INDICATORS AND METHODS FOR MEASURING TRANSITION TO CLIMATE NEUTRAL CIRCULARITY

Task 5: Case-study group 3

Report for: DG RTD, Directorate B – Healthy Planet, Unit B1: Circular Economy & Biobased Systems

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1. INTRODUCTION

The transition to a circular economy (CE) needs to occur on multiple levels, from households and individual consumers to national and cross-border ecosystems. Measuring and monitoring the development of this transition is an ambitious task and is ideally supported by indicators relevant to all steps in that process.

This case-study is one of 19 developed for a research project into "*Indicators and methods for measuring transition to climate neutral circularity, its benefits, challenges and trade-offs*". It provides a detailed summary of the development and testing programme conducted for Group 3 of the bioeconomy sub-policy area during Task 5 of the project. The main purpose of this case-study is to investigate the potential use of Social Life Cycle Assessment (SLCA) as a tool for measuring the social benefits of circularity.

The aim of Task 5 is to take the learnings of all other tasks thus far and develop and test the new indicators identified in tasks 3 and 4 as having potential to enable a deeper understanding of the 3 facets of circularity for the five key approaches. This case-study is a direct output of Task 5.

This case-study focuses on the following indicator outlined in Table 1.

Table 1. Overview of case-study group 3

URN	Indicator name		Methodology	Level of implementation				
				EU	National	City / Region	Companies	Household
B7	**3**	Effects on local communities of a circular bioeconomy	Literature review of Social Life Cycle Assessment			X	X	X

2. EFFECTS ON LOCAL COMMUNITIES OF A CIRCULAR BIOECONOMY

2.1 SOCIAL IMPACTS OF A CIRCULAR BIOECONOMY

The bioeconomy is defined by the EC as "using renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy"[1]. A circular bioeconomy in turn introduces the general principles of CE into this, considering how those resources can be maintained at as high as value use as possible, for as long as possible. Therefore, assessing the effects on local communities of a circular bioeconomy is critical to ensuring that a truly sustainable society can be created. To be successful, any initiatives or projects fostering a transition to a CE, including circular biobased economies, must consider the associated social impacts alongside the environmental and economic impacts to prevent unintended burden shift from one issue to another.

The notion of moving from a linear economy, where the emphasis is on constant production, use, disposal and then replacement of goods to drive the economy, to a more CE, where products are designed to last and where waste is converted into valuable materials again, has been around since the 1990s (Peña, et al., 2021). While the focus on how a CE may be achieved has evolved over the last three decades, from the initial focus on waste feedback mechanisms, to more recent emphasis on product durability, repairs and making products last longer, the overall concern and ambitions of the CE remain unchanged (Peña, et al., 2021).

Most definitions and discussions around the CE today, focus on the economic and environmental benefits but the social impacts are rarely discussed (Peña, et al., 2021; Murray, et al., 2017). To transition to a truly sustainable circular bioeconomy, the social impacts including the effects on local communities must be considered.

Transitioning to a CE presents a number of social value opportunities where, alongside environmental impacts, social wellbeing can be decoupled from resource use for economic growth. However, many CE strategies may inadvertently lead to increased social issues if not done correctly or fully considered (Peña, et al., 2021). This is because social issues are a lot more nuanced with complex and varied causes that need tailored approaches as there is no one size fits all in terms of social policy. For example, in almost all cases, moving waste from landfill to recycling will lower environmental impacts, yet the social impacts are specific to the situation, context and geography. In some cases, moving materials to recycling will result in positive social impacts but in other situations, it may lead to increased social harm such as health and safety impacts.

To ensure that a project is as sustainable as possible and that new social harms/impacts are not inadvertently created, the social impacts of all CE projects and initiatives need to be assessed and monitored. The challenge for the EC is that there is not one indicator or harmonised methodology that does it all. Instead, several social methodologies have been used for assessing social impact projects and initiatives including Social Return On Investment (SROI), Social Impact Assessments (SIA), and Social Life Cycle Assessment (SLCA) to name just a few. All social impact methodologies have their place and use but in many cases were developed to meet a specific market need and therefore, have a limited scope based on their design. For example, SROI requires social impacts to be assessed in terms of value created, divided by the financial investment cost, to assess the social return. This limited scope focuses on positive social impacts at the potential detriment of social risks or harms as the practitioner is solely focused on identifying positive social value and quantifying it. SIA can provide a more holistic insight but due to the less tangible nature of the assessment method, requires the involvement of trained social experts to properly conduct the assessment which was not feasible for this study. Therefore, SLCA was selected as a suitable methodology to measure this indicator over these alternative methodologies as its flexible nature allows for oversights such as bias to either positive or negative issues to be addressed and it is considered to be more tangible for organisations to pick up and follow.

Additionally, both SIA and SROI are methodologies that are predominantly designed to be used at a project or intervention level to assess impacts on the local community but are less easily scaled to product, organisation, or country level. They also are more developed approaches, with more historical uptake than SLCA. Therefore, SLCA was selected as the focus of this study as it is a methodology that provides the most flexibility in terms of scope, social impact coverage and social groups assessed, and offers interesting innovation value and

[1] European Commission, Bioeconomy. https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy_en. Accessed March 2024.

potential. This study evaluates how SLCA could be used as an indicator to assess the social impacts on the local community from the bioeconomy.

There are many benefits to monitoring this indicator, for example:

- Ensuring that the social impacts including the effects on local communities of the transition to a truly sustainable circular bioeconomy are considered.
- Providing a tangible methodology for organisations to measure social impacts.
- Filling a gap in the existing CE monitoring framework which currently does not monitor social impacts.

2.1.1 EU Context

The EU has a history of being at the forefront of advances in sustainability, from implementation of the United Nations (UN) Sustainable Development Goals (SDG) to critical raw material human rights, health and safety assessments and Corporate Social Responsibility (CSR) reporting (Di Noi, et al., 2020). European entities have been critical to the development of SLCA as a methodology with most SLCA studies conducted in Europe. It would not be unexpected for the EC to implement SLCA as a way to monitor social impacts on the local economy of CE initiatives in the bioeconomy sector.

In fact, the EC's Circular Economy Action Plan[2] already recognises the importance of social impacts and refers to the EC commitment to a strong social Europe and the supporting action plan for achieving a European Social Pillar[3] (COM, 2020; European Commission, 2020). The EC is already supporting advancements in holistic multi-pillar assessments covering social, economic and environmental impacts to support CE decisions having funded a four year project looking to harmonise a joint assessment considering all three pillars of sustainability, known as a Life Cycle Sustainability Assessment (LCSA) (European Commission, 2020). The EC Horizon 2020 funded Orienting Project is working to harmonise social and environmental Life Cycle Assessment (LCA) with life cycle costing to produce a comprehensive overview of all issues including highlighting any possible trade-offs (European Commission, 2020).

European commitments in the Circular Economy Action Plan and European Social Pillar Action Plan include commitments on:

- Jobs and opportunities.
- Fair working conditions.
- Social protection and inclusion.
- Collaboration.
- International best practice.

Increasing legislation coming from the EC is already mandating assessing social impacts and improving performance to generate social value. However, there is currently no requirement for organisations to complete a specified social impact method or even to have collected social data on many of the relevant social topics. While some legislation such as the CSRD exists, at present collection of social data and the social impact assessment methodology is at the discretion of each organisation. This results in the number and scale of social topics assessed varying significantly from organisation to organisation. If the EC wants to assess the social impacts on the local community, then more needs to be done to ensure that organisations are collecting social data for all relevant stakeholders (for example, local communities, workers and the supply chain).

2.1.2 SLCA Overview

SLCA builds on the work done by environmental LCA over the last few decades to shift the widely accepted life cycle thinking approach onto social issues as well as environmental and economic issues. As with environmental LCA, the impacts of the full lifecycle of the product, service, organisation, or facility, are assessed (although it should be noted that currently product level assessments are the most common). This includes everything from raw material extraction, upstream supply chain, production, use and final disposal.

[2] European Commission, 2020. *Circular Economy Action Plan. For a cleaner and more competitive Europe..* Luxembourg: Publications Office of the European Union.

[3] COM, 2020. *Communication from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions. A strong social Europe for just transitions.* Brussels: European Comission.

SLCA is a flexible and holistic method for assessing the social impacts across all main stakeholder groups and topics across the full value chain of a project, intervention, service, facility, organisation or even country.

It is important to note that all projects, products, processes, and services have social impacts, be that on the workers, users, supply chain, and/or local community. These impacts can be positive or negative and SLCA allows for the assessment of both (UNEP, 2020; Goedkoop, et al., 2020).

SLCA is a flexible methodology that can be tailored to the situation being assessed, with the study practitioner required to make several decisions on the scope, type of impacts to assess, which impact assessment method to use and which indicators to use.

There have been several SLCA methodologies and methodology versions published since the first SLCA methodology was released by the United Nations Environmental Program in 2009. Each methodology varies slightly in terms of the stakeholder categories and impact subcategories and indicators; however, the overall methodological approach remains consistent (UNEP, 2020; Goedkoop, et al., 2020; UNEP/SETAC, 2009).

Common stakeholder categories include workers, local community, value chain actors / small scale entrepreneurs and consumers/users, with the UNEP method also further subdividing local community into local community, society, and children as their own distinct stakeholders (UNEP, 2020; Goedkoop, et al., 2020). These stakeholders are the default recommended groups to be considered with some being more relevant than others depending on the situation being assessed. It is for the study practitioner to determine the stakeholder categories relevant to the study and justify any exclusions. Further stakeholder categories can be added by the practitioner as required.

Once the stakeholders are identified the relevant subcategories can then be selected from a range of default suggestions such as child labour, fair salary, health and safety, indigenous rights, local employment, education and more.

SLCA studies require significant amounts of primary social data on a range of social topics. To collect the primary data required for a SLCA on all social topics would be an intensive, expensive and time-consuming undertaking even for small supply chains. Therefore, SLCA methodologies such as the United Nations Environment Programme (UNEP, 2020) guidelines for SLCA and Product Social Impact Assessment (PSIA) method (Goedkoop, et al., 2020) recommend that a social hotspot study should be conducted first based on readily available secondary data, such as SLCA databases and/or literature reviews, to estimate the potential relative importance of different social issues and prioritise primary data collection (UNEP, 2020; Goedkoop, et al., 2020).

Once the practitioner has determined the stakeholder and subcategories to be assessed then a key methodological decision around the impact assessment method needs to be made. SLCA studies can be conducted using two impact assessment methods, known as types of impact pathways (Mesa Alverez, 2021; UNEP, 2020)

- Type 1: Performance reference point (PRP).
- Type 2: Impact pathway methods.

The vast majority of SLCA studies conducted to date have been type 1 reference point methods which involve assessing social impacts based on accepted reference points: typically based on international standards, legislation or guidance (Mesa Alverez, 2021; UNEP, 2020; Goedkoop, et al., 2020). Positive or negative impacts of each social topic are then assessed in comparison to this reference point. Type 1 is the method most recommended and utilised by SLCA practitioners and social scientists (Goedkoop, et al., 2020; Mesa Alverez, 2021). However, others promote the use of type 2 impact pathway methods, which more closely resemble environmental LCA, where characterisation models are produced to quantify social impact by establishing a cause-and-effect relationship (UNEP, 2020). The key challenge to this method is that at present characterisation models are extremely limited. Instead, study practitioners often have to develop these as part of the study (UNEP, 2020). Developing characterisation models for social issues requires significant work which should not be overlooked. In environmental LCA, most studies are conducted using existing and well-established characterisation models that simply do not exist yet for SLCA.

Type 1 versus type 2 is an area of debate within SLCA with differing views on which is best and why. The specific aim of the study is crucial in determining which is more appropriate. If the user wants to assess the performance of the system, then type 1 is more relevant. However, if the user wants to assess the potential implications and consequences as a result then type 2 is typically more appropriate (UNEP, 2020).

This study focuses on how SLCA could be adopted by the EC to assess the social impacts of circular bioeconomy projects on the local community. This study is not recommending one SLCA approach over another but instead details the advantages and disadvantages of SLCA and how this methodology could be used to assess the social impacts.

2.1.3 Methodology

Initially, it was hoped that this study would be able to trial using SLCA as a method to assess the social impacts of the bioeconomy on the local community. However, it quickly became apparent that this was not going to be feasible due to the significant data requirements and the time/cost implications for organisations conducting bioeconomy projects. Instead, a literature review and theoretical assessment was completed to assess the current status of indicators used to evaluate the social impact of bioeconomy projects on the local community. In particular, the review focused on the use of SLCA, the benefits and limitations of using SLCA methodology, and the role that it could play in supporting the transition to a more CE. This study summarises the findings of the literature review.

2.2 SLCA KEY ANALYSIS RESULTS

This section summarises the results of the literature review, detailing the advantages and limitations associated with using SLCA methodology to evaluate the social impacts of bioeconomy projects on the local community.

A case study is explored to assess the potential of using SLCA to identify social impacts on the local community using a real-life European bioeconomy project. The case study is used to highlight any challenges and limitations identified and review the potential insights obtained from using SLCA.

Lastly, using the results of the literature and case study review, the status of SLCA methodology and its potential to assess the social impact of bioeconomy projects on the local community was evaluated against RACER criteria and rated based on the perceived relevance, acceptability, credibility, ease, and robustness of the indicator.

2.2.1 Advantages

Understanding social impacts is becoming increasingly important. SLCA enables the inclusion of extra dimensions of impact analysis when assessing the sustainability impact of a project or product, providing a more holistic approach to obtain a broader understanding of the true impacts. SLCA studies can be conducted on their own to assess the social impacts or conducted alongside other assessment methodologies such as environmental LCA and or life cycle costing to conduct a wider assessment taking multiple pillars into account. When all three pillars of sustainability; society, environment and economy, are assessed together then a combined life cycle sustainability assessment can be produced. This combined approach would account for the multifaceted nature of sustainability to holistically assess a bioeconomy project's contribution to the CE (UNEP, 2020). At present this holistic approach is quite rare, however in the last few years work on combined LCAs has seen significant investment and research and is accelerating.

Assessing the social impacts of bioeconomy projects also helps to prevent burdens from shifting from environmental issues to unforeseen social issues.

SLCA is an assessment method that covers a wide range of social impacts and topics. The flexible nature of the methods ensures that all relevant impacts can be assessed. SLCA could significantly help to assess the impact of bioeconomy projects on the local community at different stakeholder levels and covering topics such as:

- Access to material resources.
- Access to non-material resources.
- Migration and delocalisation.
- Cultural heritage.
- Safe and healthy living conditions.
- Indigenous rights.
- Community engagement.
- Local employment.
- Skill development.
- Living conditions.

(UNEP, 2020; Goedkoop, et al., 2020)

SLCA can be used to identify, understand and communicate potential social benefits of CE schemes which could be used to help gain public and financial support by business or in making funding allocation decisions by the EC. This indicator could be used to ensure that, as a minimum, standard social impacts on the local

community are carefully considered and a focus of all future projects. The Product Social Impact Assessment (PSIA) SLCA method contains a specific sub-section of the methodology to assess CE impacts specifically (Mesa Alverez, 2021; Goedkoop, et al., 2020).

SLCA does not only assess social impacts, it also encourages engagement with potentially impacted groups. SLCA methodologies recommend that stakeholder engagement in the form of interviews and focus groups is conducted with stakeholders on each social topic. This helps prevent bias in company reported data and ensures that all perspectives can be included in any assessment (UNEP, 2020).

This is summarised in the UNEP 2020 SLCA guidance which states that "Stakeholder participation can help in the selection of a final set of indicators that reflect stakeholders' values, improves democratic representation, and promotes empowerment and learning opportunities for communities while encouraging partnerships. Moreover, it increases the legitimacy of the assessment" (UNEP, 2020).

As mentioned in Section 2.1.1 above, the EC's Circular Economy Action Plan already recognises the importance of social impacts and refers to the EC's commitment to a strong social Europe in the Social Pillar Action Plan (COM, 2020; European Commission, 2020). SLCA presents a comprehensive methodology to assess the relevant social impact of projects and can be used to assess contributions towards these action plans to ensure that progress is being made in line with EC targets and commitments.

2.2.2 Limitations

As noted above, SLCA offers a transparent and repeatable method to quantify the potential social impacts of a product or service and can read across to Circular Economy Action Plan objectives such as Fair Working Conditions, by reporting impacts on social categories such as wages, skill development and health and safety conditions.

However, these impacts are highly sensitive to the precise practices of businesses. This means that a product produced in one geography, may have drastically different social impacts to the average impacts of a similar priced good from the same industry and region. The true benefits of SLCA lie in updating the SLCA hotspots, built on generic data, with primary data. Within the literature review, concerns and limitations were identified associated with completing a SLCA based on primary data particularly regarding data collection process. These limitations are discussed below.

Primary data

SLCA is highly resource intensive with significant time investment required to collect the data required.

Quantitative data is easier to obtain for some social topics than others. Where it is available it is often less time intensive to collect. However, it is not without its challenges. Numerical data still needs to be put into context, (e.g. compliance with minimum wage does not necessarily mean that the wages are liveable in the associated areas (UNEP/SETAC, 2009; UNEP, 2020)). Potential bias in the data also needs to be considered and the source assessed. Particularly if a social harm is occurring that is below legal compliance or accepted standards then many organisations do not want to record this and disclose it. For example, health impacts on local communities from nearby businesses can be difficult to prove and organisations may report zero instances unless certain explicit criteria are met. More qualitative data based on interviews and opinions of local community members may be more accurate in these instances but need to be carefully reviewed and verified.

All SLCA data needs to be contextualised and potential bias (conscious or unconscious) considered. Particularly with social issues, untrained practitioners tend to struggle to remove their own subconscious beliefs and assumptions from situations which can lead to dangerous misreporting and in some cases make social issues worse. This is particularly the case where cross-cultural beliefs differ or where social harms are identified, and knee jerk policies and procedures are created to 'remove the problem'. Social issues need to be handled with care and practitioners need to remember that the issues reported are affecting human lives – any mitigation activities to improve situations need to be done with the right intention and in a careful way where businesses work with the affected groups to make the situation better.

SLCA data collection must be handled with care by capable experts who are able to conduct research and interviews appropriate for the context of the assessment and limiting bias as much as possible (Mhatre-Shah, 2023; UNEP, 2020; Goedkoop, et al., 2020). To do this properly is a resource intensive undertaking and takes time and commitment from organisations and requires access and cooperation of relevant stakeholders.

Secondary data

If primary data is not available then there are databases developing as sources of proxy data, though these are limited as the area is in its infancy. Data within default databases are typically recommended for initial hotspot studies only, to inform organisations on the likely social risks and therefore to support with decisions such as selecting the relevant social topics. Secondary data sources such as the Social Hotspot Database[4] (SHDB) or Product Social Impact Life Cycle Assessment[5] (PSILCA) (Di Noi, et al., 2020; Goedkoop, et al., 2020; UNEP, 2020)) are the two currently used SLCA databases that exist. SLCA databases contain proxy social risk data for specific sectors, typically workers and local community by country. It should be noted that while most countries are covered by social hotspot databases, not all countries are covered and even when they are the information of different countries may not be comparable. Social databases are based on global input output financial models and as a result are at a country level, local issues and regional differences will not be picked up (Di Noi, et al., 2020). This may mean that some issues are over or underestimated.

Caution must be considered when selecting and using secondary data as the context with which it was collected may differ from the context in which it is used. The age of the data may also be different and social circumstances may have changed (eg, data on salaries from 2010 may not be representative of today). Social indicators taken from international databases are based on national publicly available data such as census data or other governmental / intergovernmental reports (Di Noi, et al., 2020). In many cases, the underlying data sources are not updated annually, and many countries do not have the resources to complete them accurately. Therefore, there may be methodological issues and estimations to account for missing data.

As concluded by McGillivray; "*As a consequence, differences among countries in the values of social indicators are difficult to interpret. Yet, these problems do not provide grounds against the use of social indicators per se, but grounds for attempting to improve their reliability*" (McGillivray, 2007). McGillivray makes a key point that just because there are issues and challenges in using secondary country level social data, this does not mean it should not be done. SLCA and social assessments more widely are still in early stages of development and integration, there is more work to be done on developing these methods further and as more work is done the limitations and challenges around data will reduce as collecting data and reporting it becomes more standard practice.

Standardisation

Another potential limitation of SLCA, when assessing the local community impact of the bioeconomy, is that while the flexibility around the methodology helps to ensure that all relevant topics can be included, it does prove challenging for when it comes to standardisation. The key standardisation issue is around type 1 or type 2 assessments, with the majority of the studies to date conducted using type 1 reference point methods. Type 2 assessments are less well developed and face several additional challenges around quantification of diverse and difficult social topics into characterisation models. Standardised characterisation models are not widely available, and practitioners are typically expected to find existing models or develop their own. This is an area of debate within the SLCA community and requires further research and work to determine if or how these may be useful. The UNEP method offers more flexibility in the method approach than the PSIA SLCA method. While the UNEP method says either type 1 or type 2 methods can be used, the PSIA method suggests a type 1 reference scale approach and goes further to suggest possible reference scale indicators (UNEP, 2020; Goedkoop, et al., 2020).

System boundary

Many SLCA studies choose to limit the scope to focus on cradle-to-gate assessments, excluding the use and end-of-life stages and, therefore, often exclude the link with the CE (Mesa Alverez, 2021). Standardised best practice guidance and sector-based guidance could be developed to help address this. Sector based guidance has not yet been developed, with one exception: guidelines for the chemical sector (WBCSD, 2016). SLCA needs to be applied further for these guidelines to be developed, but once they do, they will help to improve accuracy and consistency in assessments (Valente, 2017). Work is currently underway on an international ISO standard for SLCA, ISO14075 which it is hoped will set a standard for best practice to be followed in all SLCA studies.

Interpretation

[4] SHDB Link: http://www.socialhotspot.org/ (Accessed 29/03/2024)
[5] PSILCA Link: https://psilca.net/ (Accessed 29/03/2024)

While not a limitation of SLCA as such, there are limitations and debates on the presentation and interpretation of SLCA results. Most SLCA studies that follow type 1 assessments present the results in a semi-quantified manner by using a typically five-point reference scale where zero is minimum compliance and plus one/ plus two are positive social impacts, and negative one/ negative two are negative social impacts or risks. Presenting the results in a semi-quantified manner can make it easier to understand and communicate, however further attempts to quantify the results have been highly criticised by other social experts. This is due to concerns about simplifying complex social issues and the ethics around quantifying social impacts which can encourage comparing impacts (for example, ranking which social impacts are of greater importance). Previous Product Social Impact Assessment (PSIA) SLCA methods included more quantifications, however, as the methodology was developed, this was removed due to the challenges around trying to quantify social issues (Goedkoop, et al., 2020). The current PSIA methodology notes these limitations but suggests that some form of quantification may be needed to support aggregation for reporting in the future (Goedkoop, et al., 2020). This is to ease understanding and that further work is needed to find a way to do this transparently (Goedkoop, et al., 2020).

2.2.3 Case Study

As part of testing this indicator, a case study of a bioeconomy project utilising SLCA to assess the social impacts on the local community has been reviewed.

Water2Return, is a bioeconomy project, based in Seville Spain, that aims to capture and recover nutrients present in wastewater from the slaughterhouse industry to produce fertilisers for use in the agricultural sector (Water2Return, 2022; Water2Return, 2018). The project received funding from the EU's H2020 Research & Innovation and construction began in 2018 (Water2Return, 2022).

The proposed project was assessed using 11 different work packages, exploring the ethics, feasibility, technology (Water2Return, 2022; Water2Return, 2018). This was a large project involving four research institutes, two associations and nine SMEs, completed over a five-year period and spanning partners from eight different European countries (Water2Return, 2018). The assessment ran from 2017 to 2022 and the work packages included an evaluation of the sustainability impact of the project, which involved undertaking an environmental, economic, and SLCA (Water2Return, 2022).

As part of the SLCA conducted by Water2Return, the social impacts on local communities and workers were assessed. The social impacts of the circular Water2Return nutrient recovery system were compared with a baseline where the slaughterhouse sewage would have gone to wastewater treatment (Water2Return, 2018).The SLCA was completed following UNEP guidelines to assess both the positive and negative social impacts of the scheme compared to the baseline scenario and included avoided use phase impacts.

Social indicators were selected and assessed for the following social topics (Water2Return, 2022) as shown in Table 2.

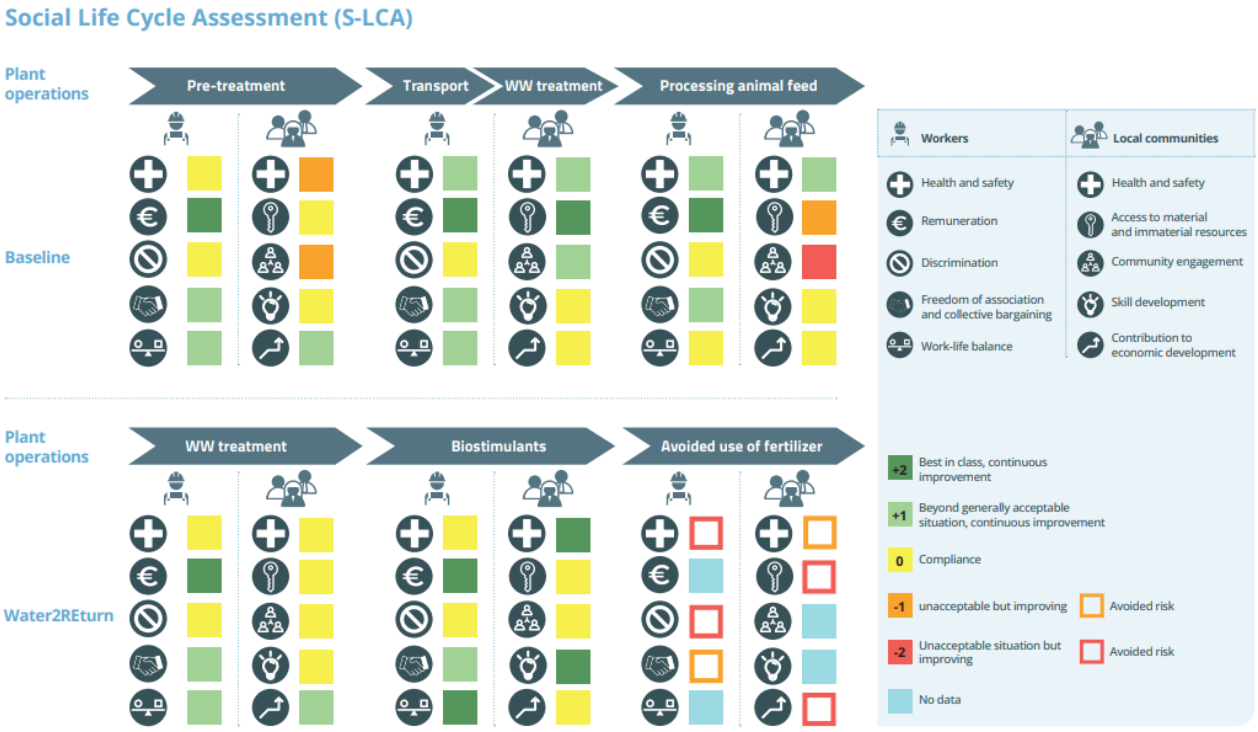
Table 2: Water2Return Social Topics

Stakeholder	Social topic. Subcategory
Local community	Community Engagement
	Health And Safety
	Local Employment
	Access To Material and Immaterial Resources
	Contribution To Economic Development
Workers	Health And Safety
	Remuneration
	Discrimination
	Freedom of association and collective bargaining
	Work-life balance

Although details into the methodology and data collection process were not provided, the results are stated to be based on secondary database data taken from the SHDB[6]. As mentioned above, SLCA databases contain proxy social risk data for specific sectors based on the country. The social data was typically for workers and selected local community impacts. It should be noted that databases such as the SHDB can be useful in cases, such as this, where primary data was limited or not available and a preliminary assessment was taken during the early days of the project. These databases are useful at providing a first indicator or early social hotspot studies to help identify where primary data should be collected (determining if a social impact is likely to be relevant or not) but come with high level of uncertainty as they are at a country average level only.

The type 1 reference point SLCA results for Water2Return were presented split by social impact on workers and local community, and by life cycle stage (pretreatment, biostimulants and avoided use of fertiliser). This assessment, like most SLCAs, was a type 1 assessment where positive and negative impacts were assessed using a five-point reference scale where '-2' is unacceptable situation but improving, zero is compliance and internationally accepted standards, and '+2' is best in class, continuous improvement. The scheme was shown to improve the social impact to both the workers and local community when compared to the baseline, though the results for the impact of the avoided use of fertiliser were limited by a lack of data for several topics.

Figure 1: Water2Return SLCA results (Water2Return, 2022)



The study concluded that the construction of the plant had a significant social impact and should therefore be taken into consideration to identify ways to improve the social impacts (Water2Return, 2022). In particular, it was highlighted that focus should be given to the selection of suppliers for the components of the different treatment lines. The production of biostimulants was identified as an opportunity for positive social impacts on the local communities and workers, whilst the reduction in the use of fertilisers was identified as potential to avoid social risks for workers and local communities.

This case study shows the potential insight that can be gained by SLCA as a means to assess the social impacts on the local community of the bioeconomy. In this example, it can be seen that completing a social assessment, even at a high level such as the social hotspot undertaken here with no/limited primary data does provide valuable insight and has enabled the identification of key potential social risks and benefits to be considered. This study enabled Water2Return to make changes prior to implementation to further reduce potential impact and ensured that the funding received by the EC went to creating the most social value possible. A key conclusion of the study was to ensure "*participatory engagement with the local community to*

[6] SHDB Link: http://www.socialhotspot.org/ (Accessed 29/03/2024)

gain their acceptance for the technology and the project on the whole" (Water2Return, 2018). This will provide the opportunity for capturing qualitative data and ensuring that the social impacts on the local community are considered whilst the project is developed, with the potential to improve the social benefits and increase the long-term sustainability of the scheme.

2.2.4 Evaluation

The status of indicators used to assess the social impact of bioeconomy projects on the local community was assessed using a RACER evaluation.

Relevance

Relevance refers to whether the indicators are closely linked to the objectives. SLCA is considered to have significant potential to meet the objective of assessing the effects on the local community of a circular bioeconomy.

SLCA was scored 3 for relevance as it is deemed to be highly relevant as it can support a better understanding of true circularity and the wider impacts. Particularly as social aspects can impact the long-term sustainability of circularity and can identify otherwise overlooked issues and opportunities.

SLCA is also aligned with existing and future European policy objectives further cementing its relevance as an appropriate indicator as discussed in Section 2.1.1 above.

The relevance score remained unchanged between Task 4 and Task 5.

Acceptability

Acceptability refers to whether the indicator is perceived and used by key stakeholders such as policy makes, civil society and industry.

The acceptability scoring was downgraded from 3 to 2 following testing in Task 5 as while the benefits of the SLCA are widely accepted, the methodology is still in its infancy and as a result has had limited uptake beyond academia and those associated with developing SLCA methodologies. The limited uptake is attributed to the current intensive nature of SLCA with significant time required and technical expertise needed to conduct SLCA.

Additionally, there are several competing methodologies developed to assess social impacts of projects and initiatives such as the social return on investment (SROI) and social impact assessments (SIA) though these are designed to be used on a smaller scale at project or intervention level only. Therefore, SLCA was selected as the focus of this study as it is a methodology that provides the most flexibility in terms of scope, social impact coverage and social groups assessed.

There is also no legislative or supply chain requirement for SLCA to be conducted at present which combined with the time requirements results in a low uptake.

Credibility

Credibility refers to whether the indicator is transparent, trustworthy, and easy to interpret.

The credibility scoring was downgraded from 3 to 2 following testing in Task 5 as while there are several available methodological guidelines for completing SLCA, which were deemed to be easy to understand, SLCA requires expertise on the part of the practitioner to ensure things are performed correctly in a transparent and appropriate manner. The flexibility of SLCA at present is both a benefit and concern as in inexperienced hands it may be misconstrued.

There also remains debate around interpretation and reporting of results in terms of how results should be presented and whether type 1 or type 2 assessments are more appropriate.

Ease

Ease refers to the easiness of measuring and monitoring the indicator.

The ease scoring was downgraded neutral 2 to 1 following testing in Task 5 SLCA as due to the novelty of SLCA methodology, the data required for SLCA studies is not currently readily available. Collecting the social data required is often a costly and time intensive process which requires significant investment from organisations and input from stakeholders. The challenge for SLCA is that there needs to be a culture shift and industry wide push to begin collecting social data for SLCA to become easier to conduct. The

implementation of legislative requirements for social assessment could encourage the development of more readily available data, however there is currently no such legislation. Once the data is collected, and a process established, then maintaining the data needed will be easy, but the initial process to set up system for data collection is not.

Secondary databases are available with proxy data for some social topics, but these are limited, have a high degree of uncertainty due to the specific nature of SLCA, and also tend to focus on supply chain impacts.

Robustness

Robustness refers to whether the data is biased and comprehensively assess circularity.

The robustness scoring was downgraded from good 3 to 2 following testing in Task 5 as while there are recognised SLCA methodologies available, the qualitative nature of the method and current flexibility does mean that bias is possible. For example, SLCA requires practitioners to make judgment calls with regards to which social indicators to use, which could be abused or impacted by unconscious bias. However, to use SLCA results in public communications, guidance recommends that the study undergoes an independent review by SLCA experts, similar to the environmental LCA ISO 14040 guidance. This should ensure that public SLCA studies are robust, limiting potential bias and ensure transparency. A SLCA specific ISO standard (ISO14075) is currently under development which should help improve the robustness score.

Table 3 below presents the summary of the RACER evaluation. Details on the scoring are available in Appendix 4.1.

Table 3. RACER evaluation (Scored 1-3 with 1 being poor and 3 being good)

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	3	3	2	3	**14**
After Task 5 (following testing)	3	2	2	1	2	**10**

2.3 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

This indicator is considered important and in need of further development by the EC. The social impact on the local economy is deemed an important indicator for the bioeconomy and CE more widely. Assessing the social impact of circular bioeconomy projects on local communities will be central to transitioning to a fair, equitable CE and meeting the EU's commitments as laid out in the Circular Economy Action Plan and Social Pillar action plan.

This study has discussed how SLCA could be used to assess the indicator in question, however, as noted at the beginning of our study, SLCA is one of several potential methodologies that could do this. It is recommended that the EC develop this indicator further and consider more explicitly what types of social impacts should be assessed as a minimum and whether this should just be limited to the local community and the bioeconomy or expanded further. One of the main advantages of SLCA is that it can be used to undertake a holistic assessment of all relevant social impacts. It is for the study practitioner to determine what is relevant and justify any exclusions. Mandating specific social topics that must be reported as a minimum is an option that may be considered to help improve the transparency and robustness of the indicator. However, there is not a one size fits all process as social impacts are so nuanced and specific to the context in question and the EC should keep this in mind when developing this indicator and setting any targets. If minimum criteria are introduced, it is recommended that this is developed as part of sector specific guidance rather than a blanket policy.

Requiring a social and environmental LCA of any project receiving EU or national government funding could be a good way to ensure that the EU's social and environmental ambitions are achieved and accidental burden

shifting from environmental to social issues is avoided by mitigating any potential unforeseen social implications. However, it will not be an easy or cheap option and would require significant investment (both time and monetary) to support bioeconomy projects in assessing social impacts which by their very nature are difficult to assess and even harder to attempt to quantify. It is recommended that adding a required social indicator such as SLCA to European Commission funded projects would add value to the project and help mitigate any potential adverse effects, however this benefit will need to be balanced with the cost/effort implications. The EC may wish to establish criteria such a project size or value where a social assessment is required given the cost implication make exception for smaller projects.

Following the study of this indicator, it was found that its original name ‘Effects on local communities of a circular bioeconomy’ was fit for purpose and that no variation was needed. However, we would suggest that once this indicator is well understood at the bioeconomy sector level, that it is replicated for other sectors.

Table 4: Summary of recommendations for indicator

Type of recommendation	Recommendation	RACER criteria addressed	Timeline	Key stakeholders or partners
Legislation	Develop legislative frameworks at the EU level that mandate comprehensive social impact assessments for significant bioeconomy projects. This could be integrated into existing environmental assessment regulations or introduced as part of new sustainability reporting standards.	Acceptability, Credibility, Ease and Robustness	Medium (1.5 – 5 years)	Responsible: EC Accountable: EC and National EU governments Consulted: National EU governments and Companies Informed: Companies
Development of guidance	Development of sector specific guidance with clear, actionable instructions to support organisations in understanding and implementing SLCA. By developing sector specific guidance, SLCA methodological decisions such as which social topics to assess can be tailored to the unique challenges and opportunities of specific sectors.	Credibility, Ease and Robustness	Medium (1.5 – 5 years)	Responsible: EC Accountable: EC and National EU governments Consulted: International Standards Organisation; existing SLCA method authors and industry bodies Informed: Companies
Indicator development	It is recommended that this indicator is further developed and that the EC consider expanding the scope beyond just the local community impacts of the bioeconomy to consider wider social topics and sectors.	Acceptability and Credibility	Medium (1.5 – 5 years)	Responsible: EC Accountable: EC Consulted: existing SLCA method authors and National EU government Informed: Companies
Data collection	The European Commission could support the development and uptake of digital platforms that facilitate the efficient collection and management of social impact data across the supply chain. This information should be supplemented with stakeholder interview data and standardised best practice protocols and guidance established.	Ease and Robustness	Medium (1.5 – 5 years)	Responsible: EC Accountable: EC Consulted: Digital data collection companies Informed: Companies

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4. APPENDICES

4.1 RACER MATRIX

Criterion	Description	1 (Poor)	2 (Neutral)	3 (Good)
Relevance	Refers to whether the indicator is closely linked to the objectives to be reached.	Does not support a better understanding of true circularity.	Supports a better understanding of true circularity.	Highly supportive towards gaining a better understanding of true circularity.
		Supports no value-added circular opportunities.	Supports lower value-added opportunities (i.e. metrics related to waste generation, recycling, waste management, etc.)	Supports higher value-added opportunities (i.e. all R-strategies above remanufacturing) and wider systemic change (e.g. indicators that encourage PSS or circular design).
		Not linked to the project objectives and/or European policy objectives (existing or upcoming).	Linked to the project objectives, but not to European policy objectives (existing and/or upcoming).	Fully aligned with project objectives and European policy objectives (existing and/or upcoming).
Acceptance	Refers to whether the indicator is perceived and used by key stakeholders (such as policymakers, civil society, and industry).	Poorly accepted by key stakeholders, e.g. due to the use of confidential data.	Relatively accepted by key stakeholders as the benefits of measuring are clear.	Key stakeholders are motived to report this indicator, due to mandatory legislative requirements (current or upcoming), potential commercial benefit or being in the public interest.
Credibility	Refers to whether the indicator is transparent, trustworthy and easy to interpret.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Ease	Refers to the easiness of measuring and monitoring the indicator.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Robustness	Refers to whether data is biased and comprehensively assesses circularity.	No consistent methodology and dataset are available.	A consistent methodology and dataset available.	A consistent methodology and dataset available.
			A composite/aggregated indicator (based on multiples dimensions).	A one-dimensional indicator.
			A proxy indicator.	

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