Non-profit state organization with special tasks

Turn over in 2019 (est.) 51,5 M€

Headquarters in Espoo, datacenter in Kajaani

Owned by state (70%) and all Finnish higher education institutions (30%)
The EuroHPC initiative

• The **EuroHPC Joint Undertaking** will pool EU and national resources in high-performance computing (HPC)
  o **acquiring and providing a world-class supercomputing and data infrastructure** for Europe's scientific, industrial and public users
  o **supporting an ambitious research and innovation agenda**

• The EuroHPC declaration has been signed by **30 European countries**

• The first generation of EuroHPC systems announced in June
  o 3 pre-exascale systems (150+ Pflop/s Linpack) to Finland, Italy and Spain
  o 5 petascale systems (4+ Pflop/s Linpack) to Czech Republic, Bulgaria, Luxembourg, Portugal and Slovenia
## LUMI budget

<table>
<thead>
<tr>
<th>Country</th>
<th>Budget (M€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>50</td>
</tr>
<tr>
<td>Belgium</td>
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<tr>
<td>Switzerland</td>
<td>10</td>
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<td>Sweden</td>
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<td>Denmark</td>
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<tr>
<td>Poland</td>
<td>5</td>
</tr>
<tr>
<td>Norway</td>
<td>4</td>
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<tr>
<td>Estonia</td>
<td>2</td>
</tr>
<tr>
<td>EU</td>
<td>102.5</td>
</tr>
</tbody>
</table>

- **Finland**: 50 M€
- **Belgium**: 15.5 M€
- **Switzerland**: 10 M€
- **Sweden**: 7 M€
- **Denmark**: 6 M€
- **Czech Republic**: 5 M€
- **Poland**: 5 M€
- **Norway**: 4 M€
- **Estonia**: 2 M€
- **EU**: 102.5 M€
From Saw and Paper to Renforsin Ranta Business Park

1907
First Saw Mill

1919
First Paper Mill

2008
Renforsin Ranta

2012
CSC Datacenter
CSC World-class Data Center in Kajaani

- **Annual PUE 1.03* (2018)** bringing tangible energy cost savings to customers. (*free-air cooling*)

- **Cool climate**: Kajaani has only a few days each year when the temperature is over +25°C (annual average temperature below +3°C). No compressor based cooling is required to maintain the required temperatures for the direct free air-cooled data centre (CSC has both direct free air and cool water-cooled data centres in Kajaani).

- High capacity green power is provided within the Renforsin Ranta Business Park with four links to the national grid. **Green energy production in the region**, three local hydroelectric power plants and a wood burning biomass power station. The region is also investing heavily to the Wind farms and Solar Energy.

- CSC uses 100% certificated hydroelectric power (CUE close to zero) in all its data centre production and office environments.
Green Power

- **High capacity green power** is provided within the Renforsin Ranta Business Park with **four links to the national grid**. Green energy production in the region, three local hydro power plants and a wood burning biomass power station. The region is also investing heavily to wind farms and solar energy.

- Redundant **green power scalability** up to hundreds of MWs, based on customer need.

- **95% of Data Center energy consumption can be re-used** (energy re-use factor, ERF) with these heat pumps by utilizing local district heating system. The Data Center operation costs goes down because local energy company buys the waste heat.

- **CSC uses 100% certificated hydroelectric power** (with a Carbon Usage Effectiveness of close to zero) in all its data center production and office environments.
Regional Strengths

• A previous paper mill site (brownfield solution), with heavy-duty power infrastructure already in place, extremely high reliability

• CSC’s datacenter space 3,000 m² (option to 4,000 m² additional datacenter space) – scalability in space and power.

• Total business park area is 120 + 200 hectare, land and premises owned by UPM

• Finland and Kajaani are low-risk areas in terms of geographical, weather, political and man-made risks.

• No risk of seismic / volcanic activities, hurricane/tidal or other form of severe weather

• Strong local datacenter ecosystem: local authorities, university, funding organisations, industry – all onboard.
LUMI Datacenter

2200 m² white space, expandable up to 4600 m²

100% hydroelectric energy up to 200 MW

Very reliable power grid: Only one 2 min outage in 36 years

100% free cooling, PUE 1.03

Waste heat reuse in the district heating system of Kajaani city
effective energy price 35-40 €/MWh

negative CO₂ footprint: 13500 tons reduced every year

Extreme connectivity: Kajaani DC is a direct part of the Nordic Internet backbone.
4x100 Gbit/s to GEANT in place, can be easily scaled up to multi-Tbit/s level

Elevated security standards guaranteed by ISO27001 compliance
SITE AVAILABILITY FROM 2 MW UP TO 200 MW IT LOAD

- 110 kV transformers ready up to 50 MW
- Formar paper mill buildings ready up to 100 MW
- 110 kV main switchgears can support dc up to 200 MW
- Green field availability if required
MODULAR AND EXPANDABLE FROM 16 MW UP TO 100 MW IT LOAD DCs

- 110 kV transformers ready up to 100 MW
- Former paper mill buildings ready up to 100 MW
- Electrical 110 kV main switchgears can support dc up to 200 MW
- All technical spaces can be located close from the loads > economical design

16 MW (IT)  |  50 MW (IT)  |  100 MW (IT)
Numbers of LUMI

- **204 M€** total budget
- **149 M€** system acquisition budget
- **6 years** of operation

Cost-efficiency

- **9** country consortium
- **19** Top-50 entries

User base of **20 000 users**

Collaboration

Sustainability

- **100%** carbon-neutral electricity
- **100%** free cooling
- **-13 500** tons CO2 emissions each year

Leadership-class system

- **220 Pflop/s**
- **1+ TB/s I/O**
- **1 system**