carbotech
Environmental Projects and Consulting

Coaching instead of teaching LCA
20 Years of experience at universities of applied science

Event

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Overview

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About Carbotech AG

- 25 years of experience in environmental consulting
- 30 specialists in the field of environmental science, chemistry, physics, toxicology, biology and economics
- Our clients are from the private industry, public authorities and NGOs
- Advisory activity all over the world, but with focus on Switzerland
- independent, neutral and objective
- Quality management: ISO 9001:2000 certified

About Carbotech AG
Business units

Environmental consulting (Umweltberatung)

- Environmental consulting
- LCA
- Environmental audits
- Cleaner Production
- Teaching and coaching LCA

Pollutants/Contaminants (Schadstoffe)

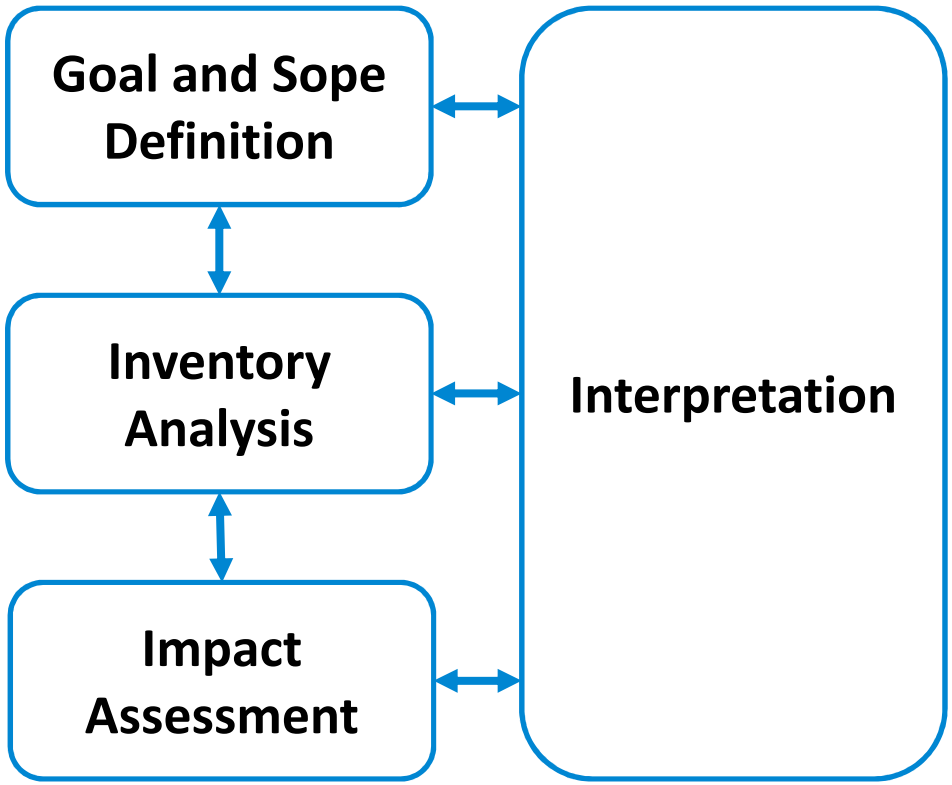
- Asbestos and PCB/CP diagnosis
- Indoor and outdoor air measurements (VOC, PM10 etc.)

About Carbotech AG

Teaching experience: courses per year

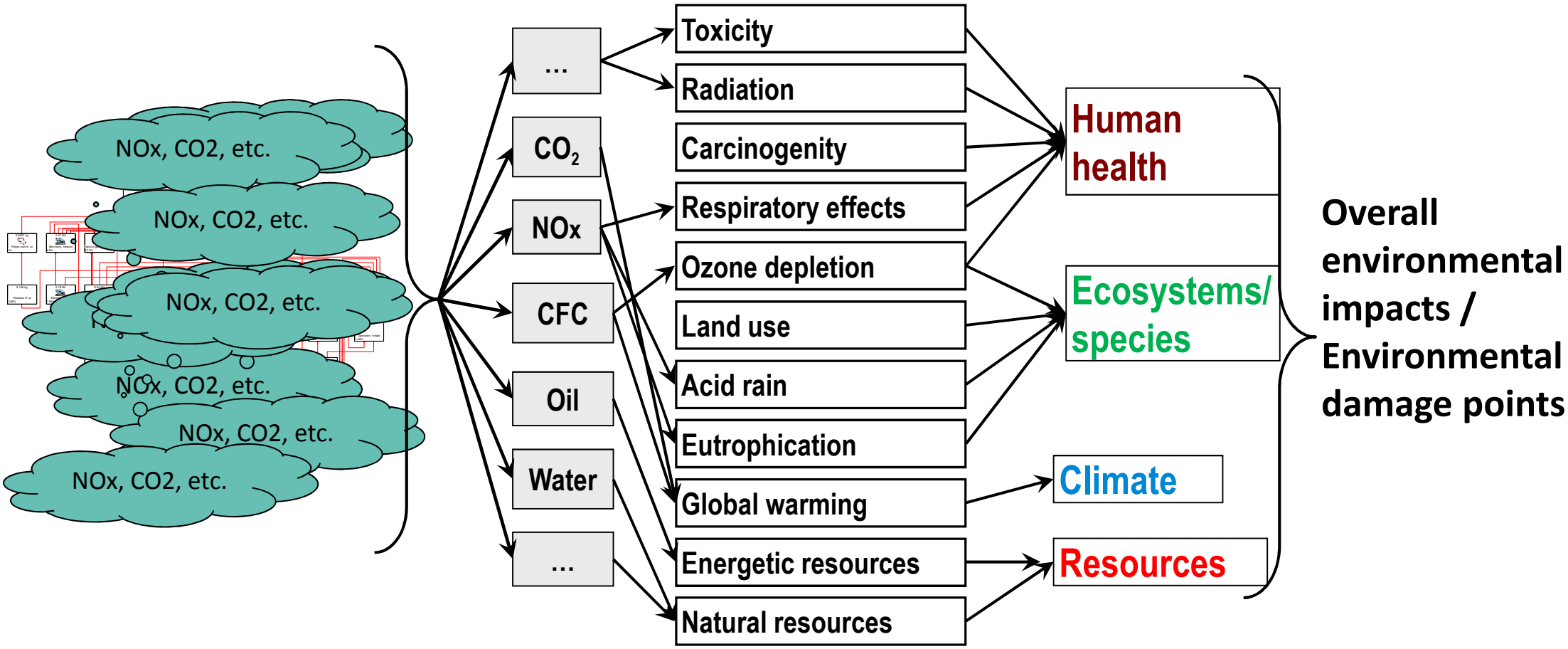
Lessions / Semester	Organisation	Type
3	Swissmem	LCA short course further education in industry
6	University of Applied Sciences and Arts Northwestern Switzerland FHNW	LCA short course for students in economy
7	PHW	LCA short course further education in environment
15	FHNW	Part of Bachelor
24	FHNW	Part of Master of Life Science
32	Zurich Universityof Applied Sciences ZHAW	Part of Bachelor of Env & Nat Res
32	Sanu	LCA course in further education for environmental specialists
45	FHNW	Part of Bachelor of Life Science
64	FHNW	Part of Maser of Life Science

Teaching LCA theory
4 Steps of ISO 14040



- LCA of product or service is complex, it undergoes subjectivity
- There was a need in the 90's to elaborate a standardized assessment process
- It was elaborated by Society of Environmental Toxicology and Chemistry (SETAC)
- And standardized by International Standardization Organization (ISO)

Teaching LCA theory
Proceeding



emissions impacts effects weighting

Teaching LCA

It is easy to calculate a LCA…

Today, everone can perform a LCA by

- following the ISO guidelines
- using a powerful LCA software and computer
- using an extensive LC-inventory database

It’s easy

Teaching LCA
…but that is not the problem!

Nowadays, it is easily possible to calculate complex systems as precise as 12 places after the decimal point with the help of LCA software and computers. But does this enormous calculation power with such extremely precise calculations lead to extremely exact results?

Not realy. Even today we are happy if the order of magnitude of our LCA is correct. We still have do deal with many assumptions and uncertainties considering the goal and scope, data, the methodology, the evaluation etc.

Sources of problems…

LCA step	Sources of problems	Type of problems
Goal and scope	Functional unit, system boundaries, goal definition, allocation	Uncertainty, fuzziness
Inventory	Quality of data, error in measurements, selecting the adequate background data	Fuzziness, inaccuracy
Impact assessment	choice of the impacts, uncertainty of impacts	Uncertainty, fuzziness, inaccuracy
Valuation and interpretation	social-political, selection of the adequate methods, conclusions and recommendations	Uncertainty

…are difficult to transfer by theory

From theory you know the problems, but not really how to handle it

Such problems need to be experienced in order to be fully understood.

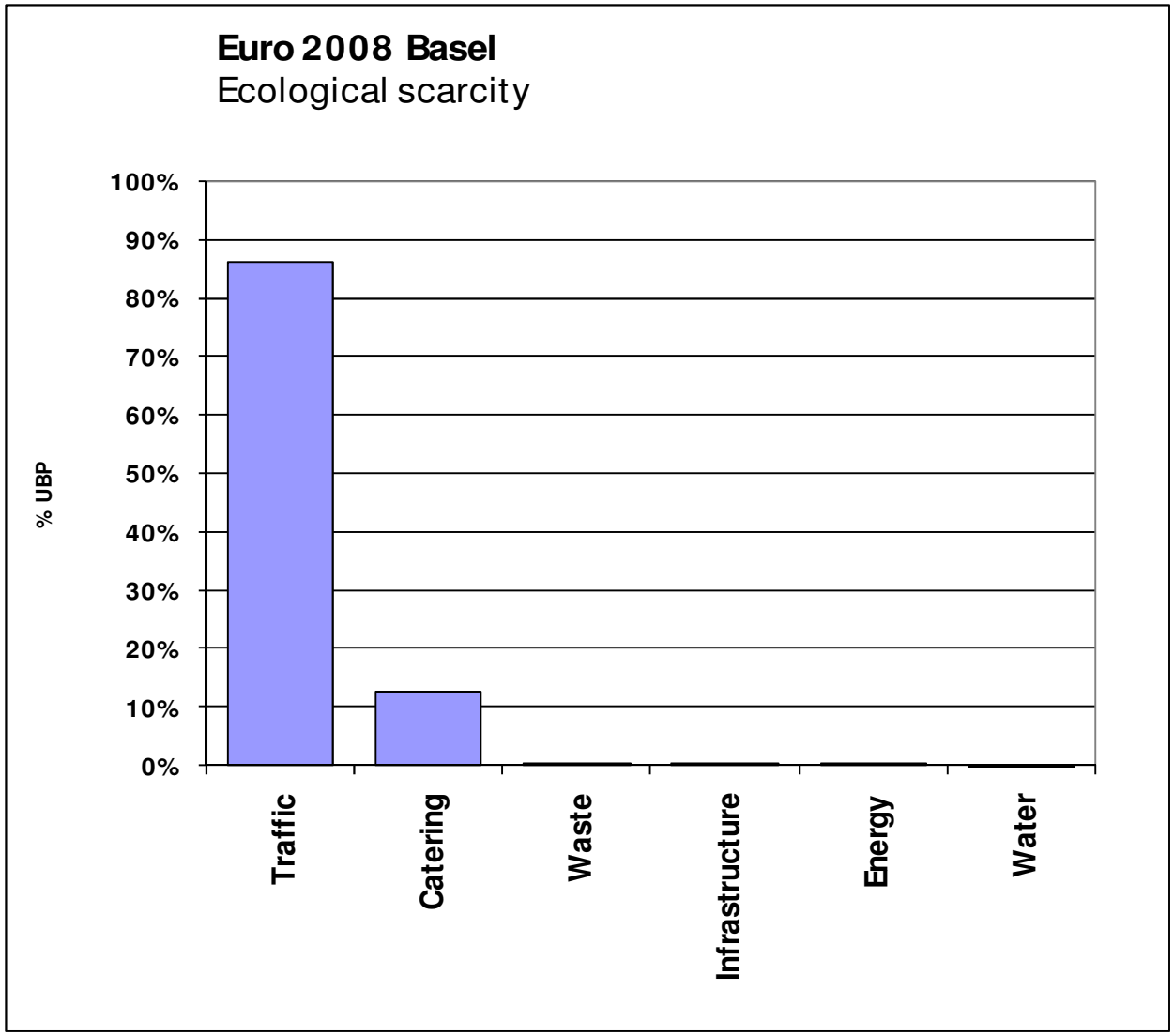
You know what you experience! That’s why we use most of our lessons for practical exercises (case studies).

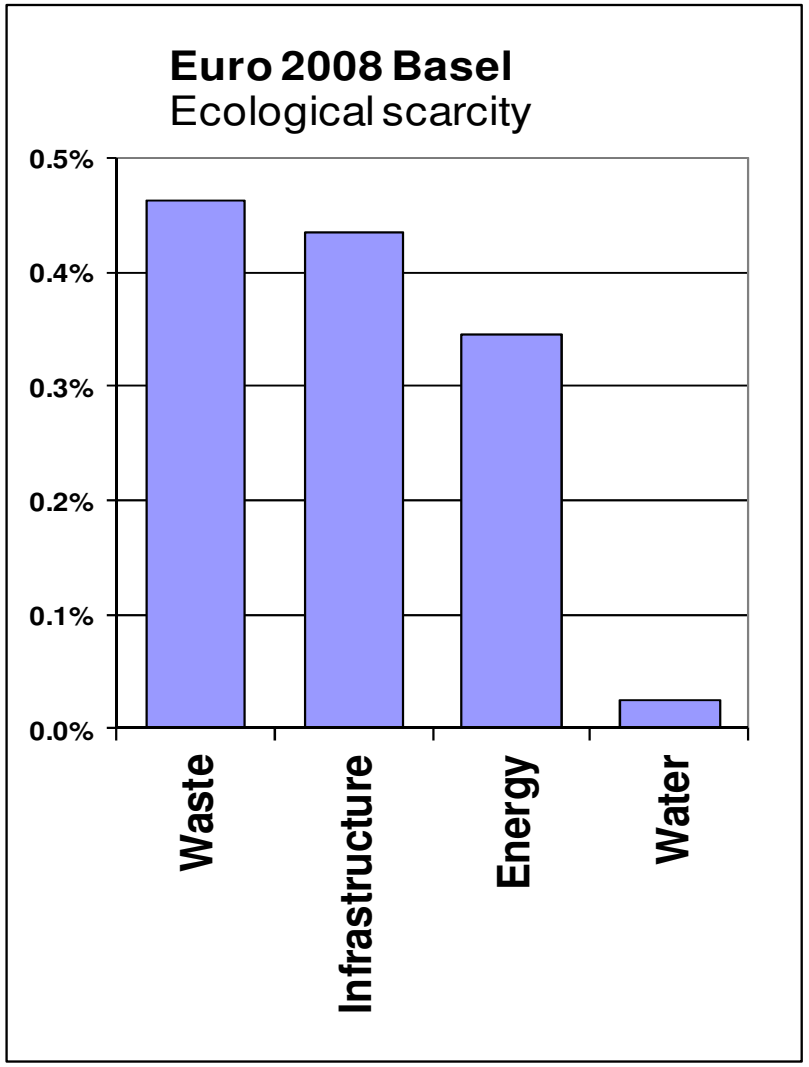
Case study example
Euro 08

Goal:
Defining measures in preparation of the EURO 08

Special problems:
- Handling unknown data
- Handling future scenarios
- Communication of results to persons who are interested in soccer and not in LCA results (midpoint vs. endpoint methods)

Case study example
Euro 08, results





Case study example
Euro 08, selected measures

not only but also because of the case study

Transportation
- Free tickets for public transport
- Increase of the capacity

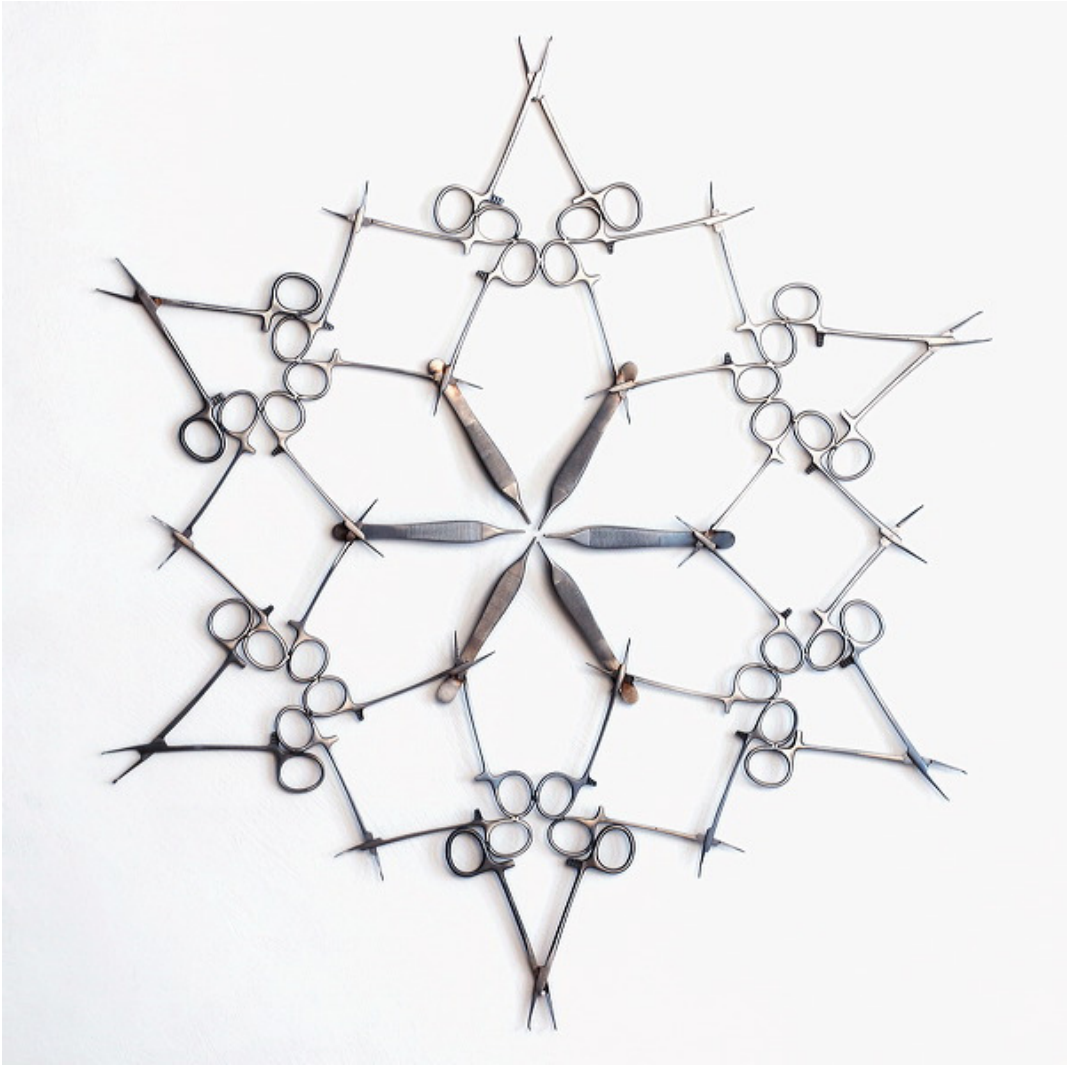
Energy
- Green electricity

Littering – waste - safety
- Use of reusable cups
- No flyers
- No glass bottles
- Reducing the packaging of food to the max

Case study example
Surgical instruments: one way vs recycling

Goal:
environmental comparison of end of life treatment of surgical instruments
(this is a current question of FOEN)

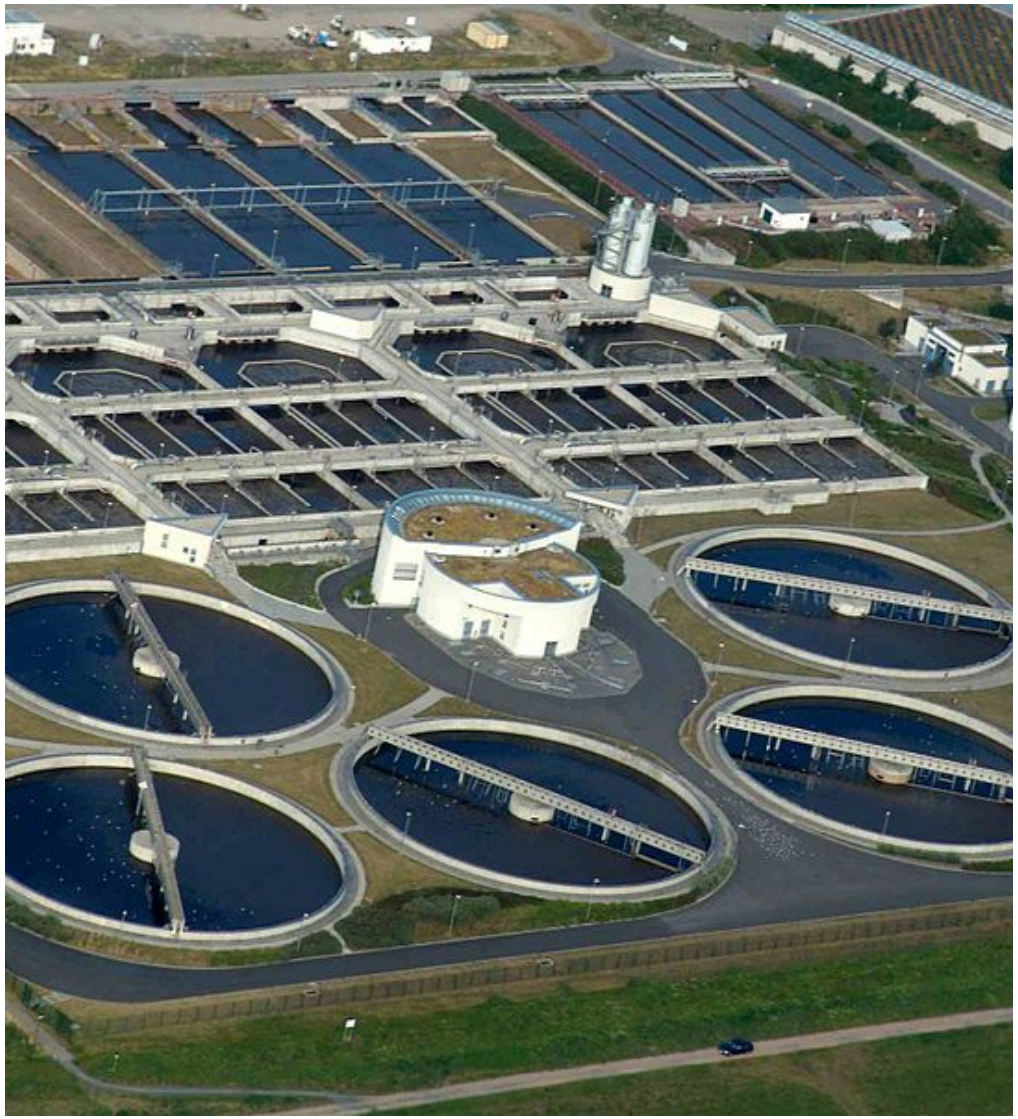
Special problems:
- Handling 100’000 data inputs
- Handling allocation and recycling approaches



Case study example
Micropollutants in water

Goal:
environmental comparison of ozonization, reverse osmosis and carbon filter

Special problems:
- No ecofactors for micropollutants available



Case study example
Micropollutants in water, outcome

- Eco factors for micro pollutants in EDIP have been developed.
- To evaluate the benefits of the different technologies it is important to have a look on a large number of pollutants.
- If this is not done the conclusions may show a wrong direction.
- Recommendations to the government concerning the treatment of waste water

Conclusions

Values we observed

- Motivated students
- Working with ill-defined problems: Students understand the importance and relevance of assumptions and approximations made along the way.
- Handling the unknown: They have to deal with uncertainties and contradictions.
- Asking the right questions: They have to discover how hard it is to get relevant and useful data.
- Relevance of context in solving problems: Estimating the environmental burdens of a product depends upon the assumptions made about various aspects at the different life cycle stages.

Conclusions

Values we observed

- Interdisciplinary team work
- Practical experience: Case studies give students the opportunity to gain experience in practical LCA project work.

Handicap we observed:

- Although students gain practical experience, it does not seem to help in the written examination.

Thank you
for your attention!