

The Nordics: The secret to future-proofing the data center



Introduction

Data center operators continue to face several challenges as they look to future proof their data center operations, while business reliance on digital services, remote working, and heavy workloads such as HPC, AI, analytics and machine learning grows¹. To put the potential impact of digitalization into perspective, roughly 90% of businesses are involved in or have undertaken digital transformation projects, while 87% of senior business leaders say that digitalization is a priority. The success of today's data center projects is more precarious than ever before, with cost efficiencies, sustainability and performance all playing a key role.

Sustainability is also a growing concern, with many organizations today recognizing the urgent need to ensure their business processes, systems, and operations all maintain focus on the surrounding environment and global climate. In looking into the top trends for this year, Gartner² identified environmental and social sustainability as a top three priority for investors alongside profit and revenue.

Equally integral to the future of business and tech innovation is performance. Businesses are undertaking massive digital transformation projects that rely on a solid and strong IT infrastructure to support their growing workloads – from artificial intelligence (AI) to high performance computing (HPC), with the required performance, connectivity, and scalability. The right data center in the right location can hold the key to solving these challenges.

Organizations have more choice than ever before on where to invest, but with the Nordic region's ability to underpin and support these key factors, it is fast becoming the preferred safe haven for data center operations and colocation. In this paper, we look at three of the most important drivers for protecting and safeguarding your data with Nordic investment: cost, sustainability, location and performance.



1. Digitalisation Strategy for Business Transformation; Gartner
2. Gartner Identifies Top 10 Strategic Technology Trends for 2023; Gartner

Cost efficiencies

Alongside an industry-wide growing concern for sustainable IT and its role in contributing to the healthy future of our planet, cost remains a key consideration for businesses and organizations today. The economic outlook for Europe³ is turbulent driving a cost-of-living crisis across key markets. The region has hit a 25-year high in inflation this year as weak growth and interest rates continue to soar⁴, which many organizations are now starting to feel the weight that these increases can cause.

This economic uncertainty continues to impact IT decisions worldwide, as organizations assess their IT strategy and the best underlying infrastructure to support ongoing digital transformation initiatives – all with a keen eye on the bottom line. It has been estimated that the overall cost of running a data center can range between \$10 and \$25 million a year, which can offer considerable savings if energy usage, server and rack space are optimized.

Location, location, location

The Nordic region has developed into a European hub for the data center industry⁵ with key factors for site selection and investment including reliable and abundant power supply, international connectivity, low energy prices, political stability, a skilled workforce and low natural disaster-free environment.

As a result, the region boasts tremendous cost savings opportunities with its colder climate that offers significant advantages for data centers to operate cost effectively. With its abundant natural resources, government incentives towards sustainability, low carbon power, cost effective land and naturally cooler climate, the Nordic region continues to prove itself as the leading location to power data centers through the current global energy transition.

Europe's lowest energy prices

The Nordics offer consistently low energy prices thanks in part to the surplus of renewable power generated in the region. In Iceland, cost savings have been staggering⁶, with some estimates placing power for data centers in Iceland at 20% of the cost for equivalent facilities in London.

The Nordic region has been at the forefront of renewable energy for decades where clean

energy is estimated to account for two-thirds of its overall production. The range of renewable energy produced across Norway, Sweden, Finland, Denmark and Iceland is vast – from hydro and solar to geothermal and wind – and it is this diversification that is equally key to the success of managing high-density workloads with cost, performance, and the environment to mind⁷.

Competitive energy prices and additional profit by selling the excess heat to reuse

30% About 1/3 of the OPEX costs of the data center come from the price of electricity

Cold climate lowers server cooling costs: the northern location is an advantage for both the center and the climate.

Finland also has good access to electricity from renewable energy sources.

The electricity tax for data centers operating with a capacity of less than 5 MW is 2.253 cents / kWh in Finland

Based on prices from Nord Pool, a pan-European power exchange, Nordic energy has been the lowest priced in Europe during the last decade.

3. <https://www.worldbank.org/en/news/feature/2023/04/06/weak-growth-and-a-cost-of-living-crisis-in-emerging-europe-and-central-asia-region>

4. Weak Growth and Cost of Living Crisis Emerge in Europe; The World Bank

5. The Nordic Societies and the Development of the Data Center Industry; Science Direct

6. <https://www.infrastructureinvestor.com/the-rise-and-rise-of-the-nordic-data-centre-industry/#>

7. The Nordics: a renewable energy powerhouse: <https://www.downing.co.uk/insights/the-nordics-a-renewable-energy-powerhouse>

Cost-efficient cooling

With power consumption requirements intensifying, it is becoming ever more critical to design and build sustainable data center operations with energy-efficient cooling. As computing becomes more powerful, components within the data centers start to generate more heat, which can lead to decreased performance, sustainability and efficiency challenges.

The region is well positioned, ushering in a new era of innovations that are driving major changes in the data center industry – from renewable energy to liquid cooling. Liquid cooling is one such innovation gaining momentum, as it requires less water than air-cooled systems to keep servers cool because liquid is a more efficient circulator of heat. This combined approach of using DLC and warm water decreases the dependence on fans and expensive air handling systems to cool data center halls, which ultimately results in higher rack density, overall reduced power usage, and significantly advanced performance.

Power-saving heat recovery

Another factor central to supporting power and cooling efficiencies is the deployment of heat recovery. This innovative use of recycling the waste outputs from data center facilities through nearby energy grids can provide heat and hot water for surrounding communities in a way that supports the carbon footprint and bottom line for data centers and organizations alike while also giving back to the community in a sustainable manner.

For example, atNorth's data center campus in Stockholm, Sweden is a first-of-its-kind data center with a primary cooling system designed for heat recovery. In partnership with Stockholm's energy provider, Stockholm Exergi, the SWE01 campus captures the heat outputs generated by the site's data halls, capturing up to 85% of the outputs in some cases. The residual heat is recycled through Stockholm Exergi's district heating plant to provide heat and hot water for residents.

Leading with sustainable IT

While the energy crisis has caused global disruption to industries of all shapes and sizes, this has been a growing challenge for the data center sector for many years. Data centers are massive consumers of energy, and as pressure mounts to adopt a climate-first approach, it will be crucial to support the industry in the development of future facilities that put sustainability at their core. Here, we must prioritize the use of renewable energy, promote alternatives to the fuel economy, and reduce overall greenhouse gas emissions to minimize the impact of digitalization on our planet.

An unfaltering commitment to clean energy

The Nordic region produces a surplus of energy, made available to global data center operators as a green alternative to carbon-producing sources. Its use of renewable energy is embedded in the region's history⁸ where hydro power, wind energy production, and geothermal sources produce renewable energy for these countries.

This commitment and unwavering focus on renewable resources across the Nordics has shown that the region has the right infrastructure in place to continue to drive the clean energy transformation and power the next generation of data centers, helping businesses navigate the global energy transition. It has also meant that the region benefits from improved cost stability compared to countries that traditionally rely on fossil fuels, given the price of renewable energy won't be as affected by economic upheaval, political disruption, or regulatory changes.

⁸The Nordic Societies and the Development of the Data Center Industry; Science Direct



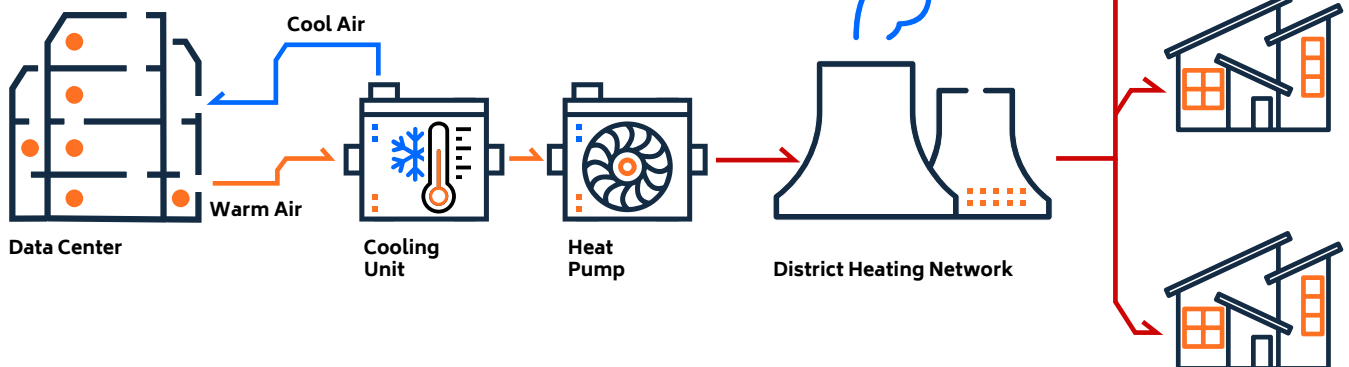
Innovative tech driving a circular economy

In addition, the Nordics not only provide access to abundant renewable energy, but these countries also have the infrastructure in place to enable the circular economy with initiatives such as data center heat recovery. By housing your data in the Nordics, organizations can reduce their overall energy consumption and do so at a lower cost than most other European locations.

Across the Nordic region, wind and solar power production continues to increase rapidly, and the power production surplus in the Nordics remains high with further increases expected in the coming years.

Data center facilities in the region are advancing these goals with "recovered energy" initiatives. The atNorth campus in Stockholm, Sweden is part of the city's Open District Heating program, which channels heat created by data center equipment, as an energy source for heating the homes in the local community. The facility's primary cooling system is designed for heat recovery, allowing the heat outputs generated by the site's data halls to be recycled through Stockholm Exergi's district heating grid. This innovative cooling system relies on direct liquid cooling, which helps increase the efficiency of the heat capture process and can also be customized to fit specific customer installation requirements.

Putting cost and environmental savings at the top of the IT agenda is crucial for any organization that wants to flourish and remain competitive in our fast-paced. As organizations re-examine their IT needs, the question they need to ask is two-fold: does the data center have the best possible infrastructure in the right location to support the organization's road to digitalization, and can it drive increasingly critical sustainability initiatives.



The Nordic Path to Clean Energy:

- 100% renewable in Iceland, 2/3 renewable across the region
- 100% carbon neutral electricity sector by 2050
- 21TWh energy surplus in 2019, growing to 45TWh by 2025
- Finland plans to reach net-zero emissions by 2035
- Iceland plans to reach net-zero emissions by 2040
- Sweden plans to reach net-zero emissions by 2045
- Stockholm, Sweden's capital, aims to become the first city with a positive carbon footprint by 2040
- Norway has set goals to achieve climate neutrality by 2030
- Denmark has plans to achieve climate neutrality by 2050⁹

9. The Nordic countries - a model in the transition to climate neutrality: <https://www.northsweden.eu/english/news/2021/the-nordic-countries-a-model-in-the-transition-to-climate-neutrality-says-the-european-commission/>

Performance

Nordic data centers connect to major European and North American markets via an expanding network of more than 25 high speed, sub-sea fiber optic routes, providing excellent connectivity that makes it possible for organizations in the USA, UK, and mainland Europe to run end-user computing workloads. Latency between Reykjavik and major markets is less than 20 milliseconds (ms).

Round trip latency (ms)

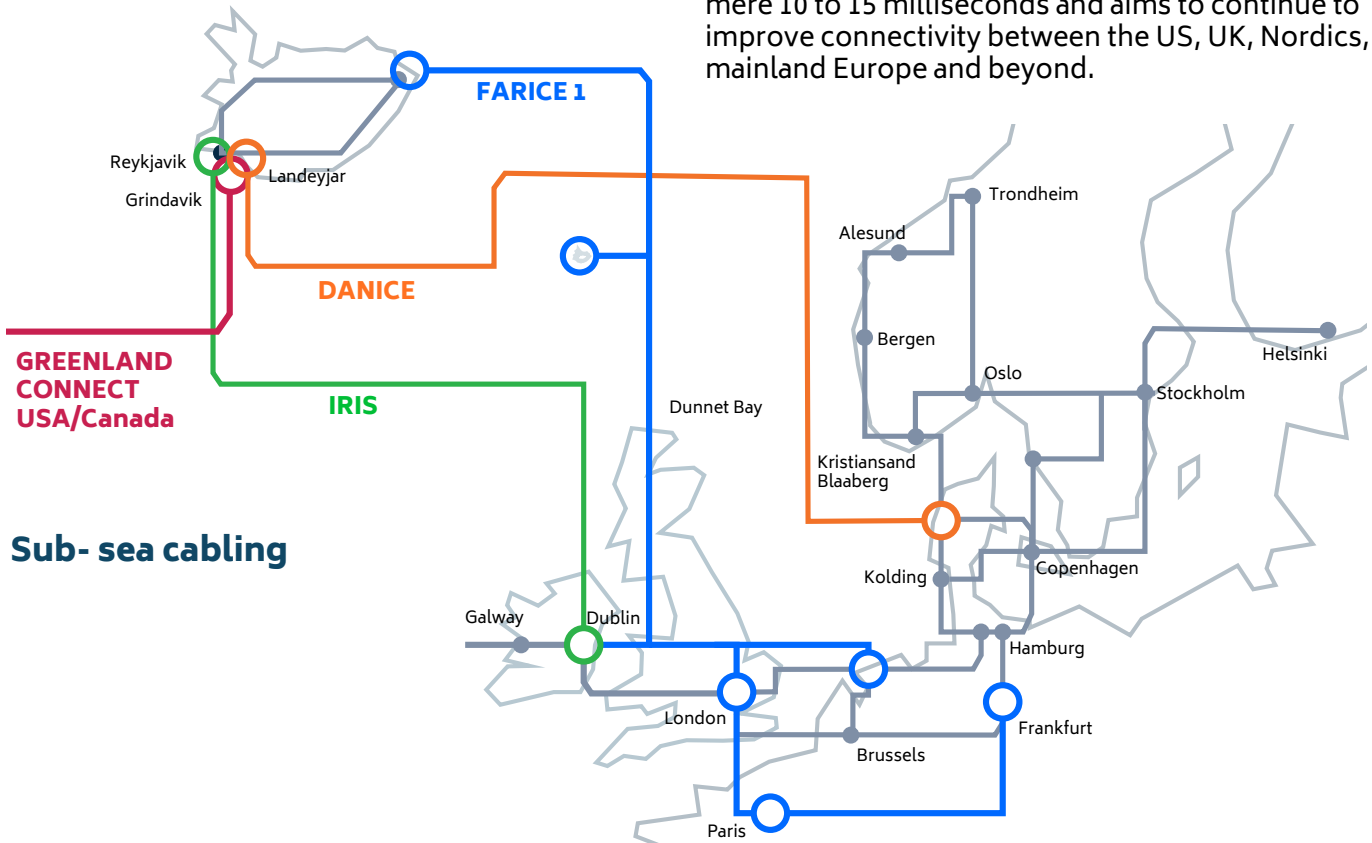
Location	Reykjavik Iceland ⁹	Stockholm Sweden ¹⁰	Helsinki Finland
London, UK	37	25	19.9
Amsterdam, Netherlands	35	19	18.8
Copenhagen, Denmark	29	9	21.5
Frankfurt, Germany	35	20	19.5

The Nordics are well connected to countries around the world; Sweden alone is directly linked to Denmark, Poland, Lithuania, Latvia, Estonia, Finland, Germany and more, while Iceland serves FLAPD markets in under 40 milliseconds, sometimes in as little as 19 milliseconds. Sweden is also ranked number three in the world for internet speeds, boasting an average download speed of 55.18 Mbps.

Sub-sea cabling advancements

In March 2023, a new sub-sea cable installation was completed linking Iceland to the rest of Northern Europe through Ireland. The IRIS cable system is a high-speed cable that spans 1,700 kilometers in length and forms the first direct connection to Ireland from the south coast of Iceland – a location chosen for its close proximity to Reykjavik and the country’s data center industry¹⁰.

The system aims to increase capacity and connectivity across Europe and has been designed with a six-fiber pair trunk for a total system capacity of 132 Tbps, or 22Tbps per fiber pair¹¹. Serving as a perfectly situated hub between the US and Europe, the new IRIS cable will drive down latency to a mere 10 to 15 milliseconds and aims to continue to improve connectivity between the US, UK, Nordics, mainland Europe and beyond.



Sub-sea cabling

10. Landmark subsea cable connecting Ireland and Iceland: <https://www.siliconrepublic.com/comms/iris-subsea-cable-ireland-galway-iceland-farice-northern-europe>

11. IRIS: <https://www.submarinenetworks.com/en/systems/intra-europe/iris#:~:text=IRIS%20is%20a%20new%20high,or%2022Tbps%20per%20fiber%20pair.>

Easy to access

While it may be easy to imagine Nordic data centers located in remote and difficult-to-reach locations, on the contrary, facilities across the Nordics are easily accessible. The location and access to data center facilities is growing in importance, as connectivity and speed are playing a more critical role in driving down latency between locations. The proximity of data centers to city centers and international hubs must be considered when assessing land and property cost implications, rack rates, and travel accessibility for engineer visits.

Many facilities are located on the outskirts of metropolitan areas with international airports nearby. In Sweden, the atNorth campus in Kista, SWE01, is the largest ICT cluster in Europe. It is located just outside the capital of Stockholm and a 20-minute car ride from the Stockholm Arlanda international airport, while our facility in Finland is located in Espoo just 30 minutes from Helsinki Airport. And, the atNorth ICE02: MJOLNIR site near Reykjavik is only a 10-minute drive from Keflavík International Airport, an international hub that managed 4.6 million people¹² through its doors in 2022.

Highly scalable facilities

As digital transformation continues to drive high performance workloads and initiatives across a multitude of industries, the evolution of data capacity, storage and processing is equally changing at breakneck speed. Today's fast-paced enterprises no longer have the luxury of integrating and deploying hardware servers, instead the ability to scale their capacity on an as-needed basis, on-demand basis is becoming critical. The modular design and nature of high-performance computing as a service is optimized to support any workload with increasing or decreasing capacity needs to deliver performance in a highly scalable and instantaneous way.

12. Passengers through Keflavik International Airport: <https://www.statista.com/statistics/716850/number-of-passengers-at-keflavik-airport-in-iceland/>



The Nordic way

Data center operations in the Nordics offer considerable advantages for forward-thinking organizations that want to future-proof their operations and prioritize:

Cost efficiencies and low operating expenses, thanks to a colder climate that lends itself to the data center environment, low energy prices by capitalizing on renewable energy production, and innovative cooling tech that allows data centers to be cooled by air rather than refrigeration.

Sustainable IT, helping to protect the planet for future generations with the region's abundant access to clean energy, renewable-powered data center facilities, innovative technology and environmental programs.

Performance and reliability, due to the region's accessible locations and high-quality facilities, diverse workloads, global connectivity to mainland Europe, and a range of government incentives to drive successful business operations.

Top 10 reasons to choose the Nordics

1. Cost efficiency: a mild climate minimizes the need for refrigeration-based cooling.

2. Low energy prices: offering Europe's lowest energy prices thanks in part to the surplus of renewable power generated throughout the region.

3. Connectivity: an expanding network of more than 25 high speed, sub-sea fiber optic routes connected to major European and North American markets.

4. Sustainable energy: the Nordic region produces a surplus of energy, which is made available to global data center operators as a green alternative to carbon-producing sources.

5. Carbon neutrality focus: two-thirds of electricity produced in the Nordics comes from renewable resources and the region is on track to become fully carbon neutral by 2050.

6. Heat recovery: in Sweden, atNorth has been able to capitalize on the infrastructure in place to support heat recovery – atNorth's Stockholm campus is part of the city's Open District Heating program, which repurposes the heat waste from the data center to provide heating and hot water for local residents.

7. Highly scalable facilities: government support for the Nordic data center industry has led to the creation of large campuses with additional land available for development.

8. Ease of doing business: Nordic governments have put legislation and initiatives in place designed to assist large global organizations.

9. Experienced workforce: the whole of the region provides unmatched access to professional, highly skilled, and trained IT experts.

10. Accessible locations: all atNorth's facilities are located on the outskirts of metropolitan areas across the Nordic region to provide ease of access to city, transportation and network infrastructure.

It is without doubt that existing data centers across the Nordics benefit from a secure supply of green electricity, along with a climate that reduces the need for expensive cooling operations. For these reasons, hyperscale operators have increasingly been enticed to head north. This has resulted in a resurgence for the Nordic data center industry, which is emerging as one of the most mature, safest, and best suited locations to serve our digitally demanding, data-intense heavy computing workloads in a way that future proofs organizations for today and tomorrow and protects our climate for the next generation.



atNorth is a leading Pan-Nordic data center services company offering sustainable, cost-effective, and scalable co-location and high-performance computing services across Iceland, Sweden, Finland and Denmark.

With sustainability at its core, atNorth's data centers are powered by energy from renewable sources and support circular economy principles. All atNorth sites leverage innovative design, power efficiency, and intelligent operations to provide long-term infrastructure and flexible colocation deployments.

atNorth is headquartered in Reykjavik, Iceland, and is trusted by industry-leading organizations to operate their most critical workloads. The business was founded in 2009 and acquired by Partners Group in 2022.

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