Balances as guides towards a sustainable future

(Resource ID: 553)

Andreas Pfennig
Andreas Pfennig
andreas.pfennig(at)ulg.ac.be
This teaching resource is allocated to following University:
ULg - Université de Liège

Institution:
Department of Chemical Engineering

http://www.sustainicum.at/en/modules/view/553.Balances-as-guides-towards-a-sustainable-future

Individual work
Plenum

Independent of the number of students

4-7 lecture units

English, German

Balances allow to quantitatively describe fundamental relations in respect to human activities on earth for the actual situations as well for projections into the future. Balances are set up for fossil and biogenic raw materials, for land area and several other aspects. It is taken care that these aspects are presented in a way that they can be used as reference to compare them to the individual behavior. Information on global average values as well as values for Austria form a basis to evaluate the large anthropogenically induced material flows. This creates a framework for dealing on a fact-based level with sustainability e.g. also for judging political statements or discussions in the media.

In discussions on sustainability with people from different groups one often realizes that some fundamental boundary conditions are left out of the considerations either accidentally or deliberately. Basic boundary conditions can be formulated as simple balances that lead to inevitable interrelations for resources used especially if they are scarce. Such balances hold for different areas, e.g. energy supply from fossil resources, CO2 emissions, food for mankind. To lay a solid foundation in this context a presentation has been developed which describes and visualizes the corresponding interrelations quantitatively. Balances allow to estimate how long fossil resources will last, how much bio-

energy can be supplied without severely conflicting with food supply and how many people can be fed with a growing world population. Special focus is placed on a sensible order of magnitude of the numbers that are required for the quantitative discussions and that they can be compared to individual experiences. Energy utilization in KWh/(year and capita) can be directly compared to the electricity bill. The area used for our food production is roughly one soccer field per capita. With such a sensible order of magnitude it becomes possible to relate figures presented by politicians and decision makers in public discussions and in the media to some reasonable basis even though these figures are often deliberately presented in such a way as not to be able to easily relate them.

Beside these insights gained by balancing a further goal of this module is to supply a solid basis for a variety of figures presented in media and public discussions. One essential result of the quantitative balances is that one of the major influencing factors is human behavior e.g. in respect to nutritional habits, energy utilization and number of children. Here it becomes apparent that there are conflicting rights of the people also within the UN human rights in a limited world. Such conflicting rights are explicitly addressed.

The structure of the presentation is in three subtopics. In a first section the basics for balancing are presented and today's world situation is quantitatively described. In the second part scenarios of future development are derived based on these data. In the third section the consequences resulting from the scenarios are discussed.

The module contains a collection of slides for up to 6 lecturing and exercises or homework. The level is suited for previously uninformed people and can be adjusted by leaving out individual slides according to previous knowledge of the audience. Also the length of the presentation can be adjusted either by reducing the depth of treating some

topics or by suitably choosing the topics presented. A detailed manuscript is available which is suitable for self-study. Also some source data are supplied in corresponding files, e.g. excel.

Additional resource: following video series "Balances as guides towards a sustainable future**":**

video 1: chapter 1

video 2: chapter 2

video 3: chapter 3

video 4: chapter 4.1

video 5: chapter 4.2

video 6: chapter 4.3, 4.4

video 7: chapter 5, 6

Teaching Tools & Methods

 

Written material Video

Learning Outcomes

The participants understand that balances allow fundamental statements on interrelations with respect to resource utilization, reserves, etc. They have a quantitative impression on the order of magnitude of anthropogenic material streams. They can judge and evaluate scenarios of future human development. They have available a uniform framework that allows to relate information on sustainability in media, politics, and discussions. This relates especially to world average values as well as average values for Austria. The participants have learned to properly assess the orders of magnitude used and e.g. to distinguish relevant from irrelevant changes with respect to sustainability.

Relevance for Sustainability

Without balances and corresponding reliable basis data for using them in the balances dealing with and discussion of sustainability is not possible on a sound basis.

Related Teaching Resources

No specific previous knowledge / related resources required

Sustainability criteria

- Interdisciplinary
- Related to global challenges / needs
- Application oriented
- Related to acquiring knowledge
- Strengthens strategic competence
- Problem-solving oriented

Preparation Efforts

Medium

Access

Free

Sources and Links

video 1: chapter 1

video 2: chapter 2

video 3: chapter 3

video 4: chapter 4.1

video 5: chapter 4.2

video 6: chapter 4.3, 4.4

video 7: chapter 5, 6

Funded by

Funded by the Austrian Federal Ministry of Science and Research within the framework of the call "Projekt MINT-Massenfächer" (2011/12)