

## **Implication of Sustainable Lifestyles: Results from an EU-wide Impact Evaluation**

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### **Abstract**

Keywords: Sustainable consumption; consumption patterns; lifestyle changes; policy evaluation; material flow analysis

The development and implementation of policies to promote sustainable lifestyles is a growing and demanding task: different actors and institutional bodies have to cooperate and integrate their strategies. In this context, one of the leading questions is how policy instruments influence consumption patterns with regard to cultural or lifestyle differences and how changes in consumption patterns translate into impacts in terms of ecological, social and economic sustainability.

The EU FP7-funded project EUPOPP focused on the need areas of housing and food to identify best-practice policies to promote a more sustainable lifestyle. Guided by a Conceptual Framework, research work reflected present and future lifestyles as well as existing best-practice to promote sustainable daily routines and lifestyles. The integrated assessment of such practices must account for inter linkages of consumer action with activities of other market players. An interdisciplinary tool for the assessment of consumption policies combined policy and material flow analyses, including focus groups and different qualitative data. With this approach sustainability effects have been quantified.

Thus, EUPOPP explored impacts of different instruments at national and individual household levels. Best practice examples encompass regulatory, economic and communicative instruments as well as societal self-regulation. The impact assessment was based on statistics, interviews, focus groups and workshops. The effects of future instruments on consumption patterns were estimated, and material flow analysis (MFA) has been carried out to quantitatively analyze the ex-ante impacts on sustainability.

Results are discussed on consumption trends and projections as well as on instrument specific effects on consumer behavior and lifestyles. These form the baseline against which sustainability impacts have been quantified in order to identify the potential of change that new bundles of information, incentives or regulatory instruments may offer.

One encouraging result is that the sum of the sustainable instrument bundles for food and housing could each mobilize about  $\frac{2}{3}$  of the 2030 potential which was estimated before. In comparison with the total GHG emissions of the EU-27 of approx. 4 billion t of CO<sub>2</sub> equivalents by 2030, instrument bundles for food and housing alone could reduce emissions by 10%. Compared to the emissions of households in the reference scenario, the sustainable instrument bundles could reduce GHG emissions by 22% to 25%. EUPOPP derived policy recommendations with regard to more effective instrument bundles, taking into account qualitative aspects of policy implementation such as context factors or consumer acceptance.

## **Introduction**

While recent years have seen the evolution of a growing body of knowledge and reflection on SC instruments targeting household behaviour (see, among others, EEA, 2005; Tucker et al., 2008; Rubik et al., 2009), a few important gaps remain. Particularly, the evaluation of SC policy effects and the quantification of social and ecological SC policy impacts, measured by a set of sustainability indicators, is still a methodological and data challenge.

EUPOPP tackles the existing knowledge deficit in the policy arena of sustainable consumption and production (SCP) with regard to the effectiveness of sustainable consumption (SC) strategies and instruments. A focus is on policies in the need areas of housing and food. EUPOPP is based on an overall conceptual framework for portraying the relationships between SC policies, consumption patterns and sustainability.

Under this umbrella the following questions were addressed and transformed into research hypotheses:

- What are consumption / production trends and what are the respective sustainability potentials of SC policies – in general and in selected need areas?
- How can impacts of policy instruments on sustainable consumption be assessed and how do they influence sustainable consumption – mainly in the need areas housing and food?
- What are conditions of success or failure that promote or hamper the impacts of a SC instrument on consumption patterns?
- What are options to enhance sustainable consumption policies and instruments?

## **Methodological Approach**

EUPOPP addressed these research questions with an innovative mixed-methods approach, linking policy analysis with in-depth empirical research and material flow analysis.

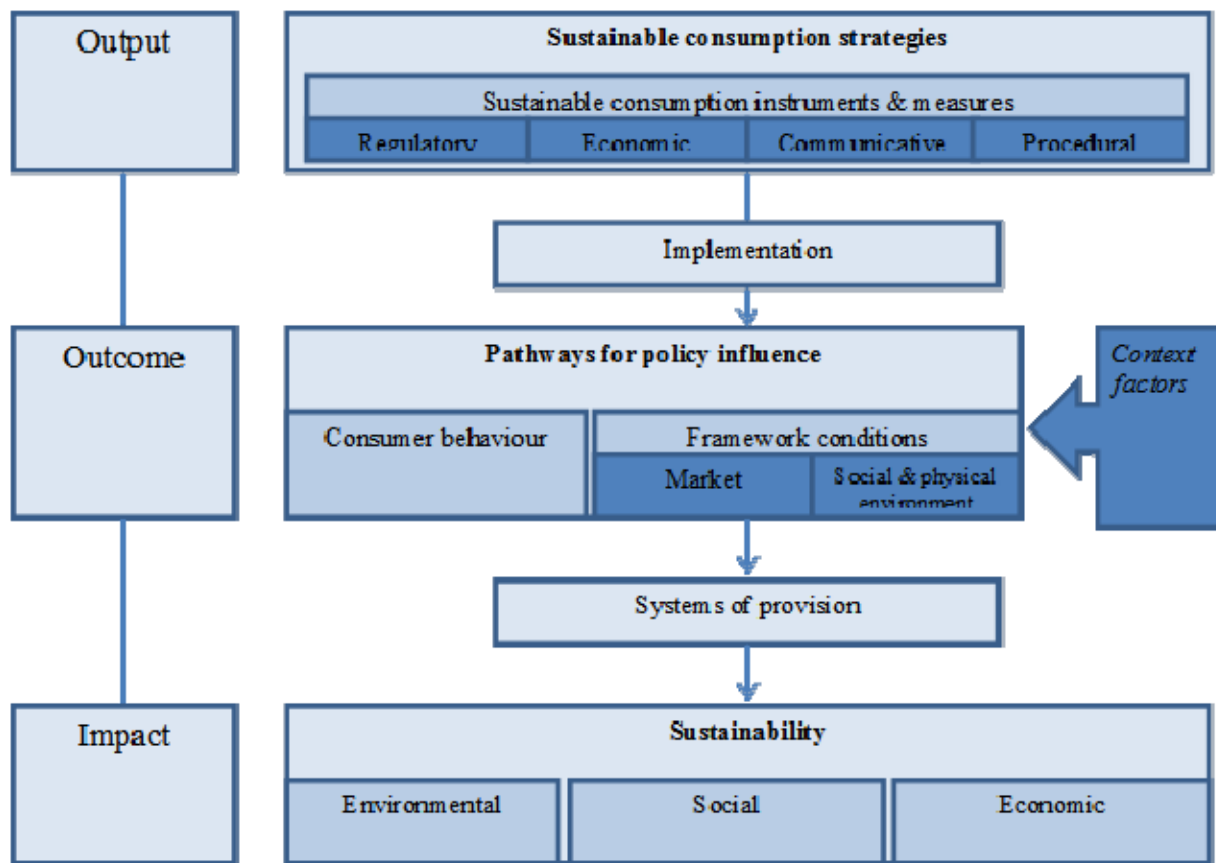
The framework for SC instrument evaluation devised in the EUPOPP project draws on various disciplinary approaches and existing literature to consumer behavior (cp. Heiskanen and Schönherr, 2009). Until today, not much work exists to combine these literatures for studying the particularities of policy instruments for SC and their assessment throughout the whole impact chain (Tukker et al., 2008). This observation was the starting point of our methodological thinking.

The EUPOPP approach builds on an established categorization of effects (outputs, outcomes, impacts): SC policy instruments are being developed and implemented in the form of various concrete measures and activities (outputs of the policy process). When successful, policy outputs lead to outcomes. Outcomes of an SC policy instrument are changes in consumption patterns triggered by changes either in individual consumer behaviour or in the framework conditions of consumption. Changes in consumption patterns typically entail changes in related production systems. In a final step, changes in consumer behaviour (i.e., outcomes) can lead to positive changes in the environment, economy and society and can be quantified via sustainability impacts.

Due to internationalized value chains, sustainability impacts of SC instruments often emerge beyond the country or region in which they are implemented, e.g., in developing countries from which input materials are being sourced. Finally, SC policies can have side effects which may, in turn, promote or hamper sustainability.

The above mentioned steps can be integrated into a comprehensive model of policy pathways as illustrated in Figure 1:

Figure 1 Model of policy pathways of sustainable consumption instruments



The elaborated framework distinguishes different steps for the identification, evaluation and explanation of instrument effects. The initial ‘output analysis’ includes the three steps of (1) analysing and (2) evaluating an instrument’s ‘intervention logic’<sup>1</sup> and of (3) examining the instrument’s implementation.

These steps serve to sound out at an early stage an instrument’s “theoretical” potential to succeed as well as possible blockages in its policy pathway. Subsequently, effects (outcomes, impacts, side effects) need to be measured and causally attributed to the instrument. Concrete steps include (4) development of outcome and impact indicators; (5) identification of the changes in outcome indicators based on various data sources; (6) establishment of causality between the instrument and the identified changes in outcome indicators, including through process tracing and causal reconstruction; and (7) identification of the changes in impact indicators (e.g., with the help of Material Flow Analysis, see below).

The final part of the assessment encompasses the evaluation proper and the explanation of instrument effects. More concretely, we suggest to value in step (8) the (intended and unintended) outcomes and impacts by benchmarking them against the instrument’s stated goals (goal attainment analysis) but also by critically reflecting on the level of ambitiousness of the stated policy goals. Step (9) covers the analysis of drivers of and barriers to the identified SC policy effects. We suggest this exercise to be guided by hypotheses.

In the EUPOPP project, a respective set of hypotheses has been developed which related the successful generation of instrument effects to influences as: a valid intervention logic underlying the instrument; acknowledgement and accommodation of consumers’ needs and practices in instrument design; consideration of both consumer behaviour and framework conditions of consumption in instrument design; stakeholder involvement in instrument development; a favourable market context; and synergetic interaction with other policies and instruments.

<sup>1</sup> i.e., an “ideal” causal story of how the instrument is intended to work (e.g., Leeuw 2003).

## **Results**

As discussed above, the research reflected present and future lifestyles as well as existing best-practice to promote a more sustainable lifestyle. The assessment of such impacts must account for inter-linkages of consumer action with activities of other market players and path-creating effects of systems of consumption and supply. The hybrid assessment tool has successfully linked policy and material flow analyses in different iterative steps. Sustainability effects can be quantified in order to identify the potential that e.g., information on energy efficiency, climate protection campaigns or other programs may tap.

Based on the results of the analysis of existing instruments, sets of new instruments for future SC policies in the need areas of food and housing were derived. EUPOPP also assembled instruments into groups relevant for the two need areas, i.e. the instruments were “bundled”. The selection of instruments for “bundling” used the result of the impact assessment which analysed the efficiency of selected instruments (Wolff and Schönherr, 2011). The selection considered possible synergies of the combined implementation of individual instruments, and options to reduce negative trade-offs.

### ***Bundling policy instruments***

The variety of instruments in the two need areas housing and food was classified by criteria for bundling which inter alia focus on the most effective combination of instrument types regarding sustainable consumption practises. The selection of instruments to be bundled considered the potential of creating synergies through the implementation of the individual instruments, and of maximising opportunities to reduce negative trade-offs in parallel. To estimate the capacity of different instrument types, insights from ex-post policy analyses to have been used and translated into explicit hypotheses. Furthermore, instrument bundles have been combined that cover different instrument types and more than one consumption phase or framework conditions of consumption. A bundle could be focused on a specific consumer group in a specific consumption ‘setting’ (e.g. catering at school), and focused on a specific issue (e.g. reducing meat consumption). Bundles also include elements to ‘counter’ rebound effects and to improve spill-over effects. The instrument bundles were aggregated at the EU level, warranting in some cases the transposition of existing national/regional instruments to the EU level and a combination of these instruments with existing EU level instruments. Furthermore, estimates on EU level outcomes and impacts and on the magnitude of synergistic interaction between the instruments within one “bundle” were made.

### ***Determining Impact***

The innovative EUPOPP approach connects material flow analysis (MFA) for quantifying impact indicators with a previous assessment of SC instruments. In our hybrid methodological approach, quantitative material flow analysis was used both to complement and to ‘triangulate’ findings of qualitative policy analysis. For this purpose, a number of impact indicators have been chosen to measure changes in the environment, society and economy that contribute to an attainment of the instrument’s goals. Impact indicators may be quantitative or, where reliable and comparable quantitative data is lacking, qualitative.

MFA is a methodology to determine life-cycle impacts of product groups and services in a comprehensive, cross-sector and cross-border (i.e. global) approach (UNEP, 2010; OEKO, 2011). As a more generic and scenario-oriented form of life-cycle analysis, MFA is the systematic determination of stocks and flows within a system: it connects the resources, pathways and final sinks of energy and materials, taking into account all relevant conversion steps, and transports (Brunner and Rechberger, 2003) throughout the lifetime of a product. MFA was used to model the ex ante impacts of future (hypothetical) instrument implementation. For this, MFA compares scenarios in which both the demand side (e.g. customer behaviour) changes and the supply-side responses are dynamic and both have cross-sectoral and cross-border impacts on energy and material flows. MFA delivers quantitative results for environmental aspects such as resource use and GHG or air emissions, but also data on cost and employment effects, and consistently takes future developments of technologies and markets into account.

The MFA scenarios in EUPOPP consist of a baseline case, which represents the business-as-usual (BAU) development as a reference, and a set of sustainability scenarios which assume the successful implementation of SC instrument “bundles” (developed in EUPOPP based on findings from case studies) in the two need areas of food and housing.

To develop the SC scenarios, the implementation of SC instruments and policies in the two need areas was assumed beyond a business-as-usual (BAU) reference scenario. This means that the scenarios presumed the implementation of additional or the enhancement of existing instruments. For each need area, a moderately ambitious (mainly optimisation of existing instruments) and a highly ambitious (inclusion of innovative instruments) were quantified.

The instrument bundles were considered for a time horizon of 20 years, i.e. between 2010 and 2030. To allow for a “delay” caused by policy formulation and legal or administrative preparation, the implementation of bundled instruments is assumed to start in 2015, with full implementation by 2030. The implementation of the bundled instruments must also allow for some time to recruit acceptance in the respective customer groups and need areas, i.e. they are introduced slowly.

### ***The housing instruments: standards and more***

In the need area of housing, the instrument bundles aim at reducing overall energy consumption through improving the energy performance of buildings, mainstreaming efficient technologies, and building capacity to address energy related issues among house owners and residents. The bundles address three relevant consumption aspects: household electricity consumption due to the use of appliances; household heating requirements due to building characteristics; and household energy consumption for heating and hot water.<sup>2</sup>

*Energy-efficient homes:* Optimise existing minimum performance standards for existing buildings, in combination with a “scrapping requirement” for very old non-retrofitted buildings, and a respective financial incentive scheme

*Capacity building:* Increase energy advisory and audit services for residential customers, supplemented by large-scale information campaigns

*Promoting efficient appliances:* Improve the EU Energy Label for appliances by regularly adjusting efficiency classes to the best available technology in the market and requiring the phase out of “outdated” appliances

*Heating:* Implement individual metering for heat consumption, and “green” heating quotas for new systems based on renewable energy sources

*Taxation:* Implementing an energy (or CO<sub>2</sub>) tax on end-energy to prevent rebound effects, and use revenue to finance economic support schemes.

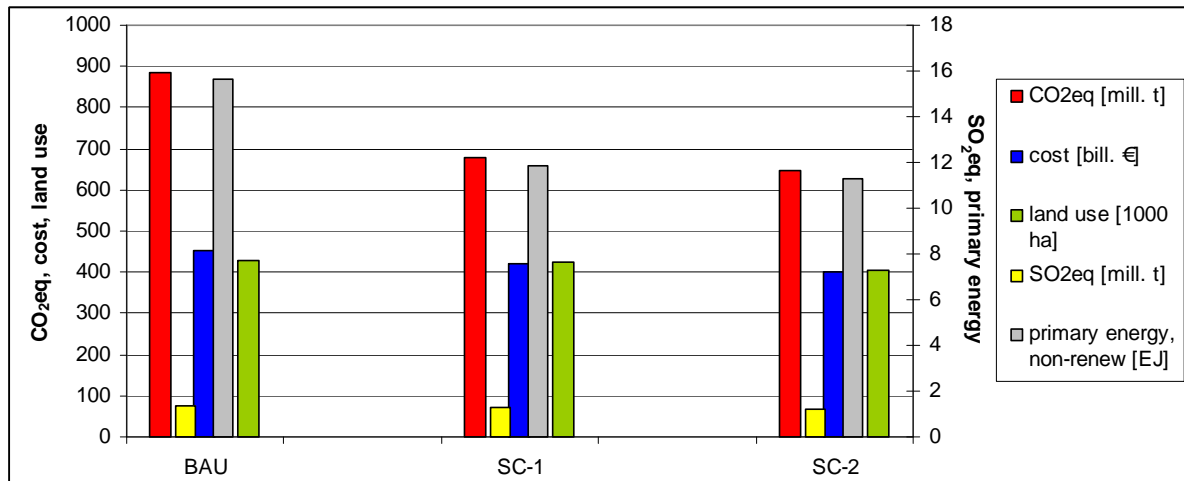
In total, the implementation of these measures might realise a reduction of about 200 million tonnes of CO<sub>2</sub>-equivalents by 2030 (SC-1). In a highly ambitious scenario including a mandatory scrapping requirements for old buildings and standardised individual metering across the EU, about 230 million tonnes of CO<sub>2</sub>-equivalents can be saved by 2030 (SC-2).

Figure 2 shows that compared with the BAU scenario the instruments could reduce emissions in a relevant range.

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<sup>2</sup> These three aspects needed to be dealt with separately, as consumer behaviour and decision making differs significantly with regard to them (e.g. pertaining to investment cycles).

Figure 2 Housing Scenarios – Effects of SC Instrument Bundles vs. BAU



### The food instruments: sustainable diets and reducing waste

The need area of food is closely related to lifestyle aspects, health considerations, income, and daily routines. Therefore, instrument bundles for sustainable food must target these daily activities, and – as changing of consumption and lifestyle habits need motivation and knowledge – must consider information and motivation. The most relevant target area with regard to SC interventions is the consumption of meat and dairy products, as both product groups entail high emissions, biodiversity loss, as well as land and water pollution. However, changes in dairy consumption are very hard to address due to the fact that dairy products are deeply ingrained in many diets and food styles, and that their sustainability depends on a variety of specific factors (like fat content). Meat consumption, on the other hand, is a more ‘generic’ element of diets and food styles and can (partially) be replaced by nutrient-equivalent combinations of cereals and vegetables. For this reason, the key for instrument bundling in the need area of food is meat consumption<sup>3</sup>.

The proposed instrument bundles address both household food consumption and public catering, e.g. in school canteens. Since there are only very few mature instruments available for optimising in the need area of food, the scenarios include more consensus-building communicative instruments, presuppose more radical behavioural change, and include more innovative instruments than in the previous section.

**Green Public Procurement:** Introduce requirements for sustainable (low-meat) meals in catering for public educational institutions, in combination with one vegetarian day per week

**Pricing:** Implement a consumer tax on meat products

**Reducing wastage:** Require retailers to expand the sell-by dates of food in retail, and promote customer information on best-use-before labels

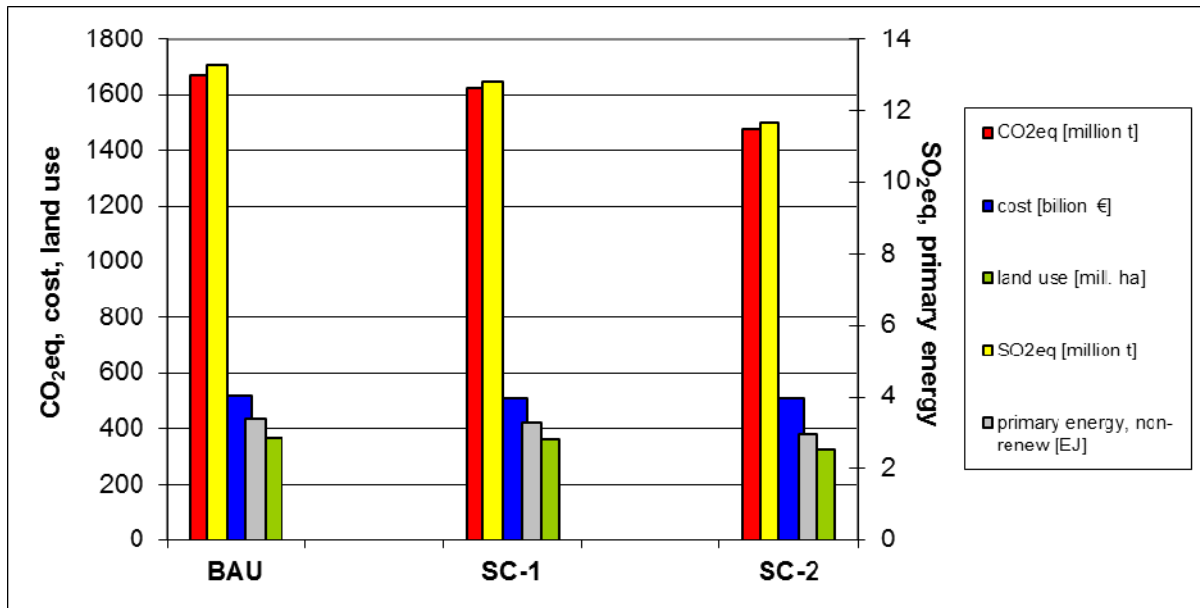
**Going organic:** Raise the share of organic food through a combination of public procurement, mainstreaming availability in retail, and tax exemptions

**Promoting sustainable diets:** nutrition classes in school and advice in stores, in combination with other communicative / awareness-raising instruments

In a moderately ambitious scenario, about 50 million tonnes of CO<sub>2</sub>-equivalents could be saved by 2030 (SC-1 compared to BAU). The largest share of potential GHG emission reductions, however, is realised through tackling food wastage. A total of about 200 million tonnes of CO<sub>2</sub>-equivalents could be saved in the ambitious scenario by 2030 (SC-2 compared to BAU). This constitutes a 3% (SC-1) / 12% (SC-2) emissions reduction respectively, as the following Figure 3 shows.

<sup>3</sup> It must be noted that generic “meat“ is meant as a crude proxy of unsustainable meat consumption which reflects the different GHG and air emission impacts from e.g. beef, chicken and pork, and their different animal health, (agro)biodiversity and land/water impacts in an aggregated manner.

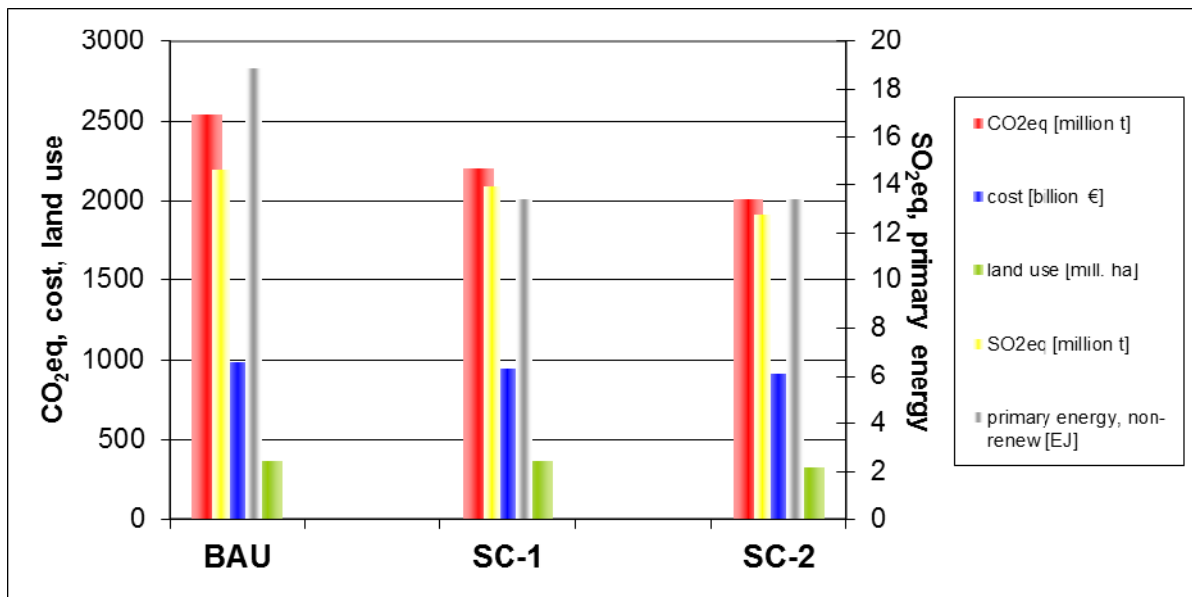
Figure 3 Food Scenarios – Effects of SC Instrument Bundles vs. BAU



#### Combined effects

The following figure (4) summarises the quantified impacts of all instrument bundles by 2030 in terms of GHG emissions as additional net savings compared to the reference scenario.

Figure 4 GHG Savings of SC Instrument Bundles Compared to the Reference by 2030



The SC instrument bundles for food and housing could each mobilize about  $\frac{2}{3}$  of the sustainability potential estimated for 2030 (EUPOPP 2009). Compared with the estimated total GHG emissions of the EU-27 (for all end-uses including energy, food, transport and industry, and including life-cycles) of approx. 4 billion t of CO<sub>2</sub> equivalents by 2030, the SC instrument bundles for the need areas of food and housing alone could reduce emissions by 10-13%. Compared to the emissions due to the energy and food consumption of households, which are estimated at about 2 billion t of CO<sub>2</sub> equivalents by

2030 in the BAU scenario, the sustainability instrument bundles could reduce GHG emissions by 20% (SC-1) to 26% (SC-2).

## Conclusions

For policy instruments, it is typically hard to identify and quantify causal effects. The hybrid approach of the EUPOPP methodology, however, although complex and data-intensive, addresses this difficulty: The successful combination of an ex-post and an ex-ante analysis provides a solid basis for hypotheses on the effects of different instruments in the future and will allow well-founded recommendations for policy makers at different levels of decision.

On the evidence based results from policy analysis and material flow analysis the following selected conclusions can be drawn:

SC policy should not be afraid of ambitious targets and respective instruments. The EUPOPP results show that instruments successful in changing consumer behaviour encompass regulatory and economic measures. Communicative and voluntary instruments alone did not provide comparative levels of results, though they have valuable contributions in policy mixes. As a general lesson, the existence of complementary supportive policies within policy mixes was often decisive in promoting instrument effects. Furthermore, policy makers should adopt a more integrated approach to sustainable consumption and production. We found out that the majority of the more successful SC instruments addressed not (only) consumer behaviour as such but modified the structures and systems that define the opportunities and limits for individual consumption.

It can be concluded that the majority of more successful instruments had clear objectives and ambitious, quantified targets the (non-) achievement of which was monitored and credibly sanctioned.

Sustainable Consumption (SC) policy needs to better target the consumer. The respective case studies show that SC instruments are more successful when they fit with the constraints and requirements of consumption habits in everyday life. As a consequence for policy-making, an instrument will be more effective if it accommodates the diversity of consumers' everyday needs and practices, capacities and personal life situations. More 'consumer-adequate' instrument designs can be achieved, for instance, by better integrating consumers into policy-making. On a European level this creates new problems as overarching instruments can hardly take into account several different target groups in different countries. Therefore, EUPOPP suggests bundles of policy instruments which actually address the EU level as well as activities and processes at the member state level (Top-runner-scheme; control mechanism of energy performance certificates).

Thus, bundling should ideally be achievable at the EU level, this means the transposition of existing national/regional instruments to the EU level and a combination of these instruments with existing EU level instruments. Furthermore, estimates on EU level outcomes and impacts and on synergies between the instruments have to be taken into account. The implementation logic of the bundled instruments should reflect administrative preparation and also time to find acceptance in the respective consumer groups and need areas. To allow for a different "ambition" of sustainability, SC instruments should be split into two categories:

- SC instruments or instrument bundles which contain "mainstream" elements, i.e. those which are already discussed today, and which can be expanded and/or extended without major debate
- SC instruments or instrument bundles which are rather new, and, therefore, might be subject to more (political) controversy.

This differentiation allows policy makers – and society - to determine and define possible "gains" from higher sustainability ambition on which a qualitative discussion of the "attractiveness" of more controversial instrument bundles can be based. The instruments that have been "bundled" by EUPOPP result in a relevant sustainability relief in the next 20 years on the European level as well as on a global scope.

## References



- Brunner, P. and Rechberger, H. (2003) Practical Handbook of Material Flow Analysis. Boca Raton (Lewis Publishers)
- COM (2008) Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (COM(2008) 397 final) – [http://ec.europa.eu/environment/eussd/pdf/com\\_2008\\_397.pdf](http://ec.europa.eu/environment/eussd/pdf/com_2008_397.pdf)
- EEA (2005) Household consumption and the environment. Copenhagen: European Energy Agency. EEA Report 11/25.
- EEA (2007) Europe's environment. The fourth assessment. Chapter 6: Sustainable consumption and production. Stockholm.
- EC (2008). Accompanying document to the proposal for a Directive of the European Parliament and of the Council on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products. Brussels: European Commission. {SEC(2008) 2863}.
- EUPOPP (2009) WP 2: Consumption Trend Analysis and Sustainability Potentials - Deliverable 2.1 [http://www.eupopp.net/docs/wp2\\_executive%20summary\\_d21kons.pdf](http://www.eupopp.net/docs/wp2_executive%20summary_d21kons.pdf)
- EUPOPP (2011) WP 4: Bundling of Sustainable Consumption Instruments and Hypotheses on the Effects of Instrument Bundles for Food and Housing - Deliverable 4.1 – Part 2. Darmstadt ( [www.eupopp.net](http://www.eupopp.net))
- FAO (Food and Agriculture Organization of the United Nations) (2011) Global food losses and food waste - extent, causes and prevention; Gustavsson, Jenny/Cederberg, Christel/Sonesson, Ulf; Swedish Institute for Food and Biotechnology (SIK) Gothenburg, and van Otterdijk, Robert/Meybeck, Alexandre (FAO); Rome [http://www.fao.org/fileadmin/user\\_upload/ags/publications/GFL\\_web.pdf](http://www.fao.org/fileadmin/user_upload/ags/publications/GFL_web.pdf)
- Heiskanen, E. and Schönherr, N. (2009) WP 1: EUPOPP Conceptual Framework. , Deliverable 1.2. With contributions from Aalto, K., Adell, A., Alcantud, A., Barth, R., Bremere, I., Brohmann, B., Fritsche, U., Larcom, S., Schäfer, B., Schmitt, K., Wolff, F. Online at [www.eupopp.net](http://www.eupopp.net).
- Hertwich, E. (2005) Life cycle approaches to sustainable consumption: a critical review. Environmental Science and Technology, 39, 4673-4684.
- OEKO (Oeko-Institut - Institute for Applied Ecology, 2011) Overall Approach of Material Flow Analysis and its Application to the Need Areas Food and Housing – Methods and Data; Fritsche, Uwe R. et al.; Work Package 4 Deliverable 4.1 – Part 1 of the FP7-sponsored project EUPOPP; Darmstadt/Freiburg ([www.eupopp.net](http://www.eupopp.net))
- Rubik, F., Scholl, G., Biedenkopf, K., Kalimo, H., Mohaupt, F., Söbech, Ó. et al. (2009) *Innovative approaches in European sustainable consumption policies*. Berlin: Schriftenreihe des IÖW 192/09.
- Tukker, A., Charter, M., Vezzoli, C., Sto, E., & Munch Andersen, M. (eds.) (2008) System innovation for sustainability 1. Perspectives on radical changes to sustainable consumption and production. Sheffield: Greenleaf Publishing.

## Brohmann/Fritsche, Implication of Sustainable Lifestyles

- UNEP Resource Panel (2010). Assessing the Environmental Impacts of Consumption and Production - Priority Products and Materials; International Panel for Sustainable Resource Management, Working Group on the Environmental Impacts of Products and Materials: Prioritization and Improvement Options; Paris [http://www.unep.fr/shared/publications/pdf/DTIx1262xPA-PriorityProductsAndMaterials\\_Report.pdf](http://www.unep.fr/shared/publications/pdf/DTIx1262xPA-PriorityProductsAndMaterials_Report.pdf)
- Wolff, F. and Schönherr, N. (2011) The Impact Evaluation of Sustainable Consumption Policy Instruments. In: Journal of Consumer Policy, Vol. 34, Issue 1: 43-66.