LCI Data for Electronics

First Comprehensive Public Inventory Data for ICT Sector & its influence on existing studies / existing conclusions

Swiss Centre For Life Cycle Inventories

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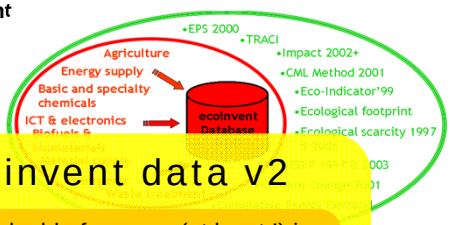
ecoinvent database v2.0

www.ecoinvent.org

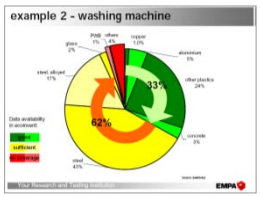
- More than **4000 generic** LCI **process datasets**
- **Included** in the leading LCA software and eco-design tools
- **Online access** to LCI and LCIA results for all datasets
- Based on **industry data**, compiled by **independent experts**
- Consistent, validated and **transparent**
- Continuously maintained
- **International** in scope, including e.g. data of US agriculture, global sourcing of raw materials,

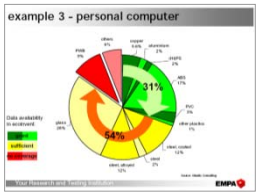


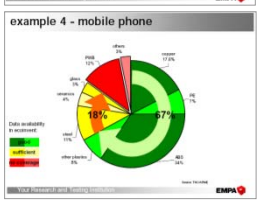
Electronics @ ecoinvent data v2

To establish **average datasets** – valuable for a use (at least !) in Switzerland & Western Europe – covering **production, use & disposal of electronics devices & its components** (including subsequent datasets for relevant basic materials etc.).

Introduction







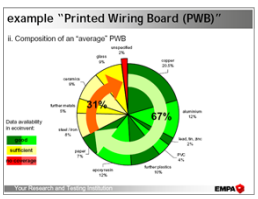
ecoinvent data v1 can **cover** already a **major part of the materials** used by the EEE industry

there is still a **part of raw materials** with a relevant environmental influence **missing**:

- **Metals**: alloyed steels, precious metals, ...
- **Chemicals**: ICT specific chemicals, high purity grade chemicals, ...

specific processes for production of **electronic components & modules** are **missing** (e.g. printed wiring board, capacitors, ...)

Source(s): **Hischier (2004), Electronics Goes Green Conference Proceedings**



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Electronics @ ecoinvent data v2

(i) Modular structure of dataset … e.g. Printed Wiring Board

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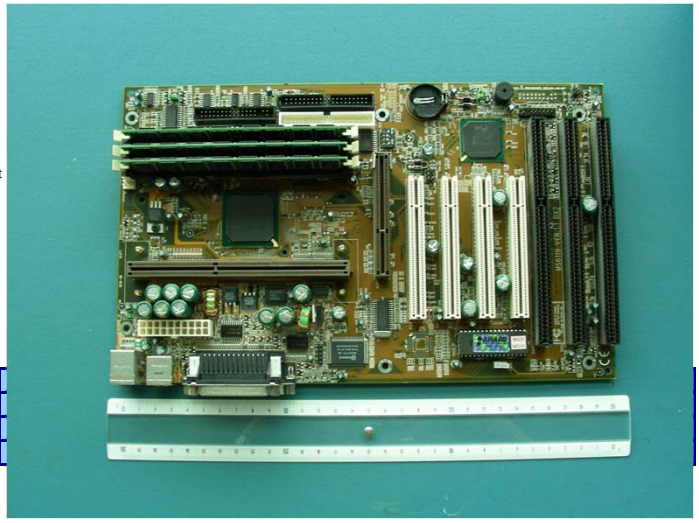
Legend:

Type-dependent

Type-independent



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(ii) Modular structure of sector “electronics” (e.g. Desktop PC)

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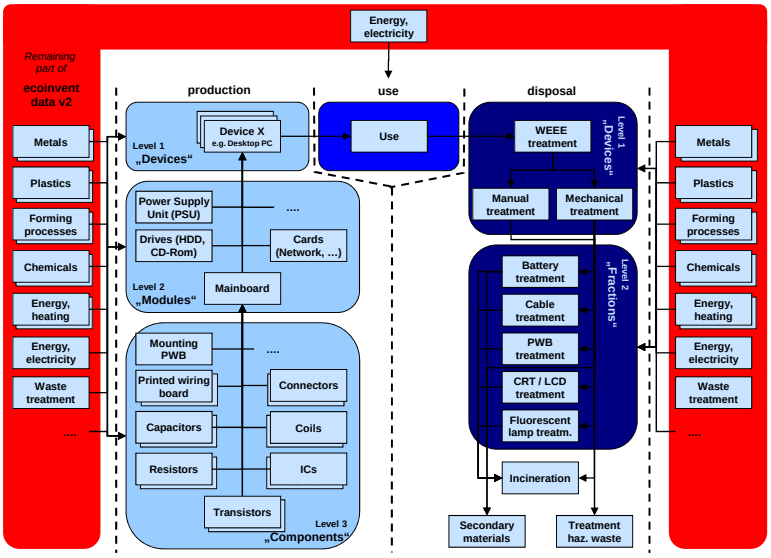

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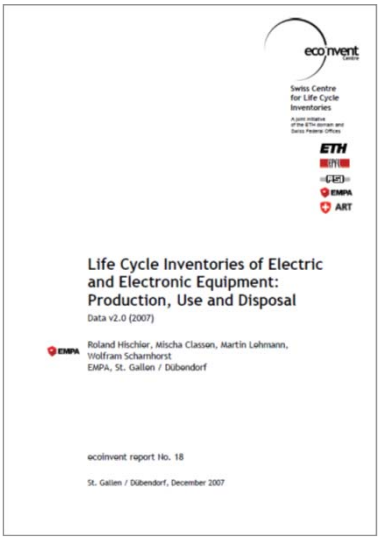
(iii) Transparently documented



- Accessible ONLINE
- Requirements for access:

  a Guest account (free of Charge !) @ ecoinvent

  -> www.ecoinvent.org

  -> Database

  -> Registration

  -> Registration as **Guest**

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Case studies

(i) influence(s) on a single dataset …

Case Study No.1
dataset „electronics for control units“

(ii) influence(s) on study results …

Case Study No.2
Plasma Television Device

Case Study No.3
Internet vs Television vs Newspaper

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Case Study No.1

(i) Level of Printed Wiring Board

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→ three modelling options for printed wiring board …

- „old PWB“:
  keep material composition (from ecoinvent v1.3)
- „customized PWB“:
  establish specific dataset for the PWB of device (with electronics data of ecoinvent v2)
- „PWB, mixed mounted“:
  use mixed mounted PWB dataset of ecoinvent v2

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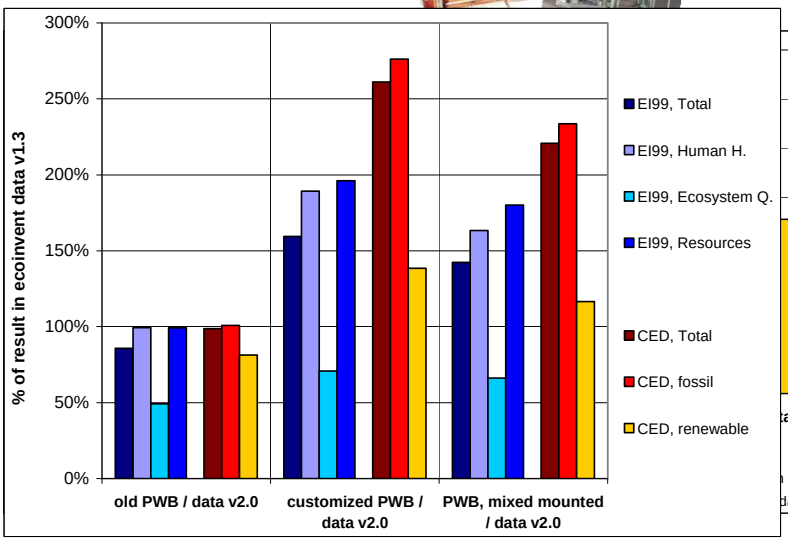
Case Study No.1

(i) Level of Printed Wiring Board



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Case Study No.1

(ii) Level of complete Device

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→ two options for the complete dataset (i.e. the dataset „electronics for control units“):

- „old control unit“:
  keep material composition (from ecoinvent v1.3) & „re-calculated“ in context of ecoinvent v2;
- „new control unit“:
  use a specific PWB dataset for the amount of PWB

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Case Study No.1

(ii) Level of complete Device

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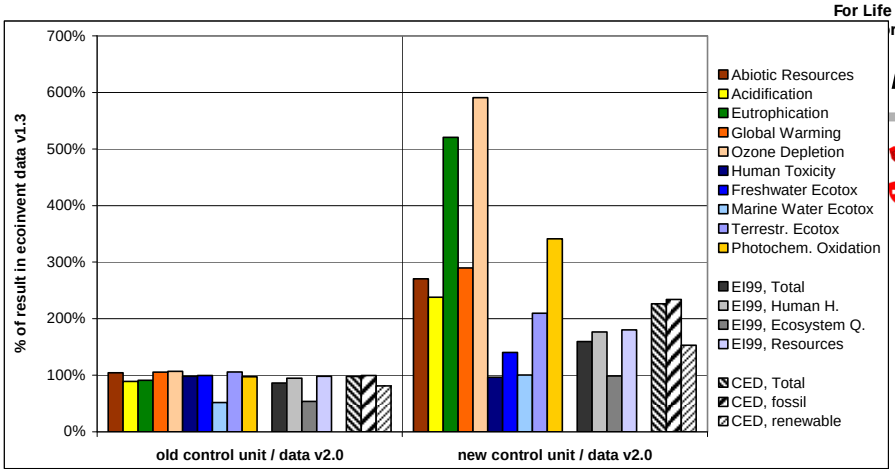

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Case Study No.2

(i) Original study

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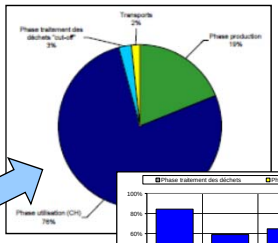
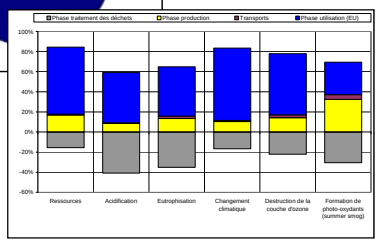
- Diploma thesis – calculated with ecoinvent data v1.3
- (Re)-calculated, using the (new) possibilities from ecoinvent data v2.01





Source(s): Baudin (2007), Diploma Thesis
Hischier, Baudin (submitted), Int J LCA

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Case Study No.2

(ii) Influence of changes to ecoinvent data v2

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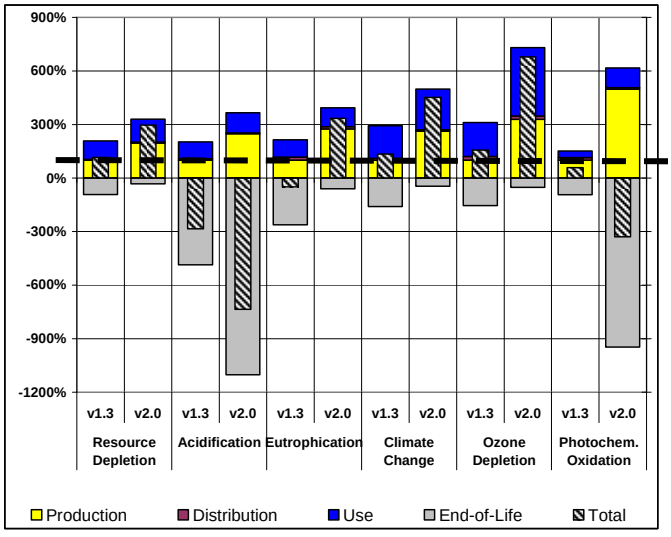

100% = Prod. with data from ecoinvent v1.3

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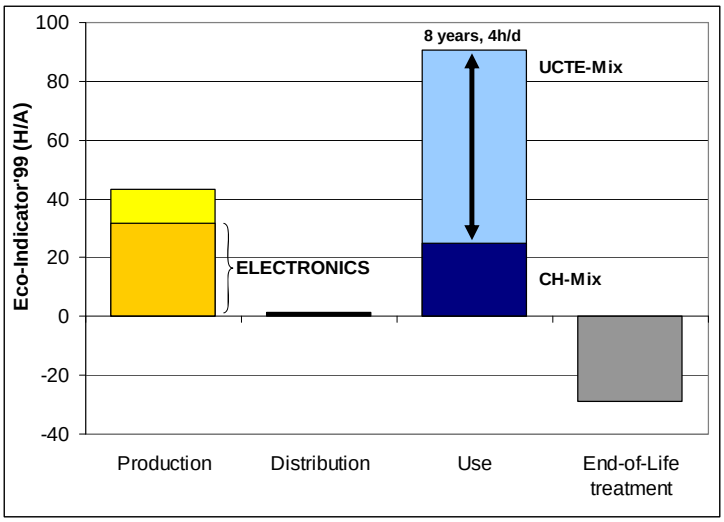
Case Study No.2

(iii) Overall results with ecoinvent data v2



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Case Study No.3

(i) Original study

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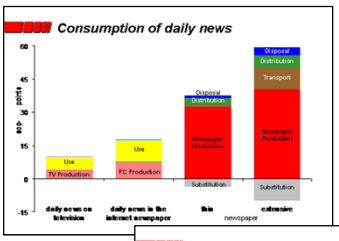
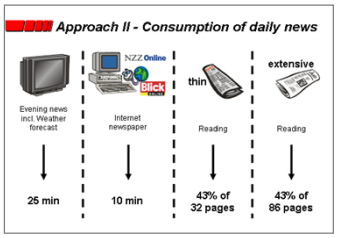
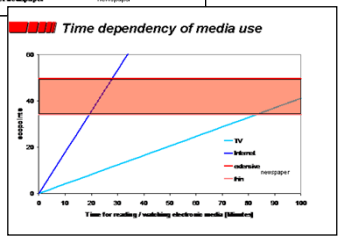
- Empa research project – calculated based on various data sources (before ecoinvent !).
- No change of specification of the various media … only (re)-calculation with ecoinvent







Source(s): Hischier, Reichart (2003), Int J LCA
Reichart, Hischier (2003), Journal Industrial Ecology
Hischier, Lehmann (submitted) Journal Industrial Ecology

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Case Study No.3

(ii) Influence of changes with ecoinvent data v2

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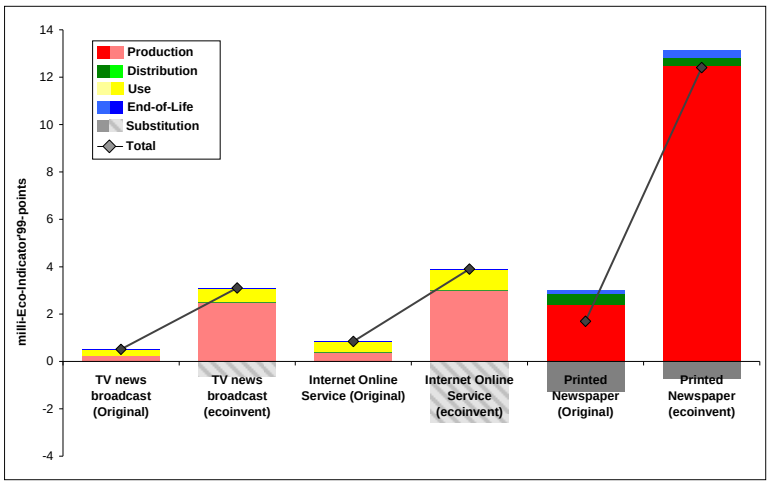

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(iii) Relative changes

(100% = Impact of newspaper production)

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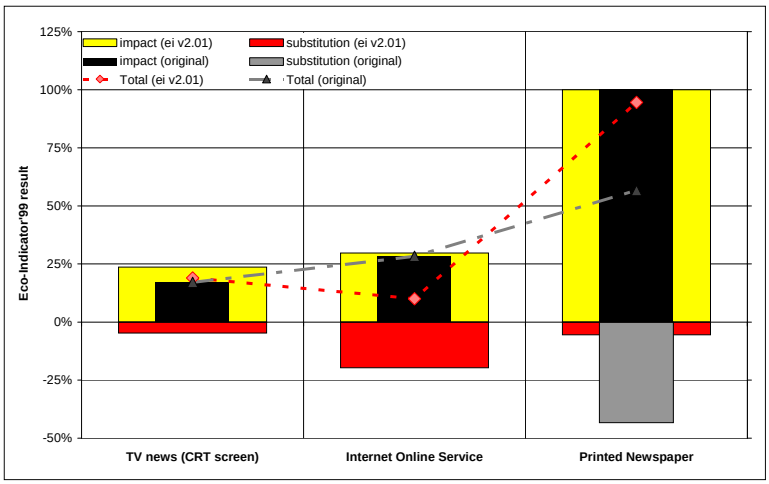

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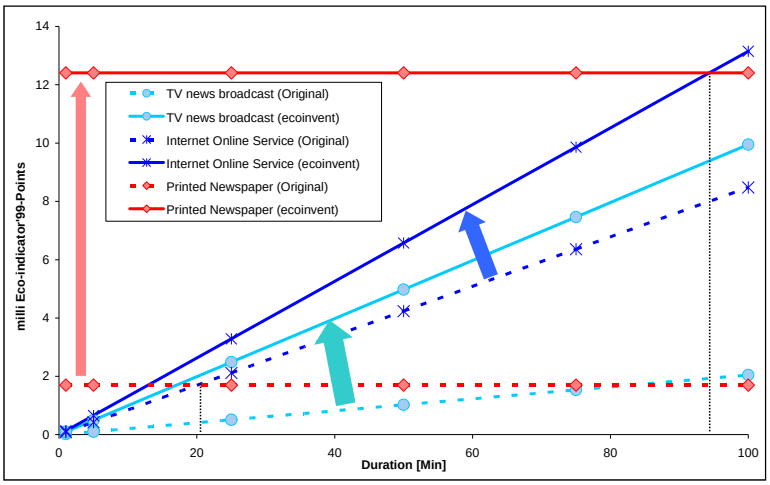
Case Study No.3

(iv) Influence of changes with ecoinvent data v2 / II



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Conclusions

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- Simple change of the **background database** (v1.3 to v2.01) without other changes **causes only a minor change** in impact assessment results;
- When using **electronics data** from ecoinvent data v2.01, all examined studies **show a clearly higher impact** (in comparison to the respective calculation without these specific datasets for electronics);
- **production phase** of electronic components (and thus also of entire electronic devices) has a much **higher environmental impact** than so far expected;
  - → Inclusion of new data for (precious) metals;
  - → Inclusion of high(est) purity requirements in electronics production.

Conclusions

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- **production of electronic** devices has rather high environmental impact in comparison to the subsequent use phase
  - *Consequence*: **"environmentally friendly" in case of electronic devices would mean heading for a maximum long use phase**.
  - But this represents somehow the **opposite way of thinking compared to the present reality** in our society, where these electronic devices are put quicker and quicker on the market in order to seduce consumer to a more and more frequent change of their device(s).
- Examined cases (even "old") shows **no changes of elementary conclusions** of these earlier studies.
  - *Conclusion*: change to a comprehensive database like e.g. ecoinvent data v2.0 results also for other economic areas (here example of paper & pulp industry) in higher environmental impacts, due to the more comprehensive inclusion of their value chains.

Thank you

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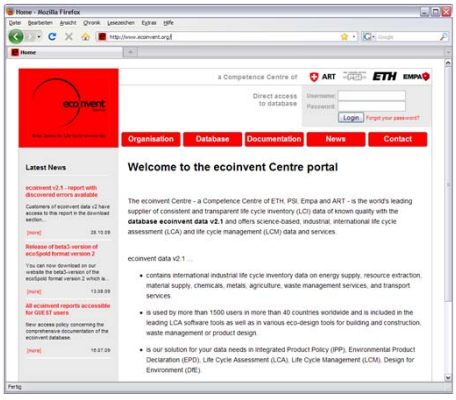

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