ESU-services

fair consulting in sustainability

EU projects - Life cycle assessment - Partner Profile of ESU-services Ltd.

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Customer

European Research Programmes
https://esu-services.ch/ourservices/eu/

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1 Background and Objectives

ESU-services is a Swiss SME (small and medium enterprise) which collaborated in several European Research projects. Feel free to contact us if you search an experienced SME consultancy in the field of life cycle assessment (LCA), carbon footprint (PCF), water footprint, energy analysis, product environmental footprint or organizational environmental footprint.

More information about us can be found on www.esu-services.ch.

2 Kind of co-operation

ESU-services investigated the environmental impacts over the life cycle of all types of products and services in the past. We can offer to conduct e.g.

- An analysis for new process and the products developed in the research project. This will enable to see benefits and disadvantages compared to competing products. Furthermore, the analysis will help to identify weak points from an environmental point of view and help for the further improvement of the process.
- A comparison of different technologies, products, services, etc. to assist decisions made in the project.
- In-depth LCA analysis for political decisions e.g. regarding food consumption or biofuels
- Management of LCI (life cycle inventory) data
- Methodological developments e.g. on impact assessment or database management.

ESU-services looks for partners and a project coordinator interested in European Research Programme calls. We offer to be responsible for a working packaging according to the calls specification dealing with the environmental impacts of different scenarios or products investigated and developed in the project.

3 Typical tasks in working packages

3.1 Method description for life cycle assessment and literature review (ESU)

In general, the ISO 14040 and 44 standards on LCA will be followed. Some issues, which are specific for food products, will be addressed according to the present methodology for PEF compliant data or the ENVIFOOD Protocol. The first tasks will also include a short literature review of existing LCA case studies for the production processes investigated in this project.

3.2 Definition of goal and scope (ESU)

The first step of an LCA is the goal and scope definition. It includes the way of modelling the object of investigation, the identification as well as the description of the processes. Currently it is foreseen to investigate new process routes according to the scenarios developed in a separate task and compare them with the data available in the ESU database. The functional unit, which determines the base for the comparison, will be defined in this task. The approach used for the allocation of co-products will be discussed. The LCIA category indicators for the

impact assessment will be defined. The goal and scope definition will be sent to the project partners for commenting.

3.3 Scenario development

In this task a detailed summary on the new production pathways investigated in this project is elaborated. The present technologies applied in the market are described and an overview of innovative technologies covered in this project will be given. According to different technological options and changes in value chains considered in this project, different scenarios and value chains will be defined.

Flow charts for each scenario will be generated showing the relevant processes, products, energy, and material fluxes appropriate for further use in the LCA. The common scenarios will ensure that comparable assumptions are taken to compare different pathways of development from environmental, economic and social points of view. The scenarios form the basis for the collection of relevant data from project partners and literature.

3.4 Questionnaire for data collection for the environmental, economic and social assessment

To evaluate the developed technologies within this project representative and appropriate data must be collected during the testing and demonstration phase. Data for life cycle assessment and the other assessments will be collected jointly in this task to ensure a clear data management. ESU is responsible to collect data from the industrial and demonstration partners. Therefore, a questionnaire is elaborated and harmonized with the data needs of the relevant project partners. Questions concerning the necessary infrastructure and machinery are integrated in this document. This questionnaire will ensure that data to assess the common assessment scenarios will be available. The contents of the questionnaire are discussed with the project partners to ensure that only one round of data collection is necessary. Project partners have to foresee a certain workload for collecting and measuring relevant data. Data which cannot be obtained directly from project partners will be estimated with literature data.

3.5 Life cycle inventory analysis (ESU)

In the life cycle inventory analysis (LCI) the data collected in another task will be used for the modelling of the newly developed processes. This includes the whole process chain as defined in the goal and scope. Data from public databases and from the ESU data-on-demand will be used for all other processes in the background system. The LCI data will be fully documented in the electronic EcoSpold format. It is expected that between several new unit processes will be investigated during this project. The EcoSpold format allows an easy exchange of data between different LCA software tools. They will be imported into the SimaPro LCA software, which allows a first test of the consistency and reliability of the data. The data and scenarios developed in a WP will also be used as framework for the economic assessment. Preliminary data are provided to project partners for review and commenting. It is planned to make the LCI data available for the European Reference Life Cycle Data System (ELCD).

3.6 Electronic documentation of data

All data are summarized in electronic format e.g. Excel. The LCA data is documented by ESU in an electronic XML format (EcoSpold or PEF compliant) in order to allow an easy publication and data exchange. The handbook of PEF/ELCD/ILCD will be followed for the data

documentation. This includes a documentation of data uncertainties and electronic documentation of underlying data sources. The data collected and documented in this task will be used to assess different types of impacts in the WP on LCA.

3.7 Life cycle impact assessment of new products and value chains (ESU)

Within the life cycle impact assessment (LCIA) environmental impacts of the value chains investigated in this project will be analysed. Recommendations of the Environmental Footprint method (EF) concerning the choice of environmental indicators will be followed. About 10-20 different types of impact categories will be considered with this approach. Final definitions will be made in the goal and scope definition. Within this task the environmental impacts will be analysed over the life cycle to identify the contribution and influence of the most important stages. The scenarios defined in the goal and scope definition will also be assessed. Scenarios for potential improvement options are developed and evaluated. There will also be a comparison of the different processing technologies as defined in the first task of this work package. The reduction of environmental impacts which will be realised compared to conventional technologies is quantified here.

3.8 Result interpretation and sensitivity analysis (ESU)

The results of the LCIA, the data quality and the scenarios outcome will be interpreted in the last stage of the LCA. The aim is to answer the questions defined in the goal and scope definition. It will include an analysis of the weaknesses of the different technologies and an outlook on improvement potentials. A scenario analysis will help in better understanding of the results.

3.9 Independent critical review or verification according to EF handbook (with sub-contractors)

According to the handbook a verification or critical review of the LCA will be required. The reviewers should be independent from the project consortium. They will be searched after the finalization of the goal and scope of the LCA. The critical review is not part of the normal LCA work and it must always be performed by a third party which is independent of the stakeholders involved in the work. Different LCA experts and experts for the environmental impacts of the production of new food products will be asked for an offer for the critical review. The choice on the 3 critical reviewers will be made together with the project management and the partners in the WP. The critical review statement will be added to the final deliverable on the LCA.

Deliverables		*Due date*
	Goal and scope definition for the life cycle assessment	9
	Scenarios for the assessment with description of involved technologies	10
	Questionnaire for data collection	12
	Report on data inventory analysis	18
	Life cycle inventory data in electronic format	30
	Report on life cycle assessment	42
	Recommendations for relevant stakeholders	48

3.10 Life cycle costing (LCC) and social LCA (s-LCA)

ESU-services has furthermore experience in life cycle costing (LCC) and social LCA.

4 Which further information is needed for our contribution?

To provide an offer we need some information about the goal and scope of your LCA or carbon footprint study. This can also be clarified by phone. Key questions are shown below:

- Who is demanding the service (legal address, contact details, key persons involved)?
- Why do you want to start this project?
- Which products should be analysed (please provide product information available, photos, links to your webpage, etc.)?
- Do you assume any advantages from environmental point of view for your product and can you describe them?
- What are the key questions to be answered?
- Which stages of production should be investigated (cradle-to-gate, cradle-to-grave)?
- What are the main inputs and outputs for this product (materials, energy uses, etc.)?
- Can you provide environmental data for your production processes (energy use, water use, emissions, etc.)?
- Will suppliers be involved in the data collection?
- Which comparisons should be made?
- How do you want to disseminate or publish the LCA (internal, customer, public)?
- Which standards or product category rules (PCR) should be followed (e.g. ISO 14040, EN 15804, etc.)?
- Which environmental indicators should be calculated?
- What is your timeframe and budget?

5 Qualification

5.1 ESU-services Ltd., Switzerland

Number		**Short name**	**ESU**
Full name	ESU-services Ltd.		
PIC	963342406		
Address	Vorstadt 10 CH-8200 Schaffhausen jungbluth@esu-services.ch www.esu-services.ch Tel. +41 44 940 61 32		
Short description			
ESU-services Ltd. (SME) 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, i.e. from resource extraction to manufacture, use and end of life treatment. Fairness, independence and transparency are the main characteristics of our consulting philosophy. We work issue-related and accomplish our analyses without prejudice. Transparent and comprehensible documentation is a quality standard for our studies. We offer a fair and competent consultation, which enables our clients to control and continuously improve their environmental performance.

ESU-services Ltd. is also specialised in elaborating high quality life cycle inventories with a fully transparent documentation. The project database of ESU-services covers more than 2,500 of further life cycle inventories (LCI) e.g. of food products often including also organic production. Our database covers among others the following types of products and services:

- Simplified agricultural production services: application of fertilizers
- Meat and fish: pork, veal, beef, lamb, poultry, eggs, salmon, cod, tofu
- Dairy products: butter, milk, milk powder, yoghurt, cheese
- Food distribution: cooling, refrigerated transports, processing, supermarket
- Food consumption: packages, transports, cooking, consumption patterns

More detailed information about contents of data sets on demand can be found on www.esu-services.ch/data/data-on-demand/.

Main tasks

ESU-services will be responsible for the environmental LCA of different technologies/products developed in this project (WPxxx). For this it will coordinate the collection of data about newly developed products and processes. These foreground data are linked to LCA background databases. Environmental impacts are evaluated and analysed with methods recommended in the European context. Due to its longstanding experience and extensive database in this field they will be able to conduct such a study with a minimum on resources used.

Previous experience in EU projects

PROFUTURE (2019-2023), www.pro-future.eu: Microalgae Protein-Rich Ingredients for the Food and Feed of the Future

ProFuture aimed to set the basis for market uptake of innovative, healthy and sustainable food and feed products made from algae. ESU-services supported the identification and implementation of innovative technologies with environmental life cycle assessment and life cycle costing calculations. Algae protein can today already be better than animal-based proteins. But further improvements are necessary to make algae competitive with plant-based proteins for food and fodder. Therefore, especially improvements in the electricity consumption and provision are necessary.

SUSMILK : (2013-2016, www.susmilk.com). Re-design of the dairy industry for SUStainable MILK processing

The European project initialized a change within the process chain for milk and milk products to minimize energy and water consumption and establish the use of renewable energy resources. The project includes the development of technical components, and testing at partner dairies as well as a process simulation of a “green dairy”. ESU-services was responsible for the life cycle assessment (LCA) of the improved heating, cooling and water supply technologies developedhttps://www.susmilk.com/.

SENSE : 2012-2015) www.senseproject.eu/. HarmoniSed ENvironmental Sustainability in the European food and drink chain

ESU-services elaborated the LCA for fruit juices, milk and beef. Furthermore we tested the SENSE tools which allows SME in the food sector to easily calculate the environmental impacts of their products including a cooperation on data collection with their suppliers.

RENEW : 2004 – 2008, www.renew-fuel.com. Renewable Fuels for Advanced Powertrains , Sixth Framework Programme: Sustainable Energy Systems. Within the RENEW project several pathways for the production of automotive fuels were developed and tested. ESU was responsible for the LCA of second generation biofuels.

NEEDS, www.needs-project.org: New Energy Externalities Development for Sustainability. Life cycle assessment of future energy options.

ECLIPSE (Environmental and Ecological Life Cycle Inventories for present and future Power Systems in Europe), www.eclipse-eu.org/

Key persons

Mr. Niels Jungbluth started working with LCA in 1994. He works with ESU-services since 2000 and is now managing director. His main working areas are energy systems, food, biomass, input-output-analysis and sustainable consumption. He is in the editorial board of the “Int. Journal of LCA”

and works as a reviewer for several other scientific journals and in private projects according to different standards. He works as a special expert for several organisations.
ORCID-ID: 0000-0003-1798-9479

Mr. Christoph Meili works as project manager for ESU-services since July 2016. He is responsible for software sales and support in the Regional SimaPro Centre for Switzerland, Germany, Austria, and Liechtenstein. Since starting at ESU he conducted several LCA projects on 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.

Ms. Maresa Bussa started working as project manager for ESU-services in 2020.
Maresa Bussa studied energy and environmental engineering at the École des Mines de Nantes and the Technical University of Madrid. 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. As part of her doctorate at the Technical University of Munich, she conducted life cycle assessments on different microalgae cultivation systems and extraction methods. Maresa Bussa started working for ESU-services in 2020. Since than she investigated alternatives to cow's milk as a drink and was leading the life cycle assessment work in the European PROFUTURE project on algae. In addition, she conducted Environmental Product Declarations for electric components. Furthermore, she works for the SimaPro Centre providing support for our clients and is leading our training centre.
ORCID-ID: 0000-0002-7424-5495

Relevant publications (https://www.esu-services.ch/publications/)

ESU-services published several hundred publications related to life cycle assessment methodology and application. Some important are listed below.

- N. Jungbluth and C. Meili (2023) Ökobilanz von Trinkwasser und Mineralwasser in Deutschland. DVGW energie | wasser-praxis 2023 Vol. 10 Issue 2023 Pages 30-37, https://energie-wasser-praxis.de/ausgabe-10-2023/
- Roesch, S. Sala and N. Jungbluth (2020) Normalization and weighting: The open challenge in LCA. Int J Life Cycle Assess 2020 Vol. 25 Pages 1859–1865
- GHEEWALA, S. H., JUNGBLUTH, N., NOTARNICOLA, B., RIDOUTT, B., WERF, H. V. D. 2020: “No simple menu for sustainable food production and consumption.” In Int J Life Cycle Assess (25): 1175–1182, https://www.readcube.com/articles/10.1007/s11367-020-01783-z.
- Jungbluth N. and Meili C. (2018) Recommendations for calculation of the global warming potential of aviation including the radiative forcing index. In: Int J Life Cycle Assess, accepted, pp., DOI: 10.1007/s11367-018-1556-3, retrieved from: https://link.springer.com/article/10.1007/s11367-018-1556-3, https://rdcu.be/bbKZk.
- Jungbluth N., Keller R. and Meili C. (2018) Life cycle assessment of a detailed dairy processing model and recommendations for the allocation to single products. In: Int J Life Cycle Assess, 23(9), pp. 1806-1813, DOI: 10.1007/s11367-017-1392-x, retrieved from: www.esu-services.ch/projects/lcafood/susmilk/, https://link.springer.com/article/10.1007/s11367-017-1392-x.
- Jungbluth N., Keller R. and König A. (2016) ONE TWO WE - Life cycle management in canteens together with suppliers, customers and guests. In: Int J LCA, 21(5), pp. 646-653, DOI: 10.1007/s11367-015-0982-8, retrieved from: https://link.springer.com/article/10.1007/s11367-015-0982-8.
- Meier M. S., Stoessel F., Jungbluth N., Juraske R., Schader C. and Stolze M. (2015) Environmental impacts of organic and conventional agricultural products - Are the differences captured by life cycle assessment? In: Journal of Environmental Management, 2015(149), pp. 193-208, retrieved from: www.journals.elsevier.com/journal-of-environmental-management/.
- Muñoz I., Flury K., Jungbluth N., Rigarlsford R., Milà i Canals L. and King H. (2014) Life Cycle Assessment of bio-based ethanol produced from different agricultural feedstocks. In: Int J LCA, 19(1), pp. 109-119, DOI 10.1007/s11367-013-0613-1, retrieved from: https://link.springer.com/article/10.1007%2Fs11367-013-0613-1.
- Nemecek T., Jungbluth N., Milà i Canals L. and Schenck R. (2016) Environmental impacts of food consumption and nutrition: where are we and what is next? In: Int J LCA, 21(5), pp. 607-620, 10.1007/s11367-016-1071-3, retrieved from: https://link.springer.com/article/10.1007/s11367-016-1071-3.

• Ramos S., Larrinaga L., Albinarrate U., Jungbluth N., Ingolfsdottir G. M., Yngvadottir E., Landquist B., Woodhousee A., Olafsdottir G., Esturo A., Zufía J. and Perez-Villareal B. (2016) SENSE tool: Easy-to-use web-based tool to calculate food product environmental impact. In: Int J LCA, 21(5), pp. 710-721, 10.1007/s11367-015-0980-x, retrieved from: https://link.springer.com/article/10.1007%2Fs11367-015-0980-x.
Significant infrastructure and/or technical equipment, relevant to the proposed work
ESU-services owns all infrastructure necessary for conducting the research tasks: • SimaPro software. LCA tool to calculate professional life cycle assessments • LCI databases in SimaPro including ten-thousands of background datasets for all types of products, processes, and services. • Data-on-demand. Own LCA database with more than 2'500 datasets on energy systems, materials, transports, food production and consumption. • Suitable IT infrastructure and office rooms in Schaffhausen (Home office possible).
Patents
• None (LCA related patents are rather unusual): ESU-services owns a proprietary LCA database with more than 2'500 datasets that will be used as background in the project.
Current projects
• ESU-services is involved in different projects dealing with life cycle assessment case studies on technical products, energy carriers, food products, life styles or global assessments for the Swiss economy.

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

5.2 Our philosophy "fair consulting in sustainability"

ESU-services Ltd. was founded in 1998. Its core business is research, consulting, review, and training in the field of Life Cycle Assessment (LCA). 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 comprehensible manner. We offer fair and competent consultation, which enables our clients to monitor and continuously improve their environmental performance.

Our customers include various national and international companies, associations, and administrations. Our team has pioneered the development and operation of web-based life cycle assessment databases, as well as research into the environmental impacts of food, biofuels, and consumption patterns.

5.3 Wide range of consulting services

ESU-services offers a wide range of consulting services around the topic of life cycle assessment[1] (LCA):

- 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[2].
- Environmental extended input-output analysis.

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

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

- 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 oil and gas products.
- Sales of own and third party life cycle inventory data for various areas of interest (e.g. food, chemicals or social life cycle assessment.
- 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.
- 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.

5.4 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. One person will be appointed as project manager at the start of the project. He or she will be the main contact for the customer. Other staff members might assist the work depending on experience and availability. Niels Jungbluth, CEO at ESU-services, will oversee the project lead.

5.4.1 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. Besides managing ESU-services, 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 in the board of the LCA foods conference. He works as reviewer for other scientific journals.

5.4.2 Dr. Maresa Bussa, project manager

Dr. rer. nat. TU Munich, M.Sc. in Energy and Environmental Engineering

Maresa Bussa studied energy and environmental engineering at the 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. As part of her doctorate at the Technical University of Munich, she conducted life cycle assessments on different microalgae cultivation systems and extraction methods. Maresa Bussa started working for ESU-services in 2020. Since than she investigated alternatives to cow's milk as a drink and was leading the life cycle assessment work in the European PROFUTURE project on algae. In addition, she conducted Environmental Product Declarations for electric components. Furthermore, she works for the SimaPro Centre providing support for our clients and is leading our training centre.

5.4.3 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 been 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-services he has conducted several LCA projects on the extraction of energy sources, local energy systems, various electronic devices, packaging materials, drinking water and food recipes. He also assessed 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 LCA topics.

He has also been working part-time for WWF Switzerland since 2012. 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 consumption topics.

5.4.4 Samuel Solin, project manager

B.Sc. ZFH in environmental engineering

Samuel Solin did an apprenticeship as a chemical laboratory assistant at Dottikon ES and worked there in the wastewater laboratory. He then studied environmental engineering at the ZHAW Wädenswil, specializing in natural resources and renewable energies. In his bachelor thesis, he conducted a feasibility study on a possible power-to-gas plant at a sewage treatment plant in the canton of Zurich.

From 2017 to 2022 he worked as a research assistant at the University of Applied Sciences Northwestern Switzerland. As part of this activity, he carried out life cycle assessments for various products, services, and companies, such as edible insects, Swiss shrimp, and all locations of the University of Applied Sciences Northwestern Switzerland. Samuel Solin has been working for ESU-services since 2022. While working at ESU-services, EPDs were conducted for a construction product and various switch cabinets, as well as life cycle assessments for various medical devices, coffee and - with a chemical focus – a resin for the plastics industry. He also helps with SimaPro sales and support.

5.4.5 Martin Ulrich, project manager

M.Sc. ETH in Environmental Engineering

Martin Ulrich studied environmental engineering at ETH Zurich with a major in ecological system design about resources management. In his master thesis he evaluated the relation between cost and environmental impact of products and services throughout the broad spectrum of consumption in Switzerland.

In 2020 Martin had his first experiences with ESU-services during a 6-month internship and returned to the company in 2021. Martin also worked as the team leader of a bicycle courier team of the Familie Wiesner Gastronomie AG. There he remains a bicycle courier which he sees as a good sporting balance.

Martin Ulrich is working as a project manager at ESU-services since 2021. Since then, he has completed various LCA projects in different industrial sectors such as the paper, chemical, machinery and food industries. Investigations around agricultural production, consumption and nutrition recommendations or LCAs of public institutions such as the Zurich City Parliament are also part of his field of experience. In addition, Martin Ulrich is responsible for data sales and the distribution of LCA databases for SimaPro. For this purpose, he manages the broad "data-on-demand" offer of ESU-services and is in daily contact with our customers and partners.

5.5 Environmental and social responsibility

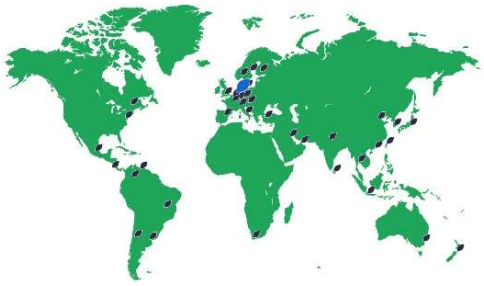
We care about the environmental impacts and other sustainability aspects with regards to the services offered. Our environmental key figures and sustainability related information is reported annually.[3] The service offered in one of our projects also causes an environmental impact. ESU-services has developed a key parameter model which allows calculation of the impacts per project (Jungbluth & Rocha 2023; PCR 2012). Business trips are key factor for the impacts of single projects. Therefore, they are calculated separately from the general impacts of the service per consulting hour. Tab. 5.1 shows an example for the calculation of impacts due to executing a project. We can also report the true environmental impacts of our services after finalization of the project without any extra costs for the commissioner.

Tab. 5.1 Example calculation of the environmental impacts due conducting a consulting project at ESU-services

Calculation of impacts per project		Expenses	Greenhouse gas emissions	Ecological scarcity method
			kg CO2-eq	UBP'21
Time budget consultancy	d	12.3	142	354’674
Train trips, CH	km	100	1	2’988
Train trips, DE	km	500	25	42’626
Airplane travel	km	-	-	-
Hotel nights	-	2	45	102’537
Total			**213**	**502’826**

[3] https://esu-services.ch/news/reporting/

5.6 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 fact-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.

5.7 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 below for a list of the most relevant projects over the last 25 years. A full list of about 380 project references can be found on the internet (www.esu-services.ch/projects/fulllist/).

5.8 Pioneering Projects

ecoinvent database: ESU-services was project leader to design, build-up and introduce v1.0 of the international, harmonised and quality controlled life cycle inventory database. We elaborated the LCIs of about 900 out of 4000 datasets in v2.0.

OneTwoWe: ESU-services analysed the environmental impacts due to the purchases of the SV Group. The company operates about 300 hundred canteens in Switzerland. Afterwards, improvement potentials have been proposed. They are applied in the program "One Two We",

[4] https://esu-services.ch/network-customers/partner/

[5] Download on https://esu-services.ch/address/tender/

which was initiated in collaboration with the WWF Switzerland. This initiative was awarded with the Zurich Climate Prize in 2013.

Biofuels: Several LCA studies on biomass based fuels commissioned by Swiss Federal Offices, the European Commission and private organizations were conducted under the project lead of ESU-services. One study is the basis for tax exemption of biofuels in Switzerland.

SENSE: FP7 project HarmoniSed ENvironmental Sustainability in the European food and drink chain. ESU-services elaborated the LCA for orange juice, dairy products and beef in different European regions. Now the project team develops a simple online tool which will allow SME in the food sector to calculate their environmental product footprint.

Green energy: ESU-services contributes to the "naturemade star" labelling scheme run by the Association for Environmentally Friendly Energy (VUE). We developed the LCA criterion and carried out the LCA of electricity, heat and biomethane from renewable energy sources such as biogas or photovoltaics.

Environmental extended input-output analysis: ESU-services quantified the total environmental impacts due to international trade, the so-called embodied emissions, of Switzerland. The analysis complements the national inventory and provides a realistic picture of Switzerland's contribution to climate change and environmental impacts. The Swiss Federal Office for the Environment commissioned this pioneering study.

SUSMILK - Re-design of the dairy industry for sustainable milk processing The dairy industry accounts with 13% turnover for the total food and drink industry in Europe. Within the European research project SUSMILK a detailed model of dairy processes has been developed. This serves for identifying the best improvement options for reduced energy and water use.

LCA of food styles This study compares the environmental impact of food consumption scenarios. The analysis includes the full life cycle of the food products until they are purchased in the Swiss supermarket. The study was commissioned by the WWF Switzerland to provide guidance to consumers.

The role of packages in the life cycle of food products: The evaluation of packages usually concentrates on a comparison of different packaging materials or types of packaging. In a broader approach, which focuses on the whole life cycle of the goods packed, the full environmental footprint of the system has been investigated in collaboration with packaging manufacturers. The environmental relevance of the life cycle stages, food wastage and their interdependencies was analysed while also taking into account consumers' behaviour and portion sizes.

Environmental impacts of food trade: ESU-services quantified the environmental impacts due to international trade, the so-called embodied emissions. The same methodology has been used for quantifying environmental impacts of food purchased by the City of Zurich, goods traded by a large food retailer and food purchases by a catering service.

LCA for tap water, mineral water, and other beverages: ESU-services compared the consumption of several beverages in an LCA. The study has been cited in several dozens of media reports.

6 References

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