

COST Action 530, WG 5 - End of Life
Waste Management and LCA Training School
Bulbank Rest Home, 2 Lazouren Bryag str, Sozopol, Bourgas, Bulgaria
September 26-30 2005

Final Report
for COST Office

P. Sinclair (UK), R. J. Saft (NL), V. Vladimirov (BG)

15 Participants from 8 countries (Bulgaria, Greece, Hungary, India, Israel, Lithuania, Poland, and Romania) were allowed after more than 30 (from 14 countries) have shown interest. Some interested people were refused because of a lack of reimbursement possibilities or because special personal interpretation of the Cost rules and they didn't fit with the intended target group. Some others retreated for personal reasons.

With lecturers from other 5 countries (Switzerland, Germany, Netherlands, UK and Italy-JRC) the 13 European countries were represented.

Practical organisation is taken care of by V. Vladimirov and assistance.

The training school is running as follows:

Friday 23 September 2005

Beginning of participants arriving and their accommodation

Saturday 24 September 2005

Participants arriving and their accommodation

Sunday 25 September 2005

9.00-13.00 Preparing of Final detailed Training School Program by P. Sinclair (UK), R. J.Saft (NL), and V. Vladimirov (BG)

All day participants arriving and their accommodation

Monday 26 September 2005

9.00-9.30 Registration: 15 students registered

9.30 Welcome, Introduction and Opening of the Training School (V.Vladimirov)

Welcome from Bulgarian Ministry of the Environment

General Presentation on Cost, Action 530 and WG5 End of Life (V.Vladimirov)

Objectives (R. Saft)

Main objectives were to raise awareness for and build capacities on the use of LCA regarding integrated waste management. Each country represented needs capacity-building in LCA. The emphasis of the training school will be on how to do LCA, with waste management identified as a key area for focus. The aim is to have an open and interactive training school in a non-formal setting.

Introductions (participants)

Countries represented: Bulgaria x 4, Romania x 3, Hungary x 2, Greece x 1, Poland x 2, Lithuania x 1, Israel x 1, and India x 1

Variety of backgrounds: academic staff x 3, consultancy x 5, non-governmental organizations x 3, government ministry x 1, PhD students x 5
The participants also said what they wanted from the training week

11.0 Expectations of the participants were gathered (P. Sinclair)

Feedback was gathered from the participants on their expectations and what they wanted from the week, and was displayed on a blackboard. Feedback was also periodically gathered throughout the remainder of the week by informally asking the students on a one-to-one basis, and in one more formal questioning session on the Wednesday. Many participants expressed their interest in practical issues such as available software tools and their purchase prices. But also the communication surrounding waste management and LCA together with dissemination of results were mentioned.

ALL THE REMAINING SESSIONS WERE ACCOMPANIED BY QUESTIONS AT ANY STAGE, AND IN PARTICULAR BY FORMAL QUESTIONS AND ANSWER SESSIONS AT THE END OF EACH LECTURE WITH DISCUSSION. DISCUSSION ALSO CONTIUED INFORMALLY AT ALL COFFEE BREAKS AND MEALS.

11.30 Waste Issues in Europe (Chair P. Sinclair)

Waste Management and Circumrotating of waste in Bulgaria (N. Ofcharov, Waste Management Directorate Representative, Bulgarian Ministry of the Environment)

A summary of EU requirements for Bulgaria in respect of environmental directives, and Bulgarian plans to meet them. Policy attention will be paid to prevention, recovery/recycling and final disposal. As some main problems now arising in the final disposal emphasis for the short term is on establishing sanitary landfills and well equipped incineration facilities, aided by EU funding.

Waste quantities and trends in Europe (R. Saft)

A summary of quantities and trends of different types of waste forms of treatment, collection methods, taxation instruments used, etc in different European countries. Since recovery and recycling for some major waste flows (e.g. construction and demolition waste) is growing, and because of declining economies in Eastern Europe in the past decade, waste arising seem somewhat stabilized. This however does not appear for municipal wastes were the trend is a growth in quantities. Data sources for further research are given.

14.30 Waste Issues in Europe (Chair P. Sinclair)

Environmental burden of waste and Dutch case study (R. Saft)

Impacts of waste and waste management in Europe. A set of indicators is prepared by the EEA. Main issues are GHG-emissions, leachates and land use. Most of these indicators relate well to LCA.

Waste management and LCA: the Dutch case since 1991: establishment of National Council, changes in incineration, participation in source separation, etc. In general now a well structured waste management system. National waste management policy plans are supported by LCA in the field of technology selection and the field of strategic planning.

16.00 Examples of LCA (Chair P. Sinclair)

Life cycle thinking in EU directives – institutional stakeholder – future developments (K. Koneczny)

Life cycle thinking is a subject in many EU-directives, not in the least the forthcoming Waste Framework Directive. Life cycle thinking originates from the directive on Integrated Product Policy (IPP). Covering IPP studies on the JRC Website, the European platform on life cycle thinking and assessment at JRC (IES), many other useful LCA databases and EU Municipal Waste Management Life Cycle Pilot Studies in all EU Member States.

19.00 Official Dinner

Tuesday 27 September 2005

9.0 Introduction to LCA (Chair R. Saft)

Introduction to LCA and ISO-standards for LCA (R. Saft)

Standard procedures for conducting a Life Cycle Assessment including the main phases: goal and scope definition, inventory, impact assessment and interpretation. Each of these phases is supported by standards within the ISO140040 family. LCA is an iterative process: the phases are constantly being reviewed and adapted when necessary. LCA databases help to structure inventories and impact assessment. Databases mainly deliver background system, where foreground systems are the actual subject of the LCA being conducted.

11.0 Life Cycle Inventory (Chair V. Vladimirov)

Functional Unit and System Boundaries (R. Hischier)

Including functional unit example exercises, ISO allocation recommendations, system boundary extensions including value-corrected substitution method.

Life Cycle Inventory (R. Hischier)

Including databases and Swiss ecoinvent database (also suited for other European conditions), uncertainties in inventory data. LC Inventories deal with input-output data of a process/material contains often used standard data and facilitates the user to conduct an LCA. Emphasis on transparency and traceability (as complete as necessary) but also as practicable as possible.

14.30 Steps in LCA (Chair R. Saft)

Life Cycle Inventory (R. Hischier)

Continuation of the morning lecture with exercises and case studies in photocopying, the LCA of a conference (paper vs. CD comparison for conference proceedings), and the services supplied by television, newspapers and the Internet. A practical case for WEEE is presented where take-back and recycling system show clear environmental advantages, compared with the scenario assuming a complete incineration.

16.0 Steps in LCA (Chair R. Saft)

Life Cycle Impact Assessment Methods (R. Saft, P. Sinclair)

Descriptions of the main LCIA method groups making a distinction in problem oriented midpoint indicators and damage oriented endpoint indicators. In-depth discussion of impact categories in the CML-2 methods (GWP, acidification, ozone layer depletion, toxicity, etc.) including impact assessment factors, subjective nature

of impact assessment factors and uncertainties. Overall message (also in lecture of R. Hischer): in case of doubt about quality of impact assessment, select several and compare their impact on outcomes of the study at hand.

Weighting of impact categories is controversial and not included in ISO. For communication purposes and for decision makers however it is a valuable option and should be regarded as such (but with care).

Wednesday 28 September 2005

9.0 Use of LCA in Waste Management (Chair P. Sinclair)

PVC recovery case study (M. Betz)

In-depth description of a detailed waste management models for PVC cabling (incineration, re-use, landfill), including economic and environmental impact assessment data in the decision-making process. Discussion of how such data can inform the decision-making process. In this case LCA results follows waste management hierarchy of re-use, incineration and landfill. This however is not common.

11.0 Use of LCA in Waste Management (Chair P.Sinclair)

Software tools – public data (M. Betz)

Live presentation of how GaBi software works, including system definition, inventory generation, parameters, impact assessment and other features.

14.30 Use of LCA in Waste Management (Chair P. Sinclair)

Software tools – public data (M. Betz)

Hands-on session for all participants using 5 laptops and student versions of GaBi software. Constructing a system, generating the inventory, impact assessment etc. Participants continued with the help of printed manuals through the WG5 administrative meeting (which included the lecturers and lasted from 1615 – 1645 to discuss the production of follow-up materials) and did not finish until **1830**.

Thursday 29 September 2005

9.0 Communication of LCA and use of SimaPro LCA software (Chair: R. Saft)

A case study in environmental systems assessment with the use of multimedia materials and quantitative LCA (P. Sinclair)

Description of a case study in participatory waste management informed by books, documents, the presence of specialists and the use of multimedia materials and quantitative LCA.

11.0 Practical demonstration of SimaPro software (R. Saft)

Live presentation of how SimaPro software works, including system definition, inventory generation, parameters, impact assessment and other features.

Afternoon – field trip to nature reserve on former petrol waste landfill with exceptional birds' biodiversity. (V.Vladimirov)

Friday 30 September 2005

9.0 Input-Output methods and hands-on use of SimaPro software (Chair: R. Saft)

Integrated Regional Material Flow Accounting by Input-Output Analysis (P. Sinclair)

Use of Input-Output analysis, household expenditure data, prices, outputs and stocks data and import/export data to construct regional I-O models. Example case study methodology and results.

10.0 Hands-on session for participants of SimaPro software with case study (continuation after lunch)

An inventory list for the waste management of waste water treatment sludge (option: wet oxidation) is given. The participants get a set of tips and questions i.e. to prepare a waste treatment process, to select from the background data, to select an impact assessment method and to interpret/analyse results from the calculations.

12.30 Course feedback and evaluation session

At first the lectures give an overview of their impressions. The practical organization worked very well. The interaction with the participants was very good. The lecturers elaborated that LCA is a complex but not a rigid tool. This means that every step has to be conducted with a sensible mind and not take already defined LCA-systems for granted along the way. The participants also explicitly expressed their satisfaction. A formal evaluation including improvement options will be prepared for COST based on the individual evaluation forms.

Close and final summery and documents preparation till 16h

Saturday 01 October 2005

Departure of participants

It was decided to be prepared a follow-up of the training school. This follow-up consists of several topics in either written form or CD-ROM. The final compilation for the CD-ROM will be prepared by V. Vladimirov.

The CD-ROM will consist of the following topics:

- Introduction (objectives, programme, participants, lectureres, photo)
- Overview slides and papers
- Useful addresses and info (partly in lecture of R. Hirschier and other lectures). Others to be supplied by R. J. Saft if necessary
- Glossary of terms. P. Sinclair has some available on waste management. Others to be supplied by P. Sinclair.
- Feedback on expectations (prepared by P. Sinclair), evaluation by participants (prepared by V. Vladimirov), impressions, summaries of the presentations (prepared by P. Sinclair and R. J. Saft).

The evaluation of the participants will be summarised and sent to the COST office by V. Vladimirov. As we want the presentation of the follow-up before the next COST 530 MC-meeting half November, all information should be sent to V. Vladimirov in the second half of October at the latest but preferably earlier.

R. J. Saft will explore the possibility of sending a short article to the International Journal of LCA for the section of workshops and meeting. The size should be no more than 1/3 of a

page. V. Vladimirov will use this article for translation in Bulgarian and publication in relevant Bulgarian articles and media.

In general we identified a positive attitude in Central and Eastern European Countries for the use of LCA in relation to integrated waste management. Knowledge transfer and capacity building however should focus more on practical issues such as data availability and data quality. This at the moment seems more appropriate than highly sophisticated tools introducing cutting edge knowledge.

COST 530, WG5 “End of Life”

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Summary of 15 Participant Evaluation forms

1. How did you learn about the training school?
 - colleague / friend **10**
 - flyer
 - internet **4**
 - other **1**

2. Did the course meet your expectations?
 - Yes **15**
 - no

3. If not, why not?

4. Can the information learned in this course be used in your every-day work?
 - yes **13**
 - no **2, Maybe in the future**

5. If yes, please give an example.
IPP, communication tools, decision making, waste management, PhD study, LCA software, waste management decision making, lectures, projects,

6. Which information was new to you? Please list examples
LCI, LCA theory and software, LCA (multiple answers), Software (multiple answers), EMS planning, GaBi software (multiple answers), Waste management, LCA case studies,

7. The course met my expectations very well.
 - agree strongly **7**
 - agree somewhat **8**
 - disagree somewhat
 - disagree strongly

8. The content of the program was completely satisfactory.

- agree strongly **5**
- agree somewhat **10**
- disagree somewhat
- disagree strongly

9. There were several topics not covered.

- yes **3**
- no **12**

10. If yes, which ones?

Link with Eco-design, labels, EMS, NGO problems using WM+LCA, accepted case studies and reports on LCA and WM on governmental level

11. The balance between theory and lab exercises was excellent.

- agree strongly **5**
- agree somewhat **8**
- disagree somewhat **2**
- disagree strongly

12. If not, why not?

More practical examples, with software specific case study, one day exercise for 5 days of training

13. The practical organization of the school was completely satisfactory.

- agree strongly **11**
- agree somewhat **4**
- disagree somewhat
- disagree strongly

14. If not, what can be improved?

We would like to have presentations printed at the time, include local problems & solutions,

15. Do you have further suggestions?

More practical exercises, perhaps also a case study to be conducted by the students. More materials distribution (reports, information sources). To invite more lectures. Repetition of written above.



SOFIA UNIVERSITY
St. Kliment Ohridski



COST Action 530 Training School on
“Waste Management and LCA”
Sozopol, Bulgaria, 26-30 September 2005



IVAM – University
of Amsterdam

CERTIFICATE OF ATTENDANCE

We certify that

Anna Jurek

has successfully attended the COST 530 training school.

*Michael Betz (Dipl.-Phys.)
(Chairperson COST 530)*

*Ing. Robert Jan Saft
(IVAM – Uni. Amsterdam)*

*Prof. Petar Slaveykov
(Dean Sofia Uni. - GGF)*

*Dr. Valentin Vladimirov
(Director of the school)*



