No. C238
January
2017

Open Space workshop on sustainability indicators for bio-based products

Tomas Ekvall

In cooperation with Formas, Chalmers and SP

Author: Tomas Ekvall, IVL
Funded by: Formas and Chalmers University of Technology
Photographer: Michael Martin, IVL
Report number C238
ISBN 978-91-88319-56-2
Edition Only available as PDF for individual printing

IVL Swedish Environmental Research Institute Ltd.
P.O Box 210 60, S-100 31 Stockholm, Sweden
Phone +46-(0)10-7886500 // www.ivl.se

This report has been reviewed and approved in accordance with IVL's audited and approved management system.

Foreword

This report summarizes an Open Space workshop and details its results. The workshop was held on November 10th, 2016 at the Gothenburg office of IVL Swedish Environmental Research Institute. It was organized as part of two different projects:

1. "Life Cycle Sustainability Evaluations of Biomass Value Chains: Current Practice, Limitations and Recommendations", funded by Formas, coordinated by Michael Martin at IVL, and jointly conducted by IVL and SP Technical Research Institute of Sweden.
2. "Bioeconomy transition sustainability decision support", funded by Chalmers Energy Area of Advance, coordinated by Magdalena Svanström at Chalmers University of Technology, and jointly conducted by Chalmers and IVL.

In the first project, the workshop was part of our process to form an idea of what aspects and impact categories an ideal or adequate sustainability assessment of bio-based products should include. We needed this as basis for a discussion on the limitations of current assessment approaches.

In the second project, the workshop was part of an initial investigation into the state of art and research needs in the area of methods for sustainability assessments.

Table of contents

Summary

This report presents an Open Space workshop aiming to identify and discuss indicators and aspects that are important in a sustainability assessment of bio-based products. After an initial individual brainstorming, the 19 workshop participants formed five small groups, each of which selected 3-5 sustainability indicators that they considered important for assessments of bio-based products. The ideas were presented for the rest of the workshop participants and posted on a wall. Once all sustainability indicators were identified, overlaps were eliminated, and we were left with ideas for 15 potentially important indicators to include in a sustainability assessment (see table below). Most of these are related to environmental impacts and resources.

Indicator	Selected for group discussion	yes-votes	no-votes
Climate impact	yes	12	0
Biodiversity	yes	10	0
Emissions of particulates	yes	2	0
Eutrophication	no	0	0
Odour	no	4	1
Human health	no	3	0
Ecosystem functions	no	9	1
Water use	yes	9	0
Resource use	yes	7	0
Resource availability	no	0	0
Corruption	yes, as a joint topic	3	0
Human rights			
Working conditions	yes	10	0
Intra- and intergenerational human well-being	yes	2	3
Regional value creation	no	2	0

The participants selected eight indicators for in-depth group discussions with an aim to agree on why the indicator is important, and on what aspects and facts should be considered and accounted for when including the indicator in a sustainability assessment of bio-based products.

At the end of the workshop, each participant was given 6 yes-votes and 3 no-votes to freely distribute among all ideas for sustainability indicators, and all aspects and facts identified in the group discussions. Most of the yes-votes were cast on the indicators themselves while most of the no-votes were cast on aspects and statements from the group discussions (not included in the table), indicating that some participants did not think all aspects listed by the groups should be included in the sustainability assessment and did not agree with all statements from the group discussions.

The voting results indicate that the workshop participants consider the following indicators particularly important in sustainability assessments of bio-based products: climate impact, biodiversity, working conditions, water use, ecosystem functions, and overall resource use.

Sammanfattning

Denna rapport presenterar en Open Space-workshop som syftade till att identifiera och diskutera indikatorer som är viktiga i en hållbarhetsbedömning av biobaserade produkter. Efter en inledande individuell brainstorming bildade workshopens 19 deltagarna fem små grupper. Var och en av grupperna valde ut 3-5 indikatorer som de ansåg vara viktiga. Dessa indikatorer presenterades för resten av workshopdeltagarna och nålades upp på en vägg. När alla indikatorer presenterats, eliminerade vi de identiska eller kraftigt överlappande förslagen. Då hade vi kvar idéer för 15 potentiellt viktiga indikatorer som ska ingå i en hållbarhetsbedömning (se tabell nedan). De flesta av dessa gäller miljöeffekter och naturresurser.

Indikator	Utvald för gruppdiskussion	ja-röster	nej-röster
Klimatpåverkan	ja	12	0
Biologisk mångfald	ja	10	0
Stoftemissioner	ja	2	0
Övergödning	nej	0	0
Lukt	nej	4	1
Hälsoeffekter för människor	nej	3	0
Ekosystemfunktioner	nej	9	1
Vattenanvändning	ja	9	0
Resursanvändning	ja	7	0
Resurstillgänglighet	nej	0	0
Korruption	ja, som ett gemensamt ämne	3	0
Mänskliga rättigheter			
Arbetsförhållanden	ja	10	0
Mänskligt välbefinnande inom och mellan generationer	ja	2	3
Regionalt värdeskapande	nej	2	0

Deltagarna valde åtta indikatorer för mer djupgående gruppdiskussioner, med syftet att komma överens om varför indikatorn är viktig, och om vilka aspekter och fakta som bör övervägas och tas hänsyn till när den indikatorn inkluderas i en hållbarhetsbedömning av biobaserade produkter.

Vid slutet av seminariet, fick varje deltagare 6 ja-röster och 3 nej-röster att fritt fördela både mellan alla hållbarhetsindikatorer och mellan alla aspekter och fakta som listats under gruppdiskussionerna. De flesta av ja-rösterna gavs till själva indikatorerna, medan de flesta av nej-rösterna gavs till aspekter och uttalanden från gruppdiskussionerna (syns ej i tabellen), vilket betyder att vissa deltagare inte anser att alla aspekter som angavs av grupperna bör ingå i bedömningen av hållbarheten och/eller inte håller med alla uttalanden från gruppdiskussionerna.

Resultaten från omröstningen tyder på att workshopdeltagarna ser följande indikatorer som särskilt viktiga i hållbarhetsbedömningar av biobaserade produkter: klimatpåverkan, biologisk mångfald, arbetsförhållanden, vattenanvändning, ekosystemfunktioner och generell resursanvändning.

1 Formalities

1.1 Venue and time of workshop

IVL Swedish Environmental Research Institute, Göteborg
November 10th 2016, 13.00-1630

1.2 Participants

Name	Organization	E-mail
Karin Halldén (KH)	AkzoNobel	karin.hallden@akzonobel.com
Greg Peters (GP)	Chalmers	petersg@chalmers.se
Magdalena Svanström (MS)	Chalmers	magdalena.svanstrom@chalmers.se
Matty Janssen (MJ)	Chalmers	mathias.janssen@chalmers.se
Akram Sandvall (AS)	Chalmers	akram.sandvall@chalmers.se
Malin Johansson (MJ)	Innventia AB	malin.johansson@innventia.com
Lisa Hallberg (LH)	IVL	lisa.hallberg@ivl.se
Tomas Ekvall (facilitator)	IVL	tomas.ekvall@ivl.se
Albin Pettersson (AP)	IVL	albin.pettersson@ivl.se
Åsa Moberg (ÅM)	IVL	asa.moberg@ivl.se
Michael Martin (MM)	IVL	michael.martin@ivl.se
Mathias Gustavsson (MG)	IVL	mathias.gustavsson@ivl.se
Sofia Poulikidou (SP)	KTH	sofiapo@kth.se
Pernilla Cederstrand (PC)	SCA	pernilla.cederstrand@sca.com
Ellen Riise (ER)	SCA	ellen.riise@sca.com
Serina Ahlgren (SA)	SLU	serina.ahlgren@slu.se
Frida Røyne (FR)	SP	frida.royne@sp.se
Lisa Bolin (LB)	SP	lisa.bolin@sp.se
Anna Ekman Nilsson (AEN)	SP	anna.ekman@sp.se
Anna Runa Kristinsdottir (ARK)	SWEREA	anna.runa.kristinsdottir@swerea.se

1.3 Workshop aim and format

The explicitly stated aim of the workshop was to identify and discuss indicators that are important in a sustainability assessment of bio-based products.

Open Space is a self-organising technique aiming to generate creativity and informal discussion on a common theme (Owen 2008). Open Space workshops begin without a fixed agenda beyond this overall theme; specifying the agenda is instead one of the tasks assigned to the workshop participants. We have found such workshops useful for identifying important indicators and research questions at the beginning of LCSAs (Ekvall 2016).

Invitations to this workshop were distributed mainly to researchers and industry in Sweden. The 19 participants who actually attended the workshop were almost all researchers in academia, institutes and industry, with a background in LCA or energy systems analysis.

1.4 Agenda

The agenda of the meeting included the following points:

1. Generating ideas for important sustainability indicators
   a) Individual brainstorming
   b) Sifting in small groups
   c) Presentation in plenum
2. Generating a schedule for group discussions
3. Group discussions on important indicators, Round A
4. Group discussions, Round B (with coffee)
5. Presentation in plenum
6. Voting on sustainability indicators
7. Discussion in plenum

2 Ideas for important sustainability indicators

After an initial individual brainstorming, five small groups each selected 3-5 sustainability indicators that they considered important for assessments of bio-based products in general. The ideas were presented for the rest of the workshop participants and posted on a wall. When the overlaps had been eliminated, we had the following ideas on the wall:

- Climate impact*
- Biodiversity*
- Emissions of particulates*
- Eutrophication
- Odour
- Human health
- Ecosystem functions
- Water use*
- Resource use*
- Resource availability
- Corruption*
- Human rights*
- Working conditions*
- Intra-generational human well-being*
- Regional value creation

The nine indicators with an asterisk were selected for group discussions, but human rights and working conditions were combined into a single discussion topic. The indicators left out of group

discussions were still considered when the most important indicators were selected at the end of the workshop (see below).

3 Group discussions and final voting

3.1 Procedure and detailed results

The workshop included two rounds of group discussions. Each round had four parallel group discussions, where each group discussed one indicator. For each indicator the groups were asked to discuss the following questions:

1.) Why is the indicator important?
2.) What aspects and facts should be considered and accounted for when including the indicator in a sustainability assessment of bio-based products?

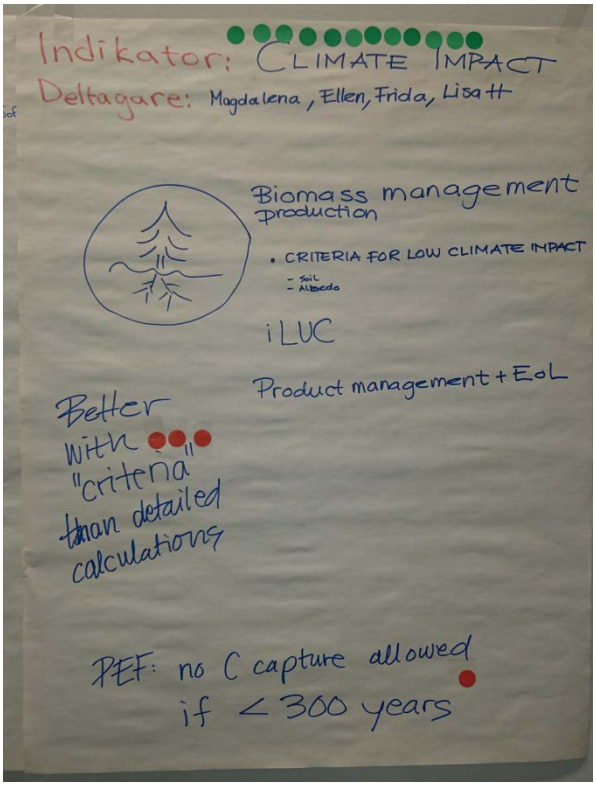
The outcome of the discussions were summarized on flipchart sheets, presented for the rest of the workshop participants and posted on a wall to facilitate voting.

Each participant was given a maximum of 6 votes in the form of green dots to freely distribute among the indicators and aspects to show that they consider the indicator or aspect important. Each participant was also given a maximum of 3 red dots to use if they wanted to show an indicator or aspect should preferably not be included in the sustainability assessment. All votes were not used in the voting process.

The results of the group discussions and voting are presented here:

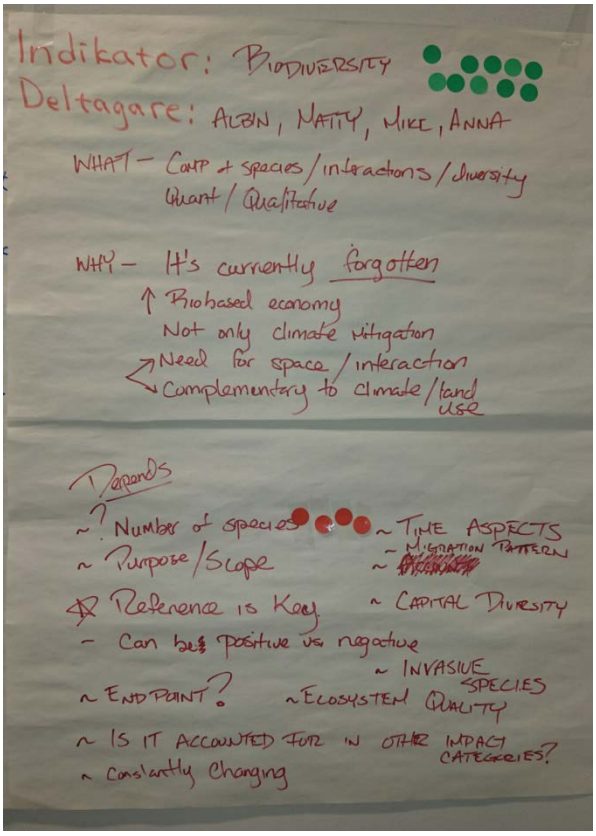
Climate impacts (12 green dots)
Participants: MS, ER, FR, LH

- Biomass management production
- Criteria for low climate impact: soil, albedo
- Indirect land-use change (iLUC)
- Product management + End of life
- Better with "criteria" than detailed calculations (3 red dots)
- Product Environmental Footprints (PEF): no carbon capture accounted for if <300 years (1 red dot)



Biodiversity (10 green dots)

Participants: AP, MJ, MM, ARK

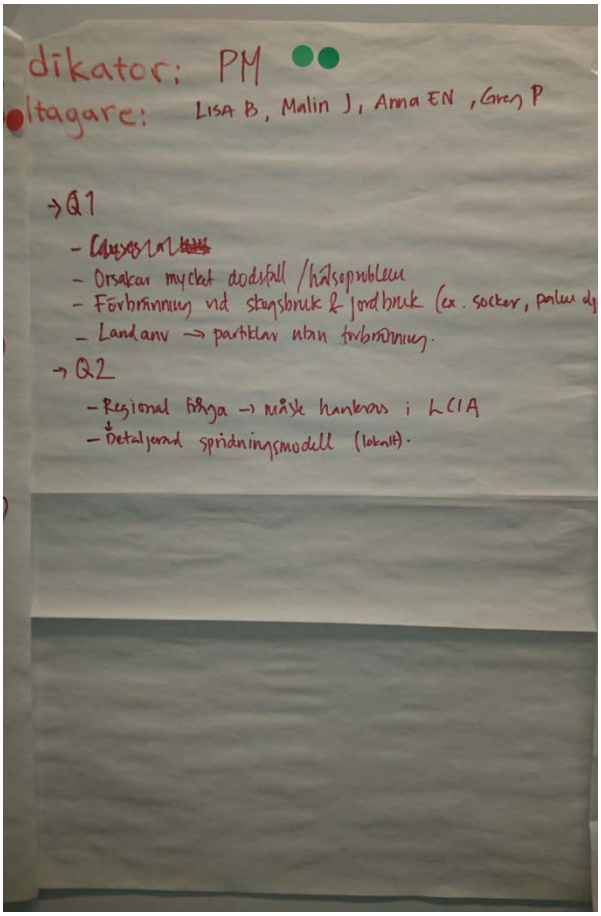


1. Why important?
- It's currently forgotten
- Biobased economy
- Not only climate mitigation
- Need for space and interaction
- Complementary to climate and land use

2. What to account for?
- Composition of species, interactions and diversity
- Quantitative and qualitative
- Depends
  - Number of species (4 red dots)
  - Purpose and scope
  - Time aspects
  - Migration patterns
  - Capital diversity
  - Invasive species
  - End point?
  - Ecosystem quality
  - Is it accounted for in other impact categories?
  - Constantly changing
- Reference is key
  - Can be both positive and negative

Particulates (2 green dots)

Participants: LB, MJ, AEN, GP



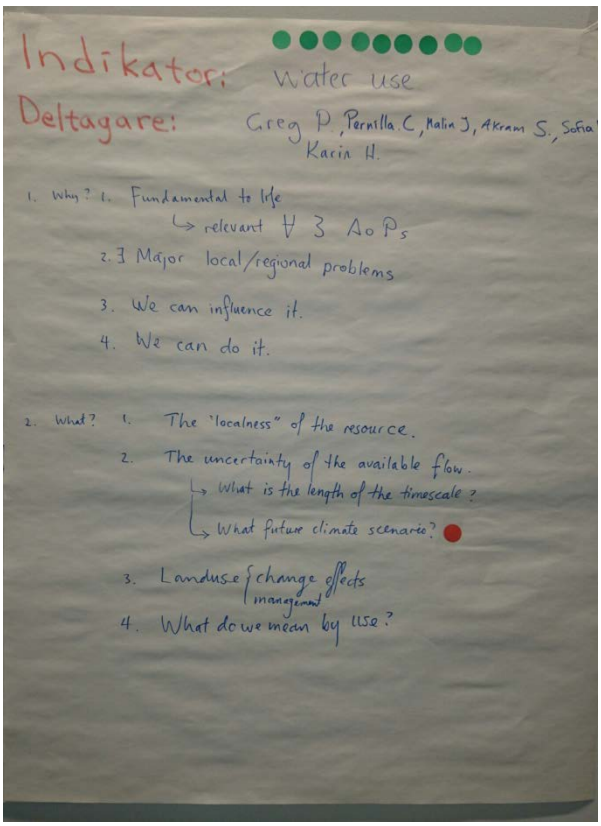
1. Why important?
- The cause of much health problems and premature death
- Cause by combustion in forestry and agriculture (examples: sugar, palm oil)
- Land use cause particulate emissions without combustion

2. What to account for
- Regional issue – to be dealt with in the impact assessment
- A detailed dispersion model (locally)

Water use (9 green dots)
Participants: GP, PC, MJ, AS, SP, KH

1. Why important?
- Fundamental to life; relevant to all 3 AoPs
- Major local/regional problem
- We can influence it
- We can do it

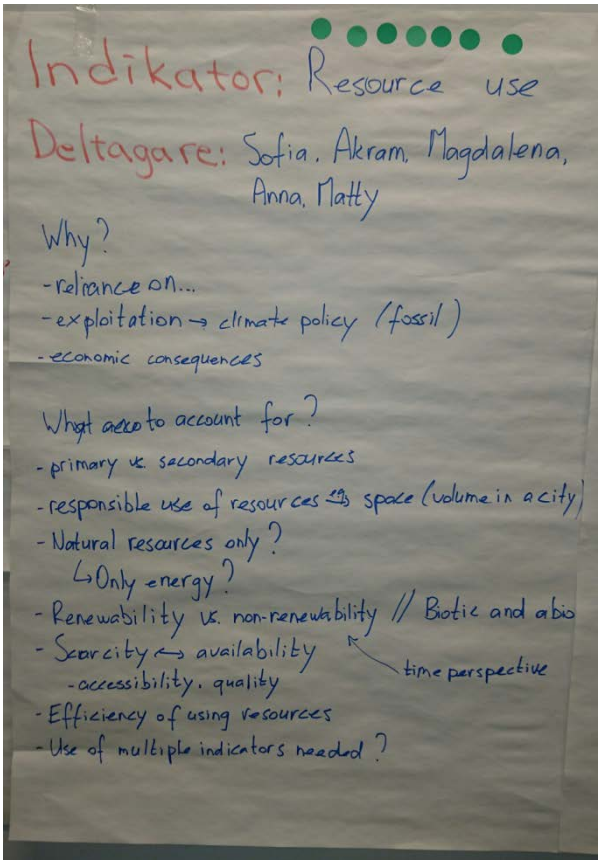
2. What to account for?
- The "localness" of the resource
- The uncertainty of the available flow
  - What is the length of the timescale?
  - What future climate scenario? (1 red dot)
- Land use change effects and management
- What do we mean by use?



Resource use (7 green dots)
Participants: SP, AS, MS, ARK, MJ

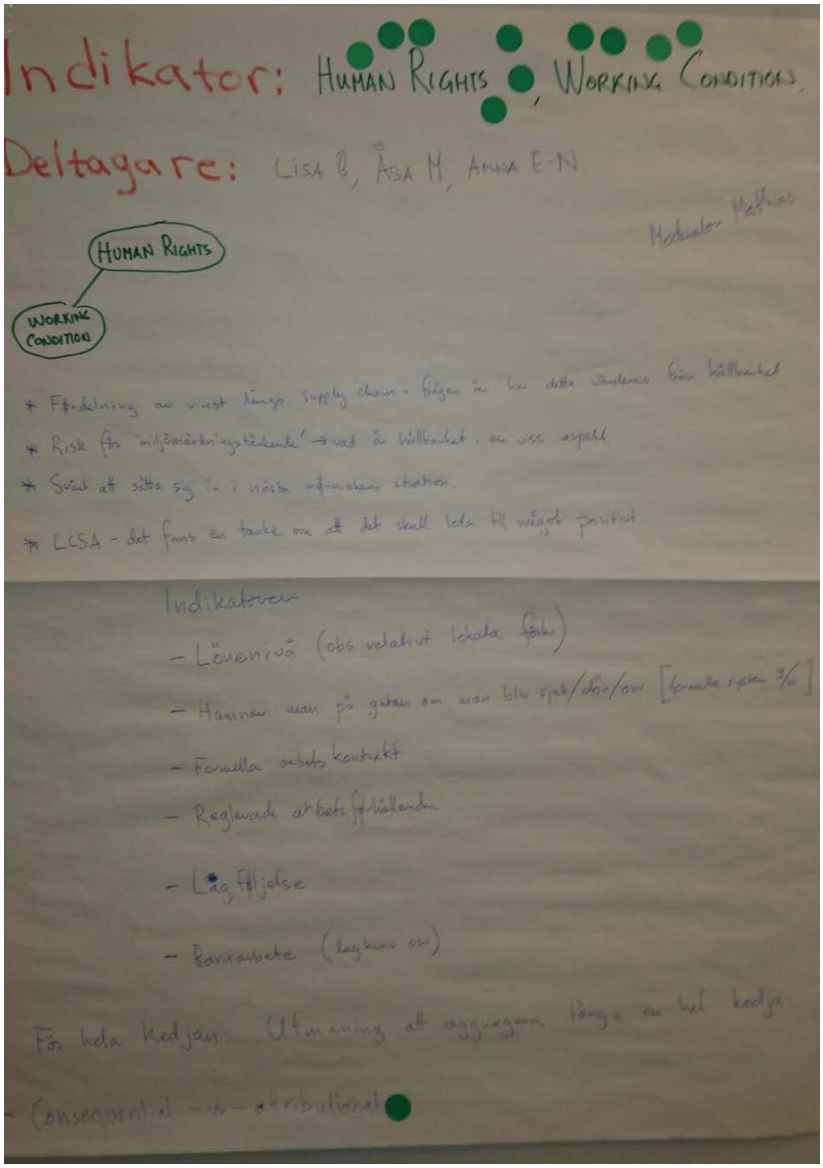
1. Why important?
- Reliance on...
- Exploitation => climate policy (fossil)
- Economic consequences

2. What to account for?
- Primary vs. secondary resources
- Responsible use of resources, for example space (volume in a city)
- Natural resources only? Only energy?
- Renewability vs. non-renewability (accounting for time perspective)
- Biotic and abiotic
- Scarcity <=> availability (including accessibility and quality)
- Efficiency of resource use
- Multiple indicators needed?



Human rights and working conditions (10 green dots)

Participants: MG, LB, ÅM, AEN



1. Why important?
- There is a connection between human rights and working conditions
- Distribution of profit along the supply chain – how to account for this in a sustainability assessment?
- There is a risk for thinking similar to environmental labelling: what does sustainability mean for a specific indicator
- LCSA aims to lead to something positive

2. What to account for?
- Level of salaries compared to local conditions
- The existence (yes/no) of social safety systems for employees in the case of illness, functional disability, etc.
- Formal contracts for employees
- Regulated working conditions
- Abiding by the law
- Child labour (legal regulations, etc.)
- A challenge to aggregate these aspects over the life cycle
- Consequential vs. attributional approach (1 green dot)

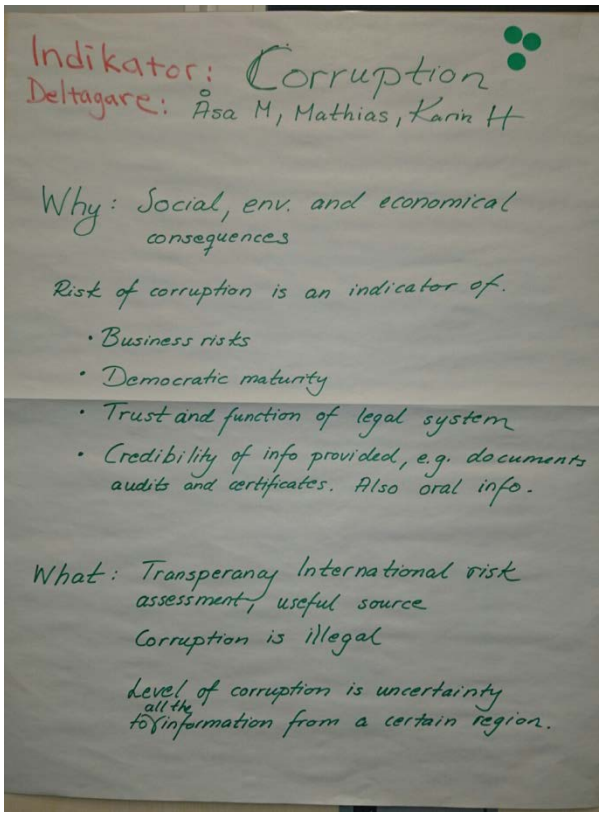
Corruption (3 green dots)
Participants: MG, ÅM, MG, KH

1. Why important?

- Social, environmental and economic consequences
- Risk of corruption is an indicator of
- Business risks
- Democratic maturity
- Trust and function of legal system
- Credibility of information provided to the assessment, for example documents, audits, certificates and oral information.

2. What to account for?

- Transparency International risk assessment is a useful source
- Corruption is illegal
- Level of corruption is uncertainty for all the information from a specific region.



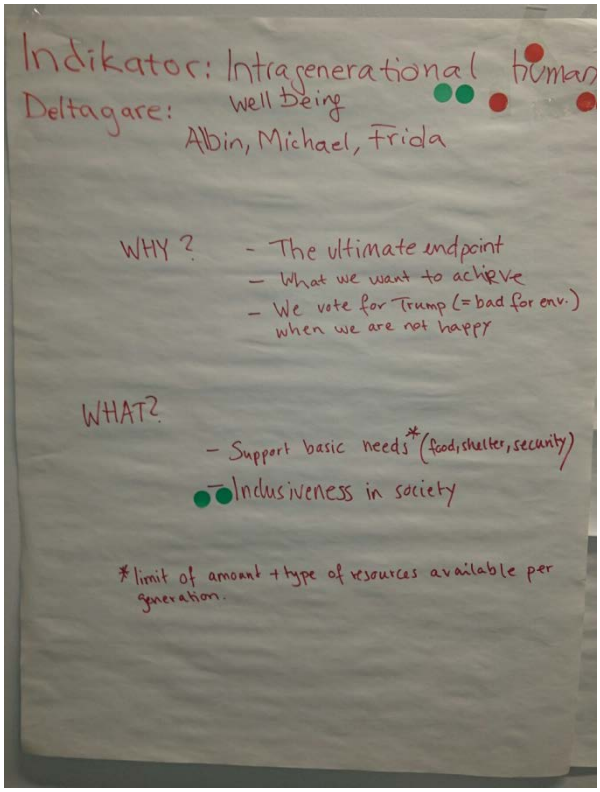
Intra- and intergenerational human well-being (2 green dots; 3 red dots)
Participants: AP, MM, FR

1. Why important?

- This is the ultimate endpoint
- What we want to achieve
- When we are not happy, we vote for Trump => bad for the environment

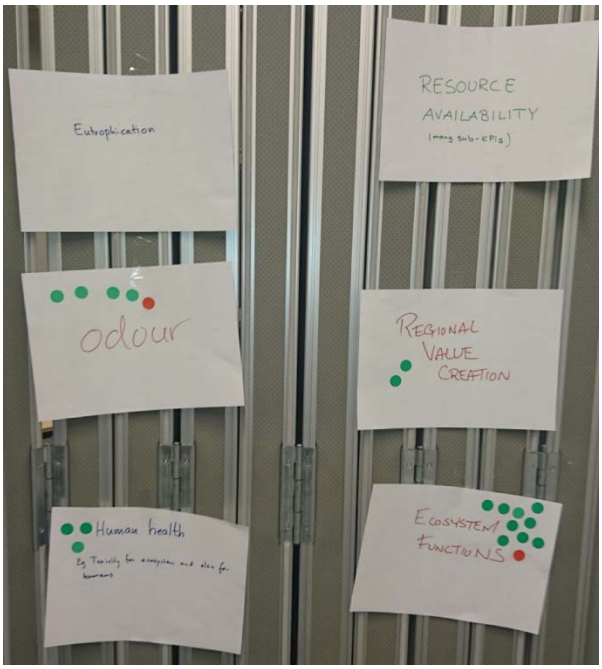
2. What to account for?

- Support of basic needs (food, shelter and security), accounting for the limited amount and type of resources available per generation
- Inclusiveness in society (2 green dots)



Some of the indicators that were not topics of group discussions still got several votes:

- Eutrophication (no votes)
- Odour (4 green dots; 1 red dot)
- Human health (3 green dots)
- Ecosystem functions (9 green dots; 1 red dot)
- Resource availability (no votes)
- Regional value creation (2 green dots)



3.2 Summary of results

The workshop participants identified a total of 15 indicators that are potentially important. Of these, 10 were environmental indicators, 4 were social indicators, and a single indicator concerned the regional economic impact. The indicators chosen as topics for group discussions included 5 environmental indicators, 4 social indicators aggregated into 3 discussions, but no economic indicator.

The results of the voting procedure at the end of the workshop indicate the following list of top-priority indicators in sustainability assessments of bio-based products:

- Climate impacts (12 green dots)
- Biodiversity (10 green dots)
- Human rights and working conditions (10 green dots)
- Water use (9 green dots)
- Ecosystem functions (9 green dots; 1 red dot)
- Resource use (7 green dots)

Most of the indicators that received many votes are environmental indicators. Social aspects are also represented through the indicator ”Human rights and working conditions”. The list of top-priority indicators does not however include economic indicators. The only economic indicator identified as potentially important, received only two votes in the end.

Most votes were cast on the heading of the group discussion, i.e., on the indicator itself. However, a few votes were spent to state an opinion on details in the results from the group discussions. One or two participants voted to say that inclusion in society is also an important social aspect. One participant gave a vote to the distinction between attributional and consequential studies of social aspects.

Four negative votes (red dots) were spent to state that the number of species is not a good indicator for biodiversity. Three negative votes indicate that participants did not agree with the statement that detailed calculations are not important in the assessment of climate impacts.

4 Discussion

The results of the workshop represent the views of the individuals participating in the workshop. To be more precise, they represent the views the participants held that day. Environmental issues dominated both the ideas for indicators, the group discussions and, particularly, the outcome of the voting and the resulting list of top-priority indicators. This might be because most or all of the participants are environmental experts at universities, institutes and companies.

An earlier Open Space-workshop generated mainly economic indicators. That workshop was held to identify important indicators and research questions for a sustainability assessment of a pipeline for residual heat from and industrial cluster in Stenungsund to the district heating systems in Kungälv and Göteborg. The participants in the workshop included several environmental researchers, but also decision-makers in industry and district-heating companies. This might have influenced the results of the workshop. The fact that a 100M EUR investment in the pipeline was at stake might also have contributed to giving economic aspects a high priority.

Contrasting the two workshops strengthens the view that the workshop results depend heavily on the composition of the participants. It might also depend heavily on whether the case at hand is a real large-scale decision, or more of an academic exercise.

Hence, when interpreting the results from our workshop the reader should take into account the fact that the participants of the workshop were mainly environmental experts. They should also consider the fact that the workshop was carried through to generate a basis for future research on bio-based products in general, and not as part of an assessment of a specific decision.

5 Future work

The results from this Open Space workshop will be used as input to a research project on sustainability assessments of bio-based products. This project is conducted by IVL Swedish Environmental Research Institute and SP Technical Research Institute of Sweden. It aims to investigate to what extent life cycle studies on bio-based products account for sustainability indicators. We have investigated what indicators are actually included in published life cycle studies and will use the results from this workshop as part of the basis when discussing what sustainability indicators should be included.

The workshop and its results can also be used by any participant or reader as inspiration for future research in this area.

6 References

Ekvall T, Ljungkvist H, Ahlgren EO, Sandvall AF. (2016) Participatory life cycle sustainability analysis. Report B2268. IVL Swedish Environmental Research Institute, Stockholm, Sweden.

Owen H. (2008) *Open Space Technology: A User's Guide – Third Edition*. Berrett-Koehler Publishers, San Fransisco, USA.

IVL Swedish Environmental Research Institute Ltd.
P.O. Box 210 60 // S-100 31 Stockholm // Sweden
Phone +46-(0)10-7886500 // www.ivl.se