



LIFE Project Number
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Carbon Footprint Report

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Action
Action 1 - Management

LIFE+ PROJECT NAME or Acronym
SNOWCARBO

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List of abbreviations

CEA	Commission a l'Énergie Atomique
COICOP	Classification of Individual consumption by purpose
CPI	Consumer Price Index
EkoSYKE	ISO14001 certified system for reducing environmental impact of the Finnish Environment Institute
FMI	Finnish Meteorological Institute
GHG	Greenhouse gas
LSCE	Laboratoire des Sciences du Climat et de l'Environnement
SYKE	Finnish Environment Institute (abbreviation from finnish name)
WWF	World Wildlife Foundation

Foreword for the update

This report is an update to the 1st Carbon footprint report from the mid-term of the project where the anticipated carbon footprint of the project was calculated with the ENVIMAT model (see below) of SYKE. The calculation is based on choosing the dominant commodity group was describing the greenhouse gas emissions from the cost class. All in all the SNOWCARBO- project was very much focused on the work of the personnel. The offices of FMI, SYKE and CEA have all committed to reduce the carbon and environmental footprints in the office environment.

The main sources of *additional* greenhouse gas emissions, due to the project, were caused by travel and purchase of consumables i.e. computer hardware and software. Although several meetings were held with teleconference equipment, it was sometimes more fruitful to have all partners represented in the meeting causing additional greenhouse gas emissions. Also during the field campaigns the travel was made by flight and using rental cars, mainly due to time constraints.

Due to more travelling than anticipated the resulting greenhouse gas emissions were increased by one third from the predicted emissions, finally summing up to ~57t of carbon equivalent, this was around 14t more than anticipated.

The method of calculating the greenhouse gas emissions of ENVIMAT is based on the life span of commodities and therefore it should be noted that some of the emissions directly related to SNOWCARBO project are somewhat over estimated as the life span of the products do not end in SNOWCARBO.

Summary

All activity of our society consumes energy and natural resources. One way of quantifying the energy consumption and our impact on the surrounding climate and environment, is to calculate the carbon dioxide equivalent of our consumption. As consumers and participants in the modern society we are encouraged to make smart choices in order to reduce the carbon footprint of our activity and save the environment and resources for future generation, reduce the amount of energy consumed and counter the effects of warming climate. This report presents the choices made and actions done to reduce the carbon footprint in the SNOWCARBO- project. It also introduces one way of calculating the greenhouse gas (GHG) emissions of such activity and gives estimates for the greenhouse gas emissions during the project lifespan 2009-2012.

1. Introduction

Our daily activities in the modern society we use energy as commuters, workers and consumers. The emissions from energy production have an impact on our climate and environment. During the beginning of the 21st century, we've seen our knowledge of the impacts grow and this has led to awareness that the resources are limited and their utilization can have strong negative effects on our surroundings. The work of atmospheric and environmental scientists and experts has also been recognised as a source of carbon emissions, mainly due to travel to conferences and collaboration institutes (Stohl, 2008). Carbon emissions to the atmosphere and possible consequences are currently one of the most burning questions in natural sciences. The SNOWCARBO project is also aiming to provide tools for the impact appraisal of the carbon dioxide emissions.

One way to assess the impact of the project activities to the environment and climate is to calculate the carbon dioxide emission equivalent for the actions, so called 'carbon footprint' and consumption in the project. During the course of the project we also try to minimize our effect. The project relies heavily on existing infrastructure and existing services, which reduces the related carbon dioxide emissions. While planning the project, the following actions were indicated in the project proposal as activities in reducing the greenhouse gas emissions resulting directly from the project implementation:

1. The project strives for as minimal carbon footprint as possible by arranging only needed amount of meetings and avoiding unnecessary travelling.
2. Of project beneficiaries SYKE has an ISO 14001 certified environmental management system which encompasses e.g. travelling, acquisitions, real estate management (energy and water consumption, waste), and paper consumption.
3. Other project beneficiaries have chosen their experts working in the project so that travelling will be minimized (however some travelling by airplane are needed due to the international characteristic of the project, primarily between France and Finland).
4. Teleconferences and -meetings are used primarily for work meetings.
5. National travelling involving experts and stakeholders are carried out mainly by train.
6. The project will avoid the unnecessary use of paper by using mainly electronic documentation and extranet- and Internet-facilities. The project will follow-up this decision regularly.
7. The project team will assess how successfully these efforts have been reached throughout the project (Actions related to the project monitoring).

From the above actions the main two activities for saving in the carbon dioxide emissions are the replacement of the travel to meetings with teleconferencing and the reduction of hardcopies of the project documents, where ever possible. Additionally all institutions are strongly committed in promoting greener offices. The partner institutes of the project are involved in programs, which try to reduce the environmental impact of office functions. Finnish Meteorological Institute (FMI) is taking part in the 'Green Office' – program of the World Wildlife Foundation (WWF). Finnish Environment Institute (SYKE) has its own ISO-standardized environmental program called EkoSYKE and CEA has established their carbon footprint for the entire institution.

A model has been developed at SYKE, which is used to assess the environmental and climatic impact of the any function in society in the perspective of a consumer. The ENVIMAT- model (Seppälä et al. 2009) is used as bases for the calculations of the carbon footprint of the project.

2. Green office WWF

Via the Green Office program a business or an institution can show that they are taking measurable actions in reducing their effect on the environment. By meeting the criteria set by the Green Office program, the company or institution is granted a permission to use a diploma granted by the WWF. The program was developed in Finland in 1997, and has since gathered participants from 10 other countries (namely Kenya, Estonia, Latvia, Lithuania, India, China, Pakistan, Turkey, Vietnam and Indonesia), additionally to Finland.

The three main goals of the Green Office program are (from Green Office Introduction-presentation [in Finnish] Web-pages: http://www.wwf.fi/yriitykset/green_office/tule_mukaan.html)

- To **reduce the consumption of natural resources** by developing the eco-efficiency of offices.
- To **promote sustainable way of life** by increasing the environmental awareness of employees.
- To **slow down the climate change** by promoting energy saving and use of renewable energy sources.

The program is also beneficial for the participants, since the consumption of energy and paper also reduce the costs at the Green Offices. The main themes of the program are paper consumption, consumption of electricity in appliances, commuting, heating and sorting of waste. Based on these themes a Green Office needs to fulfil the following criteria, in order to be awarded the diploma from WWF:

- Select a Green Office co-ordinator and team.
- Plans a practical environmental programme.
- Improve energy efficiency continuously in order to mitigate greenhouse gas emissions.
- Reduce waste, and recycle and sort out waste according to local requirements.
- Pay attention to green issues in procurements.
- Inform and educate its personnel about Green Office practices.
- Aspire towards continuous improvement in environmental matters.
- Choose the indicators, set numeric objectives and monitor the fulfilment of the objectives.
- Report to WWF annually.

By participating in the Green Office- program, FMI wants to reduce the environmental burden and participate in slowing down the climate change. In addition to conducting research on climate change, FMI wants to be part in the mitigation measures. FMI was granted the 'Green Office'- diploma in June 2008.

3. EkoSYKE

As the governmental institute for environmental research and expertise in Finland the Finnish Environment Institute also needs to set example on measures in protecting the nature and reducing the environmental burden from the activities in and outside the office. EkoSYKE- program has the following overall goals:

- The possible negative environmental impacts of SYKEs different projects should be prevented in advance.
- The negative environmental impacts on travelling, paper consumption, energy consumption, purchases and waste should be reduced.
- Environmental and safety risks at SYKEs premises should be minimized.

- The awareness of SYKEs staff about the environmental impacts of the institute should be further increased.

The EkoSYKE- program was certified according to ISO 14001- standard in October 2006. The certificate was evaluated by the Det Norske Veritas (DNV), a foundation for providing classifications, certifications and verifications for large range of functions in society and industry. The certification was renewed in 2009. The ISO 14001 is the most recognized and used framework for environmental management systems. The core concept for the standard is that the organization is continually improving their environmental friendliness.

The environmental impact of the SYKE office is annually evaluated. Indicators for following the progress in the central themes of the program are calculated and reported. Based on the report the goals for the next year are set, according to the internal environmental program of SYKE for the years 2010-2013. The central themes of the EkoSYKE are:

- Paper consumption
- Consumption of energy
- Procurement
- Environmental and safety risks
- Waste management
- Environmental awareness of the staff

There is also a systematic evaluation process for all projects at SYKE for the environmental impact through the project lifespan. An evaluation document is filled out and archived together with the project documentation. Depending on the nature of the project, at least the following themes are covered.

- Chemicals and substances, used in the project, causing environmental risks: Risk assessment and precautionary measures.
- Travel during the project: Means of transportation; routes; replacing meetings in far locations with tele-/videoconferences.
- New procurements: Common procurements with other institutes; leasing; renting; environmental friendliness of the procurements etc.

The above list is not exhaustive, but shows that the impacts of the projects are considered in depth. If the implementation of the project mainly includes the office work at the institution, which is already covered in EkoSYKE, the evaluation is not performed, but the reason for this is written down on the form and archived.

4. ENVIMAT

A research project was established in 2002 in SYKE to assess the impacts of production and consumption in the Finnish Economy. The project used the years 2002-2005. This resulted in the ENVIMAT model (Seppälä et. al 2009), which can be used to analyze the relationship between material flows, environmental impacts and economic impacts. The model is based on monetary and physical input-output tables and an environmental life cycle impact assessment, which is one of the central areas of research and development at SYKE. The

model is based on analysis from Finnish economy, but we feel that this can be extended to give a good estimate for the French CEA as well, as the standard of living is relatively same for all western-Europe.

The input-output tables, based on commodity groups of COIOP (Classification of Individual consumption by purpose) classification, established by the United Nations xxx have been constructed based on life span analysis of commodities and services (work done at SYKE). They give the greenhouse gas emissions and energy consumption per spent euro. The model is currently indicating the commodities and services for households, but it is considered here to give a good estimate also for the same services in large institute.

5. Projected and realised greenhouse gas emissions from the project for 2009-2012

The greenhouse gas emissions that can be seen as a direct result of the implementation of the project are calculated using the ENVIMAT- model. We will only consider the additional emissions due to direct purchases for the project. This will exclude the regular use of electricity, heating and regular office functions, since all institutes are committed in greener offices. The main commodity categories and related greenhouse gas (GHG) emissions and energy consumption, applicable in the SNOWCARBO- project, given in **Error! Reference source not found..** The original table was created in 2005. Since then the overall increase in the general livelihood costs until 2010, this has been corrected with an average ratio of consumer price index (CPI) in 2010 and CPI in 2005.

Table 1. Greenhouse gas emissions, energy consumption, Eco-index and TMR, for commodity groups used in the SNOWCARBO- project.

COICOP- class	Commodity group	2005	2010	Energy consumption MJ/€
		GHG kg/€	GHG kg/€	
C072	Utilization of personal vehicles	1,5	1,4	16,5
C0733	Travel – airplane	1,3	1,2	12,3
C0731	Travel - train, metro, tram	0,6	0,5	9,5
C0732	Travel - bus and taxi	0,8	0,7	8,8
C081	Telecommunication	0,2	0,2	1,6
C091	Audiovisual, photographic and IT- equipment	0,4	0,4	2,6
C094	Recreational- and cultural services (including conferences and exhibitions)	0,2	0,2	2,7
C111	Catering services	0,4	0,4	2,2
C112	Accommodation services	0,5	0,5	2,8
C127	Other un-categorized services	0,3	0,3	3,0

The foreseen greenhouse gas emission for the project duration from 2009-2012 have been calculated in Table 2, based on the project budget. The dominant commodity category has been chosen for each cost class. Also in table 2, there is also a list of items from the project budget, which have not been included in the calculations. This is mainly due to the fact that the procurement is readily existing product or service, which would have been or has been established, regardless of the SNOWCARBO- project.

Table 2. Foreseen greenhouse gas emissions for the direct costs due to project implementation in 2009-2012 calculated using the ENVIMAT- mode of SYKE.

Item	Commodity group	Foreseen cost (€) 2009-2012			Foreseen GHG Emission (kg)		
		FMI	SYKE	CEA	FMI	SYKE	CEA
Travel	C0733	3000	3000	11000	4103.219	4103.219	15045.14
External auditing	C127	10000	10000	10000	2735.479	2735.479	2735.479
Computer hardware	C091	9000	28000	0	2461.931	7659.342	0
Other direct costs	C111	3000	0	0	820.6437	0	0
SUM					10121.27	14498.04	17780.61
TOTAL					42399.92	kg	

Excluded items from budget	Reason for excluding
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Travel inside Helsinki to meetings	The normal work related commuting includes the costs for this. Mainly with public transportation.
External assistance - in-situ data from METLA	The datasets are not produced primarily for commercial use, but for the purposes of the selling institution itself.
Acquisition of GSE Polarview and GSE-Land services	The datasets are not produced primarily for commercial use.
Satellite data and aerial ortophotos	The datasets are not produced primarily for commercial use.

Table 3 lists the realised costs and greenhouse gas emissions as they were available at the time of reporting. The external auditing has not been carried out yet and the travel costs from CEA were not available. The main difference arises from the increased travelling expenses to what was projected. Although teleconference tools were used to hold meetings, there was a need to have more close collaboration and longer discussion, where travelling was necessary. Also time constraints are seen as the main reason for using flying as the means of transportation over more climate friendly options e.g. during the field campaigns.

As noted earlier the ENVIMAT is based on the entire life span of the project. The emissions caused by consumables such as computer hardware and software are therefore somewhat over estimated, as the life span of the equipment do not end in the end of the project.

Table 3. Realised costs and greenhouse gas emissions during the course of the project calculated using the ENVIMAT model of SYKE. The figures in red are those budgeted as there was not exact information available at the time of reporting.

Item	Commodity group	Realised cost (€) 2009-2012			Realised GHG Emission (kg)		
		FMI	SYKE	CEA	FMI	SYKE	CEA
Travel	C0733	15155.37	6223.94	11000	20728.6	8512.729	15045.14
External auditing	C127	10000	10000	10000	2735.479	2735.479	2735.479
Computer hardware	C091	0	9433.67	0	0	2580.561	0
Other direct costs	C111	5772.93	0	0	1579.173	0	0
SUM					25043.25	13828.77	17780.61
TOTAL					56652.63	kg	

References

Stohl, A. 2008. The travel-related carbon dioxide emissions of atmospheric researchers. *Atmospheric Chemistry and Physics Discussion*, 8, 2008.

Seppälä, J., I. Mäenpää, S. Koskela, T. Mattila, A. Nissinen, J.-M. Katajajuuri, T. Härmä, M.-R. Korhonen, M. Saarinen and Y. Virtanen. 2009. Suomen kansantalouden materiaalivirtojen ympäristövaikutusten arviointi ENVIMAT-mallilla. *Suomen ympäristö*, 20, 2009.