73 NRP Sustainable Economy National Research Programme

SWITZERLAND'S SUSTAINABILITY FOOTPRINT

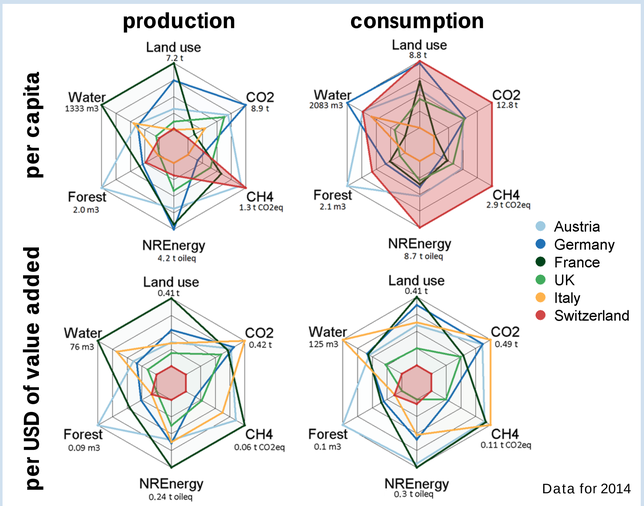
world trade institute

UNIVERSITÄT BERN

ENVIRONMENTAL INDICATORS, POLICY INSTRUMENTS, AND INTERNATIONAL TRADE RELATIONS

Switzerland's sustainability position

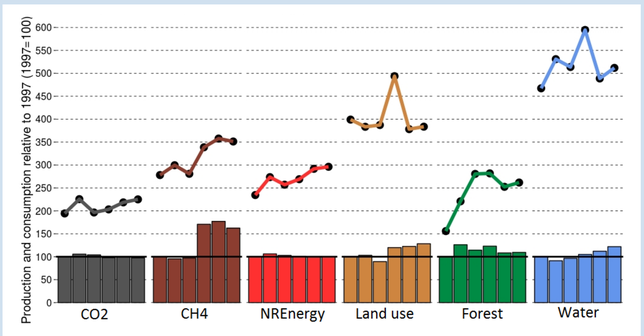
- Switzerland's environmental footprint is much larger from a consumption-based perspective than from a production-based perspective
- Switzerland is very resource-efficient, but the scale of consumption implies large per capita footprints



Land use: primary and fodder crops, grazing volumes, crops residues, tons; Water: usage in agriculture and livestock breeding, cubic meters; Forest: industrial and fuel wood including tropical wood, cubic meters; CO2: carbon dioxide emissions, tons; CH4: anthropogenic methane emissions, tons of CO2 equivalents based on global warming potential over 100 years (GWP100) ; NREnergy: energy except solar, wind and hydro, tons of oil equivalents

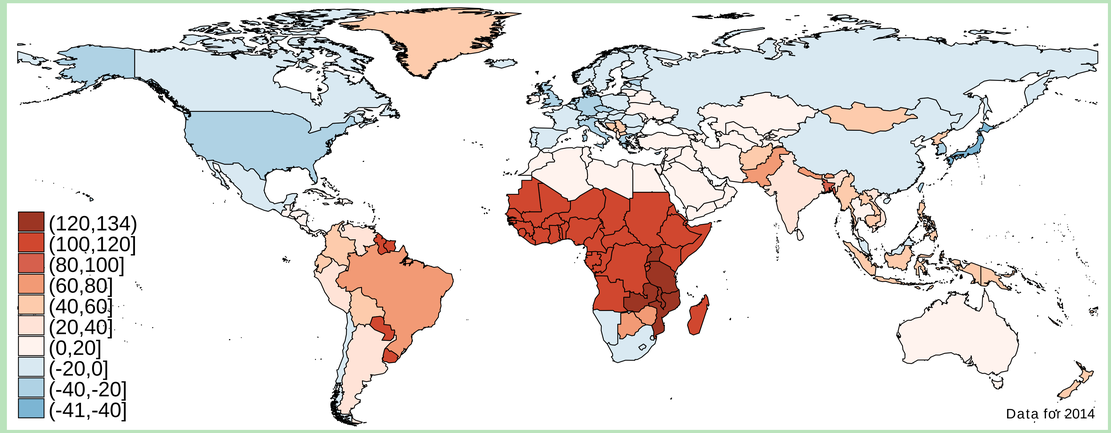
Evolution of Swiss environmental inventories

- Switzerland's environmental footprint, especially from consumption, increased from 1997 to 2014



Total environmental inventories. Data for each inventory is shown for 1997, 2001, 2004, 2007, 2011 and 2014 (from left to right). All inventories are scaled to production in 1997. Production inventories are shown as bars, consumption inventories as dots connected by a line

Implications of conversion metrics for aggregate CO2 and CH4 emissions footprints

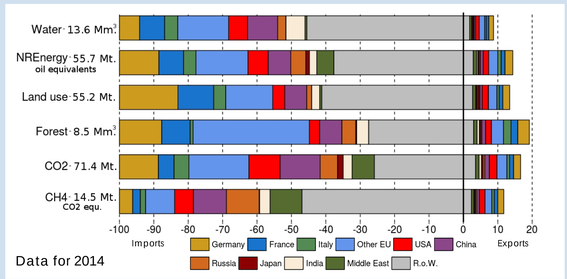


Percentage change in aggregate CO2 and CH4 emissions of regions relative to the worldwide average change when using global warming potentials over 20 years (GWP20) instead of global warming potentials over 100 years (GWP100) to convert emissions to a common scale

The choice of alternative time horizons to calculate CO2 equivalents (CO2eq) changes emission footprints. International climate agreements regulate aggregate greenhouse gas (GHG) emissions reported as CO2eq. Regulation should address different GHGs separately.

Switzerland's trade-embodied footprints

- Switzerland is a net importer of embodied environmental footprints. Footprints embodied in imports are 5 to 10 times larger than footprints embodied in exports
- Switzerland trades embodied footprints intensively with EU countries.
- EU environmental regulation will likely affect Switzerland



Trade flows scaled to total imports of embodied environmental footprints (imports=100). Mm³: million cubic meters; Mt: megaton

Traded CO2 and CH4 emissions and value chain relations

- The ratio of traded to domestic emissions is high in Switzerland compared to its trading partners
- Swiss value added crosses sectors about 3.5-4.5 times before ending up in final production in other countries

Country	CH	Germany	France	Italy	UK	USA	China	Austria
CH	-	24.10	10.65	9.28	6.41	21.18	25.19	3.19
Germany	1.91	-	5.78	4.15	4.33	11.38	17.31	2.78
France	1.39	9.52	-	6.06	4.99	12.91	15.17	0.75
Italy	1.17	6.61	5.86	-	2.86	7.22	9.78	1.09
UK	0.60	5.10	3.57	2.12	-	9.12	14.41	0.41
USA	0.16	1.09	0.75	0.43	0.74	-	7.59	0.10
China	0.14	1.24	0.66	0.44	0.88	5.70	-	0.11
Austria	2.86	31.32	5.10	7.69	3.87	11.59	17.89	-

Traded greenhouse gas emissions: CO2 and CH4 aggregate, based on GWP100. Emissions embodied in bilateral trade scaled to domestic emissions of row-country. Data is reported for the year 2014

Country	CH	Germany	France	Italy	UK	USA	China	Austria
CH	1.58	3.55	3.63	3.92	3.68	3.58	4.43	3.52
Germany	3.57	1.60	3.57	3.87	3.69	3.78	4.32	3.50
France	3.73	3.75	1.59	3.85	3.72	3.95	4.53	4.10
Italy	3.70	3.91	3.73	1.67	3.89	3.93	4.73	3.84
UK	3.72	3.77	3.63	4.11	1.59	3.71	4.79	4.16
USA	3.67	3.86	3.75	4.29	3.72	1.63	4.38	4.13
China	4.78	4.74	4.66	4.85	4.65	4.50	2.27	4.91
Austria	3.53	3.49	3.84	3.79	3.98	3.87	4.54	1.54

Bilateral value-chain length: Average number of times value added from one country (in rows) crosses sectors and/or borders before it ends up in the country in which the final product is produced (columns). Data for the year 2014

Environmental policy instruments

Types of policy instruments

- Instruments include price-type (e.g. taxes, charges, fees, tariffs, subsidies, deposit refunds), quantity-type (e.g. quotas, bans, technology- and performance standards) and soft instruments (e.g. information disclosure, labeling, nudging).
- They can be combined to increase efficiency

Efficiency considerations

- Price instruments lead to efficient allocations under heterogeneous abatement costs. The specific price instrument (e.g. taxation vs. emission trading systems) is secondary for efficiency, but may have distributional consequences
- Quantity instruments may be preferred if damage costs are high and the price-elasticity of pollution is low. Damage and abatement costs are often uncertain

Feasibility of instruments

- Distributional consequences and political economy considerations have to be taken into account. Non-uniform/discriminatory pricing may be considered
- Refunding of tax revenue can reduce political resistance. Re-labelling taxes as fees or climate contributions enhances acceptability

Instruments in international settings

- Border tax adjustment (BTA) can offset competitiveness disadvantages to domestic firms and prevent leakage. BTA should be symmetrically applied to imports and exports. BTA based on the emission content of domestic production requires less information than BTA based on the emission content of imports and would affect developing country trade less adversely
- International frameworks for climate and trade should be more integrated to achieve environmental objectives. Climate clubs could implement emission reduction targets and influence the behavior of other countries

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International Trade Centre

World Trade Organization

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