Elisa Oyj

Elisa´s environmental calculation document

20.3.2018

Content

IMPLEMENTATION AND RELIABILITY OF MEASUREMENTS

Elisa's carbon dioxide emissions have been calculated according to the Greenhouse Gas Protocol Corporate Standard. In Scope 2 emissions calculations the GHG protocol Scope 2 guidance has been taken into account and the Scope 3 calculation has been reported in accordance with the GHG protocol Corporate Value Chain. Elisa's emission savings calculations is based on ISO 14040: 2006 principles.

Elisa's environmental calculations is assured by a third party. The assurance included assessing the reliability of the data collection and reporting systems, the existing controls, and the risks relating to the data calculation method and data collection. This calculation document has not been assured.

The independent assurance for emission savings meters and carbon footprint 2017 was carried out by EY. These included assessment of the requirements and objectives set for the calculations, and the risks affecting the correctness of the information. They also included review of the reporting and data formation processes, the systems and data collection instructions. The objective is to ensure that the policies, practices and information systems created will allow for a sufficiently accurate and reliable calculation.

SIGNIFICANT ADJUSTEMENTS TO PREVIOUS ACCOUNTING PERIOD

Significant adjustments to previous accounting period (2017):

The following changes have been made in the Carbon footprint calculations:

- Scope 1 emissions have been corrected retroactively to year 2015

The following changes have been made in the CO_2 emission savings calculations:

- There is no significant changes in the calculations compared to the last reporting period

SERVICES REDUCING CUSTOMERS' EMISSIONS

Virtual conferencing

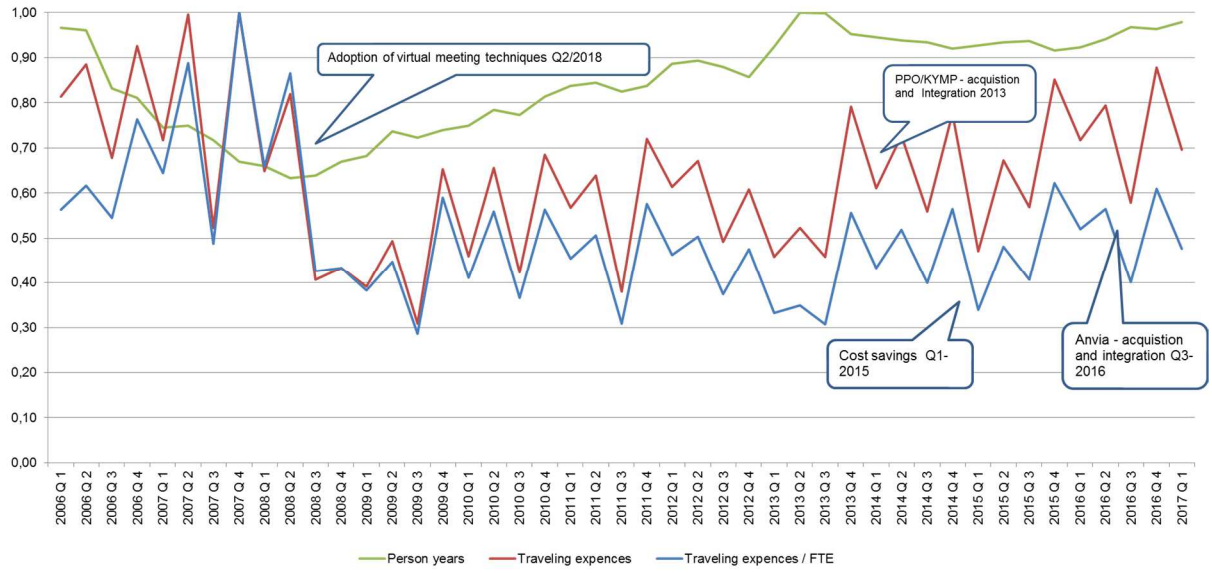
The objective is to calculate the CO_2 emission savings of the virtual conferences arranged by Elisa for customers, compared with a traditional conference where participants are travelling to the conference venue. Elisa offers customers several virtual conference solutions. The conferencing types consist of Videra's video conferencing services and Microsoft's Lync. Teleconferences were excluded from the calculation. The services included in the calculation will subsequently be called *virtual conferencing*.

Videra´s systems provide information about number of participants in Videra´s videoconferences. In respect of Lync service, information about participants is not available. To assess the meeting volumes, the results of surveys made to Elisa´s Office 365 customers 3.4.2013 and 10.4.2014 is used.

Total 187 companies have been participated to surveys. According the surveys an average 7, 97 virtual meeting were held per one user (it´s the same as per one license) in half year. In average 3,46 participants

in one meeting. In external benchmark, Crimson Consulting Group´s survey, average participant in meetings is 4 persons. (Crimson Consulting Group 2009).

Virtual conferencing can replace traditional conferencing but it will increase the total number of meetings as the threshold for virtual conferencing is low. The growth in the number of meetings carried out due to possibility of using virtual conferencing was estimated on the basis of the related surveys available and the meeting and business travel behavior of Elisa's own employees. The calculation is largely based on the changed business travel behavior of Elisa's employees. **In the calculation, one videoconference in three is considered to replace a traditional meeting.**



Elisa's travel expenses/employee within the period 2006-2016

Measuring distances

The use of Elisa's own virtual conferences is comprehensively documented. The data collected in Elisa's Meeting Centre reports are utilized when assessing virtual conference behavior among customers: the number of participants, length of avoided conference travel, and distribution by modes of transport. Complementary data was derived from national commutation surveys (Statistics Finland as the source for overseas areas and the National Travel Survey 2004–2005 for Finland) and surveys held to customers.

The assumption of office distribution of the conference participants is**: head office or nearby area 87 per cent, other parts of Finland 8 per cent, Europe 4 per cent and other continents 2 per cent.** Calculation assumption based on two customer inquiry. In year 2010 the sample of survey was 7 companies, in year 2013 56 companies and in year 2014 118 companies. Distribution of companies offices were volume weighted average of these inquiries.

The shares of transportation by mode Finland is assumed to be: passenger car kilometers 69 per cent, train kilometers 22 per cent, ship kilometers 0 per cent and short flights 9 per cent. Calculation assumption is average on Elisa's own use and the National Travel Surveys 2004–2005 and 2011.

The assumption for medium-long flights in Europe is 100 per cent and that for intercontinental flights 100 per cent. The average travel distance is assumed to be 390 km in Finland (based on Elisa's own use), 2,000

km in Europe (Helsinki-London 1,800 km) and 8,000 km to other continents (Helsinki-New York approx. 6,600 km).

Despite careful background surveys and operational assessments, the calculation of the decrease in travel owing to the use of virtual conferencing still contains many assumptions and generalizations that are based on Elisa's own structure and the geographical location of its offices. However, Elisa has complied with the prudence principle and thus used the lowest coefficient in both teleconferencing and other calculations of emission saving.

Cloud services for customers

Elisa's cloud services provide customers with a virtual server, i.e. server capacity from Elisa's equipment, instead of traditional server solutions.

The objective is to calculate the CO_2 emission reductions enabled by Elisa's cloud services, compared with a service produced traditionally.

First, the number of virtual servers is sorted out. The number includes the virtual servers and -services sold by Elisa and those sold by subsidiaries Elisa Links Ltd, Appelsiini Ltd and Elisa Estonia. Then it´s estimated how many traditional servers would be needed to produce a corresponding service. Next, the energy consumption of servers Elisa's cloud services and of servers in a traditional system is assessed. Finally, energy savings is calculated by comparing a cloud service system to a traditional system. The calculation assumes that services transferred to Elisa have been produced by another service provider so that 20 % is being produced using traditional server technology and 80 % in another virtual server platform.

The power consumption of traditional server solution is assessed based on the values given by the manufacturers. Power consumption is assumed to be 242 W (Dell, 2017). The power consumption of a traditional server environment is assessed on the basis of the average 1,91 PUE figure (EPA, 2010). The power consumption in Elisa´s data center is assessed on the basis of the measured PUE figure.

The power consumption of virtual servers is calculated based on the power consumption of the Blade server, which is estimated to be 3600 W. Inside one Blade server is assumed to be 20 virtual servers. The PUE of the virtual server environment outside Elisa is assumed to be 1.85 (Rittal 2014). Elisa's PUE figure is measured.

Recycling terminal equipment

The objective is to calculate the emission savings achieved in the manufacture of new terminal equipment by recycling used phones.

The assumption is that if the customer does not purchase a used mobile phone or mobile broad band modem (MBB-modem), he/she will be purchase a new, inexpensive one. The calculation is based on the number of used phones and MBB- modems sold and the carbon footprint of manufacturing (including manufacturing and logistics) a new phone.

The calculation don't´ take into account any possible emission reductions resulting from material server cycling, as carbon footprint standards take into consideration the use of recycled material in a product manufactured. Either the energy consumption of phones and chargers is not taken into account. Depending on assumptions made, older phone models have higher energy consumption, equal to one to three per cent of the emissions of manufacturing a new mobile phone (Nokia Oyj, 2014).

EMISSION REDUCTIONS IN SERVICE PRODUCTION

Elisa is determined to make every effort to reduce its own emissions throughout the 2000´s. In day-to-day operations, Elisa has reduced its carbon footprint by improving energy efficiency, making the most of its own services, and changing its operating methods.

Ideal work

The objective is to calculate the extent to which mobile work solutions have reduced carbon dioxide emissions in Elisa's operations. Mobile work means accessibility of people, services and data regardless of time and place. Emission reductions were calculated for three sub-areas: (1) emission reductions with the help of teleworking, (2) emission reductions in business travel with the help of virtual conferences, and (3) emission reductions with the help of a multi-functional office solution.

Lower level metric: Remote working

The objective is to calculate the extent of Elisa's employees reduced carbon dioxide emissions, taking into consideration the travel-related carbon dioxide emissions saved by Elisa's personnel by reduced daily commuting.

Employees who are working in Elisa´s offices were sent the link to survey in April 2016. The survey is conducted yearly to evaluate the amount of remote working days deployed by employees during the year. The response rate in survey was 17 per cent. The latest survey showed an average of 6,8 days a month of remote working. The surveys also collected data of the distance of daily commute to a central place of work (average ca. 21 km) and the methods of transportation. The emission volumes for each were calculated using emission factors obtained for road and rail travel from VTT's Lipasto calculation system.

Lower level metric: decrease in business travel

The objective is to calculate the extent of Elisa's own virtual conferences reduced carbon dioxide emissions during calculation period, taking into consideration the travel related carbon dioxide emissions saved by Elisa's personnel by attending virtual conferences.

The base of the calculation was that as a rule the possibility to arrange virtual conferences will increase the number of conferences. It was defined in the calculation that the total number of virtual conferences replaces traditional conferences by 30%. The conservative assumption of a 30% replacement rate is supported by other information sources and further justifications are presented in the "Virtual conferencing" chapter of this report.

The calculation covered all conferences arranged by Elisa's personnel using the following services: Lync, Vidyo and Teleprecense and Webex (Webex- service was discontinued from 1.4.2016) Teleconferencing was omitted from the calculation. Teleconferences were omitted from the calculation due to lack of sufficiently reliable and extensive information. Teleconferencing is generally used during Webex and LiveMeeting conferences as part of more versatile virtual conferencing technology.

Distances were calculated on the basis of assumptions underlying Elisa's own calculations and based on the business travel behavior of Elisa's personnel and data available on the use of the service. For Webex and Telepresence, the figures for kilometers travelled between offices were obtained from Elisa's Webex and Telepresence reporting (Elisa meeting center reporting) for the calculation of period H1/2010. The starting point was the conference participant's office, which was obtained from his/her registration data (name and

e-mail address) and personnel management software. Distances between the points were calculated for travel by car, train and air, and the following websites were used to determine distances:

• Car: Googelmaps: www.maps.google.fi

• Train: Publication of the Railway Administration Centre: http://portal.liikennevirasto.fi/sivu/www/f/liikenneverkko/rautatiet

• Airplane: Data on distances between airports: http://www.partow.net/miscellaneous/airportdatabase/

The percentages of different means of transport between offices were drawn on a matrix. The most likely means of transport between Elisa's offices were assessed. Elisa's offices furthest from Helsinki are located in Joensuu, Kokkola and Oulu. The share of flights to and from these offices was checked from Elisa's travel invoices. The emission volumes of the various means of transport were calculated using emissions factors obtained for road and rail travel from VTT's Lipasto calculation system and for air travel from the GHG - Protocol. The average number of Lync conference participants and travel distances were assumed to be the same as the average in Webex.

The emission savings were calculated on the basis of the emission calculations for H1/2010 by first calculating emission savings for one conference based on the data for H1/2010 (Webex, Lync and Videran Office Mobile- service 12,10 kg CO2/meeting ja Teleprecence ja Videra´s physical virtual meetings 44,2 kg CO2/meeting). This figure was multiplied by the number of conferences. Since the calculation for H1/2010 involved analyzing data on approximately 15,000 conferences, the resulting figure can be considered reliable.

Lower level metric: space efficiency

There are no dedicated desks for any employees Elisa's multi-functional offices. As a result of mobile working, Elisa has reduced the office space and the number of desks. The calculation of the space efficiency metrics aimed to show the carbon dioxide emission savings for the office space that otherwise would have required heating. **In the calculation Elisa´s space efficiency is compared with the average Finnish space efficiency figure of 23 m2/person (source: Consulting office DTZ 23.6.2009).**

The result is the assumed emissions for the amount of space saved during the calculation period. The floor area in square meters and the number of employees is obtained from Elisa's facility service information system. The emissions are calculated by using the average specific consumptions for Elisa's offices obtained from Elisa's latest carbon footprint calculations.

Emission calculations are restricted to the consumption of electricity and heat usage of the building and user electricity usage. Water consumption was excluded from the calculation as the impact of lifecycle emissions from water purification is very small.

Energy efficiency of server environments

The objective is to calculate savings in carbon dioxide emissions in Elisa's server centers as compared to average energy efficiency of the ICT sector. There were three different aspects in the calculation:

• Efficiency of the IT infrastructure measured with a PUE figure

• Level of virtualization (The number of virtual servers)

• Reuse of the waste heat arising from the servers

Lower level metric: Calculated energy efficiency with the PUE figure

Cooling has a major role in data center energy consumption. PUE is calculated by dividing the total energy consumption of the machine rooms by IT energy consumption (Green Grid). The following calculation formula was used:

(Elisa's IT energy consumption * reference PUE) – (Elisa's IT energy consumption * Elisa's PUE) =energy efficiency as compared to the average ICT company. The reference PUE figure was 1.91 (EPA, 2010).

Calculations were limited based on data of only two major data centers due to the lack of accurate measurements in other centers and computer rooms. Elisa have small equipment facilities around Finland. The total energy consumption of the two data major centers is about 60% of the energy consumption of all the equipment facilities.

Lower level metric: Cloud services

Elisa's cloud services provide customers with a virtual server, i.e. server capacity from Elisa's equipment, instead of traditional solutions. The advantage of virtual servers is their energy efficiency, which allows for using the servers more efficiently at the maximum utilization rate.

First, the number of virtual servers is sorted out. Next, the energy consumption of servers in cloud services and of servers in a traditional system is assessed. Finally, energy savings is calculated by comparing a cloud service system to a traditional system.

The power consumption of traditional server solution is assessed based on the values given by the manufacturers. The power consumption of a traditional server environment is assessed on the basis of the average 1,91 PUE figure (EPA, 2010). Power consumption is assumed to be 242 W (Dell, 2017).

The power consumption of virtual servers is calculated based on the power consumption of the Blade server, which is estimated to be 3600 W. Inside one Blade server is assumed to be 20 virtual servers. Elisa's PUE figure is measured.

Lower level metrics: Heat utilization

In summer of 2011, Elisa started to deliver the heat generated by a server center in Espoo to Fortum's district heating network. Next autumn, the heat recovery system was expanded, which considerably increased the volume of utilized heat energy. In the system, the heat generated by servers is bound with the district heating system's coolant and transferred, along with it, to the district heating network of Espoo. The heat generated is used in the district heating network as an energy source, instead of using the heat generated by fossil fuels. The quantity of heat is measured based on heat coefficient of the coolant, the flow rate and the temperature difference of liquid before and after the server center.

In CO2 emission saving calculations was used emission factor which obtained from Fortum. The emission factor consisted production of district cooling and the emissions savings resulting from avoided production of district heating.

Reuse of products

Product returns

The purpose of this calculation is to monitor the emission savings arising from the recycling of product returns. In H1/2010 is used as the reference point. Some of the devices sent by Elisa to consumer customers (phones, SIM cards, modems, etc.) are returned to Elisa after a short testing period. Improved checking and packaging methods enable Elisa to recover more efficiently those devices that are still functional and forward them to other customers. Recycled devices are sent to customers as replacements for new devices. Since the carbon dioxide emissions generated by the manufacturing of electronic devices are large, the new practice results in remarkable emissions savings.

The calculations included the following products:

• Mobile phones

• Mobile broadband dongles

• Broadband modems

• IPTV set-top box

• Home Security Service devices

SIM cards were omitted from the calculation, because nearly all SIM cards have undergone recycling for many years.

The products that were returned by customers and sent by Elisa to new customers were regarded as recycled products. The recycling was considered to have generated emission savings that equal the emissions arising from the manufacture of new similar devices.

Electronic invoicing

The objective is to calculate the CO2 emission reductions enabled by Elisa's electronic invoicing and electronic order confirmations, compared with invoicing produced traditionally. The calculation covered electronic invoices and order confirmations delivered by the Elisa parent company. Both have similar processes.

Then emission savings are calculated by comparing an invoice or order confirmation sent traditionally to an electronic one. The actual figure is calculated by multiplying the number of electronic invoices and confirmations sent by emission savings per one electronic invoice/order confirmation.

Moreover, the calculation includes emissions from disposal and recycling as well as archiving (6 years) for corporate customers.

Energy saving measures in the mobile network

The purpose of the calculation is to monitor the carbon dioxide emission savings resulting from the actions that will reduce mobile network power consumption in Elisa's mobile network. For reference is a situation, that no actions should not be taken.

Regarding to electricity saving features, savings are based on the measured energy consumption of base station sites and the difference in energy consumptions before and after the procedure.

Other measures are the physical base station configurations changes. For those measures, the savings are calculated based on the number of actions in the calculation period. The actions are multiplied by the amount of electricity savings per action, which are based in measured electricity consumption in mobile network. The result is electricity savings in calculation period. Electricity savings in calculation period are multiplied by a coefficient of carbon dioxide emissions.

Renewal energy

The purpose of the calculation is to monitor carbon dioxide emission savings resulting from the purchase of renewable energy.

The reference situation is where purchased energy is not produced with renewal energy. Certificates of origin shall be purchased in advance at the beginning of the year. The amount of purchased electricity for reporting year can be get from guarantees of origin. This amount is divided by two to get the guarantees purchased to one calculating period (H).

OTHER EMISSION SAVINGS RESULTING FROM ENERGY EFFICIENCY

Energy consumption of one mobile subscription

The objective is to calculate energy consumption of one mobile subscription. In the calculation, the energy consumption of the mobile network was divided by the number of subscriptions.

Calculation of the electricity consumption of the radio network is based on the measured electricity consumption of base stations in sites. In sites where we have rented, energy consumption is based on the configurations of the base stations in sites and base station specific electricity consumption, which is based on measured consumption in our own sites. The energy consumption of drivers is included as well as the estimated electrical power required by heating and cooling.

Those subscriptions of Elisa and Saunalahti that have generated invoiced income during the six-month period were taken into consideration in the calculation. The calculation covered all subscription types (postpaid, prepaid, telematics and non-commercial subscriptions).

Energy consumption of mobile data

The objective is to calculate energy consumption of the mobile network per package data volume transmitted through the network. The criteria for calculating the energy consumption were discussed in the previous chapter. The energy consumption of the radio network is divided by the amount of data transferred. The number of mobile data in the mobile network will be obtained from maintenance statistics.

ELISA´S CARBON FOOTPRINT

Elisa's carbon footprint is calculated on the basis of the most recent completed year-over-year statistics and the actual data obtained . The carbon footprint calculation at Elisa is based on the Greenhouse Gas Protocol (GHG), which is developed by the World Resources Institute and the World Business Council for Sustainable Development.

The GHG protocol calculation and reporting are based on complying with the general principles used by companies in their calculation and reporting of the key financial indicators. These principles consist of relevance, comprehensiveness, consistency, transparency and precision.

Elisa has taken the general calculation principles into account. The calculation criteria have been defined for the various functions with a view to ensuring that they correspond to Elisa's operations, products and services as well as possible. The calculation has been implemented to ensure the method is transparent and assurable by a third party.

EMISSION FACTORS USED IN CALCULATION

Scope 1:

Fuel	Source
Burning oil	Tilastokeskus 2017: http://tilastokeskus.fi/tup/khkinv/khkaasut_polttoaineluokitus.html
Gasoline	Tilastokeskus 2017
Diesel	Tilastokeskus 2017

Scope 2:

Country	Source
Finnish average (electricity)	Motiva 2017: https://www.motiva.fi/ratkaisut/energiankaytto_suomessa/co2-laskentaohje_energiankulutuksen_hiilidioksidipaastojen_laskentaan/co2-paastokertoimet
Estonian average (electricity)	Rediss three year average (2014-2016) : www.aib-net.org. Market based factor is based on Elisa´s own separate calculation verified by a third party
Great Britain, average (electricity)	Rediss three year average (2014-2016) : www.aib-net.org
Spain average (electricity)	Rediss three year average (2014-2016) : www.aib-net.org
Sweden average (electricity)	Rediss three year average (2014-2016) : www.aib-net.org
Norway average (electricity)	Rediss three year average (2014-2016) : www.aib-net.org
Fortum (district cooling)	Fortum 2017
Great Britain, average (district heating)	DEFRA 2016: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2016 - Conversion factors 2016 - Full set (for advanced users)
Finnish average (district heat)	Motiva 2017: https://www.motiva.fi/ratkaisut/energiankaytto_suomessa/co2-laskentaohje_energiankulutuksen_hiilidioksidipaastojen_laskentaan/co2-paastokertoimet
Helen (district cooling)	Helen 2017: https://www.helen.fi/yritys/energia/energiantuotanto/sahkon-ja-lammon-ominaispaastot/
International average (district heating)	WWF ilmastolaskuri 2017 (Euroheat&power): http://www.ilmastolaskuri.fi

Scope 3:

Transport type	Source
Train (Express)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Long haul flight, (over 1126 km, Outside Europe)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm

Ferry (HEL-STO)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Short haul flight, under 463 km (domestic flights)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Bus	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Commuting by Metro and tram	HSL is using renewal electricity: https://vuosikertomus.hsl.fi/
Commuting by walk	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Ferry (HEL-TLL slow speed)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Train (Local)	HSL is using renewal electricity: https://vuosikertomus.hsl.fi/
Train (Intercity)	VR is using renewal electricity: http://www.vrgroup.fi/fi/vuosiraportti-2016/?goto=/fi/vuosiraportti-2016/vuosiraportin-kuvaus/
Ropax vessel (HEL-Travenmunde)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Ferry (HEL-TLL high speed)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Commuting by bicycle	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Medium haul flight, > 463 km	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Commuting by Bus	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Car (own)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Commuting by train	VR is using renewal electricity:
Commuting by car	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Express vessel (HEL-TLL)	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Car (leasing)	ALD and Leaseplan: average of Elisa´s leasing cars
Train (International)	Defra 2017, international train
Taxi (Finland)	ALD and Leaseplan: average of Elisa´s leasing cars
Taxi (Estonia)	ALD and Leaseplan: average of Elisa´s leasing cars
Flight freight	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Road freight	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Sea freight	VTT lipasto 2017: http://lipasto.vtt.fi/en/index.htm
Equipments	**Source**
	Apple 2017: https://www.apple.com/environment/reports/
	Apple 2017: https://www.apple.com/environment/reports/
	Nokia 2013
	Samsung 2015: http://www.samsung.com/us/aboutsamsung/sustainability/sustainabilityreports/download/2015/SAMSUNG%20SUSTAINABILITY%20REPORT%202015_ENG%20-%20ENVIRONMENT.pdf, page 16
	Anders S. G. Andrae & Otto Andersen Int J Life Cycle Assess (2010) 15:827–836 DOI 10.1007/s11367-010-0206-11
	Anders S. G. Andrae & Otto Andersen Int J Life Cycle Assess (2010) 15:827–836 DOI 10.1007/s11367-010-0206-12
Services	**Source**
	Defra 2012
	Jyri Seppälä et.al. 2019. ENVIMAT research: https://www.motiva.fi/files/4771/Suomen_kansantalouden_materiaalivirtojen_ymparistovaikutusten_arviointi_ENVIMAT-mallilla.pdf
Bills	**Source**
	The paper emission factor used in the calculation is based on average emissions reported by four different manufacturers
	VTT LEADER research project (VTT LEADER 2007–2010).
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	Itella 2011: Ipost research

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Rittal 2017: http://www.rittal.com/fi-fi/content/fi/unternehmen/presse/pressemeldungen/pressemeldung_detail_33088.jsp [9.3.2018]

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APPENDIX: BUSINESS TRAVEL CHANGES IN ELISA CORPORATION

In H1/2010 Elisa employees attended over 30,000 virtual conferences, which were well documented. According data gathered virtual conference users' central place of work and Elisa employees' average methods of transportation based on travel invoicing and distances between different Elisa office locations, theoretical travel distance of virtual meetings was calculated and normalized. The result was 1.2 million kilometers, excluding such virtual meetings, where the use of international and domestic flights would have been the most likely means of replacement. Reliable data on these distances was not available.

The review of Elisa's travel expenses indicates that the total amount of business travel has decreased considerably, whereas the total amount of virtual conferencing has increased significantly. Based on the travel expenses development during 2006-2010, the

statistical cost reduction of travel expenses during calculation period can be roughly estimated and converted to kilometers based on allowances for travel expenses paid for employees at Elisa using their own cars. Recalculation the travel expenses in the spring of 2014 showed that the travel expenses per man-year have permanently stabilized at a very low level.

The train is commonly used for short and medium distances in Elisa business travels. However, at the time of calculation, the amount of train travel could not be comprehensively separated from other travel expenses. Therefore allowances for travel expenses for employees using the train are assumed according to the use of car. The expense of train per kilometer is based on Statistics Finland's review of train expenses in Finland for a travel distance of 200 km in 2010. As a result, the actual replacement could be calculated from the period, as travel expense reductions (excluding flights, lodging and other expense) and virtual meetings as 100 percent replacement distances were converted to kilometers. The calculation result shows that the percentage at which virtual conferencing has replaced traditional conferencing, was 31 per cent. If we assume that 60 per cent of travel allowances for this period related to travelling by train, the replacement degree would increase to as high as 39 per cent.

According to the report of the Carbon Disclosure Project, at the initial phase 44 per cent of virtual conferences are new but their share reaches 66 per cent after five years. This means that at first 56 per cent of the virtual conferences replace travelling and that the share falls to 34 per cent after five years. (Carbon Disclosure Project Study 2010, The Telepresence Revolution). The point of departure here was the careful assumption that at least 30 per cent of the conferences replace traditional conferences, a trend also supported by information available from other sources (Crimson Consulting Group 2009, James 2009, 2005).