

A systemic perspective on eco-innovation

Eco-innovation brief #16

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*Given that current trends of development in Europe, but also in other world regions, are increasingly unsustainable, there is an urgent need for action. **What is required is a systemic change**, a shift of paradigm, away from a society based on ever increasing consumption of nature and strive for infinite growth in quantitative terms towards a development path, which is oriented towards the overarching goal of high quality of life for all people and which needs to be realised within the environmental carrying capacity of the planet. **Eco-innovation is one important way to achieve the required systemic change.***

The thematic report “A systemic perspective on eco-innovation” illustrates that a number of eco-innovation examples do already exist in various thematic fields. The report also lists key elements, which decision makers in the policy arena as well as in companies need to take into account, if they want to actively contribute to a systemic change.



Source: Microsoft office images

The global need for a systemic change

Global resource extraction and use have almost doubled within the past 30 years, from around 38 billion tonnes in 1980 to more than 68 billion tonnes in 2008. The majority, around 50 billion tonnes, is consumed by the high income population segment. Only around 20 billion tonnes remains for the poor, in particular in developing countries. To ensure an equal level (“fair share”) of consumption of natural resources by the currently poor with the rich, global material use would have to more than double and more than triple if population growth is taken into account. The planet will not be able to sustain such a high level of resource consumption and all its impacts such as pollution and increased global warming. Given those unsustainable trends, there is an urgent need for action.

Some companies have become aware of today’s environmental challenges and have begun to adapt their offers to “green products”. Nevertheless a larger systemic change has to be proposed. According to EU surveys, such as the Community Innovation Survey, there exists an “eco-innovation gap” and the majority of companies still do not eco-innovate at all, or their actual material savings due to eco-innovation are not in the required order of magnitude.

On the consumption side some developing countries are adopting consumption patterns of industrialized countries resulting in a further over consumption of resources; this situation represents a serious environmental threat. However the preference for “green products” is rising. Recent surveys show that for example 8 in 10 EU citizens state that a product’s environmental impact – such as whether it was reusable or recyclable – is an important element when deciding which products to buy.

The role of eco-innovation in achieving a systemic change

Eco-innovation plays a key role for achieving the required systemic change towards sustainable consumption and production patterns associated with significantly less resource inputs and causing significantly less environmental harm. Two different approaches can be identified to achieve systemic change: the first is systemic eco-innovation by design, i.e. eco-innovation targeted towards systemic changes. The second option is multiple eco-innovation along the whole production-consumption chain, which together can lead to a systemic change. Very likely, these will need to be implemented in parallel, taking into account the specific constraints.

Systemic eco-innovation by design

Systemic eco-innovation aimed for *by design* is destined at fundamental and lasting system-wide changes at both the societal level (e.g. societal values and attitudes) and at the technical level (infrastructure, technology, tools, production processes etc). A key feature of systemic innovations is that they comprise a series of explicitly connected changes that together lead to a greater change than the sum of individual adaptations. Systemic eco-innovations require the interaction of a number of actors to plan and realise concerted action.

Examples of systemic eco-innovations by design

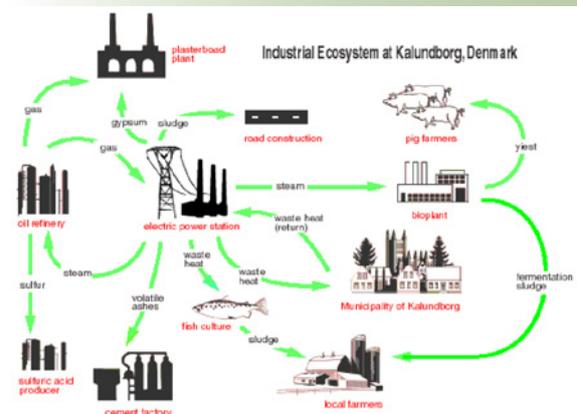


Image source: Ecodecision

Eco-industrial parks and industrial symbiosis: an example for an industrial symbiosis network is in Kalundborg, Denmark. Private and public enterprises buy and sell waste products from industrial production in a closed cycle. Residual products from one company are used as raw materials in another company, therefore the economy and the environment are benefiting. In Kalundborg a coal-fired power plant (1500 MW) is linked with other companies and the community. The surplus heat, which is not needed by the powerplant is used for heating about 3500 households nearby and a local fish farm. The sludge from the fish farm is sold as fertilizer.

Source: <http://www.symbiosis.dk>



Eco-cities: Masdar city in Abu Dhabi is a modern Arabian city that aims to be in harmony with the surrounding natural system, like ancient Arabic cities. As such, it shall serve as a model for sustainable urban development regionally and globally, seeking to deliver high quality living and working environments with low environmental impacts. Masdar City is an emerging global clean-technology cluster and a high-density, pedestrian-friendly city, where current and future renewable energy and clean technologies are showcased, marketed, researched, developed, tested and implemented. The city, which at full build out will house 40,000 residents and hundreds of businesses, will integrate the full range of renewable energy and sustainability technologies, across a living and working community.

Source: <http://www.masdarcity.ae/en/>

Systemic eco-innovation by multiple changes

A second approach is incremental **eco-innovation** in steps **along the production-consumption chain**, which together could contribute to a systemic change. In order to move to a radically different development trajectory, change needs to happen simultaneously at several stages. The ultimate aim would be to on the one hand reduce negative environmental impacts while on the other hand increase the quality of life. This overarching objective can be decomposed into various aspects: (1) de-coupling environmental impacts from resource use, (2) de-coupling resource use from GDP, (3) de-coupling the GDP from societal services and products, and finally, (4) de-coupling quality of life from the amount of services and products.

Examples of systemic eco-innovations by design

Closing material loops: British scientists have developed a process that will make the fashion and clothing industry more sustainable and profitable. wear2™ is a unique new garment seam technology which allows items of clothing to be partially or completely disassembled rapidly and easily. Without damaging the surrounding fabric garment seams can be selectively dismantled and labels and logos can be removed. The whole garment can literally fall apart into its component parts, but the durability of the garments is not affected, they remain fully robust before the disassembly treatment is applied. wear2™ thus enables the clothing industry to re-use material to supplement or replace virgin fibre in new garments, it saves material costs, ease potential supply constraints and reduces environmental impact in a virtuous closed loop system. It is not necessary to spend money on shredding or on landfills and it significantly increases the financial value of end-of-life corporate clothing.

Source: <http://www.wear-2.com>



Key messages for policy makers

- **Setting the right policy framework:** governments need to set the right policy framework in order to facilitate the shift to systemic change at different levels
- **Ensuring proper governance in policy implementation:** introducing feedback loops and early warning systems for policy implementation to ensure achievement of the desired effects
- **Achieving policy goals with less resources and a smaller environmental impact:** all policies need to be seen in conjunction with resource policies, including getting resource prices right and fostering public procurement
- **Promoting circular societies via policy strategies:** there is huge untapped potential for companies, regions and countries to design material input for products in a way they can be reused over and over again in analogy with the design of nature.
- **Putting sustainability at the center of learning:** designing an educational framework that supports the provision of necessary skills for sustainable entrepreneurship, sustainable engineering and sustainable design
- **Combining regulatory measures with increasing public awareness:** policy needs to support a systemic shift to hard policy measures such as regulation by soft approaches such as information and awareness raising campaigns.
- **Promoting responsible research and science.** Sustainability and resource use research can help identify the leverage points and phases of the life cycle in which to decrease resource use.

Key messages for business

- **Investing in sustainability now will help to lead the future markets:** businesses that want to succeed in the long-term need to establish themselves as leaders on the sustainability agenda.
- **Business models themselves need to become inherently sustainable:** this implies not just greening of the existing business practices, but also increasing the service per material input and shifting to a dramatically new ways of delivering value proposition to their customers.
- **Pursue lifecycle perspective for products and services:** business needs to consider whether the final product can be used over a longer period of time or can be re-used or recycled hence contribute to the closing of material loops and a circular economy.
- **Company leadership dedicated to sustainability:** this is a key in fostering sustainable and eco-innovative companies. Business needs to anchor systemic eco-innovation issues at the board level.
- **Building the cross-functional team:** for reaping the full potential of systemic eco-innovation, business needs to build cross functional teams. These allow taking a companywide approach from strategic planning to operations and risk management to design.
- **Implementing the ongoing monitoring of eco-innovation strategies:** using and contributing to life cycle science helps building the case for better understanding the true cost and the environmental and social hot spots of products.

Further links and resources:



- Thematic report “A systemic perspective on eco-innovation” is available on <http://www.eco-innovation.eu/reports>
- Analytical, thematic and foresight reports are available at <http://www.eco-innovation.eu/reports>
- Eco-innovation good practices repository: <http://www.eco-innovation.eu/practice>
- Database: <http://database.eco-innovation.eu/>
- News stream: <http://www.eco-innovation.eu/news>
- Glossary: <http://www.eco-innovation.eu/glossary>
- The Eco-IS visualization tool is available at <http://database.eco-innovation.eu>

- Detailed analyses of eco-innovation in EU Member States are available at www.eco-innovation.eu/countries