Report on environmental responsibility indicators H2/2010

elisa

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This is Elisa Corporation's first report on the calculation of environmental responsibility indicators, covering the period H2/2010 (1 July 2010–31 January 2010). The purpose of the report is to present the calculation of Elisa's CO_2 emission savings and the results of the calculation as openly as possible. The next calculation will take place during H1/2011 (1 January 2011–31 June 2011). There were no such major changes in Elisa's operations during the reporting period H2/2010 that would have any major impact on the calculation results as compared with the period H2/2009. This report has also been published in English and is available at www.elisa.fi/environment

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REVIEW OF ELISA'S ENVIRONMENTAL RESPONSIBILITY

Elisa wants to contribute to creating a society with small carbon emissions and promote sustainable development. This goal can be reached by reducing the carbon footprint of customers and Elisa with the help of Elisa's services. Reaching the goals is ensured through continuous measuring and assessments.
It is possible to reduce all greenhouse gas emissions in the ICT sector indirectly by as much as 15 per cent by the year 2020. Each of us is responsible for the future. In the sector where it operates, Elisa can contribute to the future considerably by offering technology by means of which its customers can reduce their carbon footprint and by adopting energy saving solutions.

Reducing customers' carbon footprint guides Elisa's environmental responsibility towards the operative functions of its business units and is part of the company's business opportunities. In spring 2010, Elisa launched the construction a new serve centre in collaboration with a leading energy company, featuring an internationally unique, environmentally friendly solution. With a traditional solution, the carbon dioxide emissions of the server room would be approximately 2 000 carbon dioxide tonnes (tCO_2). In the solution now under construction, however, the emission balance of the computer room will be negative, as all of the heat generated by the servers will be utilised in district heating in the City of Espoo. Thanks to heat utilisation, the room will cut down carbon dioxide emissions in the Espoo region by about 7 500 tCO_2.

Elisa launched a target-oriented calculation of carbon dioxide emissions on 1 July 2010. With the help of reliable calculation methods, Elisa is able to present concrete figures on carbon dioxide reductions. The results of the calculation are verified by an impartial outside expert. Theoretical emission savings during the second half were 1 247 tCO_2 for customers and 1 620 tCO_2 in Elisa's operations. The emissions of the radio network per subscription decreased by 1.9 per cent in autumn, and in relation to package data volume by more than 55 per cent as compared with the reference period 2009.

Veli-Matti Mattila
CEO

KEY INDICATORS H2/2010

Total emission savings	-2 867 tCO_2
Savings as compared to Elisa's total emissions in H2/2009	-19 %
Customers' CO_2 reductions	
Virtual conferencing	-832 tCO_2
Elisa's cloud services	-311 tCO_2
Recycling of terminal equipment	-104 tCO_2
Total	-1 247 tCO_2
Elisa's own CO2 reductions	
Mobile work	-709 tCO_2
Computer rooms	-911 tCO_2
Total	-1 620 tCO_2
Other emission savings resulting from energy efficiency	
Emissions per transferred gigabyte	0.78 $kgCO_2$/gigabyte
Emissions per gigabyte decreased from 2009	-55.2 %
Emissions of mobile phone subscriptions	3.04 $kgCO_2$ /subscription
Emissions per subscription decreased from 2009	-1.9 %

ROLE OF THE ICT SECTOR IN PREVENTING CLIMATE CHANGE

We are standing at the crossroads. A climate crisis will threaten our planet if we do not change the way we act. However, there is still time to choose the course of our environment and the world. Elisa has chosen an approach that takes the environment into consideration. Elisa wants to participate in creating new opportunities towards a society with low carbon emissions and sustainable development. It is important to Elisa that customers have access to low-carbon services. Elisa's wants to take responsibility and act as an example in environmental issues.

The Intergovernmental Panel on Climate Change (IPCC) has published four broad assessment reports containing information on the scientific grounds and impacts of climate change and ways of adapting to and mitigating it, as seen from a social and economic perspective and from the point of view of natural sciences. According to the most recent report, which was completed in 2007, the greenhouse gas emissions have increased globally by 70% during 1970–2004. If the emissions stay at or exceed the current level, global warming will be accelerated. According to scenarios, climate temperature will rise by 0.2 degrees per decade in the next two decades. Even if all greenhouse gas and aerosol concentrations were kept at the level of the year 2000, the climate would still warm up by 0.1 degrees per decade. (IPCC, 2007).

Most of the greenhouse gas emissions are generated by energy production. The less energy we use for electricity production and heating, the less energy we need to produce by means of fossil fuels. In addition, the less we travel with fuel-powered vehicles, such as cars and aeroplanes, the smaller the emissions caused by them.

Approximately one third of the electricity in Finland is produced using fossil fuels, and the aim is to actively reduce this share. This can be done most conveniently by reducing energy consumption. The society has introduced measures to direct people towards more sustainable consumption and energy production. Companies play a special role in this, as they can offer new ways of acting in a more environmentally friendly manner and manufacture products and provide services using less energy.

There has been discussion in the information and communication technology (ICT) sector in recent times about the role of the sector in mitigating climate change. Emissions from the ICT sector account for approximately two per cent of the world's carbon dioxide emissions, which is as much as the emissions of air traffic. It is estimated that the emissions will reach 3-4 per cent by 2020. However, it is possible to reach emission savings of up to 7.8 $GtCO_2e$ by 2020 with the help of products

and services manufactured in the ICT sector. This is five times more than the ICT sector's own carbon footprint. The ICT sector can have an impact by providing products and services that help create a more energy efficient society (Smart 2020, 2008). Such solutions include an intelligent energy grid, intelligent traffic, remote meetings and teleworking (Ministry of Transport and Communications, 2010).

ELISA'S ENVIRONMENTAL RESPONSIBILITY GOALS

The Elisa Corporation wishes to stop climate change. Taking care of the environment in particular reflects one of Elisa's key values: responsibility. High-quality environmental responsibility has long-lasting effects. The aim is that Elisa will be an example of excellence and quality in environmental responsibility in the future. This cannot be reached overnight, however, but it calls for quality objectives and patience.

The goal of reducing carbon dioxide emissions is in line with Elisa's values. Our aim is that in the future Elisa's customers and employees are much more satisfied, Elisa operates in a more responsible manner and Elisa's performance is unsurpassed. Elisa and its personnel are constantly developing and innovating new environmentally friendly services to its existing and new customers alike.

The aim of Elisa's environmental responsibility is to reduce the carbon footprint of Elisa and its customers. Elisa can reduce the carbon footprint of its customers by improving its existing processes and offering new services, products and features that help customers act in an environmentally sustainable manner.

Elisa's environmental responsibility is based on objectives and measures for reaching the objectives. Elisa seeks to reach or even exceed its goals with the help of sustainable solutions. Elisa has adopted indicators to ensure that the goals set are reached. Elisa compares the actual fulfilment of the goals with those set and with the fulfilment of earlier goals in order to make its operations even more environmentally friendly and energy effective.

A key issue in corporate environmental responsibility is transparency, which can be achieved through operative reporting. This means that outsiders, took, can view Elisa's environmentally responsible actions. However, a company recognising its responsibility must not focus on reporting in bearing its environmental responsibility but on systematic, environmentally responsible operation. The environmental actions taken by the company should centre around changing operative mechanisms so as to keep their environmental impacts to the minimum. In the process, measuring and reporting are means to an end.

IMPLEMENTATION AND RELIABILITY OF THE MEASUREMENTS

The calculation of Elisa's carbon footprint is based on the Greenhouse Gas Protocol (GHG), which has been developed by the World Resources Institute and the World Business Council for Sustainable Development. In the light of the present information, this is the most reliable calculation method. In addition, use is made of the Standard ISO 14064-1:2006 (Greenhouse gases - Part 1), also with a view to the future development of standards and guidelines.

GHG protocol calculation and reporting is based on general principles used by companies in the calculation and reporting of their key financial indicators. These are: relevance, comprehensiveness, logic, transparency and accuracy.
Relevance means that the results of the calculation should reflect real carbon dioxide emissions and that the report should contain information that can be used to support decision-making both internally and externally. Comprehensiveness, in turn, means that the calculation must take as comprehensive account as possible of all the emission sources contained within the calculation criteria set. If an issue is excluded, this must be mentioned and grounds must be given for its exclusion. Generalisability, in turns, means that a calculation method is used that can be employed from one calculation to another. This produces comparable figures. Transparency means that all issues are based on facts and that logic is maintained. Assumptions are written down and information sources are visible (The Greenhouse Gas Protocol).

Elisa has taken general calculation principles into consideration in its calculations. The calculation criteria were 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 was implemented so that the method is transparent and can be verified by a third party. All assumptions and stages in the calculation have been reported clearly. The reliability of the data collection and reporting systems, the existing controls and the risks connected with the data calculation method and data collection were assessed by a third party. The results were calculated in accordance with Standard ISO 14064-1:2006 and can thus be verified according to Standard ISO 14064-3:2006 (Greenhouse gases - Part 3), where necessary. Gaia Consulting Ltd. was used as an expert in the calculation.

The measured outcome was verified by an impartial outside expert. In 2010, calculations were verified by PricewaterhouseCoopers Ltd. The aim was to verify the correctness of the carbon footprint calculation data, thereby supporting Elisa's environmental responsibility in the calculation and

reporting process and its development. Verification included an assessment of the requirements and objectives set for the calculation of carbon footprint and of the risks affecting the correctness of the information. It also involved reviewing reporting and data formation processes, systems and data collection instructions. The aim was to ensure that the policies, practices and information systems created will allow sufficiently accurate, reliable carbon footprint calculation.

METERS

Customers' CO_2 reductions

Virtual conferencing

The aim was to calculate the CO_2 emission savings of the virtual conferences arranged by Elisa to its customers, compared with a traditional conference where the participants have to travel to the conference venue. Elisa offers its customers several virtual conference solutions. Information available on their usage volumes varies. The conference types are: WebEx, Microsoft Live Meeting and Telepresence. Teleconferences and Telepresence were excluded from the calculation. The services included in the calculation will be called virtual conferences below.

For the virtual conferences arranged by customers, data was sampled from Elisa's system on the number of virtual conferences implemented and partly also on the number of conference participants. The sample consisted of the conferences implemented during H2/2009. In addition, an inquiry was conducted with corporate customers in order to obtain an overall estimate of the offices in which the participants of the virtual conferences were stationed (Appendix 1).

Virtual conferences were assumed to replace traditional conferences. The increase in the number of conferences, which was prompted by the possibility to use virtual conferencing, was taken into consideration by assessing the proportion by which virtual conferences replace traditional conferences. The number of conferences that could be arranged during traditional conference travel was also assessed. The assumption in 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%.

According to the report of the Carbon Disclosure Project, at the initial phase 44% of virtual conferences are new but their share reaches 66% after five years. This means that at first 56% of the virtual conferences replace travelling and that the share falls to 34% after five years. (Carbon Disclosure Project Study 2010, The Telepresence Revolution). The point of departure here was the careful assumption

that at least 30% of the conferences replace traditional conferences, a trend also supported by information available from other sources. (Crimson Consulting Group 2009, James 2009, 2005).

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

It was assumed that the office distribution of the conference participants was as follows: head office or nearby area 40%, other parts of Finland 40%, Europe 18% and other continents 2% (calculation assumption based on Elisa's own use, the Finnish Travel Survey published by Statistics Finland, and the customer inquiry). The distribution by mode of transport in Finland was assumed to be as follows: passenger car kilometres 59%, train kilometres 30%, ship kilometres 1% and short flights 10% (calculation assumption based on Elisa's own use and the National Travel Survey 2004–2005). The assumption for medium-long flights in Europe was 100% and that for inter-continental flights for other contents 100%. The average travel distance was assumed to be 390 km in Finland (based on Elisa's own use), 2000 km in Europe (Helsinki-London 1800 km) and 8000 km in other continents (Helsinki-New York approx. 6600 km).

It was assumed that an average of 3.9 people attend a conference. The figure is an average for conference participants in Elisa's Webex conferences during the period H1/2010. For the purposes of the calculation, a sample was also collected of the number of people participating in customers' conferences. According to the latter sample, which was much smaller, the number of participants was 4.21. However, when the target group's highest and smallest company-specific averages are removed from the smaller sample, the figure is 3.38. In an external comparable survey, which was conducted by Crimson Consulting, the average number of conference participants is 4.

Despite careful background surveys and operative assessment, the calculation of the decrease in travelling owing to the use of virtual conferences still contains many assumptions and generalisations about the structure of the organisation using virtual conferences and about the geographical location of its offices. Therefore, it should be noted when interpreting the results that any generalisations about the structure of the organisation, and the distribution of travel of Elisa's own personnel, which was used in the calculation, can lend uncertainty to the results of the calculation.

Elisa's cloud services

Elisa's cloud services offer the customer a virtual server, i.e. server capacity from Elisa's equipment, instead of a traditional server solution. The advantage of virtual servers is that the same server device can be used by several customers. This will make server use more effective, while less energy is needed to maintain capacity than in a traditional solution.
The aim was to calculate the CO_2 emission reductions enabled by Elisa's cloud services, compared with a service produced traditionally. The number of virtual servers in use during H2/2010 was first calculated, followed by an assessment of the number of traditional servers that was needed in order to produce a corresponding service. Next, the energy consumption of servers in the system producing Elisa's cloud services and that of servers in a traditional system was assessed. Finally, energy savings were calculated by comparing a system implemented using the cloud services with a system implemented in a traditional manner.
It was assumed in the calculation that the service to be replaced is implemented using traditional server technology. The power consumption of virtual servers and traditional server solutions was assessed based on the values given by the manufacturers. The power consumption of a traditional server solution was assessed on the basis of the average PUE figure (EPA, 2007).

An indicator was calculated on the basis of estimated electricity savings that shows the amount of electricity saved for each virtual server unit. The actual realised figure was thus calculated on the basis of the number of virtual servers sold. The number includes the virtual servers sold by Elisa and also those sold by its subsidiaries Xenetic Ltd (1 January 2011 Elisa Links Ltd) and Appelsiini Ltd. Elisa purchased the entire capital stock of Appelsiini Ltd on 4 November 2010. For Appelsiini, the savings for the virtual servers were calculated from the above date onwards during the period of investigation.

For Elisa's cloud services, the specific CO_2 consumption reported by Savon Voima for 2009 was used as the emission coefficient for electricity consumption. Savon Voima Plc is the electricity supplier for Elisa's equipment facilities. For traditional server technology, it was assumed that the customer purchases the corresponding service from a non-specified service supplier in Finland. Here, the average calculated by Statistics Finland for 2004-2008 was used as the emission coefficient.

Recycling of terminal equipment

Elisa launched a campaign for its consumer customers in 2010, in which it pays a refund for a used, working mobile phone when replaced with a new one. Used phones are sold for re-use while parts or at least raw-materials are re-used of phones that cannot be repaired. The purpose of the refund is to encourage customers to return their old mobile phones instead of just leaving them in the drawer.
The aim was to calculate the emission savings achieved in the manufacture of new terminal equipment by recycling used phones. The assumption was that if the customer does not purchase a used mobile phone, he/she will be purchase a new, inexpensive phone. The calculation was based on the number of used phones sold and the carbon footprint of manufacturing a new phone.

The carbon footprint of a Nokia phone, posted on Nokia's website (Nokia Plc, 2010), was used as the carbon footprint of manufacturing a new mobile phone. Only the share of production and logistics has been taken into consideration of the carbon footprint. Even though Elisa also sells other mobile phone makes than just Nokia, eight of the most inexpensive phones among the best selling fifteen makes were Nokia phones (Saunalahti and Elisa, best selling phones, December 2010). In addition, other mobile phone manufacturers do not announce the carbon footprint of their inexpensive price range in public.

The calculation did not take account of possible emission reductions resulting from material recycling, as carbon footprint standards take into consideration the use of recycled material in a product manufactured of such material. Besides, it would have been very challenging to estimate the amount of material resulting from phone recycling or parts to be utilised as components, the energy spent on their recycling process, and the carbon footprint of the virgin production of each material or component.

Differences in energy consumption during the use of new and recycled phones and their chargers were not taken into consideration in the calculation either. Depending on the assumptions made about the amount of use of mobile phones and their chargers, the higher energy consumption of recycled phones causes carbon dioxide emissions that are approximately 1-3% of the carbon footprint of manufacturing a mobile phone (Nokia Plc, 2010).

ELISA'S OWN CO_2 REDUCTIONS

Mobile work

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

Lower level meter: decrease in business travel

The aim was to calculate the extent to which Elisa's own virtual conferences reduced carbon dioxide

emissions during H1/2010 and H2/2010, taking into consideration the travel-related carbon dioxide emissions saved by Elisa's personnel by attending virtual conferences.
The assumption in 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%.

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

The calculation covered all conferences arranged by Elisa's personnel using the following services: Webex, Livemeeting and Telepresence. Telephone conferences were excluded from the calculation, as sufficiently reliable, comprehensive data were not available on them. In addition, conferences where only teleconferencing was used cannot be fully distinguished from cases where more versatile virtual conferencing technology was used. Teleconferences are usually conducted simultaneously with Webex and Livemeeting conferences.

Distances were calculated on the basis of assumptions underlying Elisa's own calculations and based on the business travel behaviour of Elisa's personnel and data available on the use of the service. Another alternative would have been to use the average distribution for business travel in Finland (the National Travel Survey 2004–2005). However, this would have been less accurate.

For Webex and Telepresence, the figures for kilometres travelled between offices were obtained from Elisa's Webex and Telepresence reporting (Elisa meeting centre reporting) for the calculation of period H1/2010. The start point was the conference participant's office, which was obtained from his/her registration data (name and e-mail address) and SAP HR. Distances between the points were calculated for travel by car, train and air, and the following websites were used to determine distances: googlemaps: www.googlemaps.fi, http://www.rhk.fi/tietopalvelu/julkaisut/f-sarjan_julkaisut/?x39544=251225, http://www.partow.net/miscellaneous/airportdatabase/

The percentages of different means of transport between the offices were defined by means of a matrix. The most likely means of transport between Elisa's points were assessed. Elisa's furthest offices are located in Joensuu, Kokkola and Oulu. The likelihood of flights to and from the above points was checked from Elisa's travel invoices.

The emission volumes of the various means of transport were calculated using coefficients obtained for road and rail travel from VTT's Lipasto calculation system and for air travel from the GHG Protocol. From VTT's Lipasto calculation system (car, train) and the GHG Protocol (air).

For the Livemeeting, the number of conferences and participants was obtained from Elisa's reporting system. The average travel distance to the conference venue was assumed to correspond to the average in Webex. The average number of conference participants was assumed to be the same as the average in Webex.

The emission savings for H2/2010 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. The figure was then multiplied by the number of conferences arranged during H2/2010. The calculation for H1/2010 involved analysing data on approximately 15 000 conferences, so the resulting figure can be considered reliable.

Lower level meter: space efficiency

The aim was to calculate savings in the carbon dioxide emissions of heated office space during H1/2010 and H2/2010. The amount of office space saved resulted from mobile work solutions in Elisa's multi-space facilities. Only employees working in multi-space offices were taken into consideration in the calculation. The location and number of the multi-space facilities are listed below:

- Helsinki, Pasila
- Helsinki, Tali
- Tampere
- Turku
- Jyväskylä

The facilities altogether have some 1900 employees.

Emission calculations were limited to the consumption of electricity and heat and consumer electricity in the property. Water consumption was excluded from the calculation, as the impact of life-cycle emissions from water purification is very small and there is high degree of uncertainty in the coefficient. Hot domestic water was included in the calculations in the form of thermal energy.

A comparison was made with a situation where Elisa's employees had access to the same amount of working space as an average office employee in Finland. The result indicated assumed emissions for the amount of space saved during H1/2010 and H2/2010.

Floor area in square metres and the number of employees were obtained from Elisa's facility service information system.

Emissions were calculated based on specific consumption for Elisa's offices. The consumption figures were obtained from Elisa's carbon footprint calculation for 2009. Elisa's situation was compared with the average space efficiency figure in Finland, which is 23 m2/person (source: Konsulttitoimisto DTZ, 23 June 2009) and with the consumption and CO emissions calculated on the basis of specific consumption for Elisa's offices.

Computer rooms

The aim was to calculate savings in carbon dioxide emissions in Elisa's server centres. This was calculated as the number of virtual servers and machine room energy efficiency (with the help of the PUE/ERF figure). The PUE and ERF figures were determined in accordance with the Green Grid (2010):

PUE = Total energy consumption of the machine rooms/IT energy consumption and;

ERF = (Total energy consumption of the machine rooms – waste heat recovery)/IT energy consumption.

The following calculation formula was used: (IT energy consumption * reference PUE) – (IT energy consumption * Elisa's PUE) = (IT energy consumption * reference PUE) – total energy consumption of Elisa's machine rooms. The coefficient used to calculate energy consumption emissions was the average electricity production emission figure in Finland for 2004–2008 (Statistics Finland). The reference PUE figure was 1.91 (EPA, 2007).

Calculations were first limited to four machine rooms only, as accurate measurement data were available on them from the year 2009. When the calculation of the actual realised figures for 2010 began, it was noticed that sufficiently accurate measurement results were not available for machine room A. In addition, machine room B had largely been adopted for use by other players during H2/2010. Accurate measurement results were not available for machine room A, as its cooling system was used by several players. It was impossible to allocate the use of cooling energy correctly between the various users. In the end only two machine rooms were thus included in the calculation. In addition to the above computer rooms, Elisa has many small equipment facilities, which are not included in the calculation. In addition, of the large computer rooms, computer room E is not included in the calculation either, due to the lack of sufficient comprehensive measurement results.

For the computer rooms, the specific CO_2 consumption reported by Savon Voima for 2009 was used as the emission coefficient for electricity consumption. Savon Voima is the electricity supplier for Elisa's equipment facilities.

Other emission savings resulting from energy efficiency

Emissions from the use of mobile phone subscriptions

The aim was to calculate the subscription-specific carbon footprint of Elisa's mobile phone subscriptions. In the calculation, the emissions caused by the radio network were divided by the number of subscriptions. The results obtained were allocated to the various business units on the basis of the number of subscriptions.

The emissions caused by the radio network were calculated on the basis of the network's electricity consumption. The specific CO_2 emissions reported by Savon Voima, the electricity seller, from 2009 were used as the emission coefficient for electricity consumption for electricity purchased directly. In so far as a third party was responsible for the electricity used in the equipment facilities, and the original seller of the electricity was not known, the moving average of Statistics Finland for emission coefficients for 2004–2008 was used as the emission coefficient (260 gCO_2/kWh).

The number of base stations divided according to type was multiplied by the energy consumption of the base station types in question. Here, the consumption caused by an average configuration was used. The energy consumption of drivers was also calculated. The calculation did not take into consideration the electrical power required by heating or cooling or base station transmission. Therefore, the amount of energy consumption is theoretical and based on the specific energy consumption of different base station types. When determining the measurement method, theoretical energy consumption was compared with invoiced and measured energy consumption. Data on theoretical, measured and invoiced energy consumption were consistent.

For subscriptions, the subscriptions of Elisa and Saunalahti having 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).

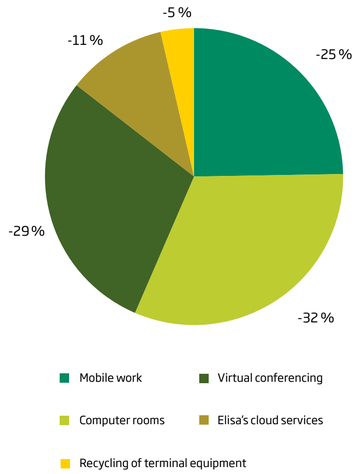
Energy efficiency of the radio network

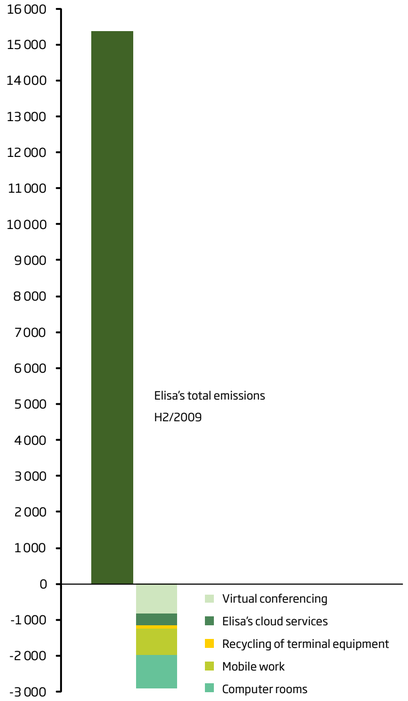
The aim was to calculate the emissions of the radio network in relation to the package data volume transmitted through the network. The emissions caused by the radio network were calculated on the basis of the network's electricity consumption. The criteria for calculating the emissions were discussed in the previous chapter.

The energy consumption of the radio network was divided by the amount of data transferred during the period (July-December 2010, measurement result from Elisa's equipment). This indicated carbon dioxide emissions per transferred gigabyte.The first and last month of the calculation period were used as the start and end points in calculating the amount of data and electricity consumption, and the average of the months was utilised as the monthly values of the calculation period. The actual realised figure was compared with the period H2/2009. This produced the best possible accuracy, as there were major changes in the amount of data, the number of base stations and thus electricity consumption during the six-month period.

MEASUREMENT RESULTS

Total emission savings	-2 867 tCO_2
Savings as compared to Elisa's total emissions in H2/2009	-19 %
Customers' CO_2 reductions	
Virtual conferencing	-832 tCO_2
Elisa's cloud services	-311 tCO_2
Recycling of terminal equipment	-104 tCO_2
Total	-1 247 tCO_2
Elisa's own CO2 reductions	
Mobile work	-709 tCO_2
Computer rooms	-911 tCO_2
Total	-1 620 tCO_2
Other emission savings resulting from energy efficiency	
Emissions per transferred gigabyte	0.78 $kgCO_2$/gigabyte
Emissions per gigabyte decreased from 2009	-55.2 %
Emissions of mobile phone subscriptions	3.04 $kgCO_2$ /subscription
Emissions per subscription decreased from 2009	-1.9 %





The following meters were used for customers' CO_2 reductions: emission savings gained by customers from virtual conferences, emissions savings from Elisa's cloud services, and the recycling of terminal equipment. The emission savings gained through virtual conferences during the period of investigation were 832 tCO_2. Savings through Elisa's cloud services were 311 tCO_2. Emission savings from the recycling of terminal equipment amounted to 104 tCO_2.

The CO_2 meters used by Elisa were emission reductions resulting from mobile work and machine room emission reductions. The emission savings of the virtual conferencing sub-meter amounted to 310 tCO_2 and space efficiency emission savings to 398 tCO_2. The emission reductions of mobile work totalled 709 tCO_2. Emission savings in Elisa's machine rooms amounted to 911 tCO_2.

Other energy efficiency meters indicating CO_2 emission savings were emissions from mobile phone subscriptions per subscription and the radio network's emissions per transferred gigabyte. The emissions of mobile phone subscriptions were 3.04 $kgCO_2$/subscription. For the radio networks, the emissions were 0.78 $kgCO_2$/gigabyte.

The emission savings of Elisa's customers were 1 247 tCO_2 and Elisa's own emission savings 1 620 tCO_2 during the period of investigation 1 July 2010 – 31 December 2010. The emission savings totalled 2 867 tCO_2 during H2/2010.

Energy efficiency of the radio network

The emissions of the radio network per subscription decreased by 1.9 per cent in autumn, and in relation to package data volume by more than 55 per cent as compared with the reference period 2009. The emissions of mobile phone subscriptions were 3.04 kg CO_2/subscription during the period of investigation. The reference value for 2009 was 3.10 kg CO_2/subscription. For the energy efficiency of the radio network, the emissions per transferred gigabyte were 0.78 kg. The corresponding figure during the reference period H2/2009 was 1.74 kg CO_2/gigabyte.

CONCLUSIONS

The total emission savings for Elisa's environmental responsibility meters amounted to 2 867 t CO_2 during the period H2/2010 (excluding the emission savings of the radio network and mobile phone subscriptions, which are not comparable with others). The figure includes the emission savings of Elisa and its customers. During the reference period H2/2009, Elisa's own emissions totalled 15 370 tCO_2. Compared with Elisa's emissions during the same period in the previous year, the calculation

indicated emission savings amounting to 19% of the total emissions of the reference period. The figure can be considered very high. It can be assumed, however, that the amount of actual savings is much higher particularly with regard to the actual emission savings gained by Elisa's customers.

Customers' emission savings amounted to 1 247 tCO_2 during the period H2/2010. According to the Smart 2020 report, the most important role of the ICT sector in combating climate change lies in the offering of different types of products and services that reduce greenhouse gas emissions. The results of the meters indicate that there is every reason to assume that with the help of Elisa's products, customers can reduce their carbon dioxide emissions considerably and that potential savings are much higher than suggested by the calculation. More accurate verification of this would require developing the calculation scheme further, if necessary, and extending it to also cover Elisa's other services, which were not included in the calculation for the period H2/2010.

During the period of investigation, Elisa's radio networks offered higher usage capacity with higher energy efficiency than during the reference period, considering the amount of transferred data and the number of subscriptions. Radio network energy efficiency meters thus indicated that on a broader scale the more effective use of Elisa's networks allowed broader savings in other sectors during the period of investigation.

REFERENCES AND ADDITIONAL INFORMATION

Carbon Disclosure Project Study 2010, The Telepresence Revolution. https://www.cdproject.net/CDPResults/Telepresence-Revolution-2010.pdf

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

EPA. 2007. Energy Star for Data Centers. http://www.energystar.gov/ia/partners/prod_development/downloads/EPA_Datacenter_Report_Congress_Final1.pdf [20.1.2011]

Henkilöliikennetutkimus 2004–2005. 2006. http://www.hlt.fi/HTL04_loppuraportti.pdf [20.1.2011]

IPCC. 2007. IPCC Fourth Assessment Report: Climate Change 2007. http://www.ipcc.ch/ [20.1.2011]

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

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

Liikenne ja viestintäministeriö. 2010. Viestintäteknologian ja palveluiden sähköistämisen päästövaikutukset.

Lipasto, VTT. 2010. http://lipasto.vtt.fi/[25.1.2011]

Nokia Oyj. 2010. Environmental impact. http://www.nokia.com/environment/devices-and-services/creating-our-products/environmental-impact [20.1.2011]

Smart 2020. 2008. SMART 2020: Enabling the low carbon economy in the information age. http://www.smart2020.org/_assets/files/02_Smart2020Report.pdf [20.1.2011]

The Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard. http://www.ghgprotocol.org/files/ghg-protocol-revised.pdf [20.1.2011]

APPENDIX

INDEPENDENT ASSURANCE REPORT

(Translation from the Finnish Original)

To the management of Elisa

We have been engaged by the Management of Elisa Oyj (later "Elisa") to perform a limited assurance engagement on the CO2 emission savings for customer services and energy efficiency meters for own functions for the reporting period of H2/2010 (1.7.2010 - 31.12.2010). The Subject Matter has been the following:

Customers' CO2 reductions

- Virtual conferencing
- Elisa's cloud services
- Recycling of terminal equipment

Elisa's own CO2 reductions

- Mobile work
- Computer rooms

Other emission savings resulting from energy efficiency

- Emissions from the use of mobile phone subscriptions (t/subscription)
- Energy efficiency of the radio network (t/GB)

Management's responsibility

The Management of Elisa is responsible for producing the carbon footprint calculation according to the Reporting Criteria as set out in Greenhouse Gas Protocol and in Elisa's reporting guidelines.

Practitioner's responsibility

It is our responsibility to present an independent conclusion on the Subject Matter information based on our limited assurance engagement. We do not accept, nor assume responsibility to anyone else, except to Elisa for our work, for this report, or for the conclusions that we have reached.

We have conducted the assurance engagement in accordance with the International Standard on Assurance Engagements (ISAE) 3000 "Assurance engagements other than audits or reviews of historical financial information". The ISAE 3000-standard requires compliance with ethical principles as well as planning and performing the assurance engagement to obtain limited assurance on whether any matters have come to our attention that would cause us to believe that the Subject Matter information will not give a balanced and appropriate view, in all material respects, on Elisa customers' services and own functions emissions savings and energy efficiency activities in accordance with the Reporting criteria.

In a limited assurance engagement the evidence-gathering procedures are more limited than in a reasonable assurance engagement, and therefore less assurance is obtained than in a reasonable assurance engagement. The procedures selected depend on the practitioner's judgment, including an assessment of the risks of material misstatement of the carbon footprint information according to the Reporting Criteria. We have planned and performed our assurance engagement in a way, that we have obtained appropriate amount of evidence to support our conclusions. Our work consisted of, amongst others, the following evidence gathering procedures:

- Conducting interviews with personnel responsible for CO2 emission savings calculation and data collection and reporting for energy efficiency meter calculation;
- Testing the data completeness, comparability and accuracy on sample basis;
- Testing the data consolidation on sample basis;
- Inspected the calculations and
- Assessing the certainty of calculation factors and assumptions.

Conclusion

Based on the work described in this report nothing has come to our attention that would cause us to believe that the Subject Matter information will not give a balanced and appropriate view, in all material respects, on Elisa customers' services and own functions emissions savings and energy efficiency activities in accordance with the Reporting criteria. When calculating H2/2010 information, specific emission information having been obtained from 2009 metering results, has been used as reference values, which shall be taken into consideration when assessing the absolute emission figures.

Our assurance report should be read in conjunction with the inherent limitations of accuracy and completeness for carbon dioxide emissions evaluation. This independent assurance report should not be used on its own as a basis for interpreting Elisa's environmental performance.

Helsinki, January 28th, 2011

PricewaterhouseCoopers Oy

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Sustainability & Climate Change