



Lifecycle Analysis and Lifecycle Cost Analysis for Bed Pads - A comparative study of disposable and washable bed pads

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Agenda

- Method and scope
 - Life cycle analysis (LCA)
 - Life cycle cost analysis (LCC)
 - Delimitations
 - Empirical analysis of Bed Pads
- Inventory analysis
- Results
 - Life cycle analysis
 - Life cycle cost analysis
 - Sensitivity analysis
- Conclusions
- Questions





Used Research Methodology

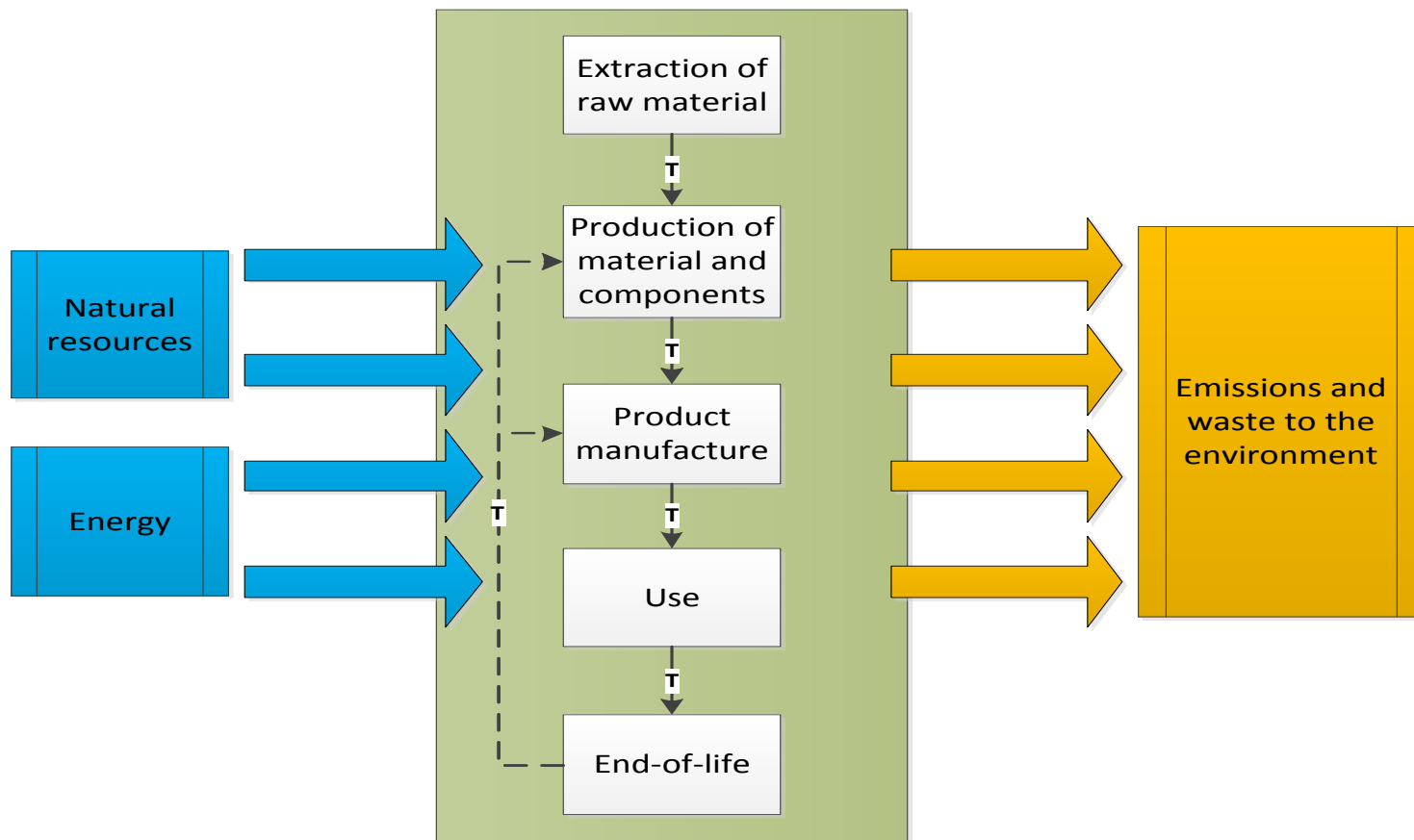
- Start: Ca 35 Telephone Interviews on general caring practices with regards to ordering, handling and disposing of Disposable and Washable Bed Pads, under supervision of the University of Linköping.
- Observation of labour time spent on Disposable and Washable Bed Pads in two separate Care Homes in Sweden, during a ca 6 week period, under supervision of the University of Linköping. 2 Care Homes were selected, one that only used Disposable Bed Pads during the research period, and one that only used Washable Bed Pads.
- Questionnaire interview with 42 av 52 contacted Home Care Nurses in the north of Sweden on purchasing, handling and washing practices of Washable Bed Pads in the At-Home market.



Method and scope

Life cycle analysis

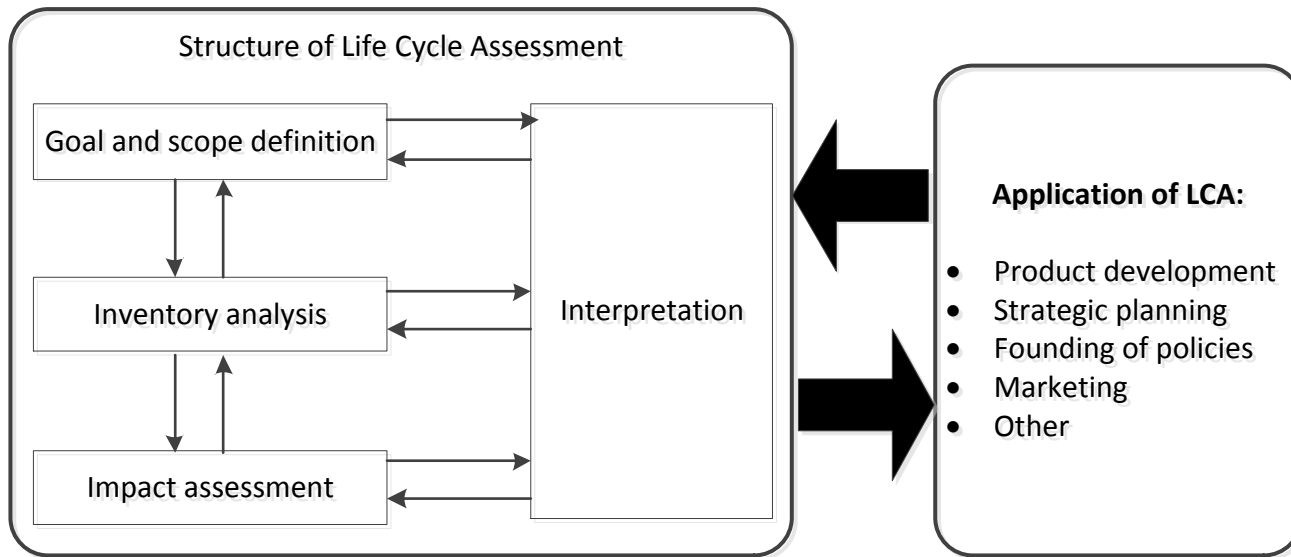
Life cycle perspective, "from cradle to grave"



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Method and scope

- Structured working method



- Functional unit: *Use of Bed Pads for a caretaker over one year* (applicable to both LCA and LCC)





Method and scope

- Life cycle cost analysis (LCC)
 - Charts the total cost of the product by investigating the cost at the various stages involved:
 - Procurement cost (cost of purchase)
 - Usage cost
 - Consumables (only applicable to washable Bed Pads)
 - Residual processing cost



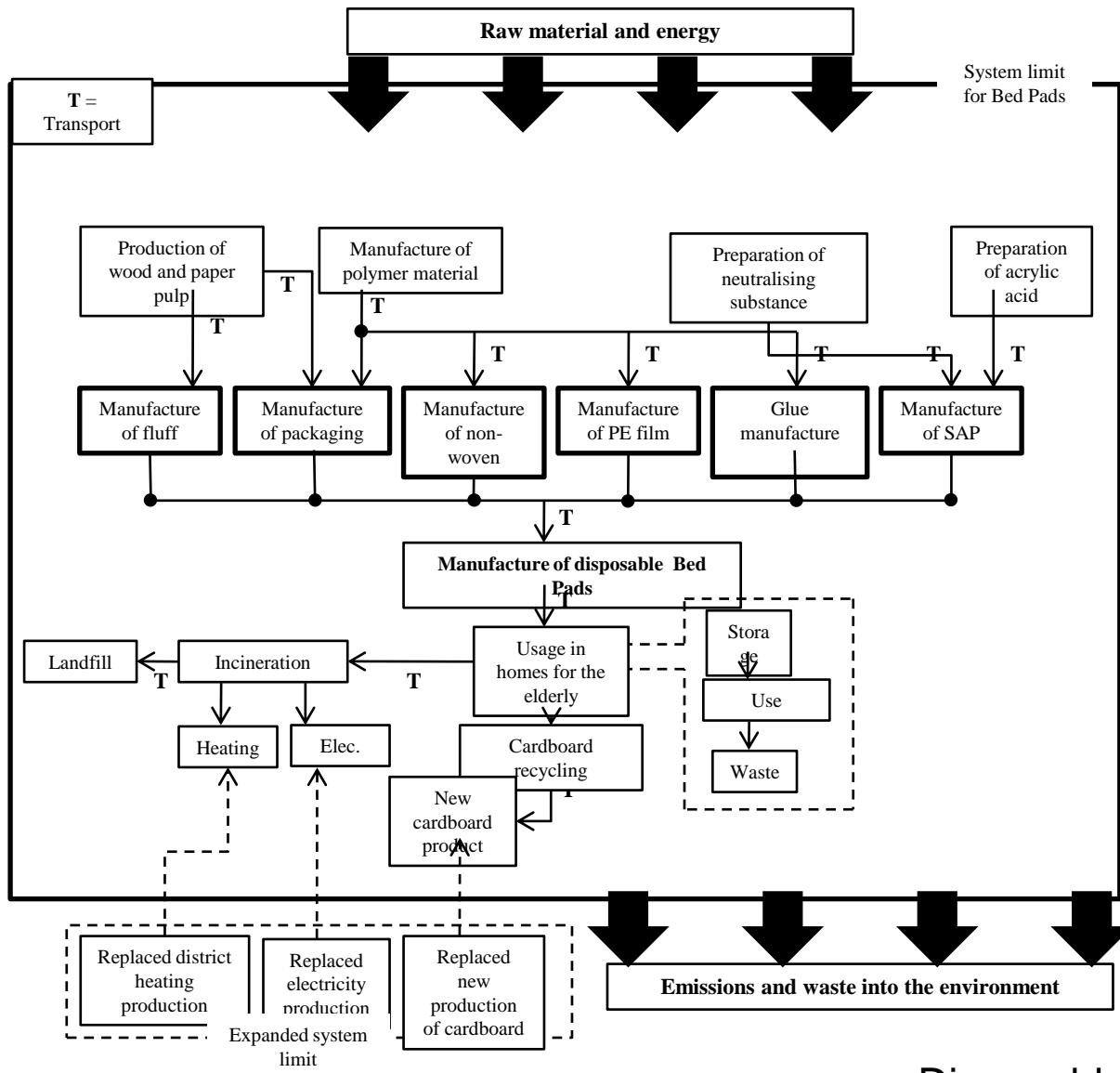


Method and scope

- Delimitations
 - Disposable Bed Pads



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Disposable Bed Pads



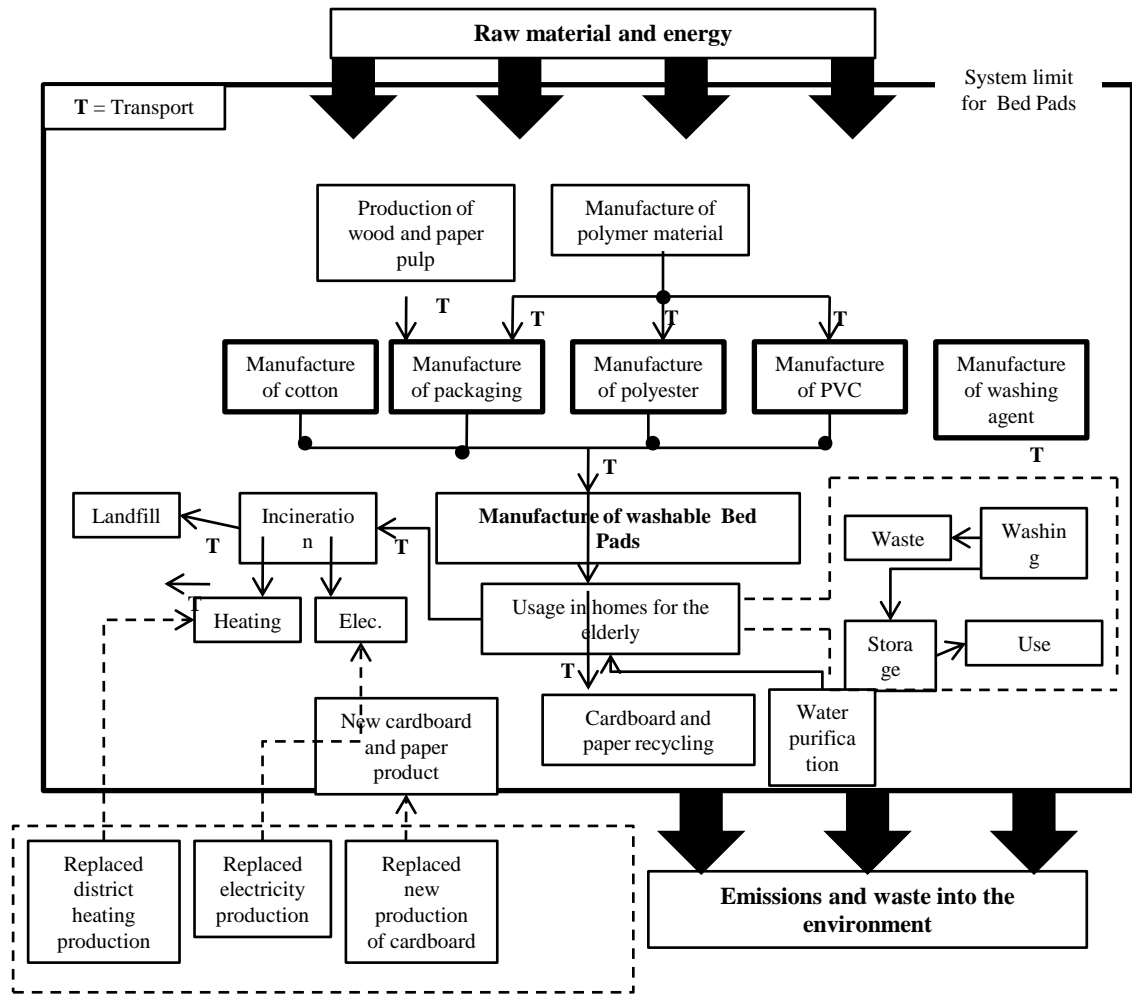
Method and scope

- Delimitations
 - Washable Bed Pads



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Washable Bed Pads



Method and scope

- Geographical and time-related delimitations
- Delimitations with respect to other product systems
- Empirical analysis of Bed Pads
 - Telephone interviews
 - Observation
 - Survey
 - The purpose was to investigate usage procedures, frequency of use and time required for use of Bed Pads
 - The results will be combined to work out average ratios for disposable and washable Bed Pads.





Inventory analysis

- Data obtained from manufacturers and subcontractors was used as far as possible for material and processes in product systems
- General industry data was used when company-specific data was not available.
 - Industry data was obtained from the life cycle database *Ecoinvent*.
- Literature and websites



Results

- Baseline scenario
 - The comparison is based on the assumption that Bed Pads were used at the same replacement rate – replaced every other day (183 replacements per caretaker per year).

Bed pad	Scenario	Bed Pads purchased per care recipient per year	Replacement rate per care recipient per year	Bed Pads discarded per care recipient per year	Explanation
Cover dri	Baseline scenario - Cover dri	183	183	183	Replacement every other day on the caretaker's bed means that 183 Bed Pads are purchased, replaced and discarded over one year.
Washable bed pad	Baseline scenario - Washable bed pad	5	183	1	Replacement every other day means 183 washes in one year. Five Bed Pads are assumed to be purchased per care taker and one is discarded. During washing, the machine is 75 % full and a 60 °C cotton programme is used. The Bed Pads are hung to dry. The electrical energy used originates from Swedish electrical energy mix.





Glossary

Global warming

- *Globala uppvärmningen/ Opwarming van de aarde / Die globale Erwärmung /*

Ozone Depletion

- *Nedbrytning av stratosfäriskt ozon / Aantasting van de Ozonlaag/ Der Abbau der Ozonschicht*

Acidification

- *Försurning / Versauerung / Verzuring / Versauerung*

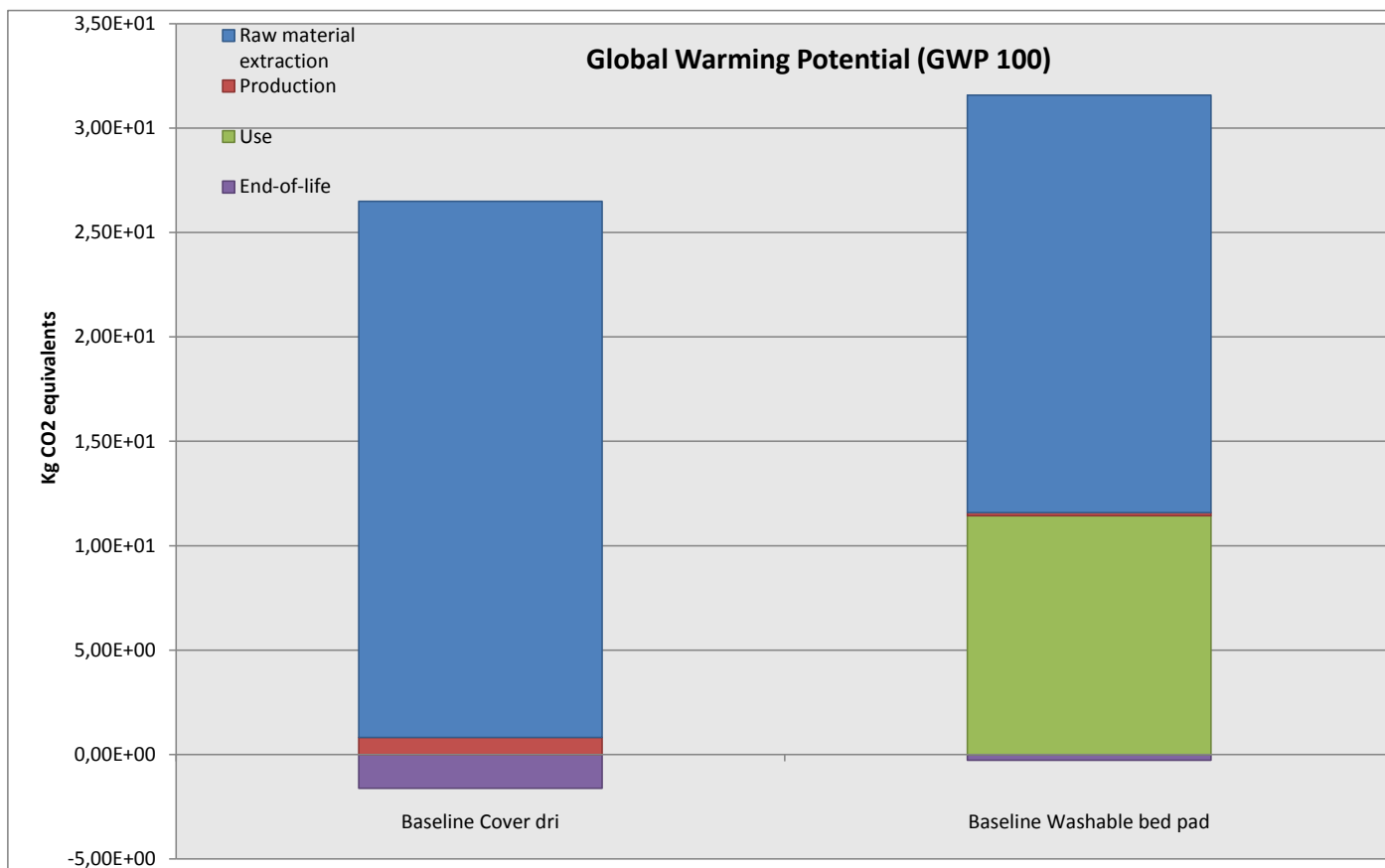
Eutrophication

- *Overgödning / Eutrophierung / Overbemesting/ Überdüngung*



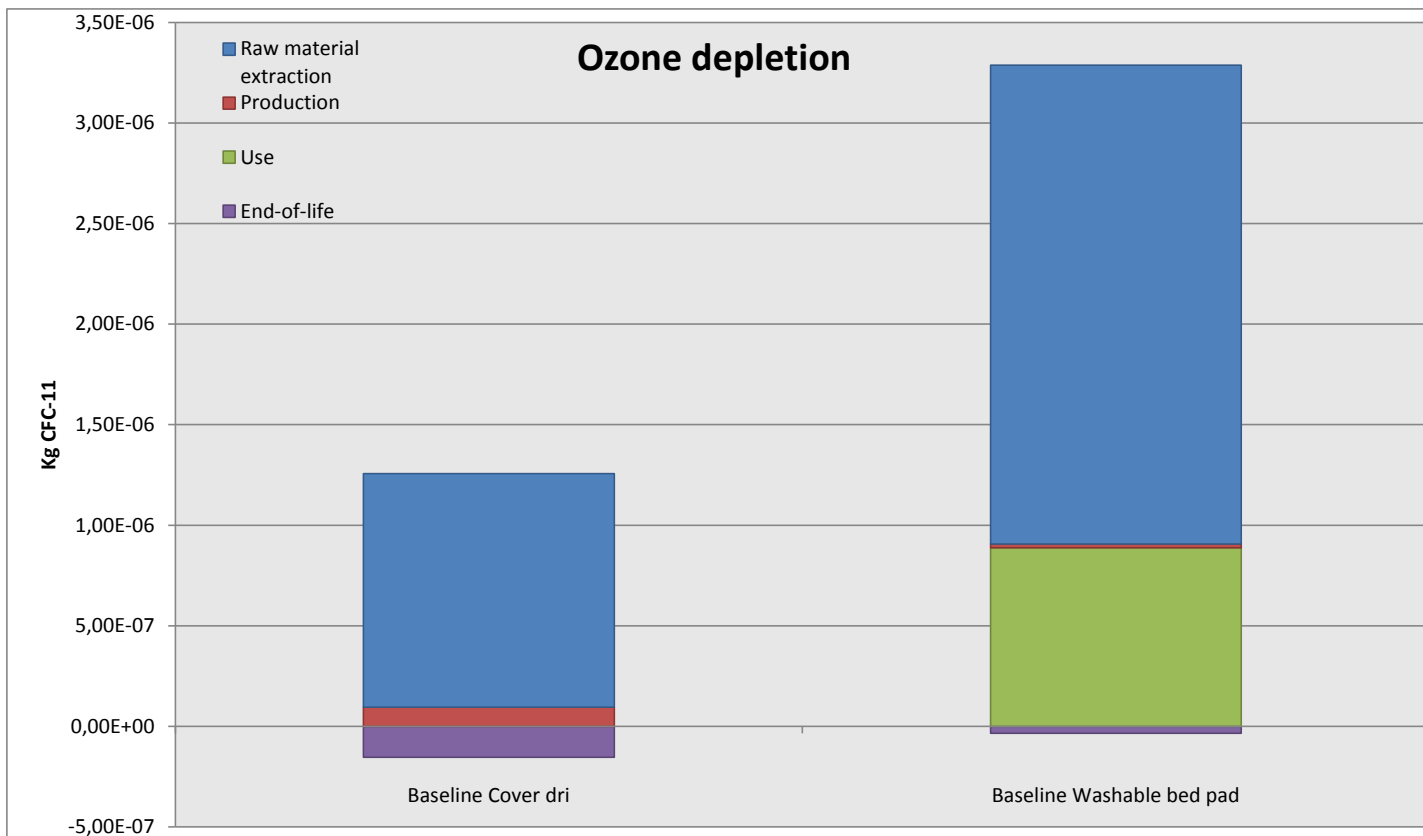
Results - LCA

- Comparison of Bed Pads' potential climate-damaging emissions



Results - LCA

- Comparison of Bed Pads' potential ozone-depleting emissions



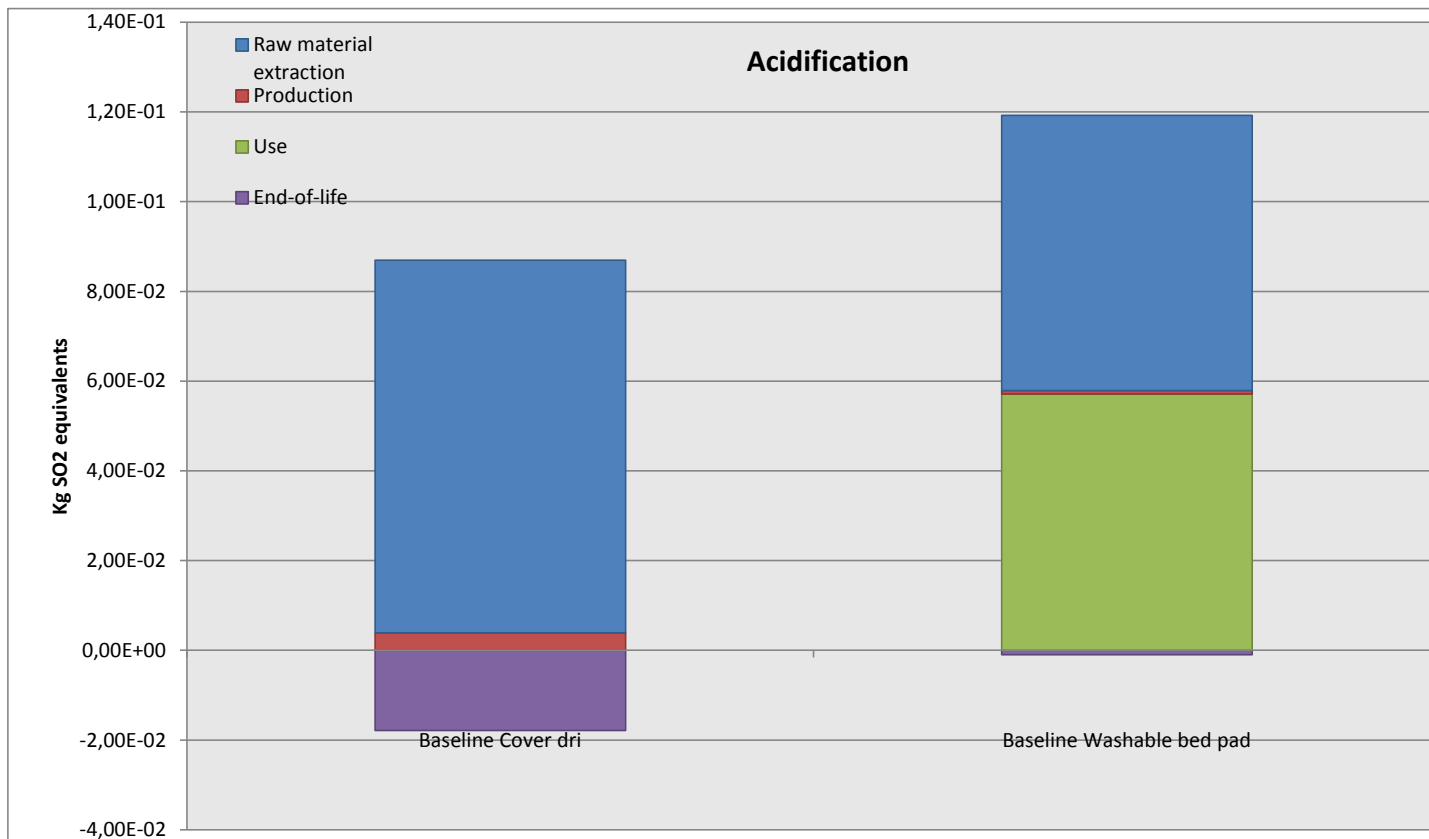
CO₂



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Results - LCA

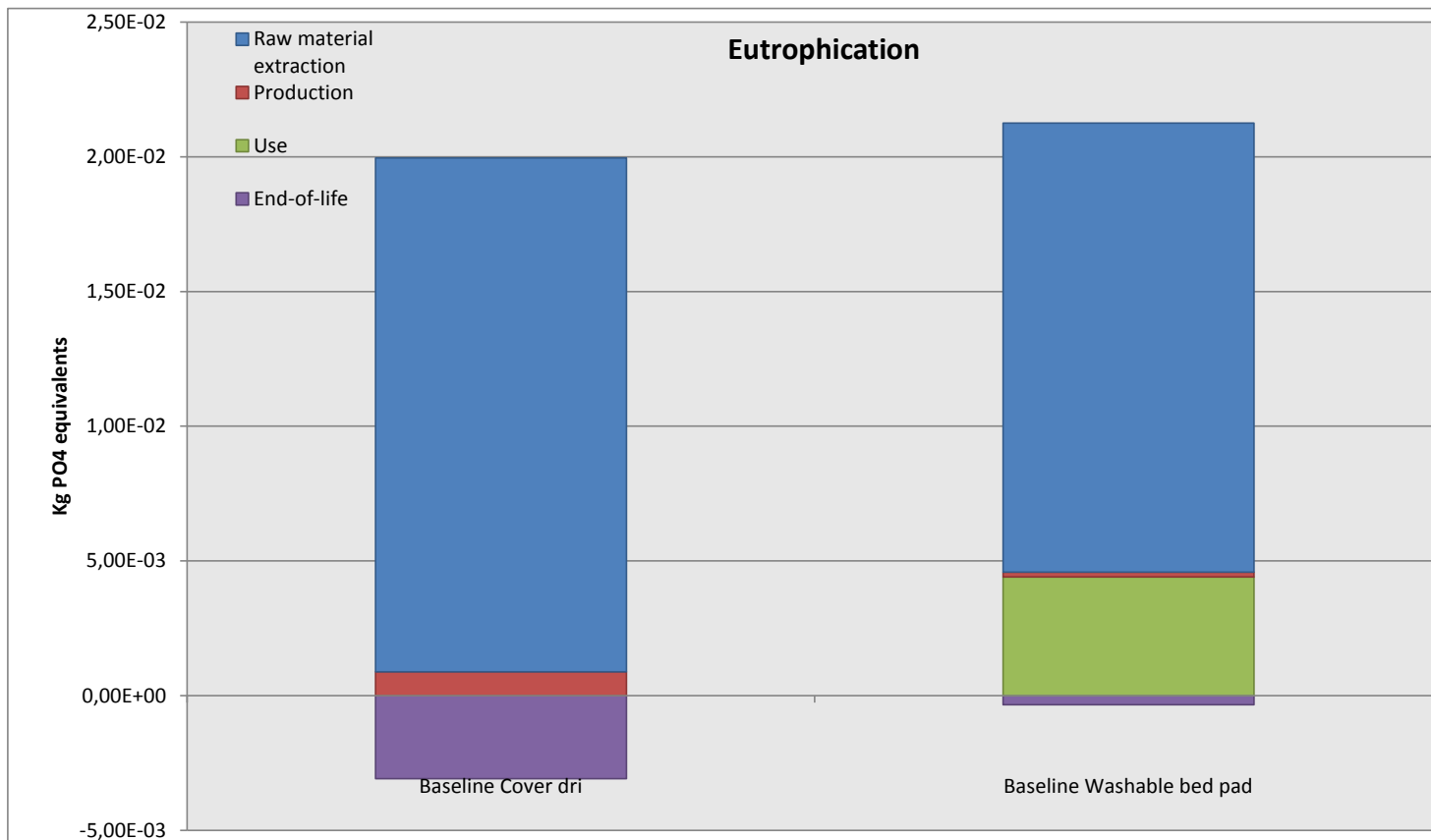
- Comparison of Bed Pads' potential emissions of acidifying substances



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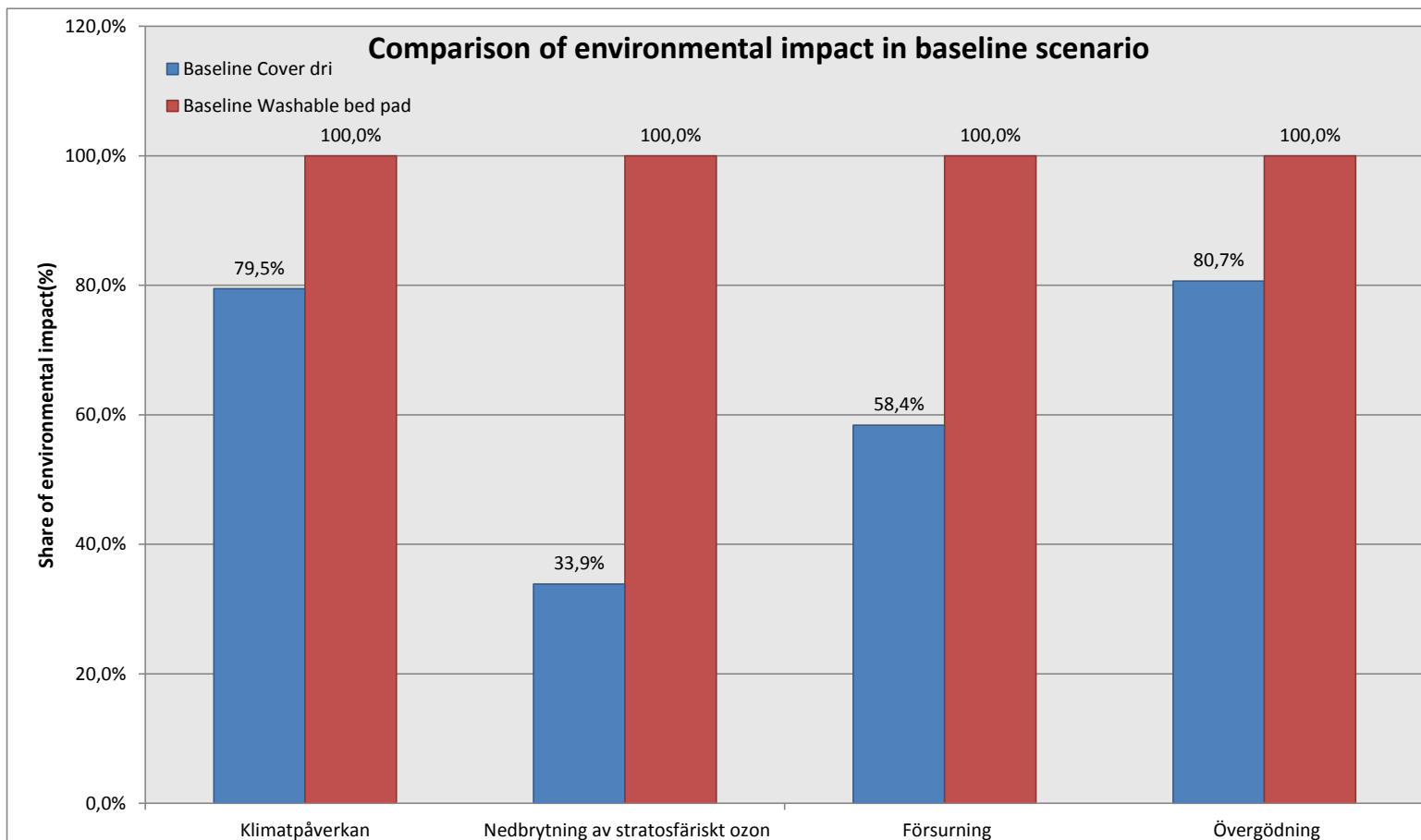
Results - LCA

- Comparison of Bed Pads' potential emissions of eutrophication substances



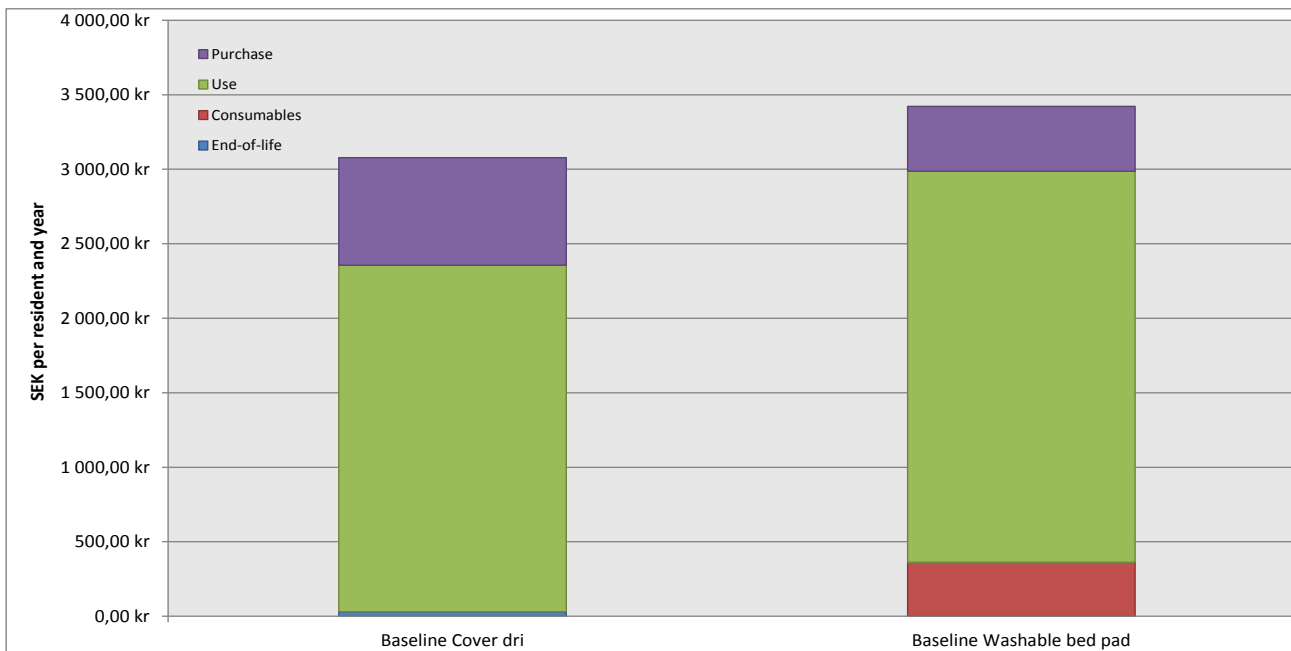
Results - LCA

- Summary of results from comparison of baseline scenarios



Results - LCC

- Comparison of Bed Pads' costs in baseline scenarios



Life cycle phase	Baseline scenario Cover dri	Baseline scenario Washable bed pad
Purchase	722,9 kr	435,0 kr
Use	2 325,0 kr	2 623,8 kr
Consumption goods	0,0 kr	361,9 kr
Waste management	30,7 kr	1,3 kr
Life cycle cost per resident and year	3 078,5 kr	3 421,9 kr



Results – sensitivity analysis (LCA)

- Sensitivities in the life cycle analysis baseline scenario were tested in a further five scenarios

Bed Pads	Scenario	Bed pads purchased per care taker per year	Replacement rate per care taker per year	Bed pads discarded per care taker per year	Explanation
Cover dri	Sensitivity 1 - Cover dri	52	52	52	Replacement every week on the care taker's bed means that 52 bed pads are purchased, replaced and discarded over one year.
	Sensitivity 2- Cover-Dri	365	365	365	Replacement every day on the care taker's bed means that 365 bed pads are purchased, replaced and discarded over one year.
Washable bed pad	Sensitivity 1 - Washable bed pad	5	52	1	The replacement rate has decreased from 183 to 52, i.e. replacement every week over one year.
	Sensitivity 2 - Washable bed pad	5	365	1	The replacement rate has increased from 183 to 365, i.e. replacement every day over one year.
	Sensitivity 3 - Washable bed pad	5	183	1	The washing machine is assumed to be 100 % full, which represents lower energy and water usage per sheet.
	Sensitivity 4 - Washable bed pad	3	183	1	3 washable bed pads are purchased per caretaker, instead of 5.
	Sensitivity 5 - Washable bed pad	5	183	1	PVC is assumed to be part of the product, instead of Polyuretan.

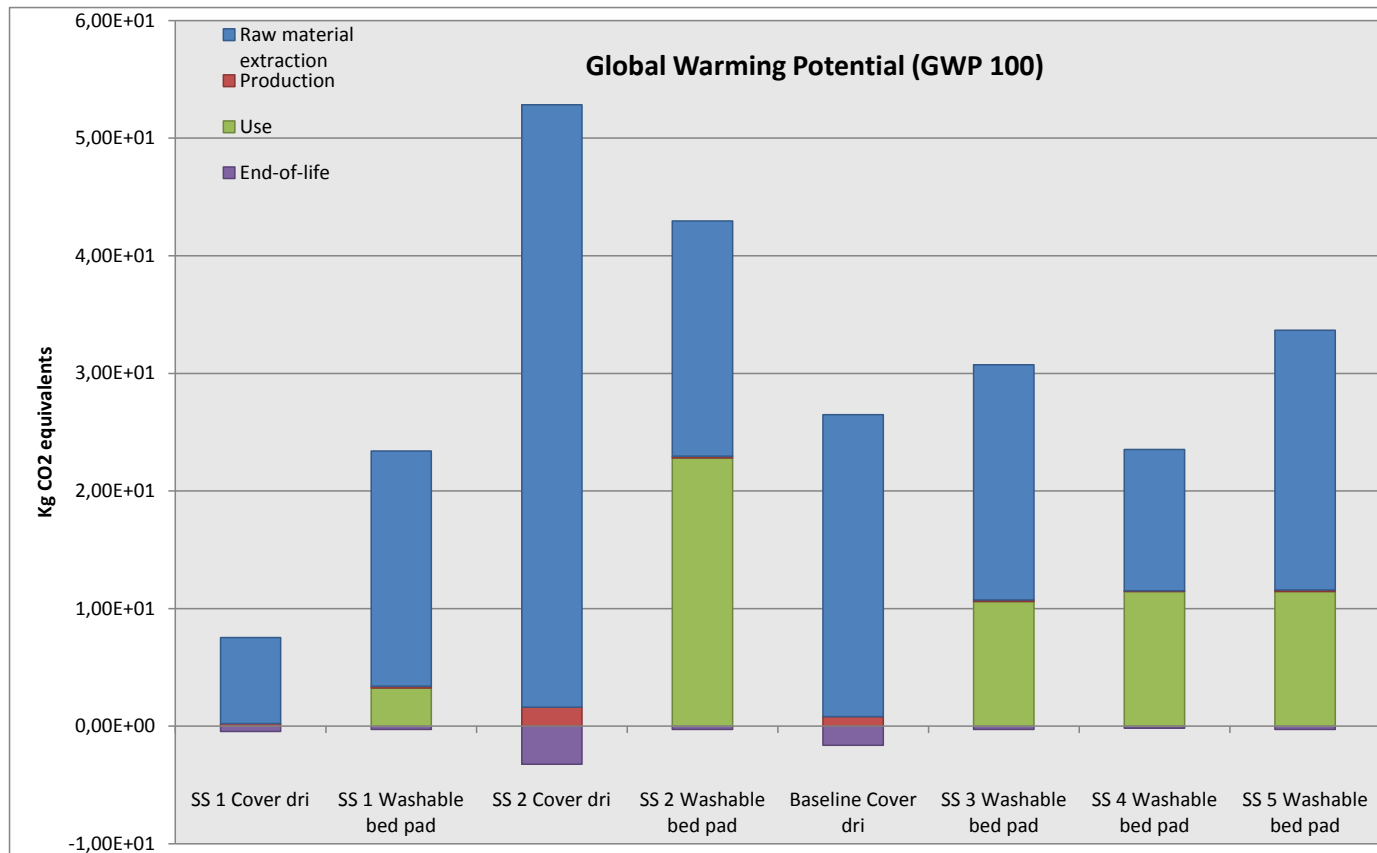
CO₂



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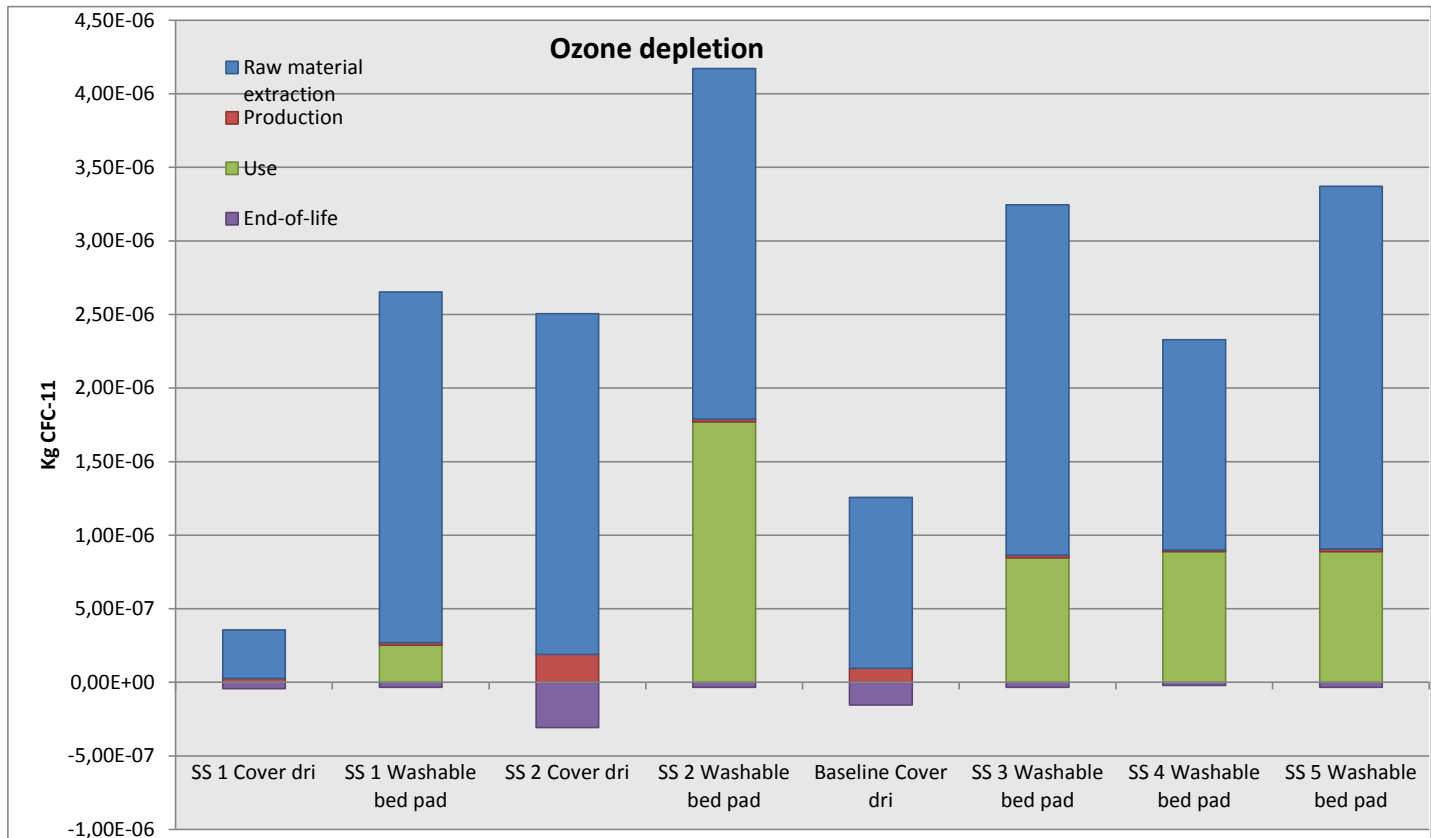
Results – sensitivity analysis (LCA)

- Comparison of sheet protectors' contribution to climate impact in the sensitivity scenarios



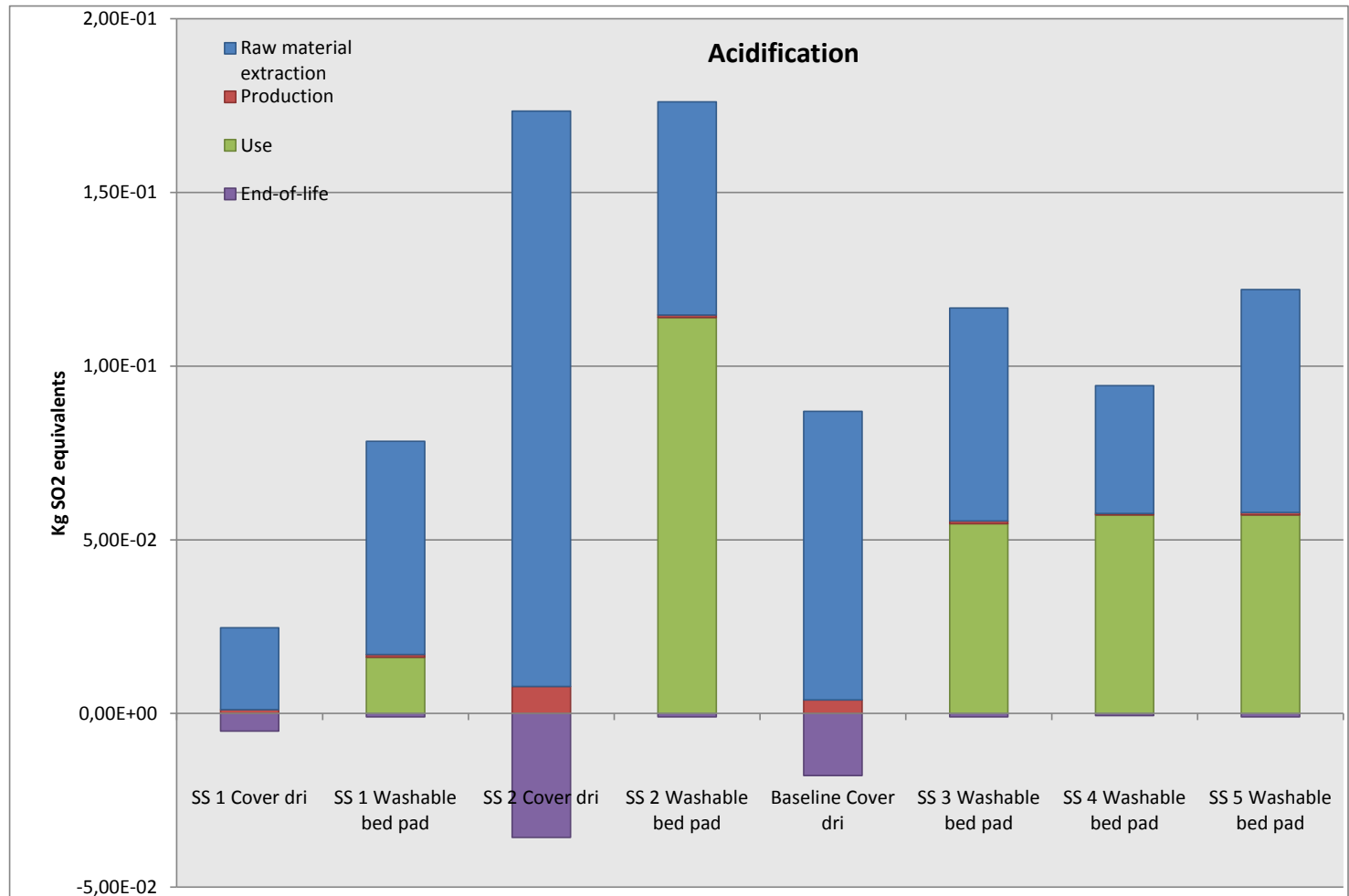
Results – sensitivity analysis (LCA)

- Comparison of Bed Pads' contribution to ozone-depleting emissions in the sensitivity scenarios



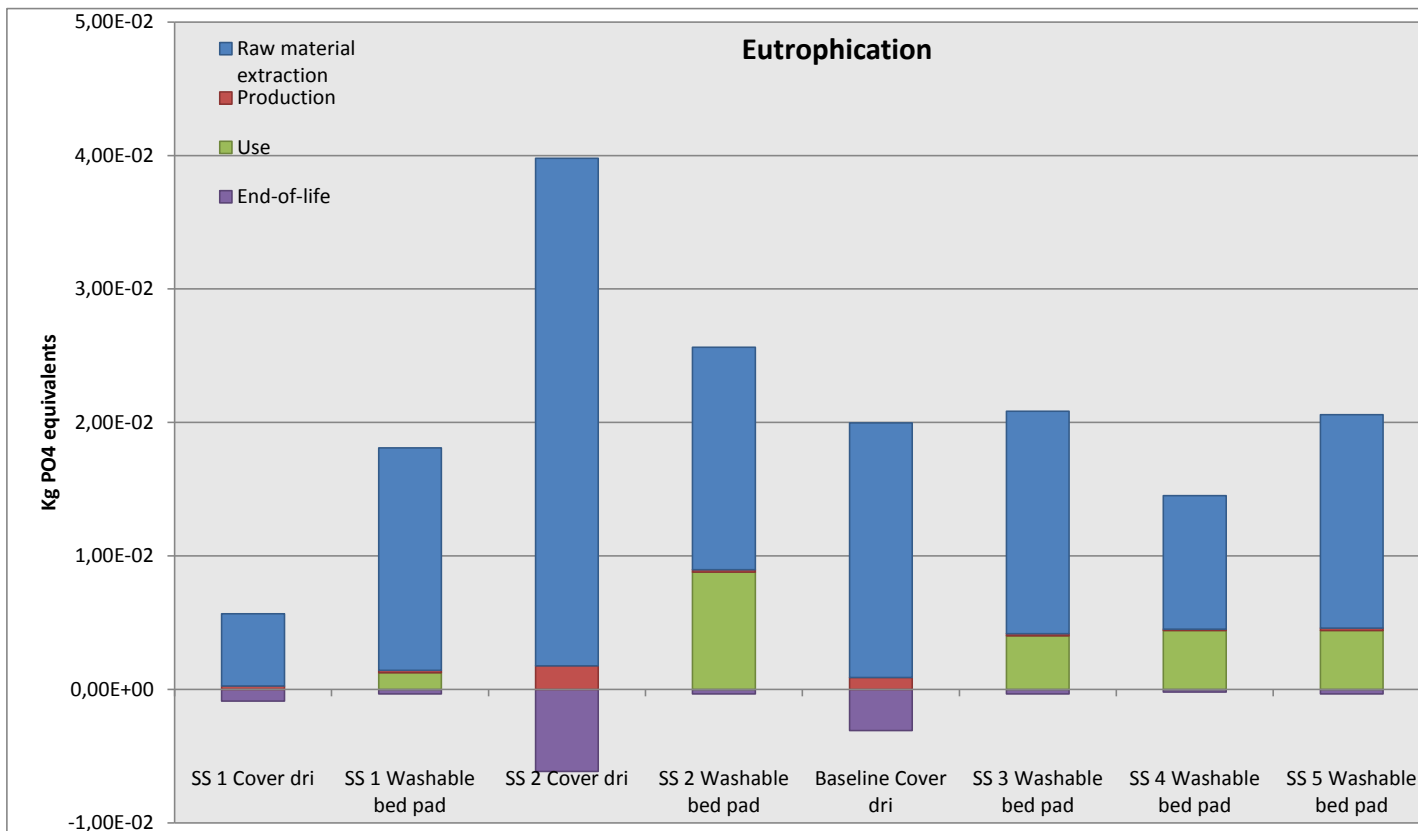
Results – sensitivity analysis (LCA)

- Comparison of Bed Pads' contribution to acidification in the sensitivity scenarios



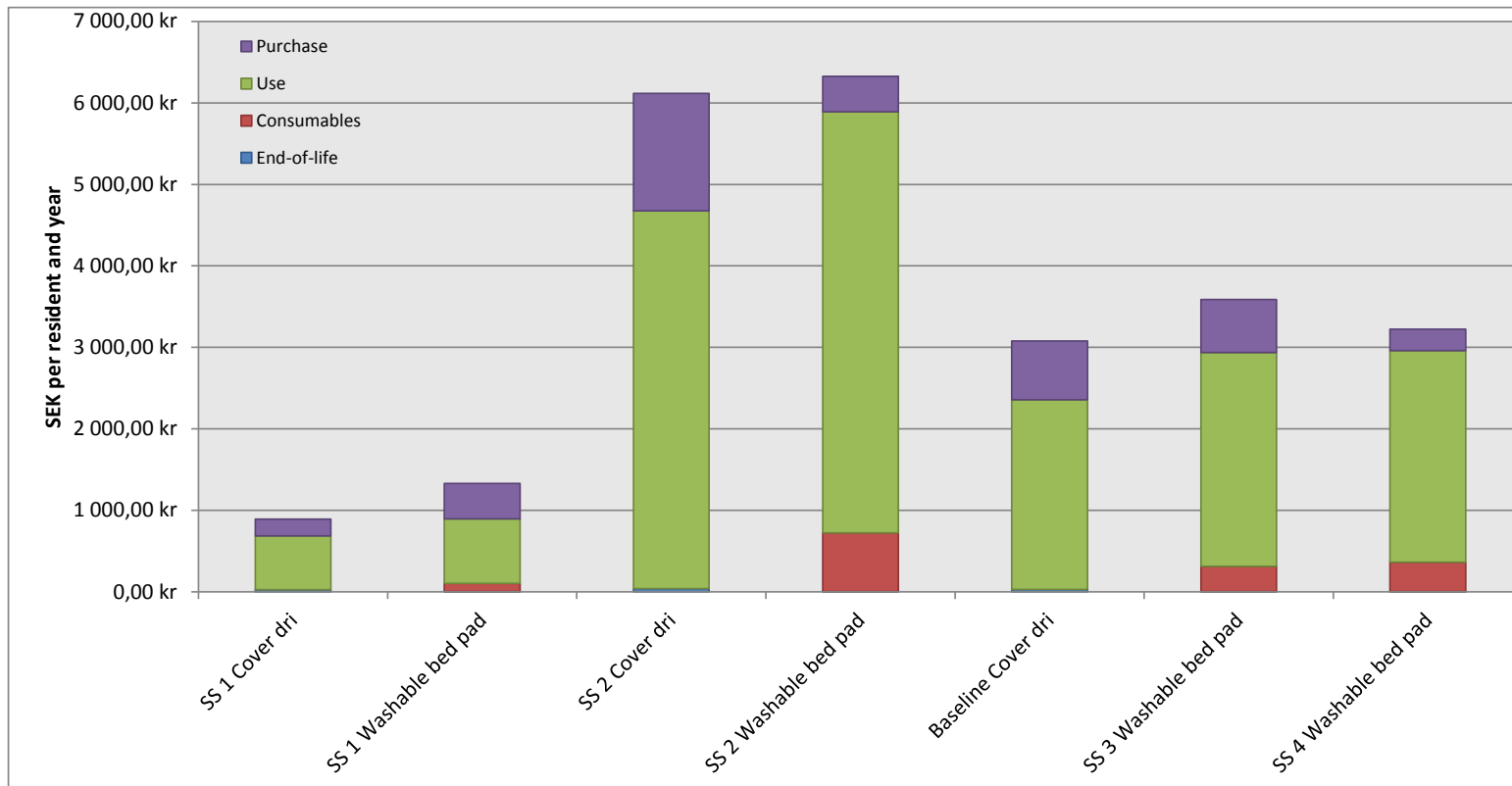
Results – sensitivity analysis (LCA)

- Comparison of Bed Pads' contribution to eutrophication in the sensitivity scenarios



Results – sensitivity analysis (LCC)

- Comparison of Bed Pads' costs during the life cycle in the sensitivity scenarios



Conclusions

- With a replacement rate of every other day over one year for one care giver in the baseline scenario, a washable Bed Pad contributes more to all investigated environmental impact categories than a disposable Bed Pad.
- Under the same conditions as above, the life cycle cost for the washable Bed Pad is approximately 11 % higher than for the disposable Bed Pad.
- The results from the comparison in the baseline scenarios do not change appreciably in any of the sensitivity scenarios. The exception is in sensitivity scenario 2 and 4, when an increased replacement rate (s 2) and decreased purchased volume (s 4) result in disposable Bed Pads contributing more to Global Warming and Eutrophication.
- The sensitivity analysis of LCC shows no change in the comparison between Bed Pads. It is less costly to use disposable Bed Pads in all tested sensitivity scenarios for one care taker over one year and under the given circumstances.
- In almost all scenarios investigated extraction of new natural resources contributes the most towards the various environmental impact categories. In S 2, the use phase of the washable Bed Pad contributes more to Global Warming and Acidification than the other lifecycle phases.
- The use phase contributes most to costs in the life cycles of the Bed Pads.

