Elisa Oyj

Elisa´s environmental calculation document for CO2 emissions

Contents

IMPLEMENTATION AND RELIABILITY OF MEASUREMENTS

Elisa's emission savings calculations is based on ISO 14040: 2006 principles.

Calculations are assured by a third party. The independent assurance for emission savings meters 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 was to ensure that the policies, practices and information systems created will allow for a sufficiently accurate and reliable calculation. This calculation document has not been assured.

SIGNIFICANT ADJUSTEMENTS TO PREVIOUS ACCOUNTING PERIOD

There are 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 Skype. 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 Skype service, information about number of 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 are 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 3,69 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 (see the appendix).**

Measuring distances

The use of Elisa's own virtual conferences is comprehensively documented. The data collected in Elisa's Meeting Centre reports is 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 417 km in Finland (244 km train trips weighted by Elisa's own use), 1781 km in Europe (based on the distance of Elisa's flight trips) and 7561 km to other continents (based on the distances of Elisa's long haul flights).

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. Emission saving per one meeting is 31 kgCO2.

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 doesn'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 1: 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. Elisa in this calculation consists of Elisa Oyj, Enia Oy and Elisa Eesti AS.

Employees who are working in Elisa´s offices were sent the link to survey in September 2018. 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 36 per cent. The latest survey showed an average of for Elisa 6,3 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 17 km) and the methods of transportation.

Lower level metric 2: 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: Skype and Videra´s meetings.

Lower level metric 3: 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:

- Customers virtual servers (The number of customer´s virtual servers)
- Elisa´s virtual servers (The number of virtual servers)
- Reuse of the waste heat arising from the servers

Lower level metric 1: Customer´s virtual servers

The objective is to calculate the CO_2 emission reductions enabled by customer´s virtual serves, compared with a service produced traditionally. Instead of providing traditional servers, customers are offered server capacity from virtual servers.

Benefits obtained by virtualization are increased efficiency and utilization.

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. Next step is to estimate how many traditional servers would be needed to produce a corresponding service. Then the energy consumption of Elisa's cloud services and of servers in a traditional system is assessed. The calculation assumes that services transferred to Elisa have been produced by another service provider so that 25 % is being produced using traditional server technology and 75 % in another virtual server platform. 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 Rack- frame (375 W). One Rack -frame is assumed to include about 38 servers. The PUE of the virtual server environment outside Elisa is assumed to be 1.8 (Rittal 2014). The power consumption in Elisa´s data center is assessed on the basis of the measured PUE figure.

Lower level metric 2: Elisa´s virtual servers

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

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.

The power consumption of virtual servers is calculated based on the power consumption of the Rack- frame (375 W). One Rack -frame is assumed to include about 38 servers. The PUE of the virtual server environment outside Elisa is assumed to be 1.8 (Rittal 2014). The power consumption in Elisa´s data center is assessed on the basis of the measured PUE figure.

Lower level metric 3: Heat re-use

In summer of 2011, Elisa started to deliver the heat generated by a server center in Espoo to Fortum's district heating network. From 2018 onwards the heat recovery from Kamppi Service Center was delivered to Helen's district heating network. 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. The heat generated is used in the district heating network as an energy source, instead of using the heat generated by fossil fuels.

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

Electronic invoicing

The objective is to calculate the CO_2 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.

CO2 free energy

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

Emission saving is calculated by multiplying amount of renewable energy with market based factor. In 2018 certificates of origin were purchased for nuclear power (160GWh) and renewable energy (111GWh).

OTHER EMISSION SAVINGS RESULTING FROM ENERGY EFFICIENCY

Energy consumption of mobile data

The objective is to calculate energy consumption of the mobile network per package data volume (Giga byte) transmitted through the network. 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. The criteria for calculating the energy consumption were discussed in the previous chapter.

ELISA'S OWN CARBON FOOTPRINT

Elisa's carbon footprint is based on most recent annual statistics and actual data obtained. Calculation methodology is based on The Greenhouse Gas Protocol (GHG) developed by World Resources Institute and World Business Council for Sustainable Development.

The underlying principles for the calculation and reporting of corporate financial calculations and reporting are used for calculations and reporting of GHG protocol. These area relevance, comprehensiveness, consistency, transparency and accuracy.

Elisa takes general principles of calculations into account in its calculations. The boundaries of the calculation are defined for the operations so that they best correspond to Elisa's operations, products and services. The calculation is carried out in such a way that the method is transparent and verifiable by a third party. All assumptions and steps in the calculation have been clearly reported. Data collection and reporting systems and the reliability of existing controls, as well as the method of calculation and data risks related to data collection has been evaluated by a third party.

SOURCES

Carbon Disclosure Project, 2010: Carbon Disclosure Project Study 2010, The Telepresence Revolution. Internet address: https://www.cdproject.net/CDPResults/Telepresence-Revolution-2010.pdf [27.2.2014]

Crimson Consulting Group, 2009: Study Shows Cisco TelePresenceTM Delivers Rapid ROI and Unique Business Benefits. Internet address: http://www.cisco.com/en/US/prod/collateral/ps7060/ps8329/ps8330/ps9599/TelePresence_Research_Brief_Final_03_20_09.pdf [27.2.2014]

Dell,2017: Dell PowerEdge Energy Smart Servers (http://www.dell.com/en-us/work/shop/servers-storage-and-networking/sc/servers) [9.3.2018]

James Peter, 2009: CONFERENCING AT BT - Results of a Survey on its Economic, Environmental and Social Impacts, Department of Environmental Science, University of Bradford.

James Peter, May 2005: CONFERENCING AT BT - Results of a Survey on its Economic, Environmental and Social Impacts, SustainIT and the University of Bradford.

Liikennevirasto, 2012: Henkilöliikennetutkimus 2010–2011. Internet address: http://www2.liikennevirasto.fi/julkaisut/pdf3/lr_2012_henkiloliikennetutkimus_web.pdf [27.2.2014]

Nokia Oyj 2014: Energy efficiency: Internet address: http://www.nokia.com/global/about-nokia/people-and-planet/sustainable-devices/energy/energy-efficiency/ [27.2.2014]

OpenCo2.net: https://www.openco2.net/

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

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition. Internet address: http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf [27.2.2014]

The Greenhouse Gas Protocol: The Corporate Value Chain (Scope 3) Standard [9.3.2018]

U.S. Environmental Protection Agency ENERGY STAR Program, 2010: Energy star for Data Centers at the Green Grid Technical Forum, February 2010. Internet address: http://www.energystar.gov/ia/partners/prod_development/downloads/DataCenters_GreenGrid02042010.pdf?9cf1-305d [27.2.2014]

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).