econsense

Forum for Sustainable Development of German Business

Assessing Environmental and Social Impacts

Information and Guidance for Organizations

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econsense is an association of leading, globally active companies and organizations of German business specializing in the area of sustainable development and corporate social responsibility (CSR). Founded in 2000 on the initiative of the Federation of German Industries (BDI), the goal of econsense is to provide a dialogue platform and think tank, with the dual objectives of advancing sustainable development in business and assuming social responsibility.

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1. Introduction

Nowadays, it is expected by stakeholders and customers alike that organizations[1] conduct in a responsible and sustainable manner. Thus, organizations are increasingly concerned with the environmental and social impacts of their activities. As a first step to manage and improve their sustainability performance, organizations need to assess and understand how and to what extent their activities impact environment and society. For sound management decision making and credible communication, detailed data on environmental and social impacts is required.

The understanding of "impacts" is diverse. While the term "impact" is commonly defined as an effect or influence on something, in practice it is often also used to refer to process outputs (e.g., CO_2-emissions). Assessing and reporting on outputs (or inputs) is a first step to assess the effects of an organization's activities and can be sufficient in certain cases.[2] However, only the assessment of impacts enables a link to actual problems (e.g., climate change) and allows target-oriented solutions and measures.

In the context of this guide, impacts are understood as the social or environmental changes caused by an organization's business activity along the entire value chain or by the (positive) implications of engagement activities. For the assessment of impacts, it is important to understand causality between an organization's business activity, behavior, or engagement and the respective consequences (impacts) on society and environment. Environmental mechanisms need to be considered that link environmental stressors (e.g., CO_2-emissions) to potential impacts (e.g., climate change or human health), describe the consequences of social interactions occurring in the context of an activity, or depict the results of an organization's engagement.[3] Environmental impacts occur as a result of production processes, resources use, etc. Social impacts are caused by an organization's specific behavior towards stakeholders or decisions (e.g., vocational training) and are the result of complex relationships.[4]

In a narrow sense, environmental impact assessment (EIA) and social impact assessment (SIA)[5] focus on specific sites and assess compatibility of projects with regard to environmental conditions, social practices, and standards considering local circumstances. In many jurisdictions such assessments are part of a project approval process and are conducted to comply with regulatory requirements. Due to the site-specific nature of traditional EIA and SIA, the scope and boundaries are restricted to impacts on the local environment and society only, whereas environmental and social impacts in other parts of the value chain, which could be of critical importance, are not considered.

To achieve more sustainable production and consumption patterns, environmental and social implications of the whole supply-chain of products, their use, and waste management within as well as beyond the gates of an organization regardless of geographical boundaries need to be considered. For that, consistent and reliable data and procedures are required. Since more and more frameworks and methods are developed to facilitate the assessment of environmental and social impacts, organizations experience difficulties to find appropriate guidance in this field. Existing frameworks and methods are oftentimes developed with a diverging scope, different degrees of detail and maturity, and – depending on the underlying purpose – focus on different types of impacts. Thus, results of impact assessments are often difficult to interpret and compare.

This guide is intended to provide a first orientation to interested parties amongst and beyond the econsense member companies to navigate through the landscape of assessment methods and tools and to ask the right questions prior to and during an impact assessment exercise. Firstly, this guide provides some basic definitions. Secondly, it discusses common motivations / goals for conducting an impact assessment. This is followed by a discussion of the scope of the assessment as well as data requirements. Next, commonly used frameworks and methods are introduced and linked to those environmental and social aspects they can cover. This overview is complemented by a set of questions intended to guide through the selection of appropriate frameworks and methods. Furthermore, corresponding fact sheets provide details on the introduced frameworks and methods.

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[1] In this document, the term organization refers to a company, corporation, firm, enterprise, authority or institution, or part or combination thereof, that has its own functions and administrations (see also definition in ISO 14001:2004).

[2] A pragmatic assessment of input and output indicators can be sufficient, especially when the respective output indicators are commonly used and/or when each unit of the output (e.g., CO_2) has fairly similar impacts on the system under investigation.

[3] Next to the assessment of impacts on society and environment, the impacts of an organization's activities on internal performance can be evaluated. However, this is outside of the scope of this guide.

[4] Social impacts are a function of politic, economy, ethics, psychology, legal issues, culture, etc. and are associated with a high degree of subjectivity.

[5] EIA is commonly defined as the process of „identifying, predicting, evaluating and mitigating, for example, biophysical and other relevant effects of development proposals, plans or physical activities at certain facilities/sites. SIA includes the process of analysis, monitoring and managing intended and unintended social consequences of planned interventions (e.g., policies, programs, projects) (see e.g., Vanclay 2003).

2. Definitions

As a first step towards a common understanding of what impact assessment is and what it is good for, frequently used terms are defined in the following: [6]

- **Input**
  All resources used for a particular activity (e.g., energy, raw materials, working hours, etc.).
- **Output** [7]
  Direct results of an organization's activities that can be clearly stated or measured (i.e., emissions, waste, "business outputs" (e.g., product/service), professional trainings, etc.).
- **Inventory**
  In the inventory, inputs and outputs are compiled. Inventory data for the assessment of environmental impacts is almost always expressed exclusively in terms of quantity per unit of process output. Inventory data for the assessment of social impacts are often related to attributes or characteristics of processes and their responsible organizations.
- **Impact**
  Changes to the systems being considered (e.g., environment, society) – whether intended or unintended, positive or negative, direct or indirect – that are caused by an organization's activity. *Environmental impacts* are any changes to the environment resulting from an organization's activities and behavior. *Social impacts* are consequences of positive or negative pressure on social endpoints (e.g., well-being of customers, health and safety of employees).[8] Actual (real) and potential impacts need to be considered throughout the whole value chain of the organization.[9]
- **Impact Category**
  An impact category is a logical grouping of assessment results, related to social and environmental issues of interest to stakeholders and decision makers. *Environmental impact categories* classify inputs or outputs (e.g., raw material use, emissions) with regard to their effects on human health, climate, plants, animals, or the future availability of natural resources. *Social impact categories* represent social topics of interest (e.g., working conditions) that are expressed in relation to stakeholders affected by an activity (e.g., workers). Both environmental and social impact categories can be characterized by means of specific environmental (e.g., CO_2-equivalents) or social units (e.g., working hours).[10]
- **Impact Assessment** [11]
  Process aimed at understanding and evaluating the magnitude and significance of environmental and social impacts of a particular activity for a product, process or organization, etc. Although some impact assessment methods are well advanced in methodological development, maturity, and applicability and are rooted in empirical evidence, the assessment of environmental and social impacts is not an exact science. It will always include value judgement to a certain extent.
- **Scope** [12]
  The scope defines details on the approach taken to conduct the impact assessment. The *focus* of the impact assessments can be on multiple aspects or only on certain aspects (e.g., climate change). The *scale* refers to the specific application of the impact assessment (product, process, project, site, or organization). The *system boundary* specifies which business activities (upstream, internal, and downstream) are part of the assessed system.[13]
- **Framework, methods, and tools**
  A framework defines the approach/procedure of how to conduct an impact assessment. Methods are specific procedures to calculate potential impacts associated with emissions, resource use, land use, etc. Tools are instruments that can be used to assess the impacts associated with an activity. Tools can include the use of several methods.
- **Life Cycle Assessment**
  Life cycle assessment (LCA) is a method, which helps to quantify potential environmental and social impacts of a product or service under consideration of a wide range of environmental and social issues. The term life cycle indicates that ideally all stages in a product's life, from resource extraction to final disposal, are taken into account (upstream, internal, and downstream inputs and outputs). LCA, in particular in the context of ISO 14040/44, is commonly used in the environmental domain. Social LCA mainly follows the ISO 14040/44 framework, but assesses social impacts along the life cycle of a product.

[6] Definitions are based on ISO 14040/44, UNEP/SETAC Life Cycle Initiative (2009), and UNEP/SETAG Life Cycle Initiative (2015).

[7] Sometimes "outcome" is considered as an additional step, referring to changes that occur in a target group as the results of specific outputs. The effects of outcomes on society are then described as impacts. This terminology is often used with regard to the evaluation of corporate citizenship activities and not common in value chain assessment.

[8] Based on the definition of the UNEP/SETAC Life Cycle Initiative (2009). Social endpoints are social issues giving cause for concern.

[9] For the assessment of environmental impacts, often only potential effects are described, as little and incomplete information regarding the entire cause-impact network is available and temporal and spatial consideration cannot be captured properly. A "potential" refers to a possible, as opposed to an actual, condition.

[10] Social impacts can be both, positive and negative. Beneficial environmental impacts of business activities seldom occur. Environmental engagements aim at creating positive impacts on the environment.

[11] It is also possible to determine the effect/impact of social or environmental performance on an organization's operating profit. In this context, output values are monetized to link non-financial and financial performance data. The process of impact valuation is not further addressed in this guide.

[12] According to ISO 14040 the scope includes more items than regarded in this document.

[13] Engagement activities are outside of the value chain of an organization.

3. Motives for assessing environmental and social impacts

This section highlights different motivations for assessing environmental and social impacts including business opportunities, risk management, and compliance. Organizations should clearly define their motivation and the target audience(s) before they start an impact assessment.

3.1. Business opportunities

- **Corporate strategy and innovation management**
  Transparency about environmental and social impacts of products and processes can boost the innovative potential of organizations and support smart product development and product portfolio decisions. For example, considering environmental aspects in the design phase (eco-design) can be a business opportunity for organizations to develop products and processes that are long lasting ("green sells better") and that contribute to sustainable development. Furthermore, impact assessment can help to identify topics for the sustainability strategy of businesses.
- **Customer communication and marketing**
  The assessment of environmental and social impacts on a product level can be used for B2B and B2C communication and marketing. In B2B relations, product details on life cycle energy consumption, hazardous/toxic substances, etc. are in many cases expected as standard information. In B2C relations, sustainability information at the point of sales – for example in the form of environmental labels – or as part of marketing campaigns can form a competitive advantage.
- **Management accounting**
  Impact assessment can enhance the value of internal management accounting. Once comprehensive data on outputs and impacts gets continuously integrated into management accounting systems, the quality of decision making – for example with respect to investment and procurement decisions – can be improved. The incorporation of environmental, social, and governance (ESG) factors enables management to actively steer businesses towards optimizing environmental/social impacts and towards leveraging additional opportunities.
- **Reporting / Investor relations**
  Measuring certain social and environmental indicators can also be utilized for reporting and investor relations. Some sustainability ratings require information on environmental impacts of individual sector's and for corporate citizenship activities.[14] But also mainstream investors are increasingly requesting information on environmental and social impacts of a particular activity. Sustainability reporting provides transparency for internal and external audiences (stakeholders) on the social and environmental performance of an organization and creates an impetus for improving performance. In order for this information to be communicated in a meaningful manner, reports should reflect the organization's economic, environmental, and social outputs and possibly also impacts. Most large organizations use the Global Reporting Initiative (GRI) guidelines for their sustainability reports. The latest G4 version explicitly requires statements on material "impacts". These "impacts" might be identified inside or outside of the organization's direct control. Current reviews of the first G4 reports conclude, however, that many of these reports focus on outputs rather than actual impacts as defined in the present guide.
- **Reduction of operational costs**
  Reduction of impacts are sometimes also associated with a reduction of operational costs, particularly when actions are focused on decreasing resource consumption. A better insight in operations may result in improved, more efficient cost management.

3.2. Risk management

- **Operational risks**
  By assessing environmental and social hotspots along the value chain, organizations can analyze their risk exposure related to products or product portfolios. This involves upstream as well as downstream processes such as processing, transportation, use, and end-of-life. Negative impacts occurring in the value chain may backfire at the organization, for example, through supply interruptions caused, for example, by legal actions, etc.
- **Reputational risk**
  Negative environmental and/or social impacts may cause adverse effects on the organization's brand and reputation. Impact assessments can help to identify social and environmental hotspots and can therefore also serve as a risk radar to inform the organization about its weaknesses and improvement areas.

3.3. Compliance

While traditional EIA and SIA are mandatory for certain projects, a comprehensive impact assessment as described in this guide is not mandatory yet in any jurisdiction. However, reporting of inputs and outputs is already required by regulations in certain cases. For example, reporting of greenhouse gas emissions is a legal requirement for quoted companies in many areas of the world and regulations such as RoHS (Restriction of Hazardous Substances) or REACH restrict the use of certain substances or demand the assessment of properties and impacts of substances used in products to determine potential risks for human health and environment. The *EU Directive on disclosure of non-financial and diversity*

[14] By considering environmental and social impacts, organizations are better positioned to face the trends towards „Natural & Social Capital".

information requires organizations to disclose relevant environmental and social information. The *EU Directive for establishing a framework for the setting of eco-design requirements for energy-related products* requests a more comprehensive assessment of the consequences of an activity.[15] Even though the assessment of environmental and social impacts is currently mostly voluntary, a transition from voluntary to mandatory impact assessment practice can be expected in the foreseeable future. With respect to the environmental impacts of products, for example, the EU is currently piloting a product environmental footprint (PEF) methodology which is meant to empower consumers to consider environmental aspects in their product choices. Future mandatory schemes in this – and other – context(s) are not unlikely.

4. Scope of assessment

The assessment of impacts associated with an organization's activity can be applied with varying focus and depth. This section provides an overview over possible focuses, scales, and system boundaries for the assessment of environmental and social impacts.

4.1. Focus of assessment

The focus of the assessment can be either on the business activities of an organization along its value chain or the impacts of engagement/investment in environmental or social projects. Furthermore, focus can be on specific environmental or social aspects (e.g., climate change) or on the comprehensive assessment of multiple topics. The focus of the assessment needs to be specified to choose appropriate frameworks, methods, and tools.

4.2. Scale of application

In the following, five commonly applied scales of application are introduced briefly: product/service, process, project, site, and organization.

- **Product/service**
  The assessment of environmental and social impacts of products and services is relevant to identify hotspots and improvement potentials associated with the provision of products (or the delivery of a service). When assessing environmental and social impacts on a product (or service) level, the upstream and downstream phases are often highly relevant. Thus, products or services are often evaluated in the context of a life cycle based analysis. Furthermore, approaches are currently under development for assessing the impacts of the entire range of products and services offered by an organization.[16] Such approaches focus on the entire product portfolio and aim at identifying key indicators to reduce the complexity of the assessment.
- **Process**
  A process is often in the focus of manufacturing/production planning and engineering. Process level assessments can be used, for example, to compare alternative manufacturing processes with regard to their environmental implications.
- **Project**
  Impact assessments can refer to a particular project (e.g., engagement or investment activities). A common application for project-based impact assessments are corporate citizenship activities. But also in other areas, for example in the context of particular investment projects, the assessment of certain social and environmental impacts associated with alternative investment options can provide critical additional information for decision making.
- **Site**
  The assessment of impacts can focus on a certain production site.[17] Due to the narrow geographic boundaries of such an assessment (specific location), impacts on environment, people, and communities can be analyzed in much greater detail but also have limited significance.
- **Organization**
  An impact assessment can also be applied on the aggregated level of an organization (e.g., company or group). An assessment on an organizational level needs to consider the whole organization including all the direct and indirect activities related to the provision of the product portfolio and the sites of the organization.

4.3. System boundaries

- **Internal (organization)**
  Within the organization, management can exercise control and access comprehensive data and information. In many situations organizations therefore start their assessment with a limited internal boundary (gate-to-gate) before expanding the scope beyond their gates where reliable data is scarce.
- **Supply and value chain (upstream, internal, and downstream)**
  The environmental or social hotspots are often located outside the boundary of the organization. While in many

[15] The directive defines mandatory ecological requirements for energy related products sold in the EU. The aim of this directive is that manufacturers of energy-related products will be obliged to reduce energy consumption and other negative environmental impacts at the design stage.

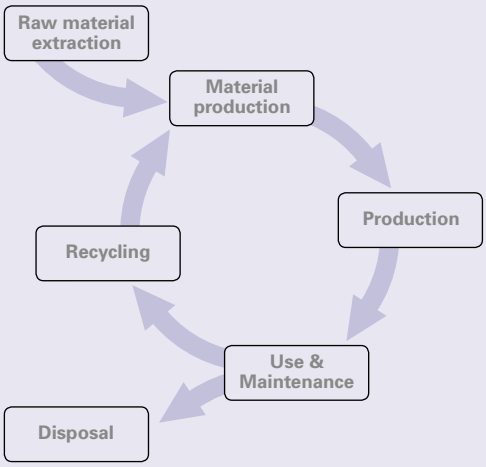
[16] For example, the Sustainable Solution Steering method developed by BASF aims to address impacts of entire product portfolios.

[17] As mentioned in the introduction, environmental and social impacts associated with particular sites are traditionally assessed by means of EIA and SIA and are often required by law, for example, in the context of new green-/brownfield investments. Such assessments are typically based on specific legislation of the focal country complemented by organization internal standards. However, EIA and SIA are not further addressed in this guide.

cases upstream processing, all the way to raw material extraction, might contribute most to the environmental impacts of an organization, in other cases downstream processes, for example the use-phase (energy consumption, emissions, etc.) may be most relevant. The assessment of the entire value chain (cradle-to-grave), or at least the supply chain (cradle-to-gate) is thus necessary for the fair evaluation of environmental and social impacts.

Value chain and supply chain assessments are often more challenging than internal assessments as certain data is often not readily available and modeling gets vastly complex. However, since requirements from politics and civil society for value chain transparency continue to increase, such assessments will likely become standard practice in many areas.

Life cycle perspective – considering an organization's entire value chain



5. Data requirements

The foundation of any impact assessment is data on relevant inputs and outputs (or pressures). Such inventory data often comes in many different forms and from a range of different sources and stakeholders (internal and external to the organization). In the following an overview of different types of data is provided. Data availability and quality are, in many cases, major hurdles to conducting a meaningful impact assessment.

5.1. Primary and secondary data

Organizations can use either primary (specific) or secondary (generic) data to calculate environmental and social impacts. Impact assessments might be most accurate where primary data can be used. Primary data is collected mostly within the organization. Primary data may be obtained through meter readings, purchase records, engineering models, direct monitoring, mass balance, stoichiometry, etc. Data availability and quality will vary from organization to organization depending on installed systems and data collection processes.

Examples of primary and secondary data for the assessment of environmental impacts [18]

Primary data sources

- Process-or plant-level consumption data
- Bills and stock/inventory of consumables
- Emission measurements
- Mass balance or stoichiometry
- Composition of waste and products
- Procurement and sale department(s) [19]

Secondary data sources

- Industry average data
  - Data from literature or scientific papers
  - Life cycle inventory databases [20]
  - Other databases from governments, international organizations, associations, etc.

[18] A more complete list of relevant data sources can be found, for example, in the GHG Protocol Corporate Accounting and Reporting Standard (http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf).

[19] For the conversion of financial information to physical flows several issues need to be considered. In ISO/TS 14072 the main issues that should be taken into account in order to reduce uncertainties are identified.

[20] To attain data over the entire supply chain is often very difficult. Commonly applied databases developed, for example, by the ecoinvent Centre or thinkstep (formerly PE International) provide average datasets for the assessment of environmental impacts including relevant inputs and outputs along the whole life cycle.

Most impact assessments also draw on secondary data. Secondary data are not based on direct measurement at the individual site(s), but include industry-average and / or process modelling data (e.g., from published databases, statistics, literature, and industry associations). When using secondary data, organizations should focus on databases and publications that are internationally recognized, provided by national governments, and/or peer-reviewed. For some methods and indicators (e.g., GHG footprint), reliable sources have been developed to provide (life-cycle) inventories in sufficient quality. However, for other environmental indicators (e.g., human toxicity, ecotoxicity) as well as for virtually all social indicators, methods and databases are less advanced.

Input-output analysis evaluates flows (usually monetary) between economic sectors and economies and can be used to track embodied impacts in products and services.[21] Thus, the direct and indirect environmental effects can be estimated. Similarly, the Social Hotspots Database (SHDB) includes an input-output model to prioritize social hotspots based on working hours.[22] Even though input-output data is easy to apply as no specific data collection is required, results have to be considered as sector averages rather than unique/specific process and product related data. Further shortcomings include the limited number of environmental and social indicators that can be linked to input-output models and the difficulties in measuring and demonstrating results of reduction efforts or improvement measures.[23]

For the assessment of internal processes, more specific and easily attainable data is available. Obtaining specific data, particularly for the activities downstream and upstream, might be expensive and time consuming. The more stages addressed in the value chain, the more complex the data collection. The frequency of product changes also adds to the data collection workload. If processes are not well documented, data collection proves to be complex and time consuming.

5.2. Global, local, and site specific data

While for many environmental impact categories the use of regionalized data is not particularly relevant, for other categories location-specific data are extremely important. For example, for environmental impact categories such as water or land-use, local data – as opposed to global figures – are relevant since the associated impacts are heavily depending on local conditions.[24] For the assessment of social impacts, site and region specific data may be required as behavior and conditions can vary from site to site and depend on regional conditions (such as the country and its laws). Global average data would not deliver meaningful information with regard to social impacts and social hotspots in the supply or value chain.

5.3. Quantitative and qualitative data

For assessing environmental impacts, quantitative inventory data are needed (e.g., liters of fuel consumed, kilograms of material used). In addition to quantitative data (e.g., number of accidents by unit process) also qualitative data can be used for the assessment of social impacts. Qualitative indicators provide information on a particular issue using words (e.g., text describing measures taken by an organization to manage stress). For example, qualitative data can be collected directly from the value-chain actors using a questionnaire. For the assessment of social impacts, practitioners will need to incorporate a large share of qualitative data, since quantitative information is not sufficient to address the issues at hand.

Not all activities are environmentally or socially significant, nor is it possible to acquire the data necessary to include them. It is often useful to conduct a generic, high-level assessment in the first phase, using less specific data to identify social and environmental hotspots. Thus, data collection efforts can be prioritized and it can be decided where more precise data collection is needed. Furthermore, organizations need to identify which social and environmental topics are most relevant for the assessment. Relevant activities can be identified, for example based on the risk exposure of certain activities, or the criticality deemed by stakeholders (e.g., customers, suppliers, investors or civil society), or based on the environmentally or socially materiality (e.g., production processes in high-conflict zones, or use of large amounts of fossil fuels). Priority setting may also benefit from taking in account the sphere of influence of organizations that are mandating the study and the relative importance of life cycle phases of the product studied.

As a general trend, scientifically most advanced methods show higher inventory data requirements. Depending on the impact assessment methods used, requirements for inventory data differ and there is often a trade-off between precision and applicability. While the collection of data within the boundaries of an organization (gate-to-gate) is manageable, inputs and outputs in the upstream (and downstream) phases are very hard to track. Thus, for the assessment of environmental impacts along the entire life cycle of products, organizations commonly rely on life cycle inventory datasets provided by

[21] Environmentally-extended input-output analysis maps general interdependencies between sectors in the economy of a given region, quantify those relationships (in monetary terms), and then assign environmental factors to the defined sectors.

[22] The SHDB (developed by New Earth/Social Hotspots Database project) includes a Global input-output model derived from the Global Trade Analysis Project, a Worker Hours Model constructed using annual wage payments and wage rates by country and sector, and Social Theme Tables covering 22 social topics within five social impact categories – labor rights and decent work, health & safety, human rights, governance, and community impacts (see Benoit-Norris et al. 2012).

[23] A discussion of input-output data can also be found in the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (http://ghgprotocol.org/sites/default/files/ghgp/Scope3_Calculation_Guidance.pdf).

[24] Whereas environmental impact assessment methods may be sensitive to location, no methods are site-specific and rather depend on physical factors such as geography type (see UNEP/SETAC 2009).

external providers. Several of these databases are internationally recognized and data with sufficient quality and reliability is available for several methods. However, complete and perfect life-cycle data does not exist. Thus, practitioners need to assess and document the quality of data.[25] The extent and quality of the data needed will depend on the motivation and scope of the study, on the framework and methods used, and on the required level of detail. Poor and inconsistent data quality should be taken seriously, since it may threaten the value of the results and conclusions. It is important to address the quality of the data, as this is fundamental to ensure the reliability and validity of the results. Sensitivity analyses help to assess the reliability and robustness of the results. Wherever results fluctuate strongly with variations in assumptions/input data, one should be careful with overstressing the relevance of the conclusions.

6. Frameworks, methods, and tools

There are many approaches for the assessment of environmental and social impacts. This includes frameworks providing guidance on how to assess impacts, specific methods to measure and evaluate impacts, and calculation or assessment tools. The selection of the frameworks, methods, and tools in this guide reflects the degree of adoption amongst econsense member companies. **This guide therefore neither makes any claims on completeness of the covered frameworks and methods nor does it provide a recommendation to use specific methods.**

In the following, commonly used frameworks and methods for the assessment of impacts are introduced and two matrices provide a link to relevant environmental and social topics. In the **environmental matrix**, a differentiation between LCA and stand-alone methods is made. Stand-alone methods focus on single aspects, and address high priority issues such as greenhouse gas (GHG) emissions, water use, and land use. These frameworks and methods are linked to one or more environmental impact categories on the vertical axis. The **social matrix** differentiates between Social-LCA and thematic clusters such as human rights impact assessment and the assessment of corporate citizenship activities on the horizontal axis and a selection of commonly assessed social aspects on the vertical axis.

As a first step of any impact assessment, the focus of the assessment, motives and target audience, as well as relevant parameters need to be identified. Thus, the matrices are complemented by several guiding questions which provide orientation and support decision making processes.

While the two matrices help identify frameworks and methods covering the impact categories of interest, the guiding questions are intended to facilitate the process of selecting the appropriate frameworks and methods. The guiding questions are addressed again in the accompanying fact sheets that provide additional information on each framework, method, and tool.

Guiding questions for selecting appropriate frameworks / methods / tools

Focus and Motivation	*Which topic / impact to assess? Why?*
Scale	*What is the scale of the assessment?* Product · Process · Project · Site · Organization
System boundaries	*Within which system boundaries should the assessment take place:* *– internal (gate-to-gate),* *– supply chain (cradle-to-gate, including internal and upstream processes), or* *– value-chain (cradle-to-grave, including internal, upstream and downstream processes)?* upstream · internal · downstream
Data requirements	*What kind of data is required to apply the selected framework/method/tool?* *Are reliable datasets available?*
Adoption in industry	*Are the frameworks, methods and tools broadly used among peers?*

[25] Guidance on how to collect data, how to prioritize data collection efforts, how to decide the extent and detail of required data collection, and how to fill data gaps is provided for example by the GHG-Protocol, the Handbook for Product Social Impact Assessment, or the PEF Guide.

6.1. Environmental frameworks, methods, and tools

Available frameworks aim at strengthening coherence of life cycle-based policy and business instruments by building a common technical and methodological basis. *ISO 14040 and 14044* are global standards for the life cycle based environmental assessment of products. ISO 14040/44 describe the principles and specify the requirements for conducting environmental LCA studies. However, the ISO standards leave the user with a range of choices. These individual choices can negatively affect the reliability and comparability of results of an impact assessment as methods and data used can differ widely. In this context, the *ILCD*[26] *Handbook* and the *Product Environmental Footprint (PEF)* methodology were developed. The ILCD Handbook is a series of technical documents that provide further guidance on how to conduct an LCA and include explicit methodological recommendations. The PEF aims at harmonizing existing LCA methods and decreasing the flexibility provided by the ISO standards by determining specific methods for modelling environmental impacts associated with products.[27] In addition to these product-oriented approaches, the European Commission launched an Organizational Environmental Footprint (OEF) Guide to assess the environmental footprint of organizations. In addition, the International Organization for Standardization developed the Technical Specification ISO/TS 14072 "Requirements and guidelines for organizational life cycle assessment", and the UNEP/SETAC Life Cycle Initiative initiated the flagship project "LCA of organizations". These approaches aim to support the identification and quantification of environmental impacts within and beyond the gates of the organization.

In the context of LCA, several methods to assess the environmental impacts of emissions or resource use have been developed. Such methods classify and characterize the inventory data (e.g., emissions of hazardous substances, extractions of natural resources) into impact category indicators that describe the potential impact (e.g., global warming potential, acidification potential) or the actual damage to, for example, human health. Examples for such methods are *CML*[28], *ReCiPe*[29], and *Eco-indicator 99*[30].

Next to the comprehensive assessment of environmental impacts in the context of LCA, high priority issues (e.g., climate change) are often addressed with stand-alone methods. A Carbon footprint assesses the amount of CO_2-equivalent emissions caused directly and indirectly by an activity. Carbon footprints can be calculated on a product or on an organizational level. Several frameworks like the *GHG-Protocol*[31] and *ISO 14067* are available that provide guidance for assessing GHG emissions.[32] These frameworks have been established on a life cycle basis and consider the entire value chain of an organization's activity. A water footprint ideally assesses relevant consequences associated with water use, the subsequent effects on water availability for humans and ecosystems, as well as direct impacts on the water resource and its users from emissions to air, soil, and water. *ISO 14046* ("Water footprint – Principles, requirements and guidelines") provides guidance with regard to relevant principles and requirements related to water footprint assessments of products, processes, and organizations based on life cycle assessment. In addition to the ISO standard, several other frameworks are available that aim to assess the performance of products and operations regarding freshwater use. The *Global Water Footprint Standard* developed by the Water Footprint Network includes detailed instructions and guidance on the calculation of water footprints for products and organizations.[33] Moreover, tools like the *Global Water Tool*[34] are available. These tools facilitate the assessment of an organization's water use against stress indicators and help to identify water risks related to their global operations, supply chains, or projects.

In addition, frameworks and methods have been developed that specify the assessment of water use in the context of LCA. The *WULCA* working group provides a general assessment framework for water use accounting and reporting. Furthermore, numerous methods to assess the consequences of water use have been developed. The method developed by *Pfister et al.* enables a comprehensive impact assessment of freshwater consumption by considering a water stress index.[35] The *WAVE* method addresses freshwater consumption by including specific vulnerability of areas and denoting the risk of freshwater depletion in certain regions.[36]

[26] International Reference Life Cycle Data System (ILCD).

[27] The PEF methodology is a life cycle based multi-criteria measure of the environmental performance of products and services. The PEF Guide was developed as part of the 2020 European strategy „ A resource efficient Europe" (see the European Commission's Recommendation on the use of common methods to measure and communicate the life cycle environmental performance).

[28] See Institute of Environmental Sciences (CML) (http://www.cml.leiden.edu/) and Guinée et al. (2002).

[29] See Goedkoop et al. (2013).

[30] See Goedkoop et al. (2001).

[31] The Greenhouse Gas (GHG) Protocol is a joint initiative of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). It is used internationally as an accounting tool to quantify and manage GHG emissions. It provides the accounting framework for most GHG programs in the world. In addition, the GHG Protocol provides tools that support the calculation of GHG emissions.

[32] The GHG Protocol built on the initial PAS 2050 method in development of its Product Standard. PAS 2050 provides a specification for the assessment of the life cycle greenhouse gas emissions of goods and services and was published by the British Standard Institution (BSI) in 2008. PAS 2050 was the first carbon footprint standard and has been applied by many companies worldwide. In 2011 the standard was revises and legally aligned with the GHG Protocol product standard.

[33] See Hoekstra et al. (2011).

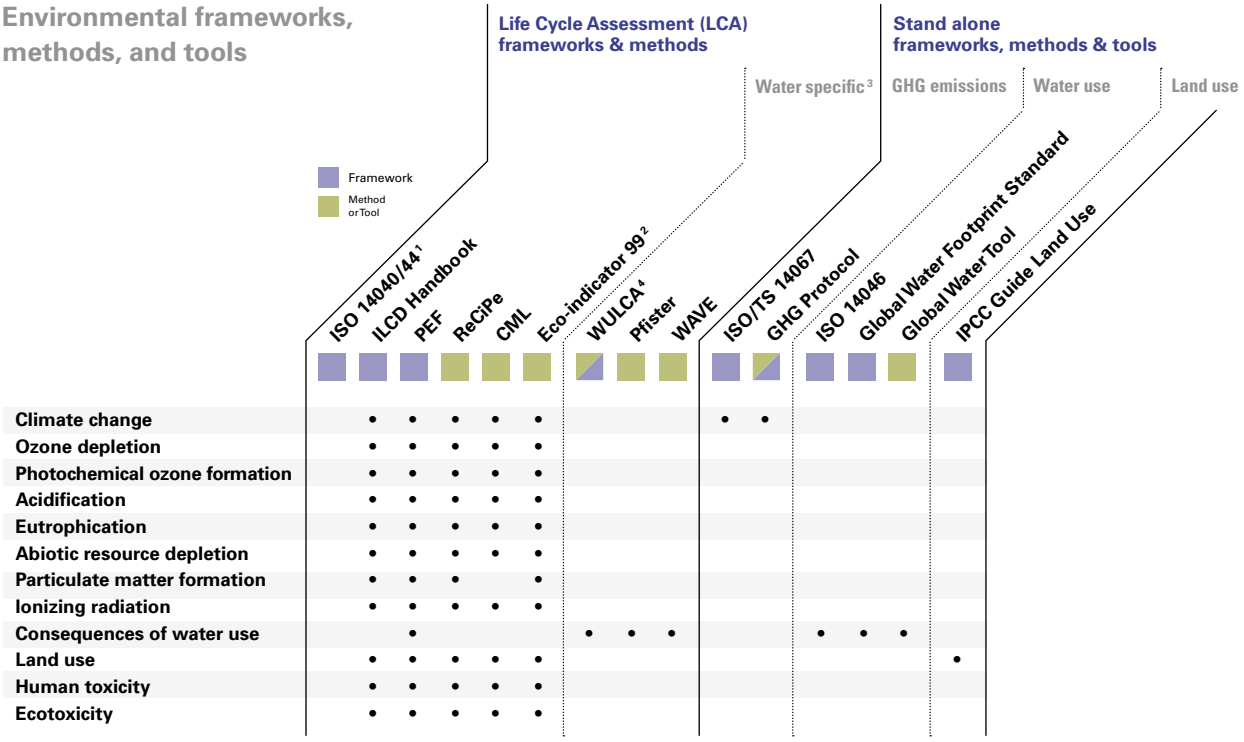
[34] The Global Water Tool is a free, publicly available resource for identifying organizational water risks and opportunities developed by the WBCSD.

[35] See Pfister et al. (2009).

[36] See Berger et al. (2014).

Table 1

Environmental frameworks, methods, and tools



Biodiversity is not included in this overview. An agreed overall method to assess impacts on biodiversity is still missing in the context of the here discussed frameworks and methods.

[1] ISO does not specify which impact categories to be used.
[2] Evaluation on endpoint level and aggregation to 3 endpoint impact categories: Damage to resources, damage to ecosystems, damage to human health.
[3] Frameworks/methods were developed in an LCA context.
[4] WULCA is a scheme for freshwater use accounting and also proposes methods to model the impact generated by freshwater use.

For the assessment of land use and land use impacts, few frameworks and methods are available.[37] The *IPCC Guide on Land Use and Land-Use Change* offers guidance on accounting for land use focusing on carbon stock changes.[38]

In Table 1 a schematic overview of frameworks, methods, and tools to assess different environmental impacts is provided.

6.2. Social frameworks, methods, and tools

While the assessment of environmental impacts is already well established, the assessment of social impacts associated with an organization's activities along the value chain is not yet established and no common or widely applied methods or datasets exist. For the assessment of social engagement activities and projects, frameworks and methods are readily available.

In the *Guidelines for Social Life Cycle Assessment of Products*, the UNEP/SETAC Life Cycle Initiative provides a framework to evaluate social impacts associated with products and services with regard to different stakeholder categories.[39] Similarly, the *Product Social Impact Assessment* guideline developed by the Roundtable for Product Social Metrics provides guidance for the assessment of social impacts of products and services throughout the entire life cycle. As social impacts are very specific, it is generally proposed to begin with the assessment of social hotspots or risks in the supply chain. The *SHDB* method determines levels of risks for different social topics and allows users to prioritize production activities and geographies.

[37] As a consequence of the multi-functionality of land, the impact assessment of land use requires the modelling of several impact pathways, covering biodiversity and ecosystem service, and is thus very complex.

[38] Frameworks and approaches are available that address specific uses of land. The *land use change assessment tool* provides a predefined way of calculating greenhouse gas (GHG) emissions from land use change due to the cultivation of crops. This tool can be used to calculate these emissions for a specific country & crop combination and attribute them to the cultivated crops. However, not in every case the previous land use is known, so this tool also provides means of estimating the GHG emissions from land use change based on an average land use change in the specified country (see http://blonkconsultants.nl/en/tools/land-use-change-tool.html).

[39] According to the UNEP/SETAC framework five main stakeholder categories can be distinguished: workers/employees, local community, society, consumers, and value chain actors. A stakeholder category is a cluster of stakeholders that are expected to have shared interests due to their similar relationship to the investigated product system.

Table 2
Social frameworks, methods, and tools

		Framework / Method or Tool	Social Life Cycle Assessment frameworks & methods			Human Rights Impact Assessment frameworks & tools		Corporate Citizenship & Community Investment assessment methods	
			Guidelines for Social Life Cycle Assessment of Products	Handbook for Product Social Impact Assessment	SHDB	Conducting an Effective Human Rights Impact Assessment[1]	Human Rights Compliance Assessment[2]	LBG	PHINEO
Workers/Employees	Forced labour		•	•	•	•	•		
	Child labour and young workers		•	•	•	•	•		
	Equal opportunities / non-discrimination		•	•	•	•	•		
	Freedom of association		•	•	•	•	•		
	Workplace health & safety		•	•	•	•	•		
	Conditions of employment (e.g., hours)		•	•	•	•	•		
	Training & education			•		•	•		
	Job satisfaction / social benefits		•	•		•	•		
Society/Communities	Access to material / immaterial resources		•	•	•	•	•		
	Cultural heritage		•		•				
	Delocalization and migration		•			•	•		
	Respecting indigenous rights		•		•	•	•		
	Community engagement		•	•		•	•		
	Safe & healthy living conditions		•	•	•	•	•		
	Corruption and bribery		•		•	•	•		
	Corporate citizenship (sponsoring, contribution to development)							•	•
	Local employment		•	•	•				
Customers	Health & safety		•	•		•	•		
	Customer satisfaction / well-being		•	•					
	Transparency		•						
	End of life responsibility		•						

[1] No specific social topics are named in the framework. The topics subject to assessment should be based on the rights included in the International Bill of Rights and the International Labour Organization Core Conventions.

[2] Refers to internationally recognized human rights – understood, at a minimun, as those expressed in the Internaitional Bill of Human Rights and the principles set out in the International Labor Organization's Declaration on Fundamental Principles and Rights at Work.

Moreover, specific frameworks and tools exist that focus on the assessment of an organization's compliance regarding human rights principles. BSR developed the *Effective Human Rights Impact Assessment* framework for identifying, prioritizing and addressing human rights risks on an organizational, site, and product-level. The *Human Rights Compliance Assessment* is a tool designed to help companies detect potential human rights violations caused by the effect of their operations on stakeholders.[40] The tool aims to help organizations to deal with human rights issues relevant for their particular operations.

Contrary to the assessment of social impacts of business activities along the value chain of an organization, the methods developed by PHINEO and LBG aim at evaluating the impacts of corporate citizenship activities on society. The LBG method provides a structured approach for measuring and evaluating the impacts of community involvement activities. With the PHINEO method, potential social impacts of corporate citizenship activities and projects can be assessed and projects with a strong potential to bring about (positive) social change can be identified.

Table 2 provides a comprehensive overview of these frameworks, methods, and tools for assessing social impacts.

The present guide makes no claim on completeness. In addition to these frameworks, methods, and tools, several sector-specific approaches exist, aiming to specify and simplify impact assessment procedures. For example, the WBCSD Reaching Full Potential Project launched chemical industry specific guidance documents on Scope 3 greenhouse gas reporting (corporate level), avoided emission calculations, and environmental life cycle metrics on a product level.[41] Furthermore, approaches

[40] The tool was developed by the Humans Rights & Business Project at the Danish Institute for Human Rights.

[41] A guidance document for social life cycle metrics for chemical products is currently developed (expected publication end of 2015). For further information see http://www.wbcsd.org/chemicals.aspx.

like the *Social Return on Investment* or the *Public Value Scorecard* can be used to manage and understand the social, economic, and environmental values created by an organization or activity.[42] Even though these two approaches do not directly assess impacts as defined in this guide, they can be used to evaluate the performance of an organization and are thus included in this overview.

7. Adoption of methods in business community

The assessment of environmental and social impacts gains increasing relevance for all industries. Impact assessments can be applied in many areas of an organization's activity with varying scales and system boundaries. Depending on the motivation and the scope of the study, different frameworks, methods, and dataset can be used. Whereas the identification of environmental and social hotspots based on generic data might be sufficient for the determination of risks, the optimization of products and processes requires more specific data and procedures.

Several frameworks and methods, like ISO 14040/44 or the GHG Protocol, are well known, generally accepted, and used throughout the business community. Especially with regard to well-established approaches, such as environmental LCA, databases with sufficient quality are available including all relevant inputs and outputs along the entire life cycle. Such databases significantly facilitate life cycle based assessments and improve the comparability of results.

While the assessment of environmental impacts is already well established in several industries, social impacts along the life cycle of products or organizations are examined less frequently. Organizations already engage in the assessment of their social performance, but no broadly used frameworks or methods are available yet. However, frameworks such as the Guidelines for Social Life Cycle Assessment of Products or the Handbook for Product Social Impact Assessment are a starting point for an enhanced analysis of social impacts associated with an organization's activities along the entire value chain.

The current degree of adoption of impact assessments varies with different industries. In the chemical and automotive industry, for example, the assessment of environmental impacts along the value chain is common practice and is used in the design of products and to avoid environmental risks in the value chain. With increasing standardization, more (reliable) datasets and tools will become available that will facilitate the assessment of environmental and social impacts and support a broader application throughout different industries and organizations.

[42] Next to the Guide to Social Return on Investment also a Self-Assessment Tool was developed by the Social Value Network (http://www.thesroinetwork.org).

8. Outlook

The members of econsense are committed to sustainable development. An effective sustainability strategy requires a detailed understanding of environmental and social impacts associated with an organization's activities or projects. Impacts can only be managed if they are measured and assessed. Thus, organizations increasingly start to embrace life cycle thinking and consider relevant impacts along their value chain. Furthermore, the assessment of positive impacts of engagement activities helps to direct future investment and involvements.

This guide provides a first orientation for the assessment of environmental and social impacts. The frameworks and methods addressed in this guide can be used as a basis to answer a range of important questions, for example: Where in my supply chain do negative social/environmental impacts occur? Which product is associated with higher environmental burdens? Which measures create the highest social benefits?

The choice of frameworks and methods in this guide reflects the degree of adoption amongst econsense member companies. The variety of approaches included in this guide demonstrates that several businesses already embrace impact assessment and proactively analyze potential environmental and social impacts to manage opportunities and risks. However, several challenges remain. To support decision making at all levels, the applicability of the frameworks and methods has to be improved and best-practice procedures in different industries have to be identified. Further incentives and initiative are needed to establish comprehensive and reliable databases and to create harmonized procedures that increase the reliability, comparability, and significance of the results. With this guide, econsense supports these processes by encouraging discussions and the exchange of experiences and assessment practices.

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