



# DATA CENTRES IN SWEDEN

MARCH 2022

A REPORT PRODUCED BY CBRE FOR



# FOREWORD

## A DYNAMIC MARKET WITH SUSTAINABILITY AT ITS HEART

As the largest player in the Nordics, Sweden offers a vibrant and dynamic data centre market which combines leading international brands with established as well as new-and-innovative local and regional providers offering colocation and other data centre services. In recent years, the country has also become home to hyperscale cloud giants that use the market to provide and produce applications. All of these companies leverage the country's natural advantages to promote some of Europe's most efficient data centre operations. From low-cost power to a cold climate ideal for free cooling and wide-spread heat re-use initiatives, the Swedish market has data centres that appeal to companies wanting to operate with a reduced environmental footprint serving local, regional and global requirements. Companies also enjoy a politically stable environment with low geographic risk, high quality power and transport infrastructure.

This report, created by CBRE Data Centre Solutions Consulting on behalf of Swedish advisor, The Node Pole, highlights the advantages of operating and leasing data centres across the key markets of Sweden. All information in the report was collected during Q3, 2021.

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# COUNTRY OVERVIEW

## A MODERN ECONOMY PROMOTING SUSTAINABLE DIGITISATION

Sweden, a gateway market for trade between Europe, Russia and the Baltics, is the largest of the Nordic countries by population. Its industry was once dominated by industrial activity, mining and forestry and as a result of such energy-intensive industry requirements Sweden has a highly resilient energy network. In recent years, this same resiliency is being replicated in communications networks, with Sweden transforming into a key European technology hub with strong investments in the technology industry supporting a wealth of new market opportunities including new cross-border opportunities. Today, as a result, the country is home to a high number of start-ups as well as some of the world's most established technology brands.

Sweden's well-established services sector, which includes industrial, telecommunications and IT services, and its growing media & content, gaming, insurance and healthcare sectors, have driven IT skills development. The country's high standard of living and English-speaking business environment ensures many of these skills remain local and that international organisations are attracted to the country, in particular its capital Stockholm. Foreign trade drives much of Sweden's GDP and the country is a member of the European Union but remains outside of the Eurozone. While the country does have high taxes for citizens, Sweden offers rebates across a number of industries and a supportive welfare system for individuals. Sweden has one of the lowest corporate tax rates in Europe at 21%.

Sustainability is deeply engrained in all the country does, with renewable energy production already high. Like many other markets, the country faces challenges with grid upgrades in certain hubs. However, many organisations have deployed workloads in the country's data centres with no grid issues, leveraging neighbouring countries provision and areas of Sweden with an abundance of power. Distribution of power from North to South is being improved to combat the existing inhibiting factors. Government and community, however, are highly supportive of its digital industry and have been working to find solutions to enable further growth of digital industries alongside sustainability initiatives.

Sweden's leading organisations include:



Nordea



SSAB

Swedbank



Handelsbanken



IEQT

### SUSTAINABILITY

#1



Sweden is the most sustainable country in the Nordics and the World

*The Global Sustainable  
Competitive Index 2020*

### EASE OF DOING BUSINESS

82/100



Ahead of all but the UK in the FLAP markets.

*World Bank 2020*

### SKILLED LABOUR

48%



Population with tertiary education, 25-34 year olds.

*OECD 2018*

### GDP PER CAPITAL

\$51,563



Ranking consistently in the top 20 globally for GDP per capita, PPP. (US\$)

*World Bank 2020*

### CORPORATE TAX

21.4%



One of the lowest rates in Europe compared to 25% in the Netherlands, 30% in Germany and 31% in France.

*Deloitte 2020*

# DIGITAL MARKET

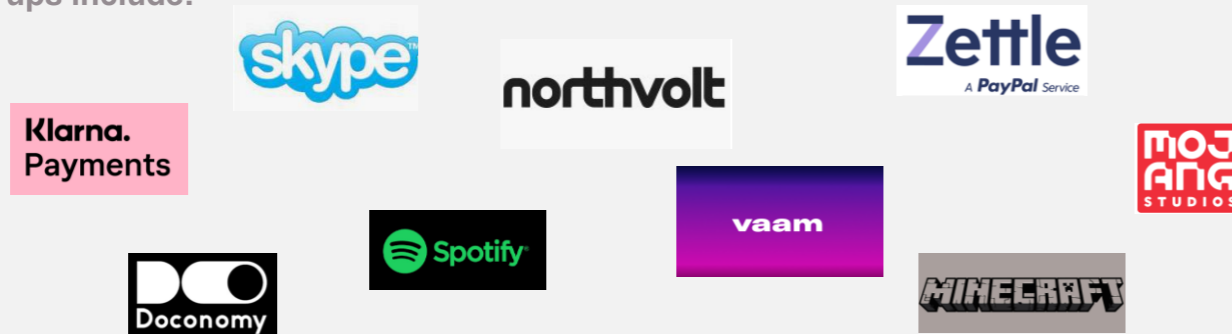
## AN INNOVATIVE, SUPPORTIVE ENVIRONMENT FOR NEW AND OLD COMPANIES

Sweden is home to unicorns. A little known fact about the country's digital economy is that it's second only to Silicon Valley in terms of the number of start-ups valued above \$1 billion per capita (a.k.a. 'unicorns') that call Sweden home. The country had 20 start-ups per 1,000 employees in 2018. This is in large part down to a highly supportive government and business environment that values digitisation. The country also has a strong venture capitalist environment with a high amount of investment, not only in start-ups but in digital infrastructure. These start-ups are spread across the fintech, media and gaming as well as sustainable industries.

Many of these companies are cloud-first, and this has helped boost the adoption of cloud across the region. It has also helped drive more local data centre environments with Stockholm not being the only hub for activity in the country.

Growth across the digital market has been heavily influenced by Swedish policies, regulations and taxation that encourage the roll-out of digital infrastructure from data centres to networks. Many leading telcos in the country are now focussing on 5G initiatives that will further boost Sweden's already strong communications infrastructure. Sweden is also the first Nordic country to establish a cyber security centre focussing on public and private business protection.

Sweden's start-ups include:



### DIGITAL COMPETITIVENESS

96/100

IMD World Competitiveness  
Centre 2019



Sweden offers one of the most digitally competitive environments in Europe and the world.

### NETWORK READINESS

TOP 3

World Economic Forum



Sweden consistently ranks in the top-three economies for network readiness

### START-UP RATE

3<sup>RD</sup>

OECD 2018



Highest global start-up rate (behind Turkey and Spain). 20 start-ups per 1,000 employees.

### START-UP INCUBATION

1<sup>ST</sup>

OECD 2018



Highest survival rate for start-ups in the world after three years with 74% still in business.

# DATA CENTRE MARKET

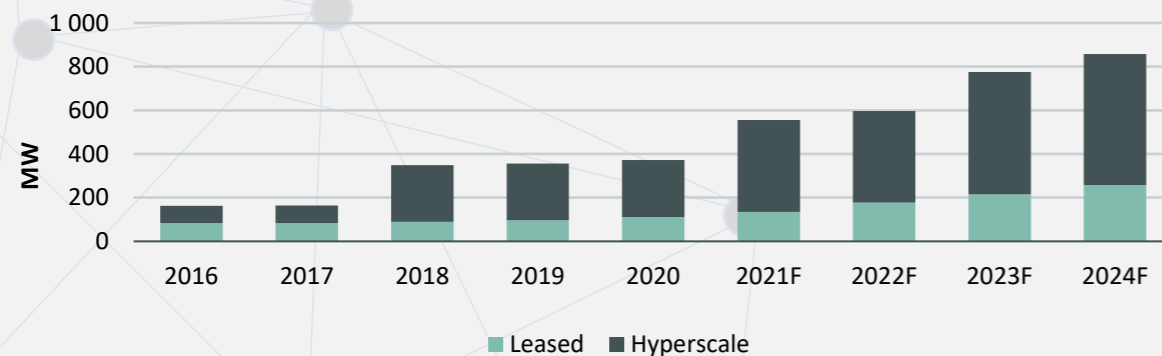
## A MATURE MARKET PREPARED FOR GROWTH

Sweden is a well-established data centre market with a high number of local and international providers operating in the country. It is also home to a growing number of hyperscale and smaller international cloud providers that enjoy Sweden's environmental benefits, access to land and low-latency access to the rest of Europe. In the next two years, it is expected that Sweden's colocation market will grow by more than 68MW and its hyperscale self-build market will become a 560MW market.

The Swedish data centre market has seen a high amount of M&A activity in recent years, with mergers taking place between colocation and hosting providers as well as local and international brands. Hyperscalers and colocation providers are also investing in new, large-scale sites and expansions. Recent activity includes the acquisition of Digiplex by IPI and Marguerite II of Conapto. M&A activity has also led to increased reach of local providers across the Swedish market, the Nordics and Europe more broadly.

Demand is also growing. Swedish companies are continuing to leverage locally-based cloud and data centre services and the market is seeing increasing interest from international companies seeking to reach into the Nordics or even mainland Europe.

Swedish leased and cloud self-build data centre market supply as of Q3, 2021



### Market Maturity

- Diverse data centre environment
  - Multiple types of providers & hubs/regions
  - Range of use cases
- Continual M&A interest
- Hyperscale/cloud colocation and self-build interest
- Supportive government/municipal bodies
- Energy efficient designs/Sustainability focus (90% providers powered by renewable energy)

### Drivers of Growth

- Investment
  - New funds & platforms
  - Hyperscaler growth
- Increasing focus on carbon-neutral data centres
- Swedish GDP
- Increasing global nature of business environment (import & export)
- Increasing digitisation of businesses

# HYPERSCALE MARKET

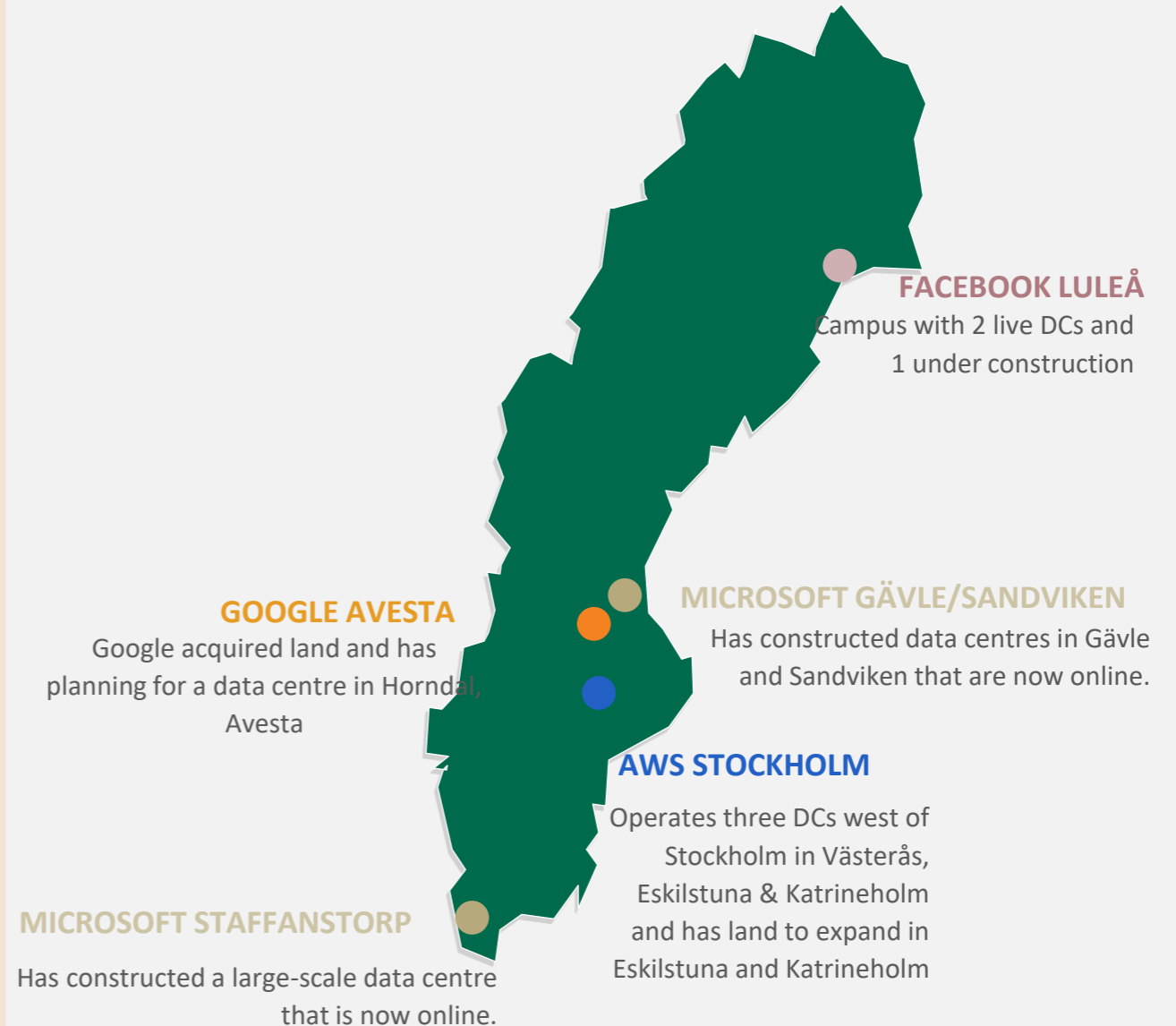
## A MARKET PREPARING FOR SELF-BUILD GROWTH

Facebook was the first hyperscale (large-scale) data centre operator to build in Sweden. It was one of the first data centre operators to build at scale in the Nordics. It chose Luleå, in the northern-most county of Norbotten, Sweden, for the location of its data centre due to the efficiency gains from the cold climate, a secure and fossil free energy supply, the location could supply. Supportive government and access to hydropower were also important deciding factors and the ability to build up a skills base around a growing campus.

Since Facebook entered the market, all other major hyperscalers have established a presence as well as smaller global cloud brands. AWS and Microsoft are building large-scale data centres and Google has acquired land, as has SAP (SAP signed for 60,000 sq m of land in Trollhättan, south-west of Sweden and Oracle has announced that it is building out a new region in Stockholm (Oracle tends to leverage third-party supply). While Facebook uses its Swedish facilities for processing of images, videos and cold storage, the providers noted above are considering the market for more critical availability zones, choosing locations where they can build out multiple data centres for redundancy to serve Swedish and other Nordic companies with mission-critical applications. Their growth is a sign of the growing maturity of the Swedish technology and enterprise industry.

Along with these hyperscale investments comes new investment in power and other infrastructure to support large-scale builds, often in municipalities seeking diversification of their business environments. Data centres in Sweden create a wide range of skills for a wider ecosystem of services supporting their operation from support services to supply chain. In Lulea, Facebook has spent more than €376 million on its first two data centres. It purchased €632 million in equipment from Swedish vendors and spent more than €100 million in goods and services and employed 343 staff by 2018 with staff wages being spent across the local economy.

## SWEDEN HYPERSCALE PRESENCE



# HYPERSCALE MARKET

## FACEBOOK

Facebook entered Sweden with its first data centre outside of US in Luleå DC in 2013. It now operates 2 large-scale data centres (around 80MW) and is building a third which will take total footprint in Luleå to around 160MW. Facebook uses its facilities in Sweden for cold storage and processing of Facebook photos, videos and virtual reality for European audiences. Its campus uses free-air cooling and is hydro-powered. Facebook's total market investment to-date estimated to be US\$987 million.



Facebook Lulea

## MICROSOFT

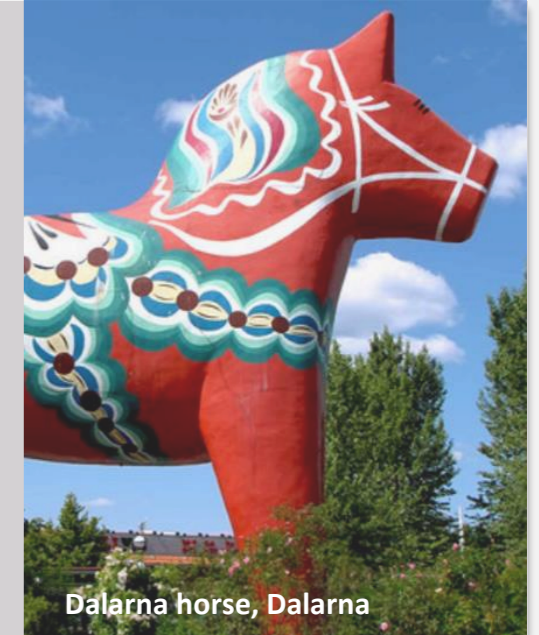
Microsoft is building two regions in Sweden – north (with data centres in Gävle and Sandviken) and south with a facility just outside Malmö in Staffanstorp. All are scheduled to open in 2021 adding more than 80MW to the market. Both regions will provide georedundancy. The south region will also serve Danish requirements. Microsoft says its Swedish facilities will be its most sustainable yet. They will be used to serve Azure customers such as H&M Group, Sandvik Coromat and Accenture Sweden. Microsoft has also invested heavily in STEM projects across Sweden.



Microsoft Gavle

## GOOGLE

Google has acquired 109 hectares of land in Dalarna county, 160km north-west of Stockholm, for a large-scale data centre. It has planning approved for a five-hall campus that will draw water from a river 20km from its Horndal site and has ten years to build. It plans to recycle heat from the data centre. It is also expected Google will draw from renewables in the region. Google invested in two Sweden energy projects in 2019. Google currently serves the Swedish market from its data centre in Finland and has a cloud onramp in Interxion in Sweden providing local cloud access.



Dalarna horse, Dalarna

## AWS

AWS entered the market with its first Point-of-Presence offering a cloud on-ramp from a third-party provider in Stockholm in 2011. It then announced a cloud region in 2017 and launched in 2018 with three of its own data centres outside Stockholm – in Västerås, Eskilstuna and Katrineholm. We expect it has in excess of 160MW capacity in the market and could grow by a further 80MW. It also added AWS Outposts in Stockholm in 2018 and acquired more land in Katrineholm and Eskilstuna for growth. It uses the market to serve Swedish customers including Nokia, Telenor, Scania, Volvo and iZettle.



AWS Sweden

# ENERGY MARKET

## FOSSIL FREE WITH A HIGH MIX OF RENEWABLES

The Swedish energy market is primarily composed of domestic renewable energy sources. The current grid transmission system operator, a state-owned company called Svenska Kraftnät, is responsible for the distribution of electricity across the four designated regions divided from north to south. To date, pricing has been lower for energy in the north, where much of Sweden’s renewable energy is produced and there has tended to be a surplus. Heavy industry in the north and increasingly large data centre developments, are, however, placing strain on some of this infrastructure.

Energy is traded, much like the neighbouring Nordic countries, on a platform known as Nord Pool, where pricing is dictated in a ‘day ahead’ fashion and traded from producer to reseller. Energy is also shared between the neighbouring countries where a country has excess supply.

Like other European markets, Sweden is also facing energy distribution challenges around areas of high-density industry and population. Plans are in place, however, for wide-spread upgrades across the network especially those serving Stockholm and Sweden’s south. Many of these upgrades will be complete by 2025.

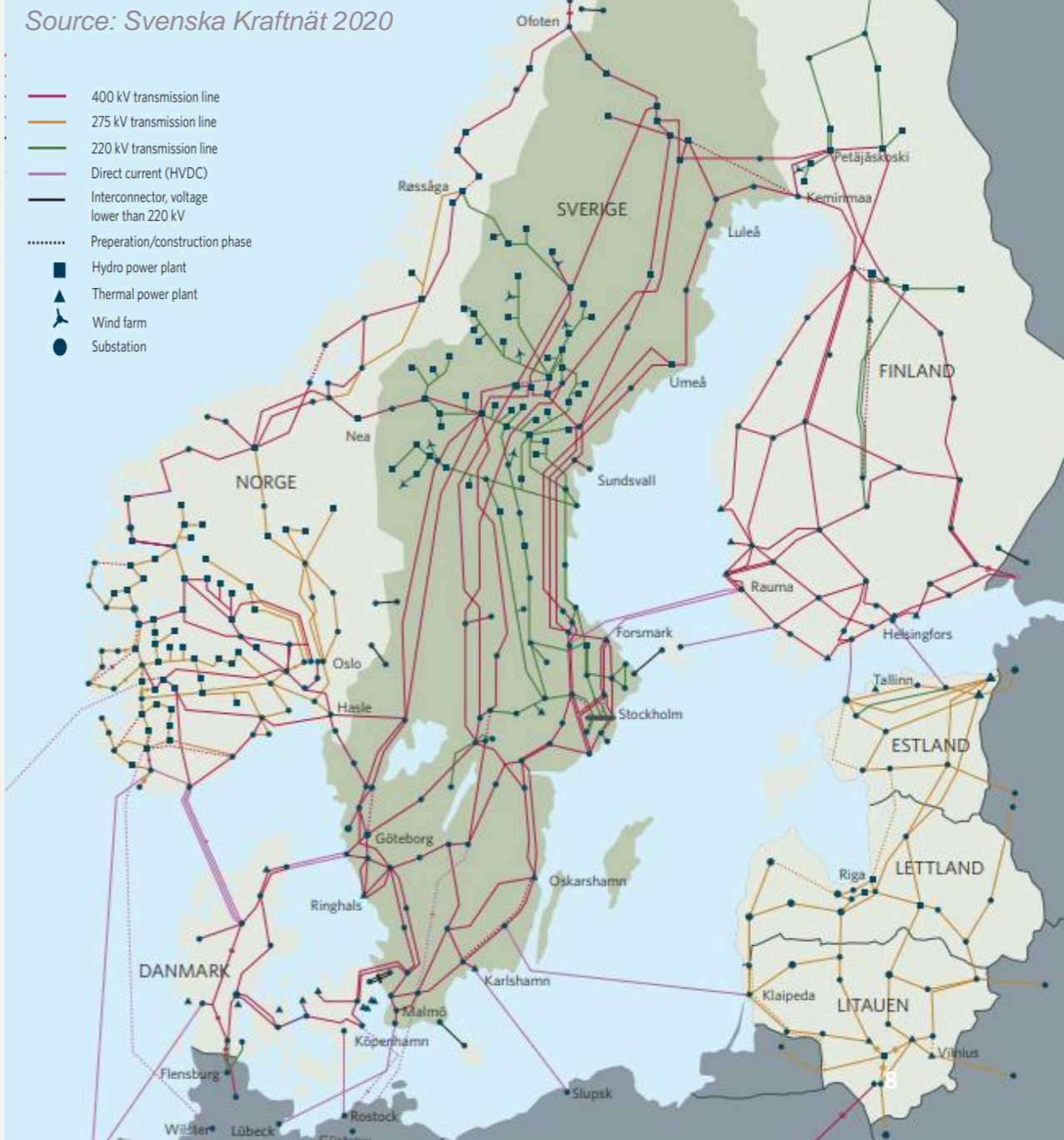
## ENERGY PRICE COMPARISON AS OF 2020 EXCLUDING TAXES

Country	Annual kilowatt-hour pricing			
	2018	2019	2020	3 Year Average
EU Average	0.0603	0.0646	0.0626	0.0625
Sweden	0.0478	0.0495	0.0483	0.0485
Germany	0.0509	0.0548	0.0567	0.0541
Ireland	0.0920	0.0919	0.0899	0.0912
France	0.0547	0.0602	0.0612	0.0587
Netherlands	0.0539	0.0595	0.0603	0.0579
United Kingdom	0.0967	0.0872	0.0910	0.0916

Source: Eurostat Non-household medium-sized consumer

## SWEDEN ELECTRICITY DISTRIBUTION NETWORK

Source: Svenska Kraftnät 2020





# ENERGY MARKET

## TAXATION

The energy policies adopted by Sweden and issued under the country's tax agency Skatteverket tend to give preference to technology-neutral measures and market mechanisms such as carbon taxes and high environmental taxes. Operators of data centres, however, and those in other asset-intensive industries, can receive rebates.

The Swedish government introduced new tax legislation regarding the data centre industry in January 2017 to stimulate investment. This reform included a 97% tax reduction on electricity consumed by data centres primarily aimed at overseas businesses with an installed power of 100kW or more. The benefit meant some providers could save up to 40% on their electricity bills.

The tax incentives were introduced to encourage foreign investment in data centres and organic growth within the sector across the country. The aim was to increase Sweden's competitiveness with neighbouring Nordic countries such as Denmark and Finland. It applies to companies consuming data centre services including self-build operations as well as colocation customers.

The benefit of the US hyperscale corporations being able to procure their own hardware and platform services has allowed them to continue their entitlement to the full tax discount on energy use. The government is also considering ways it can adapt the existing incentives to be more applicable across the industry, introducing a new concept focussing on the operational party that uses the data centre to receive lower tax benefits.

The Swedish Tax agency implemented a change in 2019, where customers consuming over 100kW of electricity through the use of IT infrastructure can claim tax relief.

21%

Corporate Tax

97%

Energy Tax Reduction

- Foreign-owned hyperscale and leased data centre customers operating with more than 100kW in Sweden can claim 97% tax reductions on energy consumed.
- Corporation tax of 21% is among the lowest rates in Europe.

# ENERGY MARKET

## RENEWABLE ENERGY TARGETS

Sweden has adopted energy framework ambitions, including the generation of 100% renewable electricity, by 2040. This is achievable by imposing carbon tax measures, without compromising on energy supply continuity. Nuclear power will be partially phased out as an energy source by 2040 in Sweden; it will be supplemented by wind and hydropower as part of a broader renewable electricity mix to the grid.

The country is seen as a global leader in decarbonisation and its energy targets are far more advanced than the EU targets including a 50% more efficient energy consumption by 2030 compared to 2005 and a 100% production of electricity by 2040 will be from renewable sources.

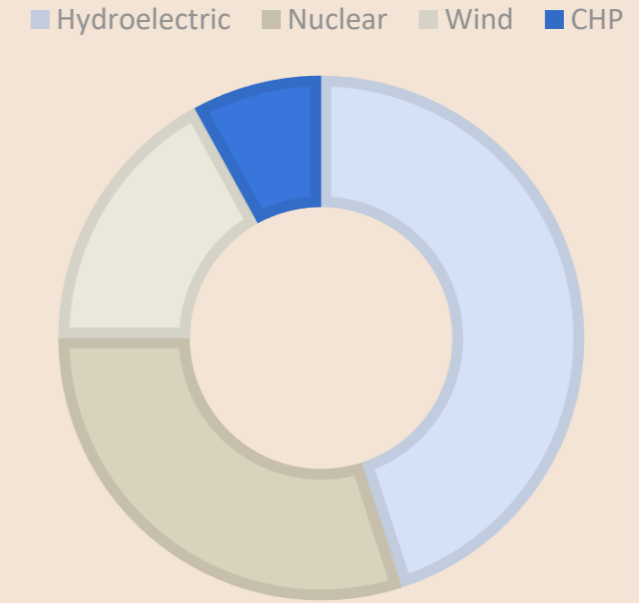
## RENEWABLE ENERGY PRODUCTION

Electricity in Sweden primarily comes from hydropower (40%) and nuclear power (40%). New entrants such as wind power, solar and biofuels are offering an alternative to these historical sources of energy.

Most of Sweden's hydropower facilities are found in the north of the country. The Lule River, for example, holds 15 hydropower dams. Sweden's largest hydropower producer is Harsprånget, which has 977MW of installed capacity.

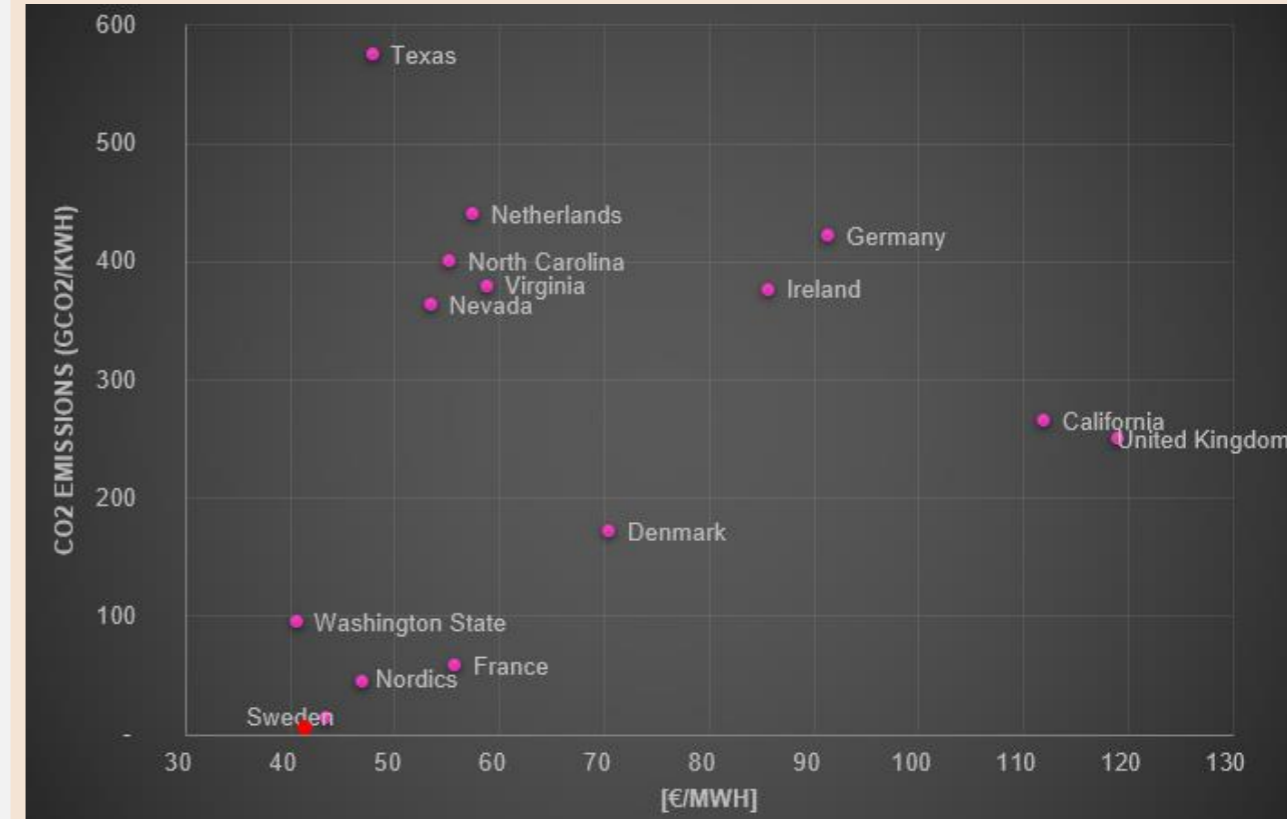
Biofuel supply has increased by three times over the last 40 years in contrast to crude oil and petroleum decreasing by 50%. Changing demands from the end user have driven this change. The primary user of electricity in Sweden is the residential sector, closely followed by the industrial industry.

## SWEDEN ENERGY SOURCES IN 2020



## CARBON EMISSIONS PER KW

Source: International Energy Agency 2020



# CONNECTIVITY

## ADVANCED TERRESTRIAL CONNECTIVITY

Stockholm accounts for the majority of internet traffic and connectivity in Sweden. It is home to the NASDAQ and Netnod IX Stockholm (the largest Internet Exchange in the Nordics). Netnod also operates an internet exchange (IX) in Gothenburg serving south-west Sweden. Stokab, owned by the City of Stockholm, has the world's largest fibre network, with a length totalling 1.8 million fibre kilometres

Sweden is regularly ranked as one of the top-three economies for network readiness by the World Economic Forum. Latest figures show that around 81% of Sweden has access to full fibre connectivity (in comparison to the UK with 24%). This means data centre deployments outside of Stockholm also tend to be well-connected.

The Swedish government has ambitious targets to further improve connectivity across the country. By 2025 'A completely connected Sweden' should have been fulfilled with 100% of the country having access to fibre connectivity. 5G will also play an important role where the country has committed to be at the forefront of the technology's rollout. In 2018, the Nordic government signed a declaration to be the first and foremost integrated region in the world. This has also been outlined in the Nordic Council of Ministers for Digitalisation.

The Swedish telecom market used to be dominated by the state monopoly Televerket. The market has been deregulated and three main companies became the main players alongside a number of smaller operators. These three companies are Telia Company, Telenord and Tele 2. The Swedish Post and Telecom Authority (PTS) is the regulatory agency that monitors the electronic communications and postal sectors in Sweden.

The Telia Carrier fibre backbone accounts for nearly 65% of all internet routes globally (shown in the adjacent figure) with over 70,000km of optical fibre connecting more than 300 PoPs in 35 countries. It operates across Sweden with PoPs in Falun, Stockholm and Gothenburg. The backbone caters for connections to neighbouring countries in the Nordics as well as countries globally. The cable is owned and operated by Telia Carrier.

## THE TRIANGELBOLAGET DARK FIBRE NETWORK Source: Triangelbolaget



# CONNECTIVITY

## A SUBSEA GATEWAY TO EUROPE AND THE EAST

Sweden is often viewed as a gateway market to other international destinations across the Nordics, Baltics and into western Europe and Russia. The country offers multiple landing points for subsea cables crossing the Baltic sea to Poland, Lithuania, Estonia and Finland and across to Germany and Russia. An additional cross traversing the Gulf of Bothnia connects into western Finland and connections across Kattegat connect into Denmark. Cables that currently land in Sweden include:

**BALTIC SEA SUBMARINE CABLE:** TALLINN ESTONIA, HELSINKI FINLAND, STOCKHOLM SWEDEN.

**BALTICA:** GEDSER DENMARK, PEDERSKER DENMARK, KOLOBRZEG POLAND, YSTAD SWEDEN.

**BCS EAST-WEST INTERLINK:** SVENTOJI LITHUANIA, KATTHAMMARSVIK SWEDEN.

**BCS NORTH – PHASE 1:** HANKO FINLAND, HARADSHOLM FINLAND, HELSINKI FINLAND, MARIEHAMN FINLAND, STAVSNÄS SWEDEN.

**BOTNIA:** VAASA FINLAND, UMEÅ SWEDEN.

**DANICA NORTH:** TUBORG DENMARK, BARSEBÄCK SWEDEN.

**DENMARK - SWEDEN 15:** HELSINGOR DENMARK, HELSINGBORG SWEDEN.

**DENMARK – SWEDEN 16:** MOSEDE DENMARK, VELLING SWEDEN.

**DENMARK – SWEDEN 17:** ALSGARDE DENMARK, KRISTINELUND, SWEDEN

**DENMARK – SWEDEN 18:** HELSINGOR DENMARK, HELSINGBORG SWEDEN.

**EASTERN LIGHT:** HANKO FINLAND, HELSINKI FINLAND, KOTKA FINLAND, STOCKHOLM SWEDEN.

**ENERGINET LAESO-VARBERG:** LAESO DENMARK, VARBERG SWEDEN.

**GLOBALCONNECT 2 (GC2):** SAEBY DENMARK, KUNGSBACKA SWEDEN.

**IP-ONLY DENMARK – SWEDEN:** BRONDBY DENMARK, KLAGSHAMN SWEDEN.

**KATTEGAT 2:** LYNGSA DENMARK, OSTERBY DENMARK, VESTERO DENMARK, SKALVIK SWEDEN.

**LATVIA – SWEDEN 1 (LV-SE 1):** VENTSPILS LATVIA, NYNÄSHAMN SWEDEN.

**NORDBALT:** KLAIPEDA LITHUANIA, NYBRO SWEDEN.

**SCANDINAVIAN RING NORTH:** HELSINGOR DENMARK, HELSINGBORG SWEDEN.

**SCANDINAVIAN RING SOUTH:** DRAGOR DENMARK, BUNKEFLOSTAND SWEDEN.

**SWEDEN – ESTONIA (EE-S 1):** KARDLA ESTONIA, TALLINN ESTONIA, STAVSNÄS SWEDEN.

**SWEDEN – FINLAND 4 (SFS-4):** TURKU FINLAND, NORRTALGE SWEDEN.

**SWEDEN – FINLAND LINK (SFL):** MARIEHAMN FINLAND, VÄDDÖ SWEDEN.

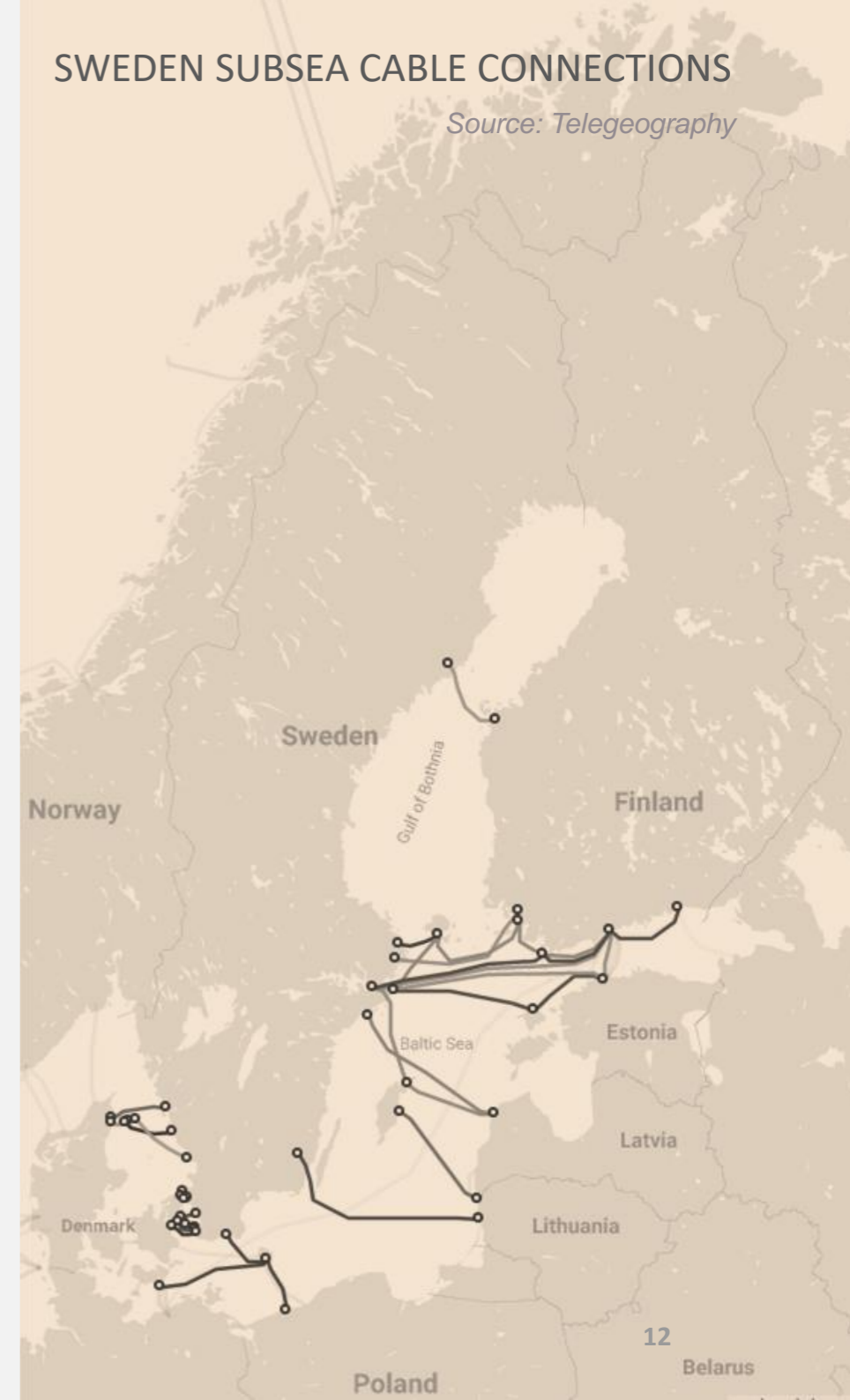
**SWEDEN – LATVIA:** VENTSPILS LATVIA, FÅRÖSUND SWEDEN, STOCKHOLM SWEDEN.

Short-path milliseconds, round trip delay from Gothenburg and Stockholm to global destinations Q3, 2021

	Amsterdam	Copenhagen	Dublin	Frankfurt	London	Moscow	New York	Paris
Stockholm	16.5ms	7.5ms	30ms	17ms	22ms	17ms	88ms	23.5ms
Gothenburg /Malmö	10ms	0.5ms	23ms	10ms	15ms	24ms	81ms	17ms

## SWEDEN SUBSEA CABLE CONNECTIONS

Source: Telegeography



# DATA CENTRE LOCATIONS

## STOCKHOLM

Sweden's capital Stockholm is the country's main connectivity and data centre hub. It includes up to Upplands Väsby in the North and out to Eskilstuna in the west and down to Sodertalje in the South. This region covers providers serving wider Stockholm requirements.



## NORTH

The North is Sweden's hydropower capital – all energy comes from here and is distributed down south. As a result, northern locations such as Luleå and even down as far as Falun and Gävle are gaining attention for their ability to meet high density, large-scale, data centre needs.



## SOUTH

The South refers to the markets around Gothenburg and Malmö. Traditionally these markets have served mostly local requirements with providers often offering hosting, network and other services as well as colocation. Increasingly, locations such as Malmö are being viewed as lower-cost alternatives to nearby Copenhagen.



# STOCKHOLM



- City driven by early investments in Internet connectivity. (Stockholm is the most fibre connected city in the Nordics.)
- Home to largest number of Global 2000 companies in the region.
- Gateway to Russia, the Baltics and Asia.
- Nordic hub for financial services and start-ups.
- Green focus: Consumer, political and business commitment to green energy is high!
- Promotes digital economy: Government encourages infrastructure growth from fibre to data centre operations and supports foreign investment.
- Around a quarter of Stockholm's 100,000 companies are in the Telecommunications, IT, Media and Entertainment sectors. The Stockholm-Uppsala region is also a centre for industrial healthcare.



## STOCKHOLM DATA CENTRE HUBS

### Kista/Sollentuna

Kista is one of Sweden's main data centre hubs, situated midway between Stockholm Central and Arlanda international airport. It is an important European IT cluster (home to some of Sweden's most innovative companies). Stockholm Data Parks promotes land for data centre development and has created one of the country's largest data centre clusters offering access to 100% renewable power and heat re-use options.

**Home to: Interxion (carrier hotel), Bahnhof, Conapto, OBE Hosting, Stockholm Dedicated, Verizon, Interxion and soon Global Connect.**

### Central Stockholm (Östermalm/Södermalm)

Traditional hub with highly connected, smaller sites, many operated by telcos and hosting providers.

**Home to: Bahnhof, GTT, Teliasonera, Stockholm Colocation, Global Connect**

### Solna

North of Stockholm City, Solna is a highly connected location. It is a residential area that has attracted universities and businesses and is home to the Karolinska Institute and European Centre for Disease Prevention and Control.

**Home to: Equinix SK1 (carrier hotel),**

### Server Centralien, Teliasonera and Bahnhof.

### Spånga

Neighbours Stockholm to the north west, used largely for redundant sites due to distance from main markets.

**Home to: Equinix, Verizon (Previously Nasdaq Nordic's main trading site)**

### Upplands Väsby

20 miles north of Stockholm Central nearby to Kista offers good connectivity and large-scale sites.

**Home to: Digiplex (NASDAQ OMX's primary Nordic site)**

## STOCKHOLM DATA CENTRE MARKET

### LEASED DATA CENTRES

**27 DCs 78MW (163MW in 2024)**

### HYPERSCALE DATA CENTRES

**3 - 180MW (300MW in 2024)**

- Leased DCs refers only to carrier-neutral retail and wholesale operators
- Hyperscale DCs refers to hyperscale self-built facilities

# STOCKHOLM

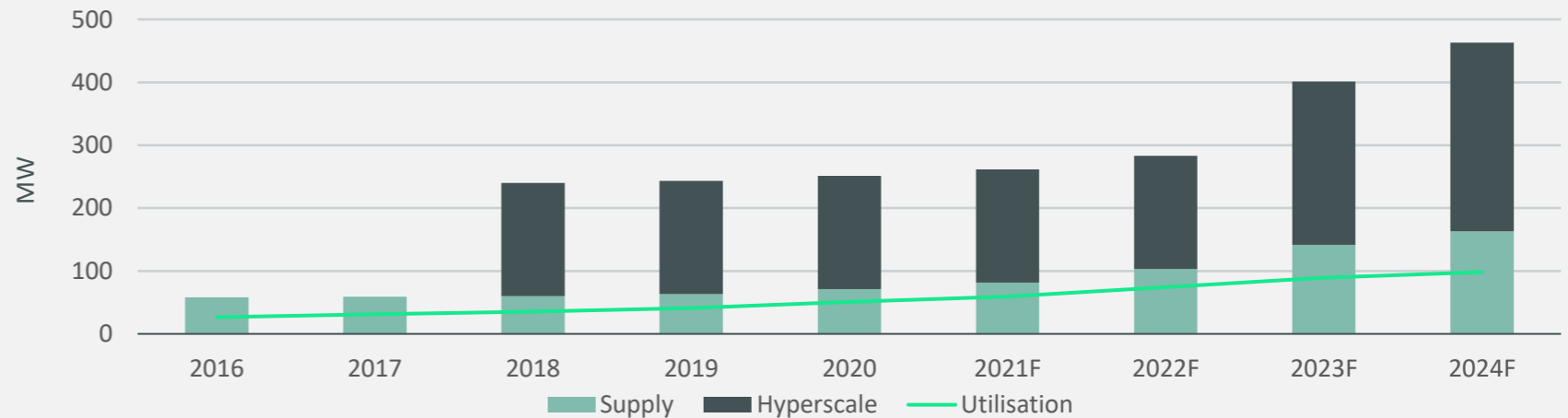
## MARKET SUPPLY DYNAMICS

- Stockholm currently offers 78MW of data centre supply
- 16MW of this is for wholesale colocation, the remainder is for 13 retail providers. Many of those also offer hosting and other services
- Most data centre providers already connect in to heat recovery systems/district heating networks.
- The market is predicted to grow to 163MW by 2024

## MARKET DEMAND DYNAMICS

- Stockholm is the most connected market in the Nordics. Most major Swedish and international network providers have a presence in the city.
- Cloud has helped drive demand since the first cloud nodes were deployed around 2016. Enterprises are increasingly using colocation to gain access to cloud on-ramps as do managed service providers.
- Enterprises use colocation as they move out of existing self-run data centres.
- Government is moving ahead with next-gen services and smart city initiatives.
- International and multi-national organisations also have a strong data centre presence in Stockholm serving the Nordics as well as wider European needs. Global data centre providers regularly onboard customers from other global markets.
- Stockholm is also home to many financial services and content ecosystems as well as gaming providers, digital media (serving the Nordics and Russia) and start-ups.

Stockholm leased data centre and hyperscale supply (MW) as of Q3, 2021



Source: CBRE Research, Q3 2021

### HYPERSCALE PRESENCE

#### AWS

AWS has three sites to the west of Stockholm that are used for delivering cloud services for Swedish and Nordic customers. They are in Eskilstuna, Katrineholm and Västerås.

The hyperscaler chose the location for its low energy costs and access to renewables. It uses a Swedish wind farm the Bäckhammar project in Western Sweden for 91MW of energy and has invested in the Västernorrland wind project for a further 122MW of supply in 2022.

AWS is also working with water supply company Sormland Vallen to upgrade local stormwater infrastructure.

### DEVELOPMENT OPPORTUNITIES

#### Stockholm Data Parks

Stockholm Data Parks was started by the City of Stockholm and is made up of the City, Invest Stockholm, Stockholm Exergi, Ellevio and Stokab. It was launched to help the city become fossil free by 2040 by promoting large-scale, easily accessed data centre sites offering heat recovery with the objective that in future 10% of the city's residential heating demand will be met through recovered excess heat from data centres.

Stockholm Data Parks has a well tenanted site in Kista and a new site in Brista, close to Arlanda Airport offering up to 400,000 sqm for development. A site in Skarpnack, south Stockholm, also offers 20,000 sq m.

# STOCKHOLM


## MARKET GROWTH DRIVERS

- Mature data centre market with well-established international and local brands offering wholesale and retail colocation.
- Advanced dark fibre network. Dense connectivity for the Nordics and access to the European, Russian and global markets.
- Growing amount of cloud access is driving local interconnections, especially with service providers seeking access to leading cloud providers.
- Increasing local digitisation efforts and start-ups including fintech companies with a cloud-first mentality.
- Access to skills and increasing business interest in the Stockholm market (for Swedish and international companies). Continued focus on sustainability and access to renewable energy and low energy costs attracts global companies keen on reducing environmental impact.
- Access to all relevant construction and supply-chain providers.
- Presence of all major hyperscale providers.

## MARKET CHALLENGES

- Access to power but investment in new substations and grid infrastructure is taking place and more power is scheduled to come online 2027-2030.
- Laying fibre can take 6-month or more depending on icy conditions.
- Stockholm has a healthy pool of talent but with more data centre providers entering the market, competition can be fierce.

## STOCKHOLM CARRIER-NEUTRAL COLOCATION PROVIDERS

Provider	Facilities	Details
 EQUINIX	SK1(Carrier hotel) SKII, SKIII	Equinix operates one of the city's main carrier hotels. It provides services to a growing number of international organisations needing a retail colocation presence in Stockholm.
 interxion A DIGITAL REALTY COMPANY	STO1, STO2, STO3, STO3, STO4, STO5, STO6 (Planned)	Retail colocation operator with some of the city's main carrier hotels in large campus in Kista and a growing campus next door. Sees increasing business with Swedish companies needing global reach.
 DigiPlex	STOCKHOLM UPPLANDS Väsby	Wholesale facility offered by Nordic provider recently acquired by IPI with Nasdaq OMX as main customer.
 CONAPTO COLOCATION MADE IN SWEDEN	Stockholm South/ Stockholm North	Provides disaster recovery as well as colocation, was a former Sungard subsidiary. Has been expanding with renewed funding and focussing more on colocation.
 GleSYS AB	Stockholm Zone 1/Stockholm Zone 2	IT service provider that merged with Portlane offers data centres in north and south in city.
 GlobalConnect	Hammarby, Järfälla, Satra	Connectivity provider that merged with IP-Only. Offers hosting/network service as well as colocation is expanding in Kista with a new data centre.
 atnorth	SWE 01:Sif DC	atNorth (previously Advania) is an Icelandic provider that is building a high-density data centre in Kista.
 EcoDataCenter	City1 Atlas/ City 2 Tellus	Two smaller facilities acquired through acquisition providing access into the connectivity-rich Stockholm market.

### Other (non carrier or service-neutral) colocation providers





# NORTH



- Sweden's north is a large region that includes Dalarna as well as the Arctic Circle, where are a number of notable companies with sustainable goals have invested. Offers access to hydropower and cold climate ideal for free cooling with an average temperature of 3.3°C.
- Region has large amount of energy intensive industries and R&D facilities focussing on telecommunications, minerals and metals, space (aerospace) among other areas. This has driven engineering and technology skills.
- Attracted Sweden's first hyperscale build – Facebook in Luleå, which brought attention for further developments to the region.
- The area of Falun and Gävle to the south is becoming its own data centre hub due to its proximity to Stockholm, interest from hyperscale providers and ability to access power in an energy region with surplus power.



## NORTHERN SWEDEN HUBS

### Gävle/Sandviken

Gävle is a small city in central Sweden with more than 100,000 inhabitants. It is part of the Stockholm-Mälardalen region which includes Sandviken. It offers proximity to Stockholm without the same land and power challenges. Microsoft is building dual data centres in Sandviken and Gävle which will come online in 2021.

**Home to: Microsoft**

### Dalarna – Falun/Avesta/Horndal

Growing region for data centre activity with EcoDataCentre continuing to build out a facility there and Google holding sites for data centre builds.

The local governments in Dalarna are actively promoting data centre builds with a strong focus on sustainability. The region offers easy access to Stockholm and Arlanda airport.

**Home to: EcoDataCenter, Google (sites only)**

### The Arctic Circle/North Pole

The very north of the northern region, the Arctic circle has smaller towns but a high amount of heavy and technical industry. The area is recognised as a centre of expertise for engineering, construction, logistics and installation, other industries. Facebook built its first

data centre here, to leverage free-air-cooling and hydropower, and the area also sees high interest from HPC operators and bitcoin miners keen to exploit low power and operational costs. Norbotten, which includes Boden, Luleå and Piteå, has the largest collection of data centres in this area. As a result, it has a strong ecosystem of data centre vendors and supportive government. Skellefteå in Västerbotten is also promoting itself as a data centre destination.

**Home to: Hydro66, Nordlo, ATEA, A3, Hi5**

## NORTH SWEDEN DATA CENTRE MARKET

LEASED DATA CENTRES	HYPERSCALE DATA CENTRES
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5 – 34MW (87MW by 2024)	2 – 80MW (240MW by 2024)
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- Leased DCs refers only to carrier-neutral retail and wholesale operators
- Hyperscale DCs refers to hyperscale self-built facilities

# NORTH

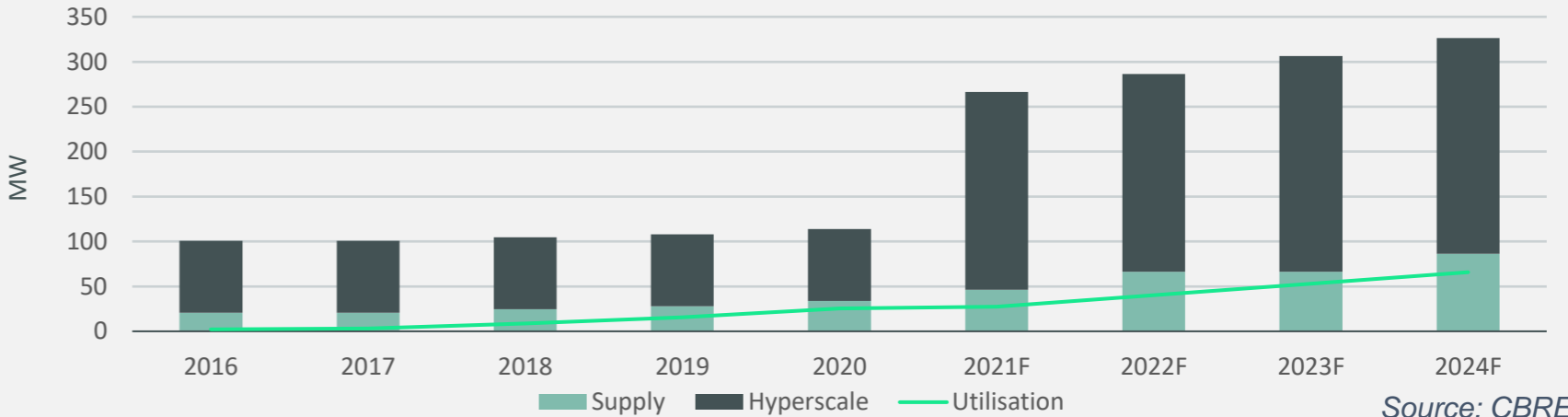
## MARKET SUPPLY DYNAMICS

- There is currently just under 34MW of leased data centre supply in Sweden's north and 80MW of hyperscale supply.
- We expect the amount of leased data centre capacity to grow by around 20MW in the coming two years and it could grow a further 20MW by the end of 2024.
- Hyperscale supply is likely to grow to 220MW by the end of 2021.
- Most data centres built north of Stockholm focus on sustainability offering access to renewable power and designed to use free-air cooling and other efficient technologies.
- Government support for the data centre industry has been strong across the north, with councils helping ensure pre-planning and fast time to market.

## MARKET DEMAND DYNAMICS

- Hyperscalers self build in the north and while few leverage colocation. Their presence has fostered interest in the region and driven demand.
- Automotive industry, in particular German firms seeking lower-cost locations for test and development that do winter testing in the region, and DevOps and HPC activities are some of the region's main customer use cases for leased supply along with other HPC users.
- Bitcoin miners/blockchain companies that require high density, lower power costs.
- Web hosting companies, enterprises, cloud and systems integrators that can benefit from more flexible contracts and lower-cost supply/operational costs or those marketing sustainable credentials.

Sweden north leased data centre and hyperscale supply (MW) as of Q3, 2021



## HYPERSCALE PRESENCE

### GOOGLE

Google has a site that has planning for a data centre build in Horndal, Dalarna, and another site nearby in Avesta. In Horndal, the local government has stipulated that any build will re-use waste heat.

### MICROSOFT

Microsoft is opening a data centre in Gävle and in Sandviken in 2021. Both will use renewable energy supplied by Vattenfall. They will serve as a new Sweden North region. Microsoft chose the locations because of their focus on sustainability and 100% access to renewable energy and plans to build with a focus on 'zero waste'.

### FACEBOOK

Facebook has a growing campus in Luleå where it has two live data centres and one under construction. Once complete, Luleå will be one of the largest data centre

campuses in Europe. Facebook chose Sweden for its political stability, sustainable focus and low seismic activity. Luleå offers a cold climate which allows Facebook to use free-air cooling most of the year and access to hydropower. Facebook also received support for its development, supply chain and skilling from local authorities and business groups. It has since invested heavily in the region through its Community Actions Grants project and is a contributor to its local technical university. It has invested US\$987 million in its campus in Luleå to date.

## DEVELOPMENT OPPORTUNITIES

The north of Sweden offers abundant land and access to power. The north – in particular the far north – of Sweden also offers multiple development opportunities. One that has recently been marketed is in Jokkmokk, Norrbotten – a location with less than 3,000 inhabitants. The site that's been marketed offers 10 hectares of land for an electricity intensive business with power offered to the site.<sup>18</sup>

# NORTH



## MARKET GROWTH DRIVERS

- Access to 100% renewable energy and large land developments.
- Hyperscaler presence.
- Highly supportive local governments and partnerships with local energy providers.
- Focus for research and development projects covering innovation and development of skills.
- Very low land and power prices.
- Ability to tap directly into hydropower resources.
- The continued move by companies to split workload environments. (The north is ideal for HPC and other high density requirements that may not have critical latency requirements but will benefit from lower operational costs.)
- Skills from traditional industry including telecommunications.
- For the south, proximity to Stockholm and ability to access power.
- Advanced fibre optics across the region.





## MARKET CHALLENGES

- While the region has a large amount of power being produced, providers now find themselves in competition with other heavy industries that are also keen to take advantage of the energy benefits of Sweden's north.
- Bitcoin mining operators also compete for energy.
- Cold climate means construction can only be done at certain times of the year.
- Distance from key connectivity hubs for providers in the north (the south benefits from proximity).

## NORTHERN SWEDEN CARRIER-NEUTRAL COLOCATION PROVIDERS

Provider	Facilities	Details
	Main Site (Falun), Arctic 1/ Arctic 2 (Piteå)	Ecodatacentre is one of Sweden's fastest growing data centre providers offering retail and wholesale options. In the north it operates out of Falun, where it can still serve the Stockholm region, and Piteå, where it has three sites. Arctic 1 was previously a high security cash management facility and Arctic 2 was previously owned by the National Defence Radio Establishment. BMW uses this provider for its HPC requirements.
	H66 Boden	Hydro66 was recently acquired by Northern Data which also uses the business to house HPC-as-a-Service offerings. It was one of the first leased data centre providers in the north, with a large site on a former military base in boden offering access to 250MW of power from a local hydropower plant. IT houses HPC environments, bitcoin operations, internet and hosting service providers serving the European market among others.

## NORTHERN SWEDEN OTHER PROSPECTIVE COLOCATION PROVIDERS

 <p>Nordlo is an infrastructure and cloud services provider. They offer a suite of services and take responsibility for the servers, databases and applications.</p>	 <p>Atea provides hardware and software solutions to their clients and caters for 100% or partial outsourcing of a customers data centre operations through cloud services or third parties.</p>	 <p>Acon, recently has re-branded as Nordlo offering IT operations solutions. Tailormade solutions, cloud services and project management are a selection of products offered.</p>	 <p>Hi5 data centre is now part of Advania through the acquisition in February 2021. Hi5 offers a range of services including hosting, operations and system development.</p>
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# SOUTH



## MARKET CHARACTERISTICS

- Region includes industrial cities Malmö and Gothenburg, which is Sweden’s second largest city. Malmö is 41km from Copenhagen and acts as a sub market of Denmark in terms of connectivity and data centre supply.
- Malmö and Gothenburg have strong and growing tech ecosystems. Both are start-up hubs, but Malmo in particular is attracting digital entrepreneurs focussing on gaming, education, healthcare and environment. Investment in start-ups is currently high with export potential.
- Strong international skills base with a focus on engineering
- Mild climate and a stable power supply tough access to power can be a challenge in some areas across the market.
- Abundance of high-grade fibre connections and high number of ISPs.



Source: CBRE

## SOUTHERN SWEDEN HUBS

### Gothenburg

The second-largest city in Sweden driven by industry transitioning to digital technologies driving a start-up market. One of the Europe’s most sustainable cities. Most data centre operators provide cloud and other services for local companies including automotive and universities requiring HPC. Has a mix of carrier-neutral and non-neutral sites.

**Home to: Gompute, Global Connect (IP-Only), Gothnet**

### Malmö

Forward-thinking port city offering connectivity to Europe. Home to many start-ups and telecommunication data centres. As a result, offers a mix of carrier and non carrier neutral sites

with providers offering a raft of services. Most providers serve local or Stockholm/Copenhagen based requirements. Most also build with sustainability in mind, with many tapping into district heating networks.

**Home to: Global Connect and many non-carrier neutral providers (Bahnhof Global Crossing DC Malmo Scheelegatan, DNA, PTS, City Network, Affarsverket Karlskrona, Redband 2)**

### Staffanstorp

Just outside Malmo, Staffanstorp will be home to Microsoft’s new campus. They city has been looking to diversify its business with modern technologies and Microsoft will be the municipality’s largest investment yet.

**Home to: Microsoft**

### Trollhättan

SAP has chosen Trollhättan for a possible new data centre. It is an hour from Gothenburg on the west coast and offers access to a number of education facilities and fibre proximity to Oslo.

**Home to: SAP**

### Falkenberg

Town where Swedish fibre provider Portlane/Glesys operates two data centres that serve as redundant offerings to Stockholm. Offers access to land and 100% renewable energy.

**Home to: Portlane/Glesys**

### Borås

Home to data centres by local fibre provider Borås Elnet owned by the local municipality.

**Home to: Borås Elnet**

SOUTH SWEDEN DATA CENTRE MARKET	
LEASED DATA CENTRES	HYPERSCALE DATA CENTRES
11 – 6MW (7MW by 2024)	0 – (60MW by 2024)
<ul style="list-style-type: none"> <li>• Leased DCs refers only to carrier-neutral retail and wholesale operators</li> <li>• Hyperscale DCs refers to hyperscale self-built facilities</li> </ul>	

# SOUTH

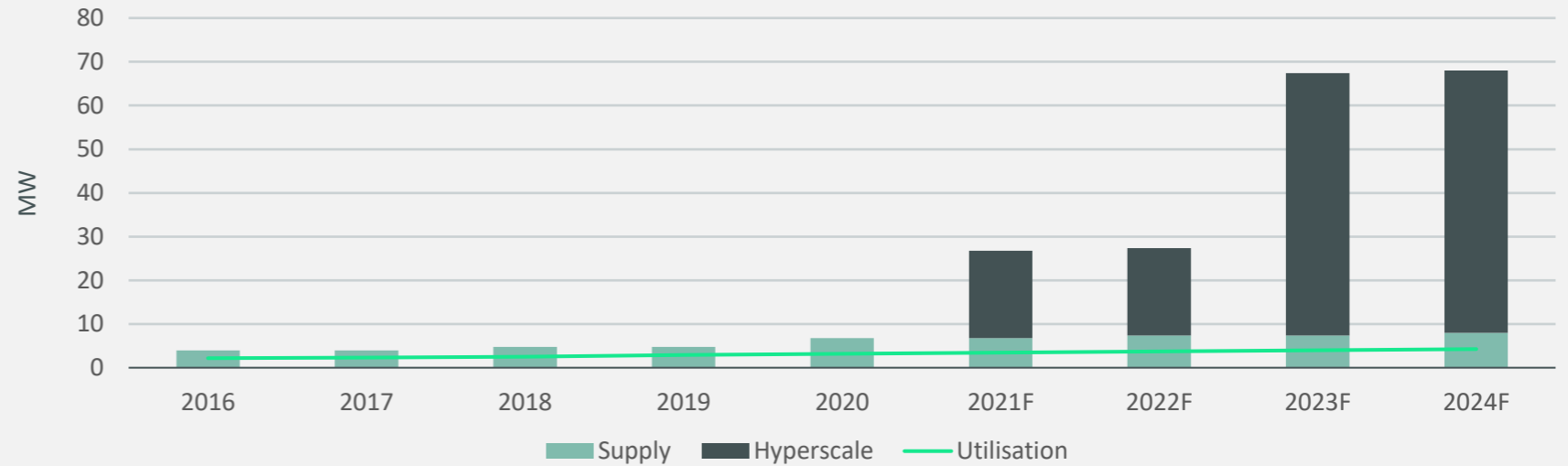
## MARKET SUPPLY DYNAMICS

- The south is a small Swedish data centre market in terms of the MW of supply offered, with just 6MW, but it has a large number of providers offering smaller facilities (11 providers with carrier-neutral sites). Many of these providers offer hosting, telecommunications and other services as well as colocation.
- There are no wholesale providers in the market to date.
- There are currently no hyperscale operators in the area though a number have acquired sites and are building out and by 2024 we expect there will be around 60MW of hyperscale supply in the market.
- Local constituencies have been supportive of data centre market growth, in some cases establishing their own fibre networks and/or data centres to promote digitisation of local industry.

## MARKET DEMAND DYNAMICS

- Hosting companies and others serving regional requirements and local start-up and industry needs.
- Start-ups seeking access to cloud and colocation supply.
- Local industry including logistics, automotive, life sciences, education, life sciences, construction.
- Companies seeking alternatives to the more expensive Copenhagen market
- Customers seeking redundancy from deployments in Stockholm or lower-cost supply options.
- Local governments for internal use and regional service offerings

Sweden south leased data centre and hyperscale supply (MW) as of Q3, 2021



Source: CBRE Research, Q3 2021

## HYPERSCALE PRESENCE

### MICROSOFT

Microsoft commenced construction on a data centre in Staffanstorp in 2019 with the intention of opening a new region in 2021. The hyperscaler has 12 hectares of land at the site, chosen for its proximity to Malmö and Lundh.

The data centre site will be used for redundancy to Microsoft's northern data centre cluster in Gavle and will eventually offer Office 365 and Microsoft Dynamics 365 services as well as Azure.

Once the project is finished, Microsoft will be one of Staffanstorp's largest employers.

### SAP

German software-as-a-service, customer relationship management (CRM) provider SAP is a growing second-tier cloud operator. It has expanded its presence across Europe targeting locations where its customer base is growing.

To that end, SAP agreed to purchase 60,000 sq m of land in Trollhättan, western Sweden. While it has not yet committed to building a data centre here, it can build a fossil-free data centre facility for delivery of its services across the region.

# SOUTH









## MARKET GROWTH DRIVERS

- Increasing hyperscale interest with Microsoft leveraging the market for reach into Denmark and across Sweden and SAP choosing the region to provide regional services.
- The region is often used as an export industry for technology offering connectivity into other markets such as Stockholm and Copenhagen and then on to other global markets from these connectivity hubs yet with lower-cost to operate.
- The region is gaining attention due to its highly sustainable cities. Gothenburg is classed as one of the most sustainable cities in the world and sustainability is becoming more important for many corporate customers and data centre operators.
- Research and development – there is a growing need for R&D infrastructure for the public and private sector.
- Increasing digitisation of local industry.

## MARKET CHALLENGES

- Some cities in the south can face similar challenges in terms of access to power for energy intensive industry to Stockholm, but local grid investments will look to overcome these challenges in years ahead making the region a good option for future development.
- Competition with the well connected and busier Stockholm and Copenhagen hubs, though this region does have a role to play in providing access to these locations.
- A lack of wholesale supply means only smaller requirements can be met in terms of leased supply.

## SOUTHERN SWEDEN CARRIER-NEUTRAL COLOCATION PROVIDERS

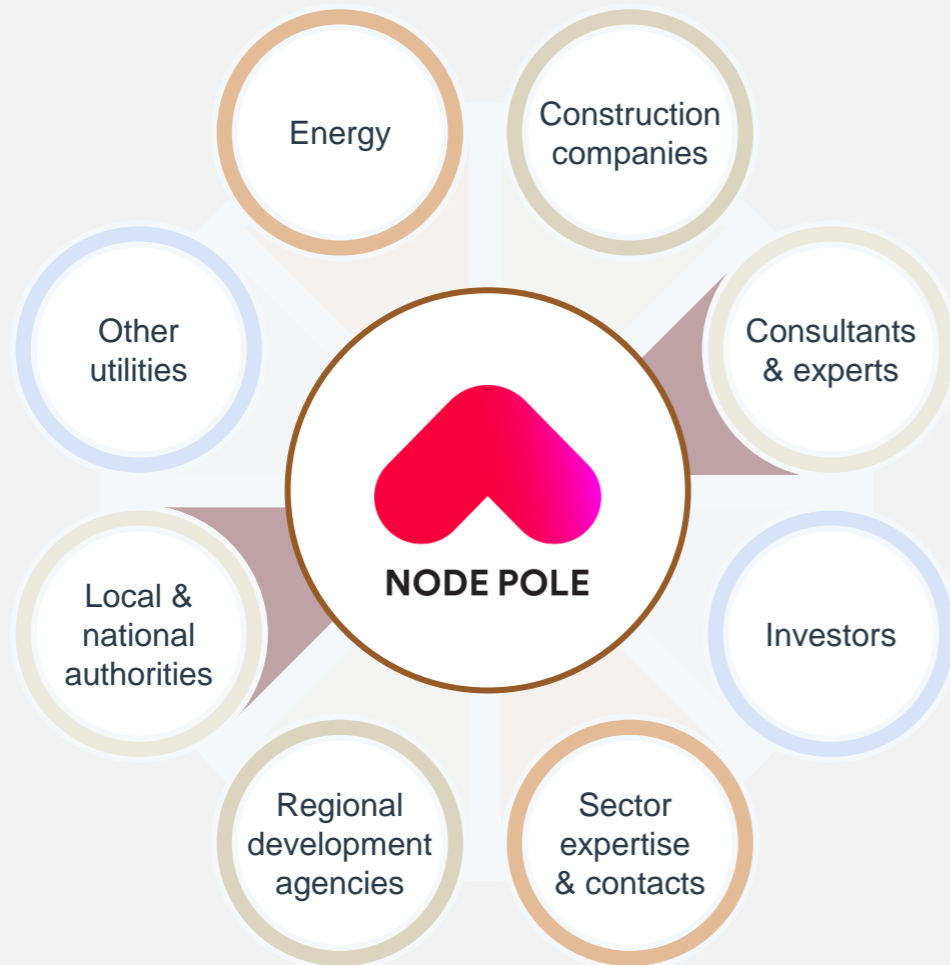
Provider	Facilities	Details
	Boras Elnat DC	Owned by municipality-owned fibre provider Boras Energy/Splitvision. Connects to municipality-owned fibre network and provides retail colocation
	DC01-ESL-SE-CYGRIDS	Small facility by provider serving IT service, colocation and cryptocurrency needs in Eslov.
	Falkenberg DC-2020/ Falkenberg FBGDC-C	Two data centres – the newer facility (2020) is one of the largest in the region offering 2MW of supply. Also has data centres in Stockholm. Taps into district heating and offers access to renewable energy and provides dedicated services on top of colocation.
	DC Gothenburg Tagene, DC Malmö Limhamn	Danish carrier with a strong presence in Sweden and Germany. Took on sites through acquisition of IP-Only, provides dedicated services as well as colocation.
	Gompute DC	Gothenburg-based provider that targets HPC service users with high-density loads. Offers colocation as well as cloud as a service
	DC Hisingen, SHG5	Part of Swedish utility Goteborg Energi, operates two sites used for geo redundancy. Newest site is in Halmstad, Hisingen Island in Gothenburg. It uses green energy and tap into district heating.
	Junet DC	Small data centre by an internet service provider offering colocation outside Linköping
	Malmö/B	Data centre in Malmö operated by the National Post and Telecom Agency

### Other (non carrier or service-neutral) colocation providers



# NODE POLE BORN OUT OF CRITICAL INFRASTRUCTURE, NODE POLE IS A CATALYST OF INDUSTRIAL DEVELOPMENT IN SWEDEN

## The Node Pole ecosystem



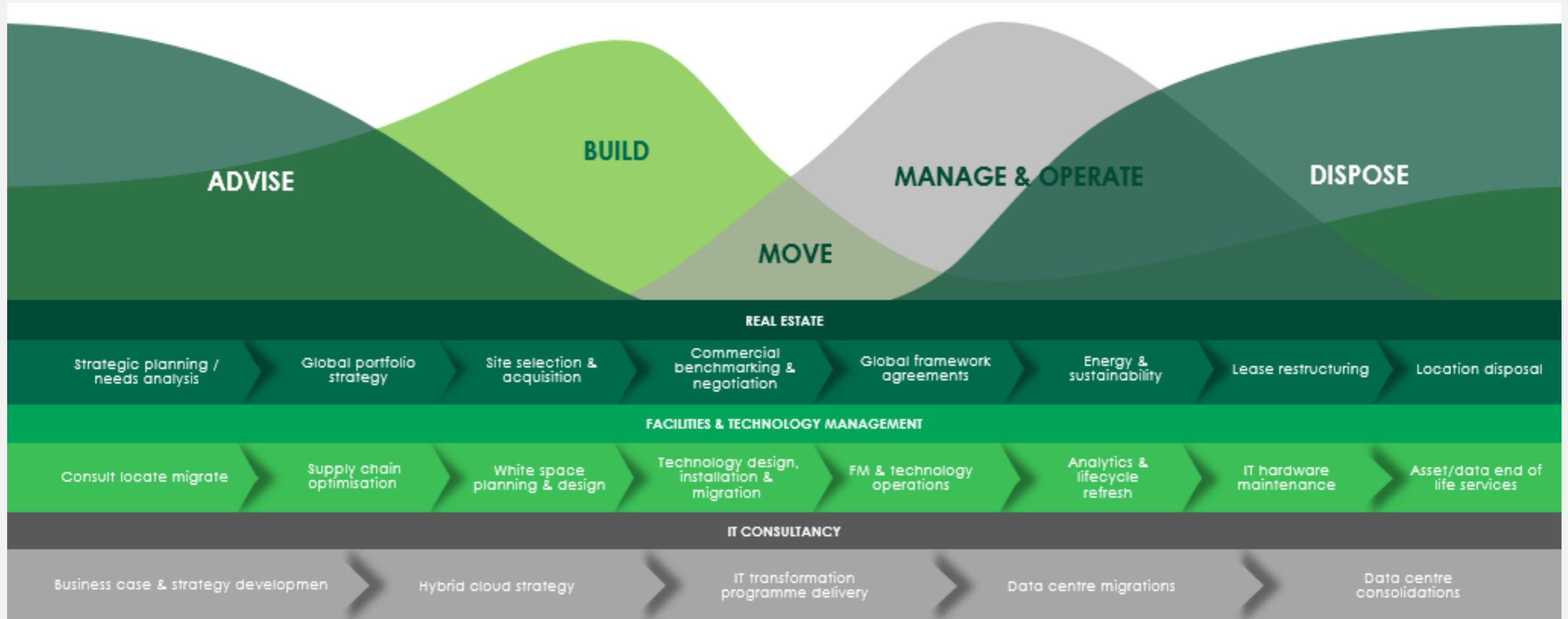
## Our strengths

- Rooted in the energy industry Node Pole has excellent knowledge of all matters regarding energy as well as site, permit and land issues
- With experience and expertise from various industries and large development projects, Node Pole is a world leading development partner who knows what is needed for efficient development projects tailored to your needs
- Node Pole will help you reduce risk, and save time and money, enabling a successful investment

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# THE NODE POLE

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