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Swiss Ecological Scarcity Method: the new version 2006

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Overview

- The basic concept
- The extended formula
- New impact categories
- Regionalised eco-factors:
  Freshwater resource assessment
- Conclusions

The basic concept

Distance to target method: $\left(\frac{F}{F_k}\right)$

- Actual emission situation (F)
- Politically defined environmental targets (F_k)
- Swiss situation or international targets signed by Switzerland (F_k)
- Sister of the JEPIX method

Goals of the update 2006

- Reflect current environmental policy
- Include additional environmental impacts
- Increase ISO-compliance
- Ensure
  - practicality
  - comparability among nations / regions

The extended formula

$$\text{eco-factor} = \frac{1EP}{F_k} \cdot \frac{F}{F_k} \cdot c \qquad (1)$$

$$= 1EP \cdot \underbrace{K}_{\substack{\text{Characterisation} \\ \text{(optional)}}} \cdot \underbrace{\frac{1}{F}}_{\text{Normalisation}} \cdot \underbrace{\left(\frac{F}{F_k}\right)^2}_{\text{Weighting}} \cdot \underbrace{c}_{\substack{\text{Constant} \\ \text{(1e12 UBP/a)}}} \qquad (2)$$

EP : eco-point (the unit)

F : current flow

F_k : critical flow

Features of extended formula

- Characterisation made explicit
- Normalisation flow based on actual flows (not critical flows)
- Normalisation flow independent of flows used in weighting factor
  => enables regionalisation
- identical eco-factors with new and with existing formula in basic cases (national averages)

Meaning and purpose of the factors

- Normalisation:
  - quantifies Swiss annual contribution to the environmental problem
  - relates the scale of the environmental problem to the Swiss scale
- Weighting:
  expresses the scarcity of the environmental impact in Switzerland or any other region

New environmental impacts

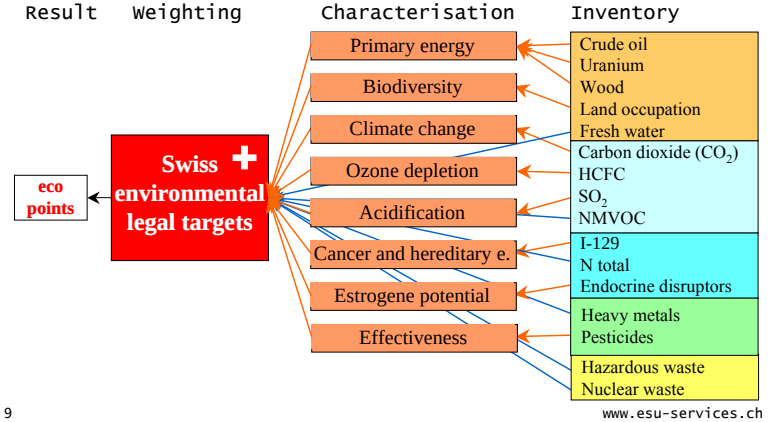
Resources:

- Use of Freshwater
- Land occupation

Emissions to water:

- Endocrine disruptors
- Radionuclide emissions to the Sea

General Layout



Freshwater use

- Freshwater is getting increasingly scarce in more and more world regions
- Large regional and local differences in scarcity
- Need for regionalised eco-factors
- Scarcity to be defined in relative terms
- Water pressure index:
  water consumption / renewable water resources
- References
  - Concept: OECD 2004: Key environmental indicators
  - Data: FAO 2005: Aquastat database

Normalisation / Characterisation

- Method applied on Swiss situation
- Freshwater use in Switzerland:
  2.57 km³ per year
  (= normalisation flow)
- No characterisation applied

Weighting

$$\text{Weight (Region A)} = \left(\frac{\text{current flow in Region A}}{\text{critical flow for Region A}} \right)^2 \quad (3)$$

$$= \left(\frac{\text{water consumption (Region A)}}{\text{renew. water resource (Reg. A)} \cdot 20\%} \right)^2 \quad (4)$$

- Critical flow = medium water pressure
- Medium water pressure:
  consumpion = 20% of renewable water resources

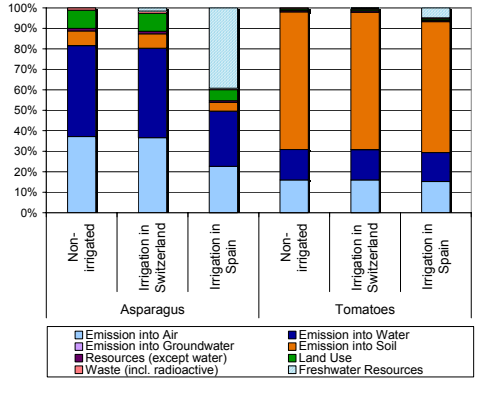
Regional water pressure

Category	water pressure range	actual water pressure	weighting factor
low	<0.1	0.05	0.0625
moderate	0.1 to <0.2	0.15	0.563
medium	0.2 to <0.4	0.3	2.25
high	0.4 to <0.6	0.5	6.25
very high	0.6 to <1.0	0.8	16.0
extreme	≥1	1.5	56.3

Classification of countries

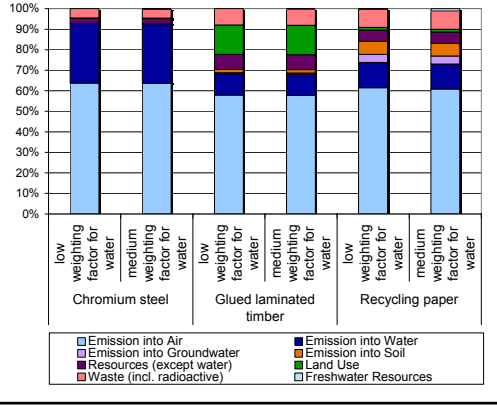
Water pressure category	weighting factor	Countries
low	0.0625	Argentina, Madagascar, Russia, Switzerland
moderate	0.563	France, Greece, Mexico, USA
medium	2.25	Japan, Thailand, China, Germany, Spain
high	6.25	Algeria, Morocco, Sudan, Tunesia
very high	16.0	Pakistan, Syria, Tadschikistan, Turkmenistan
extreme	56.3	Israel, Jemen, Kuwait, Saudi-Arabia

Example 1: agricultural products



grown in
- Switzerland
- Spain

Example 2: material supply



applying
- low
- medium
weighting factor

Conclusions

- Eco-scarcity formula slightly revised
- Regional eco-factors are now possible
  => method is transferable to other regions
- Freshwater use, Land occupation, emissions of endocrine disruptors and radionuclides to the Sea are now included in the assessment
- Freshwater consumption gets relevant in agricultural production in regions with medium and higher water pressure
- Eco-factors available in EcoSpold format