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Federal Office for the Environment FOEN

Division Economics and Innovation

Relevance of single score approaches and planetary boundaries

9th sept. 2019, Life Cycle Discussion Forum 72

Dr. Josef Känzig, section consumption and products,
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Interest for single score methods. Why are they important for politics? (1)

- Decision-making in environmental policy needs clear, understandable and comprehensible statements
- **Single score methods**
 - provide an overall picture
 - serve as a control measurement to reveal trade-offs (e.g. less greenhouse gases, higher environmental impact)
 - help to summarize a comprehensive analysis



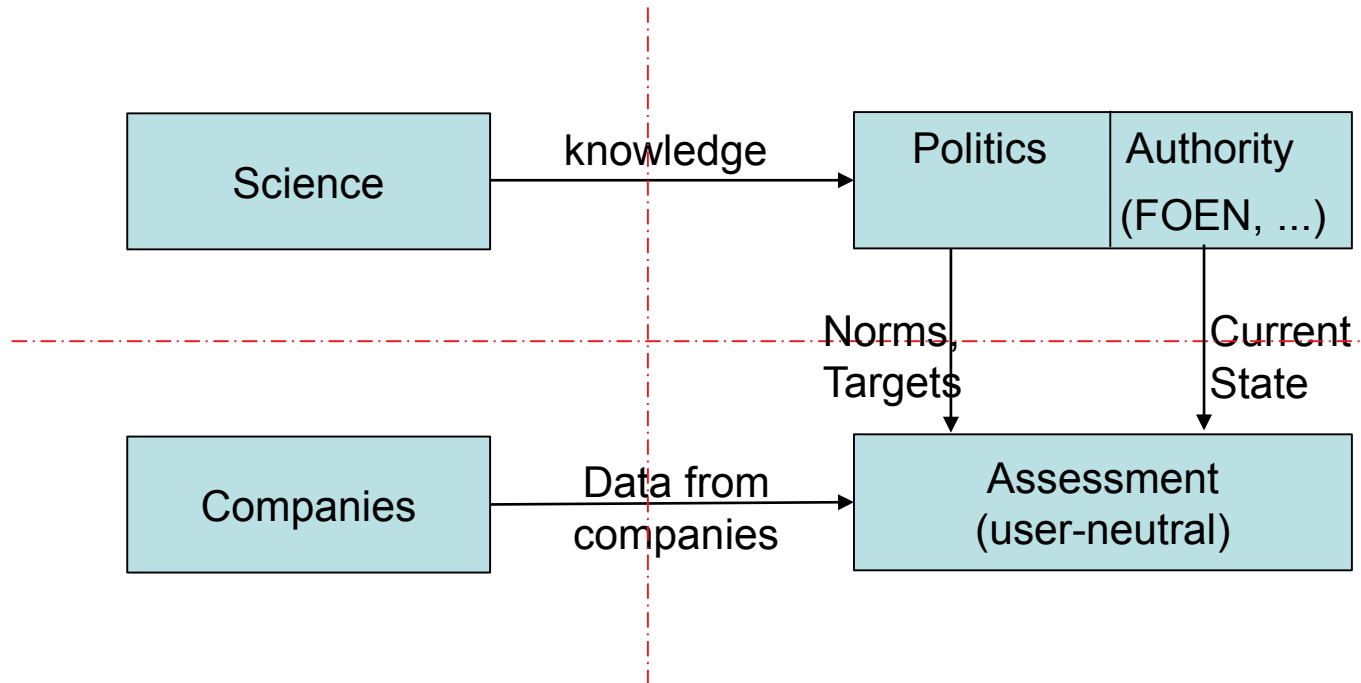
Interest for single score methods. Why are they important for politics? (2)

- A single score analysis should always be supplemented by further Life-Cycle Impact Assessment (LCIA) methods, e.g.
 - Midpoints
 - Other single score LCIA-methods
- **Distance-to-target methods**
 - are based on the principle of separation of powers
 - offer a high transparency & a good traceability



“Separation of powers” in the ecological scarcity method (“UBP method”)

Principle to avoid arbitrary assumptions
«Separation of powers»





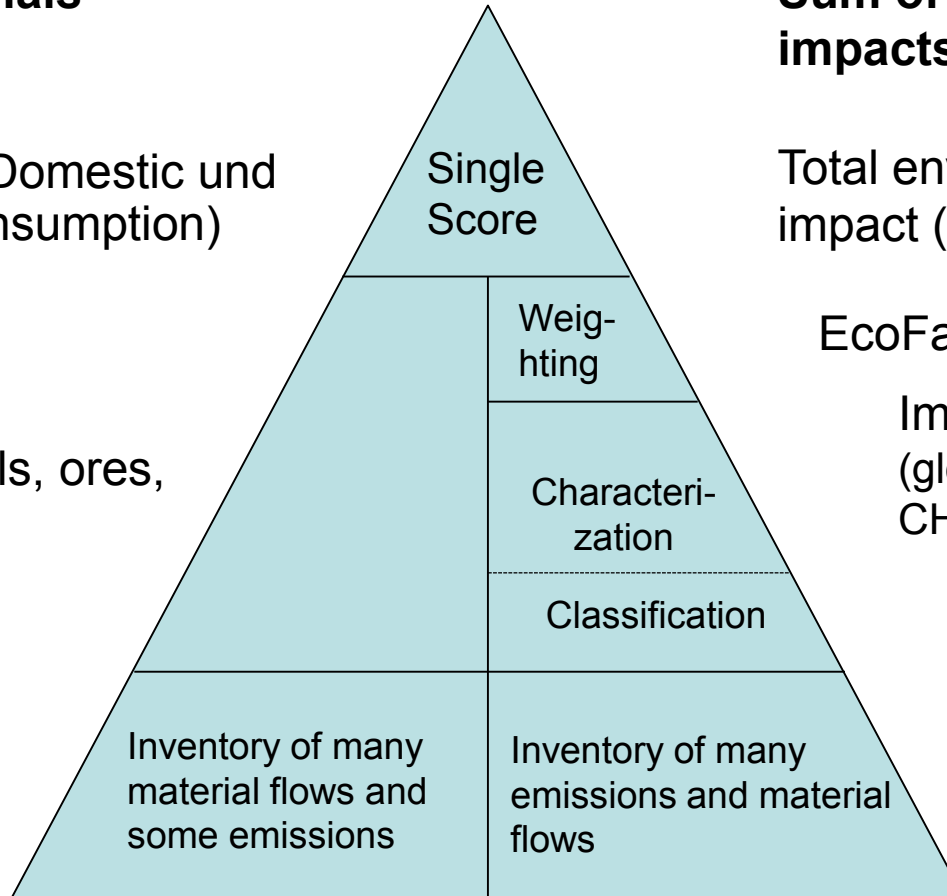
Comparison of total environmental impact and material flow analysis

Sum of all materials (tons)

DMC und RMC (Domestic und Raw Material Consumption)

Material category (biomass, minerals, ores, energy sources)

t compost
t gravel, sand
t metals
t coal, oil



Sum of environmental impacts (eco-points)

Total environmental impact (eco-points)

EcoFactor (eco-point/unit)

Impact Categories (global warming potential $\text{CH}_4 = 25 \times \text{CO}_2$)

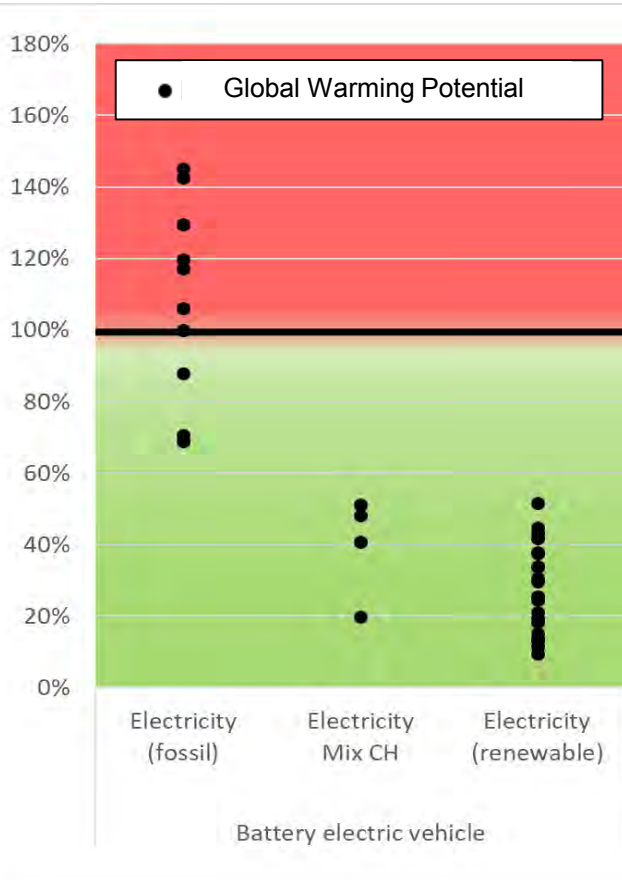
t CH_4 contributes to global warming

t CO_2
t CH_4

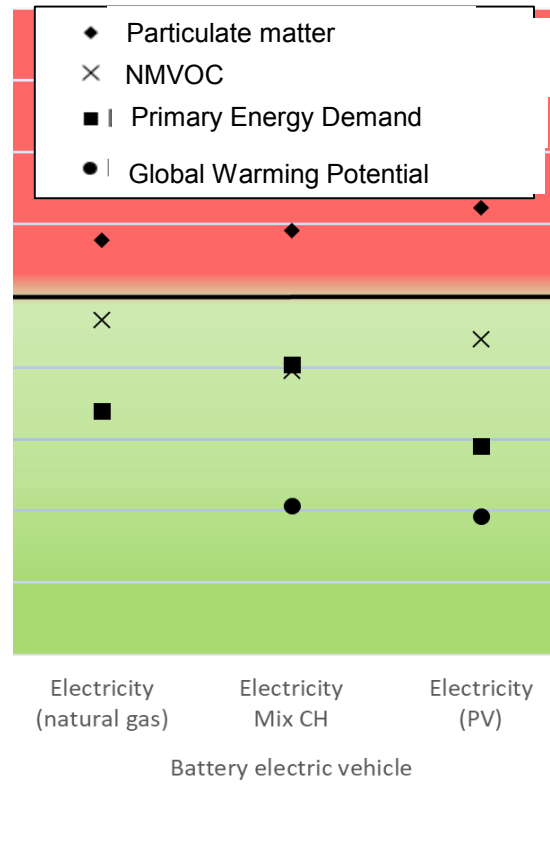


Greenhouse gas emissions, environmental impacts and eco-points from passenger cars [/ passenger-km]

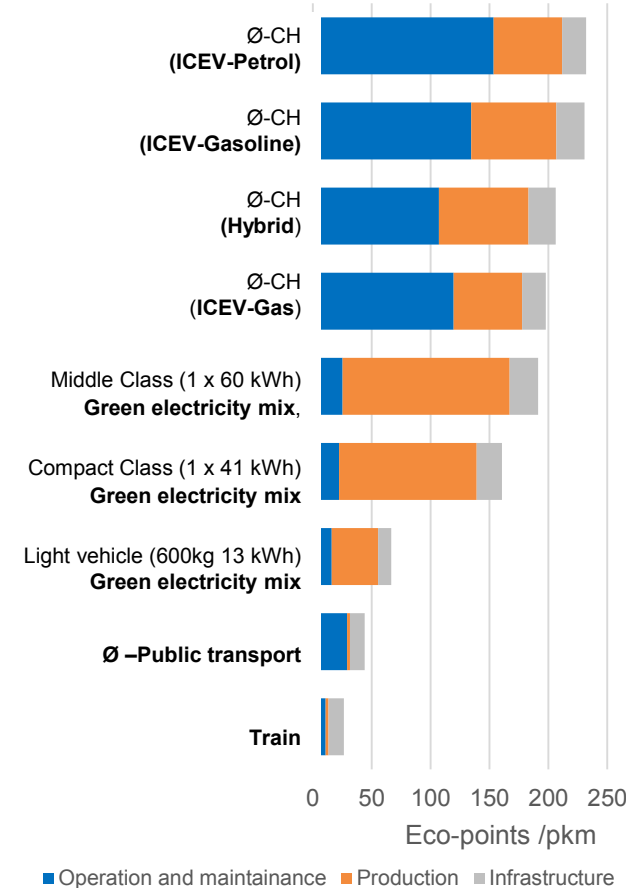
Greenhouse gas emissions:
and all other environmental effects?



Several environmental impacts:
Is a clear statement in favor of a variant possible?



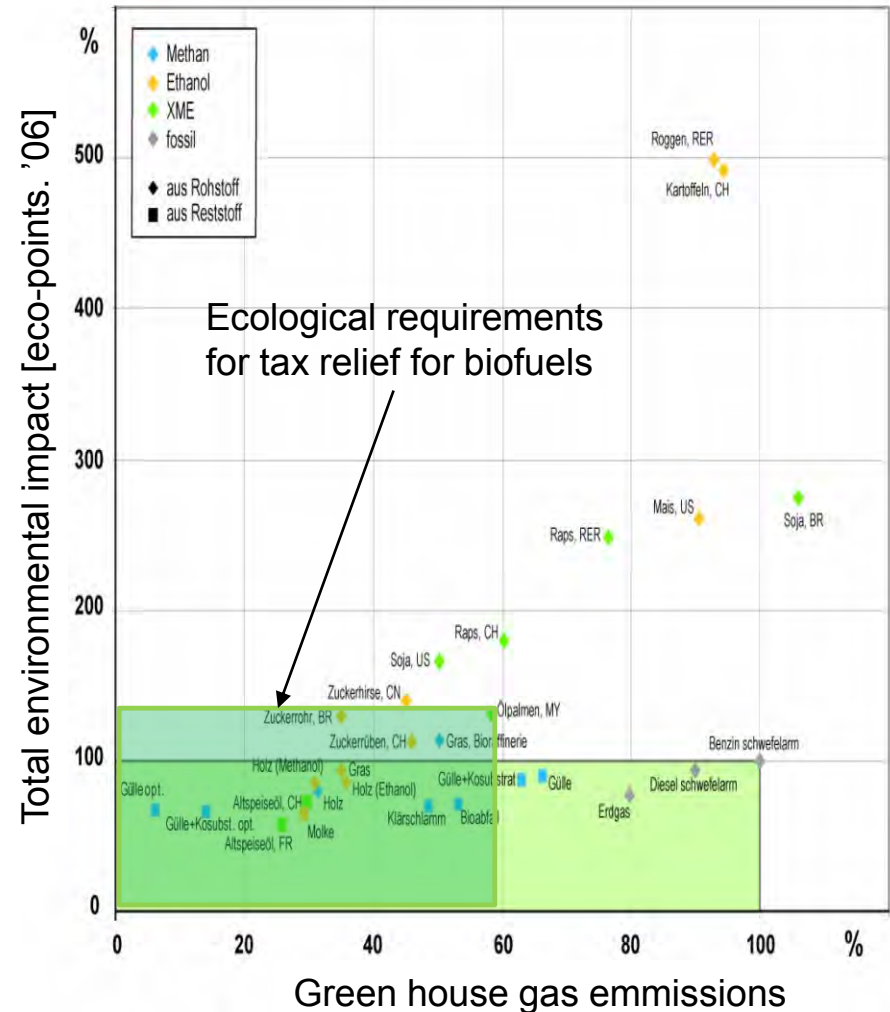
Single score
Clear statement based on the assumptions/
and value system used, but ...





Greenhouse gas emissions & environmental impacts of alternative fuels [per passenger-km] compared to the fossil reference petrol

- Analysis and graphics were crucial in designing tax relief for biogenic fuels
- Consequence:
 - Eco-points as a control variable in the mineral oil tax ordinance
 - almost exclusively biofuels based on biomasse waste and residues on the market (with the exception of small amounts of fuels from wood gasification or synthetic fuels)





Impact assessment with the method of ecological scarcity (eco-points = UBP)



Principles:

- Aggregation of pollutants according to their scarcity: Emissions and resource consumption (**current** situation) compared with environmental targets according to environmental legislation (target size)

Characteristics:

- Difference approach (Distance to target)
- fully aggregated (eco-point as indicator)
- Eco-factors based on a political process
- takes into account a variety of environmental impacts (air, water, soil, ...)
- Regionalization is possible (for example water)
- international targets are used where no specific CH targets available



Strengths of the method of ecological scarcity

- Provides an overall view
- Transparent and clear distribution of roles (it reflects the environmental goals of Switzerland)
- Enables presentation of individual environmental effects as well as the aggregated results;
- Aggregated valuation result (x eco-point):
 - allows easy presentation of multiple alternatives;
 - Helpful for decisions of authorities and management;
- Specific information, as it is tailored to the environmental situation in a country / region (CH, D, JPN, EU);
- Same value for domestic emissions and emissions from abroad



Comparison of Life Cycle Impact Assessment methods

Quelle: BAFU basierend auf Jungbluth et al, 2011 überarbeitet 2019

© ESU-services Ltd. (2019)		One environmental issue		Several issues					
LCIA method:	Impact category	CED	Carbon footprint	Ecological footprint	Ecological scarcity	ReCiPe	Environmental Footprint (PEF)	ImpactWorld+, Midpoint	Rockström et al. 2009
Resources	Energy, non-renewable	√	∅	∅	√	√	√	√	∅
	Energy, renewable	√	∅	∅	√	∅	∅	∅	∅
	Ore and minerals	∅	∅	∅	√	√	√	√	∅
	Water depletion	∅	∅	∅	√	√	√	√	√
	Biotic resources	∅	∅	∅	∅	∅	∅	∅	∅
	Land occupation	∅	∅	√	√	√	√	√	√
	Land-transformation	∅	∅	∅	∅	√	√	∅	∅
Emissions	Only CO ₂	∅	∅	√	∅	∅	∅	∅	∅
	Climate change incl. CO ₂	∅	√	∅	√	√	√	√	√
	Ozone depletion	∅	∅	∅	√	√	√	√	√
	Human toxicity	∅	∅	∅	√	√	√	√	∅
	Particulate matter formation	∅	∅	∅	√	√	√	√	∅
	Photochemical ozone formation	∅	∅	∅	√	√	√	∅	∅
	Ecotoxicity	∅	∅	∅	√	√	√	√	∅
	Acidification	∅	∅	∅	√	√	√	√	√
	Eutrophication	∅	∅	∅	√	√	√	√	√
	Persistent organic pollutants	∅	∅	∅	√	∅	∅	∅	∅
	Odours	∅	∅	∅	∅	∅	∅	∅	∅
	Noise	∅	∅	∅	√	∅	∅	∅	∅
	Ionising radiation	∅	∅	∅	√	√	√	√	∅
	Endocrine disruptors	∅	∅	∅	√	∅	∅	∅	∅
Others	Accidents	∅	∅	∅	∅	∅	∅	∅	∅
	Wastes	∅	∅	∅	√	∅	∅	∅	∅
	Littering	∅	∅	∅	∅	∅	∅	∅	∅
	Salinisation	∅	∅	∅	∅	∅	∅	∅	∅
	Biodiversity loss	∅	∅	∅	∅	∅	∅	∅	√
	Erosion	∅	∅	∅	∅	∅	∅	∅	∅
Framework	Reference	GLO	GLO	GLO	CH	GLO	RER	GLO	GLO
	Publication	2007	2013	1996	2013	2016	2018	2019	2009
	Damage assessment	∅	∅	√	∅	√	∅	partly	∅
	Normalization	∅	∅	GLO	CH	GLO	GLO	∅	∅
	Weighting	√	∅	∅	√	√	√	∅	∅

Relevance of a single score approach and planetary boundaries

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Application of the ecological scarcity method mainly in 3 areas

Predominantly **for comparisons of products** e.g.:
beverage packaging, plastics, electromobility, paints and varnishes, buildings

But also;

- in the **implementation of the tax relief for biomass based fuels** (MinöStG SR 641.61)
- in the **environmental reporting** of companies and organizations (e.g. RUMBA in the Federal Administration)
- **progress measurement and objectives setting** (environmental footprints of Swiss consumption 1996 to 2015);



Updating and further developing the method of ecological scarcity (2006, 2013, 2020)

FOEN has started the process for the update of the method of ecological scarcity 2020.

Goals:

- Updating existing eco-factors with the current emission flows and, if necessary, new target values (eg. GHG)
- Adaptation
 - to the latest scientific developments (e.g. biodiversity, traffic noise)
 - to new legal requirements (e.g. Waste Ordinance, tolerance quantities for pesticides)
- Further development:
 - new topics are e.g. microplastics in oceans, overfishing,...



Updating the method of ecological scarcity

- Goal: completion by the end of 2020
- Actions:
 - Assessing needs: Workshop with the Swiss users of the method in 2018
 - Closing Gaps: standardized method for the measurement and evaluation of pollutant emissions from building materials
 - Study comparing different approaches for eco-factors in Switzerland and Europe

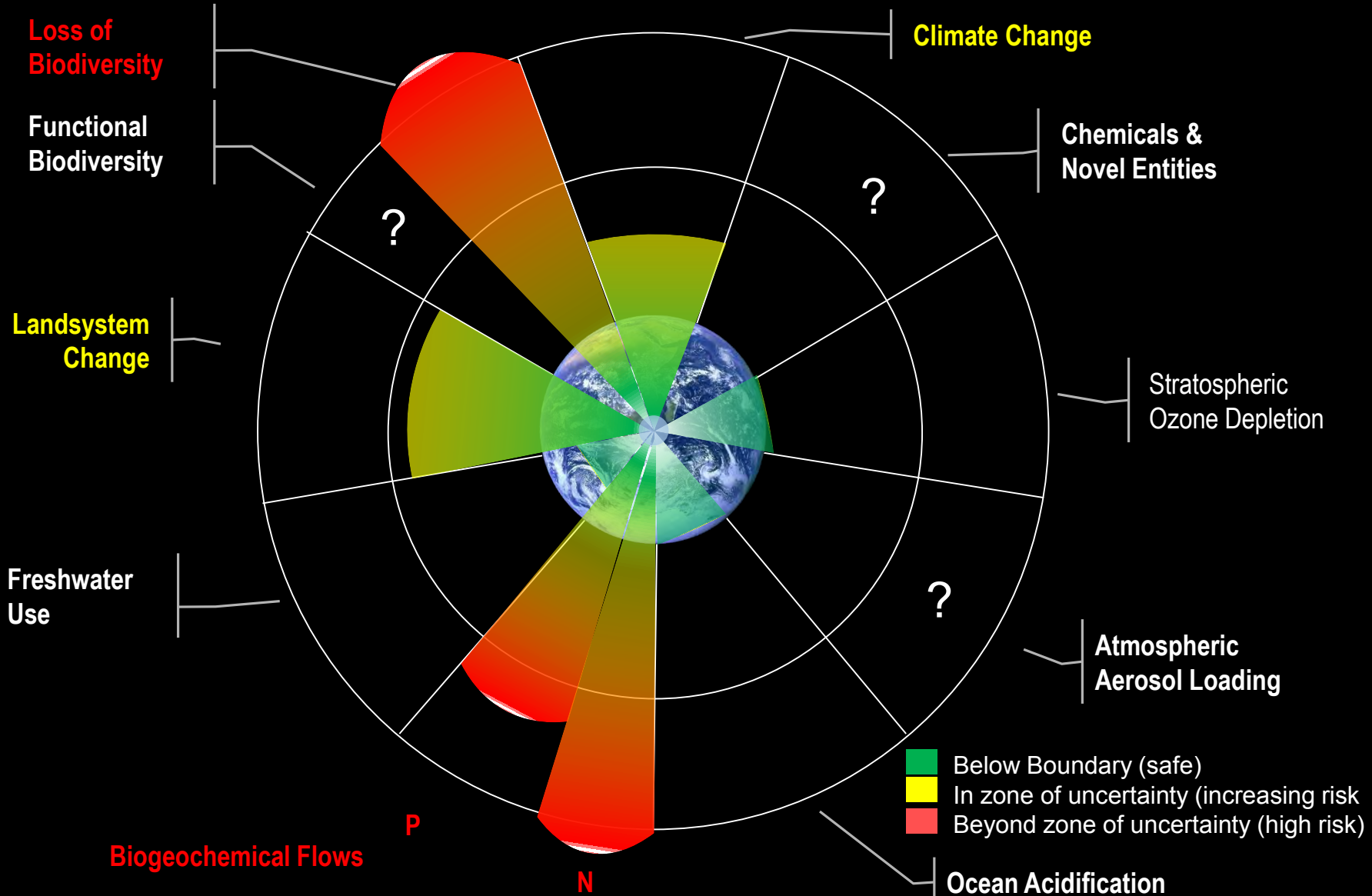


Updating the UBP-Method: Schedule

- End of July 2019:
 - invitation procedure for contracts in 5 areas to external consultants;
- Mid-September 2019:
 - Granting of surcharges and elaboration of individual contracts
- From September 2019:
 - Discussions with technical departments to update existing eco-factors (environmental objectives and current flows)
- End of 2020:
 - Publication of the version in German; Translations in e and f (1st part only)
- Early 2021: Publication of the report in d, e and f



Exceeding the planetary boundaries an associated risks





Planetary boundaries used in several reports financed by FOEN



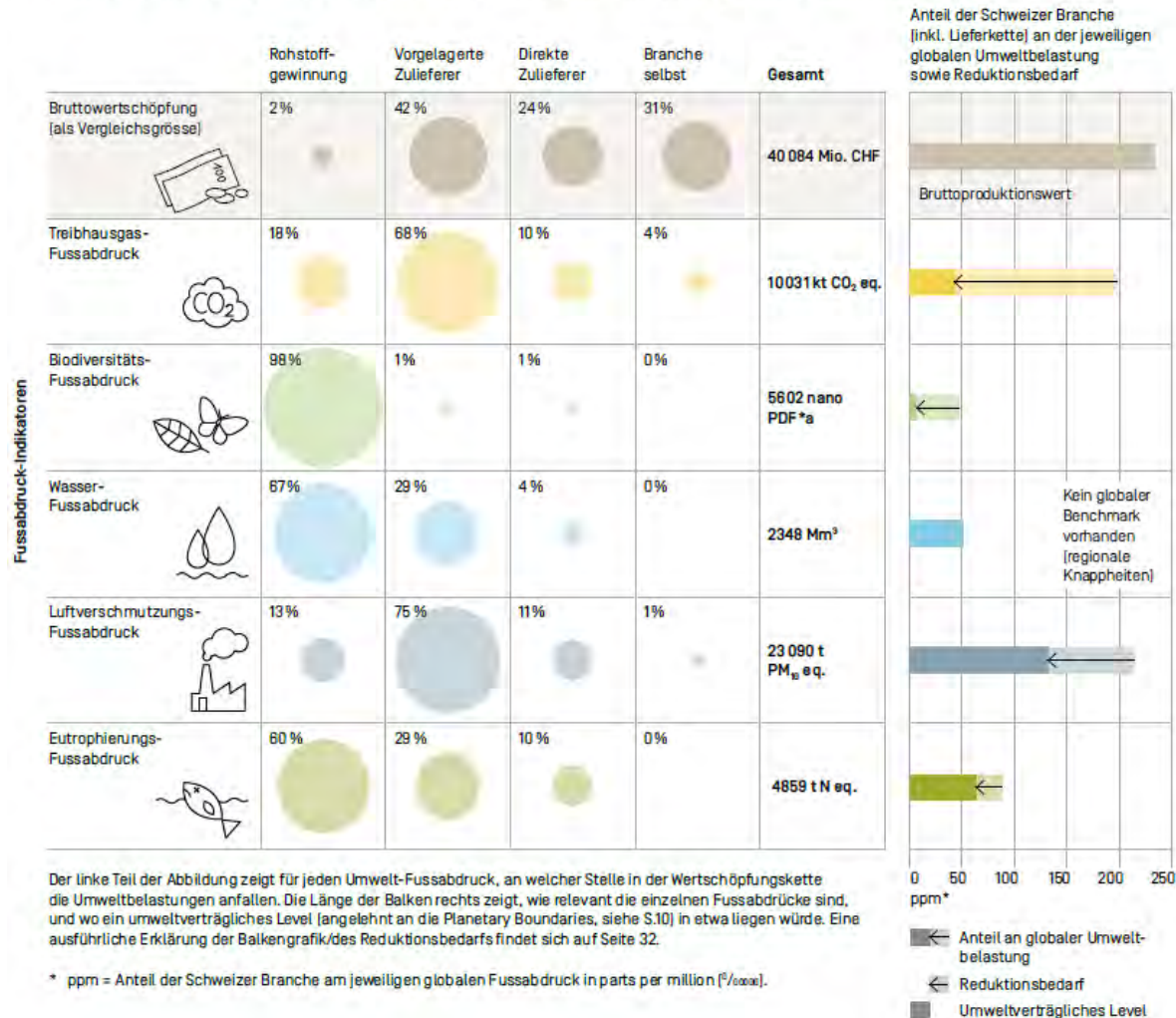
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Environmental Atlas of 8 Swiss sectors (focus on supply chains)

Anteil der Wertschöpfungsstufen an den durch den Schweizer Maschinenbau ausgelösten Umweltbelastungen

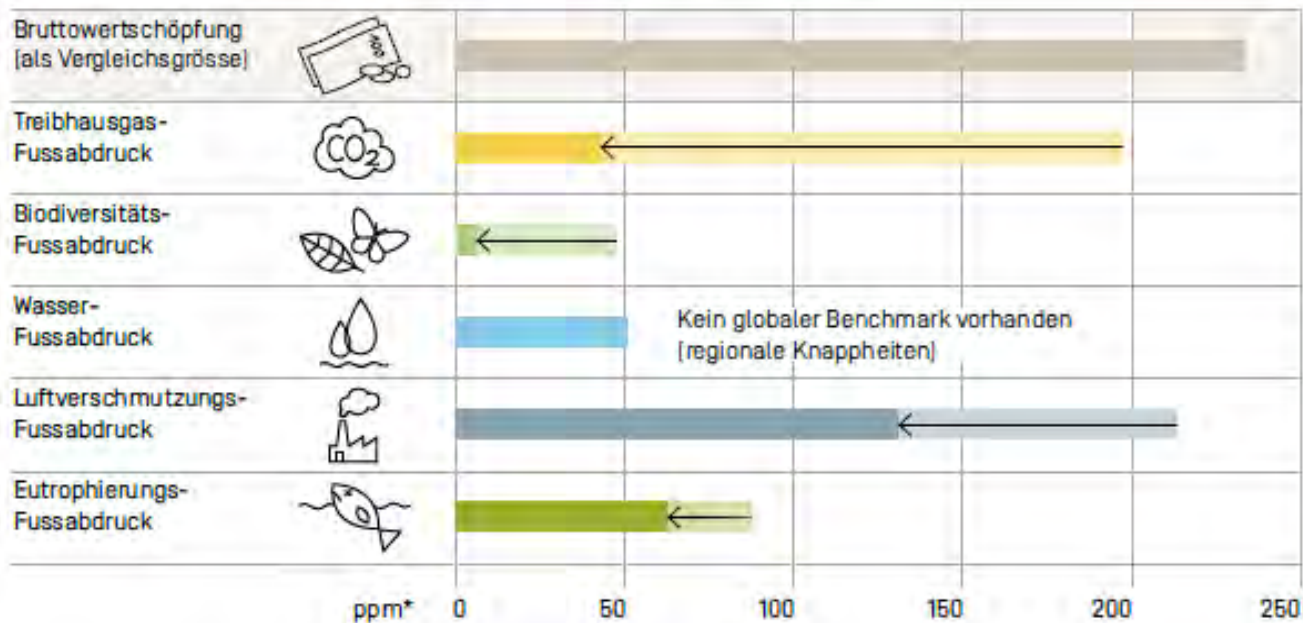




Environmental Atlas of 8 Swiss sectors (focus on supply chains)



Anteil der Fussabdrücke des Schweizer Maschinenbaus an den jeweiligen globalen Fussabdrücken in ppm* sowie nötige Reduktion zur Einhaltung der planetaren Belastbarkeitsgrenzen. Als Vergleichsgrösse ist der Anteil des Bruttowertschöpfungs des Schweizer Maschinenbaus am Bruttowertschöpfungswert der gesamten Weltwirtschaft dargestellt.



- ← Anteil an globaler Umweltbelastung
- ← Reduktionsbedarf
- Umweltverträgliches Level

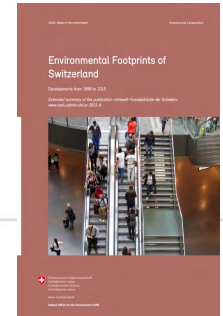
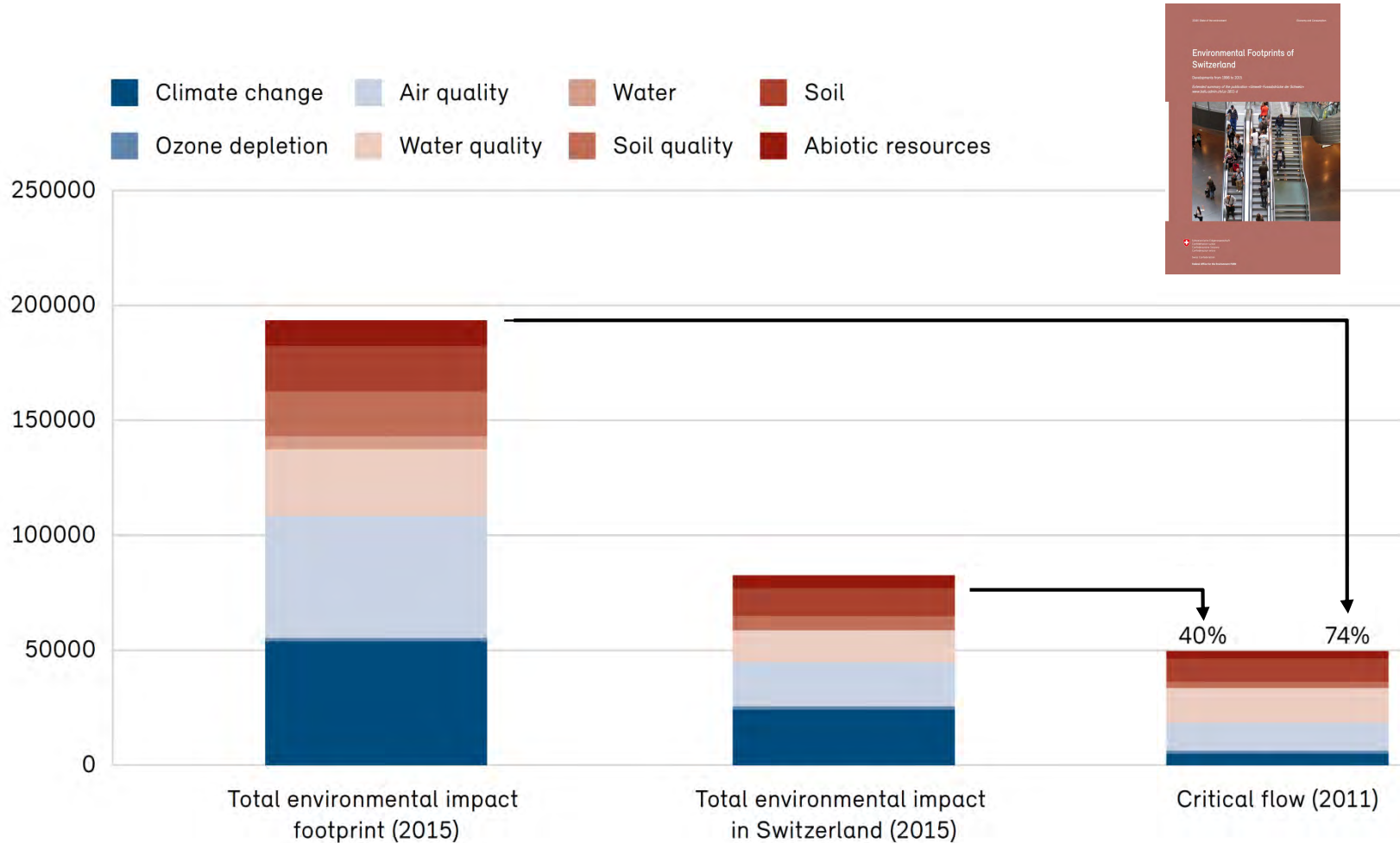
Die Gesamtlänge der Balken zeigt, wie relevant die einzelnen Fussabdrücke sind. Die Pfeile zeigen den Reduktionsbedarf und wo ein umweltverträgliches Level in etwa liegen würde.

* ppm = Anteil der Schweizer Branche am globalen Fussabdruck in parts per million [‰/1000].

Eine ausführliche Erklärung der Balkengrafik/ des Reduktionsbedarfs findet sich auf Seite 10.



Comparison of the total environmental impact with the critical flow (eco-points)





Conclusions

- The update of the method of ecological scarcity **is an important project.**
 - We use ecopoints as a control variable
 - as a means of communication
- FOEN will continue to invest in updating and developing the method of ecological scarcity
- A single score analysis should always include other LCIA methods
- The planetary boundaries
 - offer the opportunity to put the environmental impact of Swiss consumption into a global context
 - Can help to point out the distance from the target



Thank you for your
attention and your very
important work on LCA!