

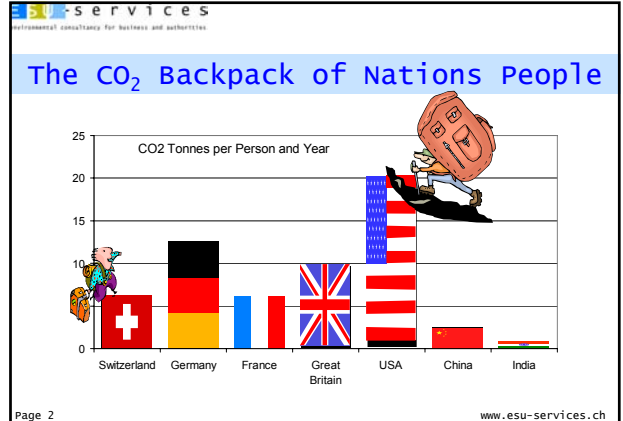
Combining LCA, trade statistics and the national greenhouse gas inventory to determine the embodied emissions caused by international trade

Dr. Niels Jungbluth, Roland Steiner
 Dr. Rolf Frischknecht
 ESU-services Ltd., Uster



erscp

European Roundtable on Sustainable consumption and production
 Basel, 21. June, 2007



ESU-services
 environmental consultancy for business and authorities

Problem Setting

- what is the true contribution of Swiss citizens to global warming?
- which role do im- and exports of embodied emissions play?
- what is the development of embodied emissions?

Page 3 www.esu-services.ch

ESU-services
 environmental consultancy for business and authorities

Contents

- Methodology for determining the embodied emissions with LCA and statistics
- Summary of direct and embodied emissions
- Second approach with Input-Output-Table
- Conclusions

Page 4 www.esu-services.ch

esu-services
environmental consultancy for business and authorities

Use of LCA for determining the embodied emissions

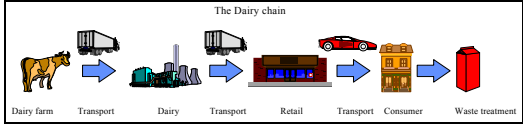
- Foreign trade statistics, Energy statistics
- Emission factors (CO_2 , CH_4 , N_2O , NO_x , CO , NMVOC, SO_2) for single products based on LCA studies

➤ Calculation of embodied emissions for all imports and exports

Page 5 www.esu-services.ch

esu-services
environmental consultancy for business and authorities

Principle of Life Cycle Assessment



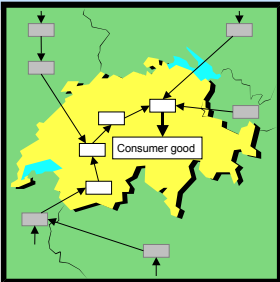
© LCA network food, final document

➤ LCA looks from cradle to grave

Page 6 www.esu-services.ch

esu-services
environmental consultancy for business and authorities

Territorial Principle of IPCC statistics



- Direct emissions
- Embodied emissions

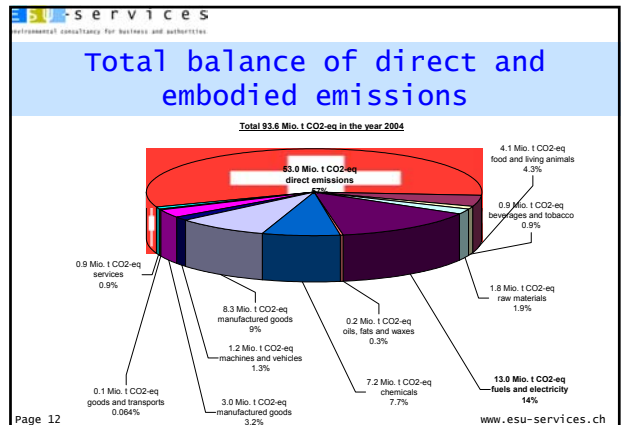
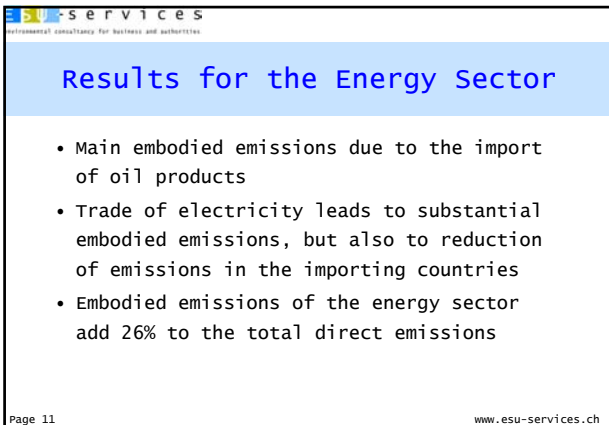
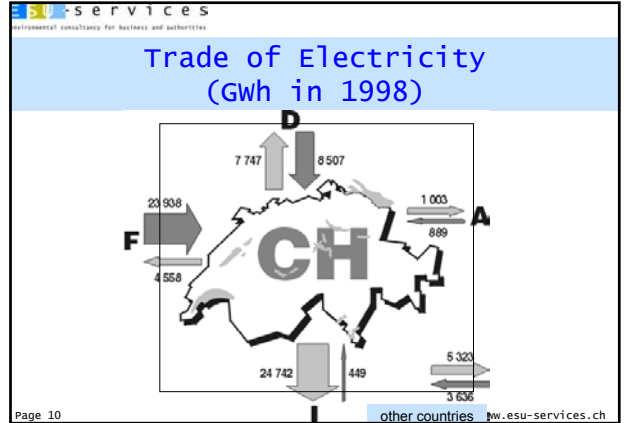
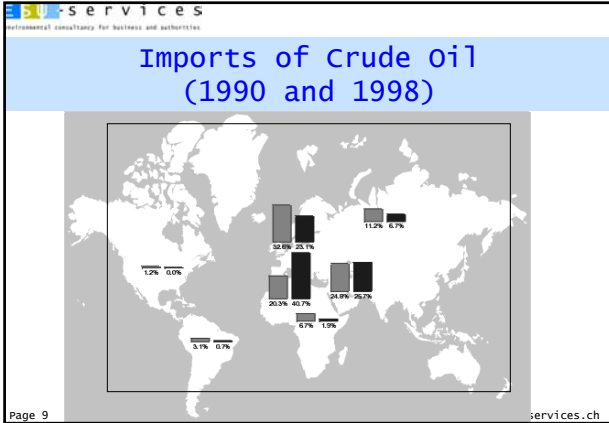
Page 7 www.esu-services.ch

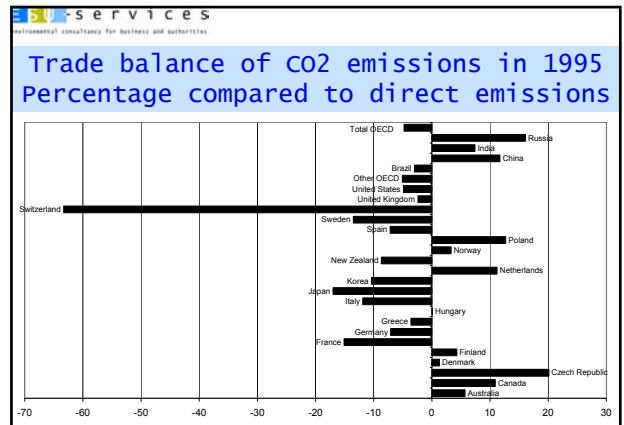
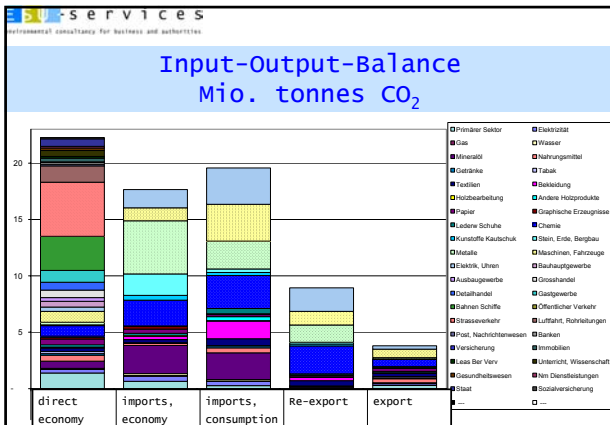
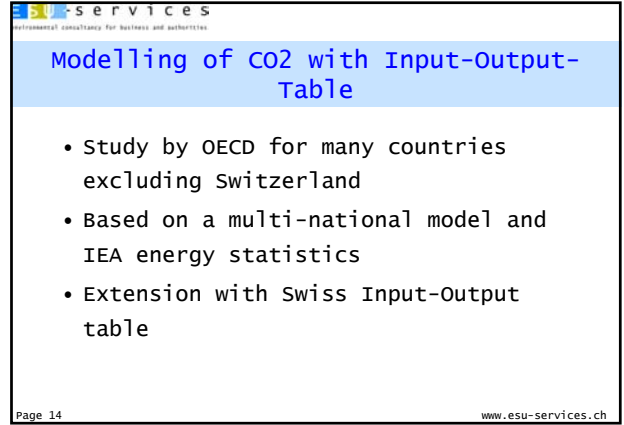
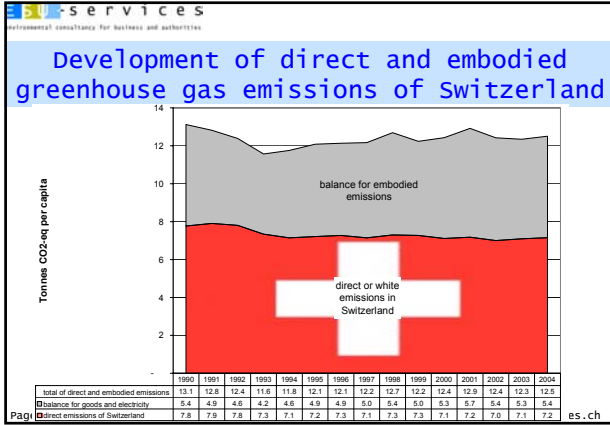
esu-services
environmental consultancy for business and authorities

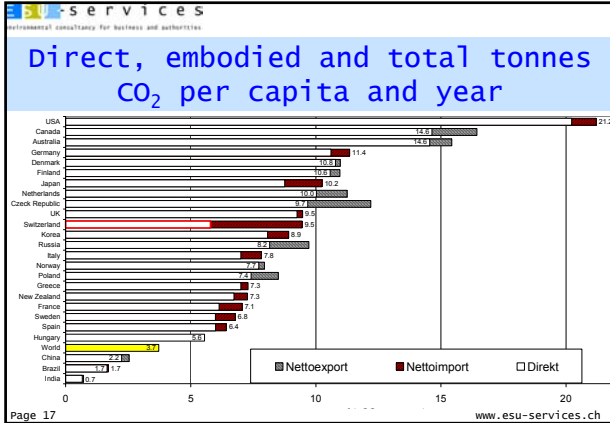
Example for Tomatoes

- Import: 39 772 tonnes/a
- Exports: 1 tonne/a
- Emission factor for agriculture: 0.52 kg CO_2 per kg Tomatoes
- Separate calculation for transports

➤ Embodied Emission due to trade with tomatoes: 20.6 Gg/a







esu-services
environmental consultancy for business and authorities

Conclusions

- Total embodied emissions are as high as 78% of the Swiss direct emissions
- Combination of national statistics and product LCA is feasible and necessary in order to have a realistic picture
- Input-Output modelling confirms and explains the results
- Differences in national GHG emissions are partly levelled out if consumption patterns are taken into account

Page 18 www.esu-services.ch

esu-services
environmental consultancy for business and authorities

Thank you for your attention

Download of the study
<http://www.umwelt-schweiz.ch/uw-0711-d>