ESU-services

fair consulting in sustainability

2024

Environmental report and product declaration 2020

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Photo: ESU-services sponsored a new woodchips based heating in the Region of Schaffhausen for a community accommodation operated by Naturfreunde Schweiz.

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Schaffhausen, 23. April 2024

Imprint

Citation	Niels Jungbluth;Karen Muir;Savian Scanu (2024) Environmental report and product declaration 2020. ESU-services Ltd. commissioned by ESU-services Ltd., Schaffhausen, Switzerland, https://www.esu-services.ch/de/publications/
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About us	ESU-services Ltd. was founded in 1998. Its core objectives are consulting, coaching, training, and research in the fields of life cycle assessment (LCA), carbon footprints, water footprint in the sectors energy, civil engineering, basic minerals, chemicals, packaging, telecommunication, food and lifestyles. Fairness, independence, and transparency are substantial characteristics of our consulting philosophy. We work in an issue-related manner and accomplish our analyses without prejudice. We document our studies and work transparently and comprehensibly. We offer fair and competent consultation, which makes it possible for clients to control and continuously improve their environmental performance. The company has worked for various national and international companies, associations, and authorities. In some areas, team members of ESU-services performed pioneering work such as development and operation of web-based LCA databases or quantifying environmental impacts of food and lifestyles.
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Version	23.04.24 14:26 https://esuservices-my.sharepoint.com/personal/jungbluth_esuservices_onmicrosoft_com/Documents/ESU-intern/908 Eigener Umweltbericht/Berichte/2021/ESU-services-2021-EnvironmentalReport-EPD-2020.docx

Abstract

Sustainability is at the core of our consulting activities. With this report, our customers are informed about the measures we take to reduce the environmental footprint of our own consulting services. Furthermore, we show how we work to improve our social and economic sustainability.

In this report, the environmental impacts of our services are calculated and shown in an environmental product declaration (EPD). Business trips are a decisive factor affecting the impacts of individual projects. Therefore, they are calculated separately from the general impacts of the service. Another key factor, which is seldom considered in this type of reporting, is the insurance we provide to our employees.

Using this data basis, we can also report the full environmental impacts of our services after finalization of a project.

Train travel is our preferred means of transportation, for both national and international business trips. If it is necessary to use a car, we rely on the car-sharing organization Mobility. Airplane trips are not compensated to avoid offering disadvantageous incentives (for further explanation, please see chapter 2.3.3).

Our suppliers are also chosen based on their sustainable performance. For example, we use Fairphones and either recycled or FSC-certified paper. We use naturemade star certified electricity “CleanSolution StarFlex” provided by SH power, our local provider.

The present Corona situation changed our work style considerable and home office or mobile office form now an important part of our working location. We offer all staff members the opportunity to work part time in order support families and work-life balance. Salaries are based on talent and not influenced by age or gender. Additionally, we actively discourage structural overtime.

We actively support our customers in developing sustainable business practices. There are special consultancy rates for NGOs. Furthermore, we support all types of media with scientific sound information on life cycle assessment results.

Kurzfassung

Die Schonung der natürlichen Ressourcen und eine nachhaltige Wirtschaftsweise stehen nicht nur im Mittelpunkt unserer Beratungsangebote. Auch für die Führung unseres Unternehmens sind dies wichtige Massstäbe.

Im vorliegenden Umweltbericht werden die Umweltbelastungen, der durch uns angebotenen Dienstleistungen, unter Berücksichtigung möglichst aller relevanten Aspekte untersucht. Im Bericht werden dazu die wichtigsten Verursacher der Umweltbelastungen aufgezeigt. Der Bericht dient dazu Verbesserungsmöglichkeiten festzulegen. Mit einer Umweltdeklaration werden die Belastungen für die angebotenen Dienstleistungen ausgewiesen.

Der Umweltbericht der ESU-services GmbH zeigt, dass die jetzt verursachten Umweltbelastungen pro Beratungsstunde vor allem über Geschäftsreisen beeinflusst werden können. Nach Möglichkeit versuchen wir alle Reisen in Europa mit der Bahn durchzuführen. Für unbedingt notwendige Autofahrten gibt es eine Mitgliedschaft beim Carsharing «Mobility». Flugreisen werden nicht kompensiert, um falsche Anreize zu vermeiden (Erklärung siehe Kapitel 2.3.3).

Andere Faktoren wie die Höhe des Energie- und Wasserverbrauchs und Infrastruktur sind nur begrenzt beeinflussbar. Für unseren Strombedarf kaufen wir eine entsprechende Menge Ökostrom, die mit dem naturemade star Label zertifiziert wurde, bei unserem lokalen Versorger SH Power ein.

Für die Rentenversicherung ist ESU-services Mitglied bei der Versicherung „Abendrot“, die eine nachhaltige Anlagepolitik betreibt.

Das Pendeln hängt vom Wohnort der Mitarbeiter ab und ist damit auch eine individuelle Entscheidung. Seit Beginn der Corona Epidemie arbeiten wir deutlich mehr im Homeoffice und reduzieren so die Anzahl von Arbeitswegen und Geschäftsreisen.

Wir unterstützen unsere Kunden bei der Reduktion von Umweltbelastungen. NGO’s wird bei Projekten ein zusätzlicher Rabatt gewährt. Ferner unterstützen wir qualitativ hochstehenden Journalismus in einer Vielzahl von Beiträgen für verschiedene Medien.

Contents

Abbreviations

	Deutsch	English
CH	Schweiz	Switzerland
EPD	Umweltproduktdeklaration	Environmental Product Declaration
ISO	Internationale Organisation für Normung	International Organization for Standardization
LCA	Ökobilanz	Life Cycle Assessment
GWP	Klimaänderungspotential	Global Warming Potential
PCR	Produktkategorie-Regeln	Product Category Rules
RER	Europa	Europe
SH	Schaffhausen	Schaffhausen
UBP	Umweltbelastungspunkte	Eco-points
PEF	Ökologischen Fußabdruck für Produkte	Product environmental footprint

1 About ESU-services Ltd.

ESU-services Ltd. was founded in 1998. Its core business is research, consulting, review, and training in the field of Life Cycle Assessment (LCA). This methodology investigates the environmental aspects of products and services from cradle to grave, from resource extraction to manufacturing, use, and end-of-life treatment. We also work with related methods such as carbon footprinting and Input-Output-Analysis.

Fairness, independence, and transparency are the main characteristics of our consulting philosophy. We work in an issue-related manner and carry out our analyses without prejudice. We document our studies and our work in a transparent and comprehensive manner. We offer fair and competent consultation, which enables our clients to control and continuously improve their environmental performance.

ESU-services covers several economic sectors such as energy, basic minerals, metals and chemicals, biomass, transportation, waste management, information technology, food, and lifestyles. ESU-services also contributes to the development of impact assessment methods such as ecological scarcity method. Since 2007, ESU-services has been the Regional SimaPro Competence Centre of Switzerland, Germany, Austria and Liechtenstein.

The range of services offered by ESU-services GmbH comprises the following core areas:

- Project management in ground-breaking life cycle assessment projects such as ecoinvent and the "Life Cycle Assessment of Energy Products".
- LCA case studies on energy systems, biofuels, food, packaging, lifestyles, transport, electronics, materials, construction products, and many other sectors[1].
- Environmental extended input-output analysis.
- Other methods such as CO_2-balances (carbon footprint) and water balances, environmental footprint, energy analyses, ecological footprint, biodiversity footprint, or transport balances.
- Material and substance flow analyses (MFA and SFA).
- Balance of a company's total emissions including the flow of goods (organizational life cycle assessment).
- Consulting on life cycle and supply chain management.
- Environmental declarations and validation of EPDs (environmental product declaration)
- Product Environmental Profile (PEP) and verifications
- Development of Product Category Rules (PCR) for EPDs
- Simplified web tools and Excel parameter models
- Life cycle inventory analysis according to the ecoinvent methodology, e.g. for food or photovoltaics.
- Sales of life cycle inventory data for various areas.
- Development of impact assessment methods, e.g. method of ecological scarcity (environmental impact points).
- Critical review according to ISO 14040, 44, 67 and validation/verification according to other standards
- Advice on the development of standards for life cycle assessment.

[1] Download of further information regarding the LCA methodology and how to start a study on https://esu-services.ch/address/tender/

- Sales of and training for the world's leading LCA software SimaPro, the web-based LCA tool e-DEA, or the simplest LCA solution EarthSmart.
- Articles for scientific journals, review, editor for the Int J LCA
- Education and training, lectures, support for journalists
- Organization of workshops such as the life cycle assessment discussion forum.

2 Environmental product declaration

2.1 Methodology

This implementation of an environmental product declaration is broadly based on the product category rules (PCR) for environmental science and engineering research and development services (PCR 2012). These PCR are based on ISO Standard 14025 for the implementation of environmental declarations (International Organization for Standardization (ISO) 2006a).

Deviating from the PCR, the latest versions of the indicators as described in the general programme instructions for the international system (EPD 2019) is used.

The life cycle assessment (LCA) method according to ISO 14072 was used to quantify the environmental impacts (International Organization for Standardization (ISO) 2014) for the whole organization. The impacts per consulting hour are recorded according to ISO 14040 (International Organization for Standardization (ISO) 2006b). This method is based on a life-cycle approach, whereby the environmental impacts of a product or organization are recorded and evaluated from the extraction of raw materials through production and use to the disposal phase (from cradle to grave).

No external review or verification of the report has been conducted to date. It is therefore currently an "Environmental Supplier Declaration according to ISO 14021" (International Organization for Standardization (ISO) 2016).

2.2 Goal

This environmental report examines the environmental impacts of the services we offer, considering as many relevant aspects as possible. The report identifies the main sources of environmental pollution. The purpose of the report is to inform our customers about environmental impacts caused by our services and identify potential areas for improvement. Our first annual environmental report was published in 2014.

2.3 Scope and system description

2.3.1 Functional unit

The functional unit of the EPD refers to 1 hour of consultancy services provided in 2020.

2.3.2 System boundaries

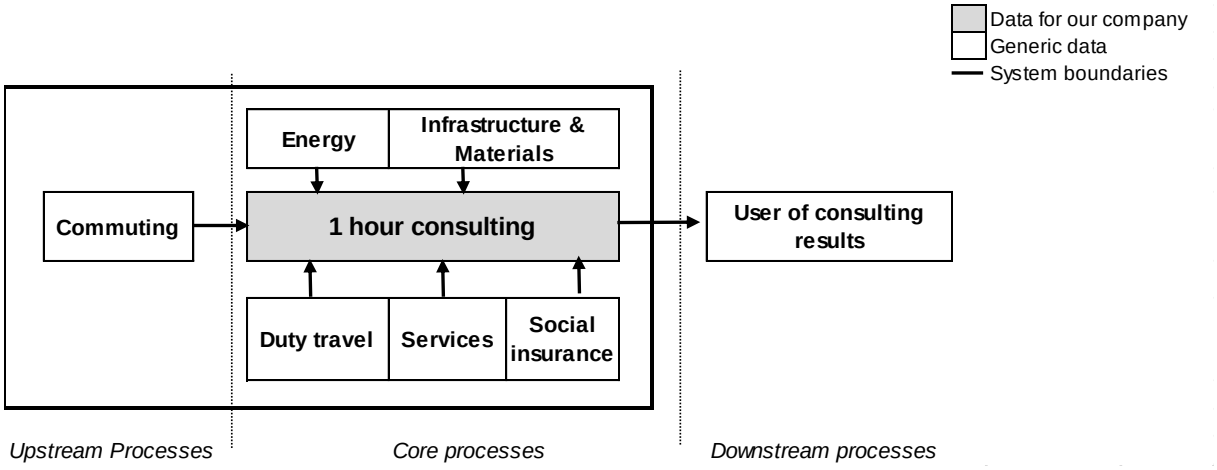
According to the product category rules used (PCR 2012), all environmentally relevant resource consumption and emissions for the investigated system are considered in the LCA as shown in Tab. 2.1. For the impact assessment, the latest implementation of the PEF method in SimaPro was used. A distinction is made between upstream and core processes. The standard "upstream processes" include only individual commuting, as this is not causally related to the service sold.

The permanent employees of the company receive a travel card for public transport (Swiss General Abonnement - GA), which is also used to travel to their place of work. All environmentally relevant processes used for core services are reported under the category "Core processes".

In contrast to the requirements of the above-mentioned PCR, this life cycle assessment is prepared without cut-off criteria. This means that all processes are included, even if their contribution to the overall balance sheet is below a certain threshold. In addition, some processes, such as statutory social insurance, are also included in the balance sheet, although this is not required under the underlying PCR. The reported burdens are therefore higher (see result in chapter 2.5) than is the case for balance sheets that are carried out exactly in accordance with this PCR.

- Upstream process:
    - Individual commuting
- Core processes:
    - Energy consumption (electricity and heating)
    - Infrastructure and material consumption (share of buildings, water consumption, paper, IT and electronic equipment, tea and coffee)
    - Business trips including hotel accommodation
    - Social security funds
    - Purchased services (telecommunications, training, and accounting)
    - Disposal of waste and wastewater

Tab. 2.1 System description for calculating the organizational LCA (PCR 2012)



2.3.3 Offsetting / compensation of environmental impacts

Today many companies use carbon offsetting, compensation, or neutralization as a means of environmental management. They even claim to be carbon neutral.

A carbon offset is a reduction in emissions of carbon dioxide or other greenhouse gases made to compensate for emissions made elsewhere. Offsets are measured in tonnes of carbon dioxide equivalent. One tonne of carbon offset represents the reduction of one tonne of carbon dioxide or its equivalent in other greenhouse gases.

There are service providers and projects on the market that allow offsetting of greenhouse gas emissions related to e.g. travel by air or car or any other activity. It is tempting to simply pay a small amount of money to offset all the emissions related to one's own activities and claim that the business is carbon neutral.

However, in our point of view this is a misleading approach that lacks purpose. It is also not supported by the underlying standards applied for this EPD.

We, as a global community, not only need to reduce greenhouse gas emissions to zero, but also must immediately eliminate gases that are already in the atmosphere. This is not possible if each company or individual only implements simple and cheap solutions or even tries to pass on the responsibility for their own shortcomings to others by purchasing offsets.

To slow down climate change, it is not sufficient to just burn fossil fuels more efficiently, it is necessary to completely stop using and burning them.

With the option to offset, we tend to only improve the internal situation where the costs are higher than for the offset, e.g. by opting for a flight and missing the opportunity to travel by train, powered by green electricity. But, with climate compensation, the maximum reduction of total CO_2-emissions is limited to 50% which is not sufficient to reach climate goals.[2]

A good approach would be if all entities acted together and improved the situation regarding their individual, specific key contributors to their global warming potential.

Paying money to other companies or individuals should only be done as a voluntary measure, e.g. by supporting so-called Gold Standard projects that also bring social benefits. In other words, carbon offsets or climate certificates are not suitable as a substitute for one's own actions.

If emissions already occurred, it is helpful if these previous emissions are offset. However, if a decision must be made regarding future emissions: No climate certificate in the world can undo one emitted ton of CO_2, regardless of if you offset it once, twice, or as many times as you want.

Instead of paying for a carbon offsetting we supported directly the construction of a wood heating for a community accommodation operated by the Swiss Naturfreunde association. This reduced the local CO_2 emission by using wood resources available in the Cantone of Schaffhausen.

2.4 Life cycle inventory analysis (LCI)

Available information and own data (such as electricity, heating, and water billing, etc.) were primarily used to model the core processes.

The data for business trips (transport, overnight stays) was extracted from the expense reports. Information on social insurance is taken from the annual financial statements for the company. Only the employer's contribution to the insurance is considered.

The consumption of coffee, tea, and paper was recorded according to receipts and our own estimates. The environmental impacts caused by the manufacture of computers and printers have been broken down to the assumed total service life of a device of 7 years or longer if actual devises are older.

The ESU database was used as background data for transport and materials (ESU-services 2024a). Data for the production of coffee, tea and provision of overnight stays are taken from the company's own database (ESU-services 2024b). For purchased services and social security, expenditure data is linked to data from the Swiss environmental-extended input-output table to

[2] https://www.esu-services.ch/fileadmin/download/jungbluth-2009-DF37-7.pdf

calculate environmental impacts (Jungbluth et al. 2011). The modelling and evaluation was carried out in the LCA software SimaPro 2024.

The complete life cycle inventory for the environmental report is shown in Tab. 2.2.

Tab. 2.2 Unit process raw data per year of consulting services provided by ESU-services Ltd. in 2020

Name	Location	InfrastructureProcess	Unit	environmental report, 2020	UncertaintyType	StandardDeviation95%	GeneralComment
Location				ESU			
InfrastructureProcess				0			
Unit				a			
environmental report, 2020	ESU	0	a	1			
light fuel oil, burned in boiler 100kW, average	CH	0	MJ	1.36E+4	1	1.05	(1,1,1,1,1,1,BU:1.05); company data; from utility balance
electricity, low voltage, certified electricity, at grid	CH	0	kWh	0	1	1.31	(2,3,1,1,3,5,BU:1.05); direct electricity; own assumption
electricity, low voltage, at grid	CH	0	kWh	8.44E+1	1	1.31	(2,3,1,1,3,5,BU:1.05); general electricity (staircase lighting); Kurt Peyer Nebenkosten
electricity, low voltage, parameterized, at grid	CH	0	kWh	2.96E+2	1	1.31	(2,3,1,1,3,5,BU:1.05); electricity use in the office; SH Power Rechnungen
electricity, low voltage, ewz oekopower 2010, at grid	ZH	0	kWh	8.25E-1	1	1.12	(3,3,1,1,1,1,BU:1.05); Electricity consumption of internet server provider; Metanet.ch
Heat, waste	-	-	MJ	1.37E+3	1	1.31	(2,3,1,1,3,5,BU:1.05); calculated from electricity uses; own assumption
building, multi-storey	RER	1	m3	1.57E-1	1	3.00	(1,2,1,1,1,1,BU:3); 80 years life time, room height incl. Floor area about 3m; own calculation
paper, recycling, no deinking, at plant	RER	0	kg	4.80E+0	1	1.30	(4,1,1,1,1,5,BU:1.05); Use of recycling paper for printers; Balance sheet
paper, recycling, no deinking, at plant	RER	0	kg	3.99E+1	1	1.30	(4,1,1,1,1,5,BU:1.05); Use of toilet paper, recycling quality; own calculation assuming annual usage of 21kg of toilet paper per pax
ground coffee, in PET/EVOH/PE-bag, at household	RER	0	kg	0	1	1.30	(4,1,1,1,1,5,BU:1.05); 1 person à 40%; 1 person à 80%; own calculation
black tea, Darjeeling, conventional, at regional storage	DE	0	kg	1.56E+0	1	1.30	(4,1,1,1,1,5,BU:1.05); 1 pax à 80%; own calculation
disposal, municipal solid waste, 22.9% water, to municipal incineration	CH	0	kg	1.60E+1	1	1.30	(4,1,1,1,1,5,BU:1.05); Estimation, 5 kg per week; own assumption
tap water, unspecified natural origin CH, at user	CH	0	kg	2.19E+4	1	1.21	(4,1,1,1,1,1,BU:1.05); company data; property management
treatment, sewage, to wastewater treatment, class 3	CH	0	m3	2.19E+1	1	1.21	(4,1,1,1,1,1,BU:1.05); calculated with water balance; own assumption
desktop computer, without screen, at plant	GLO	0	unit	3.00E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 3 PC, Average life time 10 years; own assumption
laptop computer, at plant	GLO	0	unit	5.71E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 4, Average life time 7 years; own assumption
LCD flat screen, 17 inches, at plant	GLO	0	unit	4.00E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 4, Average life time 10 years; own assumption
printer, laser jet, b/w, at plant	GLO	0	unit	1.00E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 1, Average life time 10 years; own assumption
toner module, laser jet, b/w, at plant	GLO	0	unit	3.00E+0	1	1.05	(1,1,1,1,1,1,BU:1.05); units used; expense accounts
transport, average train, SBB mix	CH	0	pkm	1.38E+4	1	2.00	(1,1,1,1,1,1,BU:2); Commuting; expense accounts
transport, passenger car	CH	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Buisness trips; expense accounts
transport, freight, light commercial vehicle	CH	0	tkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Buisness trips; expense accounts
transport, aircraft, passenger, Europe	RER	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, aircraft, passenger, intercontinental	RER	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, average train, SBB mix	CH	0	pkm	1.40E+4	1	2.00	(1,1,1,1,1,1,BU:2); Business trips by Swiss rail; expense accounts
transport, average train	DE	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, average train	IT	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, average train	BE	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, average train	FR	0	pkm	0	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
transport, average train	AT	0	pkm	4.80E+2	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
guest-night, average European hotel	RER	0	unit	2.00E+0	1	1.05	(1,1,1,1,1,1,BU:1.05); Business trips; expense accounts
G66, insurance and pension funding	CH	0	CHF2005	3.91E+4	1	1.05	(1,1,1,1,1,1,BU:1.05); Social insurance, share of company; Balance sheet
G80, education	CH	0	CHF2005	0	1	1.05	(1,1,1,1,1,1,BU:1.05); Training; Balance sheet
G71u74, other business activities	CH	0	CHF2005	3.65E+3	1	1.05	(1,1,1,1,1,1,BU:1.05); Accounting; Balance sheet
G64, post and telecommunications	CH	0	CHF2005	1.72E+3	1	1.05	(1,1,1,1,1,1,BU:1.05); Telecommunication services; Balance sheet

2.5 Life cycle impact assessment

In this chapter the environmental impacts are presented according to the different environmental indicators.

2.5.1 Category indicators according to environmental footprint method

Tab. 2.3 shows the environmental impacts of upstream and core processes according to the environmental indicators in the environmental footprint method. Results are presented for the 16 different environmental indicators according to EU-JRC recommendation (Sala et al. 2018). The share of the processes on every environmental indicator is highlighted by a coloured scale, in which the highest value is purple and the lowest is light blue.

The process social insurance has the highest share on the total impact of all indicators.

Even though the total number of person kilometres travelled for commuting is higher than for business trips, the process business trips is responsible for a higher share of the total impact of the indicators. This is not only due to hotel stays (which are included in business trips), but also due to the country-specific electricity mixes used for train travel abroad, which often have a higher environmental impact than the Swiss electricity mix used for commuting by train in Switzerland.

As the only upstream process, commuting contributes relatively little to the impact for all indicators.

Both commuting and business trips decreased significantly compared to previous years because of the corona crisis.

The process with the lowest contribution to the overall impact for all indicators is disposal. Since consultation is a service and uses only small quantities of material goods (compared to production), the disposal of materials is responsible for only a small share to the overall impacts.

The PEF category “Human toxicity, cancer – inorganics” had a value equal to 0, therefore it was not shown in the table.

It should be noted that environmental product declarations and reports from different programmes or initiatives cannot be compared with each other or can only be compared to a limited extent.

Tab. 2.3 Life cycle impact assessment per hour of ESU-services consulting in 2020 according to different environmental indicators.

Indicator	Unit	*UPSTREAM*	*Core processes*						TOTAL	TOTAL without travel
		Commuting	Energy	Infrastruct. & Materials	Buisness trips	Social insurance	Services	Disposal		
Climate change	kg CO2 eq	2.5E-02	3.4E-01	1.1E-01	4.3E-02	7.1E-01	1.8E-01	4.2E-03	1.4E+00	1.4E+00
Share	%	*2%*	*24%*	*8%*	*3%*	*50%*	*13%*	*0%*	*100%*	*97%*
Ozone depletion	kg CFC11 eq	1.5E-09	8.4E-09	3.2E-09	2.4E-09	1.2E-06	2.7E-07	1.3E-10	1.5E-06	1.5E-06
Share	%	*0%*	*1%*	*0%*	*0%*	*81%*	*18%*	*0%*	*100%*	*100%*
Ionising radiation	kBq U-235 eq	3.5E-02	7.7E-02	3.0E-02	4.1E-02	2.5E-01	5.8E-02	1.0E-03	4.9E-01	4.5E-01
Share	%	*7%*	*16%*	*6%*	*8%*	*51%*	*12%*	*0%*	*100%*	*92%*
Photochemical ozone formation	kg NMVOC eq	8.4E-05	8.1E-04	3.6E-04	1.3E-04	2.9E-03	7.5E-04	1.0E-05	5.1E-03	5.0E-03
Share	%	*2%*	*16%*	*7%*	*3%*	*58%*	*15%*	*0%*	*100%*	*97%*
Particulate matter	disease inc.	1.3E-09	2.7E-09	4.8E-09	1.7E-09	3.5E-08	8.6E-09	1.7E-10	5.5E-08	5.3E-08
Share	%	*2%*	*5%*	*9%*	*3%*	*65%*	*16%*	*0%*	*100%*	*97%*
Human toxicity, non-cancer	CTUh	1.1E-09	2.0E-09	8.8E-09	1.3E-09	1.5E-08	4.1E-09	4.0E-10	3.3E-08	3.2E-08
Share	%	*3%*	*6%*	*27%*	*4%*	*46%*	*13%*	*1%*	*100%*	*96%*
Human toxicity, cancer	CTUh	3.5E-11	5.3E-11	1.0E-10	4.1E-11	5.6E-10	1.6E-10	1.0E-11	9.6E-10	9.2E-10
Share	%	*4%*	*6%*	*11%*	*4%*	*59%*	*16%*	*1%*	*100%*	*96%*
Acidification	mol H+ eq	1.0E-04	4.9E-04	7.3E-04	1.7E-04	2.7E-03	7.0E-04	2.3E-05	4.9E-03	4.7E-03
Share	%	*2%*	*10%*	*15%*	*3%*	*55%*	*14%*	*0%*	*100%*	*97%*
Eutrophication, freshwater	kg P eq	1.5E-05	3.6E-05	1.7E-04	2.1E-05	3.1E-04	8.9E-05	5.9E-06	6.5E-04	6.3E-04
Share	%	*2%*	*6%*	*26%*	*3%*	*48%*	*14%*	*1%*	*100%*	*97%*
Eutrophication, marine	kg N eq	2.3E-05	1.3E-04	2.3E-04	4.0E-05	6.0E-04	1.5E-04	1.1E-04	1.3E-03	1.2E-03
Share	%	*2%*	*10%*	*18%*	*3%*	*47%*	*12%*	*8%*	*100%*	*97%*
Eutrophication, terrestrial	mol N eq	2.3E-04	1.2E-03	1.2E-03	3.7E-04	6.1E-03	1.5E-03	6.4E-05	1.1E-02	1.0E-02
Share	%	*2%*	*11%*	*12%*	*3%*	*57%*	*14%*	*1%*	*100%*	*97%*
Ecotoxicity, freshwater	CTUe	4.8E-01	2.7E+00	4.2E+00	7.1E-01	1.3E+01	3.6E+00	1.5E+00	2.6E+01	2.5E+01
Share	%	*2%*	*10%*	*16%*	*3%*	*49%*	*14%*	*6%*	*100%*	*97%*
Land use	Pt	9.1E-01	2.2E-01	7.5E-01	9.7E-01	6.2E+00	1.3E+00	3.6E-03	1.0E+01	9.4E+00
Share	%	*9%*	*2%*	*7%*	*9%*	*60%*	*12%*	*0%*	*100%*	*91%*
Water use	m3 depriv.	2.4E-02	6.4E-03	7.4E-02	3.7E-02	2.8E-01	7.4E-02	2.0E-03	5.0E-01	4.7E-01
Share	%	*5%*	*1%*	*15%*	*7%*	*57%*	*15%*	*0%*	*100%*	*93%*
Resource use, fossils	MJ	5.8E-01	4.8E+00	1.3E+00	8.5E-01	1.2E+01	3.1E+00	2.6E-02	2.3E+01	2.2E+01
Share	%	*3%*	*21%*	*6%*	*4%*	*53%*	*13%*	*0%*	*100%*	*96%*
Resource use, minerals and metals	kg Sb eq	1.2E-07	1.4E-07	2.0E-05	1.4E-07	3.4E-05	1.0E-05	7.7E-09	6.5E-05	6.5E-05
Share	%	*0%*	*0%*	*31%*	*0%*	*53%*	*16%*	*0%*	*100%*	*100%*
Climate change - Fossil	kg CO2 eq	2.5E-02	3.4E-01	1.1E-01	4.3E-02	7.1E-01	1.8E-01	4.1E-03	1.4E+00	1.4E+00
Share	%	*2%*	*24%*	*8%*	*3%*	*50%*	*13%*	*0%*	*100%*	*97%*
Climate change - Biogenic	kg CO2 eq	1.4E-04	1.1E-04	1.6E-04	1.7E-04	4.8E-03	7.8E-04	1.0E-04	6.3E-03	6.1E-03
Share	%	*2%*	*2%*	*3%*	*3%*	*77%*	*12%*	*2%*	*100%*	*97%*
Climate change - Land use and LU change	kg CO2 eq	2.7E-04	6.5E-05	5.9E-05	3.0E-04	1.1E-03	2.5E-04	1.2E-06	2.1E-03	1.8E-03
Share	%	*13%*	*3%*	*3%*	*14%*	*55%*	*12%*	*0%*	*100%*	*86%*
Human toxicity, non-cancer - organics	CTUh	2.7E-11	1.6E-10	4.3E-09	4.8E-11	7.4E-10	2.0E-10	1.2E-12	5.5E-09	5.5E-09
Share	%	*0%*	*3%*	*79%*	*1%*	*13%*	*4%*	*0%*	*100%*	*99%*
Human toxicity, non-cancer - inorganics	CTUh	1.5E-10	3.0E-10	9.3E-10	1.8E-10	2.8E-09	7.0E-10	2.0E-11	5.0E-09	4.8E-09
Share	%	*3%*	*6%*	*18%*	*3%*	*55%*	*14%*	*0%*	*100%*	*97%*
Human toxicity, non-cancer - metals	CTUh	9.2E-10	1.6E-09	3.5E-09	1.1E-09	1.2E-08	3.3E-09	3.8E-10	2.3E-08	2.2E-08
Share	%	*4%*	*7%*	*15%*	*5%*	*53%*	*14%*	*2%*	*100%*	*95%*
Human toxicity, cancer - organics	CTUh	3.1E-12	2.1E-11	1.7E-11	5.6E-12	1.2E-10	3.0E-11	1.8E-13	2.0E-10	1.9E-10
Share	%	*2%*	*11%*	*9%*	*3%*	*61%*	*15%*	*0%*	*100%*	*97%*
Human toxicity, cancer - inorganics	CTUh	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Share	%	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*
Human toxicity, cancer - metals	CTUh	3.2E-11	4.1E-12	2.8E-11	2.0E-12	1.1E-11	6.9E-11	9.2E-13	7.7E-10	7.6E-10
Share	%	*4%*	*1%*	*4%*	*0%*	*1%*	*9%*	*0%*	*100%*	*100%*
Ecotoxicity, freshwater - organics	CTUe	2.7E-03	2.1E-04	5.5E-02	8.9E-05	7.7E-04	4.9E-02	1.1E-01	6.3E-01	6.3E-01
Share	%	*0%*	*0%*	*9%*	*0%*	*0%*	*8%*	*17%*	*100%*	*100%*
Ecotoxicity, freshwater - inorganics	CTUe	4.8E-02	1.2E-02	1.2E+00	1.1E-02	1.6E-02	4.0E-01	1.1E-02	5.2E+00	5.1E+00
Share	%	*1%*	*0%*	*23%*	*0%*	*0%*	*8%*	*0%*	*100%*	*100%*
Ecotoxicity, freshwater - metals	CTUe	4.3E-01	2.7E-01	1.2E+00	8.1E-02	5.2E-01	2.9E+00	8.8E-02	2.0E+01	2.0E+01
Share	%	*2%*	*1%*	*6%*	*0%*	*3%*	*14%*	*0%*	*100%*	*100%*

2.5.2 Carbon footprint

A detailed analysis for the global warming potential can be found in Fig. 2.1. The energy use for heating and electricity is the major impact in the core balance. If considering social insurances as well these are most relevant for the carbon footprint caused by ESU-services.

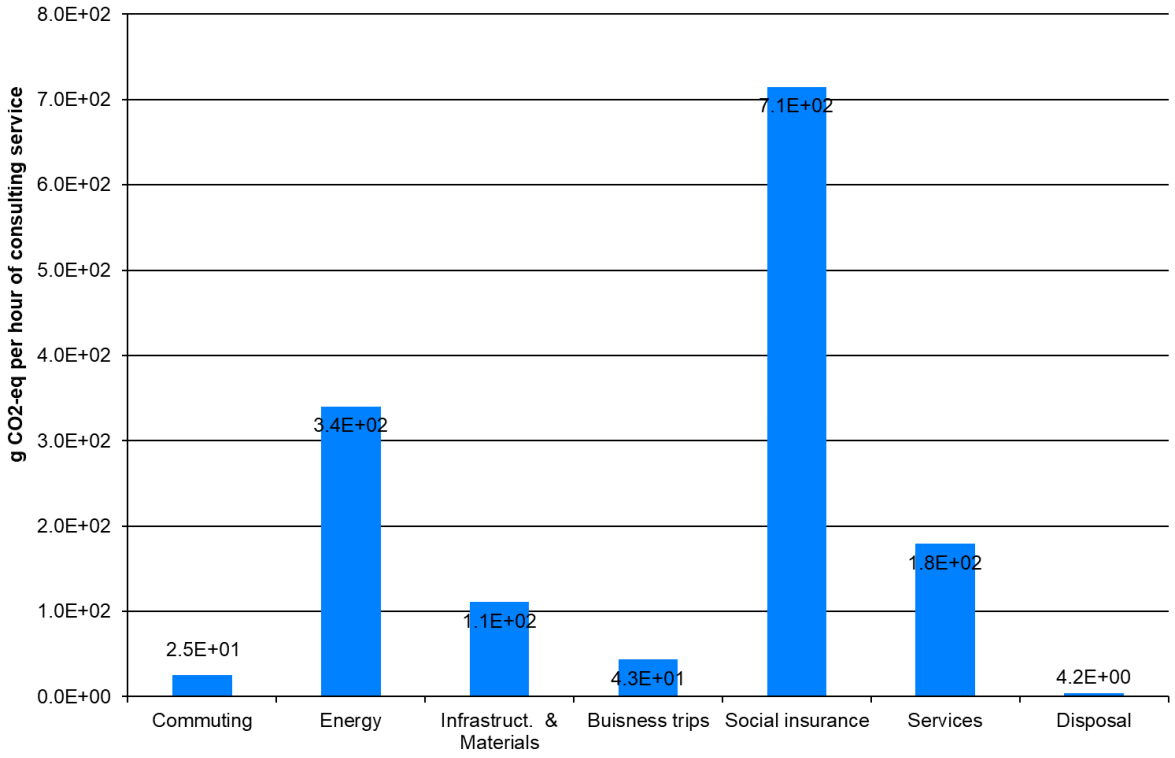


Fig. 2.1 Carbon footprint in kg CO_2-equivalents per hour of consulting service in 2020

2.5.3 Total environmental impacts according to ecological scarcity method

For our Swiss customers, information on the environmental impact points (UBP) calculated according to the ecological scarcity method 2013 (Frischknecht et al. 2013) might also be of interest. These impacts are shown in Tab. 2.4 and Fig. 2.2.

The ecological scarcity method considers several types of environmental impact and resource use, which are weighted differently according to the objectives of Swiss environmental policy. The single score result reflects the results of most indicators assessed in the PEF method. Once again, the highest share is caused by the process social insurance. As already seen in chapter 2.4, commuting contributes less than business trips according to this method, due to the aforementioned reasons. Again, disposal contributes the smallest share of the overall impact.

Tab. 2.4 LCIA with the ecological scarcity method 2013. Eco-points per hour of consulting (Frischknecht et al. 2013) in 2020

	Unit	*UPSTREAM*	*Core processes*						TOTAL	TOTAL without travel
		Commuting	Energy	Infrastruct. & Materials	Buisness trips	Social insurance	Services	Disposal		
Ecological scarcity 2013	UBP	7.0E+01	2.5E+02	2.5E+02	9.0E+01	1.1E+03	2.9E+02	2.1E+01	2103	2013
Shares		*3%*	*12%*	*12%*	*4%*	*54%*	*14%*	*1%*	*100%*	*96%*

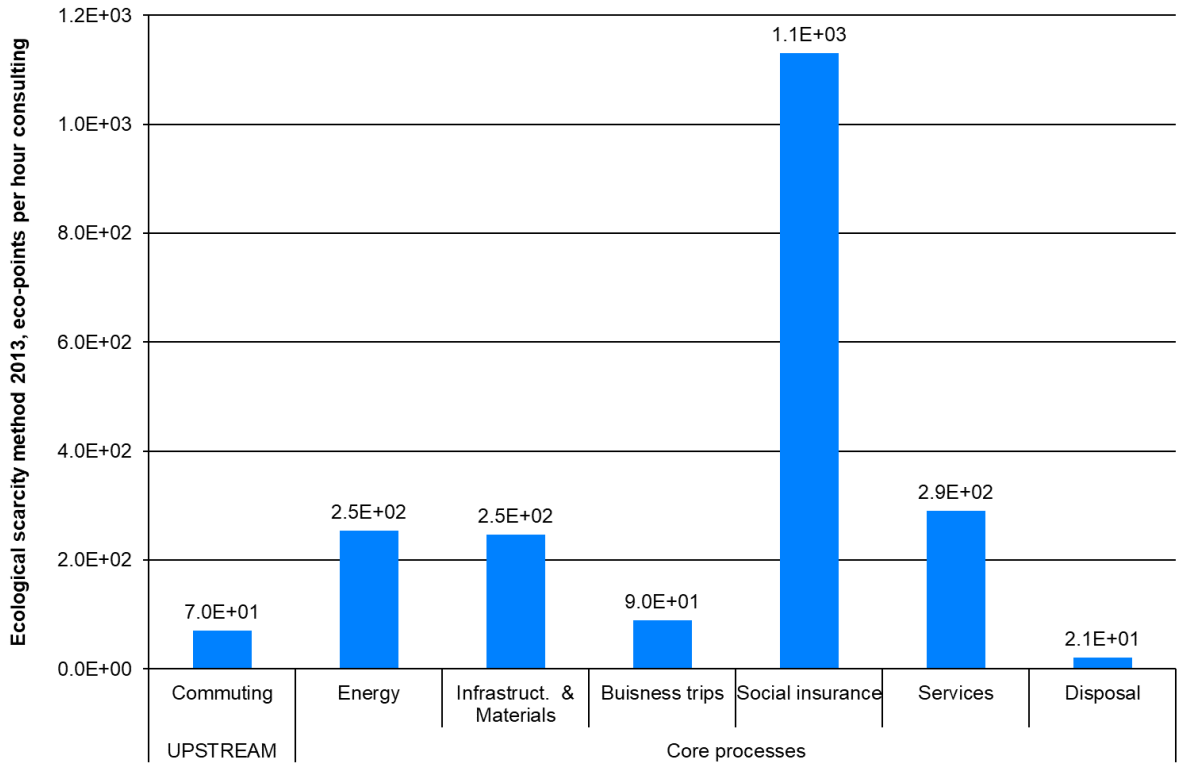


Fig. 2.2 LCIA with the ecological scarcity method 2013. Eco-points per hour of consulting (Frischknecht et al. 2013) in 2020

2.5.4 Indicator results for use of resources and waste

If waste treatment is not included within the system boundaries, the EPD PCR require listing indicators for the use of resources and waste directly taken from the life cycle inventory. As this LCA includes the whole life cycle of all required products and services, it is not necessary to carry out this step.[3] All the related impacts are assessed.

2.6 Discussion of results

According to the product category rules (PCR 2012) for this type of service, it is possible to neglect materials in the balance sheet if they contribute less than 1% to the total environmental impacts. Practically, it seems almost impossible to determine. Our balance sheet neglects certain material inputs such as ballpoint pens. It was not possible to quantify the consumption of materials purchased only in insignificant quantities. In some cases, there is also an overlap in terms of which contributions can be better recorded through monetary annual accounts and which materials can be recorded directly.

In the product category rules (PCR 2012), social security and external services such as accounting are not explicitly mentioned. Our balance shows that they account for a quite relevant share of the environmental impacts caused. Therefore, it is recommended to include them in the EPD of consulting services.

[3] Updated clarification regarding indicators for use of resources and waste: https://www.environdec.com/News-archive/#15922, online 27.07.2020

3 Our commitment to sustainability

The environmental reports published for the consulting services of ESU-services Ltd. show that the environmental impacts caused per consulting hour can be highly influenced by the number of business trips involving air travel. Air travel depends on the projects carried out and on visits to international congresses. In 2020, we were able to make all trips by train.

The number of business trips and commuting was reduced substantial in 2020 compared to previous years because of the corona crisis.

For travel by car, the company has a subscription with the car-sharing provider Mobility, which, however, hardly had to be used. The possibility of online telephone conferences has been intensively used to avoid travelling abroad.

Our suppliers are also chosen based on their sustainable performance. For example, we use recycled or FSC-certified paper. We use the naturemade star certified electricity “CleanSolution StarFlex” provided for this region by SH power. The electricity mix consists of 97.5 % hydropower and 2.5 % new renewable energies.

Other factors, such as energy and water consumption and infrastructure, can only be influenced to a limited extent.

For staff pensions, ESU-services is a member of the "Abendrot" insurance company, which pursues a sustainable investment policy. Other insurance used by the company, such as AHV, are required by law and therefore cannot be influenced. So far it is not possible for us to assess and compare the environmental impact of obligatory accident insurance.

Commuting depends on where employees live and is therefore an individual decision. Since beginning of the corona crisis we work at home for a considerable share of working time and therefore avoid commuting.

We offer all staff members the opportunity to work part time to support families and work-life balance. Salaries are based on performance and not influenced by age or gender. Additionally, we actively discourage structural overtime.

We actively support our customers in developing sustainable business practices. There are special consultancy rates for NGOs.

ESU-services cooperates closely with the global SimaPro network. With a wide range of expertise available, we can offer unparalleled services and facilitate large international or multi-client projects. Within the partner network, we have developed and expressed our ethical core values. Collaborating with partners all over the world is crucial for ESU-services as we work to meet the precise needs of our customers.

We strengthen our commitment to provide all types of media with reliable and transparent information about environmental aspects. The main topics presented were an LCA on pets (Annaheim et al. 2019) and several request concerning sustainable food consumption. Many media outlets took advantage of our services and based their articles partly on contributions by ESU-services. A full list of articles can be found here: https://www.esu-services.ch/de/publications/media/.

Title Titre Titel und Link	Media Source Quelle	Date Date Datum	Theme Événement Thema	Type Type Typ
Welcher Weihnachtsbaum hat die beste Öko-Bilanz?	Mannheimer Morgen	16.12.2020		Online
Ökologische Skis? Fehlanzeige. Fast jedenfalls	Hochparterre	11.12.2020		Online
Was steck im Ski – wer dahinter? Die Recherche.	mountain wilderness	07.12.2020	In einer Studie wurden die Umweltauswirkungen eines konventionell hergestellten Skis mit einem «ökologischen» verglichen	Online
De quoi est fait le ski et qui se cache derrière? La recherche.	mountain wilderness	07.12.2020		en ligne
ÖKOlogisch: Fakten, Wissen, Tipps - Nachhaltiger konsumieren in der Schweiz	Beobachter, biovision, Konsumentenschutz	21.11.2020	Ratgeber zum Thema ökologischer Konsum	Buch
Klare Sache: Wie es um das Leitungswasser bestellt ist	greenpeace magazin	20.11.2020	ESU-Services errechnete im Auftrag des Greenpeace Magazins, wie hoch der Energieeinsatz für Leitungswasser im Vergleich zu Wasser ist, das in Flaschen durch die Republik gekarrt wird	Zeitschrift/Online
Alternativen zur Milch	WWF Magazin	18.11.2020	Vergleich Pflanzendrinks und Kuhmilch	Zeitschrift
Haustiere & Nachhaltigkeit: Wie umweltfreundlich sind unsere Vierbeiner?	Bayern 3	04.11.2020	Aufs Klimakonto eines 29kg schweren Hundes gehen jährlich rund 950kg CO2	Radio
Ernährung – ein grosses Potenzial für den Klimaschutz	Stadt Zürich - Klima Newsletter	01.11.2020	Die Stadt Zürich stützt sich auf Zahlen von ESU-services	Online
Klimawandel und Reitsport	diemitdenpferden	27.10.2020	Instagram Story zum Thema Klimawandel und Reitsport mit Ergebnissen aus der ESU Ökobilanz	Story
Nachhaltigkeits-Ratgeber	annabelle	26.10.2020		Zeitschrift
Vegane Milch ist viel besser für die Umwelt	Nau media AG	22.10.2020	Die Bilanz wäre noch besser, würden die Produkte in der Schweiz hergestellt werden.	Online
Schädliche Rülpser von Klimakiller Kuh verschlechtern Ökobilanz	WWF Schweiz	22.10.2020		Online
Fleischersatzprodukte	annabelle	25.09.2020		Zeitschrift
Die Ökobilanz von Haustieren	agila-Magazin	14.10.2020		Online
Bei Vittel sprudelt es trotz Liquiditätsengpass	greenpeace magazin	01.10.2020	Berechnung des Umweltinstituts ESU-services von 2017 im Auftrag des Greenpeace Magazins.	Zeitschrift
Tierische Klimasünder: Die Ökobilanz von Hunden	Galileo, ProSieben	18.09.2020	Haustier versus Auto: Ein Vergleich	Fernsehen
Klimabelastung Hund	Sonntagszeitung	06.09.2020	Unsere Studie zeigt das vollständige Bild für die Haltung in der Schweiz	Zeitung
Aus der Region - für die Umwelt?	Chrut & Rüebli	31.08.2020	Wann regional einkaufen der Umwelt nützt und wann es schadet.	Radio/Online
Schweizer Rind nicht immer klimafreundlicher als Importfleisch	Nau.ch	23.08.2020	Entscheidend für die CO2-Äquivalente von Rindfleisch sind in erster Linie die Fütterung und die direkten Emissionen der Tiere.	Online
Schiffe unter die Lupe genommen	Gebana Blog	06.08.2020	Containerschiffe richten weniger Schaden an als der Anbau der per Schiff transportierten Lebensmittel.	Online
Was ist klimafreundlicher – Bier oder Wein?	Blick	27.07.2020	Eigenwillige Interpretation der Ernährungspyramide.	Zeitung
Fleisch, Fisch, Ei: Welche Auswirkungen haben Lebensmittel auf das Klima?	Bauern Zeitung	23.07.2020	Zahlen aus der Lebensmittelpyramide	Online
Beyond Meat Aktie: Das hört man gerne!	finanz trends	23.07.2020	Das Beratungsunternehmen ESU-services nahm Fleischersatzprodukte und deren fleischliche Alternative mit Blick auf die Umweltverträglichkeit genauer unter die Lupe.	Online
Vegane Burger sind für die Umwelt viel besser als Fleisch	Nau.ch	21.07.2020		Online
Umweltfreundliches Anstossen - Was ist klimafreundlicher – Bier oder Wein?	Blick	10.07.2020	Die Berechnungen für die Ökobilanz von Lebensmitteln wurde durch ESU-services durchgeführt	Zeitung
Die Ökobilanz von Lebensmitteln	Healthy 3	08.07.2020		Online
Kreuzfahrten: Auf Kurs Richtung mehr Nachhaltigkeit	SRF1; PTV-NZZ Format	02.07.2020		Fernsehen
Sonderbund "GREEN"	SonntagsBlick	21.06.2020		Zeitung
Viel Verpackungsmüll Katzen-Feuchtfutter im Test: Viele gute, wenig sehr gute	Kleine Zeitung	19.06.2020		Zeitung
Wie gut ist das Katzenfutter?	Wiener Zeitung	19.06.2020	Laut Schweizer Umweltinstitut ESU-Services steigen die Treibhausgas-Emissionen eines Schweizers durch Haltung einer Katze um drei Prozent (bei einem Hund um sieben Prozent).	Zeitung
Ökobilanz von Haus- und Heimtieren	Vetjournal (Magazin für österreichische Tierärzte)	01.06.2020	Für den einzelnen Halter kann das Haustier allerdings eine hohe Relevanz für den persönlichen ökologischen Fußabdruck haben.	Zeitschrift
Der ökologische Pfotenabdruck	Hundemagazin 5/20	18.06.2020		Zeitschrift
Jetzt persönlichen Fussabdruck berechnen.	ewl energie wasser luzern	01.06.2020	Wie sieht Ihr ökologischer Fussabdruck aus? Erfahren Sie in wenigen Klicks, wie man ohne grossen Verzicht auf Komfort einen Schritt Richtung nachhaltige und ökologische Zukunft gehen kann.	Online
Relevanz und Reduktion des ökologischen Hufabdrucks	Kavallo 6/2020	28.05.2020	Nur wenige Rösseler achten auf den ökologischen Hufabdruck ihrer Pferde. Dabei gibt es einige Punkte die zu höheren oder niedrigeren Umweltbelastungen führen können.	Zeitschrift
Steigende Nachfrage nach Bioprodukten	SRF Trend	09.05.2020		Radio
Nachhaltigkeit und Tierfutter sind kein Widerspruch	Green Petfood	23.04.2020	Das Schweizer Institut des ESU-Services stellte in einer Studie zur Ökobilanz von Haustieren fest, dass ein Hund im Jahr durchschnittlich 0,95 t CO2 …	Online
Gute Avocado, böse Avocado	Gebana Blog	20.03.2020		Online
Schweiz als Drehscheibe im globalen Rohstoffhandel	Die Volkswirtschaft / La Vie économique	11.03.2020		Online
Saubere Sache: Vergleich von Katzenstreu	Stiftung Warentest	24.02.2020	Umwelt: Pflanzenfasern besser als Ton	Online
Wir fokussieren beim Klimaschutz oft zu sehr auf Details	Republik	14.01.2020	Muss man unbedingt Veganer werden, um das Klima zu retten? Und wie schlimm ist eigentlich Netflix? Antworten auf Fragen, die nach dem Klimagame der Republik aufgekommen sind.	Online
Das Klimagame	Republik	09.01.2020	Was bringt mehr für den Klimaschutz: Veganer werden oder aufs Fliegen verzichten? Finden Sie es heraus – mit unserer interaktiven Simulation zum CO2-Fussabdruck.	Online
Schweizer Start-Up bringt pflanzliches Huhn auf den Markt	SRF, 10 vor 10	07.01.2020	Pflanzliche Fleischersatzprodukte haben das Potential Umweltbelastungen zu reduzieren wenn die Verarbeitung umweltfreundlich erfolgt	Fernsehen

4 Your partner ESU-services Ltd.

On the following pages we present us as your project partner for projects in the field of life cycle assessment.

4.1 Experienced project team

Different experts work for ESU-services who are all experienced in the field of ecological assessment of life cycles and profit from a network of renowned experts in the fields required for the study.

4.1.1 Dr. Niels Jungbluth, chief executive officer (CEO)

Niels Jungbluth studied environmental engineering at the Technical University of Berlin. He started working with LCA in 1994 and prepared his diploma thesis during a six month stay at the TATA Energy Research Institute in New Delhi, where he carried out a life cycle assessment for cooking fuels in India. Between 1996 and 2000 he worked on a Ph.D. Project at the Swiss Federal Institute of Technology (ETH) in Zurich at the chair of Natural and Social Science Interface. His Ph.D. thesis on the environmental consequences of food consumption has been awarded the Greenhirn Prize 2000 by the German Öko-Institut. In this thesis, he investigated food consumption patterns by means of life cycle assessment.

He started working with ESU-services in 2000. Since 2006 he has been the owner and managing director. Since 2000 he has worked on more than 250 consultancy projects in the areas food, biomass, energy systems, input-output-analysis, sustainable consumption, as well as several other topics. He is responsible for the SimaPro centre and the data-on-demand service of ESU. Besides working on LCA case studies, he also conducts critical reviews, verification, and validation according to different standards.

Niels Jungbluth is in the editorial board of the “Int. Journal of LCA” and works as reviewer for several other scientific journals. He worked as a special expert for several organizations as e.g. Deutsche Bundesstiftung Umwelt, CEN TC 383 standard (GHG accounting of biofuels), UNEP-SETAC life cycle initiative, Swiss law on tax exemption for biofuels.

4.1.2 Maresa Bussa, project manager

M.Sc. in Energy and Environmental Engineering

Maresa Bussa studied energy and environmental engineering at École des Mines de Nantes and the Technical University of Madrid. In her master thesis, she analysed options to adapt to climate change on the Koh Rong Archipelago in Cambodia.

Between 2017 and 2020 she worked for the Weihenstephan-Triesdorf University of Applied Sciences as a research associate in an EU project on the utilisation of cyanobacteria. She was responsible for the environmental and economic assessment of the product system developed. Since 2018, she has been a doctoral candidate at the Technical University of Munich. As part of her doctorate, she conducted life cycle assessments on different microalgae cultivation systems and extraction methods. Maresa Bussa started working for ESU-services in 2020. In her first projects she investigated alternatives to cow's milk as a drink and is leading the life cycle assessment work in the

European PROFUTURE project on algae. Furthermore, she works for the SimaPro Centre providing support and training for this LCA software.

4.1.3 Christoph Meili, project manager

M.Sc. ETH in Environmental Engineering

Christoph Meili studied environmental engineering at ETH Zurich with major in ecological system design, air quality control and waste management, and in soil protection. In his master thesis he carried out a material flow analysis and LCA for hydrothermal gasification of biomass.

Christoph Meili has worked as project manager for ESU-services since 2016. Here he is responsible for software sales and support in the Regional SimaPro Centre for Switzerland, Germany, Austria, and Liechtenstein. Since starting at ESU he has conducted several LCA projects on the extraction of energy carriers, local energy systems, several different electronic devices, packaging materials and food recipes. Furthermore, he evaluated the quality of cotton labels and developed characteristic value models for run-of-river power plants, lifestyle analyses, transport routes and raw material extraction. He leads software training courses as well as introductory courses and lectures on various life cycle assessment topics.

Since 2012 he has also worked part-time for WWF Switzerland. In the Markets department, he is responsible for the Footprint Calculator, environmental tips for everyday life, as well as scientific work and external enquiries on consumer issues.

4.1.4 Karen Muir, project manager

BSc. Parasitology, BSc. Natural Resource Sciences

Karen Muir studied Parasitology at the University of Glasgow and Natural Resource Sciences, with a major in Organic Farming and Horticulture, at the Zurich University of Applied Sciences (ZHAW) in Wädenswil. In her thesis at the ZHAW she investigated the integration of carbon sequestration into the life cycle assessment of Swiss milk. From 2017-2020 Karen was a member of the Life Cycle Assessment Research Group at the ZHAW and worked on a number of LCA projects, including an analysis of the Swiss hospital sector, various analyses of cafeteria meals, and a comparison of canteen meals, ready-meals, and homecooked meals. Karen started working for ESU-services in April 2021.

4.1.5 Savian Scanu, trainee

BSc. ZHAW in Environmental Science

Savian Scanu studied environmental sciences at the ZHAW Life Sciences in Wädenswil with a specialization in environmental systems and sustainable development. In his bachelor thesis he assessed the environmental impact of wood-based Japanese stag beetle production, which aims for a low-cost, low-energy meat alternative product. He now works as a trainee at ESU-services Ltd.

4.2 Global Partner Network

ESU-services cooperates closely with partners in the global SimaPro network.[4] With a wide range of expertise available, we can offer you unparalleled services and facilitate large international or multi-client projects. We can easily contact these partners to get access to data or information in all regions of the world. Collaborating with partners all over the world is crucial for ESU-services as we work to meet your precise needs. Furthermore, we share the following ethical values and commitments[5] with this network.

Science-based sustainable solutions are for everybody:

- We love our planet, it's our home.
- We work to restore its resilience through sustainable practices and metrics.
- LCA is at the heart of sustainability metrics and must be accessible for everybody.
- SimaPro and LCA-based practices will be pivotal in a vibrant ecosystem that connects a diversity of worlds, systems, people.
- Within that ecosystem we will co-create solutions together with clients, partners, fellow companies, and each other.

Our commitments:

- We commit to quality, accuracy, and transparency.
- We commit to the fact-based results. We won't engage in facts-distortion.
- We use our experience and knowledge to inform our customers and to facilitate sustainable development and practices (co-create better solutions).
- We take every opportunity to maximise our positive impact.
- We welcome everybody to embrace a sustainable transition and see them as a collaborator.

4.3 More than 25 years of experience

Niels Jungbluth started working on LCA in 1994. ESU-services has provided consultancy in the field since 1998. See Tab. 4.1 for a list of the most recent and relevant projects conducted over the last years. A full list with more than 300 project references can be found on our website: https://www.esu-services.ch/projects/fulllist/.

4 https://www.esu-services.ch/network-customers/partner/
5 Download on https://www.esu-services.ch/address/tender/

Tab. 4.1 Selection of recent and relevant projects done by ESU-services in 2020

Year	Project title	Commissioned by
Since 1996	Presentations about the food production, consumption and environmental impacts	Various
Since 2000	Data-on-Demand: life cycle inventory database for agriculture, food, energy, biomass, chemicals and other commodities	Own development
Since 1999	Peer Reviews of papers	www.publons.com/researcher/488732/niels-jungbluth
Since 2001	Subject Editor "LCA for Energy Systems and Food Products"	The International Journal of LCA
Since 2006	Training workshops in LCA and SimaPro	Various
Since 2007	SimaPro Competence Centre Switzerland, Germany, Austria and Liechtenstein	PRé Sustainability
2012-2020	Environmental impacts of cooking recipes	Tabula
Since 2014	Individual verifier for the international EPD® System	On request
2019-2023	PROFUTURE: Microalgae Protein-Rich Ingredients for the Food And Feed of the Future	Horizon 2020
2020-21	Update and harmonization of life cycle inventories of crude oil and natural gas extraction and supply for Switzerland	Federal Office for the Environment (FOEN) Verband der Schweizer Gasindustrie (VSG)
2020	Environmental indicators for brewery processes	Versuchs- und Lehranstalt für Brauerei in Berlin (VLB) e.V.
2020	Validation and verification according to PEFCR beer: LCA of Feldschlösschen Original Lager® beer distributed in Switzerland in different stock keeping units	Feldschlösschen
2020	Update of background data for the German footprint calculator	WWF Germany
2020	Life cycle inventory of ruthenium chloride	Exeger Operations AB
2020	Testing of new eco-factors 2020 for food production and consumption	Federal Office for the Environment (FOEN)
2020	Review: LCA calculation rules for bitumen	ecochain
2020	Environmental impacts of high-sea ship transport: Fact sheet for public discussion	Gebana
2020	Critical Review: Environmental impact of upgrading Brewer's Spent Grain (BSG) from feed to food	Blonk Consultants
2020	eco-profile of skis	Mountain Wilderness Schweiz
2020	LCA of meat alternatives	ETH Zurich
2020	LCA of cow milk and vegan drinks	WWF Switzerland
2020	Critical Review: LCA of CIGS thin film solar panels	Miljögiraff
2020	Key parameter model for planting substrates	RICOTER Erdaufbereitung AG
2020	Calculation of CO2 intensities and validation for the "Greenhouse gas balance of the rental and leasing platform Sharely.ch: Determination of the amount of CO2-eq saved per rental transaction	Sharely AG
2020	Background data for a carbon footprint calculator for German citizens	Climatelabs
2020	Background data for a carbon footprint calculator for German citizens	Coneva
2020	Background data for a carbon footprint calculator for Swiss citizens	EWL Energie Wasser Luzern
2020	Environmental intensities of food portions for the Swiss nutritional pyramid	SGE - Schweizerische Gesellschaft für Ernährung
2020	Life cycle assessment of the pyrolysis plant for biomass	IWB Industrielle Werke Basel
2020	Feedback consumer councellor to the topic grey energy	Schweizerische Energie-Stiftung SES
2020	Life cycle assessment for avocados: Comparison with other products used as sandwich topping	Satori S.A.

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