ESU-services

fair consulting in sustainability

2018

Environmental report and product declaration 2017

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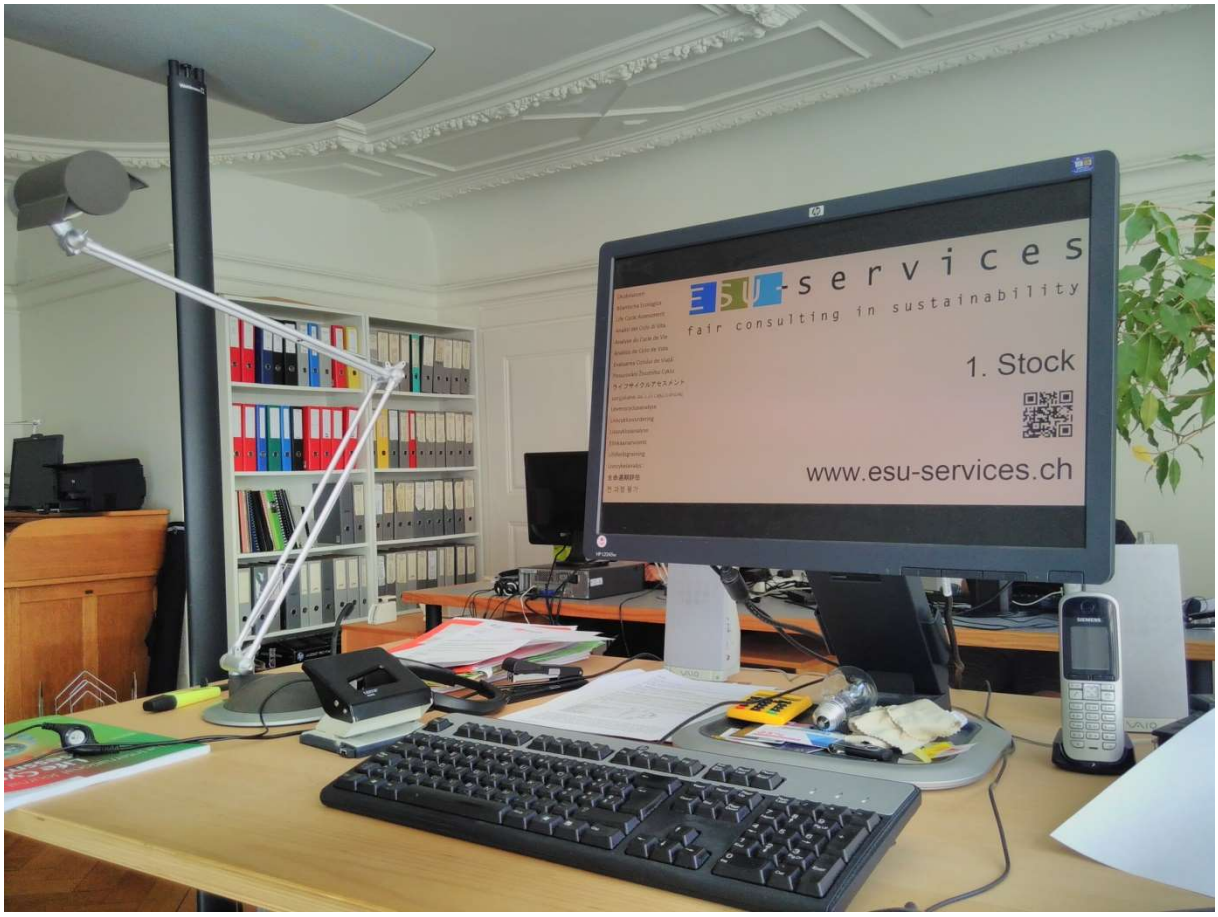

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About us	ESU-services Ltd. has been founded in 1998. Its core objectives are consulting, coaching, training and research in the fields of life cycle assessment (LCA), carbon footprints, water footprint in the sectors energy, civil engineering, basic minerals, chemicals, packaging, telecommunication, food and lifestyles. Fairness, independence and transparency are substantial characteristics of our consulting philosophy. We work issue-related and accomplish our analyses without prejudice. We document our studies and work transparency and comprehensibly. We offer a fair and competent consultation, which makes it for the clients possible to control and continuously improve their environmental performance. The company worked and works 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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Abstract

Sustainability is the core of our consulting activities. With this report we inform our customers about the measures we take for reducing the environmental footprint of our own consulting services. Furthermore, we show how we improve the 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 quite important factor for the impacts of single projects. Therefore, they are calculated separately from the general impacts of the service. Another important factor, which is seldom considered in this type of reporting, is the insurances we take for our employees.

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

All staff members have a GA travel card which allows them to use all public transport in Switzerland for free. This is also used for commuting. Train is our preferred means of transportation for national and international business travelling. If it is necessary to use a car we can rely on the car sharing organization Mobility. Air plane trips are not compensated to avoid wrong incentives.

Our suppliers are chosen also on basis of their sustainable performance. For example, we use Fairphone and recycling or FSC certified paper. We use the regional offer for naturemade star certified electricity “CleanSolution StarFlex” provided by SH power.

We offer all staff members to work also part time in order support families and work-life balance. Salaries are on basis on talent and not influenced by age or gender. Additionally, we actively discourage structural overtime.

We actively support our customers for developing sustainable business practice. There are special consultancy rates for NGO’s.

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.

In diesem 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.

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 das Büro teilen wir gewisse Infrastruktur mit anderen Firmen (Sitzungszimmer, Internet-Zugang).

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. Für geschäftliche und private Fahrten wird den fest angestellten Mitarbeitern ein Generalabonnement für den öffentlichen Verkehr zur Verfügung gestellt. Für nationale und internationale Reisen nutzen wir soweit möglich die Bahn. Flugreisen werden nicht kompensiert um falsche Anreize zu vermeiden.

Abbreviations

	Deutsch	Englisch
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

Contents

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 aims to investigate environmental aspects of products and services from cradle to grave, from resource extraction to manufacture, use and end of life treatment. We also work with related methods such as carbon footprinting and Substance Flow Analysis (SFA).

Fairness, independence and transparency are the main characteristics of our consulting philosophy. We work issue-related and accomplish our analyses without prejudice. We document our studies and our work in a transparent and comprehensible manner. We offer a 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 runs the Regional SimaPro Competence Centre of Liechtenstein, Switzerland, Germany and Austria.

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

- Project management in groundbreaking 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.
- Environmental extended input-output analysis.
- Other methods such as climate balances (CO2 footprint, 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.
- Data collection for life cycle assessments according to the ecoinvent methodology, e.g. for food or photovoltaics.
- Sale of life cycle inventory data for various areas.
- Development of impact assessment methods, e.g. method of ecological scarcity (environmental impact points).
- Critical review of life cycle assessments according to ISO 14040 and other standards.
- Advice on the development of standards for life cycle assessment.
- Sales and training for the world's leading LCA software SimaPro, the web-based LCA tool e-DEA or the simplest LCA solution EarthSmart.
- Organization of workshops such as the life cycle assessment discussion forum (Discussion Forum on Life Cycle Assessment).

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). This PCR is based on ISO Standard 14025 for the implementation of environmental declarations (International Organization for Standardization (ISO) 2006a).

The method of life cycle assessment (LCA) according to ISO 14040 was used to quantify the environmental impacts (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. An annual environmental report was first published in 2014.

2.3 Scope and system description

The functional unit of the EPD refers to 1 hour of consultancy services provided in 2017.

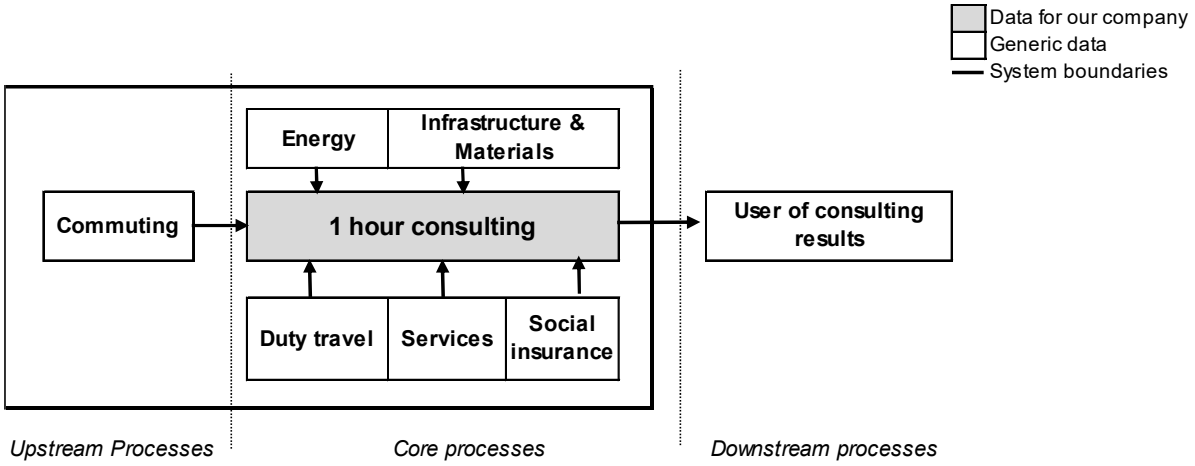
According to the product category rules used (PCR 2012), all environmentally relevant resource consumption and emissions for the investigated system are considered in the LCA as shown in Tab. 2.1. A distinction is made between upstream and core processes. The standard "upstream processes" only include individual commuting, as this is not directly related to the service sold. The permanent employees of the company receive a general subscription to public transport (Swiss General Abonnement), 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 Tab. 2.3) 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 heat)
    - 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 waste water

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



Available information and data (such as electricity, heating and hot water billing) were primarily used to model the core processes. The office of ESU-services GmbH is shared with the language school Linguasud since the end of 2016. Data on energy and water requirements are only available for the entire office and have been divided according to the proportion of space.

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 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 8 years years.

The ESU database version 2018 is used as background data for transports and materials (ecoinvent Centre 2010; ESU 2018). Data for the production of coffee, tea and provision of overnight stays are taken from the company's own database (Jungbluth et al. 2018). For purchased services and social security, expenditure data is linked to data from the Swiss environmental-extended input-output table to calculate environmental impacts (Jungbluth et al. 2011). The modelling and evaluation is carried out in the LCA software SimaPro 8.5.

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

Tab. 2.2 Unit process raw data per year and hour of consulting services provided by ESU-services Ltd. in 2017

	Name	Location	Infrastructur	Unit	environmental report, 2017	Uncertainty Type	StandardDeviation95%	GeneralComment
	Location				ESU			
	InfrastructureProcess				0			
	Unit				a			
	environmental report, 2017	ESU	0	a	1			
heat	natural gas, burned in boiler condensing modulating >100kW	RER	0	MJ	1.46E+4	1	1.05	(1,1,1,1,1,1,BU:1.05); company data;
	electricity, low voltage, parameterized, at grid	CH	0	kWh	1.03E+3	1	1.31	(2,3,1,1,3,5,BU:1.05); direct electricity; own assumption
	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	3.72E+3	1	1.31	(2,3,1,1,3,5,BU:1.05); calculated from electricity uses; own assumption
Building	building, multi-storey	RER	1	m3	1.58E-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	paper, recycling, no deinking, at plant	RER	0	kg	4.99E+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	2.68E+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
	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); 2 pax à 80% and 1 pax à 40%, which regularly consume tea; own calculation
Waste	disposal, municipal solid waste, 22.9% water, to municipal incineration	CH	0	kg	1.00E+1	1	1.30	(4,1,1,1,1,5,BU:1.05); Estimation, 5 kg per week; own assumption
Water	tap water, unspecified natural origin CH, at user	CH	0	kg	1.78E+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	1.78E+1	1	1.21	(4,1,1,1,1,1,BU:1.05); calculated with water balance; own assumption
Computer	desktop computer, without screen, at plant	GLO	0	unit	4.29E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 4 PC, Average life time 7 years; own assumption
	laptop computer, at plant	GLO	0	unit	2.50E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 2, Average life time 8 years; own assumption
	LCD flat screen, 17 inches, at plant	GLO	0	unit	5.00E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 5, Average life time 8 years; own assumption
	printer, laser jet, b/w, at plant	GLO	0	unit	1.25E-1	1	1.05	(1,1,1,1,1,1,BU:1.05); 1, Average life time 4 years; own assumption
	toner module, laser jet, b/w, at plant	GLO	0	unit	2.00E+0	1	1.05	(1,1,1,1,1,1,BU:1.05); units used; expense accounts
Transports	transport, average train, SBB mix	CH	0	pkm	1.89E+4	1	2.00	(1,1,1,1,1,1,BU:2); Commuting; expense accounts
	transport, average train, SBB mix	CH	0	pkm	5.53E+3	1	2.00	(1,1,1,1,1,1,BU:2); Business trips by Swiss rail; expense accounts
	transport, average train	DE	0	pkm	2.54E+3	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
	transport, average train	IT	0	pkm	3.20E+3	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
	transport, average train	FR	0	pkm	1.52E+3	1	2.00	(1,1,1,1,1,1,BU:2); Business trips; expense accounts
Hotel	guest-night, average European hotel	RER	0	unit	8.00E+0	1	1.05	(1,1,1,1,1,1,BU:1.05); Business trips; expense accounts
Financial services	G66, insurance and pension funding	CH	0	CHF2005	3.20E+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	3.00E+3	1	1.05	(1,1,1,1,1,1,BU:1.05); Training; Balance sheet
	G71u74, other business activities	CH	0	CHF2005	3.01E+3	1	1.05	(1,1,1,1,1,1,BU:1.05); Accounting; Balance sheet
	G64, post and telecommunications	CH	0	CHF2005	1.76E+3	1	1.05	(1,1,1,1,1,1,BU:1.05); Telecommunication services; Balance sheet

2.4 Life cycle impact assessment

In this chapter the environmental impacts are presented according to the different environmental indicators according to PCR (2012:03). Tab. 2.3 shows the environmental impacts of upstream and core processes according to the four following environmental indicators: climate change, acidification, eutrophication and ozone depletion. For commuting as the only upstream process, the results show relatively low contribution shares. Compared to former years business travel has now a much lower share because no airplane trips have been made in 2017.

The result of the ozone depletion indicator shows different conditions. Business travel is relatively insignificant here, while statutory social security benefits contribute most to ozone depletion. According to the other indicators, social security accounts for 40% to 47% of total environmental impacts. The data used for the level and distribution of emissions of ozone-depleting substances in the input-output table (Jungbluth et al. 2011) seem to be too unspecific.

Purchased services (telecommunications, accounting and training) contribute 17% to 21% to the different indicators.

From an environmental point of view, the contribution of infrastructure and material consumption is also significant, accounting for up to 25% of the total environmental impact per hour of

consulting services, depending on the indicator. The production of computers and notebooks is the most environmentally relevant factor.

The consumption of electricity and heat do not contribute more than 10% to the environmental impact. Impacts of waste and sewage disposal are neglible.

Tab. 2.3 Life cycle impact assessment per hour of consulting service according to different environmental indicators in 2017

Indicator	Unit	*UPSTREAM*	*Core processes*						
		Commuting	Energy	Infrastructure & Materials	Buisness trips	Social insurance	Services	Disposal	TOTAL
Climate change	kg CO2 eq	0.04	0.34	0.14	0.22	0.72	0.31	0.00	1.77
Share	*%*	*2%*	*19%*	*8%*	*12%*	*41%*	*17%*	*0%*	*100%*
Acidification	kg SO2 eq	1.86E-04	2.63E-04	8.51E-04	7.19E-04	3.00E-03	1.32E-03	2.05E-05	6.35E-03
Share	*%*	*3%*	*4%*	*13%*	*11%*	*47%*	*21%*	*0%*	*100%*
Eutrophication	kg PO4 eq	7.81E-05	7.84E-05	9.27E-04	4.46E-04	1.50E-03	6.47E-04	7.77E-05	3.76E-03
Share	*%*	*2%*	*2%*	*25%*	*12%*	*40%*	*17%*	*2%*	*100%*
Ozone depletion	kg CFC-11 eq	7.22E-09	4.17E-08	6.85E-09	1.03E-08	1.36E-06	5.12E-07	1.83E-10	1.94E-06
Share	*%*	*0%*	*2%*	*0%*	*1%*	*70%*	*26%*	*0%*	*100%*

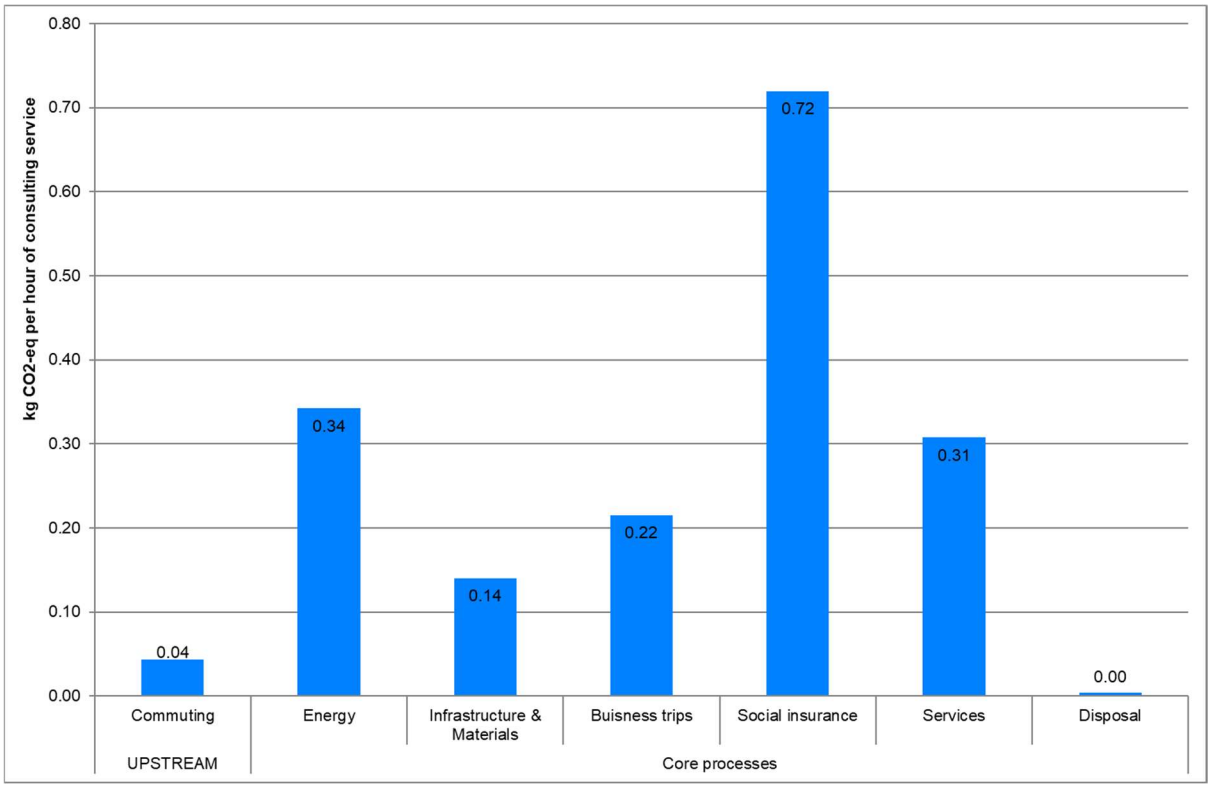


Fig. 2.1 Carbon footprint results in kg CO_2-equivalents per hour of consulting service

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 very limited extent.

2.5 Total environmental impacts

For Swiss customers of our services, information on the environmental impact points (UBP) caused according to the method of ecological scarcity 2013 (Frischknecht et al. 2013) is also relevant. These are shown in Tab. 2.4 and Fig. 2.2 below.

The assessment according to environmental impact points comprises several pollutants and resources, which are weighted differently according to the objectives of Swiss environmental policy.

The relevance of different types of core processes is similar to the results discussed for single indicators.

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

	UPSTREAM	*Core processes*						
	Commuting	**Energy**	**Infrastructure & Materials**	**Duty travel**	**Social insurance**	**Services**	**Disposal**	**TOTAL**
Ecological scarcity 2013 UBP	216	219	348	328	1214	516	23	2865
Shares	*8%*	*8%*	*12%*	*11%*	*42%*	*18%*	*1%*	*100%*

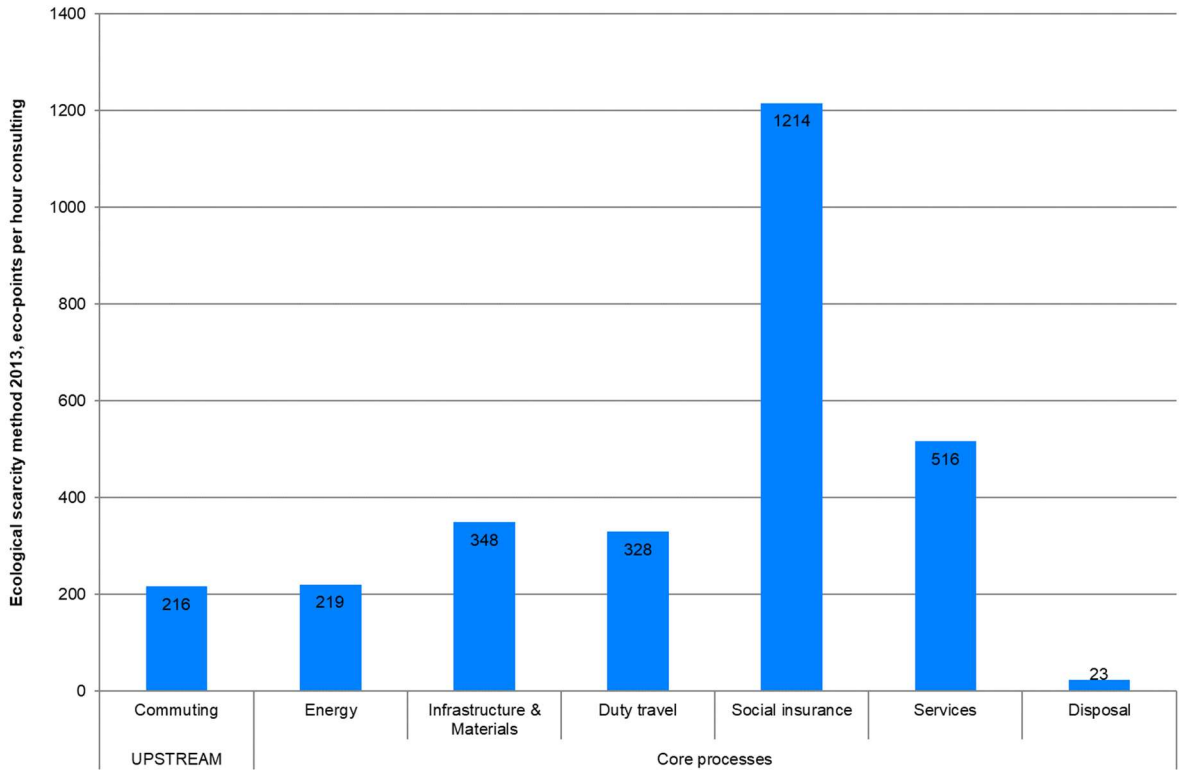


Fig. 2.2 LCIA with the ecological scarcity method 2013. Eco-points per hour of consulting (Frischknecht et al. 2013)

2.6 Indicator results for single pollutants

According to the EPD standard, cumulative life cycle inventory data should also be reported for a long set of indicators. As these are hardly meaningful, they are not presented here. We are happy to provide our customers with appropriate figures on request.

2.7 Discussion of EPD 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 hardly possible to check this. Our balance sheet also neglects certain material inputs such as ballpoint pens. It was not possible to quantify each consumption of such materials purchased in only small amounts. In some cases, there is also overlap as to 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 would be recommended to include them in the EPD of consulting services.

3 Our commitment to sustainability

The environmental report of ESU-services Ltd. shows that the environmental impacts caused per consulting hour can be influenced primarily by business trips. Air travel depends on the projects carried out and on visits to congresses. If possible, we try to make all trips in Europe by train. For travel by car there is a membership with the carsharing provider Mobility, which however hardly had to be used. The possibility of online telephone conferences is intensively used to avoid travelling abroad.

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

Other factors such as the level of energy and water consumption and infrastructure can only be influenced to a limited extent. We also share certain infrastructure at the new location with other companies (meeting rooms, internet access).

For pension insurance, ESU-services is a member of the "Abendrot" insurance company, which pursues a sustainable investment policy. Other insurances for the company like AHV administration office 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 required accident insurance.

Commuting depends on where employees live and is therefore an individual decision. As far as business concerns do not conflict with this, it is also possible to work at home for single days and thus avoid commuting. For business and private travel, permanent employees are provided with a general subscription for public transport. This creates a strong incentive to also use public transport privately instead of a private motor vehicle.

We offer all staff members to work also part time in order support families and work-life balance. Salaries are on basis on talent and not influenced by age or gender. Additionally, we actively discourage structural overtime.

We actively support our customers for developing sustainable business practice. There are special consultancy rates for NGO’s.

ESU-services cooperates closely with partners in 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.

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