Imagine a place where the energy is green and excess data center heat isn’t wasted. Imagine Stockholm.

The Stockholm Data Parks initiative will contribute to completely phasing out fossil fuels in Stockholm by 2040.
Heat Recovery City

• Stockholm has the largest heating network in the Nordics and the World’s largest cooling network
• 25 years’ experience of capturing and reusing excess heat
• Stockholm has a unique position to realize heat recovery on a large scale
  • The cold climate means heat has value
  • With more than 10 000 buildings connected to the heating network, it represents a “heat sink” of 12 TWh
  • Coexistence of heating and cooling networks enables sustainable, flexible and cost efficient solutions

A data center load of 10 MW can heat around 20 000 modern residential flats
Customer References

“For me, heat recovery is part of making data centers greener. The collaboration we have with Fortum Värme makes it possible for us to use the excess energy for residential heating in a financially attractive way. This is a perfect example of a technical solution that combined with the cold climate makes the Nordics a great place for building datacenters. We continue to innovate and work with Fortum Värme and are right now exploring how the cooling and heat recovery can be defined for our future expansion.”

Gustaf Gerspach
CTO Fortum Värme

“The fact that we are based in Stockholm with its vast district heating and district cooling networks has opened for a new way of thinking about cooling, sustainability and solutions that are unbeatable financially, which translates to significant benefits for our data center customers.”

Peter Bork
Managing Director, Interxion Nordic

“We have worked hard to connect our Stockholm data centers to the district heating/cooling network to enable heat recovery of the excess heat. The vast district heating network in Stockholm provides an ideal and secure solution for heat recovery which is a perfect match with our data centers.”

Jan Siggren
Head of Building Operations, Ericsson GICs

“Fortum Värme’s cooling service has allowed us to make an already efficient data center even better. The straightforward connection to Fortum Värme’s system gave us the opportunity to recycle energy that would otherwise have been rejected. As a bonus we doubled the redundancy of our cooling system. With the favorable economic and environmental impact, we are now looking into deploying heat recovery in our other data centers.”

Jan Lundin
Head of IT Facility Services, H&M

More than 30 data centers are connected to Fortum Värme’s district energy networks and involved in heat recovery.
Stockholm

• 80+ million market within 30 ms roundtrip delay
• Ranks third in Europe for Global HQ of Forbes 2000 companies
• 127 regional HQs of Forbes 2000 companies
• Swedish banks: 90% market share in Baltics
• Leader in cloud adoption and IT-outsourcing

Your hub for Northern Europe

Roudtrip delay in ms, Telia Carrier Network
Center of innovation

- Per capita, Stockholm is on par with Silicon Valley as a new business unicorn creator

- Stockholm received 15% of the European technology sector’s FDI in 2014

- Stockholm received 18% of VC financing to European FinTech in the period 2010-2014
SHORT TTM
OUR PROPOSITION AND SITES
Our proposition

We prepare and coordinate to minimize your costs and time to market

- Ready to build land or existing shells
- Power infrastructure at the premises
- Cooling as a Service (CaaS) and Heat recovery
- Tailormade renewable electricity contracts
- Dark fiber at the premises
- Dedicated support through build process

The offering targets investors considering to build data center of 5 MW and above.
The Parks

Stockholm Data Parks offer attractive sites for sustainable data centers

- The first Data Park with initial sites is located in Kista, the technology hub of Stockholm
- The City of Stockholm or other owner has agreed to sell or rent the site for data centers
- Each site has appropriate construction rights or the process for such rights has been initiated
- Infrastructure providers have committed to provide power, cooling as a service, heat recovery and dark fiber

Stockholm Kista is one of the major ICT cluster in the world, home of more than 1 000 ICT companies. There are 6 800 ICT students at the Kista campuses of Stockholm University and the Royal Institute of Technology.
Data Park Kista – The Sites
Data Park Kista

A. Vanda 1
- Conversion
- Site area: 10 700 m²

B. Vanda 2
- Greenfield
- Site area: 10 712 m²

C. Salo
- Greenfield
- Site area: 20 000 m²

D. Aura 1
- Greenfield
- Site area: 10 000 m²

E. Varmvattnet 5
- Greenfield
- Site area: 9 175 m²
Under preparation for 2018

Brista, 200 000 m²

Skarpnäck, 20 000 m²
SUSTAINABLE
Sweden – Carbon footprint

Average grams CO\textsubscript{2}/kWh from power generation, 2013

Asia 900  USA 600  EU 450  Nordic 100  Sweden 20
A data center load of 10 MW can heat around 20,000 modern residential flats.
Sustainable

- Green data centers of the future will source sustainable electricity to minimize their environmental impact.

- Fortum Värme is committed to do the same for Stockholm Data Parks, adding renewable capacity to the system.

- Heat recovery makes a significant contribution to reducing global CO$_2$ emissions by replacing more CO$_2$ intensive heat production, allowing data centers to become net climate positive.

Stockholm Data Parks
Net CO2 tonnes of a 10 MW data center load with renewable electricity and Cooling as a Service with Heat recovery

-1 000
-3 000
-5 000
-7 000
-9 000
Tonnes CO$_2$

-7 950
Sweden – Electricity

70 000 MWh < Consumption < 150 000 MWh
Excluding VAT and other recoverable taxes and levies
Euro, per kWh, Eurostat 2016S1

[Bar chart showing prices for different countries and EU28]
THE GREAT EXCHANGE

We cool your data center for free in exchange for your waste heat.
Cooling of the data center as a service is offered for free in exchange for the excess heat when the data center load reaches above 10 MW.

In a second option, the cooling is managed by the customer and Fortum Värme purchases the excess heat at a price reflecting its alternative heat production cost.

**Cooling as a Service with Heat recovery**

**Cooling Opex, SEK/MWh**

0  2  4  6  8  10
POWER ELECTRICITY DARK FIBER
Power ready

For all sites in Stockholm Data Parks, sufficient power is either available or planned

- In Data Park Kista, close to 20 MW power capacity is available from the outset. An additional 50 MW can be ordered
- Redundant power can be provided where all loads can be restored if any single component fails
- More than 99,98% historical availability
Green Electricity

Tailor-made contract offering

Choose length of electricity contract

Choose risk level of electricity contract

Choose source of, or additional, electricity

- 1 year
- 10 year

- Spot-price
- Spot-price + financial hedge

- Wind power
- Solar power
- Hydro power
Ready to connect

In Stockholm we have dedicated dark fibers for customers to connect directly with one another, without sharing the fiber with anyone

- 2N redundant physically separated dark fiber connections provided at all listed sites
- The world’s largest open fiber network
- Competitive prices
- Point-to-point connection to all data centers and to IXP Netnod provided on demand
CONCLUSION

Green Computing Redefined
In Conclusion

Low costs
• Lowest electricity price in EU
• Cooling as a service for free

Green
• Reuse of waste heat
• Low CO₂ content
• Renewable electricity

Short time-to-market
• Prepared sites
• Coordinated partners

The Stockholm connection
• 80+ m market within 30 ms roundtrip
• Business and finance hub of Northern Europe
• World’s largest dark fiber network
THANK YOU!

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Additional material
Stockholm Data Parks

Your Hub for Northern Europe
• 80+ m market within 30 ms roundtrip delay

Short Time To Market
• Sites and infrastructure prepared

Low cost
• We cool your data center for free in exchange for your waste heat

Unparalleled sustainability
• Net climate positive
Sweden – Economics and business

GDP growth, %, OECD

Debt, % of GDP, OECD

World Bank ranking of doing business

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Cooling as a Service with Heat recovery

Low Capex Cooling Machines for redundancy

Data Park Kista Cooling and Heat Recovery Plants

~20 °C

~30 °C

[42°C] [68 °C]
Customer Cooling with Heat recovery