INSTRUCTIONS FOR REPORT & CRITICAL REVIEW IN AG2800 (2015)

About plagiarism

When writing a research report (which is what you will do in this course!), you use a lot of data and information from different sources, e.g. reports, scientific articles, interviews, and the internet. When using information from another source, which cannot be considered to be common knowledge, you should always include a reference to this source. This is to give credit to the original author, to help your readers find the source if they are interested, but of course also to avoid presenting someone else's work as being your own.

Presenting someone else's work as your own, without appropriate use of references, is plagiarism. Plagiarism is never accepted, neither in education, nor in your future professional career.

Often, plagiarism is unintentional, simply because it's difficult to know when and how to include references in the text. Learning appropriate use of references is part of your education. If you are not sure when and how to use references in your report, please discuss this with your teacher, rather than taking a chance.

Intentional plagiarism is a serious form cheating. As a student at KTH, you are obliged to know the rules at KTH concerning cheating. These are published at:

http://www.kth.se/en/student/studentliv/studentratt/fusk-och-plagiering-1.323885

If we suspect intentional plagiarism, your report will not be accepted, and you will be reported to the Disciplinary board.

Instructions for critical review

Each group makes a critical review of the report of another group (you will be told what report to review).

- The critical review should be documented (1-2 pages) and uploaded in Canvas (Assignments/Critical review of project report) (Please see "Submission deadlines" in the course memo).
- Bring two copies of your critical review to the final seminar.
- You are not expected to make a complete and professional critical review, but a limited one as outlined below.
- Use the report template below as a check-list when doing the critical review of another group project.
- All group members must be involved in preparing and presenting the critical review.
- Please also see instructions in the course memo.

Literature for critical review:
- *Instructions for report & critical review in AG2800*
- Curran, M. A. (2015) *Life Cycle Assessment Student Handbook*. Chapter 6.7

What the critical review should cover
Always introduce your critical review in a positive manner. There is no point in aggressive criticism, the criticised person/group will not listen and learn. Negative criticism should be expressed in a constructive manner.

Over all comments
- Present some overall comments on your impression of the report.
- Do you have any reflections on the choice of topic?
- Was the language good?
- Does the report have the required structure?

Transparency and completeness
- Are all parts of the LCA sufficiently and transparently documented?
- Are any questions left unanswered?

Methodology
- Is some issue not correctly handled in the LCA?
- Ask for clarifications wherever necessary.

Clarity of results and conclusions
- Are results sufficiently documented and explained?
- Are the conclusions supported by the results?
- Do results and conclusions answer the aim and objectives?

Improvements

- Suggest improvements.

Instructions for project report and report template

Each group writes a report of their project (15-20 pages). Follow the template provided below when preparing your report.

The ISO standard outlines the requirements of how the results of an LCA should be documented:

> "The results of the LCA shall be fairly, completely and accurately reported to the intended audience... The results data, methods, assumptions and limitations shall be transparent and presented in sufficient detail to allow the reader to comprehend the complexities and trade-offs inherent in the LCA-study. The report shall also allow the results and interpretation to be used in a manner consistent with the goals of the study." (ISO 14040:1997)

The basic requirement of your report is clarity with regard to *functional* unit, and transparency with regard to *system boundaries, assumptions*, and *data*. The reader should be able to understand *what was analysed, what was included within the system boundaries, how allocations issues were handled, what data was used, and the sources of this data*.

By following the chapters in the course book you will understand better what should be reported for each stage of the LCA. The attached report template indicates what you should include, as a minimum. Feel free to have a look at project reports from earlier years for inspiration (can be downloaded from Canvas).

Report template

FRONT PAGE

- Title of project
- Course number
- Date
- Group number
- Authors and affiliations

ABSTRACT

LIST OF CONTENTS

INTRODUCTION

- Background of the problem and problem identification.

- Limited literature review; A few references to earlier studies of similar problems, if any.

GOAL OF THE STUDY

- Reasons for carrying out the study and what is the specific question you want to answer?

- Comparative or stand-alone LCA

- Change-oriented or accounting LCA

- Intended application of LCA results (i.e. what the intended application could have been if this were a "real" LCA study).

- Intended audience (i.e. who the intended audience could be if this were a "real" LCA study)

SCOPE OF THE STUDY

Functional unit

- What function does your product(s) or service(s) fulfil?

- Statement of performance characteristics and omission (if any) of additional functions in comparisons.

- Functional unit, the quantified measure of the performance of the product/service, which is used as reference for all calculations in you LCA.

System boundaries

- Which processes are included in your system?

- Initial flowchart: Sketch of your system, but without every detail, as a help when explaining the system boundaries. Simplified representation of what is included in and omitted from your system boundaries, and illustration of what you consider as foreground/background.

- Boundaries in relation to nature: Where is the "cradle" of resources, where is the "grave" of outputs?

- Geographical boundaries: What is the representative geographical region of your product system? Some process may be defined geographically, others may not.

- Time horizon: For what time period should your LCA be applicable? Are any processes in the future excluded, e.g. in landfills?

In your projects you will have little possibility to influence the choice of these boundaries as you will largely be dependent on what is available in databases. Therefore we put less emphasis on this than would be the case in a "real" LCA study. However, discuss these boundaries whenever it is relevant to your project.

- Cut-off criteria: What parts of the product system are not included in your model, for what reasons?

- Allocation procedures: If allocation is necessary, what allocation criteria were applied? Most important to discuss to the extent that you made decisions on allocation. Some data sets from databases may include allocation that you may not be able to influence.

Assumptions and limitations

- Assumptions at the system level: For instance "We assume that all plastic material used in our product is imported from Germany". Assumptions concerning the specific data that you use to build your model can be documented in the data section. For instance "We assume that the transport distance of plastics from Germany to Sweden is 800 km and that the transport is by truck".

- It is sometimes difficult to separate *assumptions* from the description of *system boundaries*. The important thing is that you document everything that's necessary to understand how you built your model.

- The competing technology if system expansion is made

- Marginal/average and source of electricity and heat

Impact categories and impact assessment method
- There are a number of different impact assessment methods available in SimaPro. In reality, you would need to choose among these. For practical reasons, all project groups should use ReCiPe Midpoint (Hierarchist). State this choice, including reference to its source. Explain briefly what type of

- What impact categories are considered in your model? A full LCA should include all impact categories, but you may have reasons to focus on one or a few. State this and motivate.

Normalisation and weighting
- Always include an overview and assessment of all impact categories. However, normalisation may be used as a way to narrow down what impact categories to focus on in the assessment. If normalisation is used, explain how and why.

- Weighting should not be done in course projects.

LIFE CYCLE INVENTORY ANALYSIS

Process flowchart
- Detailed flowchart including processes that are included in your modelled product system.

Data
- Collected data, assumptions, allocation procedures, data gaps, and calculations related to each process of your product system should be documented and explained.

- Describe the data you are using, so that somebody who is not familiar with the specific data sources that you are using will at least get a general understanding what the data represents. Look into old LCA reports, available on Canvas, for examples of how you can organise documentation of data.

- Referencing data is sometimes difficult. In the data section you should give in-text references to the sources that you are using. Check information in the end of this document.

- In your project, you should create at least one new process or material data sheet in SimaPro. This may be either data collected by your group, or from some LCA database not available in SimaPro. The purpose is that you should perform data documentation in SimaPro. A printout from SimaPro of this/these data sheet(s)

should be provided as Appendix. You can do this by using the Export function under the File menu in SimaPro.

- Check to make sure units are included correctly in tables and elsewhere.

LIFE CYCLE INTERPRETATION

Results

This section should present and analyse your results, reach conclusions, explain limitations, and provide recommendations based on the findings of your LCA.

SimaPro has many ways of presenting results in charts, networks, and tables. Before you start writing this section, explore these different options. You cannot, and should not, include everything in your report. You need to select the most meaningful and useful results. You also need to be able to understand and make an analysis of the results, not just copy a number of charts and tables from SimaPro. This is what we discuss at PS4. Make sure that the results answer your research question.

Suggested outline of presentation of results:

- Present the environmental impact categories (chart or table) that you selected in the goal and scope definition.

- Identify significant impacts of the total system (through own reasoning or normalisation/weighting)

- Identify significant life cycle stages/processes (use process network with variable arrow width, use process contribution chart or table).

- Try to explain the cause (source and emission) of main impacts and processes/life cycle stages.

- If you performed a comparative study of different alternatives, identify and explain important differences between alternatives.

- Analyse the importance of significant and uncertain assumptions by making sensitivity analysis.

- If you performed normalisation, explain what type of information you get from normalisation, and how your normalised results can be interpreted.

Check to make sure units are included correctly in tables, diagrams and elsewhere.

CONCLUSIONS AND RECOMMENDATIONS
- Discuss the results in relation to the goal that you set up for your study.

- What conclusions can you draw from your results?

- Were there any questions that you could not answer based on your results?

- Was there anything surprising about your results? Discuss and explain.

- Did you make any important assumptions that have a large influence on the results? Discuss the influence of the assumptions.

- If appropriate to the goal and scope of the study, make recommendations to decision-makers that can be justified by your results.

REFERENCES

We do not require use of any specific referencing style (there are several different styles, such as Harvard), it is up to you to choose which style you are comfortable with. Whichever style you choose, it should be clear and consistently used throughout the report. It must include the necessary information that will help a reader find the source of the information that you have used from another source.

Always include in-text references in the body of your text. Include a list of complete references at the end of your report. Examples of using Harvard style are listed below. You can easily find more examples on the web.

Scientific paper
- In-text reference: "(Finnveden et al., 2003)"
- In reference list: Finnveden, G., Nilsson, M., Johansson, J., Persson, A., Moberg, A., and Carlsson, T. (2003) *Strategic Environmental Assessment Methodologies – Applications within the Energy Sector.* Environmental Impact Assessment Review, 23, 91-123.

Report
- In-text reference: "(Björklund et al., 2003)"
- In reference list: Björklund, A., Johansson, J., Nilsson, M., Eldh, P., and Finnveden, G. (2003) Environmental assessment of a waste incineration tax. Case study and evaluation of a framework for startegic environmental assessment. Fms-report 184, *Environmental Strategies Research Group*, Stockholm, Sweden.

Web site
- In-text reference: "(fms, 2015)"
- In reference list: fms (2015) *Environmental Strategies Research (fms),* [online] Available: https://www.seed.abe.kth.se/om/avd/fms [30 Oct, 2015]

Personal communication (someone you talked to, to collect data).
- In-text reference: "(Svensson, 2015)"

- In reference list: Svensson, H. (2015) *personal communication* (November 15, 2015).

Software
- In-text reference: "…we used SimaPro (Version 8.0; Pré Consultants, 2015)…"
- In reference list: PRé Consultants (2015) SimaPro 8 [computer software]. PRé Consultants, The Netherlands.

SimaPro database (example of Ecoinvent 3)
- In-text reference: "…using Ecoinvent 3.0 database as implemented SimaPro 8 (Frischknecht et al., 2007)"
- In reference list: Weidema, B.P., Bauer, Ch., Hischier, R., Mutel, Ch., Nemecek, T., Reinhard, J., Vadenbo, C.O., Wernet, G, (2013) *The ecoinvent database: Overview and methodology, Data quality guideline for the ecoinvent database version 3*, www.ecoinvent.org

Specific dataset from database in SimaPro
"Steel, unalloyed {RER}| steel production, converter, unalloyed | Alloc Def, U", Ecoinvent 3, as implemented in SimaPro 8.

When documenting what data you used to build your model, you should refer to the exact dataset, not just SimaPro or Ecoinvent in general. You may for instance include a table with datasets for different assemblies listed, explaining where in the model this data was used, in order to model what (feel free to check project reports from earlier years for examples of this). If all datasets are from Ecoinvent, you can mention this in the header of the table. Otherwise, you need to specify for each dataset what database they were retrieved from. An example is included below:

Component [unit]	Material	Input process in SimaPro 7	Quantity	Database
CHP-plant [1 unit]	Cogen unit 1 MW	cogen unit 1MW, common components for heat+electricity/RER	1 unit	Ecoinvent v2.2
Trench works [1 m]	Pavement	cement, unspecified, at plant/CH	3.84E+01 kg	Ecoinvent v2.2
	Concrete	concrete block, at plant/DE	5.76E+01 kg	Ecoinvent v2.2
	Aggregates	sand, at mine/CH	3.61E+02 kg	Ecoinvent v2.2
	Diesel	diesel, burned in building machine/GLO	3.45E+01 MJ	Ecoinvent v2.2