

Policies to Promote Sustainable Consumption: Framework For a Future-Oriented Evaluation

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Abstract

Governments are today developing policies to promote sustainable consumption, yet policy makers face many uncertainties about policy impacts. These include uncertainties about how policy instruments influence consumption patterns and about the impact of changes in consumption patterns on ecological, social and economic sustainability. An assessment of such impacts must account for the fact that consumer action is interlinked with the dynamic activities of other market players and the path-creating effects of technologies and systems of consumption and provision. Our paper presents an interdisciplinary conceptual framework for assessing policies to promote sustainable consumption. It aims to identify the most promising mixes of policy instruments for sustainable consumption and to use material flow analysis (MFA) to model prospective impacts of policies on selected sustainability indicators in Europe and internationally, and to determine best-practices of such policies for the next decades.

1 Introduction

The role of unsustainable consumption patterns in the deterioration of the global environment has been on the international policy agenda for more than a decade (WSSD, 2002). As a result, many European governments are developing strategies and policy instruments to promote sustainable consumption (SC), and the European Commission has launched an Action Plan for Sustainable Consumption and Production (EC 2008).

The aim of the EUPOPP project (www.eupopp.net) is to analyse sustainability impacts of the implementation of strategies and policy instruments for SC in the EU. Our particular focus is on strategies and policy instruments that target the *demand side*, i.e., private or organizational consumption, and respective products. There is great potential for improvements in these areas, but also uncertainties about the capacities of public policy to influence them (Tukker et al., 2008a). We examine the impacts of SC strategies and policy instruments by assessing the resultant improvements in economic, social, and environmental performance indicators against a reference (business-as-usual) scenario. Our focus is on two of the major fields of consumption in terms of environmental impacts, i.e., housing and food (Tukker et al., 2008b).

The impacts of SC strategies and policy instruments depend on a complex network of pathways. Firstly, strategies and policy instruments are realised in the form of various outputs, such as laws, regulations, programmes, schemes and implementation measures. Secondly, these outputs can have variable outcomes in terms of changes in consumer behaviour (i.e., the demand, use and disposal of products). Thirdly, the changes in consumer behaviour can have various impacts on environmental, economic and social sustainability, which are mediated via changes in production systems, changes in other consumption patterns, and changes in entire product systems.

There is much work ongoing in policy evaluation that is relevant for analysing the impact of SC policies. In the field of e.g. energy efficiency, there are well-developed methods for evaluating the

outcomes and impacts of policy instruments (Vreuls, 2004; Joosen and Harmelink, 2006), and research exists on the interactions between various energy policy instruments (Sorrell, 2003; Simoes et al., 2005; Boonekamp, 2005; Child et al., 2008). There are also many evaluations and evaluation schemes for other individual policy instruments, such as environmental labelling schemes (Thidell, 2009).

However, to our knowledge, there are no studies or frameworks providing a *comprehensive analysis of the combined effects of multiple policy instruments*, or the *prospective* effects of an optimal package of policy instruments for SC, taking into account future changes on the supply side, and life-cycle impacts inside and outside the EU-27. Thus, it is currently difficult to estimate scales of potential improvements: could an optimal package of SC policy instruments reduce environmental impacts in Europe by 0.5%, 5% or 50%, and at what cost?

This paper summarises a conceptual framework for the *prospective* analysis of the *combined* impact of strategies and policy instruments for SC. Such a framework is useful because it enables policy makers to assess *ex ante* the effects – on a European level and internationally – of policy instruments under consideration. We first present the key concepts and methods referenced in the framework. After this, we outline three policy ‘pathways’: the path from policy idea to the realization of policies in concrete instruments (Section 3), the path from policy output to policy outcome in terms of changes in consumption patterns (Section 4) and the path from consumption pattern changes to sustainability impacts (Section 5). The concluding section draws some implications from this conceptual framework for empirical analysis and for policy design.

2. Concepts and methods

Creating a comprehensive framework for analysing SC strategies and policies requires analytical clarity, which is often lacking in the popular debate on sustainable consumption and production. In the following, we first delineate policies and strategies and develop a working definition of SC. We then outline some of the methodological tools for analysing effects at different stages of policy implementation.

2.1 Policies to promote sustainable consumption: definitions

Few authoritative documents provide a definition of sustainable consumption apart from sustainable production. Widely known definitions of sustainable consumption and production (SCP) emphasise resource efficiency, the ‘delinking’ or ‘decoupling’ of economic development from environmental degradation, as well as the provision of quality of life for current and future generations (WSSD, 2002). The most commonly referenced definition of SC is one developed by the Oslo Symposium in 1994, which defines SC as “the use of services and related products, which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations” (Ministry of Environment Norway, 1994).

Sustainable consumption and sustainable production are often discussed in conjunction. They are, in principle, two sides of the same coin (e.g., Mont and Dahlhammar, 2005; UNEP, 2008), since resource use and environmental impacts of current consumption patterns is determined by many actors in the production chains. Moreover, producers influence consumer demand via design and marketing activities, whereas consumers influence production via market demand (Mont and

Dahlhammar, 2005; UNEP, 2008). The present paper acknowledges the interlinkages between sustainable consumption and production. However, the aim is to evaluate, in particular, policies to promote SC. We define these policies as policies that are focused on the *demand side*, or policies that explicitly address the interplay between supply and demand from the *consumer* point of view, i.e., product policies (e.g. Oosterhuis et al., 1996; Scheer and Rubik, 2005) or market transformation instruments (e.g. Blumstein et al., 2000).

It is worthwhile to distinct between different levels of policy making, which are all understood to be connected to the generic term ‘policies to promote SC. Strategies are here the broadest and most overarching level, exemplified, e.g. by national strategies for SC as outlined in, e.g., Finland, Germany, and the UK . These strategies are operationalised in policy programmes consisting of a coherent set of policy instruments, usually including a time frame and plans for implementation. Policy interventions refer to the actual implementation of policy instruments so as to change existing behavioural patterns (Weiss, 1998, p. 7) Policy instruments are concrete and specified operational forms of intervention by public authorities (Bemelmans-Videc et al., 2007, pp. 3-4). More detailed examples of policy instruments are given in Section 3.

As regards the aims of policies to promote SC, many argue that mere “eco-efficiency” (i.e., a decoupling of economic development from environmental degradation) may be insufficient to address the magnitude of the global sustainability challenge and that a “sufficiency” agenda and radical reductions in total natural resource use are needed (e.g. Fuchs and Lorek, 2005; Rockström et al., 2009). We agree with this idea, but in terms of concrete policy evaluation it is unlikely that existing policy instruments could have significant impacts in terms of total natural resource use – at least within a limited time frame. Yet, they may bring significant improvements as compared with a no-policy (business-as-usual) scenario.

In empirical work, it is also necessary to delimit the concept of ‘sustainability’ to measurable indicators. Based on existing indicator sets (e.g. Konecny et al., 2007, UNEP DTIE, 2008) and expert analysis, we define these impacts using the following sustainability indicators: (1) environmental: greenhouse gas emission, non-renewable primary energy, land use, agricultural biodiversity, raw materials, water use (2) social: distributional effects on income/living standards, gender equality (income/living standards, time budget, gender labour market structure), employment, health (e.g. particulates) and (3) economic: costs to households, costs to society.

2.2 Methodological tools for analysing effects at different stages of policy implementation

Expertise from various disciplines is needed to analyse the effects of SC policies. Firstly, policy science knowledge is needed to analyse the governance mechanisms and conditions for success and failure of various instruments (Bemelmans-Videc et al., 1998; Wolff, 2004). In particular, we draw on methods for the analysis of intervention theories (Vedung, 1997; de Leeuw, 2003). This is a method used in evaluation research to uncover the assumptions of the programme, i.e., the ‘working model’ or the ‘theory in use’ that the programme draws on. Intervention theories are identified by developing the causal model that the intervention uses to link programme inputs and activities to a chain of intended or observed outcomes. This model can be used to identify whether the intended outcomes actually occurred, and also to see whether failures in programme performance are due to failures in implementation or failures in the underlying ‘theory’.

Secondly, we need to apply insights and knowledge from consumer studies, which draw on the disciplines of economics, psychology and sociology (Ekström, 2003). An important point here is to recognise that choice behaviour, especially the choice of individual products, explains consumer

behaviour only to a limited extent (see Heiskanen and Schönherr, 2009 for more details). Consumption patterns are also significantly influenced by various framework conditions, including social conventions, sociotechnical systems and culturally shaped practices (Shove, 2003; Paulesich, 2008). Understanding interdependencies between different consumption practices is crucial for identifying expected and unexpected outcomes of SC policy instruments.

Thirdly, and most importantly for the present article, the effects of changes in consumption patterns on (the selected indicators of) sustainability needs to be analysed and assessed. Material flow analysis (MFA) as a generic form on life-cycle analysis (LCA) is a systematic determination of the stocks and flows within a system: it connects the sources, pathways and final sinks of a material (Brunner and Rechberger, 2003), and it has become a common approach to examining the impact of consumption patterns on the environment and sustainability (Hertwich, 2005).

MFA allows for product-, sector-, country- or need-area-wide presentations of material and energy flows, including resultant environmental and (some) economic effects. Through scenarios, it is possible to make quantitative assessments of potentials for environmental improvements (Fritsche et al., 2004; 2009). A key issue is that MFA accounts for both the demand and the supply side in an integrated manner, thus allowing for to analyse impacts beyond national borders (Brohmann et al., 2002; Bringezu and Bleischwitz, 2009). Moreover, the analysis of the material and energy flows through the various economic sectors and across borders also allows a quantitative examination of impacts on cost and employment (Fritsche et al., 2009), and helps to identify changes in qualitative sustainability indicators (e.g., biodiversity).

In the following, we apply the concepts and methods described above to outline three policy pathways (from idea to output, from output to outcome and from outcome to impact). As this is a conceptual and methodological application rather than yet a full-blown empirical analysis, we focus here on measures and indicators of environmental sustainability, such as resource use and GHG emissions. As for a balanced sustainability assessment, social and economic indicators need consideration as well, the conceptual framework allows their integration to the extent they can be included in the quantitative and/or qualitative determination of changes induced by SC policy instruments.

3. From Policy Idea to Policy Output

We can trace the pathways from policy idea to policy output by constructing intervention theories (Vedung, 1997; Leeuw, 2003) in order to identify the conditions under which the policy ideas can lead to the expected outputs, and eventually, outcomes. Policy instruments are central here, and we define them as the set of techniques of governance by which public and private institutional actors support and effect social change. For that purpose they usually involve the totality of existing forms of societal steering, comprising institutionalised societal self-regulation (cp. voluntary and procedural instruments), various forms of cooperation of public and private institutions (cp. economic and communication-based instruments), as well as mandatory regulation (Bemelmans-Videc et al., 1998). We have conducted a review of the most commonly applied policy instruments in the field of SC in order to identify conditions for success and failure. These instruments include:

- regulatory instruments,
- economic instruments (including the special category of green public procurement)
- communication-based instruments (including the special category of labelling) and
- voluntary and procedural instruments.

Regulatory instruments oblige the addressees (citizens or organizations) to comply with government rules under threat of sanctions. Examples include bans, mandatory standards and permit requirements (Vedung, 1997; Schönherr, 2008). In order for these instruments to be successful, a number of context-related conditions must be fulfilled. A functioning legal system is required for establishing and implementing norms and standards. Appropriate physical, human and organizational resources need to be available to collect and assess information on the environmental issues at hand, as well as the capacity to decide on appropriate measures. During enforcement, governments have to be capable to oversee compliance and impose sanctions if necessary (GTZ/CSCP, 2007). New instruments can thus gain significant benefits from existing regulatory capacities: for example, regulation and minimum standards are especially successful in the housing sector where SC policies have been traditionally preceded by health and safety regulations (Tukker et al., 2008b). Building codes are an example of an existing framework that has evolved to include measures to promote SC. Apart from that, most environmental regulations have focused on production processes until now. Recently, attention in environmental policy has turned to products, and environmental product standards are a new instrument in the field of SC. The EU Eco-Design Directive (Directive 2005/32/EC) is an example of a product standard that is expected to have a significant impact on e.g., the energy-efficiency of electrical and electronic products.

Economic instruments involve the distribution or levying of resources, thus making certain behaviours more or less financially attractive. They encourage behaviour through the use of market signals rather than through explicit directives. These instruments can harness market forces, and if they are well designed and implemented, can encourage consumers and firms to undertake behaviour that is both in their own interests and in the interest of the environment. Ideally, economic instruments aimed at SC correct for environmental externalities by ensuring that consumers face the full costs and benefits of their actions by altering the price signals faced by consumers (Larcom et al., 2008). For economic instruments, macroeconomic factors such as an adequate market infrastructure and the functionality of the market are likely to be relevant contextual factors. Moreover, the availability of sustainable products and technologies may determine whether an instrument is really capable of delivering a change in market structures or whether it is merely fiscal. This may occur if addressees do not perceive a way to substitute a taxed good or revert to alternative products. Also, economic instruments may entice addressees to attempt to avoid additional costs by reverting to illegal actions, such as dumping waste in the landscape instead of recycling. Other influential factors, with specific importance in energy efficiency improvement include energy price levels and the level of integration between energy efficiency policies and other sectoral policies (World Energy Council, 2008).

Among economic instruments, special attention is given to Green Public Procurement (GPP) defined as the process by which public authorities decide to purchase products, services and works with lower environmental impact all along their lifecycle compared to others with the same performance. GPP represents a kind of organizational strategy for greening the consumption by the public administrations at local, regional or national levels. It is a multifaceted instrument type, featuring characteristics of regulatory or economic instruments, and making use of labels and training, communication and information. At the EU level, GPP is one of the main levers for promoting sustainable production and consumption. For GPP, the review presented a list of contextual factors, including the level of political commitment in the public authority, the perception of the market availability of green products and services, the exchange of experience with other public authorities, the level of centralization or decentralization of purchasing decisions and the existence of a joint purchasing body for different public authorities (Alcantud et al., 2008).

Communication-based policy instruments cover a broad range of activities aimed at influencing consumers through the transfer of knowledge, information, exhortation and/or moral suasion without involving coercion or obligation of the addressees (Bemelmans-Videc et al., 2008). As the provision of information and education are very broad categories, a large variety of tools are available for the practical application of this instrument type, e.g., consumer information campaigns, consumer information centres, or feedback on consumption (Bremere and Fammler, 2008). An important contextual factor identified in our review was the reputation of the agencies providing information, which may be crucial for the addressees to accept the information as trustworthy.

Within communication-based policy instruments, labelling deserves special attention as a tool of SC policy. Labels give information in a compact, simple form close to the point of purchase and are equally directed at manufacturers that are encouraged or obliged to label their products. If consumers, as well as private and public purchasers, are to take environmental criteria into consideration in their purchases, it is important that they can find easily understandable and credible criteria to enable them to distinguish the truly 'green' products. There are both mandatory and voluntary labelling schemes related to environmental information. Important contextual features include consumer attitudes as well as multiple intervening factors between attitudes and behaviour, including abilities, opportunities, consumer empowerment and the social example set by others. Labelling also requires functioning communications from manufacturing through trade to final consumers, and each party in this chain needs to see the benefits of participating (Aalto et al., 2008).

The traditional regulatory, economic, and communication-based instruments are supplemented by voluntary or procedural instruments. Based on OECD (2002), we define voluntary instruments as "policies that are designed to influence consumer and producer knowledge and, in turn, consumer and producer willingness to behave pro-environmentally". Four sub-types were identified: participatory mechanisms, voluntary commitments and initiatives, advisory schemes and provision of infrastructure (Schmitt and Rogalla, 2008). Their success is linked to various context factors, including political and cultural views on public dialogue, the perceived added value of participation and the public's interest in participation. Moreover, the general regulatory and social context is even more important here than in the case of other instrument types. Pressure on societal actors to voluntarily adopt SC and production patterns often depends on the threat of more restrictive instruments being introduced by the government (Ouchi, 1979).

Our review of factors influencing success and failure will be complemented by a more detailed analysis later on in our project. We will also analyse the feasibility and effectiveness of 'packages' of policy instruments and hybrid forms of instruments. Detailed inventories will be made of policy instruments for SC in Europe, and case studies will be conducted of the most promising instruments.

4 From Policy Output to Policy Outcome

In order to specify the links between policy outputs (concrete implementation of instruments) and policy outcomes (changes in consumer behaviour), we have conducted a review of consumer research in economics, psychology, social psychology and sociology, as well as integrative research on SC (Heiskanen and Schönherr, 2009). Gender aspects of SC are also highlighted (Schultz and Steiss, 2009). Due to space constraints we can only present a summary of the most important results in the context of this paper. Literature suggests that policy instruments can target consumer

behaviour directly and indirectly, the latter by changing the market environment or by modifying the social and physical environment of the consumer (Table 1).

TABLE 1 HERE

While these target areas are presented above separately, they are in fact strongly interlinked. It is more an issue of which part of the system is primarily targeted. Thus, we can identify mechanisms that focus primarily on the individual level, by trying to build up consumers' motivation and ability to 'do the right thing' by providing the appropriate information and incentives or disincentives. The initiatives can target the consumers' abilities and opportunities, routines and habits and/or motivation and internalized norms. They can also aim to build up confidence and empowerment, e.g., by providing feedback on the aggregated effects of many individuals' actions, or by supporting tendencies toward political consumerism (Stø et al., 2008).

We can also identify mechanisms that aim to change the market environment of the consumer by changing the relative prices of products (e.g., via grants, taxes or by setting restrictions on production), but also by providing information about products, about consumers' purchases (feedback) or about the market in total (e.g., comparative environmental impacts of various products offered in the market). One can also argue that rules about marketing, advertising and product labelling influence market transparency by requiring or forbidding certain information to be provided. Finally, policies can aim to change the entire structure of the market (the availability of goods and services) by supporting R&D in innovative solutions, setting minimum product standards, getting retailers to agree to drop certain products or promote certain other ones, or simply by banning certain products. Government can use its market power through green public procurement aiming to bring new products into the market. Where government also provides services, it can showcase new solutions under the auspices of these services, thus 'leading by example' and creating demand among private consumers.

The framework conditions for SC are also shaped by the social and physical environment. Policies could, in principle, try to target entire systems of provision (interlocked sets of market and non-market goods). While such 'whole system' interventions are rare, Martens and Spaargaren (2005) give one example of the attempt in the Netherlands to create a sustainable Do-It-Yourself (DIY) system for home maintenance by simultaneously targeting the supply and demand side. Enabling infrastructures and conditions, such as sustainable urban plans, are another approach to shaping the social and physical environment of the consumer. Finally, if we agree that the social environment significantly influences consumer behaviour, initiatives that target local communities and social groups are one way to facilitate change in consumption patterns.

Finally, the last row in Table 1 suggests that the ability to make use of these different mechanisms depends on timing and the use of 'windows of opportunity' (Kingdon, 2003). This suggests that policy makers should 'bend' rather than try to 'break' trends (Tukker., 2008). All fields (consumption, market and infrastructures) have certain inertia, and changes are difficult to accomplish. It is easier to try to influence developments that are already ongoing and have momentum than to try to stop them or to start new developments through individual policy instruments.

5 From Policy Outcomes to Sustainability Impacts

Successful policies and policy measures should have an effect on consumption patterns, and through the consumption patterns on overall sustainability. These impacts can occur in a variety of ways (Heiskanen et al., 2001):

1. Shifting consumption within a product group to less environmentally harmful products in the same product category.
2. Shifting consumption from one product category to another.
3. Reducing the consumption of certain product categories or commodities such as energy, water, meat or petrol.
4. Reducing overall consumption (as defined in monetary terms), which on an aggregate level would lead to a reduced share of consumption in gross domestic product (i.e., more savings and investments, less consumption), or to a decline in gross domestic product.

From a consumer perspective, we can also analyse changes in consumption in terms of changes in 'needs areas', i.e., fields of consumption such as nutrition (food), shelter (housing), mobility, etc. (Wiegmann et al., 2005). Needs areas represent grouped demands for goods and services. Changes toward sustainability can include a number of the previous changes, i.e., shifts to less harmful products, shifts to other product categories, or the reduction of the consumption of certain product categories. Changes in consumption within need areas (e.g., food and housing) are more readily modelled using a broader material flow analysis (Wiegmann et al., 2005). Shifts in consumption between different product categories and changes in the overall level of consumption can be modelled with economy-wide input-output models, but this approach lacks the opportunity to explicitly model future developments, and to link to sustainability indicators. Thus, the EUPOPP project focuses on the needs area level for which material flow analysis (MFA) is the most appropriate approach.

The relationship between consumption patterns and sustainability effects is rarely linear. It is mostly indirect, mediated by the resulting impacts on production patterns. The more indirect it is, the more there is a possibility of confounding factors. We can identify a number of mediating chains, and exemplify them with impacts on greenhouse gases.

5.1 Changes in consumption mediated by changes in production patterns

There are some examples of relatively direct impacts, e.g., changes in disposal patterns. If consumers sort organic waste for composting, this has a direct impact on methane emissions (providing that waste is appropriately composted, resulting in carbon dioxide rather than methane emissions). Most changes in consumption patterns, however, have an effect on greenhouse gases via changes in production patterns. For example, if consumers substitute green electricity for the electricity mix of their current supplier, this should have an impact on the production of various kinds of electricity, and the ensuing greenhouse gas emissions. There are intervening variables, however: e.g. the impact depends on whether demand for green electricity exceeds the existing supply.

The changes in the effects from consumption to production and to greenhouse gases are not always linear. For example, if consumers reduce their demand for electricity, less electricity needs to be produced, resulting in less CO₂ emitted from power plants. The amount of reductions in CO₂ emissions is not constant, however, but also depends on the impact of the consumption reduction on the load shape. Usually, the reductions in CO₂ emissions would be proportionally larger in the marginal/peak load than in the base load in countries with hydro/nuclear baseload generation. In countries with lignite and coal in the baseload generation, the opposite would be true.

5.2 Changes in consumption patterns mediated via changes in other consumption patterns (and then followed by changes in production patterns)

Changes in the consumption patterns are often mediated into sustainability impacts via changes in other consumption patterns (and only thereafter via changes in production patterns and the resulting reductions in greenhouse gases). Such changes can offset part of the reduction in environmental impacts, and they are conventionally called rebound effects (Schipper, 2000; Jalas, 2001; Herring, 2008).

For example, purchasing of more energy efficient appliances should lead to less consumption of electricity, eventually leading to less production of electricity, resulting in less CO₂ from power plants. But there is an additional intervening variable here: As it is relatively cheaper to use more energy efficient appliances, they may be used more frequently (e.g., lights are left on). This is called a direct rebound effect. Usually, direct rebound effects for lighting are in the order of 10%-40% (Greening et al., 2000), so part of the reduction is offset by increased use.

Additionally, changes in the consumption of an individual commodity, such as energy, can lead to unpredictable changes in the consumption of other commodities, with ensuing changes in production and greenhouse gases. For example, if we manage to reduce the demand for residential energy use via a successful campaign, and the price of energy remains constant, the consumers will have more money to spend on other things. The energy intensity of all other commodities is lower than that of energy, so the total demand for energy is reduced (Heiskanen et al., 2001), but not to the extent of the initial saving, because part of the savings accrued is offset by increased consumption of, e.g. recreational services. This type of rebound effects is called indirect rebound effects (Herring, 2008).

5.3 Long-term structural changes in production and consumption patterns

There are also changes that are mediated via long-term structural changes in production and consumption. Savings of energy and natural resources (and the ensuing reduction of CO₂) are often at least partly offset by 'transformational' or 'enabling' effects, which are a further category of rebound effects (Herring 2008; Heiskanen et al. 2005). This type of effect is most obvious in information, communication and transportation technologies. Efficiency advances in these technologies have enabled global communications, which have a self-reproducing effect of increasing the demand for more communications and transportation. Another example of transformational effects is the introduction of the microwave oven, which is more energy-efficient for heating food than a conventional oven. Microwave ovens, however, have not replaced conventional ovens, but have rather engendered a totally new category of products (ready-to-heat microwave meals).

This discussion does not aim to imply that the gains from SC policy measures are always offset by rebound effects. It is also possible to envisage the opposite kinds of positive spin-off effects (e.g. if businesses or consumers reduce their demand for energy or natural resources, they are likely to become more favourable to policy initiatives that increase the cost of energy and natural resources) (Heiskanen and Jalas, 2003). Rather, the discussion suggests that close attention needs to be paid to intervening variables between changes in consumption patterns and the resulting effects on the environment, society and the economy. These intervening variables need to be analysed on a case-by-case basis, as they can be different for different kinds of policy measures and targets.

EUPOPP aims primarily to use MFA to identify the influence of changes in consumption patterns on other parts of the product life cycle (including dynamic effects such as increase or decrease in the demand for various factors of production). Influences of changes in individual consumption patterns on overall consumption patterns and influences of changes in products and technologies on overall consumption patterns will be addressed on a case-by-case basis.

The above discussion also suggests that the dynamic effects of SC policies depend on overall developments in policies, institutions and the market at large. Production-consumption systems are complex and interlinked in many ways. Thus, improvements in one part of the system may lead to a shift of impacts to another part. Piecemeal policy instruments may thus result in counterproductive effects, whereas consistent policies are likely to support each other and avoid counterproductive results (Heiskanen et al., 2001). Influencing society via SC policies needs to be embedded in a broader and consistent set of policies in order to have the desired effects. This means the application of multiple instruments to address multiple barriers to SC practices (Stern 1999), but also the promotion of a consistent shift in society so that the natural resource intensity of all behaviours and all sectors is progressively reduced.

6. Discussion and Conclusions

In our conceptual framework, we have identified key pathways for evaluating and modeling the prospective impacts of policies to promote SC. Our empirical approach for analysis is presented in Figure 1.

FIGURE 1 HERE

We can see that the impacts of SC strategies and policy instruments depend on a complex network of pathways. Firstly, strategies and policy instruments are realised in the form of various *outputs*, such as laws, regulations, programmes, schemes and implementation measures. Secondly, these outputs can result in variable *outcomes* in terms of changes in consumer behaviour (i.e., the demand, use and disposal of products and services). Thirdly, the changes in consumer behaviour can have various *impacts* on environmental, economic and social sustainability, which are mediated via changes in production patterns, changes in other consumption patterns, and changes in entire product systems.

We can consider as an example an eco-labelling scheme and what it aims to accomplish. The launch of the scheme is to be followed by the development of labelling criteria for various products (output). Consumers, retailers and producers are to be made aware of the scheme in order for them to start participating in it (output). If this is successfully achieved, some labelled products become available, and they gain a certain market share when a certain number of consumers purchases them, i.e., consumption patterns change (outcome). The growth in the demand for eco-labelled products, and the decline in the demand for non-eco-labelled products, in turn, is expected to reduce the environmental impacts from the production, use and disposal of the product groups in question (impact).

Outputs and outcomes of effective instruments can be analysed using policy analysis (who was reached, what behaviour changes were accomplished) and the plausibility of intervention theories can draw on insights from consumer studies. Interviews and data on consumer behaviour and energy and resource consumption allow us to identify changes in consumption patterns. A careful

analysis of trends and business-as-usual scenarios enables us to distinguish the impact of the selected policy from the impacts of other factors.

Most importantly, however, our analysis framework allows us to model the outcomes and impacts of an eco-labelling scheme, for example, together with the outcomes and impacts of various other (regulatory, economic, communicative and procedural) instruments targeting the same field of consumption. MFA is used to identify changes in production systems (e.g. heating, appliances), as well as the resultant impacts on selected sustainability indicators within and outside Europe. This analysis allows the provision of advice for policy makers aiming to steer Europe towards SC.

The framework still needs to be empirically verified to establish its value. However, some implications for policy design can already be drawn. Policy makers should devote increasing attention to interactions between policy instruments, and to interactions between policy instruments and the framework conditions for SC. In order to avoid rebound effects and counterproductive results, multiple policy instruments need to be applied consistently to the most important fields of consumption, with due attention to implementation and accompanying measures.

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Table 1. Target areas for policy influence on sustainable consumption

Consumers/individual citizens	Market environment	Social and physical environment
<ul style="list-style-type: none"> • Ability and opportunity • Routines and habits • Motivation and norms • Confidence and empowerment 	<ul style="list-style-type: none"> • Prices • Product information • Consumption feedback • Market transparency • Availability of products and services • Use of government market power and example 	<ul style="list-style-type: none"> • Systems of provision • Enabling infrastructures and conditions • Support for local sustainable communities and social groups
Timing and ‘windows’ of opportunity		

Figure 1: Three-step framework for connecting sustainable consumption policies to their sustainability impacts.

