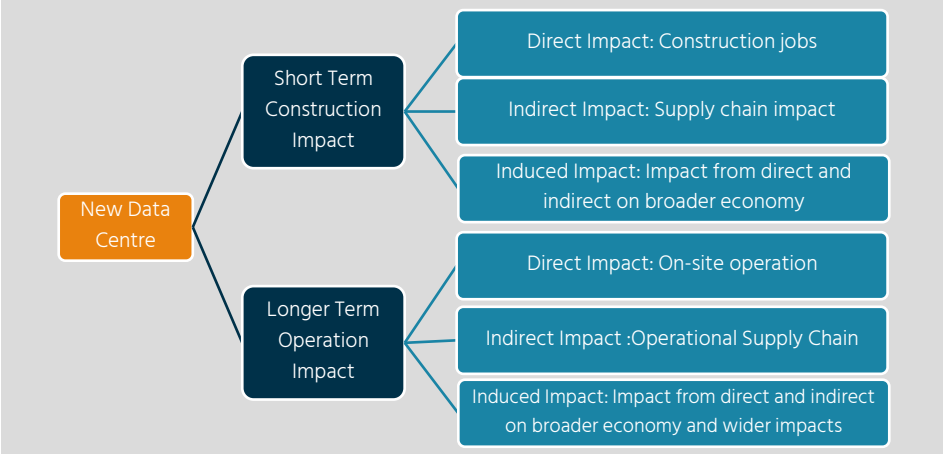


Figure 4: Potential impact of a new data centre

Figure 4 gives a very high-level overview of the types of impact that the creation of a new data centre could potentially have.

3.2 What is the short-term impact of a new data centre?

The short-term impact focuses on the design and construction phase which can be split into three "channels" of economic activity:

- Direct – this is the on-site building/ construction jobs and resources required for the initial set up of the data centre (including any contractors required).
- Indirect – this includes any of the wider supply chain, i.e., component suppliers, professional services, utilities, and facilities required for the design and construction of the data centre.
- Induced – this channel measures the spill over effects that result from the construction workers plus those of the businesses in the supply chain which spend their wages and earnings throughout the broader economy.

Any assessment must consider the impact of displacement within the region – e.g., where jobs or economic impact is being moved from one area to another internally, which would mean that the net impact was zero. Alongside this we must consider whether the data centre operator brings in workers and resources from outside of the country where the data centre is being located, which may reduce the impact on the local job's workforce and economy. Both are locality specific and will need to take the characteristics of the local economy into consideration.

3.3 What is the medium to long-term impact of a new data centre?

In assessing the medium to long term impact of any new data centres, beyond the construction phase, this is also split into three "channels" of economic activity:

- Direct – this is the on-site jobs and resources required for the operation of the data centre (including any contractors required).
- Indirect – this includes any of the wider supply chain, i.e., professional services, utilities, and facilities required for the ongoing operation of the data centre;
- Induced – this channel measures the spill over effects that result as on-site workers at the data centre plus those of the businesses in supply chain spend their wages and earnings throughout the broader economy. It also includes any induced impact that would be caused due to either the location of the data centre itself or due to any improvements in connectivity caused by the data centre (e.g. increased fibre deployment), and any impacts from any potential clustering of other digital businesses caused by the location of the new data centre(s).

Again, and in the longer term, it is particularly important to understand the impact of displacement within the region – e.g., if a new data centre leads to a clustering of businesses in one area, would those same businesses be created elsewhere within the region – which would mean that the net impact was zero. It is also important to consider that where multinationals are involved (in particular within a digital setting), where the benefits/ impact of any activity is likely to be felt. For example, the profits of the data centre developer may be retained and taxed within their local economy. Both factors are locality specific and will need to take into the characteristics of the local economy. The induced effect from clustering of businesses around the location of a data centre is of particular interest and it could be argued has led to some of the growth seen in the example geographies previously highlighted.

4. How large is the International Data Centre Market?

4.1 Global Data Centre Market

The global data centre market is a rapidly growing industry that provides the critical infrastructure for storing, processing, and distributing digital data worldwide. While it is challenging to provide an exact figure for the size of the global market due to its dynamic nature, with estimates for its size in 2022 ranging from $501 billion to $120 billion[2], the market value is predicted to continue to rise significantly as online services are used more frequently worldwide.

Data centres are distributed across the globe, with major concentrations in North America, Europe, Asia-Pacific, and other regions. The United States and China are significant players in the market, accounting for a significant share of data centre investments and infrastructure.

It is important to recognise that whilst externally these national borders may be how the market is broken down, internally within the data centre market – given the international nature of digital connectivity – these borders become irrelevant, and they are mostly thought about in terms of geographic region.

Figure 5 sets out the size and vacancy rate of the top data centre regions across the world.

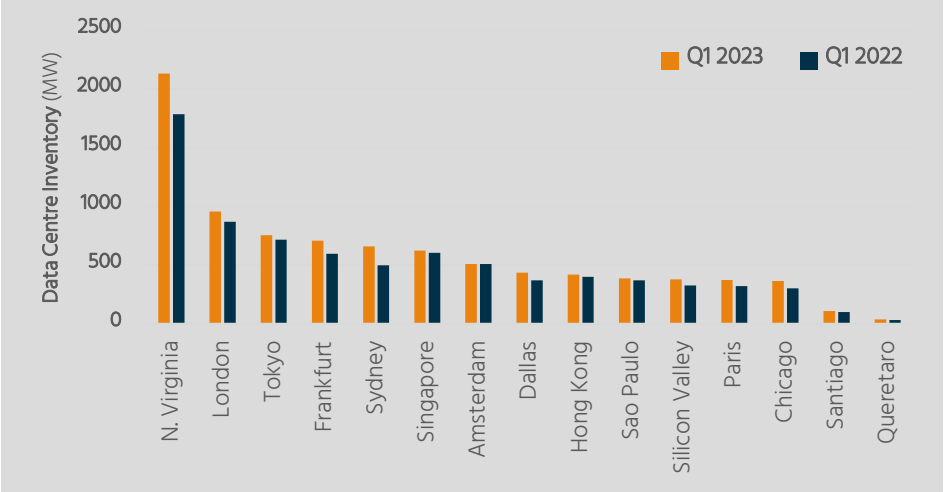


Figure 5: Top 15 Data Centre Markets (Source: CBRE)

4.2 European Data Centre Market

Europe is currently served by data centres largely concentrated within London, Frankfurt, Amsterdam, Paris, and Dublin. These markets have experienced substantial growth in recent years, driven by increasing digitalization digitalisation across industries and the need for scalable and secure infrastructure. The vast majority of Tier3 and 4 datacentres in Europe are hosted in those five key cities.

Europe boasts extensive digital connectivity infrastructure, including numerous international subsea cable connections (see Figure 6). With increasing concerns about environmental impact, many data centre operators in Europe are investing in renewable energy sources and implementing energy-efficient technologies to reduce their carbon footprint. Some countries, like Sweden and Norway, offer

[1] Source: Spherical Insights

[2] Source: Prescient & Strategic Intelligence

attractive conditions for data centres due to their abundant renewable energy resources.

The regional market is also driven by the significant demand for colocation services by the hyperscale data centre consumers, including large Internet businesses and public cloud service providers.

Whilst the 'FLAP-D' (Frankfurt, London, Amsterdam, Paris, and Dublin) regions have become significantly mature and face limitations related to physical space and insufficient energy to power new data centres, this has driven the colocation providers to find new locations, including Oslo, Berlin, Zurich, Milan, Warsaw, and Madrid. These areas are considered potential regions for data centre construction across the region, given their robust connectivity networks, alongside the fact these are still relatively densely populated areas – so remain significant demand from local businesses and populations.

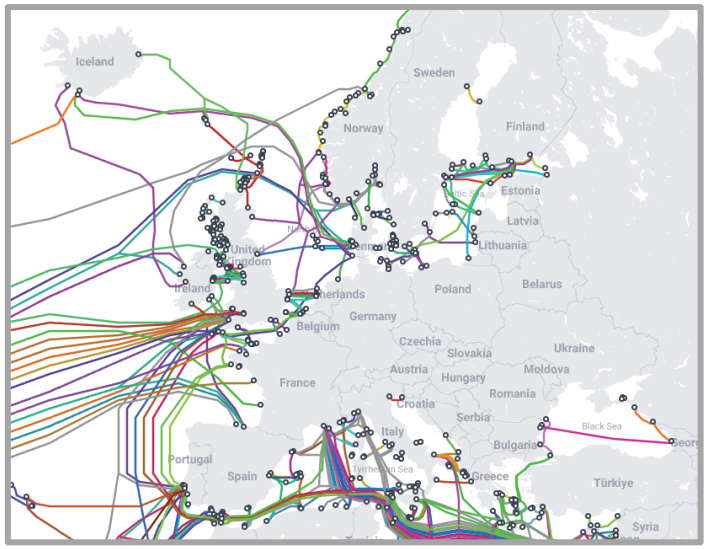


Figure 6: Subsea Connectivity (Source: Submarinecablemap.com)

4.3 UK Data Centre Market

The UK Data Centre Market is largely focussed on London where c80% of data centres, particularly the larger ones, are located. It is a rapidly growing and highly competitive industry that plays a crucial role in supporting the digital infrastructure and technology-driven economy of the UK. Both large multinational datacentre providers and smaller regional players seek market share with major global companies like Equinix, Digital Realty, and NTT Communications operating datacentres, alongside local providers, and telecommunications companies.

Market expectations are for continued growth in the London Data centre market, as a variety of large developments are set to be delivered this year. The market is projected to surpass the 1GW mark this year and remains Europe's largest colocation data centre market by total operational capacity.

It has done so despite the considerable issues operators are now having with securing power, especially in West London. Power at key substations, such as Iver, is reserved, due partly to a function of the data centre industry's growth in the region. The Greater London Authority has stated that demand from data centres equals that of all other users on a combined basis. It is widely recognised that if this issue is left unresolved, these market constraints are likely to impede the industry's ability to meet hyperscale demand beyond 2025. However, in the meantime, demand remains strong, especially from those with availability zones in London.

5. What is the situation in Scotland?

5.1 What is the current data centre market in Scotland?

Currently Scotland has a very limited data centre market (as shown in Figure 8), with ten colocation data centres – seven in the central belt, two in Aberdeen and one in Dundee. Whilst it is difficult to get accurate figures for the exact size of the market, it is estimated to be somewhere in the region of 10MW.



Figure 7: Scotland Data centre locations (Source: FarrPoint)

Most of Scotland's large private sector organisations (including those in the financial and digital sectors) currently choose data centre providers based out of London due to its proximity to wider markets.

5.2 What are the opportunities for growth in the Scottish data centre market?

Whilst the data centre market in Scotland is currently very small, the key opportunity for growth in Scotland, which will be explored through the subsequent stakeholder engagement, is the access to Renewable Power. The renewable power within Scotland, plus its relatively cool climate, are positive characteristics for attracting data centres to Scotland, similar to the growth seen in the Nordics. This is an attractive proposition for data centre operators around London where power availability is increasingly becoming a barrier for operators.

The recently published Host in Scotland *Data Centre Site Selection Report*[3] highlights a number of locations which have been assessed as potentially suitable for data centre operations and reflects the potential across the country linked to access to renewable power and relatively cheaper land. In addition to this, the Scottish Government's vision and action plan recognises that datacentre powered by renewable energy are a key part of the digital and data economy and look to support the growth of Scottish data centre clusters by coordinating marketing and engagement with international operators.

Furthermore, there is an opportunity for the Scottish Government to drive some demand for data centres through data sovereignty. Given Scotland's Cloud First approach to encourage and support the public sector towards using cloud services,

[3] Source: Host in Scotland

there is an opportunity for an aspiration for the public sector to mandate hosting data in Scotland. As is evident from Norway, which took this approach, this could encourage further growth in Scotland's data centre market. Furthermore, if the public sector were also mandated to have green IT footprint, then that would also stimulate local supply of green data centres.

5.3 What would the potential impact be of a new data centre in Scotland?

The work undertaken by Deloitte[4] in 2018, demonstrating that investment in data centres can be positive for the economy, does so in a way that potentially misses some of the nuances involved. Within this section, some of these issues will be unpicked with any of the resultant assumptions being highlighted to be used within the final report.

To begin to assess the potential impact of a new data centre in Scotland, a short and medium-to-long term impact approach will be utilised, based upon the key channels identified in Sections 3.2 and 3.3.

Firstly, it is worth highlighting these key points:

- Location – as shown in the example of North Virginia, location nearest to population centres is not a necessary requirement and it is other factors that make a location more favourable. These include availability of power, government initiatives, local supply of skills, connectivity etc. This will also have an effect on the magnitude of impact of drawing other businesses to a location based on a new data centre being built, which will be explored below.
- Size/Type of Data Centre – obviously the size/ type of data centre will have a material effect not only on the magnitude of the direct and indirect impact (larger data centre will require more people to build and operate), but also on the induced impact and potential clustering effect.

5.3.1. What is the short-term impact of a new data centre?

The first point to consider is how the design and construction of the data centre would impact the economy. This is examined across the three key channels:

Direct Impact

Building a data centre is different to building a multipurpose or non-descript warehouse structure, as data centres must incorporate strategic cooling and other systems to manage the facility. Construction workers will need to know how to efficiently leverage the equipment and floor space of the building. These considerations mean that data centre companies have strong relationships with certain build operators (and thus the required skilled labour), which they bring in from elsewhere to design and build the data centres. Given that the size of Scotland's data centre supply chain is limited[5], this would mean much of this direct impact upon the Scottish economy may be limited. There would likely be opportunity for some minor unskilled labour to be sub-contracted for certain parts of the build process, but this direct impact would be negligible.

Indirect Impact

As with the direct impact, the data centre industry has a strong established supply chain, i.e. component suppliers and professional services that it uses for the design

[4] Source: Deloitte

[5] There are some examples of supply chain companies based in Scotland - e.g. Soben and Black & White Engineering - both have Scottish offices and extensive data centre design/build experience

and build stage of a new data centre and there is currently a limited size of supply chain based in Scotland]. The creation of a new, or a small number of data centres, is unlikely to drive sufficient supply chain activity on its own to Scotland. However, the impact on the utilities sector for example, could be notable depending on the form that this takes. For example, if new power infrastructure is required to link to Scottish power generation capabilities this could be more significant. The potential impact of this will be explored with the market engagement portion of this study.

Induced Impact

This final channel measures the spill over expenditure effects that result for example from construction workers staying in the region plus those of the businesses in the supply chain who spend their wages and earnings throughout the broader economy. While figures for total direct and indirect impacts can only partly be attributed to impact within Scotland, multipliers can be used to identify and quantity the induced impact on the Scottish economy.[6]

5.3.2. What is the medium to long-term impact of a new data centre?

Once the data centre has been constructed and is operational, its medium to long term impact on an economy is considered against the three "channels" of economic activity:

Direct Impact

This is the on-site jobs and resources required for the operation of the data centre (including any contractors required). While typical company headquarters can have between 200 and 1,000 jobs on site, the number of jobs at an average data centre is significantly less and varies (and is often not publicly disclosed). However, data centres are not labour-intensive undertakings to operate, with the number of jobs onsite likely to be somewhere in the region of up to 30 people[7]. These on-site jobs are split into four main types of roles:

- *Technical Roles* - These involve maintenance, troubleshooting, and management of the technical infrastructure - e.g., network engineers, system administrators, database administrators, and technicians responsible for hardware installation and maintenance.
- *Security Roles* - Data centres require robust security measures to help ensure the safety of the facility and its data – e.g., security personnel, including physical security guards, cybersecurity experts, and access control specialists.
- *Facility Maintenance* - Facilities staff maintain the physical infrastructure of the data centre (some of which will be contracted in on an as needed basis depending on site size) - e.g., including electricians, HVAC (heating, ventilation, and air conditioning) technicians, and general maintenance personnel.
- *Administrative and Management Roles* - These are required for some overall coordination and management of the facility – e.g. data centre managers, operations managers, project managers, and administrative staff. However, much of this will likely be conducted at an off-site headquarter location.

Indirect Impact

This is the indirect supply chain impacts of having a new data centre operational in Scotland and covers the wider supply chain, i.e., professional services, utilities, and

[6] For this assessment, general rule of thumb Type II expenditure multipliers will be used, approximates 1.5 for GVA multiplier and 2.0 for employment. Source: Deloitte, Scottish Government

[7] Source: CBRE

facilities required for the ongoing operation of the data centre. As stated in the short-term indirect impact, there is currently a limited existing data centre supply chain based in Scotland and the creation of a new (or even a couple of new data centres) is unlikely to materially drive sufficient supply chain activity on its own to Scotland. The only exception to this surrounds the provision of utilities, in particular power, where if additional power generation can be established/ utilised within Scotland's renewables sector, then additional demand from data centres may lead to an increase in output. In the future, if there was a substantial increase in the data centre market, it could help to make new renewable power projects feasible by guaranteeing long term supply contracts. However, the extent to which this is possible needs to be tested with the utility providers.

A paper by Menon Economics[8] found that the availability of local businesses and labour supply with relevant competence needed both to build and to operate the data centre is key when looking at local impact. The regional effects are likely to be small if there is no firm or workers in the region that can meet the demand of the data centre. That leaves the data centre importing workers and subcontractors from other regions or internationally.

Induced Impact

Firstly, as with the short-term impact, there will be a small but not insignificant impact from the spill over expenditure from the direct and indirect effects. While figures for total direct and indirect impacts can only partly be attributed to impact within Scotland, multipliers can be used to identify and quantity the induced impact on the Scottish Economy.

Secondly, the wider potential induced impacts of a new data centre locating in Scotland considers two key factors: the first being whether it would lead to a clustering impact, and the second whether it would lead to an improvement in local digital connectivity (e.g. through enhanced fibre roll out). The 2018 Deloitte study takes both these impacts as a given and so it is worth considering the factors at play behind each of these and subsequently identifying several key scenarios upon which the more detailed modelling work can be based upon.

A new data centre will bring substantial improvements in local digital connectivity (e.g., improvements in regional fibre deployment)

The answer to whether this is likely is highly dependent on the data centre location. For example, if the various site selection factors drive a location where there is already sufficient connectivity, there is unlikely to be a need for further improvements other than specific connectivity from the site to the nearest operator points of presence. Alternatively, if a location was chosen which was poorly served, then additional fibre connectivity (including potentially subsea international connectivity) may have to be provided to connect that location back to existing operator networks, the extent of which would depend on the location. This additional fibre connectivity could provide additional benefits to the area by offering improved services to businesses and potentially residents in the area. This is not a given however and will depend on location and how any new fibre is provisioned e.g. ownership, availability of spare capacity to the wider market etc.

However, if as part of the planning legislation acceptance of the data centre, the Scottish Government ensures that the data centre operator makes improvements to

[8] Source: Menon Economics

the local fibre networks, then an uplift in local digital connectivity could be established.

A new data centre will lead to a significant clustering effect, creating significant economic growth for the region (e.g., drawing FinTech and digital businesses)

The clustering effect from data centres is a complex issue, and not one easy to generalise for all data centres or even types of data centres. There are limited international examples available where there have not been arguably more important drivers of growth in clustering than improvements in data centre availability (e.g. lower tax regimes in Ireland; other government initiatives in Scandinavia; and historical sector location in London).

As described earlier, the requirement for a data centre to be physically close to a given sector is limited given the international interconnected nature of digital connectivity. For example, if it were the case that the finance sector always required data centres to be physically close, you would expect significant financial data centres in and around New York City, not in North Virginia which is several hundred miles away.

It can also be expected that all the current and future demand of these sectors will likely be met by current and future supply of data centres close to where those sectors and markets are already based (e.g., London). This is demonstrated by the fact that most of Scotland's large financial sector organisations currently choose data centre providers based out of London due to its proximity to wider markets. Also, studies on the drivers of locations within often sited clustering sectors such as FinTech do not highlight digital connectivity, let alone data centres as being drivers of where companies within these sectors locate. For example, a 2022 Mckinsey report on the FinTech sector highlighted market structure and maturity, access to capital, regulatory and legal landscape, access to international markets, and customer openness as being the key drivers of where FinTech companies locate. Another example of this is in the Gaming and creative industries, where for the last 20 years, Scotland has been one of the leaders of video gaming innovation. Some of the best-selling video games of all time have emerged from Scotland, such as Grand Theft Auto (GTA), Crackdown, Lemmings and Angry Birds. More recently, No Code won the rights to develop a new game for the Silent Hill franchise, while Keelworks won a publishing deal with Japan-based Konami, and Outplay Entertainment is currently the largest independent mobile developer in the UK. And all of this has happened in an environment with limited data centres.

Taking these points into account, it is difficult to identify where the additional natural clustering effects linked to data centres would occur if a new data centre was brought to Scotland, even if the single data centre attracted further investment in more data centres - building up a network of data centres in Scotland.

Whilst it is possible that a clustering effect could occur naturally and a new hyperscale may attract more digital businesses, this is not a certainty. It is likely that further government intervention would be required to ensure that as part of the data centre locating in Scotland, additional investment is also brought to the region. For example, an approach could be taken that if a data centre is to locate in Scotland, the operator also invests in a digital site in the Central Belt, through which they will develop digital jobs etc.

6. Initial Conclusions and Next Steps

6.1 Key Initial Findings from Market Assessment

The global data centre market is a rapidly growing industry that provides the critical infrastructure for storing, processing, and distributing digital data worldwide. Currently, the data centres in the UK are drawn to London and the surrounding area, which is currently the second largest data centre region in the world, and home to a significant number of hyperscale and large data centres. In Scotland, there are currently less than 10 small data centres, and limited plans for organic growth.

Given innovations within the sector, and targets set by the operators, it is widely assumed by the market that all new data centres will, in effect, be green data centres. Scotland has a potentially significant benefit of the possibility of local renewable power generation being available to attract data centre investment.

This study aims to identify what the impact could be of attracting a new data centre to locate within Scotland. Data centres are a key part of the global digital connectivity network, however, the role a new data centre within a specific location is less certain.

The initial findings of this market study lead to several key conclusions on the potential economic impact of a new data centre locating in Scotland:

- The notable direct and indirect impact of a new data centre is in the small number of likely unskilled local workers required for the construction phase, the small number of people required to operate the data centre once it is live, and any potential impact that there is on the utilities' providers.
- Given the global nature of the market and its supply chain, and as a very limited amount of this supply chain is based in Scotland, it is likely that a new operator would bring in businesses and resources who have the expertise to deliver and maintain the data centre from elsewhere. This would therefore not have a material direct or indirect impact on Scotland's economy. In addition, it will be important to consider the international nature of the corporations involved, in particular when considering the impact of tax revenues etc.
- Finally, on the wider induced benefits to the economy, a new data centre located in Scotland could:
  - lead to some upgrades to the digital connectivity network, however, this would depend on (a) the location currently being significantly underserved, and (b) any improvements to connectivity to the data centre providing spare capacity made available to other operators and end users. However, if as part of the planning legislation acceptance of the data centre, the Scottish Government ensures that the data centre operator makes improvements to the local fibre networks, then an uplift in local digital connectivity could be established.
  - lead to an organic clustering effect, if there was substantial growth in the data centre industry in Scotland, this could draw in other digital and technology firms to the region. However (a) this would require a massive growth of the industry - i.e. multiple hyperscalers and large data centres; and (b) access to data centres is not seen by the majority of businesses as a key driver in where they locate. The available evidence from these sectors (such as FinTech and Digital Gaming) indicates that the current provision of services from elsewhere in the UK, means that not having the data centres in Scotland is not a hinderance to sectoral activity in Scotland. However, government intervention could be used to ensure that data centres locating in Scotland also bring additional investment to the region. For example, an approach could be taken with a new data centre operator to get agreement

to also invest in a digital site in the Central Belt, through which they will develop digital jobs etc.

6.2 Next Steps

The next steps are as follows:

1. Agree overall findings of this initial market report.
2. Complete stakeholder engagement activity to confirm these findings and assess possible steps to take to encourage data centres to locate in Scotland.
3. Finalise Economic Modelling to quantify the short and medium-to-long term direct, indirect, and induced impact.
4. Produce Final Report

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