New policy relevant indicators on national consumption and environment

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Introduction

Statistics Sweden has been leading a project on how to measure the environmental pressure from Swedish national consumption and the aim of this paper is to report to other statistically interested organisations what we did learn. The project was financed by the Environmental Protection Agency Research funding and was won in competition with other research projects.

The work has included seven different organisations (SCB, SEI, KTH, Chalmers, NTNU, TNO and CML) with a broad range of competencies in environmental economic analysis, in order to tackle the very diverse aspects that the project was aiming to measure. We named it PRINCE, or Policy Relevant Indicators for Consumption and Environment. It has explored ways to improve and expand the set of indicators used to estimate the environmental impacts linked to Swedish consumption, both within Sweden and abroad. It has used data from international input-output models in order to be able to measure the impact from Swedish consumption abroad.

The measurements are particularly linked to follow-up of the Generational Goal, the overarching goal of Swedish environmental policy, which calls for the major environmental problems within Sweden to be solved within a generation, without causing increased environmental and health problems outside Sweden’s borders.

Results

The project developed a new method for combining Swedish environmental-economic data with an environmentally extended multiregional input-output (MRIO) model, EXIOBASE. This made it possible to estimate the environmental pressures resulting from producing goods and services consumed in Sweden, based on economic and environmental statistics that reflect the characteristics of industries in different parts of the world in a given year.

The MRIO and Swedish data were combined in a hybrid model, which the project used to investigate an unprecedented wide range of environmental pressures associated with Swedish consumption.

In addition to greenhouse gas (GHG) emissions and air pollutants that have been investigated in earlier studies, this analyses also covered resource use such as land use, blue water consumption, and an aggregate measure of materials use.

An even more trail-blasing part of the project show pressures not previously used to generate national-scale indicators, such as aggregate use of chemicals, and GHG emissions from deforestation coupled to consumption.

For many indicators, the project was able to generate a time-series of results for the period

2008–2014. These were chiefly for emissions to air along with land use, blue water consumption and materials use. Emissions of GHGs, nitrogen oxides sulphur dioxide and particulate matter associated with Swedish consumption had all decreased during the period. However, it is important to note that the decreases in GHG emissions were still far short of what would be needed to meet the Paris Agreement goal to keep global warming under 2 degrees.

While overall Swedish consumption-based emissions decreased in 2008–2014, the ratio between the shares occurring inside Sweden and abroad remained relatively stable. This suggests that developments have been in line with the Generational Goal.

The project also studied how the environmental pressures from Swedish consumption are distributed among countries, and among categories of products consumed in Sweden. The results reveal somewhat different patterns for different environmental pressures. However, products from the construction and civil engineering sectors, food and other agricultural products, as well as households’ direct use of fuels for heating and vehicles, feature prominently among the top “hotspot” product groups for a variety of emissions to air.

A new set of environmental indicators explored by the project concern the use and emissions of hazardous chemicals. PRINCE developed novel data and methods capable of generating aggregate indicators. They cover both use of hazardous chemical products and emissions of hazardous chemicals. This work also produced data for two specific categories of hazardous chemicals associated with agricultural production: veterinary

antimicrobials and pesticides. The chemicals study produced preliminary results for one year, 2014, and revealed some opportunities and difficulties in obtaining data. The results indicate, among other things, that the use and emissions of hazardous chemicals associated with Swedish consumption largely take place abroad.

Another PRINCE case study suggests a new method to monitor the consumption of fish. Not only does it present the amount of fish being consumed by weight, but it also indicates the type of fish and where it has been caught and estimates its grade of vulnerability through its ecological characteristics and the catch method. This type of analyses has never been made before and would bring more clarity to consumers on what type of wild fish is most vulnerable.

The project also investigated how to deepen the analysis of water use by weighting water use results using an index of water scarcity. The results point to a need for more precise data than what is available; two different methods were tested.

A number of other special studies focused on key product groups such as food and beverages; the information and communications technology (ICT) sector; how to calculate emissions from international transportation with MRIO and for maritime shipping, using also a bottom up method to assess the import from Brazils; and socio-economic benefits of Swedish consumption in China.

Conclusions

In calculating environmental pressures from consumption, Statistics Sweden should change its current method and start using a multiregional

model such as EXIOBASE to calculate the environmental pressures from imports.

The hybrid model developed by PRINCE should be used to follow up the Generational Goal. The data sources for GHGs, NOx, SO2 and particulate emissions are deemed mature enough to generate useful indicators.

Sweden should support international efforts to achieve harmonized environmental statistics. An important observation during the work of PRINCE was the gaps in available data and statistics, including data on the use and release of chemicals, including use of pesticides in agriculture in developing countries.

Indicators related to natural resources such as land use and its connection to deforestation and loss of biodiversity, water use, material flows and energy need more work to be able to spell out the environmental impacts in a way that becomes policy relevant and a suggestion is to investigate the consumption of food as a continuation of this work. The environmental impact from food and beverage was also a part of the work in Prince and this can be further developed.

Research on and development of the chemical indicators should continue and time series be developed to eventually include them in follow-up of the Generational Goal.

See http://www.prince-project.se/ for coming publications.