Ficolo Green Bonds Framework

About Ficolo

Ficolo Oy (Ficolo) is a Finnish limited liability company providing Cloud Delivery Services including colocation datacenter services. Currently Ficolo operates three colocation datacenters and a connectivity hub point in Finland. Besides the colocation services Ficolo's services include Cloud Connectivity, Managed Cloud and Cloud Assurance service. Ficolo has decided to expand its Helsinki Datacenter (The Air Helsinki) through a ca. EUR 50 million investment plan starting 2019. Ficolo's vision is to become the largest independent colocation datacenter operator in Finland.

Environmental Sustainability in the Datacenter Industry

Global ICT sector electricity use is about 10 per cent of global electricity demand of 20,000TWh. Datacenter electricity demand is, in turn, 10 per cent of total ICT sector demand. The Finnish datacenter industry electricity demand is in line with the global demand and is estimated being 0.5-1.5% of total Finnish energy consumption of 85.5TWh.[1] [2] Ficolo's share of the Finnish datacenter industry energy demand is ca. 5 per cent, growing to around 9 per cent during the planned expansion, assuming theoretical consumption at peak power.

With global data traffic more than doubling every four years, data centers are potentially a cause of major environmental impact already in the near future. One of the most worrying models predicts that electricity use by ICT could exceed 20% of the global total by 2030 with data centers using more than one-third of that.[3] IEA report however estimated in 2017 that based on current trends in the efficiency of hardware and data center infrastructure, global data center energy demand is projected to decrease slightly by 2021[4]. This is despite a projected 80% increase in data center traffic and 50% increase in data center workloads over the next three years[5].

Although the more efficient technology may keep the energy consumption of datacenters relatively flat in the near future the exponentially increasing data traffic will be a constant challenge to the environmental sustainability of the sector. As much as 75 per cent of a pure-play data center's operational costs are spent on energy. Even now the energy bill for an individual server's entire life span equals the purchase price of a server. According to a Hewlett Packard study the energy

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[1] Motiva (https://www.motiva.fi/files/4828/Energiatehokas_konesali.pdf)
[2] Motiva (https://www.motiva.fi/en/solutions/energy_use_in_finland/electricity_supply_and_demand)
[3] Andrae, A. & Edler, T. Challenges 6, 117–157, 2015
[4] Cisco, 2018; Masanet et al., 2018; Shehabi et al., 2016
[5] Cisco, 2018

consumption of servers is typically 46 per cent of total energy consumption followed by cooling 23 per cent.

The solution to maintain sustainability despite the massive growth is twofold: look to renewable sources for energy consumption, and bring about a major improvement in the energy efficiency of servers, storage devices and other ICT equipment.

Environmental Sustainability at Ficolo

Ficolo assumes responsibility for preserving the nature and minimizing environmental impacts, both in its data center operations and otherwise. Ficolo actions are guided by applicable laws and regulations but also from Ficolo's strive to provide environmentally friendly services to its customers.

In Ficolo's case, ca. 15% of Ficolo's total costs and ca. 20% of variable costs come from energy consumption. The relative low level compared to the industry average is associated with the service mix of which substantial part is value adding services on top of colocation services Ficolo provides. In addition, promotes energy efficiency awareness among its customers and encourages lower electricity usage. Ficolo has for example excluded energy hungry crypto currency miners from its clientele.

Nevertheless, energy consumption forms the main part of the carbon footprint and operational costs of a datacenter, focuses Ficolo on energy efficiency and selection of energy sources endeavors to minimize its carbon footprint.

In order to increase the energy efficiency, reduce costs and stand out as the industry leader within environmental sustainability Ficolo has introduced the Ficolo Environmental Policy in 2011 based on seven principles:

1. We use 100% green energy in powering the datacenters.

2. We pursue to develop and implement energy efficiency of our processes and the data center e.g. by optimizing the conditions in the data center.

3. We utilize free cooling and cold and hot aisles are in use in the data center.

4. We recycle all our waste. Our target is to keep waste at minimum, especially landfill waste. Extra attention is paid to recycling of electronic waste.

5. We support our customers' environmental awareness by providing them the exact figures of their energy consumption.

6. We value products which help to protect the environment and utilize energy-efficient technology.

7. We reuse our waste heat. We equip all our datacenters with heat recovery facility to utilize the waste heat in the date center facility or local remote heating networks.

Ficolo's Environmental Policy Guidelines are Approved by Ficolo's Board of Directors. Ficolo's target is to continue to reduce the energy consumption and increase the eco-efficiency of its data centers. In addition, Ficolo is committed to environmentally sustainable business practices also outside its data center operations. For example, all of Ficolo's offices also use 100% green energy and Ficolo's travel policy recommends use of public transport.

Adaptation to Climate Change and Related Physical Risks at Ficolo

Due to the cool Nordic climate Ficolo's data centers are less likely to be exposed to physical risks than in many other geographies. There are no major natural hazard risks due to Finland's location and climate.

However, both climate related and other physical risks are carefully assessed by Ficolo's own experts before any data center investments. In addition, Ficolo always consults local authorities in relation to potential physical and other risks in conjuction with data center investments. For example, flooding risk is considered during site selection process as a major factor – one of Ficolo's data centers is located in bedrock underground, but still well above sea level, protected from physical threats and can benefit from natural coolness.

Seven Principles of Ficolo's Environmental Policy

1. Using 100% green energy in powering the datacenters

Ficolo is an active participant in the national advancement of energy efficiency and the use of green energy within the data center industry through the national data center association and other networks.

Ficolo is the industry leader in terms of renewable energy usage for powering of its data centers. Ficolo has powered its datacenters 100% with green energy since 2011. Currently, uses two models procure green energy:

- Ficolo's The Rock Datacenter (in Ulvila) is power through an electricity supply agreement with a local energy company for delivery of pure wind energy.
- In other data centers (in Helsinki and Tampere) Ficolo purchases electricity from the market through a local energy company first, and afterwards purchases the Guarantees of Origin corresponding to the amount of consumed electricity. Ficolo submits the copies of purchased Guarantees of Origin to its customers, if requested.

The nominal capacity of Ficolo's operational data centers and those under construction is ca. 11MW, which converts to electricity consumption of ca. 96,000MWh at full utilization. Such a consumption would mean an annual savings of CO_2 emissions of 3,543 tonnes.[6]

In addition, Ficolo plans to construct a solar energy park with a nominal capacity of 0.5MW in proximity of its underground data center in Ulvila in order to offset data center's electricity consumption related to cooling. Ficolo has received energy subsidy from the Finnish government for the construction of the solar park. Ficolo is also investigating wind energy production possibilities. The electricity could be offered to Ficolo's customers as a part of a service package.

Further, all of Ficolo's offices also use 100% green energy.

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[6] Based on full load assumption compared to Finland's energy mix emissions.

2. **We pursue to develop and implement energy efficiency of our data centers e.g. by optimizing the conditions in the data center.**

Ficolo follows market development closely, particularly with regard to energy efficiency. Currently used energy efficiency measurements are not particularly well suited for an environment with developed waste heat usage. The challenge of classic measurement frameworks has been that they are not comparable with regard to different technologies, datacenter utilization levels and weather conditions.

Ficolo collects big data for energy efficiency and constantly develops opportunities to publish comparable and accurate data.

PUE focuses on mechanical and electrical infrastructure efficiency. One of the weaknesses of PUE is that it does not comprise overall IT efficiency monitoring and improvement.

Ficolo has used Power Usage Effectiveness ratio (PUE) to evaluate how efficiently its data centers use energy. PUE is the ratio between the total energy consumption and the energy consumption by the data center's IT equipment.

Ficolo does not only optimize the energy consumption of the data centers it constructs, but also improves energy efficiency of the data centers it acquires. Acquired data centers are selected based on energy efficiency improvement potential among others. When Ficolo acquires a data center, Ficolo's Environmental Policy is implemented as soon as possible and energy usage is converted to 100% green energy immediately.

Ficolo does not only follow energy efficiency and consumption of ancillary functions e.g. cooling but also focuses on IT equipment energy consumption in order to minimize the total energy consumption of its data centers. Ficolo minimizes the energy consumption of its data centers by using data center automation and close monitoring:

- Data centers are built with modular structure which minimizes areas where cooling needs to be applied
- Data centers' electricity usage is monitored and optimized in real time, thus Ficolo can react to abnormal peaks in electricity usage on a customer and a detailed level
- Data center temperature is monitored and optimized; Ficolo uses big data collected from the data center (space in active use, outside temperature, inside temperature, work load etc.) to optimize temperature (Ficolo keeps the temperature as high as possible whereas data centers in general are often cooled too much)
- Lighting is used only where and when personnel working with smart sensor lightning
- Uninterruptible power supply (UPS) equipment and other equipment is selected based on energy efficiency and eco-friendliness (Ficolo uses UPS equipment with efficiency optimization function) as well as LCAs

Despite of the known challenges of PUE (excluding data for overall IT efficiency), Ficolo's data centers' PUE are on the lowest industry levels[7]:

- The Rock (Ulvila): 1.15

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[7] Google which is considered to be operating modern and advanced data centers reports combined PUE of 1.12 for all of its data centers.

- As the data center is located in tunnels in bedrock, it needs to be cooled only a few days in a year when the outside temperature rises to above 25C
  - The Deck (Tampere): 1.3; can be further improved
    - PUE was 1.6 at the time of acquisition and before Ficolo's optimization
  - The Air (Helsinki, acquired from Fujitsu): expected 1.10-1.20 after optimization
    - PUE was 1.5 at the time of acquisition and before Ficolo's optimization
  - The Air (Helsinki, under construction): 1.05
   - The Air will use air cooling only

While Ficolo's data centers' PUE are already on the lowest industry levels, Ficolo's target is to constantly enhance the energy efficiency of its operations. Ficolo's goal is to be a leader in its industry in terms of energy efficiency.

3. We utilize free cooling and cold and hot aisles are in use in the data centers.

In order to minimize the cooling needs of its data centers Ficolo uses modular structure, which means that only the area in active use need to be cooled compared to the conventional way is to cool the entire data center at once.

In addition, Ficolo uses free cooling, which is a most efficient cooling method.

- Since the Rock (Ulvila) data center is located in cool underground bedrock, the data center needs to be cooled only for a few days when outside temperature rises to above 25C. When needed, indirect free cooling is used to cool the data center.
- Liquid free cooling is used in both the Deck data center (Tampere) and the acquired part of the Air data center (Helsinki)
- The new part of the Air data center which is under construction will use indirect free cooling
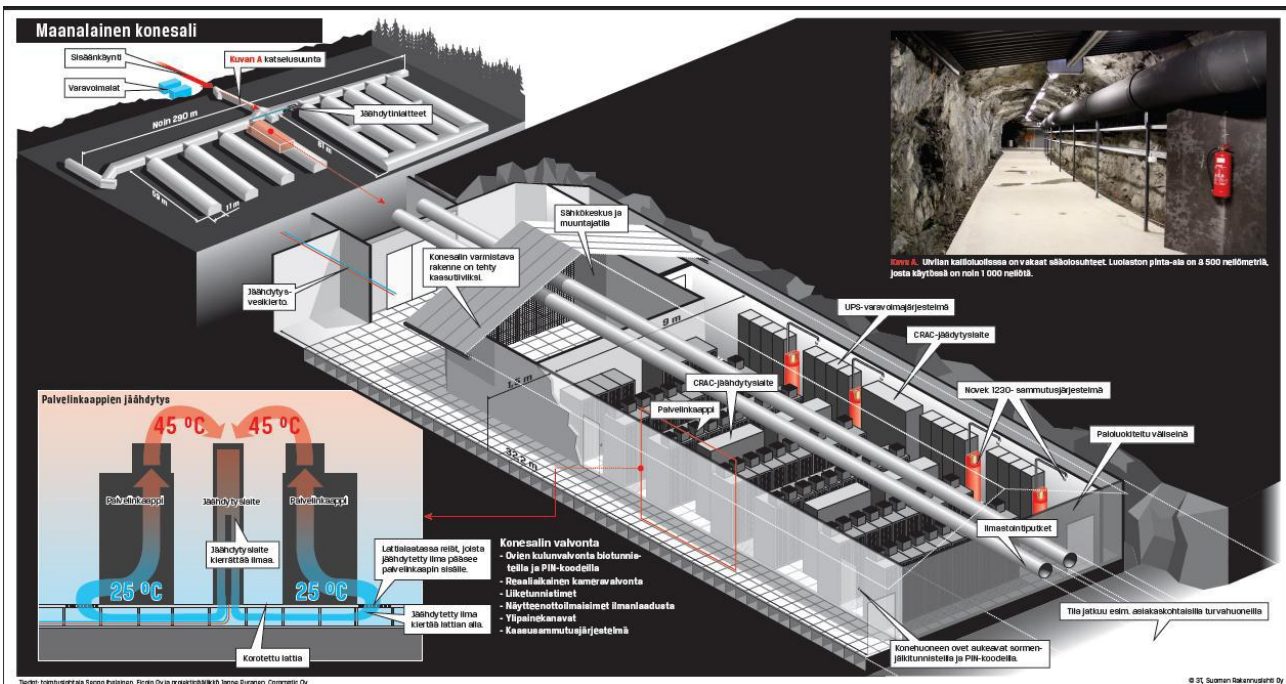
The cooling is organized with cold and hot aisles, which prevents the cold air flow led to the servers from mixing with the heat produced by the servers. In addition, server racks are isolated from each other and placed in solid rows with no empty spaces between the racks, which further decreases the need of cold air flow. The cooling is optimized using big data it collects from the data center.

4. We recycle all our waste. Our target is to keep waste at minimum, especially landfill waste. Extra attention is paid to recycling of electronic waste.

Ficolo pays careful attention to the amount of waste its operations produce as a byproduct. By far the largest source of waste is packing materials of IT equipment Ficolo purchases into its data centers. Ficolo procures its IT equipment only from reputable suppliers with strict sustainable supply chain policy and sufficient certifications in place comprehending both packing materials and the equipment itself including, manufacturing, logistics and energy efficiency.

Further, Ficolo recycles all waste it produces to minimize landfill waste. Ficolo requires ISO 14 000 certificate from its waste disposal partners. In addition, electronic waste is recycled through specialized partner with highest information security and environmental standards.

5. We support our customers' environmental awareness by providing them the exact figures of their energy consumption.

Data centers' electricity usage is monitored and optimized in real time. Ficolo's customers have access to the customer portal where they can monitor among other the work load and the electricity usage of their servers and the associated cost. This effectively increases customers' awareness of their electricity consumption associated with data storage and processing.

Real time monitoring of electricity usage enables Ficolo to react to abnormal peaks in electricity usage on a customer and a server level. Ficolo may alert a customer due to a sudden or a steady increase in electricity consumption. In addition, if so agreed with the customer, Ficolo may set a limit on electricity consumption.

In situations where the customer wants to bring its own equipment and not to procure it through Ficolo, Ficolo encourage its customers to use environmentally friendly IT equipment. In addition, IT equipment which does not fulfill European standards is not allowed into Ficolo's data centers.

6. We value products which help to protect the environment and utilize energy-efficient technology.

Ficolo procures its IT equipment only from reputable suppliers with strict sustainable supply chain policy and sufficient certifications in place comprehending both packing materials and the equipment itself including, manufacturing, logistics and energy efficiency. In addition, LCAs and residual waste are major selection criteria for IT equipment. For example, Ficolo uses only recyclable batteries in its UPS equipment.

In addition, situations where the customer wants to bring its own equipment and not to procure it through Ficolo, Ficolo encourage its customers to use IT equipment from supplies which have strict sustainable supply chain policy and sufficient certifications in place. However, at the minimum the customers' IT equipment must by CE certified.

7. We reuse our waste heat.

In line with its pursuit of minimal environmental impact Ficolo actively promotes waste heat reuse in all of its data centers.

- Waste heat reused from the Rock data center (Ulvila) is currently used to heat the data center facility. Ficolo has also agreed with the Ulvila municipality to provide heat to a new eco-friendly housing area to be built in the near future.
- The Air data center (Helsinki), which is currently under renovation and construction will be equipped with waste heat reuse. Ficolo is planning to sell the heat to the local energy company, which will further improve energy efficiency of the data center.
- While the Deck data center has an option for waste heat reuse, however, due to the current size of the data center, the amount of heat potentially to be reused is not sufficient for usage as heat energy. As data center expands, waste heat reuse will become more feasible.

ICMA Green Bond Principles

Ficolo's Green Bond Framework is developed in line with ICMA's Green Bond Principles 2018. The proceeds from Green Bonds Ficolo will issue will be used to finance projects that fall under the Energy Efficiency Green Project category as outlined by ICMA's Green Bond Principles 2018.

Use of Proceeds

Ficolo will use the proceeds from the issuance of Green Bonds to finance data center investments, including construction and acquisition of data centers (or companies operating data centers), that after investment by Ficolo are operated in accordance with Ficolo's Environmental Policy i.e. operated with 100% green energy and have a high focus on energy efficiency among others ("Green Projects").

Ficolo's Green Bonds can be used to finance new Green Projects and to refinance existing Green Projects.

Ficolo's Green Bonds will not finance fossil fuel generation projects.

Project evaluation and selection

Green Projects are evaluated and selected by Ficolo's management and proposed to Ficolo's board of directors for final decision making which is documented in minutes of board meetings.

Green Projects are evaluated based on among others energy efficiency and energy efficiency improvement potential in case of data center acquisitions.

After the selection, the board of directors ensures that Ficolo's Environmental Policy is implemented by the management in the Green Project as soon as possible.

Management of Proceeds

The net proceeds from issuance of Green Bonds will be allocated to Green Account. Green Projects will be classified in both book keeping and management accounting. Green Account will

be restricted so that it can be credited by Green Projects only. The Green Account will be controlled by CFO and CEO, which will report regarding the use of Green Account to the board of directors.

Reporting

To enable investors to follow the development and provide insight into Ficolo's business, Ficolo will provide on an annual basis Green Bond investors with a letter including:

- Power Usage Effectiveness reporting
- Confirmation of 100% green energy usage in all of its data centers
- Referral to Ficolo's up to date Environmental Policy, as part of the Green Bond Framework, approved by Ficolo's board of directors (published on Ficolo's web site)
- Information about the division of the allocation of Green Bond proceeds between new Green Projects and refinancing

Ficolo's board of directors will be responsible for compiling the letter to Green Bond investors.

Ficolo will have its Green Bonds Framework reviewed by the Centre for International Climate and Environmental Research – Oslo (CICERO) who will issue a Second Opinion. The Second Opinion as well as the Green Bonds Framework will be made publicly available on Ficolo's web page.