

WHY INVEST YOUR DATA CENTER IN FINLAND?

Finland offers major benefits for Data Center investors and operators

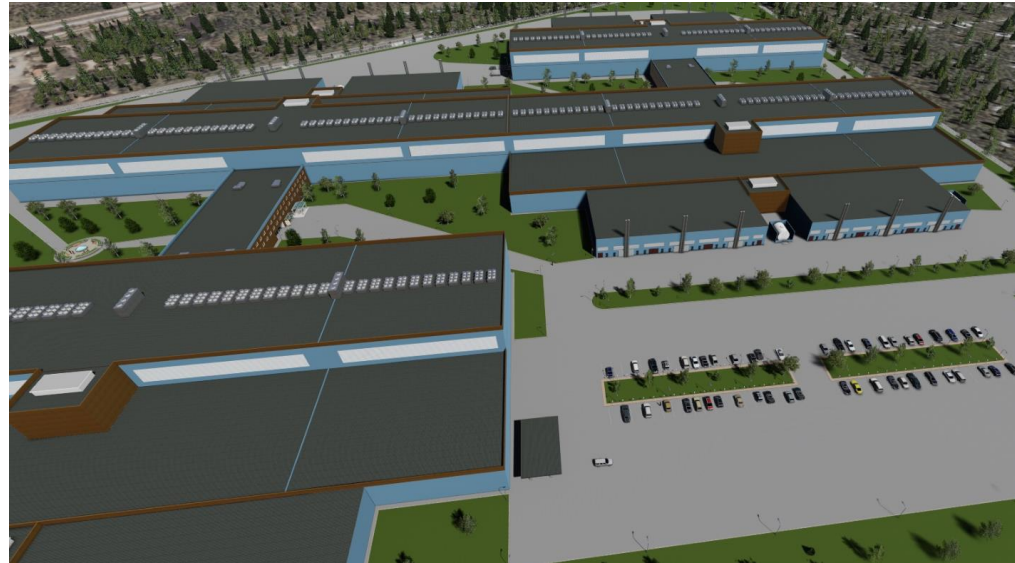
Reliable and green energy



World class connectivity



BUILD YOUR NEXT DC IN FINLAND



Cost efficient to invest and operate



Safe society and cyber security



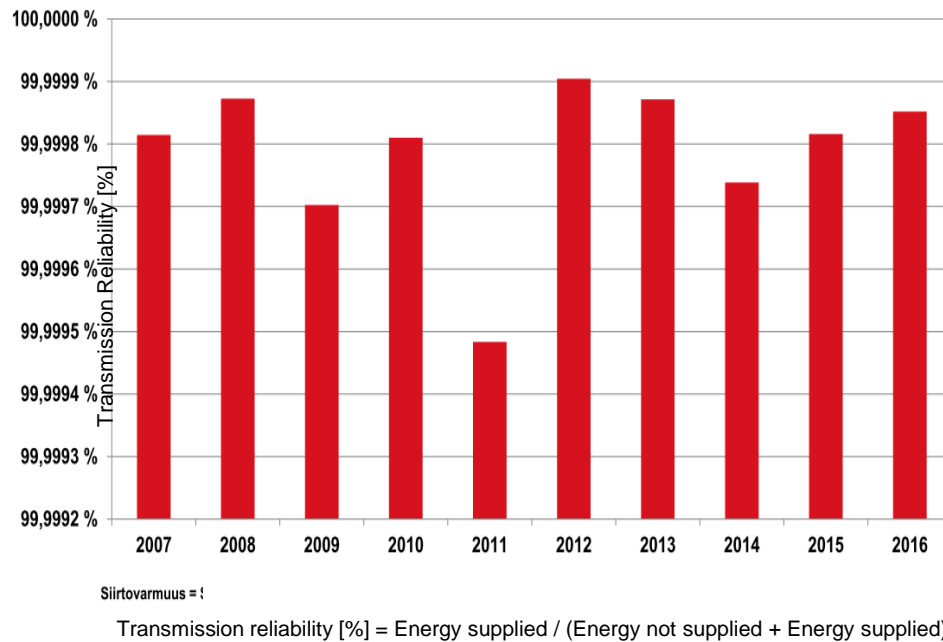
Reliable energy production and distribution

Finland has One of the Most Reliable Electric Grids in the World!

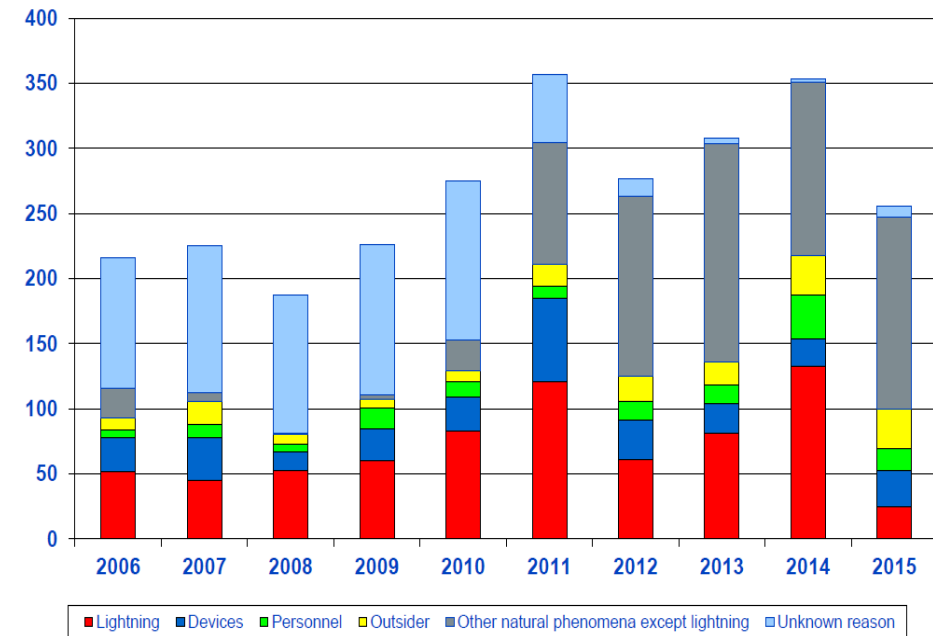
Transmission reliability: **99,99982%**

Average duration of forced interruptions: **2.1 min**

Fingrid Transmission Reliability History

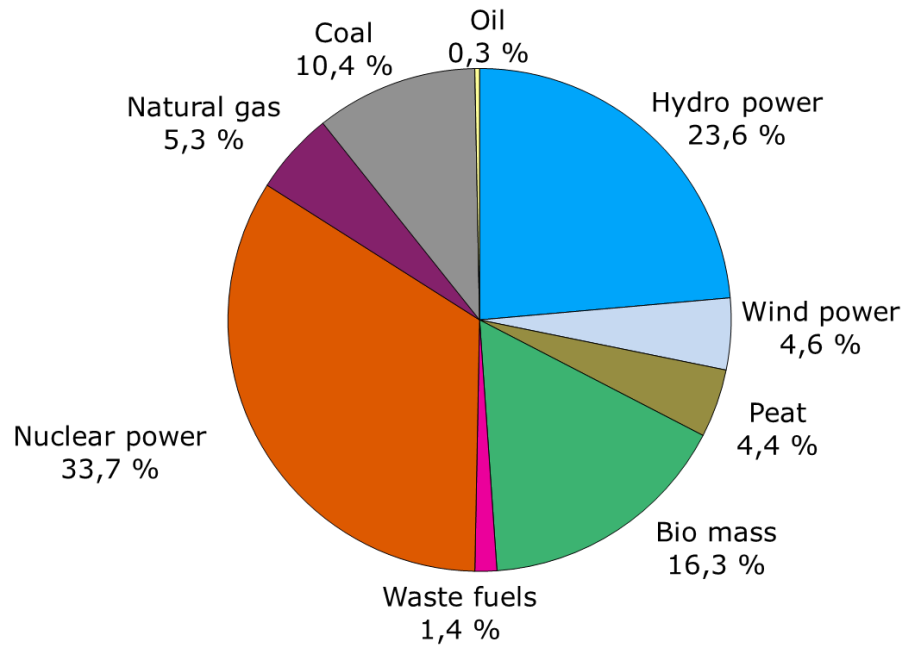


Number and Reasons of Disturbances



Renewable electricity production

Electricity Production by Energy Sources 2016 (66,1 TWh)



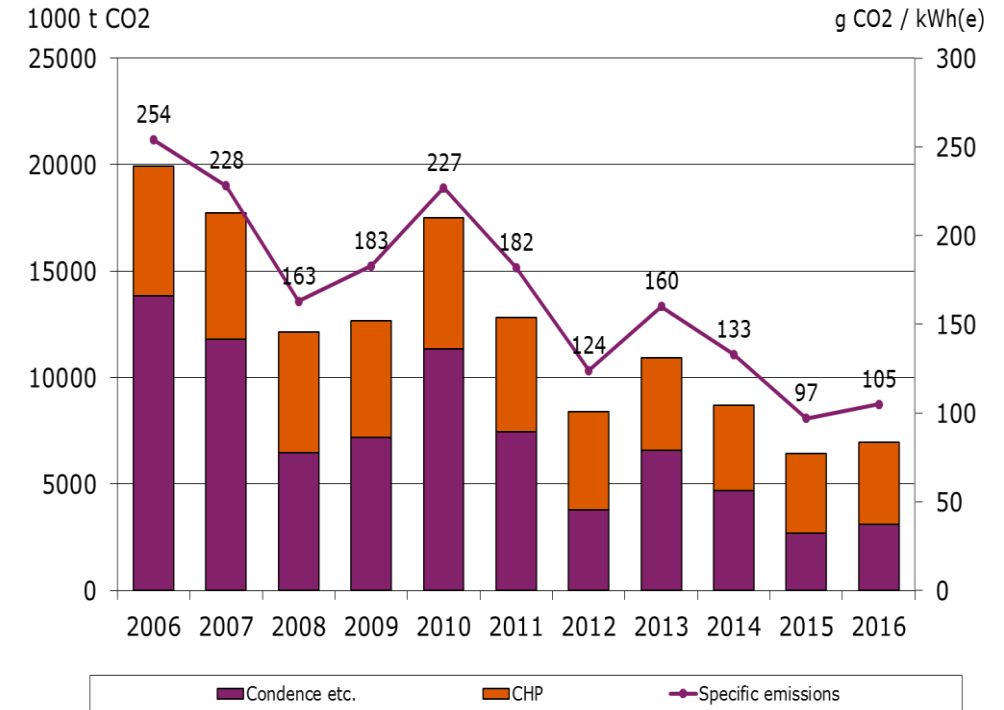
Renewable 45 %

(Year 2015: 45 %)

Carbon dioxide free 78 %

(Year 2015: 79 %)

CO₂-emissions of Power Production

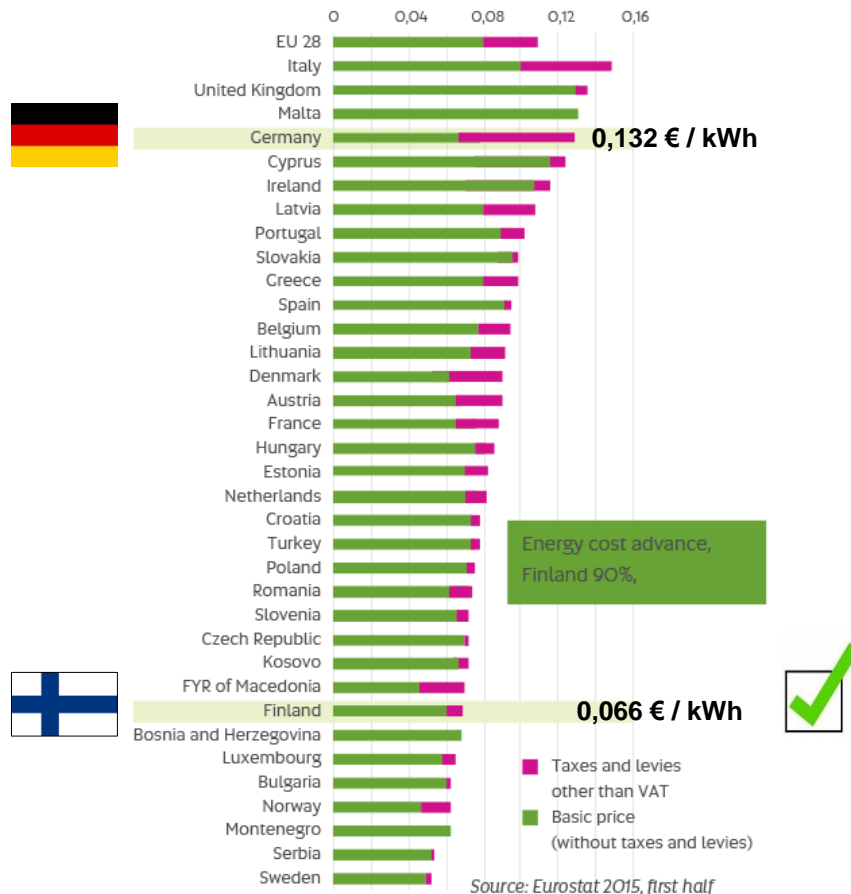


CO₂-emissions are reduced to 1/3 from 2006 to 2016

Low energy price invites to Finland

Energy cost in Finland is about 50% LESS than in Germany?

ELECTRICITY PRICES FOR INDUSTRIAL CONSUMERS
Save up to 50 % on energy cost as compared to Central Europe



Breakdown of Energy Cost

Cost item	€ / MWh
Nord Pool Spot (3.10.2016)	26,95
National grid fee	7,40
Local margin	1 – 3
Electricity tax	7,16
Total	<u>43 – 46 € / MWh</u>

- The Nord Pool is the common Nordic and Baltic wholesale market
- The price of electricity is determined hourly, based on the balance of demand and supply
- Price differences and electricity price level are expected to be very stable and low due to decentralized energy production in Finland. The power production capacity will increase significantly within the next 2-3 years when Olkiluoto 3 (a new 1600MW power plant) will start operations.

Top education but competitive employment costs

- Finnish people enjoy top level education for it's students. PISA (Programme for International Student Assessment) has qualified Finland many times as the best in the world regarding the level of education
- Although top education, the employment costs for Finnish engineers are lower than in other European countries in average.

Lower company tax structure

- Company taxation in Finland is 20 % which is much lower than average in OECD or EU countries.

Free cooling saves energy and costs

- Cool climate and pure air including numerous clean lakes and rivers plus 1100 km coast line gives many cost effective locations for cooling Data Center servers.
- Due to cool climate the need to invest to mechanical cooling systems is lower and warm periods are short in Finland => lower TCO

Lower taxation for project key personnel

- It's possible to get lower taxation for the project key management personnel for two years.

Unique possibility to sell Data Center's waste heat

Waste Heat = Product for Sale

- Finland has a district heating system in almost every town. This creates an excellent possibility to re-use waste heat from data centers
- Yandex – Russian search engine, has built a data center in Mäntsälä, Southern Finland. Yandex sells its waste heat to the local utility Nivos. Nivos primes waste heat with help of heat pumps suitable for the district heating network for Mäntsälä's consumers.
- This is an excellent showcase of the "win-win" trade for the waste heat use.
- In addition, with the use of data center's waste heat as an energy source, Nivos can lower their carbon footprint significantly.



Nivos could reduce their CO₂-emissions by 40% by re-using waste heat from Yandex Data Center.

Finland is a gateway between East and West

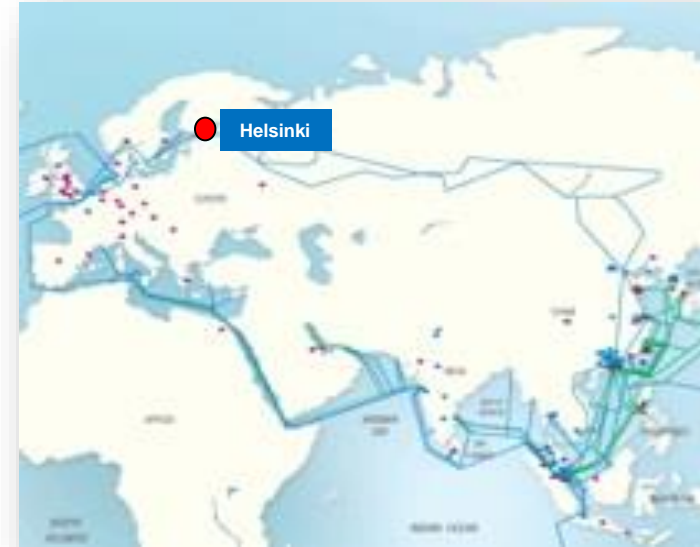
- State of the art domestic fiber network is well connected to global networks
- Hub of global data flows linking Europe, Russia and Asia
- C-Lion1, The new high capacity, super fast submarine cable route from Finland to Central Europe, is now operational.
- C-Lion1 has a record breaking capacity of 18 Tbit/s per fiber pair, total capacity of 144 Tbit/s.
- Measured RTD between Helsinki-Frankfurt is 19,7 ms



City	Frankfurt	Hamburg	Amsterdam	London	Moscow	Tokyo	Hong Kong
Helsinki	19,7	14,2	19,0	23,9	11,7	130,8	132,8
Frankfurt		5,8	11,1	11,6	31,4	150,0	152,0
Hamburg			5,3	10,3	25,9	145,0	147,0
Amsterdam				5,2	30,7	149,7	151,7
London					35,7	154,7	156,7

Future connectivity plans

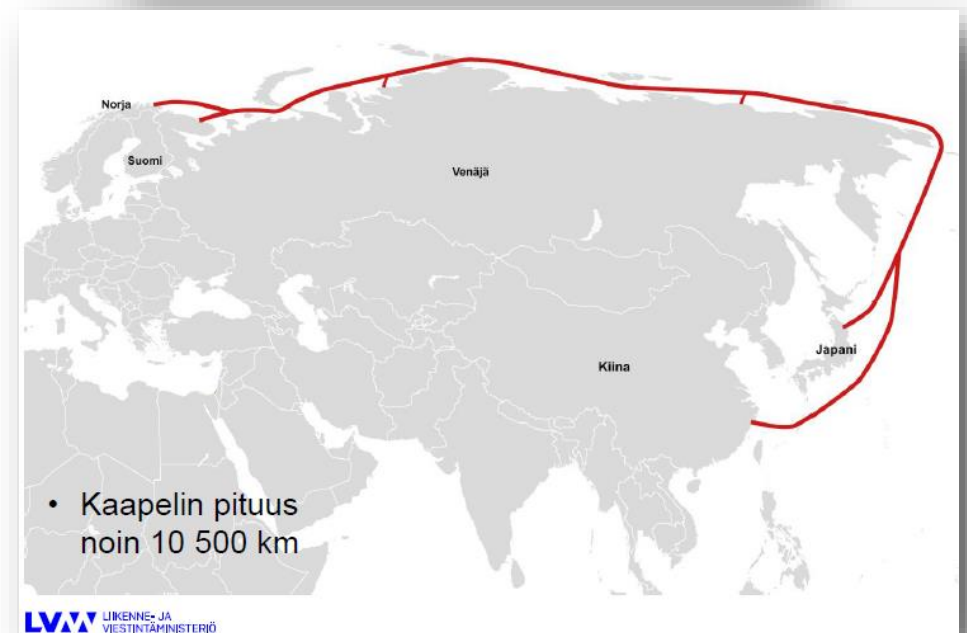
- The new submarine fiber optic routes from Europe to Asia (ARCTIC CONNECT and ARCTIC FIBRE) will lower latency between Europe and Asia about 90 - 100ms compared to traditional route (*Atlantic-Mediterranean-Suez-Red Sea-Indian Ocean-South China Sea*)
- These projects are waiting for the implementation decision.



Source: Datacenter Dynamics

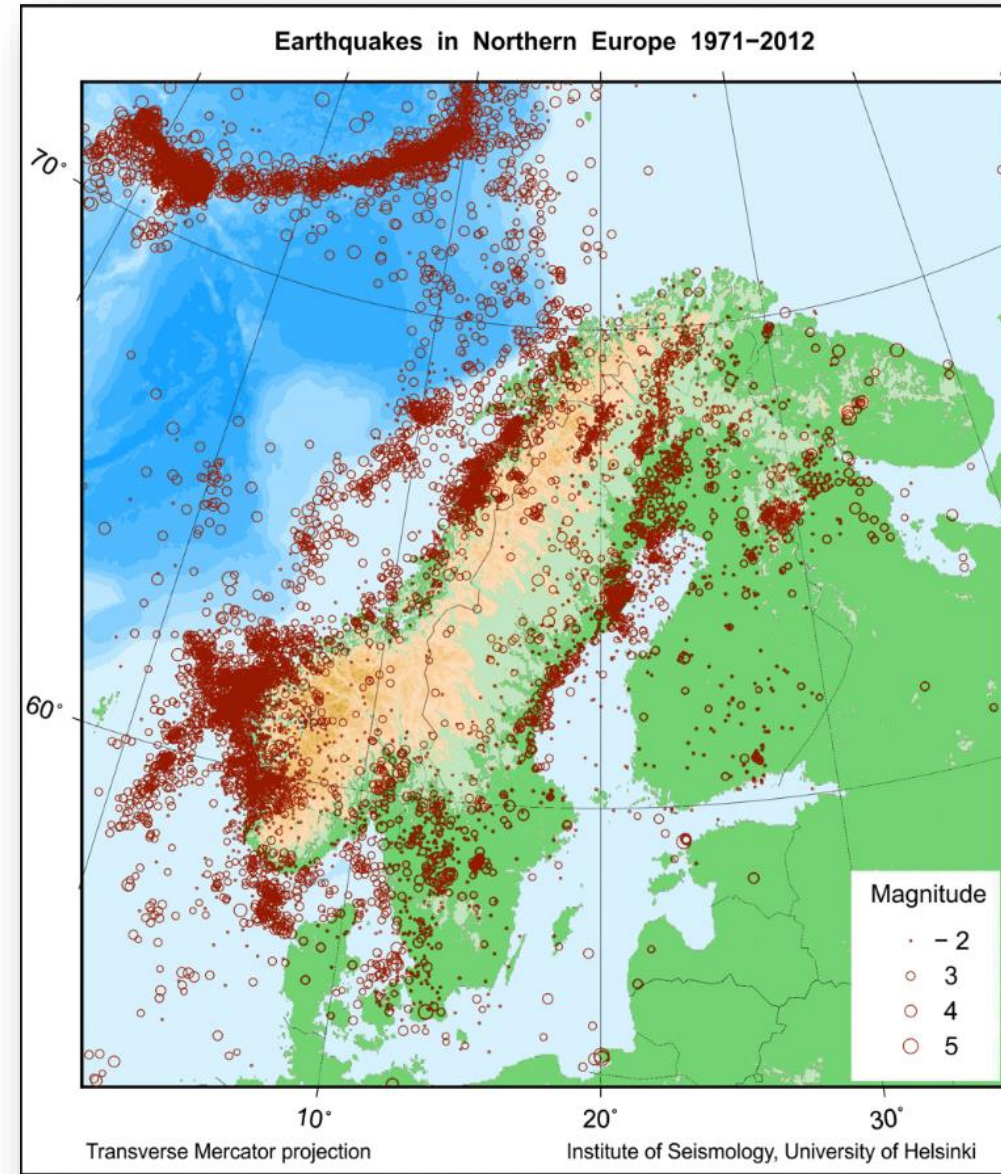


Source: LaserFocusWorld

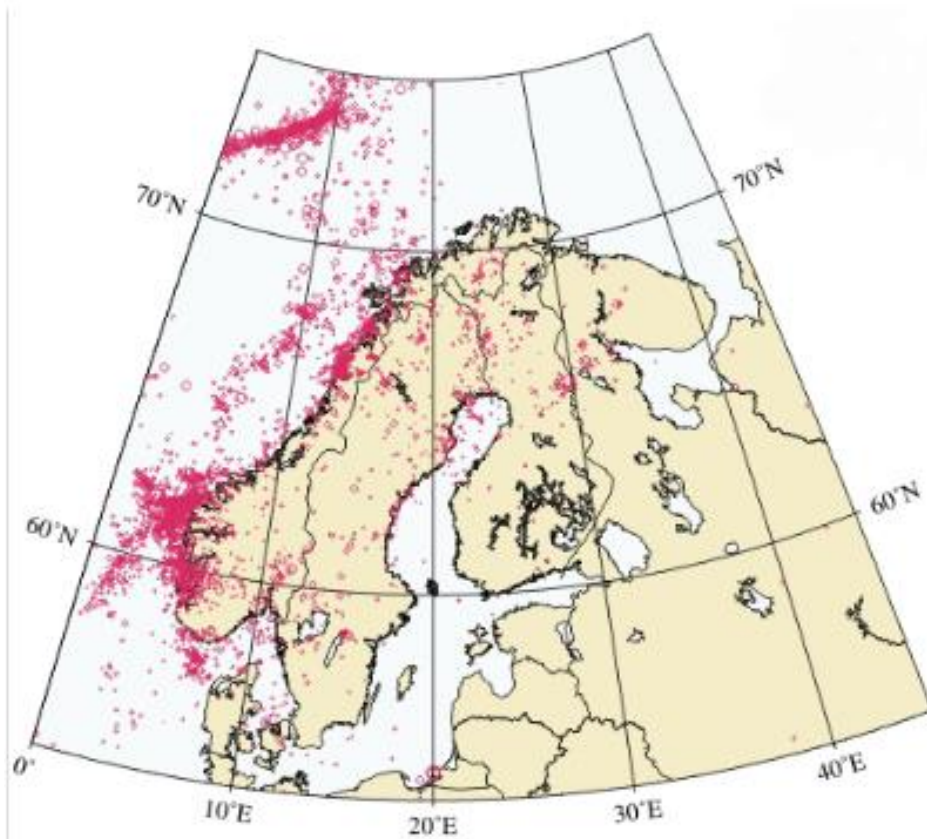


Safe geological location and nature

- Finland is geologically very safe because it lies on a very old and stable bedrock
- Finnish climate is generally mild with no hurricane class storms
- Baltic Sea floods very seldom and its all time record of sea level rise have been only 1.9 m in 2005. Areas that face risk of flooding are predictable.
- Building Regulations demands to build a min. of 3 m above the sea level



Peaceful seismological environment in Finland



Picture: Earthquakes in Fennoscandia during 1965-2005.

The largest earthquake in the region was in 2006: magnitude 2.1.

- Finland is located in a very peaceful area concerning earthquakes.
- There have been some minor earthquakes also in Hanko area, but the magnitude of those events has been small.
- Minor earthquakes in Finland are part of interplate earthquake series on Eurasian tectonic plate.
- Due to the fact that there have been only minor earthquakes, they are not required to be taken in to account in any local building regulations or codes.

Stable society honours privacy

- In addition to Finland being an ideal location for data centers, it is also a safe place to save and keep information
- The Finnish information privacy legislation is quite different from other European countries
 - Unlike most other European countries and including other Nordic countries, Finland adheres strongly to its policies on the right of privacy of individuals and corporations and enforces it's own regulation without exception.
- In Finland privacy of information is a basic right that is inviolable and sacred
 - The same laws on data sovereignty applies to all forms of (stored) information and communication (digital or not)
 - In Finland there is a strong legal protection over any surveillance of information and a dedicated authority that has the power to ensure compliance
 - Officials may not survey information unless their work requires it.
- The favourable legislation to store and handle information has led many data center operators to establish business in Finland.

Finland qualified no.1 in Fragile State Index

“The Fragile States Index is an annual ranking of 178 nations based on their levels of stability and the pressures they face. The Index is based on The Fund for Peace’s proprietary Conflict Assessment Software Tool (CAST) analytical platform. Based on comprehensive social science methodology, data from three primary sources is triangulated and subjected to critical review to obtain final scores for the Fragile States Index”.

Global Innovation index states that with innovation Finland is in 5th place 2016. [Global Innovation](#)

Very Sustainable	Very Stable	Low Warning	Warning
17.8 Finland (178)	40.9 Malta (=151)	61.9 Albania (125)	70.5 Guyana (107)
Sustainable	40.9 Spain (=151)	62.1 Seychelles (134)	70.8 Namibia (106)
20.2 Sweden (177)	41.5 Chile (150)	62.6 Brazil (123)	71.2 Dominican Republic (105)
20.8 Norway (176)	42.6 Slovak Republic (144)	62.8 Botswana (122)	71.3 Gabon (=103)
21.5 Denmark (175)	43.0 Lithuania (148)	63.0 Brunei Darussalam (121)	71.3 Paraguay (=103)
22.2 Luxembourg (174)	43.2 Italy (147)	63.4 Grenada (120)	71.4 El Salvador (102)
22.3 Switzerland (173)	43.8 Estonia (146)	64.3 Bahrain (119)	71.6 Saudi Arabia (101)
22.6 New Zealand (172)	45.2 Mauritius (145)	64.5 Macedonia (118)	71.8 Mexico (100)
23.4 Iceland (171)	46.2 United Arab Emirates (144)	64.6 Jamaica (117)	71.9 Ghana (=98)
24.3 Australia (170)	46.3 Qatar (143)	65.3 Belize (116)	71.9 Peru (=98)
24.7 Ireland (169)	46.7 Costa Rica (142)	65.9 Malaysia (115)	72.4 Vietnam (97)
25.7 Canada (168)	47.6 Argentina (141)	66.2 Cyprus (114)	73.0 Moldova (96)
26.0 Austria (167)	48.6 Latvia (140)	67.0 South Africa (113)	73.5 Cape Verde (95)
26.8 Netherlands (166)	49.1 Hungary (139)	67.4 Cuba (112)	73.6 Micronesia (94)
28.1 Germany (165)	49.3 Barbados (138)	68.2 Samoa (111)	73.7 Sao Tome & Principe (93)
29.7 Portugal (164)	Stable	68.3 Kazakhstan (110)	73.8 Serbia (92)
Highly Stable	51.0 Croatia (137)	68.4 Suriname (109)	74.2 Maldives (91)
30.4 Belgium (163)	51.6 Bahamas (136)	69.7 Armenia (108)	74.5 Turkey (90)
31.6 Slovenia (162)	52.0 Oman (135)		74.6 Morocco (89)
33.4 United Kingdom (161)	52.6 Greece (134)		
33.7 France (160)	54.2 Romania (=132)		
34.4 Singapore (159)	54.2 Montenegro (=132)		
35.3 United States (158)	54.6 Panama (131)		
36.0 Japan (157)	55.4 Bulgaria (130)		
36.3 South Korea (156)	57.0 Mongolia (129)		
36.5 Uruguay (155)	57.5 Kuwait (128)		
37.4 Czech Republic (154)	57.8 Antigua & Barbuda (127)		
39.8 Poland (153)	58.7 Trinidad & Tobago (126)		

Finland is no. 1 also in 2016.

Data Center Risk Index 2016 qualified Finland no. 4

THE INDEX RANKING BY COUNTRY

2016 RANK	REGION	INDEX SCORE (100= BEST)	COUNTRY	ENERGY - ELECTRICITY (COST PER KWH)	INTERNATIONAL BANDWIDTH (MEGABYTE PER S)	EASE OF DOING BUSINESS	CORPORATION TAX
1	EMEA	100.00	ICELAND	6	10	14	9
2	EMEA	96.21	NORWAY	11	7	7	23
3	EMEA	90.26	SWITZERLAND	8	5	16	6
4	EMEA	90.19	FINLAND	13	8	8	9
5	EMEA	89.92	SWEDEN	22	4	6	14
6	AMERICAS	85.07	CANADA	4	16	10	22
7	APAC	84.50	SINGAPORE	23	11	1	4
8	APAC	83.23	KOREA, REP.	2	1	2	16
9	EMEA	79.81	UNITED KINGDOM	30	14	4	13
10	AMERICAS	78.73	UNITED STATES	3	15	5	36
11	APAC	78.73	HONG KONG	21	2	3	3
12	EMEA	78.06	NETHERLANDS	29	6	18	17
13	APAC	76.48	JAPAN	20	3	21	35
14	EMEA	74.98	LUXEMBOURG	27	22	30	25
15	EMEA	74.73	QATAR	1	29	31	7
16	EMEA	73.75	GERMANY	34	18	11	26
17	EMEA	73.61	FRANCE	24	24	17	31
18	EMEA	73.31	CZECH REPUBLIC	28	9	22	7
19	EMEA	71.53	BULGARIA	14	13	23	1
20	EMEA	71.53	IRELAND	32	17	12	2

Risk Index listed 20 best qualified countries with least risk.



European countries' qualification in the Risk Index.

Cushman & Wakefield Data Center Risk Index 2016 Report highlights the most appropriate risks affecting data centre operations in today's current climate. It has been designed primarily to support data centre due diligence and senior decision making when considering global investment and deployment activities.