

# GreenDelta<sup>TC</sup>

## Social and environmental LCA of an ecolabeled notebook

**Juliane Franze, Andreas Ciroth, GreenDeltaTC**  
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Background

# Relevance of (Portable) Computers

- Increasing importance of computers, especially portable ones
- Production mainly in Asia; often under poor working conditions
- PCs ...
  - ... are resource-intensive
  - ... contain many different (harmful) substances as heavy metals or flame retardants
  - ... consume energy
  - ... have a rather short life span
  - ... cause numerous social and environmental effects in their LC

# Goal & Scope

# Goal

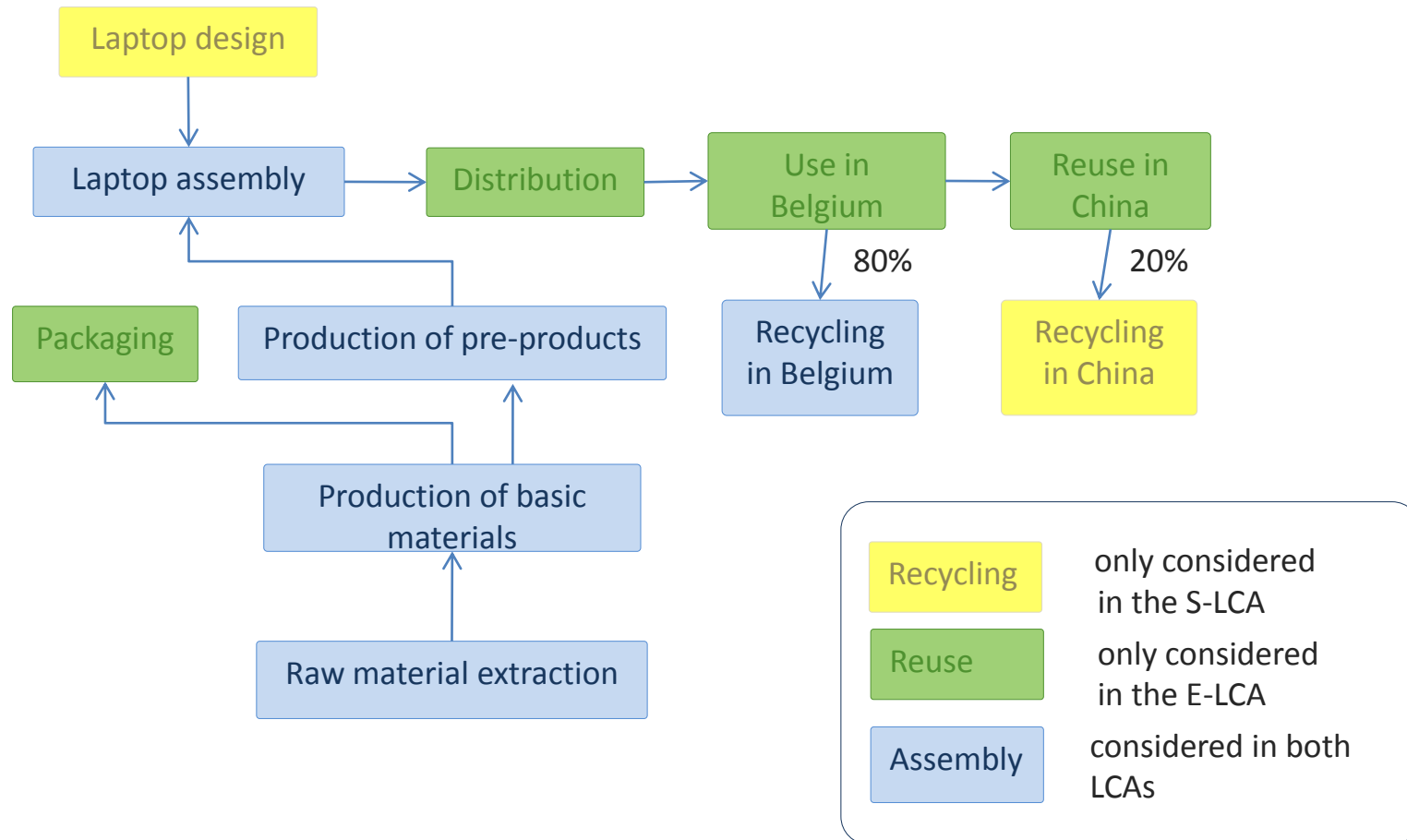
- Application of the UNEP/SETAC guidelines for social LCA on a complex product
- Identification of social **and** environmental hot spots in the entire life cycle in order to improve the sustainable performance
- Derivation of recommendations on policy and company level

# Scope: Functional unit



- Notebook certified acc. to the EU Ecolabel for office use
- 15.6" display with LED backlights
- 8 cell lithium-ion battery
- Intel<sup>®</sup> Core<sup>™</sup> 2 Duo processor with 2\*1.3 GHz, 4096 MB RAM, and 500 GB hard drive space
- 3 USB ports
- ODD
- 5 in 1 card reader
- 2.3 kg weight

# Scope: System boundary



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Method



# S-LCA Approach

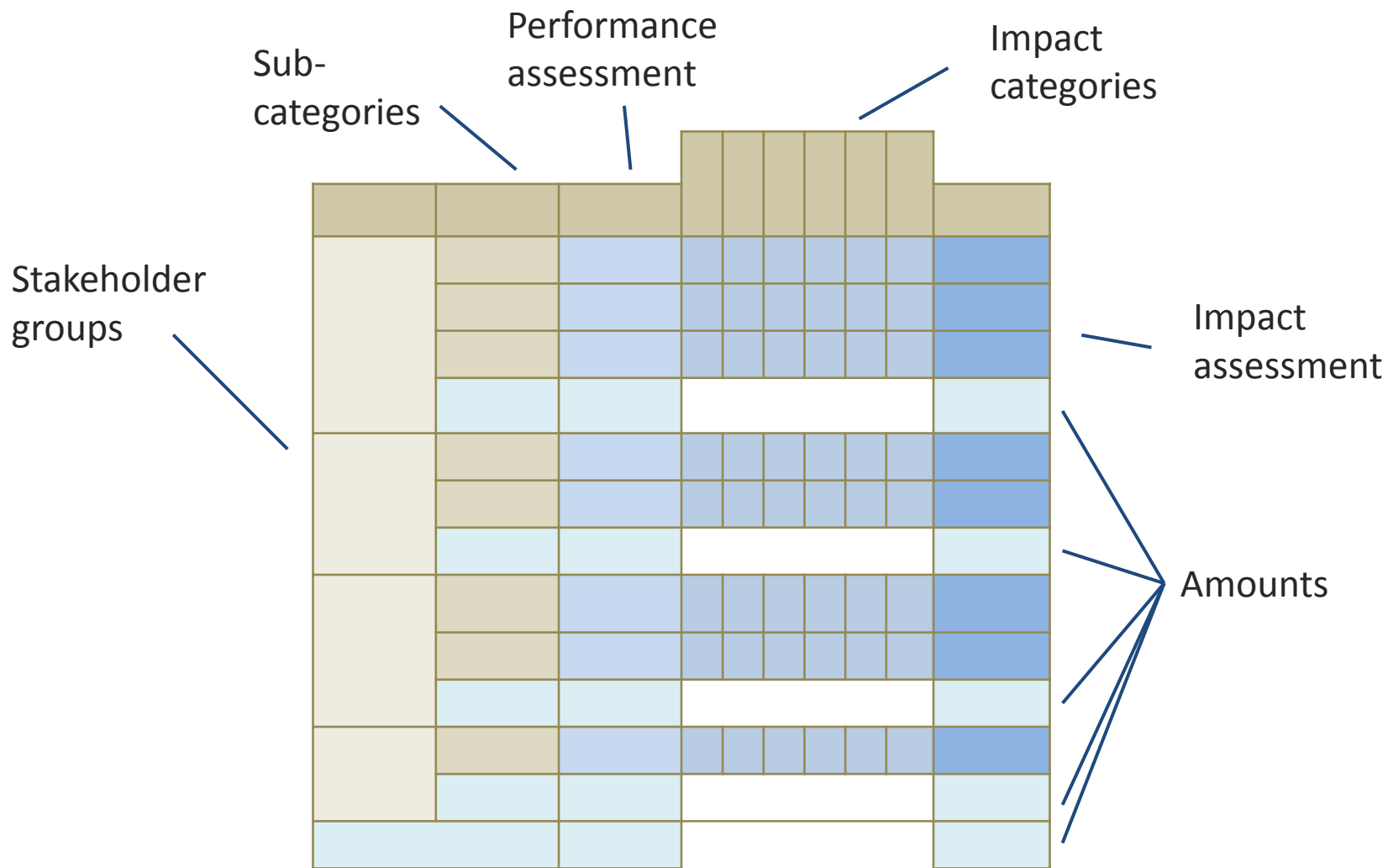
- UNEP/SETAC guidelines as basis
- Determination of stakeholders, subcategories, and indicators
- Data sources for generic data:
  - governmental and non-governmental organisations
  - Internet research and literature review
- Data sources for company-specific data:
  - Corporate reports and websites
  - Reports from NGOs
  - Questionnaires
  - Interviews with workers
  - Internet research
- Application of own S-LCIAM

# S-LCIAM: The Rating Scale

Performance assessment	Impact assessment	Colour	Factor
Very good performance	Positive effect	Dark Green	1
Good performance	Lightly positive effect	Light Green	2
Satisfactory performance	Indifferent effect	Very Light Green	3
Inadequate performance	Lightly negative effect	Yellow	4
Poor performance	Negative effect	Orange	5
Very poor performance	Very negative effect	Red	6

→ social  
→ hot spot!

# S-LCIAM: The Assessment Table



# S-LCIAM: Example

Stakeholder group	Subcategory	Performance assessment	Working conditions	Health and safety	Human rights	Socio-ec. repercussions	Indigenous rights	Governance	Impact assessment
Workers	Freedom of association and collective bargaining	2	✓	✓	✓	✓	(✓)	(✓)	1
	Child labour	1	✓	✓	✓	✓	✓	✓	1
	Discrimination	5	✓	✓	✓	✓	✓	✓	6
	<b>Amount</b>	<b>4.00</b>							<b>5.00</b>

# E-LCA Approach

- Own disassembly as starting point
- Data sources:
  - ecoinvent database as basis
  - case-specific adaptations based on product specifications and regional conditions (electricity mix, transport system, etc.)
  - Electricity consumption of the laptop in the different modes were obtained from the manufacturer or measured
- Application of ReCiPe as LCIAM

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Results

# Interpretation of the S-LCA

- Presence of social hot spots in the raw material extraction, production, and recycling phase, especially informal sectors have negative social impacts
- Workers are worst affected regarding investigated categories; end consumers and value chain actors are not affected by social hot spots
- The presence of codes of conduct could not avoid worker right violations
- Coherence between development status of a country and occurrence of social hot spots in specific sectors

# Example: Production of the RAM by Hynix

- Presence of a trade union at Hynix and a regional union, but there are restrictions
- Fair salary
- Moderate working time
- No case of discrimination, share of women is 49.6%
- Environmental pollution, but presence of an EMS
- Lacking community engagement
- Hynix is a member of a cartel

Stakeholder	Subcategory	PA	WC	HS	HR	SER	IR	G	IA
Workers	Freedom of association & collective bargaining	4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	5
	Child labour	1	✓	✓	✓	✓	✓	✓	1
	Forced labour	1	✓	✓	✓	✓	✓	✓	1
	Fair salary	1	✓	✓	✓	✓	✓	✓	1
	Working time	1	✓	✓	✓	✓	✓	✓	1
	Discrimination	2	✓	(✓)	✓	✓	(✓)	(✓)	1
	Health & safety	2	✓	✓	✓	✓	(✓)	✓	4
	Social benefits/social sec.	2	✓	✓	✓	✓	✓	✓	1
	<b>Amount</b>	3.00							4.00
	Local community	Access to material res.	4	(✓)	✓	✓	(✓)	(✓)	✓
Access to immaterial res.		4	✓	(✓)	(✓)	(✓)	(✓)	(✓)	3
Delocalisation & migration		2	-	(✓)	✓	(✓)	✓	(✓)	2
Cultural heritage		deficient data							
Respect of indigenous rights		not relevant							
Safe & healthy living cond.		3	✓	✓	✓	(✓)	-	✓	5
Secure living conditions		2	✓	✓	✓	(✓)	-	✓	2
Local employment		1	✓	(✓)	-	✓	✓	✓	1
Community engagement		4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	2
<b>Amount</b>		3.00							4.00
Society	Public commitments to sustainable issues	3	✓	✓	✓	-	(✓)	✓	2
	Contribution to economic development	1	✓	✓	✓	✓	✓	✓	1
	Prevention & mitigation of conflicts	not relevant							
	Technology development	3	✓	✓	(✓)	-	-	✓	2
	Corruption	2	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	2
	<b>Amount</b>	2.25							1.75
Value chain actors	Fair competition	5	(✓)	(✓)	(✓)	-	-	✓	4
	Promoting social respons.	3	✓	✓	✓	(✓)	(✓)	✓	2
	Supplier relationships	deficient data							
	Respect of intellectual property rights	5	-	-	(✓)	-	-	(✓)	4
	<b>Amount</b>	4.33							3.33
<b>Total amount</b>		3.15							3.27



# Example: Production of the ODD by SEPHIL

- No unions
- Low wages and long working hours
- Discrimination
- Weak CSR engagement
- Samsung is a member of a cartel
- Corruption and bribery
- Patent infringements

Stakeholder	Subcategory	PA	WC	HS	HR	SER	IR	G	IA
Workers	Freedom of association & collective bargaining	6	✓	✓	✓	✓	✓	✓	6
	Child labour	1	✓	✓	✓	✓	✓	✓	1
	Forced labour	1	✓	✓	✓	✓	✓	✓	1
	Fair salary	5	✓	✓	✓	✓	✓	✓	6
	Working time	6	✓	✓	✓	✓	✓	✓	6
	Discrimination	5	✓	✓	✓	✓	✓	✓	6
	Health & safety	4	✓	✓	✓	✓	(✓)	✓	5
	Social benefits/social sec.	no data							
	<b>Amount</b>	5.00							5.00
Local community	Access to material res.	4	(✓)	✓	✓	(✓)	(✓)	✓	5
	Access to immaterial res.	6	✓	✓	✓	✓	✓	✓	5
	Delocalisation & migration	2	-	(✓)	✓	(✓)	✓	(✓)	2
	Cultural heritage	deficient data							
	Respect of indigenous rights	deficient data							
	Safe & healthy living cond.	4	✓	✓	✓	(✓)	-	✓	5
	Secure living conditions	deficient data							
	Local employment	4	(✓)	(✓)	-	(✓)	(✓)	(✓)	4
	Community engagement	4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	4
<b>Amount</b>	5.00							4.16	
Society	Public commitments to sustainable issues	5	✓	✓	✓	-	(✓)	✓	3
	Contribution to economic development	3	✓	✓	✓	✓	✓	✓	2
	Prevention & mitigation of conflicts	not relevant							
	Technology development	3	✓	✓	(✓)	-	-	✓	2
	Corruption	6	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	5
	<b>Amount</b>	5.00							4.00
Value chain actors	Fair competition	5	(✓)	(✓)	(✓)	-	-	✓	4
	Promoting social respons.	4	(✓)	(✓)	(✓)	(✓)	(✓)	✓	2
	Supplier relationships	no data							
	Respect of intellectual property rights	3	-	-	(✓)	-	-	(✓)	3
<b>Amount</b>	4.00							3.00	
<b>Total amount</b>		4.75							4.04

# Example: Hynix vs. SEPHIL

Stakeholder	Subcategory	PA	WC	HS	HR	SER	IR	G	IA
Workers	Freedom of association & collective bargaining	4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	5
	Child labour	1	✓	✓	✓	✓	✓	✓	1
	Forced labour	1	✓	✓	✓	✓	✓	✓	1
	Fair salary	1	✓	✓	✓	✓	✓	✓	1
	Working time	1	✓	✓	✓	✓	✓	✓	1
	Discrimination	2	✓	(✓)	✓	✓	(✓)	(✓)	1
	Health & safety	2	✓	✓	✓	✓	(✓)	✓	4
	Social benefits/social sec.	2	✓	✓	✓	✓	✓	✓	1
	<b>Amount</b>	3.00							4.00
	Local community	Access to material res.	4	(✓)	✓	✓	(✓)	(✓)	✓
Access to immaterial res.		4	✓	(✓)	(✓)	(✓)	(✓)	(✓)	3
Delocalisation & migration		2	-	(✓)	✓	(✓)	✓	(✓)	2
Cultural heritage		deficient data							
Respect of indigenous rights		not relevant							
Safe & healthy living cond.		3	✓	✓	✓	(✓)	-	✓	5
Secure living conditions		2	✓	✓	✓	(✓)	-	✓	2
Local employment		1	✓	(✓)	-	✓	✓	✓	1
Community engagement	4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	2	
<b>Amount</b>	3.00							4.00	
Society	Public commitments to sustainable issues	3	✓	✓	✓	-	(✓)	✓	2
	Contribution to economic development	1	✓	✓	✓	✓	✓	✓	1
	Prevention & mitigation of conflicts	not relevant							
	Technology development	3	✓	✓	(✓)	-	-	✓	2
	Corruption	2	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	2
	<b>Amount</b>	2.25							1.75
Value chain actors	Fair competition	5	(✓)	(✓)	(✓)	-	-	✓	4
	Promoting social respons.	3	✓	✓	✓	(✓)	(✓)	✓	2
	Supplier relationships	deficient data							
	Respect of intellectual property rights	5	-	-	(✓)	-	-	(✓)	4
	<b>Amount</b>	4.33							3.33
<b>Total amount</b>		3.15							3.27

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	Forced labour	1	✓	✓	✓	✓	✓	✓	1
	Fair salary	5	✓	✓	✓	✓	✓	✓	6
	Working time	6	✓	✓	✓	✓	✓	✓	6
	Discrimination	5	✓	✓	✓	✓	✓	✓	6
	Health & safety	4	✓	✓	✓	✓	(✓)	✓	5
	Social benefits/social sec.	no data							
	<b>Amount</b>	5.00							5.00
	Local community	Access to material res.	4	(✓)	✓	✓	(✓)	(✓)	✓
Access to immaterial res.		6	✓	✓	✓	✓	✓	✓	5
Delocalisation & migration		2	-	(✓)	✓	(✓)	✓	(✓)	2
Cultural heritage		deficient data							
Respect of indigenous rights		deficient data							
Safe & healthy living cond.		4	✓	✓	✓	(✓)	-	✓	5
Secure living conditions		deficient data							
Local employment		4	(✓)	(✓)	-	(✓)	(✓)	(✓)	4
Community engagement	4	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	4	
<b>Amount</b>	5.00							4.16	
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	Prevention & mitigation of conflicts	not relevant							
	Technology development	3	✓	✓	(✓)	-	-	✓	2
	Corruption	6	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	5
	<b>Amount</b>	5.00							4.00
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	Promoting social respons.	4	(✓)	(✓)	(✓)	(✓)	(✓)	✓	2
	Supplier relationships	no data							
	Respect of intellectual property rights	3	-	-	(✓)	-	-	(✓)	3
<b>Amount</b>	4.00							3.00	
<b>Total amount</b>		4.75							4.04

# Interpretation of the E-LCA

- Environmental profile of the laptop is strongly dominated by the production phase
- Transport and use have also noticeable contribution
- Low contribution of packaging and disposal
- Main impacts originate from mining activities, the production of energy carriers, and processes linked to transport

# Comparison of both LCAs

- Results of the E-LCA and the S-LCA are partly congruent:
  - Mining activities cause both negative social and environmental impacts
  - Also the production phase shows social and environmental hot spots
- But: Negative environmental effects do not automatically entail social hot spots and the other way round!
- S-LCAs and E-LCAs consider different aspects  
=> not all social impacts are related to environmental impacts

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## Conclusions

# General Conclusions

- It is **possible** to consider social and environmental impacts of a (complex) product in a life cycle perspective
- It is **important** to consider both dimensions in order to get an entire picture of the sustainable performance of a product

# Conclusions Concerning the Application of S-LCA

- The guidelines developed by the UNEP/SETAC are applicable
- Further research is needed
- Several challenges regarding
  - data availability
  - consideration of the use phase
  - social life cycle impact assessment
  - use of subcategories and indicators
  - use of software, etc.

# Thank you for your attention!

Juliane Franze, GreenDeltaTC GmbH  
franze@greendeltatc.com

The final report of the project is available  
on our website: [www.greendeltatc.com](http://www.greendeltatc.com)



# Conclusions Concerning the EU Ecolabel

- Effects of the EU ecolabel on the environmental performance of the notebook are only middling:
  - The production phase is out of scope
  - Harmless substances with severe environmental impacts in their extraction or production phase are not addressed
  - Active mode is not considered
  - Lacking verification – declaration of compliance is sufficient
- EPDs would probably accomplish more