

“Carbon-free colocation: What’s stopping you?”

*Marcel van Drunen
Borealis Data Center*



Questions?



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Carbon-free colocation: What's stopping you?



Marcel van Drunen
Director HPC & AI PreSales and Partnerships
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Why Borealis Data Center?

- PUE as low as 1.03
- Natural cooling and stable climate
- 100% renewable electricity
- Certified operations
- Excellent service levels guaranteed by our network of partners
- Iceland & Finland among the top safest countries in the world
- As low as **.38 gCO₂ E/kWh** electric net carbon intensity in Iceland; to put into context, the **global average is 440 gCO₂ E/kWh**. The EU's **2025 goal: 100 gCO₂ E/kWh**.

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Björn Brynjúlfsson, CEO and cofounder, Borealis Data Center

Strong Leadership Team

with proven track record and domain expertise



Björn Brynjúlfsson

Co-Founder & CEO

Electrical engineer with 25+ years of leadership experience in IT infrastructure, technology, software, financial and start-up environments in Europe and USA



Halldór Már Sæmundsson

CCO

Experienced business leader with 25+ years of experience in the IT industry and has led international teams. Experienced in leading sales, marketing, operations and development teams



Marcel Mendes da Costa

COO

Started career as a strategy consultant in the Data Center industry and has since worked as consultant and operations manager in a variety of energy related and high-tech businesses for 20+ years



Hjörtur Blöndal

CTO

IT and network specialist with 30+ years of experience in software development, network architecture, computer software, IT operations, setup and configurations



Elfa Aradóttir

CFO

IT and network specialist with 30+ years of experience in software development, network architecture, computer software, IT operations, setup and configurations



Bergþóra Halldórsdóttir

Chief of Staff

Legal professional with extensive experience providing support to businesses, working with stakeholders and aligning strategic objectives



Árdís Hrafnadóttir

Compliance Officer

Árdís brings experience in compliance, legal affairs, and project management, having worked in high-impact roles across publicly listed companies in various industries, including real estate and aviation.



Kristofer Kristinsson

Director of Sales & Products

Experienced professional with 10+ years of expertise in international sales, marketing, and administration. Strong background in B2B/B2C marketing, product, and customer experience



Marcel van Drunen

Director of AI, HPC Sales & Partnerships

Experienced HPC and AI pre-sales team lead in EMEA, building top-ranking systems and fostering key industry connections, and helping top academic and commercial clients build high-ranking HPC and AI systems.



Blake E. Greene

Director of Marketing & Communications

Blake brings two decades of experience in marketing, PR, and development across diverse sectors such as government, think tanks, technology, and tourism



Tindra Dúadóttir

Director of Customer Success

Experienced in sales and customer success across B2B SaaS companies and startups, specializing in developing customer success frameworks through strategic process enhancements and enablement efforts



Our Campuses

BLÖNDUÓS CAMPUS



The Blönduós campus is located on one of the most secure places in Iceland, near the town of Blönduós. Situated between two principal destinations - Reykjavík and Akureyri - the site resides next to the award-winning hydro station, Blanda. The data center offers superior engineering and energy efficiency using 100% renewable, hydropower energy as well as natural free cooling.

The data center offers superior engineering and energy efficiency using 100% renewable, hydropower energy as well as natural free cooling.

Built capacity
50+ MW

Expansion capacity
100+ MW

Operating since
2018

REYKJAVÍK CAMPUS



Reykjavik DC is in the capital of Iceland, Reykjavik and serves as the main IT service hub of the country. The site is on prime fiber network routes serviced by international carriers. The data center offers superior energy efficiency using 100% renewable, geothermal and hydropower energy.

Reykjavik DC's facility is designed based on Tier 3 standards, meaning all critical systems are redundant, guaranteeing high levels of service availability.

Built capacity
~1 MW

Expansion capacity
10+ MW

Operating since
2019

KAJAANI CAMPUS



Kajaani, Finland, in the environmentally friendly Renforsin Ranta business park, leveraging the region's cool climate for efficient cooling and energy use.

A top-ranking business environment welcomes customers into existing high Tier facility solution.

Designed for a target capacity of 10 MW, with plans for further upgrades and brownfield and greenfield expansion.

Built capacity
~1 MW

Expansion capacity
100+ MW

Operating since
2012

FITJAR CAMPUS



Fitjar DC is located in Reykjanes, Iceland. Close to the main IT service hub of the country and 10 minutes away from Keflavik International Airport.

The site is on prime fiber network routes serviced by international carriers. The data center offers superior energy efficiency using 100% renewable, geothermal and hydropower energy.

Built capacity
~10 MW

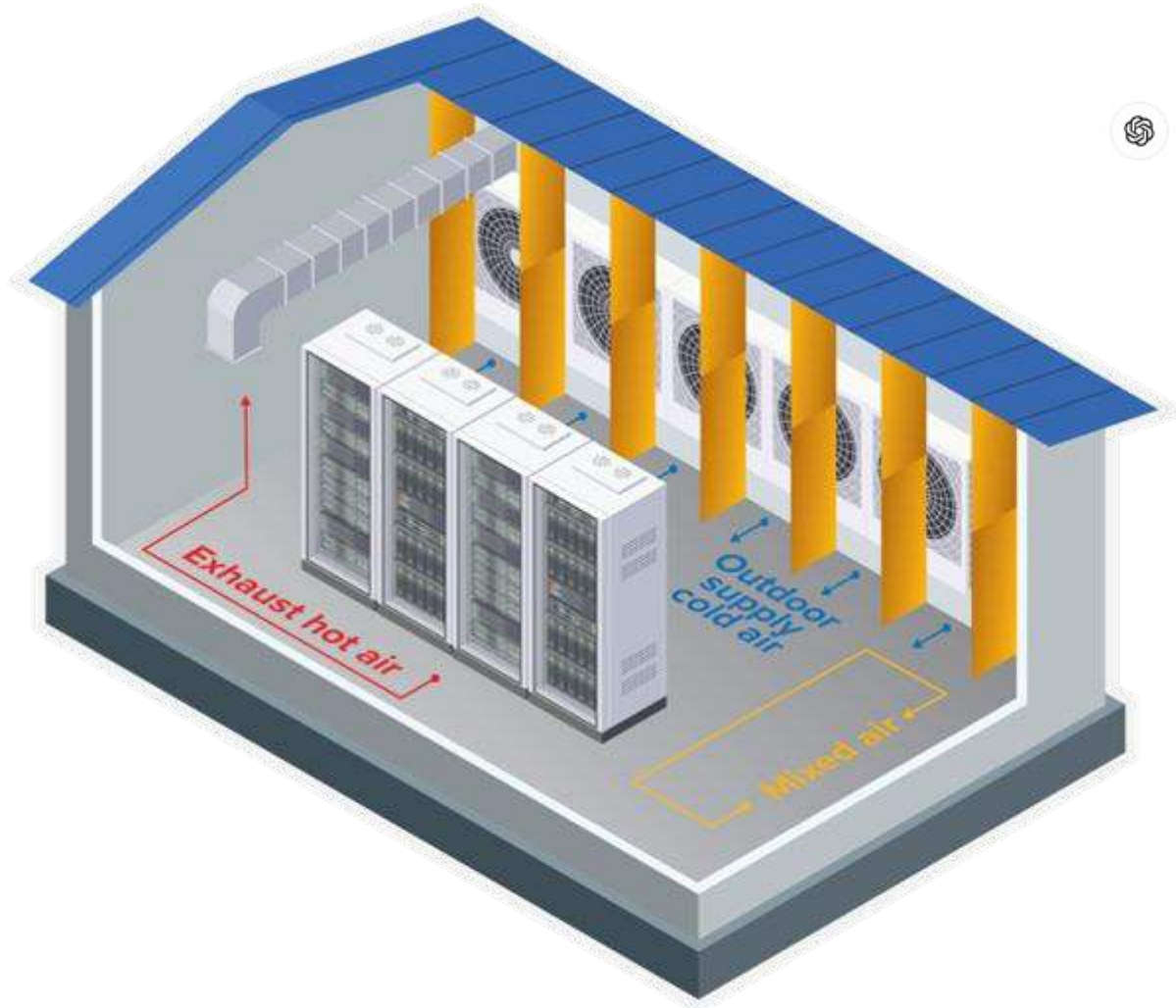
Expansion capacity
50+ MW

Operating since
2014

In perspective: LUMI uses 10 MW, to be expanded to 20 MW
One NVIDIA SuperPOD (2k GPU) uses around 3 MW



Cooling in Iceland



What was the temperature in Blönduós, Iceland, over the years 2020 till 2024?



Searched 4 sites

The temperature in Blönduós, Iceland, from 2020 to 2024 has exhibited the typical variability of Iceland's oceanic climate, characterized by relatively mild winters and cool summers. The average monthly temperatures range from around **-3 to +3°C** in January and from **+8 to +15°C** in July, consistent with the broader climate patterns of the region.

No fossil-fueled electricity in Iceland



GEOHERMAL PARK

ON POWER



HELLISHEIDI POWER STATION

CUSTOMERS

GEOHERMAL PARK
106 ha land

BOREHOLE



GEOTHERMAL WATER

250 - 300 °C
1000 l/sek

STEAM

GEOTHERMAL GAS

COLD WATER

HOT WATER

GEOTHERMAL WATER

ELECTRICITY

CARBON DIOXIDE

CARBFIX

ELECTRICITY

HOT WATER

GEOTHERMAL WATER

COLD WATER

CARBON DIOXIDE



Carbfix- We turn CO₂ into stone

Carbfix provides a natural and permanent storage solution by turning CO₂ into stone underground in less than two years.

[Carbfix.com](https://www.carbfix.com)

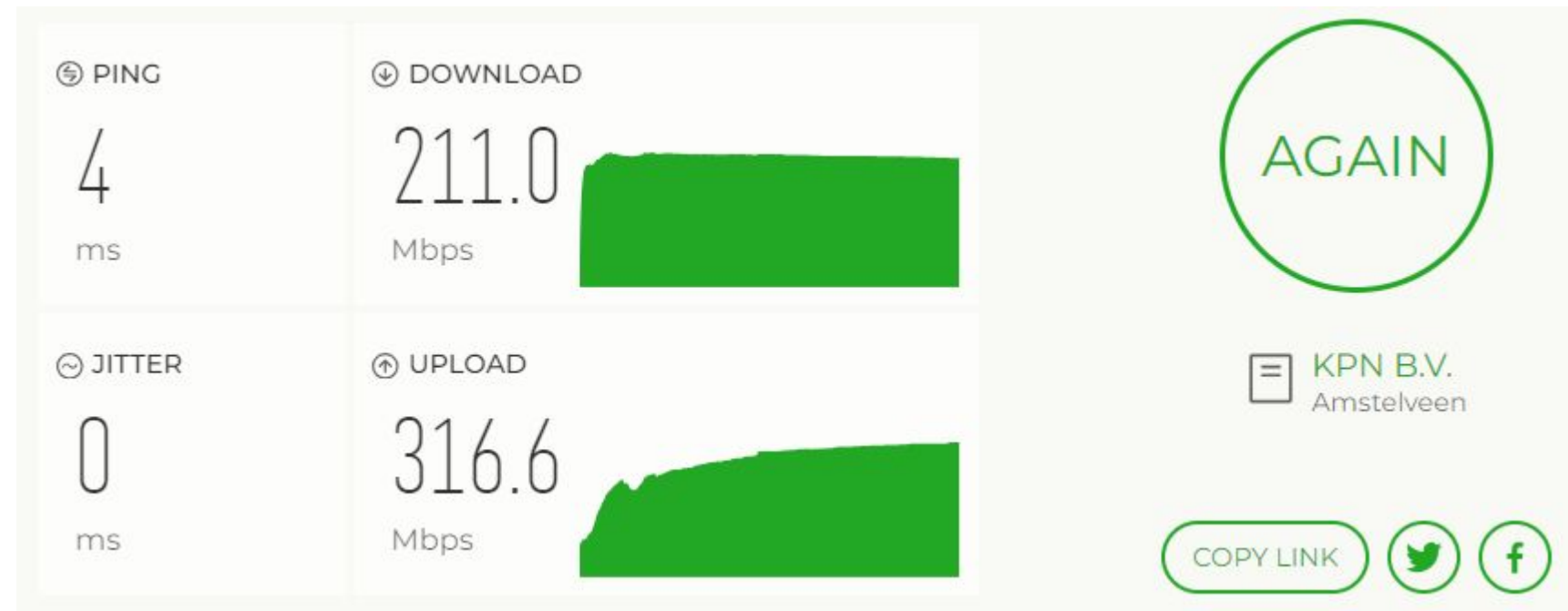
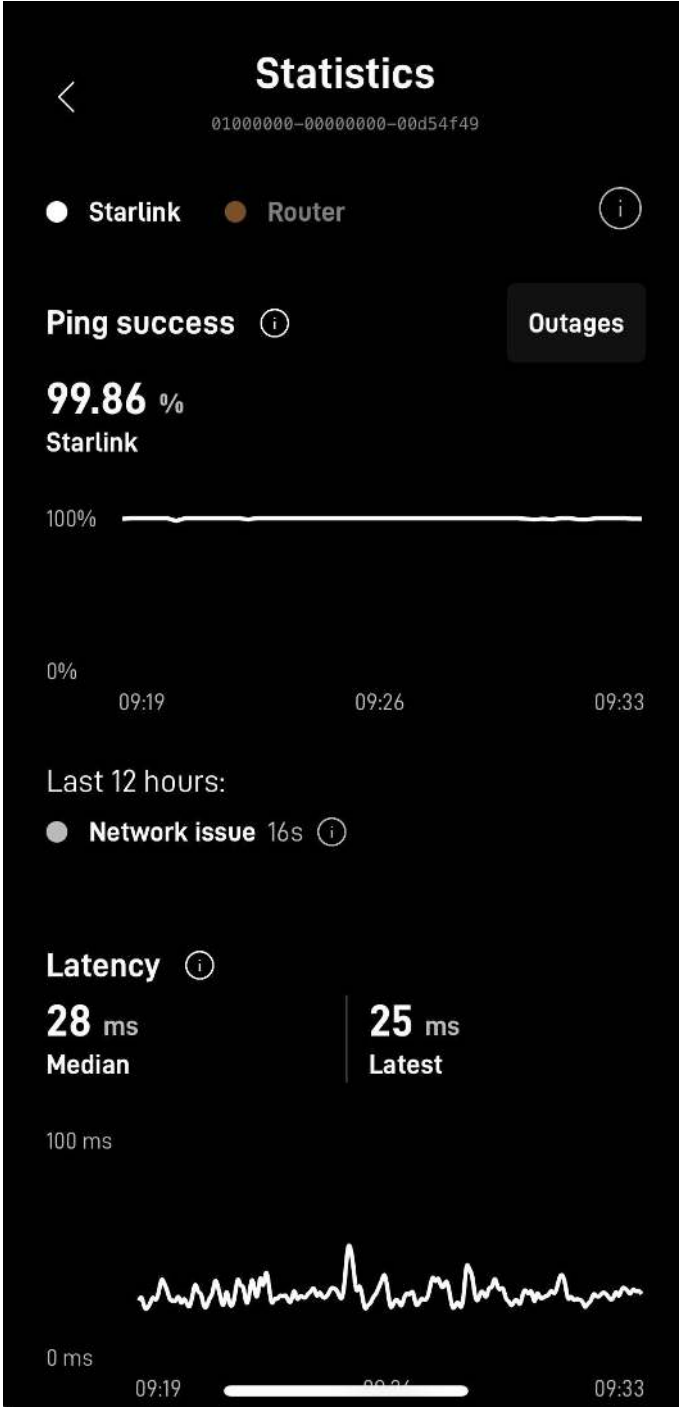




Network latency in perspective

Picture left shows latency for a StarLink connection in the UK, during a pleasant Teams call in which nobody noticed the latency of 28 ms.

Picture below is the other participant, in the Netherlands



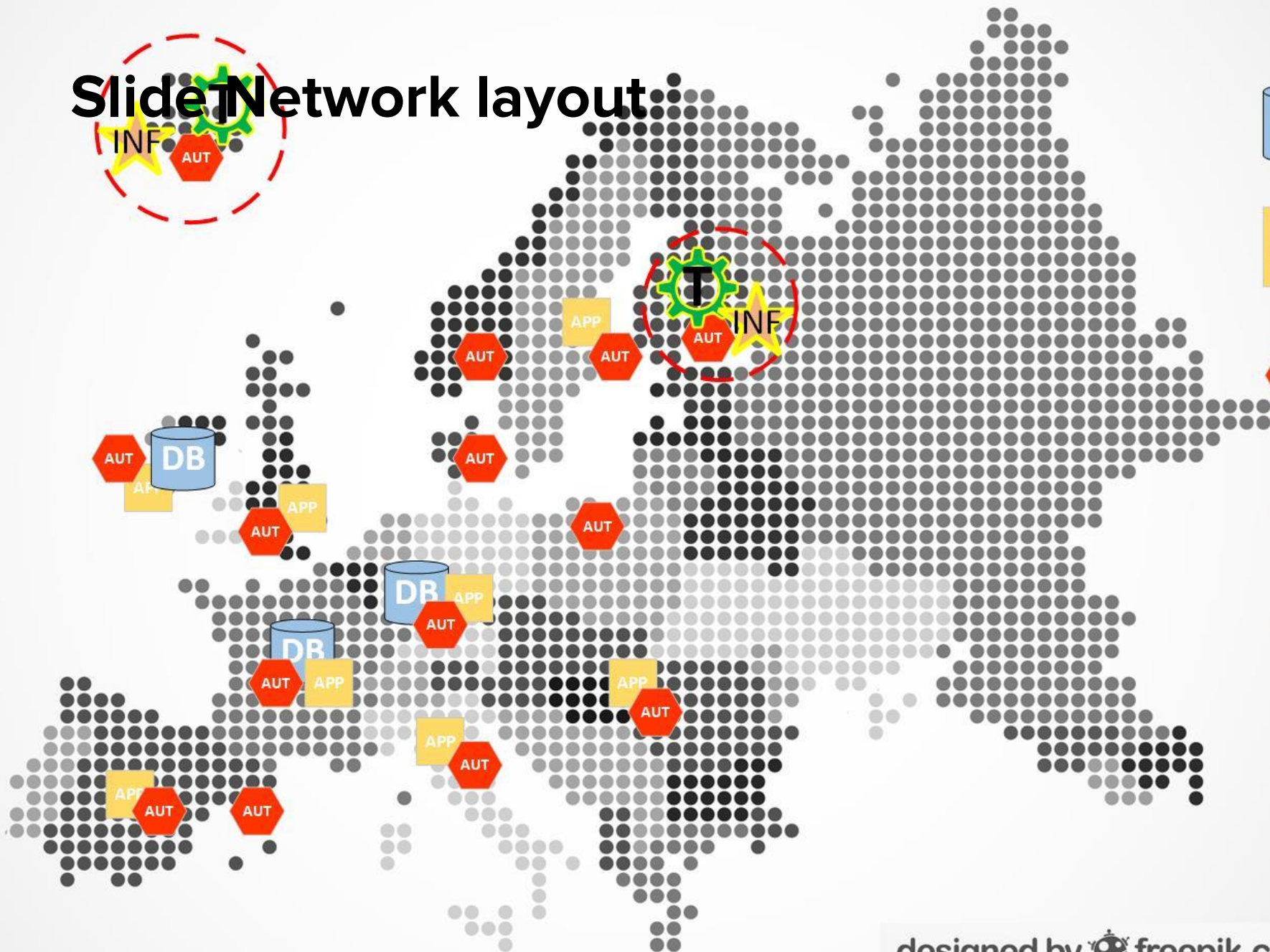


When I asked ChatGPT for a map of Europe...





Slide Network layout



Database Instances



Application and CDN



Authentication Services



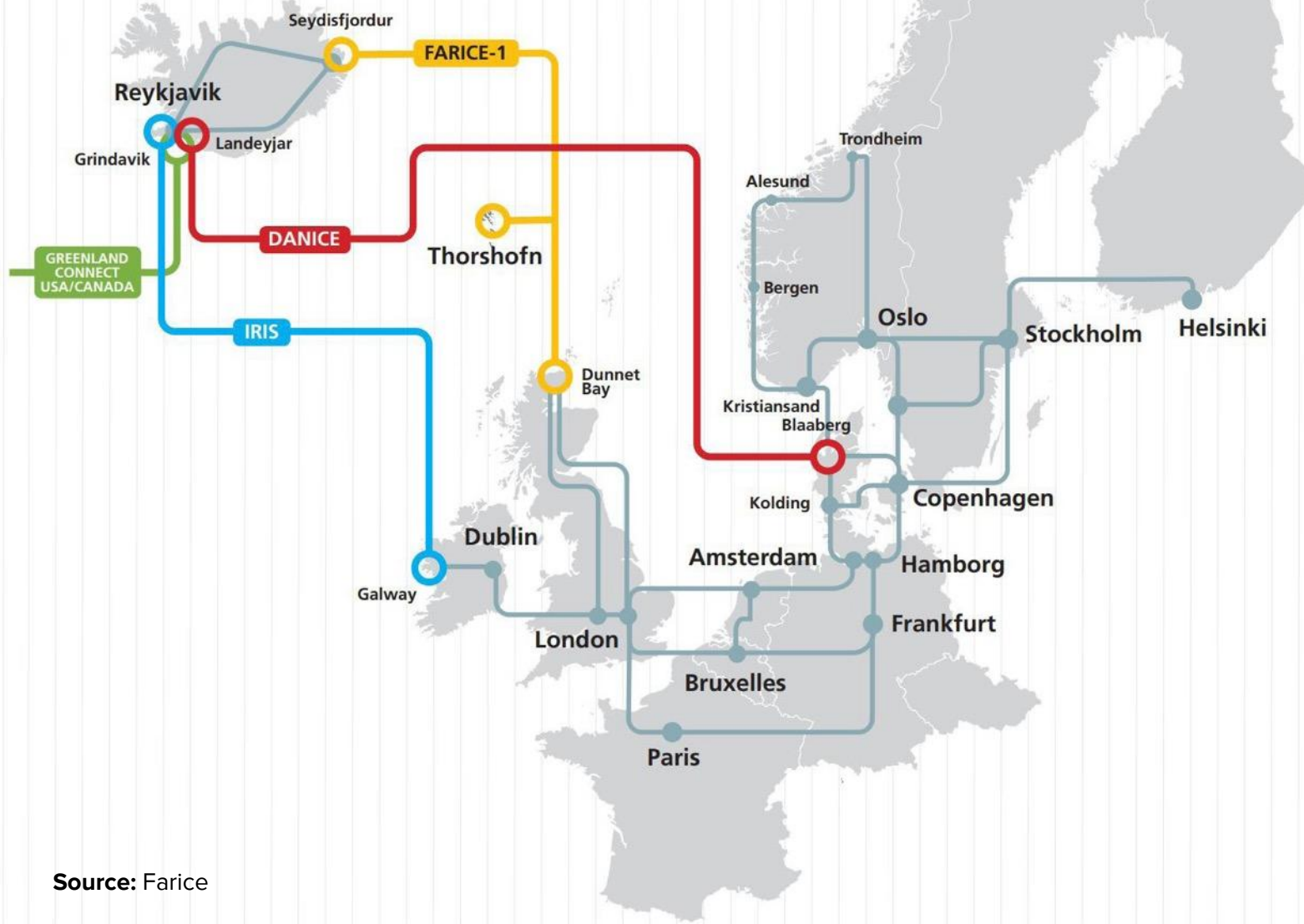
Model Training



Model Inferencing

Network Highlights - Iceland

City to city (PoP to PoP) connectivity



Latency examples point-to-point

- 10ms latency to Dublin
- 14ms latency to London
- 21ms latency to Paris
- Low latency to all main hubs, both in Europe and the US

The introduction of the IRIS subsea cable in 2023 has transformed Iceland into a digital suburb of Dublin, the low latency connections rival's local networks. This leap in connectivity positions Iceland as an emerging strategic node in the global data network and for Hyperscalers.

Plans are on the drawing board for 3 new subsea cables further enhancing Iceland's connectivity to N. America and Europe.



Alces Certified™ ping times for Kajaani

From here in Oxfordshire:

```
[wil.mayers@elmo2 ~]$ ping -c 4 86.50.255.147  
PING 86.50.255.147 (86.50.255.147) 56(84) bytes of data.  
64 bytes from 86.50.255.147: icmp_seq=1 ttl=54 time=43.5 ms.
```

From a machine in Central Oxford on JANET:

```
[root@mdsb1 ~]# ping -c 4 86.50.255.147  
PING 86.50.255.147 (86.50.255.147) 56(84) bytes of data.  
64 bytes from 86.50.255.147: icmp_seq=1 ttl=50 time=42.8 ms
```

From a machine in Belfast on JANET:

```
[root@controller ~]# ping -c 4 86.50.255.147  
PING 86.50.255.147 (86.50.255.147) 56(84) bytes of data.  
64 bytes from 86.50.255.147: icmp_seq=1 ttl=47 time=56.5 ms
```

From a machine in central Manchester on JANET:

```
[root@login2 ~]# ping -c 4 86.50.255.147  
PING 86.50.255.147 (86.50.255.147) 56(84) bytes of data.
```

Network Highlights - Finland

Renforsin Ranta Business Park, home of the Kajaani Campus, benefits from diverse fiber connections on site with multiple geo-dispersed cable entry points to the area. The existing internal cabling network within the Renforsin Ranta Business Park has undergone upgrades through the last decade.

Renforsin Ranta Business Park hosts the **CSC-LUMI** supercomputer

Our Kajaani Campus is a carrier neutral campus where customers can select from a range of ISPs.

The data center is well connected to research networks such as Funet, NORDUnet and GEANT.

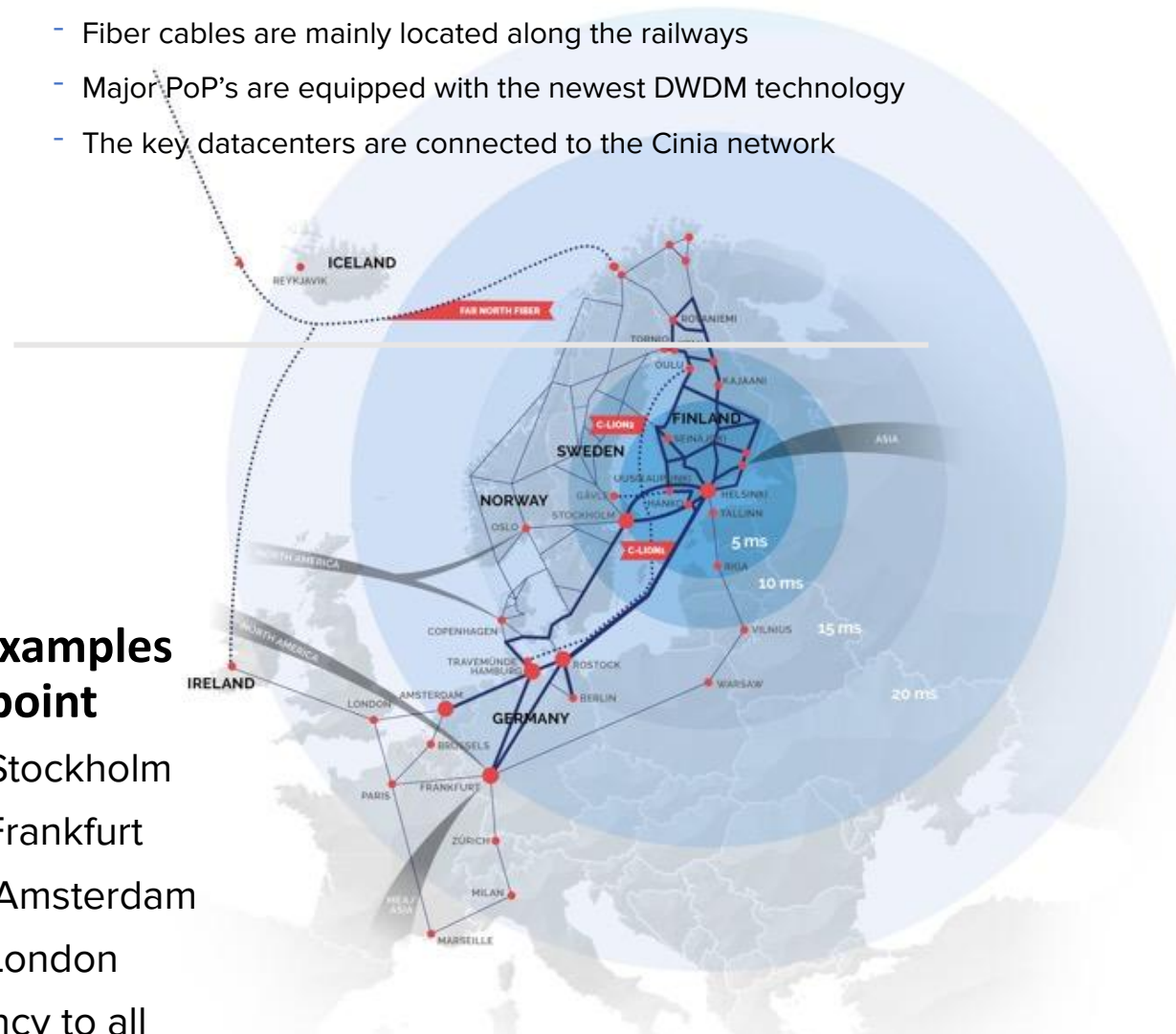
Several telecommunication service providers in Finland



- The backbone network is well looped and covers the largest cities in Finland
- Fiber cables are mainly located along the railways
- Major PoP's are equipped with the newest DWDM technology
- The key datacenters are connected to the Cinia network

Latency examples point-to-point

- 12ms to Stockholm
- 26,5ms Frankfurt
- 27ms to Amsterdam
- 31ms to London
- Low latency to all main hubs in Europe



Certified Operations Ensure Security & Compliance



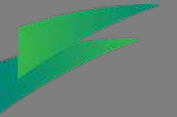
- OCP Ready Facility in Blönduós Campus
- On track for EN 50600 Q4 2024
- Exploring frameworks for new ISO certifications for artificial intelligence
- Kajaani has ISO 27001; exploring the possibility to extend other certifications

Thanks for your time!
Looking forward to your site visit



Empowering AI & HPC in the Heart of Nature





BACKUP SLIDES

We are dedicated to helping businesses embrace sustainable practices

Power Purchase Options from
<1 gCO₂ e/kWh
in Net Electric Carbon Intensity

At Borealis Data Center, Environmental, Social, and Governance (ESG) principles are the fabric of our operations. Iceland's strategic location offers some of the world's lowest electric carbon intensity, as low as <1 gCO₂ e/kWh compared to the global average of 440 gCO₂ e/kWh. This remarkable achievement underscores the unwavering commitment to environmental responsibility, setting a new standard in sustainability within the data center industry.

Power Usage Effectiveness as low as
1.03

Iceland's and Finland's unique attributes play a pivotal role in our ESG-focused strategy. Its stable and cool climate provides a natural cooling advantage, and by utilizing direct and indirect air cooling, we reduce our energy consumption to the lowest in the industry. Coupled with dedication to renewable energy, we focus to always power our data centers with 100% renewable electricity, all the time. And you can rest at ease thanks to the closed Icelandic electricity grid, which runs entirely on hydro, geothermal, and wind energy, while our Kajaani campus is close to some of Finland's largest hydropower plants.

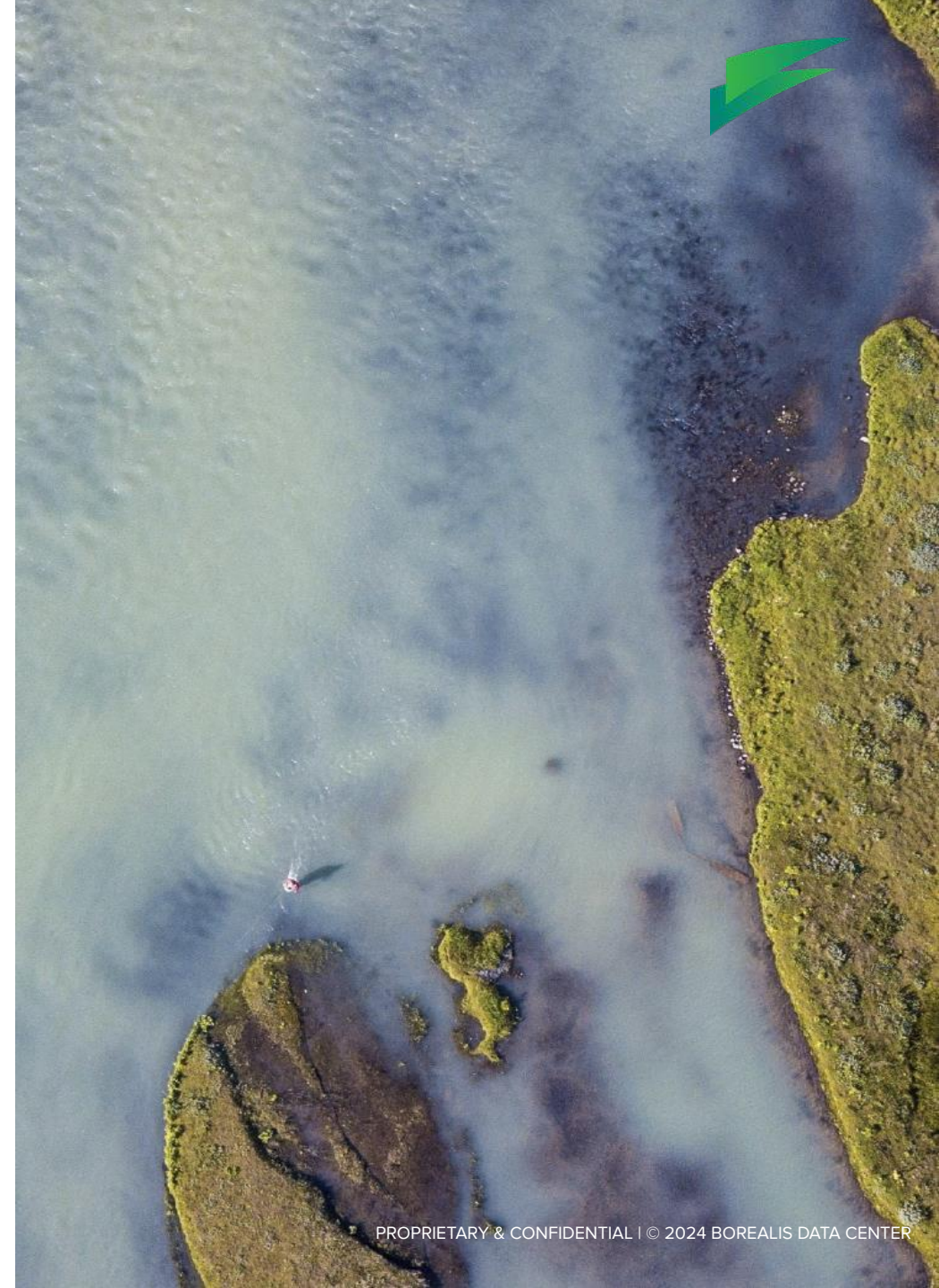
100%
Renewable Energy

Due to the free natural cooling, Borealis Power Usage Effectiveness (PUE) metric is as low as 1.03, a testament to our drive for energy efficiency, minimal environmental impact and lower the overall costs, while utilizing the potentials of the cold climate in the Nordics.

Ranked #1
Social Equality & Security

Beyond our environmental initiatives, we prioritize social equality and security, values that Iceland and Finland holds dear. Iceland is at the forefront of these principles, offering our operations a safe, stable, and equitable environment, while Finland boast as the happiest nation, and a perfect home for business. As both part of the European Economic Area(Iceland) and the European Union (Finland), we adhere to rigorous European regulations, ensuring compliance and transparency in all facets of our business.

In essence, our ESG commitment isn't just a declaration; it's a manifestation of our values and a reflection of the sustainability that has incorporated in our DNA. Borealis Data Center is a beacon of sustainable, responsible data center operations, pioneering a path toward a greener and more socially equitable digital future.





Products and Service Offerings

Borealis stands as a leader in delivering high-performance computing capabilities, high availability, and disaster recovery solutions. Our infrastructure is meticulously optimized to effortlessly handle high-density workloads, demanding energy needs, and critical cooling requirements. With us, you can expect nothing less than exceptional performance and unmatched efficiency for all your compute-intensive applications, ensuring your business operates at its peak, even in times of crisis.

High Availability

Our high availability services are tailored for mission-critical systems that demand uninterrupted uptime. With a focus on reliability and continuous operations, we ensure your essential business functions remain accessible and dependable.

HPC & AI

Borealis excels in delivering high-performance and artificial intelligence computing capabilities. Our infrastructure is optimized to handle high-density workloads with demanding energy and cooling requirements. Experience exceptional performance and efficiency for your compute-intensive applications.

High Density Workloads

Borealis excels in delivering high-intensive computing capabilities. Our infrastructure is optimized to handle high-density workloads with demanding energy and cooling requirements. Experience exceptional performance and efficiency for your compute-intensive applications.

Disaster Recovery & Cold Storage

We offer sustainable and cost-effective solutions for disaster recovery. Our secondary site solutions provide the necessary redundancy to maintain compliance and ensure data availability. Gain peace of mind knowing that your compute and data assets remain accessible and protected.

As-a-Service

Through our valued partners, we offer fully managed HPC/AI, DR/Backup, and various other cloud-as-a-service infrastructure solutions on a global scale. Whether you require high-performance computing, robust disaster recovery, or a range of cloud services, our DCaaS portfolio ensures that your business stays agile, secure, and ready to tackle its computing needs head-on.

Smart Hands

At Borealis, we provide comprehensive smart hands services at the hardware level, available round-the-clock to address any emergencies promptly. Our dedicated team ensures that clients receive expert support whenever needed, while continuously enhancing our services through partnerships with leading OEMs. Trust Borealis for reliable and efficient smart hands solutions tailored to meet your evolving needs.



Security and Access

Security monitoring systems

Fire	<p>Fire, heat, and smoke detection. VESDA smoke detection based on multi-level ASD devices</p> <p>Fire alarm system connected to 24/7/365 monitoring NOC</p> <p>Fire suppression depending on location and facility type</p>
Security / Access control	<p>Security gates, fencing</p> <p>Cameras throughout facilities</p> <p>Access controls</p> <p>CCTV and advanced CCTV systems covering all critical locations inside and outside.</p> <p>24/7/365 monitoring & security</p>
Environment	<p>Temperature and RH monitoring</p> <p>Constant monitoring of air quality</p> <p>Weather stations</p>

- Top security provided in all facilities.
- Additional security options and access control available for private spaces based on the customer's request

Resistance against natural disasters

Borealis Data Center's facilities in Iceland and Finland are constructed with safeguards to mitigate the impact of natural disasters, ensuring operational resilience and continuity.

Our sites are selected according to criteria taking a holistic assessment of availability of power, network and hazard assessments. Our large-scale northern campus in Blönduós is in one of the safest locations in Iceland as it relates to the risk of natural hazards.

Our preparedness is comprehensive, reflecting our unwavering commitment to reliability and client trust.

All buildings in Iceland are designed according to the Euro Code; the European building standards and the associated National documents

The National documents include provisions regarding wind load, snow load and seismic load, based on the local condition in Iceland



Network Highlights - Iceland

Borealis Data Center prioritizes neutrality and independence in its connectivity approach, allowing any fiber or internet service provider to install their infrastructure within its data centers.

BDC maintains a standard of having at least two fiber intake routes for each facility. Specifically in Iceland, BDC incorporates fibers from two main suppliers, Mila and Ljosleidarinn, across all routes, with the option to include other providers as well. This strategy ensures diversified and robust connectivity options for clients, tailored to their specific service agreements.

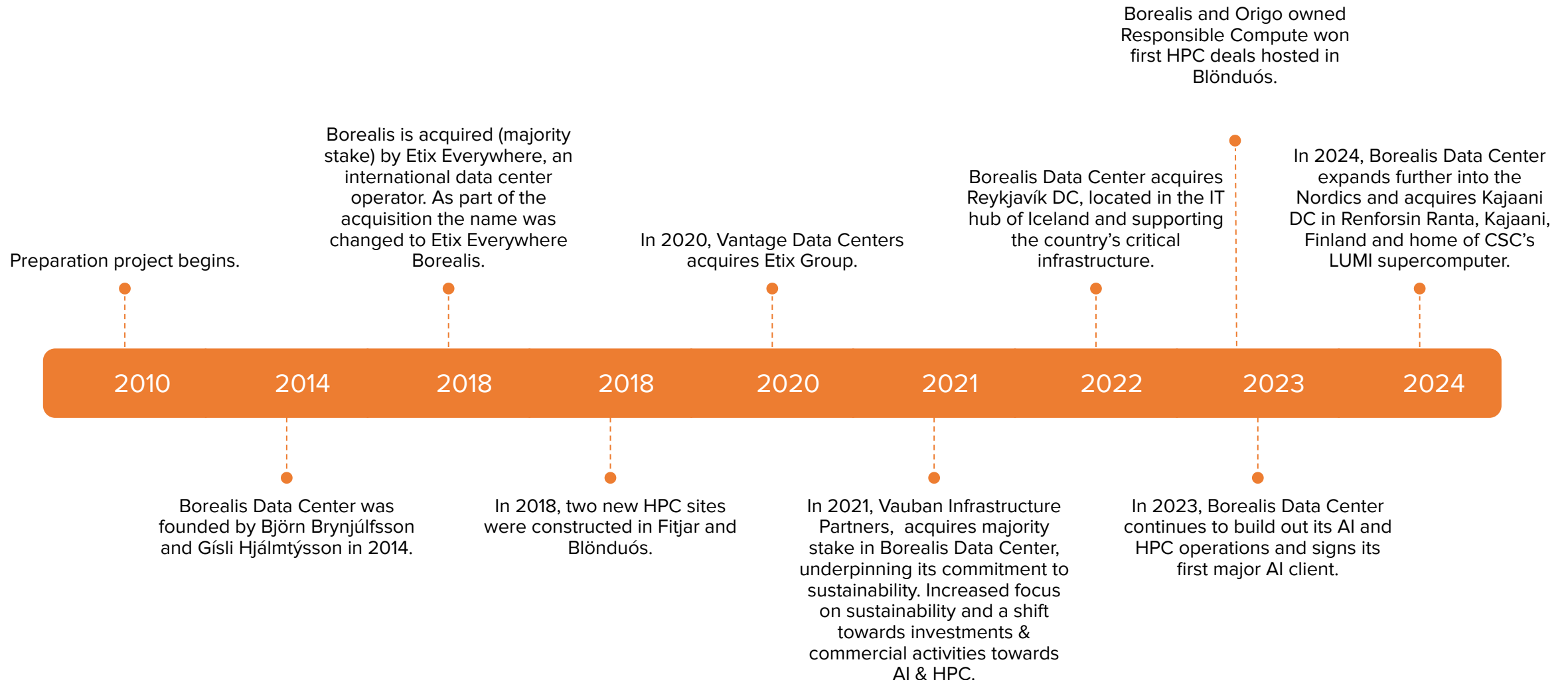
- Borealis' facilities are carrier neutral with redundant physical fibers
- Iceland is connected to both North America and Europe with four high bandwidth submarine fiber cables
- One of the most developed network globally with very high fiber to home penetration
- 1,800 km main domestic fiber network
- City to city (PoP to PoP) connectivity to all main European DC cities i.e. London, Frankfurt, Paris and Amsterdam
- Submarine fiber cable PoP in Fitjar and Blönduós (from Farice)
- Multiple diverse fiber routes connecting Blönduós to the submarine fibers
- Dark fiber providers include Ljosleidarinn and Mila

Several telecommunication service providers in Iceland





Background & Timeline





Leveraging our Ecosystem of Partners

We run our own sales organization to maintain data center capacity utilization and to grow our business. We prioritize prospecting and opportunity development based on maintaining and growing our revenue, profitably and for a high-utilization. Furthermore, we build our brand and acquire customers through relationships with stakeholders:

Long term mutually beneficial relationships – aligned interests

Power Industry Relationships



- Business development cooperation
- Long term contractual relationships
- Providers of power and services

DC Equipment Relationships



- Customer referrals
- Providers of infrastructure equipment
- Long standing working relationship

Public Stakeholders Relationships



- Customer referrals
- Events
- Long standing working relationship
- Business development cooperation

IT Service Provider Relationships



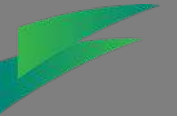
- Customer referrals
- Provider of IT equipment & services
- Business development cooperation

Note 1: This list is by no means comprehensive and provides some examples of partners within our network.

Note 2: Landsvirkjun, the national power company, and the Invest in Iceland agency are major contributors of co-marketing resources, co-marketing funds, and lead referrals.



A Sustainable Solution:
**Electrical Carbon Intensity by
Comparison**



THIS IS WHERE WE ARE NOW GLOBALLY

440g

Unit: g CO₂-eq/kWh

Source: Landsvirkjun, Semi-Annual Climate Account 2023

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THIS IS WHERE WE NEED TO BE BY 2025

ESG is in our DNA

AS LOW AS
.38 gCO₂ E/kWh*

ELECTRIC NET CARBON INTENSITY

NATURAL COOLING

THANKS TO STABLE COOL CLIMATE

CERTIFIED
OPERATIONS

100% RENEWABLE
ELECTRICITY

PUE AS LOW AS 1.03

SAFEST COUNTRY IN
THE WORLD
14TH YEAR IN A ROW

Questions?



www.menti.com

3728 9232

No personal information is collected.



Extended Lunch and Site Tour



We are delighted to welcome the experts of Bletchley Park to take those interested on a site tour.

12:30 PM - Lunch

1:00 PM - Site Tour Commences (1 hr.)

Splitting into 2 groups

2:00 PM - Afternoon Agenda Commences

