

# Eco-innovate!

**A guide to eco-innovation  
for SMEs and business coaches**

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Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Union. A number of companies are presented as illustrative examples of eco-innovation in this report. The EIO does not endorse these companies and is not an exhaustive source of information on innovation at the company level.

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## Layout

Gerda Palmeshofer



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# Contents

1	Introducing eco-innovation .....	6
2	Revisit your business model .....	12
3	Eco-innovate production processes .....	18
3.1	Waste and emissions.....	20
3.2	Material and energy productivity.....	26
3.3	Supply chains .....	32
4	Eco-innovate products and services .....	36
4.1	Research and development.....	38
4.2	Design.....	42
4.3	Marketing.....	48
5	Get your eco-innovation idea off the ground .....	52
5.1	Test your idea .....	54
5.2	Assess your strategic capacity .....	54
5.3	Get your eco-innovation funded.....	55
5.4	Get your first customer.....	55
6	Examples of European projects on eco-innovation.....	58

# Not sure what eco-innovation means for your business?

## This guide is for you

This guide is a practical and comprehensive introduction to eco-innovation addressed primarily to small and medium-sized enterprises (SMEs). The booklet overviews emerging business opportunities eco-innovation has to offer to companies that reconsider business models, develop new products, technologies or services, or improve production processes.

The aim is to summarise key business issues, questions and lessons learnt for SMEs based on the existing resources, notably specific assessment tools, checklists and databases, as well as to present selected eco-innovation good practices.

This guide is addressed above all to companies that have not yet embarked on any eco-innovation activity, but are interested in exploring the potential offered by eco-innovation for their business or new business idea.

The publication will be equally useful for business support organisations providing—or planning to provide—eco-innovation support and coaching services to SMEs.

This guide is one of many publications and information sources developed by the Eco-Innovation Observatory (EIO). Over the years we have gathered

convincing evidence on the benefits from eco-innovation, especially regarding cost savings and new market opportunities. We believe that eco-innovations in SMEs will contribute to a making a green economy work in Europe and worldwide.

Visit [www.eco-innovation.eu](http://www.eco-innovation.eu) for further information. Businesses are invited especially to browse more than 200 practical examples of eco-innovation from across the EU at [www.eco-innovation.eu/practice](http://www.eco-innovation.eu/practice).

# How to use this guide

This guide is divided into six sections. The “Eco-innovation Wheel” (see Figure 1, right) provides visual guidance on the focus of individual sections.

The opening chapter introduces the concept of eco-innovation. The focus then shifts to the key issues, challenges and opportunities of eco-innovation for SMEs.

The guide includes sections on:

- business model and value proposition
- process eco-innovation
- product eco-innovation
- getting eco-innovations on the market
- online resources for eco-innovation.

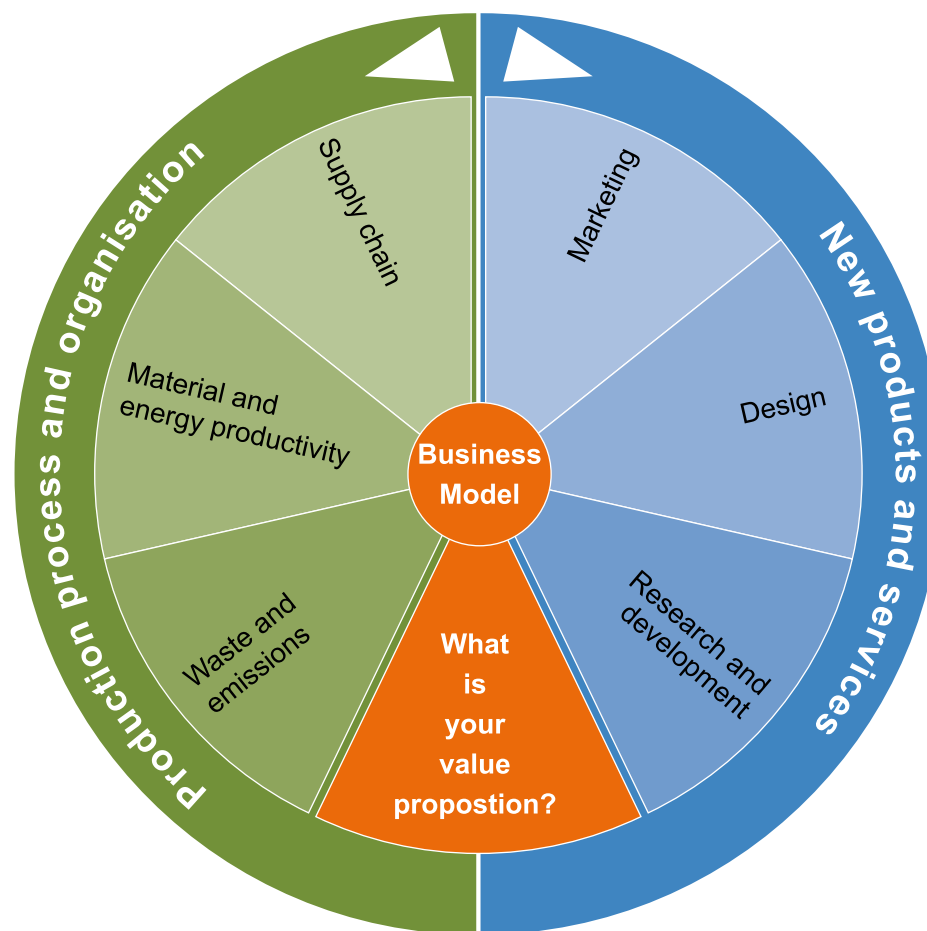


Figure 1: Eco-innovation Wheel



1





**Introducing eco-innovation**

# What is eco-innovation?

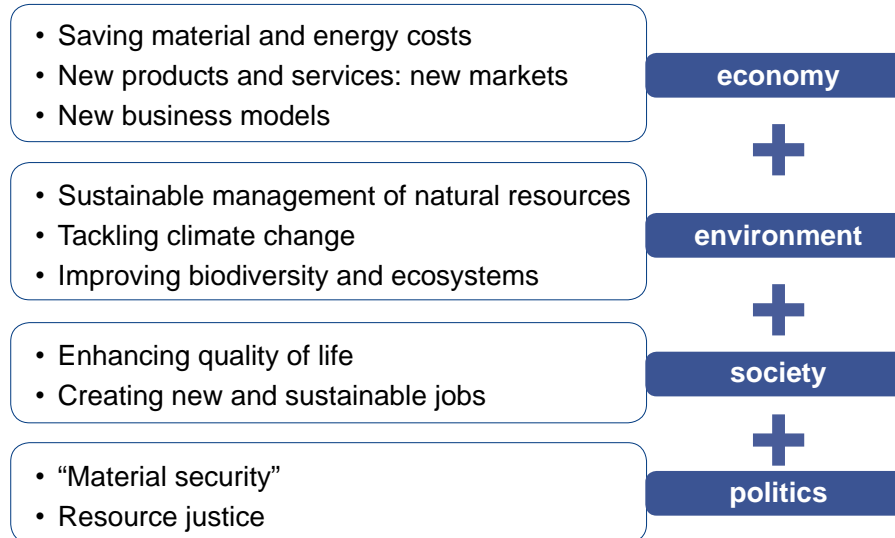
Eco-innovation makes both economic and environmental sense. It means being economically competitive while respecting the natural environment.

Eco-innovation can be an idea for a new start-up or product as well as for making improvements to existing operations. One focus of eco-innovation is new technologies, but creating new services and introducing organisational changes are just as important. At its core, eco-innovation is about creating business models that are both **competitive and respect the environment by reducing resource intensity of products and services.**

Eco-innovation takes the full life-cycle perspective into account, rather than just focusing on environmental aspects of individual life-cycle stages. It does not just mean inventing new products and delivering new services, but it also encompasses reducing environmental impacts in the way products are designed, produced, used, reused and recycled.

<sup>1</sup> EIO 2010: Eco-innovation Observatory Annual Report 2010. Pathways to a resource-efficient Europe, [www.eco-innovation.eu/index.php?option=com\\_content&view=article&id=200&Itemid=258](http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=200&Itemid=258)

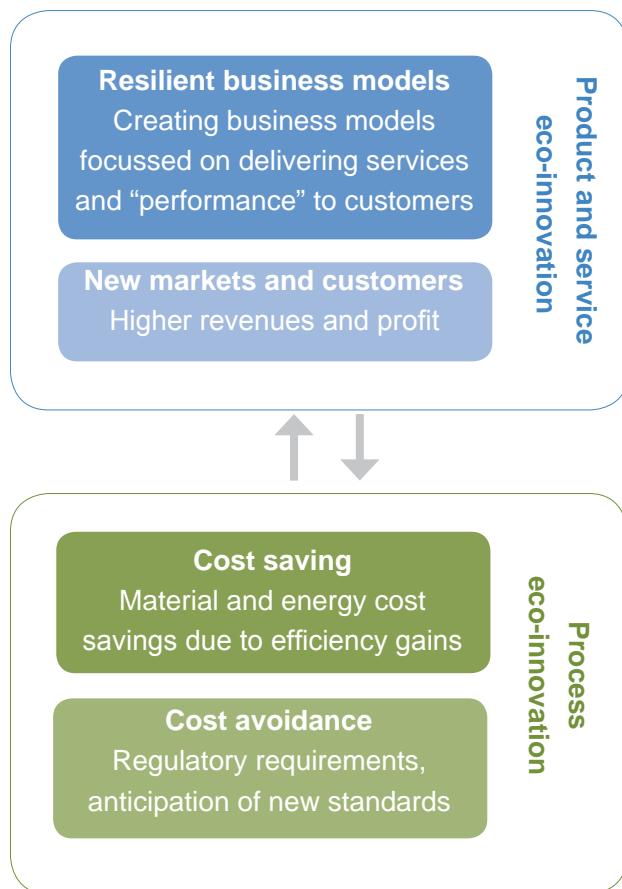
**Incremental eco-innovation** focuses on improving existing goods and services, whereas **disruptive eco-innovation** is about thinking outside of the box and bringing completely novel approaches to market.



Eco-innovation is the introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle<sup>1</sup>.

Figure 2: Why eco-innovation

# Business case for eco-innovation



## Resilient business models

Companies can revisit their **business models and value propositions** by reconsidering novel ways of delivering their services. Alternative approaches to delivering services (e.g. functional sales) can both reduce resource intensity, bring about new market opportunities and make business more resilient in the face of market trends, notably fluctuating commodity prices.

## Cost saving

Eco-innovations resulting in **improved resource productivity** save money by reducing costs of material and energy. This type of “savings opportunity” is especially associated with process innovation and grounded in initiatives like “cleaner and leaner” production. The business case for material efficiency has increased with rising commodity prices.

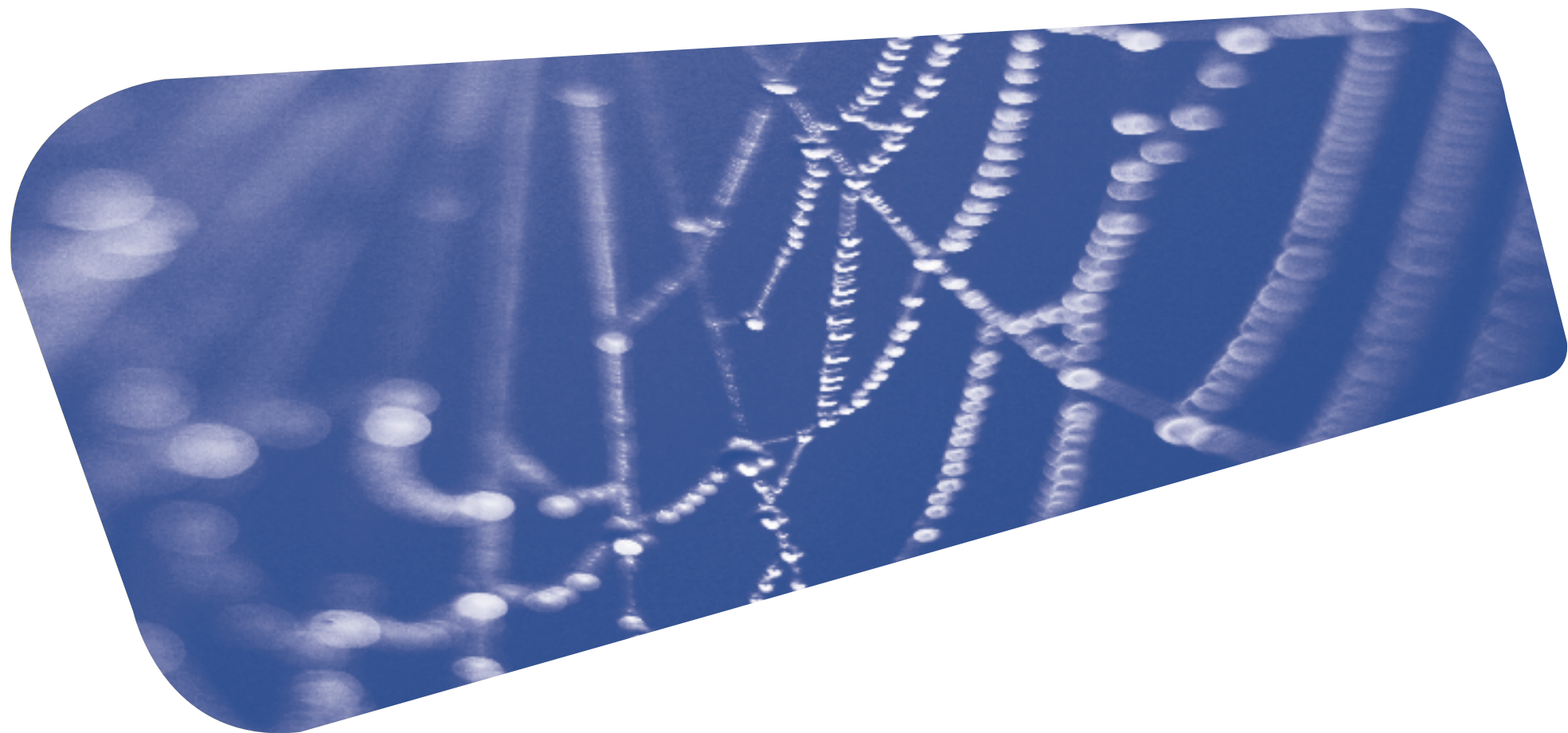
## New markets and customers

Companies **developing and selling new eco-innovative products, services and technologies** are motivated by the opportunity to access new markets and customer segments. A clear incentive here is maintaining and generating higher profits.

## Complying with regulations

Many companies **eco-innovate their processes and products to comply with regulatory requirements**, but also to meet growing environmental and social standards applied by their strategic partners and clients (e.g. retailers).

Figure 3: Business case for eco-innovation





Life-cycle stage	Environmental consideration	Business case
Resource extraction	<ul style="list-style-type: none"> <li>• Reduce environmental pressures and impacts by limiting extraction of virgin resources and by limiting “unused” extraction</li> </ul>	<ul style="list-style-type: none"> <li>• Consider renewable and secondary resources (circular economy)</li> <li>• Reduce cost by improving efficiency of extraction</li> <li>• Comply with and anticipate new regulations</li> <li>• Improve your reputation CSR (Corporate Social Responsibility)</li> </ul>
Manufacture	<ul style="list-style-type: none"> <li>• Use fewer resources, including energy</li> <li>• Use materials with less environmental impacts (substitutes)</li> <li>• Produce less pollution and waste</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce production costs by improving material and energy productivity and by material substitution</li> <li>• Build resilience to changes in commodity prices and resource supply</li> <li>• Increase your turnover and profits from sales of resource-efficient products and services</li> <li>• Comply with and anticipate new regulations (including eco-design)</li> </ul>
Distribution	<ul style="list-style-type: none"> <li>• Reduce impacts, for example through: <ul style="list-style-type: none"> <li>• Better packaging design, reuse, recycling</li> <li>• Fuel and energy use reduction in transportation and storage</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Cost reduction</li> <li>• Regulatory compliance</li> </ul>
Use	<ul style="list-style-type: none"> <li>• Use less resources, including materials, energy, land and water</li> <li>• Cause less pollution and waste</li> </ul>	<ul style="list-style-type: none"> <li>• Shift to selling services from products (i.e. functional sales, including product leasing and sharing)</li> <li>• Improve your reputation and customer relations</li> <li>• Comply with and anticipate new regulations</li> </ul>
End of life	<ul style="list-style-type: none"> <li>• Reduce impacts of waste disposal by decreasing the volume of waste or by improving the quality of waste</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and sell novel products and materials from waste</li> <li>• Reduce costs by reusing, recovering or recycling resources from your own or external waste streams (e.g. industrial ecology, C2C (Cradle to Cradle))</li> <li>• Comply with and anticipate new regulations</li> </ul>

Table 1: Environmental considerations and the business case for eco-innovation

2



# Revisit your business model



# Revisit your business model

Companies most often decide to rethink and redesign their business model to reduce costs and improve customer experience. Many companies are also driven by environmental and social concerns.

## Key challenges for your business model

- Rethink your value proposition and your offer: customers do not necessarily need to own products; services can meet their needs, perhaps even better. Consider concepts like leasing or sharing for your business.
- Scan the horizon: what are emerging trends that may influence your value proposition and business model in a short- and long-term?
- Prepare to take risks: changing a business model is a continuous process. Integrate an ongoing strategic reflection of your business model. This will make your business more resilient.

A fundamental question for any eco-innovative company is how to deliver value to a customer in a way that is both profitable and less resource intensive. Reflecting on how to satisfy fundamental needs of a customer, be it a business or household, is the first step in tackling this challenge.

The need for mobility, for example, does not necessarily equal the need to own a car; the “function” or “performance” of a car can be delivered by many other means and forms of transportation or by limiting the need for mobility altogether! Similarly, the most effective waste management approach is to avoid generating waste rather than developing even the most effective recycling methods.

## Key Questions

- What value do we deliver to customers?
- Which customers' needs are we helping to satisfy?
- What are key the activities and resources that help us to develop and deliver value to customers (e.g. skills, resources, strategic partnerships, Intellectual Property (IP))?
- How much does our business model depend on our companies' and our customers' access to and use of material and energy?
- Could we consider an alternative way to satisfy the needs of our customers (e.g. product-service systems)?



## Good practice examples

Turntoo:  
efficient chemical management system

**Turntoo** (NL) is an intermediary making pay-for-use agreements between users and manufacturers in relation to washing machines, carpeting, tiles, furniture, lighting and power monitoring. In such models producers retain ownership of a product and derive their profits from its use rather than its sale. Therefore, they have an incentive to make the product as durable and efficient as possible, as well as designing it to that it can readily reenter the production loop at the end of its lifecycle.

[www.turntoo.com/en](http://www.turntoo.com/en)

Swedish AGA Gas:  
functional sales in practice

**Swedish AGA Gas** offers its customers the ability to continuously introduce safer chemicals at lower consumption levels and with less hazardous waste disposal. **AGA Gas** reduces their customers' overall chemical procurement costs by reducing use of chemical products, mitigating risks related to the use of chemicals and improving the data management of the chemicals<sup>2</sup>.

[www.aga.com](http://www.aga.com)

CAR2GO:  
selling new forms mobility



The “next step” for car-sharing models may be the concept of CAR2GO. This is an urban mobility concept designed by Daimler, which involves a vehicle fleet of “smarts” that are

accessible to registered users at all times. The main concept is that cars can be spontaneously “hired” (customers use a chip to unlock the car), kept for as long as needed and left anywhere within the city borders when finished. The customer is charged per minute, or for longer trips per hour or day, whereas the company pays for fuel and cleaning.

[www.car2go.com](http://www.car2go.com)

<sup>2</sup> See more about chemicals management business models in Green Paper by FORA on [www.foranet.dk/media/27577/greenpaper\\_fora\\_211010.pdf](http://www.foranet.dk/media/27577/greenpaper_fora_211010.pdf)



## Learning Resources

- **Business Model Generation** offers a wide range of resources for entrepreneurs and companies on business model innovation.  
[www.businessmodelgeneration.com/canvas](http://www.businessmodelgeneration.com/canvas)
- **OECD workshop** “The Future of Eco-Innovation: The role of business models in green transformation”
  - Background Paper  
[www.oecd.org/dataoecd/7/34/49537036.pdf](http://www.oecd.org/dataoecd/7/34/49537036.pdf)
  - Workshop resources  
[www.oecd.org/innovation/innovationinsciencetechnologyandindustry/thefutureofeco-innovationtheroleofbusinessmodelsingreentransformationsummaryandpresentations.htm](http://www.oecd.org/innovation/innovationinsciencetechnologyandindustry/thefutureofeco-innovationtheroleofbusinessmodelsingreentransformationsummaryandpresentations.htm)
- **Nordic Innovation** produced a series of publications on green business models  
[www.nordicinnovation.org/Publications/green-business-model-innovation-empirical-and-literature-studies](http://www.nordicinnovation.org/Publications/green-business-model-innovation-empirical-and-literature-studies)
- **FORA** present a number of cases of green business models in its Green paper: “Green business models in the Nordic Region. A key to promote sustainable growth.”  
[www.foranet.dk/media/27577/greenpaper\\_fora\\_211010.pdf](http://www.foranet.dk/media/27577/greenpaper_fora_211010.pdf)

## Measuring environmental performance

**Ecological rucksacks** are the resource requirements of producing products or services. For products, it is the complete material input needed to manufacture a product from the cradle to the point of sale, minus its own weight. For services, it is the sum of the shares of the rucksacks of the technical means (“Service delivery machines”) employed (for example, vehicles, buildings, etc.), plus the sum of materials and energy used to deliver a unit of service<sup>3</sup>.

**MIPS** (material input per unit of service) is the life-cycle input of natural material (MI) which is employed to fulfill a human need (S). MIPS is a robust indicator for comparing functionally comparable goods or services in terms of their material or energy requirements.

[www.factor10-institute.org/terms.html](http://www.factor10-institute.org/terms.html)

The **ecological footprint** is a measure of human demand on the Earth’s eco-systems. It represents the amount of biologically productive land and sea area necessary to supply the resources a human population consumes and to assimilate associated waste.

[www.ecologicalfootprint.com](http://www.ecologicalfootprint.com)

The **carbon footprint** measures greenhouse gas (GHG) emissions caused by an organisation, event, product or person. Carbon Trust guide to carbon footprinting for organisations and products.

[www.carbontrust.com/resources/guides/carbon-footprinting-and-reporting/carbon-footprinting](http://www.carbontrust.com/resources/guides/carbon-footprinting-and-reporting/carbon-footprinting)

EC’s LCA database including carbon footprint data of over 300 materials, energy carriers, and delivery of waste treatment and transport

[lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm](http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm)

Guide to PAS 2050—How to assess the carbon footprint of goods and services

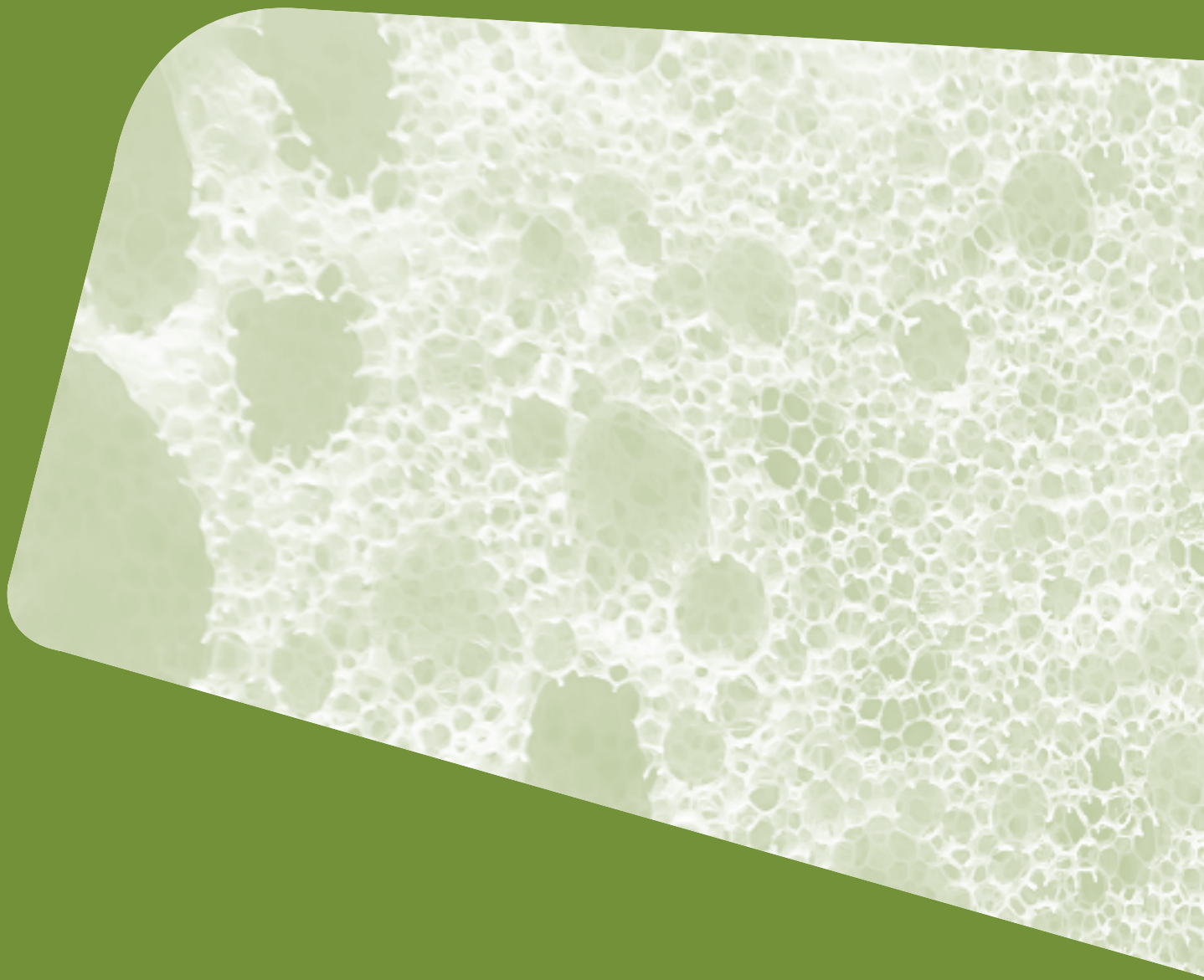
[shop.bsigroup.com/en/forms/PASs/PAS-2050-Guide/Confirmation](http://shop.bsigroup.com/en/forms/PASs/PAS-2050-Guide/Confirmation)

The **water footprint** of an individual, community or business is defined as the total volume of freshwater used to produce the goods and services consumed by the individual or community or produced by the business.

[www.waterfootprint.org](http://www.waterfootprint.org)

<sup>3</sup> See Schmidt-Bleek F., 2011: English glossary: suited for the approach to ecological and economic sustainability. Factor 10 Institute.

3





# Eco-innovate production processes



## 3.1 | Waste and emissions

Waste management has undergone a radical change. Instead of focussing on treating waste and developing “end of pipe” solutions to reducing emissions the focus has shifted to avoiding or minimising waste and recovering the valuable materials from waste.


### Key challenges for your business

**Dealing with waste.** Disposal costs are typically about 15% of waste management costs. The hidden waste costs could be sinking the company's profit margins. Savings could also take the form of reduced environmental compliance costs<sup>4</sup>.

**Monitoring and assessing your waste.** Waste minimisation is not just about reducing materials. It involves an examination of energy, emissions and effort needed to recycle or reuse the waste. When the full cost of waste is understood, initial waste reduction projects often show payback periods of less than one year. As raw material costs rise and the processing of recyclables expands, segregation of waste materials with acceptable levels of contamination may become economically viable and yield valuable income.

### Key questions

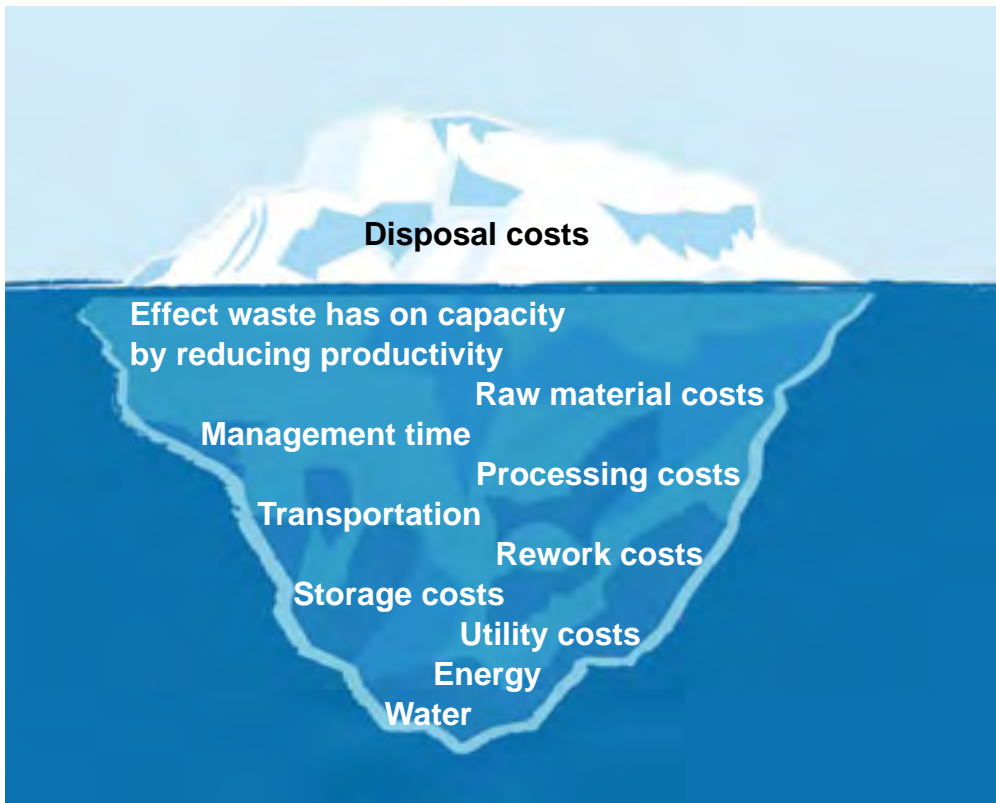
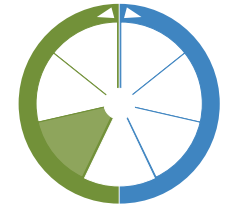
- What type of waste and emissions does our business produce?
- What are the sources of direct waste and emissions?
- What are the sources of indirect waste and emissions?
- Can our waste become secondary material for our own or other companies?
- Could waste of other companies in our city or region become material for production?

 Waste and emissions come in diverse forms (e.g. wastewater, solid and biological waste, chemical waste, air emissions, etc.).

**Direct** wastes and emissions refer to those discharged by the production facility and processes such as transportation.

**Indirect** wastes and emissions are embedded in the input materials and energy used in the extraction, processing, production, and delivery of products and services.

<sup>4</sup> See Minnesota Technical Assistance Programme, [mntap.umn.edu/source/Previous%20Issues/17-4/wastecomp.htm](http://mntap.umn.edu/source/Previous%20Issues/17-4/wastecomp.htm)



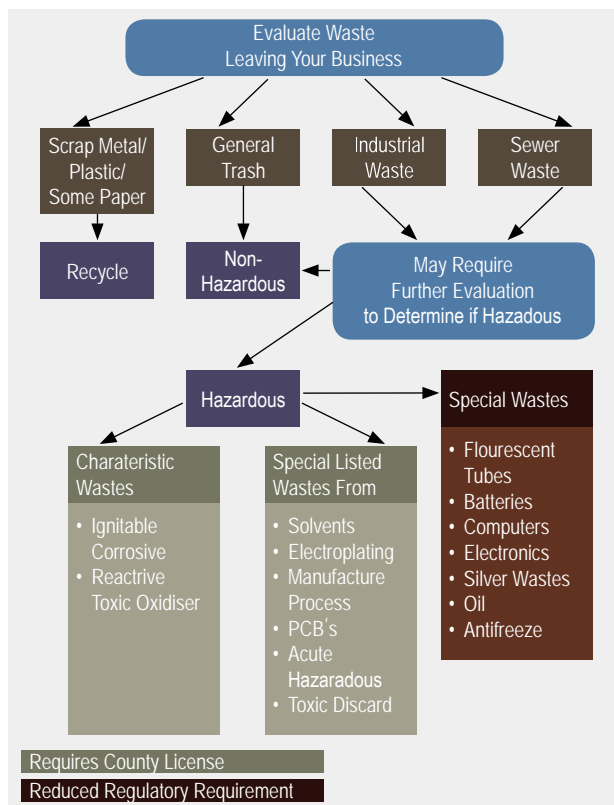
Source: WRAP 2012, Why waste prevention makes good business sense, available on [www.wrap.org.uk/supply\\_chain](http://www.wrap.org.uk/supply_chain)

Figure 4: Hidden waste costs

## Business case for eco-innovation

### Reducing waste and emissions

- Brings down regulatory compliance costs, considering that pollution and the landfill charges increase each year (currently landfill charges range between €10 to 80/tonne).
- Saves costs of raw materials, transport, storage, management etc. over relatively short time periods and with generally low-risk investments.
- Creates a socially responsible image for the company.



Source: UNEP, 2010. PRE-SME—Promoting Resource Efficiency in Small- & Medium-Sized Enterprises: Industrial training handbook

Figure 5: “Quick wins” in reducing waste and emissions in SMEs

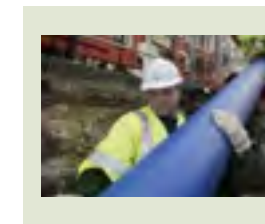
## Quick wins

### Reducing waste and emissions in SMEs

- Conducting audits of material use and waste streams will help your business to cut waste and inefficiencies and gain savings (business support in this area is increasingly being promoted and co-funded by governments).
- Selecting materials with high recycling content can minimise your costs for waste disposal.
- Ensuring proper handling and storage may help you to avoid breakages and loss.
- Establishing supplier “take back” schemes could be a way for you to resource used materials for remanufacturing.

## Good practice examples

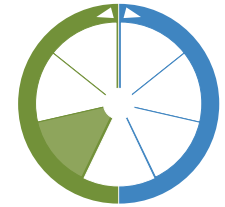
NISP:  
leading industrial symbiosis in the UK



The south-east team of the UK National Industrial Symbiosis Programme (NISP) facilitated a complex collaboration between four companies. This network delivered 100,000

tonnes of recovered and reprocessed clay and other materials for reuse from Thames Water’s replacement works. This has injected new life into an old deposition site near Chatham Docks and helped to generate additional sales for around €2m and reduce more than 12,000 tonnes of CO<sub>2</sub> emissions.

[www.nispnetwork.com/media-centre/case-studies](http://www.nispnetwork.com/media-centre/case-studies)



### Genan: turning tyres into new products



The Danish company Genan is recycling 80% of all Danish tyres. In 2003 Genan built the world's largest tyre recycling plant in Germany. The company has developed a product of rubber powder and granu-

lates that can be used as a surface in athletic fields or as artificial grass in football fields. It can also be used in paint, floors, reproduction of new tyres, or even as a sound reduction component in new asphalt. Material recycling through the Genan method compared to other disposal methods saves 1–2 tonnes of CO<sub>2</sub> per tonne of scrap tyres. Being one of the pioneers in a new market allowed the company to grow and become one of the world's largest recyclers of used car tyres in just a few years.

[www.genan.eu/Tyres-2.aspx](http://www.genan.eu/Tyres-2.aspx)

### Samsung: integrated waste management in Hungary

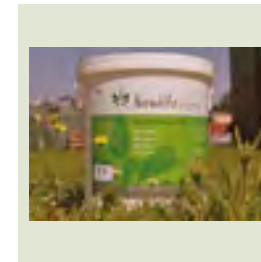


Samsung SDI Hungary Co. Ltd. introduced a number of emission reduction and recycling measures that resulted in significant cost benefits for the company. Recycling of chemical waste decreased the

amount of both waste and raw materials used by 35%, with an immediate economic return of € 7,600. The use of reusable packaging materials decreased the amount of paper, wood and chemical packaging relating to €160,000 in savings. An additional €316,000 per year could be saved by replacing a gas purifier with a thermal regenerative post-combustor. Water recycling measures allow savings of 20,625 m<sup>3</sup> per year.

[www.environmental-savings.com/megtakaritas.php](http://www.environmental-savings.com/megtakaritas.php)

### Newlife Paints: from waste to eco-paint



A UK process for retreating waste paint and turning it back into useable paint. Newlife Paints was started by an industrial chemist who now has a waste carrier's license and agreements with several house-

hold/commercial waste sites to take away their waste paint and retreat it. Newlife Paints also has agreements with paint manufacturers to take their waste and use it in his product. The company has recently won a contract with a major do-it-yourself retailer to supply their own brand of eco-paint.

[www.newlifepaints.com](http://www.newlifepaints.com)





## Learning Resources

- The **OECD Sustainable Manufacturing Toolkit** provides a set of internationally applicable, common and comparable indicators to measure the environmental performance of manufacturing facilities in any business size, sector or country. The Toolkit offers two components: a step-by-step start-up Guide and a Web Portal where technical guidance on measurement and relevant links are provided.  
[www.oecd.org/innovation/green/toolkit/aboutsustainablemanufacturingandthetoolkit.htm](http://www.oecd.org/innovation/green/toolkit/aboutsustainablemanufacturingandthetoolkit.htm)
- **PRE-SME**—Promoting Resource Efficiency in Small & Medium Sized Enterprises is an industrial training handbook. It explains basic concepts like resource efficiency and life cycle thinking and includes the the “Plan-Do-Check-Act” cycle.  
[www.unep.org/pdf/PRE-SME\\_handbook\\_2010.pdf](http://www.unep.org/pdf/PRE-SME_handbook_2010.pdf)
- **The Solid and Hazardous Waste Education Center** (Wisconsin, USA) website contains a wide range of resources that could be useful for eco-innovators.  
[www4.shwec.uwm.edu/shwec](http://www4.shwec.uwm.edu/shwec)
- The Money back through the window initiative of the **KÖVET Association for Sustainable Economies** in Hungary disseminates case study books to help SMEs invest in environmental measures that generate economic returns.  
[www.environmental-savings.com](http://www.environmental-savings.com)



- **RREUSE** is a European umbrella for social enterprises with activities in reuse, repair and recycling.  
[www.rreuse.org](http://www.rreuse.org)
- **National Industrial Symbiosis Programme (NISP)** in UK helps to identify opportunities where waste products from one industry can be recovered, reprocessed or reused by other businesses, reducing the amount of waste going to landfill.  
[www.nispnetwork.com](http://www.nispnetwork.com)
- **WRAP** is a platform working with businesses, individuals and communities. It has a lot of information and tools that can help in reaping the benefits of reducing waste, developing sustainable products and using resources in an efficient way.  
[www.wrap.org.uk](http://www.wrap.org.uk)
- **SMILE**—Saving Money through Industry Links & Exchanges is a free service for business encouraging the sharing and exchanging of resources (Ireland).  
[www.smileexchange.ie](http://www.smileexchange.ie)

## 3.2 | Material and energy productivity

Eco-innovations focused on improving material and energy productivity can save costs and lower risk by making companies less dependent on imports.

### Key challenges for your business

Global resource extraction and use increased by 78% between 1980 and 2008<sup>5</sup>. This trend cannot continue without detrimental consequences for environment.

The price volatility for commodities, notably metals, food and non-food agricultural items, was higher in the 2000s than in any decade of the 20th century<sup>6</sup>. The World Economic Forum (WEF) Global Risks Report 2012 ranked extreme volatility of commodity prices as the fifth most important risk in terms of potentially negative impacts<sup>7</sup>. At the same time, Europe is the world region most dependent on imports, especially for fossil fuels and metals<sup>8</sup>.

Many companies are **exposed to risks of raw material supply shortages, price volatility and high material prices**. But gathering market intelligence can be challenging for small companies. In order to identify “hot spots” for eco-innovation, knowledge on the challenges specific to the materials and energy used in their products is needed.

### Key questions

- What type and quantity of materials are consumed throughout the lifecycle of our products and services?
- What measures can we take to reduce the use of materials, energy, water and other resources?
- Are we considering alternative materials and different energy sources for your processes and products?

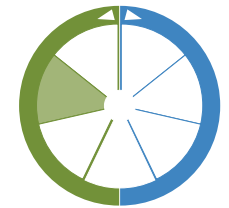
**Material productivity** expresses the amount of economic value generated by a unit of material input or consumption. **Energy productivity** expresses the amount of economic value generated by one unit of energy input or consumption.

<sup>5</sup> SERI 2011, Global Material Flow Database. 2011 Version. [www.materialflows.net](http://www.materialflows.net)

<sup>6</sup> Ellen McArthur Foundation 2012: Towards the circular economy. Economic and business rationale for an accelerated transition.

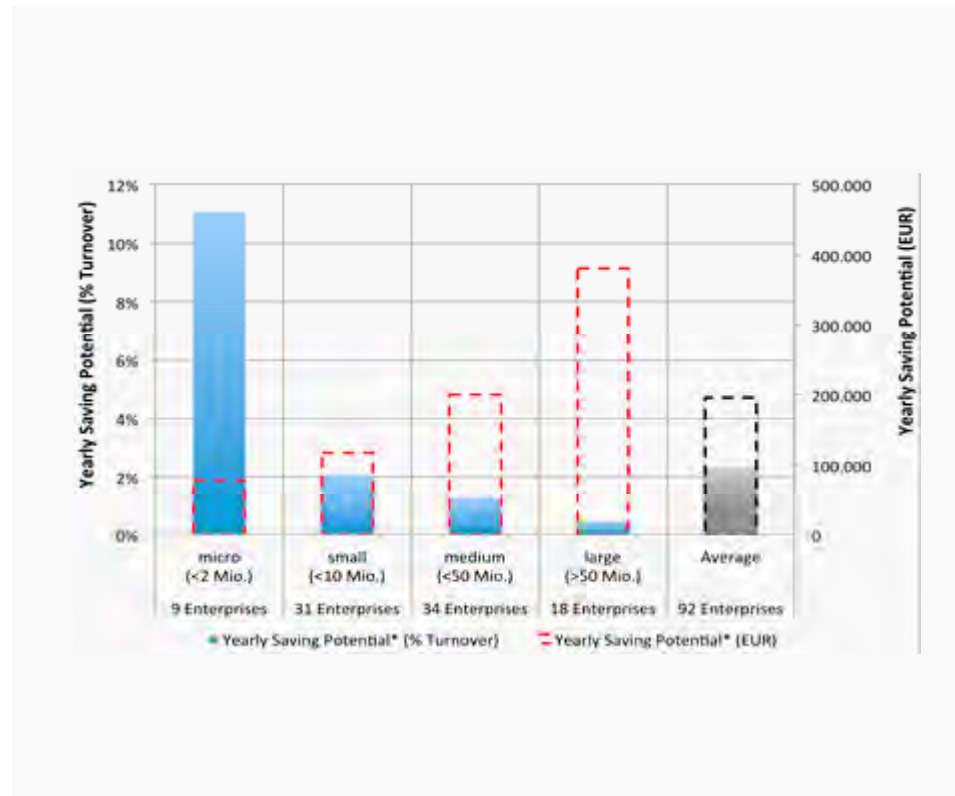
<sup>7</sup> WEF 2012: World Economic Forum Global Risks Report 2012, [www.weforum.org/reports/global-risks-2012-seventh-edition](http://www.weforum.org/reports/global-risks-2012-seventh-edition)

<sup>8</sup> European Environment Agency 2010: The European Environment. State and Outlook 2010. Material Resources and Waste. European Environment Agency, Copenhagen.



## Business case for eco-innovation

Analysis of case studies in Germany revealed that companies could save around €200,000 per year by implementing material efficiency in the manufacturing sector. On average, these investments paid off after 13 months. Micro companies achieved high relative savings (comparable to 11 % of annual turnover) while large companies had high absolute savings (€350,000 on average).<sup>9</sup>



Source: EIO 2012 based on data from Demea (N=92)

Figure 6: Yearly savings potential in SMEs introducing material efficiency solutions

<sup>9</sup> See EIO 2012: Eco-Innovation Observatory Annual Report 2011, Closing the eco-innovation gap, an economic opportunity for business, p. 17, [www.eco-innovation.eu/index.php?option=com\\_content&view=article&id=420&Itemid=210](http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=420&Itemid=210)

## Quick wins

### Cost savings and cost avoidance

- **Invest in material efficiency.** German enterprises that reduced their use of metal achieved average savings of €72,000 per year<sup>10</sup>.
- **Substitute resource-intensive materials and products** with new materials, products or services that also improve the functionality of the end product.
- **Select lightweight materials** to improve energy efficiency and the options for storage or handling of the products (see LISEC).
- **Invest in energy efficiency.** Research by the Carbon Trust showed that large UK businesses undervalue the financial returns from investments in energy efficiency by more than half. This leads them to waste at least £ 1.6 bn every year on energy they could easily save through simple energy-saving measures. [www.carbontrust.com/resources/reports/advice/the-business-of-energy-efficiency](http://www.carbontrust.com/resources/reports/advice/the-business-of-energy-efficiency)

### Adopting new practices for long-term gains

- **Recover used products and materials and reuse or recirculate** them in the production process. The Italian company Aquafil Group has reexamined the material inputs and improved their resource management system so that it regenerates 10% of the materials it produces (polymers). Apart from cost savings, it reduced CO<sub>2</sub> emissions (kg/tonne) by 29% between 2007–2011 and water consumption by 15%.

[www.aquafil.com/en](http://www.aquafil.com/en)

[www.ellenmacarthurfoundation.org/business/articles/case-study-aquafil-group](http://www.ellenmacarthurfoundation.org/business/articles/case-study-aquafil-group)

<sup>10</sup> Around 100 case studies from companies which were supported by demea (The German Material Efficiency Agency) co-funding and consultancy between 2006 and 2010 were assessed by the EIO. See EIO (2012) Closing the eco-innovation gap: an economic opportunity for business, p. 17, [www.eco-innovation.eu](http://www.eco-innovation.eu).

## Good practice examples

### LISEC:

weight and energy efficiency optimisation with glass systems.



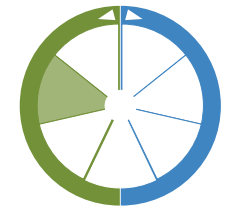
The glass tempering process of LISEC has received the Austrian Innovation Award for the “flatbed” glass tempering technology developed especially for tempering very

thin (down to 0,9 mm) and laminated glass. This process helps to reduce resource and energy consumption and leads to cost savings and longer life performances of solar panels.

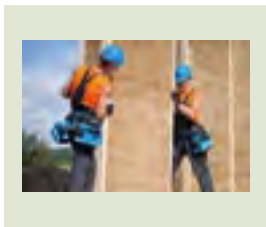
[www.lisec.com/LPS/Glas-Vorspannanlagen-speziell-fuer-Duennglas](http://www.lisec.com/LPS/Glas-Vorspannanlagen-speziell-fuer-Duennglas)

[www.eco-innovation.eu/index.php?option=com\\_content&view=article&id=514%3Aweight-and-energy-efficiency-optimisation-with-flat-glass-systems&catid=50%3Austria&Itemid=50](http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=514%3Aweight-and-energy-efficiency-optimisation-with-flat-glass-systems&catid=50%3Austria&Itemid=50)





### Ecococon: material substitution in construction



A good example from the construction industry is the alternative use of straw-based materials and clay for building. Ecococon in Lithuania is a small company that has started reap-

ing the benefits of building houses out of straw panels, which are cost-effective and have increased the speed of assembling houses at the construction site. Ecococon houses rely on a wood frame, straw as a thermal insulator, and clay plaster as a finish to protect against wind and fire.

[www.ecococon.lt](http://www.ecococon.lt)

[www.eco-innovation.eu/index.php?option=com\\_content&view=article&id=344%3Astraw-panels&catid=65%3Alithuania&Itemid=65](http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=344%3Astraw-panels&catid=65%3Alithuania&Itemid=65)

### ElectroSelf: closed-loop energy system



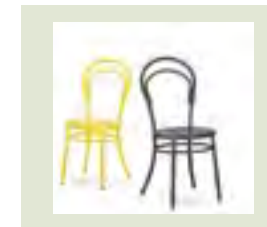
ElectroSelf (Italy) is an enabling technology for distributed energy that self-generates its own fuel and guarantees back-up power in remote areas. The intelligent closed-loop system

stores energy from the grid or when renewables are plentiful and instantaneously releases energy when there is a power dip or outage. ElectroSelf engages immediately whenever external power fails, and when-ever power is available it automatically generates its own hydrogen and oxygen from water. The producer Electro Power Systems SPA, was nominated as one of the Technology Pioneers in the field of energy and environment by the World Economic Forum in 2012.

[www.electrops.it](http://www.electrops.it)

WEF 2012, Technology Pioneers report, p. 69:  
[reports.weforum.org/technology-pioneers-2012](http://reports.weforum.org/technology-pioneers-2012)

### Made: sustainable furniture



The customers of Made can choose online what the company manufactures by voting on the designs they prefer most. The company provides furniture directly from the makers and designers,

eliminating the need for warehouses, physical stores and intermediaries. This allows for cost savings for customers of up to 70%. The material choice for the furniture production is based on a comparative analysis of closest equivalent products in functionality, materials and design to “typical high-street” items.

[www.made.com/about-us](http://www.made.com/about-us)



## Learning Resources

- The **material input per unit of service (MIPS)** method allows for comparing the material and energy requirements of functionally comparable goods or services. The Wuppertal Institute has developed a step-wise guide to how to perform MIPS.  
[www.wupperinst.org/en/publications/entnd/index.html?beitrag\\_id=1926  
&bid=169](http://www.wupperinst.org/en/publications/entnd/index.html?beitrag_id=1926&bid=169)
- The **OECD Sustainable Manufacturing Toolkit** offers well structured steps on becoming more sustainable and can be found online.  
[www.oecd.org/innovation/green/toolkit](http://www.oecd.org/innovation/green/toolkit)
- The **Guide Towards The Circular Economy of the Ellen MacArthur Foundation** offers interesting guidance on how businesses can benefit from adopting new practices based on the circular economy philosophy.  
[www.thecirculareconomy.org](http://www.thecirculareconomy.org).

Several in-depth case studies also provide insights on how companies have changed their material inputs, increased material and energy productivity and improved their processes.

[www.thecirculareconomy.org/case\\_studies](http://www.thecirculareconomy.org/case_studies)



## LiMaS WebSuite: a comprehensive assessment tool

The **LiMaS WebSuite** online application is an example of a tool that can be used free of charge as a starting point for assessing the materials and energy flow in the company, among others. The LiMaS WebSuite assessment tool enables the user to:

- Determine the applicability and compliance with the environmental legislation affecting the sector, for example the WEEE, RoHS, Eco-design and REACH regulations.
- Monitor the use of hazardous substances in the company.
- Evaluate environmental performance of the company within the frame of an environmental management system, such as ISO 14001 or EMAS.
- Determine the environmental profile of a product by carrying out a simplified LCA and determining its carbon footprint.
- Determine the principal eco-labels used by the sector and which of these can be used for a specific product.

The Tool comes with two alternatives for use:

The WebSuite online application is available for free in the beta version until the end of 2013.

[limas.simpple.com/limas-websuite](http://limas.simpple.com/limas-websuite)

The EuP Eco-profiler is a cost-free Life-Cycle Assessment software tool for Energy-using products and processes for SMEs in this sector.

[www.limas-eup.eu/en/eupeco\\_profiler?lang=en](http://www.limas-eup.eu/en/eupeco_profiler?lang=en)

## 3.3 | Supply chains

Supply chain management includes coordination and collaboration with suppliers, intermediaries, third party service providers and customers<sup>11</sup>. Sustainable supply chain management requires the management of environmental, social and economic impacts—and the encouragement of good governance practices—throughout the life-cycle of goods and services.<sup>12</sup>

### Key challenges for your business

The key challenges related to supply chain management include coping with the rising volatility of commodity prices, dealing with uncertain supply of materials, as well as meeting customer demand for an improved transparency of supply chain.

The most in-demand information includes data on the origin of resources used in products and evidence on the social and environmental impacts of resource use across the supply chain.

### Key questions

- What is our position in the global supply chain?
- What are the most value adding aspects in the supply chain?
- How can the collaboration with our partners be improved?
- Where can sustainable practices be applied: from design to purchase, from production to packaging (i.e. shelf-ready packaging), from storage to transport and finally to recycling?
- What are the risks and opportunities of implementing a sustainable supply chain management approach?

Extended Producer Responsibility (EPR) is “an environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of the product’s life cycle” (OECD). It involves shifting of responsibility from municipalities to businesses for managing the environmental impacts of their products and services and can take the form of a reuse, buy-back, or recycling programme. This can also be delegated to packaging recovery organisations that are developing to support companies in fulfilling their obligations. PRO Europe and its Green dot licence symbol are one of many examples.

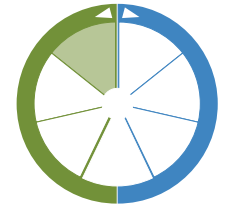


The Green Dot

Material stewardship is “the responsible provision of materials and supervision of material flows to create maximum societal value and minimum impact on humans and the environment” (ICMM). Materials stewardship encompasses both process and product stewardship.

<sup>11</sup> Council of Supply Chain Management Professionals (CSCMP), [www.cscmp.org](http://www.cscmp.org)

<sup>12</sup> BSR 2011: The Business Case for Supply Chain Sustainability, [www.bsr.org/en/our-insights/report-view/the-business-case-for-supply-chain-sustainability-a-brief-for-business-lead](http://www.bsr.org/en/our-insights/report-view/the-business-case-for-supply-chain-sustainability-a-brief-for-business-lead)



## Business case for eco-innovation

Supply chain management can contribute to eco-innovation in businesses through coordination and integration of tasks. In the case of closed-loop supply chains it encompasses concepts like reverse logistics, reconditioning and remarketing.

### Evaluate business case for action

- Evaluate the current approach to supply chain management within your company.
- Set a vision and objectives of supply chain management: this can be done internally or by involving key suppliers and other related stakeholders.
- Map and measure resource inflows and outflows from the company.
- Conduct benchmarks and consider what is being done externally in the field.

### Map Resources

- Design a supply chain map: identify the scope of flows as well as roles and responsibilities within and outside the company.
- Define internal roles and responsibilities (supply chain manager, committee or at the executive level).
- Evaluate risks and opportunities through a risk management approach or an opportunity-based approach.

### Establish a common language

- Set sustainability targets and procurement criteria for the supply chain.
- Develop indicators to monitor performance.
- Develop clear indicators based on the code of conduct to monitor progress.
- Internal and external communication is also very important at all stages.

### Develop collaborative practices and strong relationships with clients and suppliers

- Foster collaborative practices, e.g. mutualised supply management systems, collaborative planning, forecasting and replenishment.
- Encourage cooperation with clients and suppliers: this is key for SMEs that consider client dependency one of the barriers to innovation.
- Consider using regional clusters to structure your supply chain.
- Foster the use of IT and information systems in supply chain management.



## Quick Wins

- Save costs from streamlining processes at all steps of the supply chain.
- Procure eco-efficient products and services. According to the Carbon Disclosure Project, 39% of its members and 28% of their suppliers witnessed cost savings after introducing a sustainable procurement approach<sup>13</sup>.
- Develop “sustainable stories” to increase customers’ adherence to the company and its products and services.

<sup>13</sup> See Accenture, 2012: [www.accenture.com/us-en/outlook/Pages/outlook-journal-2012-why-sustainable-supply-chain-is-good-business.aspx](http://www.accenture.com/us-en/outlook/Pages/outlook-journal-2012-why-sustainable-supply-chain-is-good-business.aspx)

## Good practice examples

The Footprint Chronicles®:  
transparency in the supply chain



**Patagonia** is a US-based company specialised in high-end outdoor clothing. It developed Footprint Chronicles®, an interactive web-based map that provides information on the supplier policy towards sustainability and results of Patagonia’s audits in terms of social and environmental indicators.

[www.patagonia.com/us/footprint](http://www.patagonia.com/us/footprint)

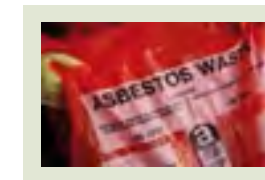
TRI-VIZOR:  
towards smart freight models

**TRI-VIZOR**, a spin-off from the University of Antwerp in Belgium, developed an original horizontal cooperation based business model for freight transport. The model is called “smart bundling”

and is similar to carpooling, since freight flows also require consolidation. TRI-VIZOR’s Cross Supply Chain Methodology® software makes it possible to maximise in real-time the total community gains in cost and CO<sub>2</sub>.

[www.trivizor.com](http://www.trivizor.com)

Shields Environment:  
recycling and remarketing



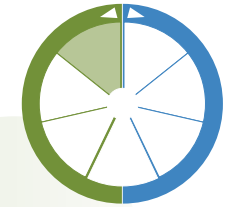
**Shields Environmental** is a UK based company that provides support services to the telecommunication sector, mainly accompanying companies with environmental management solutions and recycling.

Its flagship initiative was launched in 2002. The “Fonebak” initiative was the world’s first mobile phone recycling scheme. The company saw an increase in turnover of 254% since the start of the initiative and recruited more than 100 employees.

[www.shields-e.com](http://www.shields-e.com)

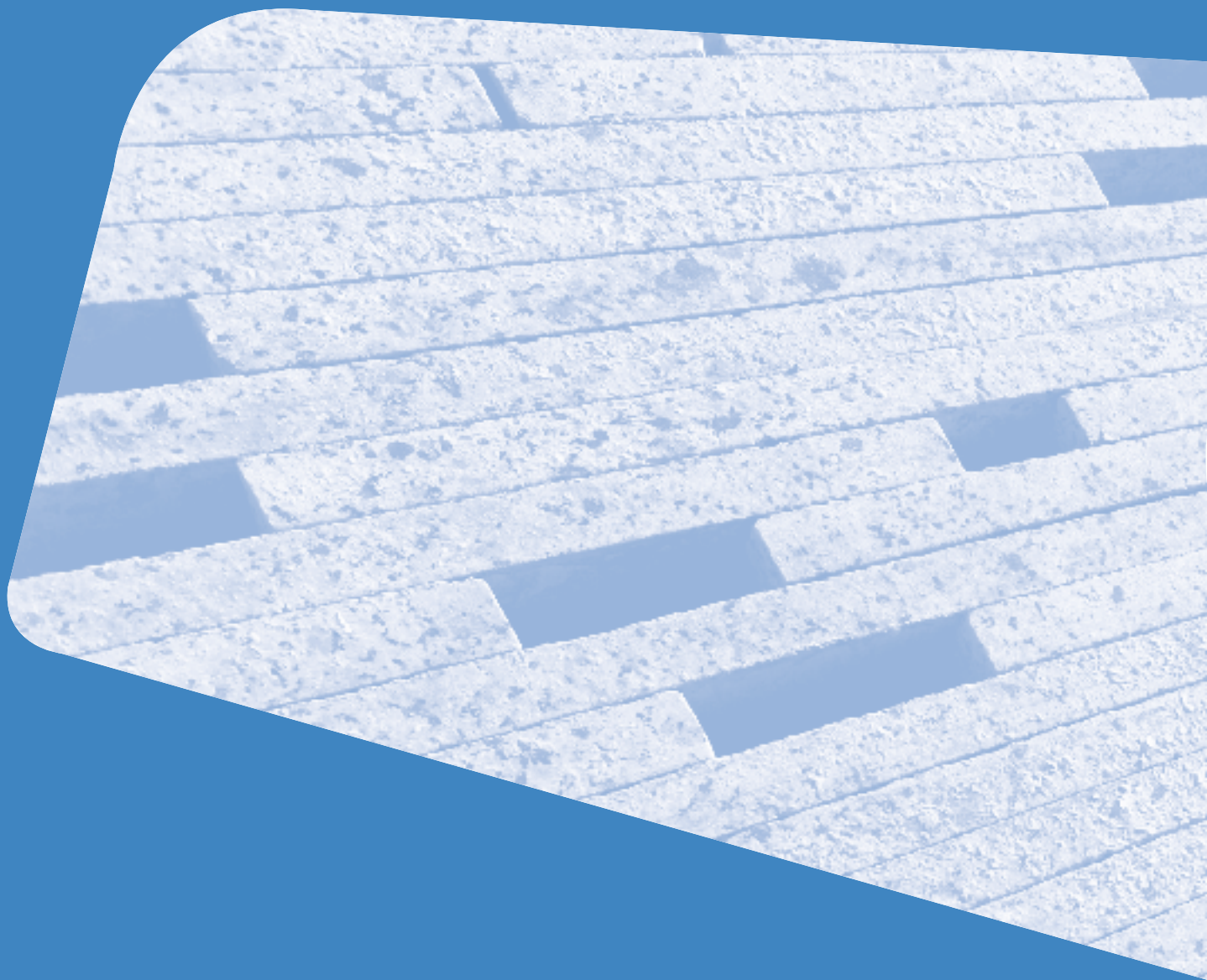


## Learning Resources



- **Supply Chain Sustainability: A Practical Guide for Continuous Improvement** (2010)  
The UN Global Compact Initiative and Business for Social Responsibility (BSR) jointly developed a guide on practical steps to implement supply chain sustainability and a guide dedicated to SMEs.  
[www.unglobalcompact.org/Issues/supply\\_chain/guidance\\_material.html](http://www.unglobalcompact.org/Issues/supply_chain/guidance_material.html)
- The UN Global Compact's **Quick Self-Assessment and Learning Tool** is an online tool to help companies assess their approach to supply chain sustainability, identify areas for improvement and provide access to relevant resources.  
[supply-chain-self-assessment.unglobalcompact.org](http://supply-chain-self-assessment.unglobalcompact.org)
- **Unchaining Value, Innovative Approaches to Sustainable Supply** SustainAbility, UNEP and UNGC (2008)  
[www.unep.fr/scp/unchaining/publications/Unchaining-Value-Final-Report.pdf](http://www.unep.fr/scp/unchaining/publications/Unchaining-Value-Final-Report.pdf)
- **BSR Key Performance Indicators for Responsible Sourcing, A Beyond Monitoring Trends Report** (2009)  
[www.bsr.org/reports/beyond-monitoring/BSR\\_Responsible\\_Sourcing\\_%20KPIs\\_Summary.pdf](http://www.bsr.org/reports/beyond-monitoring/BSR_Responsible_Sourcing_%20KPIs_Summary.pdf)  
[www.bsr.org/consulting/working-groups/beyond-monitoring.cfm](http://www.bsr.org/consulting/working-groups/beyond-monitoring.cfm)
- **Maximising Value: Guidance on implementing materials stewardship in the minerals and metal value chain** (2006)  
International Council on Mining & Metal  
[www.icmm.com/page/1183/maximising-value-guidance-on-implementing-materials-stewardship-in-the-minerals-and-metals-value-chain](http://www.icmm.com/page/1183/maximising-value-guidance-on-implementing-materials-stewardship-in-the-minerals-and-metals-value-chain)
- **The Higg Index:** Developed by the Sustainable Apparel Coalition, an industry-wide group of over 60 apparel and footwear brands, retailers, suppliers, non-profits and NGOs. The Higg index and is composed a supplier facility module and a brand/product module.  
[www.apparelcoalition.org](http://www.apparelcoalition.org)
- Developed by CERES, a non-profit network of investors, companies and public interest groups for sustainable business strategies; the **SAQ** is a **self-assessment questionnaire** for suppliers.  
[www.ceres.org/resources/reports/supplier-self-assessment-questionnaire-saq-building-the-foundation-for-sustainable-supply-chains/view](http://www.ceres.org/resources/reports/supplier-self-assessment-questionnaire-saq-building-the-foundation-for-sustainable-supply-chains/view)
- The **Buy Smart+** project is funded by the European programme “Intelligent Energy Europe” and provides free consultation and information material on green procurement. They developed a questionnaire to assess your company’s knowledge of sustainable procurement issues.  
[www.buy-smart.info/trainingstool-en/training-en](http://www.buy-smart.info/trainingstool-en/training-en)

4



# Eco-innovate products and services





## 4.1 | Research and development

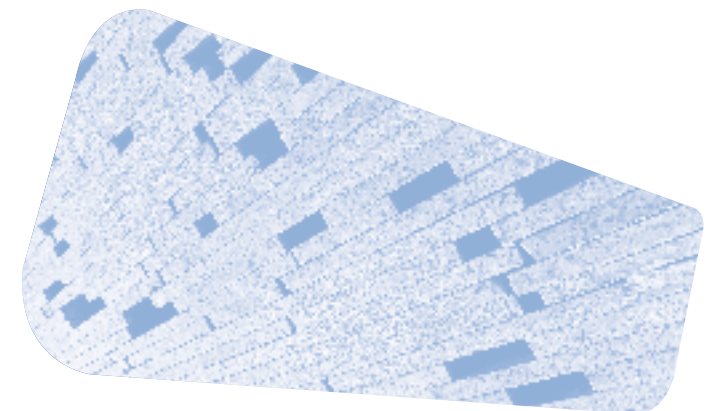
Building eco-innovative capacity into the Research & Development (R&D) process will help identify new business opportunities.

### Key challenges for your business

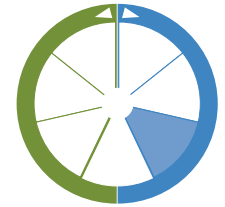
- Developing eco-innovative products, services and technologies may mean fundamental changes to existing designs, which may be costly in the short term but beneficial in the long term.
- Evaluating risk, especially long-term costs and benefits may be challenging.
- Understanding the environmental impacts across the life-cycle is essential, especially considering the complexity of upstream and downstream direct and indirect impacts.
- Skills (questioning, observing, experimenting and networking) and information relevant to eco-innovative R&D may not be available internally. Sourcing and impartially evaluating information, perhaps through a specialist R&D organisation, may be needed. Partnership brings the added challenge of conveying R&D ambitions and focus.

### Key questions

- Does our company have the skills, time and money to pursue relevant R&D?
- Who has the research and technical skills to undertake eco-innovative R&D internally or externally?
- Do R&D staff need to be trained to build internal eco-innovation capacity?
- How could R&D help identify opportunities?
- Do we have systems in place to monitor eco-innovation trends related to our core business?







## Business case for eco-innovation

- Integrate environmental considerations into the R&D strategy.
- Allocate a specific percentage of the R&D budget to eco-innovation.
- Develop an annual internal eco-innovation award for the best new ideas.
- If the company wants to develop radical eco-innovation consider the development of a team that sits outside of the normal R&D process.
- Raise awareness and understanding of environmental impacts throughout the firm to highlight opportunities and priorities related to eco-innovation alongside other product and service attributes.
- Analyse market needs and trends which could stimulate eco-innovation and disseminate your findings to key managers and designers.

- Map life-cycle environmental impacts of products, identify any “material and energy use hotspots” and indicate how resource productivity can be improved.
- Communicate new technologies, materials and processes to key internal and external stakeholders in R&D.
- Subscribe to sources of information on emerging technologies which could be applied to bring environmental benefits.

## Quick wins

- Engage key partners and stakeholders: this may produce interesting opportunities for new eco-innovative solutions, or ways to reduce environmental impacts of existing products and processes.
- Share causes of environmental impacts, improvement priorities and new technology with designers to stimulate and enable eco-innovation.
- Regularly scan websites, join groups and network proactively to identify emerging eco-innovative technologies, materials and processes.

## Good practice examples

**Trulstech:**  
biodegradable flame retardant

The science behind natural fire protection known as the Molecular Heat Eater led to Swedish inventor Mats Nilsson founding **Trulstech**. If heat and oxygen are channelled away then there is no chance for a fire. While materials like asbestos and chemicals such as bromides are toxic and potentially harmful, Mats' innovation can be extracted from grape pomace and citrus fruits.

[www.trulstech.com](http://www.trulstech.com)

**TECNARO:**  
new sustainable materials



**Arboform®**, a new material developed by **TECNARO GmbH**, combines the properties of natural wood with the processing capabilities of thermoplastic materials. The material is a biodegradable and renewable

polymer, which has already substituted plastics in many products, e.g. various components used in automotive sector, furniture, toys etc.

[www.tecnaro.de](http://www.tecnaro.de)

**Godrej & Boyce Manufacturing:**  
small and affordable fridge



A small battery-powered fridge known as chotuKool ("the little cool"), developed by **Godrej & Boyce Manufacturing**, is affordable and can be used in areas without stable access to electricity.

[www.chotucool.com](http://www.chotucool.com)

**First Energy:**  
efficient wood-burning stove



A wood-burning stove, invented by the Indian start-up company **First Energy**, consumes less energy and produces less smoke than regular stoves.

[www.firstenergy.in](http://www.firstenergy.in)

## Learning Resources



- MATREC materials database showcases developments in new, recycled materials.  
[www.matrec.it/en/materials-catalogue/recycled-materials](http://www.matrec.it/en/materials-catalogue/recycled-materials)
- Intellectual Property and Eco-Innovation for SMEs: a basic guide for eco-innovators + IP: 10 big questions about your eco-innovation  
[www.bsk-cic.co.uk/uploads/assets/media/documents/e77d55492e6e694e04a2ffe62f8a3c972f27a79d.pdf](http://www.bsk-cic.co.uk/uploads/assets/media/documents/e77d55492e6e694e04a2ffe62f8a3c972f27a79d.pdf)
- Enterprise Europe Network shares new technologies for partnering and licensing.  
[portal.enterprise-europe-network.ec.europa.eu](http://portal.enterprise-europe-network.ec.europa.eu)
- EUREKA is a European network that supports businesses carrying out R&D.  
[www.eurekanetwork.org/supporting](http://www.eurekanetwork.org/supporting)

## 4.2 | Design

Eco-design is the integration of environmental considerations into product design and development that aims to improve performance throughout the product's life cycle. Most environmental impacts can be effectively avoided at the design stage. Proactively addressing sustainability issues at the “front of the pipe” will therefore generate most benefits. For instance, design specifies which materials and to some extent which production methods will be applied. It also affects the potential reuse, recycling or disposal, as well as the indirect impacts from distribution of new products.

### Key challenges for your business

- Design may be performed by product designers, design engineers, consultants or can be completed by other technical or business functions as part of other responsibilities.
- In smaller companies design, market research and R&D may be fairly closely integrated. When this is not the case, activities like the evaluation of alternative technologies, competitor products and product concepts, and environmental performance criteria need to be closely connected to establishing the design brief and informing designers' decision-making.
- Tackling single product attributes such as recyclability, biodegradability or energy-efficiency may not mean that a product has a lower environmental impact overall. A more thorough life-cycle approach is necessary to manage trade-offs, where one attribute of a product, such as the use of an energy-inten-

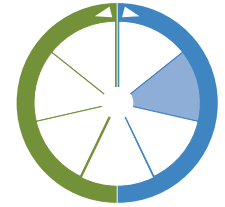
sive material, is counter-balanced by another, e.g. may create better or worse resource efficiency of the product. A common challenge is to cost-effectively calculate environmental impacts for designs which are not fully-specified and decide on trade-offs between different types of environmental impacts, e.g. CO<sub>2</sub> emissions versus scarce resource depletion versus toxic material dispersion—expert judgements may be needed.

- Radically new solutions may demand an unfamiliar degree of creativity applied alongside the systematic life-cycle approach, with inspiration possibly not easily available internally.
- Existing process development and production resources may limit what is possible internally or externally.
- Communicating data or information on a product's environmental impacts is not always a strong motivator for customers or users to change behaviour e.g. reduction in energy in the use phase. Designers may choose to

explore user-centred design approaches to help customer and/or users reduce their environmental impacts.

### Key questions

- What product design options are there to improve the environmental performance of products?
- What is the potential to extend product life and reuse, remanufacture, repair, upgrade or recycle all/part of the product? Are parts separable?
- Can less material and fewer material types be used, or materials substituted for alternatives with less impact e.g. recycled/reusable?
- Can any energy, water and consumables used by the product in use be reduced, or substituted for those with less impact? (see EcoDesign Checklist, page 44)
- What data and tools are available to assess the (quantified) environmental impacts in



each stage of the product life cycle at the design stage? Does using these tools require training or external expertise to ensure results are accurate and understandable?

- What product design features or user-information will enable low-impact behaviours? Are materials marked, also with recycling information?
- Can design enable lower impact production e.g. production consumables?
- What expertise is needed for eco-design? Can it be built internally or contracted? Which phases of development, e.g. prototyping, are best done externally?

## Business case for eco-innovation

- Identify the appropriate focal areas of eco-design for your products and services. For example, Philips—as an electronics company—explores opportunities to improve product-related environmental performance in six focal areas: reduced weight, increased energy efficiency, reduced packaging, increased recyclability, substitution of hazardous materials and increased longevity.
- Agree and apply appropriate eco-design improvement strategies to products and apply design focus areas e.g. energy, water, packaging, recycling and lifetime reliability.
- Add environmental criteria to product design and evaluate comparable, working prototypes with customer representatives to confirm the likely environmental performance related to typical user-behaviour. Similarly, define environmental validation requirements taking into

account both customer specifications and other potential failures.

- If eco-design expertise is not available in-house, you may choose to train a designer, contract an external consultancy or partner with an appropriate university or technical school.
- Find suitable tools to assess (preferably quantifiable) predicted impacts and enable designers to learn how to compare alternatives during design.
- Stimulate creative approaches, diverse concepts and involve stakeholders/experts. Reward buy-in when eco-innovative ideas are implemented.
- Choose whether to pursue patents to protect the novel function, or registered designs to protect the novel and distinctive (non-functional) 3D form.



## EcoDesign Checklist

### How does the product system actually fulfil customer needs?

- Consider:*
- Dematerialisation
  - Shared use of the product
  - Integration of functions
  - Functional optimisation of product (components)

### What problems arise in the production and supply of materials and components?

- Consider:*
- Clean/renewable/low energy content materials
  - Recycled materials
  - Recyclable materials
  - Reduction in weight
  - Reduction in (transport) volume

### What problems can arise in the production process in your own company?

- Consider:*
- Alternative production techniques
  - Low/clean energy consumption
  - Less production waste
  - Few/clean production consumables

### What problems can arise in the distribution of the product to the customer?

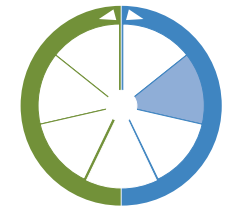
- Consider:*
- Reduction in weight
  - Reduction in (transport) volume
  - Less/clean/reusable packaging
  - Energy-efficient transport mode
  - Energy-efficient logistics

### What problems arise when using, operating, servicing and repairing the product?

- Consider:*
- Low energy or cleaner energy consumption
  - Few/clean consumables
  - No wastage of energy or consumables
  - Reliability & durability
  - Easy maintenance & repair
  - Modular product structure
  - Strong product-user relation

### What problems arise in the recovery and disposal of the product?

- Consider:*
- Reuse of product (components)
  - Remanufacturing/refurbishing
  - Recycling of materials
  - Safe incineration



## Quick wins

- Creative approaches and focused improvement strategies help identify potential design improvement.
- Environmental criteria enable design evaluation and comparison e.g. with competitors— involving customers informs their relative importance.
- Tools for assessment help designers to directly inform their decision making.
- Decisions on patents or registered designs can help secure the value of designs.

*“A checklist can act like a catalyst, influencing the way you think and design. Focusing on the environmental aspects of a product makes you start asking questions of suppliers and customers in the supply chain, and this questioning can drive innovation. The result of that can be products that give a real competitive edge, such as adding value in the supply chain, as we have done.”*

*“We know that the PCB is more easily disassembled to its component parts at its end of life, making it easier to recycle. It can now be disassembled with one screwdriver.”*

*John Simmonds, Managing director, Crawford, Hansford & Kimber*

## Good practice examples

### OrangeBox: C2C for sustainable design

**OrangeBox** used a “cradle to cradle” approach to apply materials safe and suitable to recycle. The Ara task chair design, for example, achieves product light weighting through a mono-material backing unit, improved assembly and disassembly times and improved overall resource efficiency. Orangebox has set up a recycling centre at their site in Wales achieving a significant return on investment and reduction of materials sent to landfill. Orangebox has been actively embedding eco-design for a number of years, involving all the company’s personnel from shop floor through to senior management.

[www.orangebox.com](http://www.orangebox.com)

[www.ecodesigncentrewales.org/sites/default/files/EDC\\_Orangebox\\_EnablingEcodesignInWelshIndustry.pdf](http://www.ecodesigncentrewales.org/sites/default/files/EDC_Orangebox_EnablingEcodesignInWelshIndustry.pdf)

### Crawford Hansford & Kimber: a cleaner printed circuit board



**Crawford Hansford & Kimber** developed a “cleaner” printed circuit board (PCB) that is incorporated into equipment that interfaces with data loggers that is now in use in higher education

around the world. The eco-design approach followed training around an eco-design checklist, developed by The Centre for Sustainable Design®, which prompted the use of new materials in the outsourced printed circuit board base; new track design; the reduction in the chemicals used in the production process; and the substitution of lead by organic silver in the soldering process. The entire new PCB was produced at no extra cost. The company soon used the knowledge it has gained in a new contract which it won partly because of its eco-design capabilities.

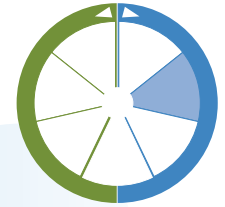
[www.crawfordhk.com/study.html](http://www.crawfordhk.com/study.html)

## Learning Resources

- Granta Design, a Cambridge University spin-off, produced an **Eco-design Guide** for starters that offers an easy-to-understand overview of how to start with eco-design.  
[www.grantadesign.com/eco/ecodesign.htm](http://www.grantadesign.com/eco/ecodesign.htm)
- An established **product eco-design checklist** is available from TU Delft.  
[ocw.tudelft.nl/courses/product-design/delft-design-guide/part-2-design-methods/21-creating-a-design-goal/ecodesign-checklist](http://ocw.tudelft.nl/courses/product-design/delft-design-guide/part-2-design-methods/21-creating-a-design-goal/ecodesign-checklist)
- The **Eco-strategy Wheel** may be used with ratings of performance to illustrate existing product, priorities for the new product and achievements.  
[cfsd.org.uk/seeba/general/ecostrat.zip](http://cfsd.org.uk/seeba/general/ecostrat.zip)
- The Mtrl Library presents information about the **design qualities and properties** of materials including biodegradable, recyclable, renewable.  
[mtrl.com/portal/site/mtrl/Home](http://mtrl.com/portal/site/mtrl/Home)
- “**Information Inspiration**” supports ecodesign through combining information (materials, life extension etc.) and inspirational product examples:  
[ecodesign.lboro.ac.uk/index.php?section=1&currentsection=1&sectionname=Home](http://ecodesign.lboro.ac.uk/index.php?section=1&currentsection=1&sectionname=Home)



Figure 7: Eco-design Strategies Wheel



The **EcoReport Tool** is based on an assessment methodology for the eco-design of energy-related products. It is a cost-free tool for evaluating to which extent the products fulfil the specific criteria of the EcoDesign Directive 2009/125/EC. The tool is based on an Excel application that calculates resource use and environmental impact of products and processes and to decide whether the product is energy-related or not for edge cases. It offers the option to analyse life-cycle impact per unit of product, from the extraction and production stages of the product through to use and end-of-life.

[www.meerp.eu/documents.htm](http://www.meerp.eu/documents.htm)

The **ECODESIGN Pilot and Assistant** is an online eco-design guide for improving environmental performance and resource efficiency of different types of products (e.g. raw material intensive, transportation intensive etc.). The guide suggests appropriate eco-design measures for products that can be taken at different phases of product lifecycle. The tool is based on a series of guiding questions and checklists.

[www.ecodesign.at/pilot/ONLINE/ENGLISH/INFO/SITEMAP.HTM](http://www.ecodesign.at/pilot/ONLINE/ENGLISH/INFO/SITEMAP.HTM)

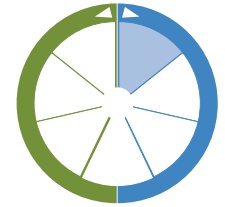
## 4.3 | Marketing

Today's customers buy greener products, services or technologies because they work better, save money or enhance health. Eco-brands integrate relevant environmental benefits into products alongside cost and quality and communicate evidence-based messages avoiding *greenwashing*.

### Key challenges for your business

- Customers—whether they are end consumers or buyers in business or government—are increasingly integrating environmental and social considerations into purchasing decisions.
- Market research may highlight important areas of environmental or social interest, improvement or concern related to existing or new eco-innovative products, services or technologies.
- Identifying more radical product concepts or new business models driven by environmental considerations will require approaches outside of normal day-to-day R&D processes with dialogue with a range of stakeholders including customers, partners or suppliers.
- Lifecycle considerations are increasingly important to customers e.g. companies need to understand how products are sourced, manufactured, packaged and disposed of.
- Understanding customer and user behaviour is important. User behaviour may be a strong determinant of a product's environmental impact e.g. reducing energy consumption in the use phase of product's lifecycle is a key area with consumer electronics or “white goods”.
- Companies need to address environmental aspects at all stages of the customer experience:
  - Awareness—how do we raise awareness about products and services?
  - Evaluation—how do we help people evaluate greener value propositions?
  - Purchase—how do customers purchase products and services?
  - Delivery—how do we deliver a greener value proposition to customers?
  - After sales—how do we provide greener post-purchase support?
- Greener customers are influenced by recommendations of trusted peers and third parties. There is a backlash against perceived greenwashing, therefore companies must be clear about the environmental impacts of products.
- Proactive companies build trust related to environmental and others issues through engaging customers in meaningful conversations through a variety of media, especially via websites and online social networks, rather than by simply talking “at” customers through traditional media.





## Key Questions

- Have we completed market research amongst customer groups to determine environmental awareness, understanding, potential opportunities and concerns?
- Who are the target audiences—consumer, business, retail or government—that we aim to create value for? What are the characteristics of our core customer groups (e.g. mass, niche, segmented)? What type of relationship does each customer type expect from us? How do we establish and maintain strong customer relationships? How can environmental considerations become integrated into customer relationships and integral to our business model?
- Which combination of customer needs are the companies' products satisfying e.g. newness, performance customisation, “getting the job done”, design, reputation, price, cost reduction, risk reduction, accessibility, convenience and/or usability? How does improved envi-

ronmental performance (e.g. reduced energy consumption and lower costs) strengthen the product's offer? How do we incorporate environmental performance related data in communications?

- What is the product's Unique Selling Proposition (USP) relative to competitive offers? Has environmental benchmarking been completed on indirectly and directly competitive products?
- Can the product's environmental features and benefits strengthen the USP? For example, product A has a X% lower electricity consumption with Y% lower CO<sub>2</sub> emissions which means that customers energy bills are reduced by €Z per month.
- What will the market pay? How will the perceived “added value” or business benefits from distinct environmental performance affect pricing, costing and communications?
- What “added value” environmental benefits can be attached to the core concept and? How can stakeholders be rewarded for adopting and promoting pro-environmental behaviour?

## Business case for eco-innovation

- Feedback from market research and ongoing communications with customers and other stakeholders can identify new opportunities for eco-innovation.
- Promotion based on clear evidence-based claims related to environmental performance will enhance internal and external reputation.
  - Test stakeholders' responses and attitudes surrounding environmental aspects. Engage existing and potential customers, as well as other stakeholders, in conversations through a variety of media. Use positive and negative feedback to improve business/product development and promotional strategies.
- Benchmark your product(s) against competitors on environmental aspects, alongside function, cost, pricing, etc.
- Identify your product(s) absolute and relative environmental features and benefits compared to your competitors.

- Determine if your product's environmental performance adds to your USP and integrate positives into communications with customers.
- Ensure environmental performance claims are valid and understandable before you incorporate them into promotional messages.
- Use social networks (Facebook, Twitter, LinkedIn etc.) selectively and carefully to promote product-related environmental messages.
- Develop press relationships with environmental media and websites and communicate good news.

### Quick wins

- Determining the extent of customers and other stakeholders environmental awareness and understanding may help to reveal business opportunities or threats.
- Identifying product(s) environmental features and business benefits may help determine areas for product differentiation.
- Researching competitors product environmental performance may identify relative strengths of your product that you can exploit in promotion.
- Communications incorporating understandable, valid and clear environmental performance claims underpinned by fact based information will build trust and reputation amongst customers.
- Establishing a reputation for environmental knowledge and expertise may attract new prospects and generate new customers.

### Good practice

Visionary Soap Company Ltd successfully established a brand of fair trade soap.

[www.visionarysoap.co.uk/about-us-1-w.asp](http://www.visionarysoap.co.uk/about-us-1-w.asp)

Elvis & Kresse achieved international press features for their bags and fashion accessories made from waste.

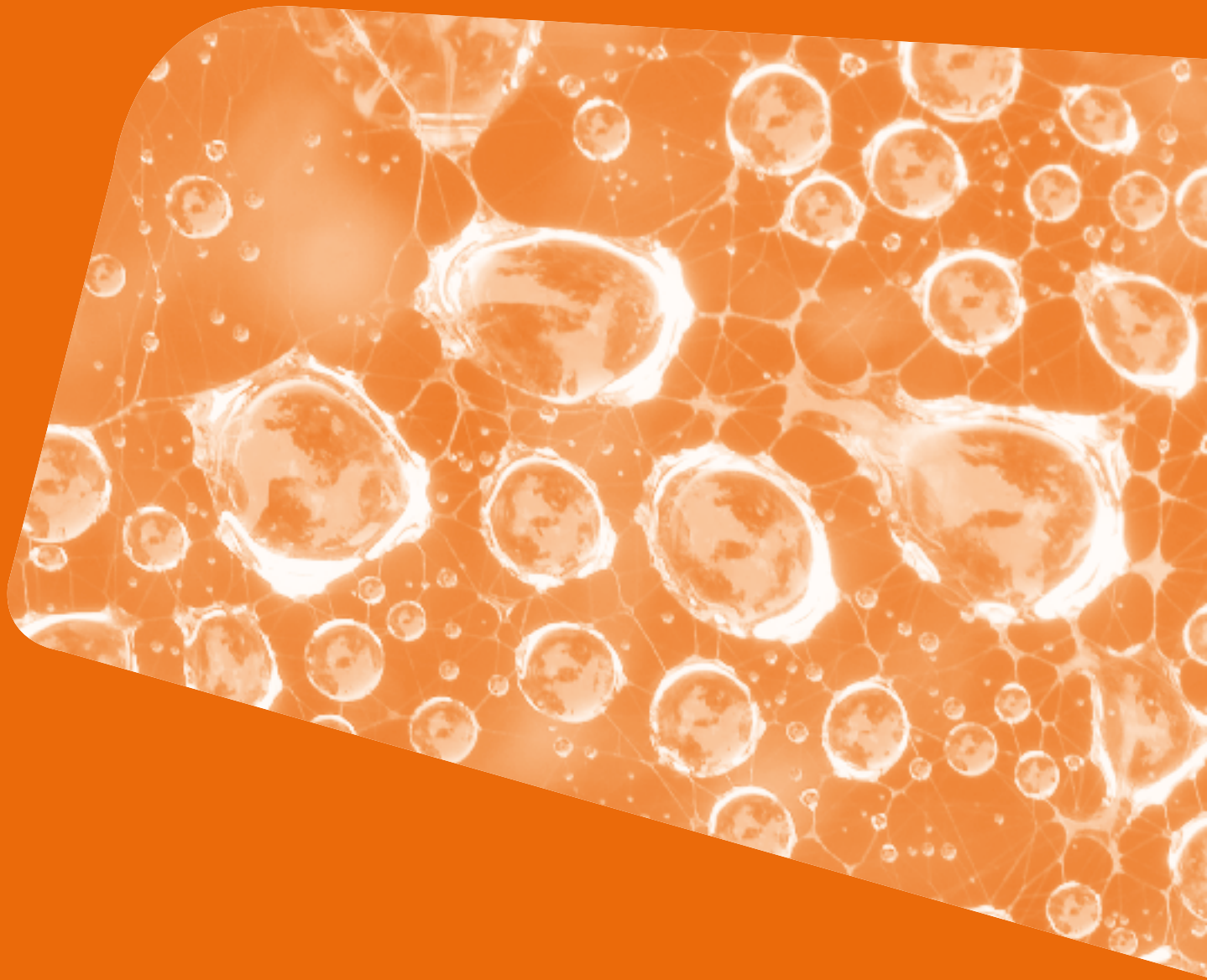
[www.elvisandkresse.com/Press/Prints.html](http://www.elvisandkresse.com/Press/Prints.html)



## Learning Resources

- SIGMA—Sustainability Marketing Guide contains four steps towards sustainability marketing as well as some practical lessons.  
[www.projectsigma.co.uk/Toolkit/SIGMASustainabilityMarketing.pdf](http://www.projectsigma.co.uk/Toolkit/SIGMASustainabilityMarketing.pdf)
  - Jacquie Ottman—New Rules of Green Marketing  
[www.greenmarketing.com/our-book](http://www.greenmarketing.com/our-book)
  - Charter et. al—Marketing & Sustainability BRASS (Cardiff University) and The Centre for Sustainable Design, 2002  
[cfsd.org.uk/smart-know-net/smart-know-net.pdf](http://cfsd.org.uk/smart-know-net/smart-know-net.pdf)
  - The EU Eco-label helps identify products and services that have a reduced environmental impact. It is a voluntary label used following certification through independent compliance checks, following a simple online application process with special discounts for SMEs.  
[ec.europa.eu/environment/ecolabel](http://ec.europa.eu/environment/ecolabel)
- Eco-labels are profiled at  
[limas.simpple.com/resources/results-communication-eco-labels](http://limas.simpple.com/resources/results-communication-eco-labels)
- ISO guidelines on environmental labelling  
[www.iso.org/iso/environmental-labelling.pdf](http://www.iso.org/iso/environmental-labelling.pdf)
  - Defra—“Green Claims Guidance” provides clear principles and examples.  
[www.defra.gov.uk/environment/economy/products-consumers/green-claims-labels/](http://www.defra.gov.uk/environment/economy/products-consumers/green-claims-labels/)

5



The background of the slide is a vibrant orange color. Overlaid on this is a pattern of microscopic cells, likely plant tissue, showing various cell walls and internal structures. The cells are rendered in a lighter, semi-transparent orange tone, creating a textured, organic feel. A large, white, rounded rectangular shape is positioned in the center, serving as a container for the main text.

**Get your eco-innovation  
idea off the ground**



## Test your idea

- What are the features and benefits of your eco-innovative product, service or technology?
- What value does your new product, service or technology deliver to your customers?
- Who are the potential customers for your product?
- Have you done any market research?
- Who are your competitors? Have you benchmarked your product, service or technology compared to competitive products and services? What are relative benefits of your product compared to competitive offers?

## Assess your strategic capacity

- What knowledge and skills does your company possess? What are your strengths and weaknesses?
- What knowledge, skills or other resources do you need to obtain from external sources to develop a new product, service or technology? How will you organise the process of pulling internal assets and external expertise together (e.g. long-standing partnerships, short-term contracts)?
- Do you need to set up a partnership with consultants or companies that possess this expertise?
- Do you need to train yourself (or partners) in order to move a weakness into part of your skill set and build competence?
- Do you make the product yourself (and invest in production equipment) or do you outsource the production to a contract manufacturer?

## Get your eco-innovation funded

- What amount of funding do you need for different tasks?
- Have you considered your fixed costs?
- What sources of funding are available: self funding; friends and family; overdraft; credit cards; bank loans; venture capital; “angel investors”; share ownership; and “crowd funding”?
- What are the risks associated with each source of funding?
- What types of free or subsidised funding or business support is available from government programmes or SME business support agencies in your country?

## Get your first customer

- What is your target market? Are you focussing on business-to-business (B2B) or business-to-customer (B2C) markets?
- What is your pricing strategy?
- How are you going to get your product to the market e.g. warehousing, retail or online?
- Do you have a good understanding and evidence of environmental performance of your product, service or technology? Have you got evidence to back-up your claims? Greenwashing must be avoided!
- How are you going to create “noise” in the market and amongst your customers?
- What can you do yourself? What will you need to outsource? What can you address by establishing new collaborative arrangements?

## Good practice

HPW:  
towards integrated sustainable design

An established SME architectural practice, HPW, recognised that sustainability was becoming a growing business issue and that many of its competitors did not have robust knowledge-based skills. In order to upskill the business the Creative Director attended a masters degree course in eco-innovative building technologies and processes. The company is now winning business based on its knowledge-based skill-set.

[www.hpw.co.uk](http://www.hpw.co.uk)

## Learning Resources

- Selling sustainability  
[www.nesta.org.uk/publications/reports/assets/features/selling\\_sustainability](http://www.nesta.org.uk/publications/reports/assets/features/selling_sustainability)

## Crowdfunding for eco-innovators

### What is crowdfunding?

Crowdfunding is a peer-to-peer funding model that offers transparency and a sense of community for both funder and entrepreneur. A pitch for funds is made to a crowd of “investors” who commit either small or large amounts in return for rewards, equity or loan repayments if the funding target is reached and the project goes forward.

### Impact investment for eco-innovation?

Impact investment is investment assessing not only the financial return on investment, but also the environmental and social impacts in the course of the operations of the business and the consumption of the product or service, which the business creates. Impact investing is expected to reach \$9 billion worldwide in 2013<sup>14</sup>. Currently, several crowdfunding platforms, such as [www.ImpactCrowd.com](http://www.ImpactCrowd.com) (NL) and [www.crowdmission.com](http://www.crowdmission.com) (UK), specialise in impact investment for ventures that aim to create environmental, social and economic impact.

### Tips for establishing a crowdfunding campaign

- Consider the proposition and scope for tiers of rewards alongside the environmental impact of the proposition and establish a clear link between the reward and the product or service offered.
- Keep in mind that people are more likely to invest in a business or project idea that they are already passionate about, in a story that is compelling and where the team’s track record and past successes are evident. It is a good practice to visualise a new idea through images or video.
- Start promotion within a community of interest e.g. networks of suppliers and customers and extend it to the likeminded crowd who have affinity with your product, service or technology, followed by the professionally interested (impact) investors. Keep your followers up-to-date with the progress of the campaign and later with the progress of the project and distribution of rewards or loan repayments.

*These tips come from Dutch foundation Enviu that specialises in crowdsourcing ideas and crowdfunded €100,000 for their entrepreneurs in a three month period. As a result of their experience Enviu has established ImpactCrowd, a crowdfunding platform for European eco-innovators.*

<sup>14</sup> [www.environmentalleader.com/2013/01/09/impact-investing-to-hit-9-billion-in-2013/](http://www.environmentalleader.com/2013/01/09/impact-investing-to-hit-9-billion-in-2013/)

## Good practice examples

In the **US Mosaic** ([www.joinmosaic.com](http://www.joinmosaic.com)) targets small businesses who seek part funding for solar photovoltaic projects. For example, Oakland's Youth Partnership's 47-kilowatt solar installation was funded by a limited pool of 51 investors offering a total of \$40,325. This was part of the project's \$264,000 cost that also benefited from a grant and a rebate from a California government programme. Small scale investors can contribute as little as \$25 and receive a fixed 4.5% annual return, which helps pay for solar installations on small businesses, community centres and other facilities.

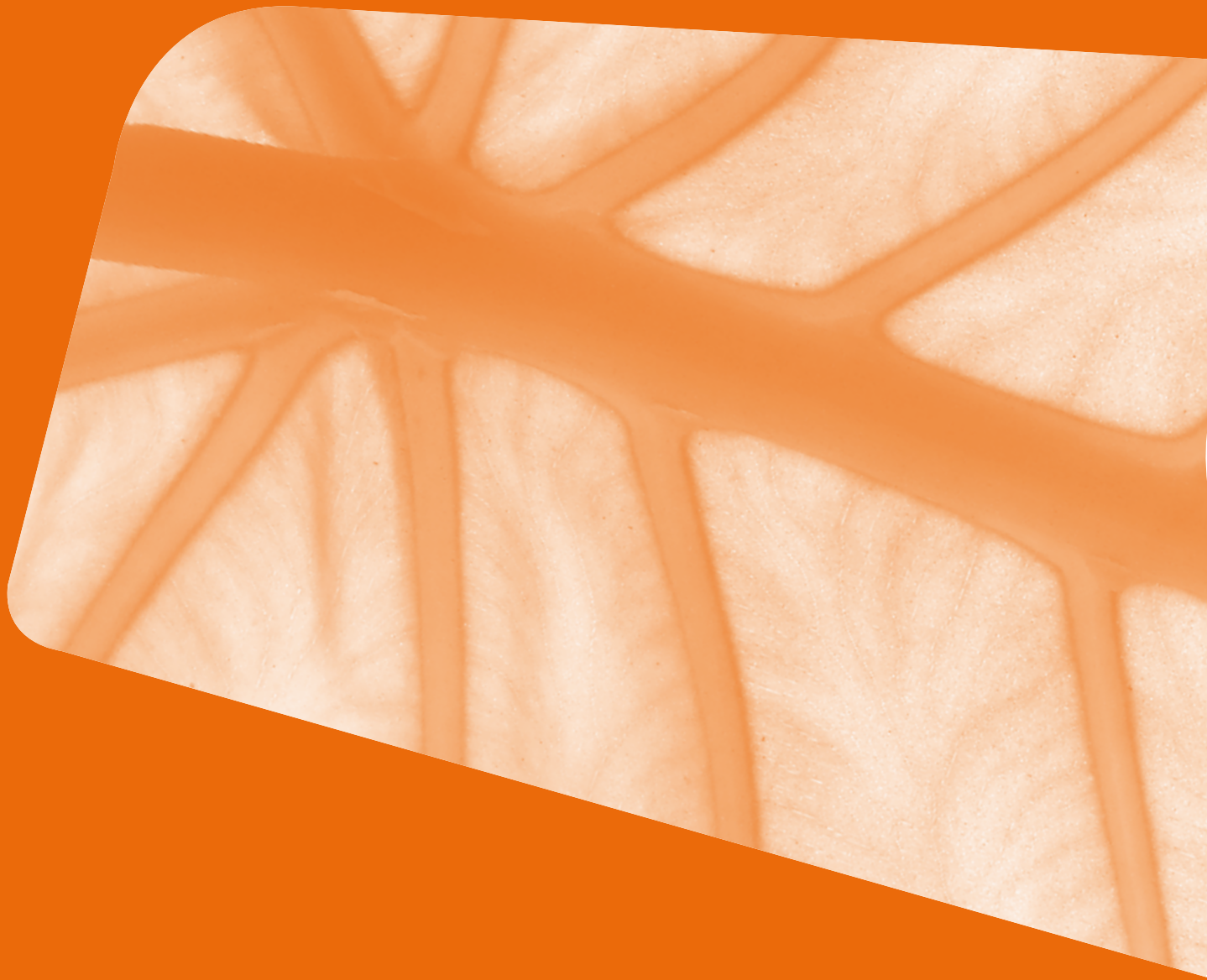
**E-car** ([www.e-carclub.org](http://www.e-carclub.org)) is a London based competitively priced, wholly electric car club operating through established community channels, building on the increasingly established pay-per-hour car club model. £100,000 was raised through Crowdcube; ([www.crowdcube.com](http://www.crowdcube.com)) investors together own 20% equity.

**ReKixx** ([www.rekixx.com](http://www.rekixx.com)) 100% recyclable sneakers (\$44,000 raised from 496 backers), and **ANI** (As Nature Intended) ([www.anibrand.com](http://www.anibrand.com)) vegan "Barefoot" shoes were both funded by Kickstarter ([www.kickstarter.com](http://www.kickstarter.com)).

## Learning Resources

- A Directory of crowdfunding platforms  
[www.crowdsourcing.org/directory](http://www.crowdsourcing.org/directory)  
*Choose the category as Crowdfunding and then country. Results can be filtered by sub-category for donations, equity or lending. Some articles focus on eco-innovation and consider the specific legal and financial considerations relevant in each country.*
- Crowdcube articles  
[www.crowdcube.com/pg/press-29](http://www.crowdcube.com/pg/press-29)
- Seedrs blog  
[blog.seedrs.com](http://blog.seedrs.com)
- Funding Circle articles  
[www.fundingcircle.com/about-us/in-the-news](http://www.fundingcircle.com/about-us/in-the-news)

6





# **Examples of European projects on eco-innovation**

## Examples of European projects on eco-innovation

The European Commission has funded a range of projects collecting data and good practice examples on eco-innovation. The following sources may be useful in looking for good practice as well as for tools supporting development and marketing of eco-innovation.

**Eco-Innovation Observatory** is an online platform for the structured collection and analysis of eco-innovation information from across the European Union. Among its resources are analytical reports, a repository of good practices and online database.

[www.eco-innovation.eu](http://www.eco-innovation.eu)

**INNOWATER** is a public-private partnership of public innovation agencies, water associations and technology specialists, innovation experts and eco-innovative cluster organisations. Among many support schemes it has one that helps SMEs with developing and testing a water audit giving a detailed analysis of the potential, and providing a roadmap for improving sustainable water management, including the identification of innovative solutions.

[www.europe-innova.eu/innowater](http://www.europe-innova.eu/innowater)

**REMake** is a partnership programme that addresses innovation support for the lead market area of recycling and resource efficiency. Using the innovation vouchers scheme, REMake helps SMEs tap into the enormous potential that recycling and resource efficiency offer to reduce material costs, which account for over 40 % of their total expenditure.

[www.europe-innova.eu/remake](http://www.europe-innova.eu/remake)

**BIOCHEM** partnership supports companies, and especially SMEs, to enter the emerging and highly promising market for bio-based products in the chemical sector. By fostering the SMEs' adoption of "lean management" and efficiency principles, BIOCHEM improves the economical and environmental performance of existing processes, including reduction greenhouse gas emission across the life cycle of bio-based products.

[www.biochem-project.eu](http://www.biochem-project.eu)

**EcoTroFood** aims at improving the access of the food industry to information and knowledge on eco-innovation, in particular for SMEs and service providers. It enables the development and testing of new innovation support practices, support SMEs in meeting future environmental standards and reaping benefits from improving environmental performance.

[www.europe-innova.eu/ecotrofood](http://www.europe-innova.eu/ecotrofood)

**ECOLINK+** is the horizontal support action of the European Eco-Innovation Platform (Eco-IP) that provides guidance in identify and exploit potential synergies among the Eco-IP partnerships. It is setting up the ECOLINK+ 100 Business Club, gathering emerging and top-performing European eco-innovators. Members receive opportunities to network, access services and financial partners and become visible internationally.

[www.europe-innova.eu/ecolink](http://www.europe-innova.eu/ecolink)

**ECO-INNOVERA** focuses on the support of eco-innovation in research and development. This ERA-Net network of 25 European partners addresses a board range of topics on eco-innovation: from research to dissemination. ECO-INNOVERA supports research, innovation and environmental policy makers with recommendations on how to boost the implementation of eco-Innovation in R&D, economy and society.

[www.eco-innova.eu](http://www.eco-innova.eu)

**Ecopol** is a transnational public partnership that aims to accelerate the implementation of eco-innovation policies across Europe. ECOPOL identifies and tests tools for implementing eco-innovation policies in European, national and regional level. Its main focus areas are Green Public Procurement, waste & recycling and internationalisation.

[www.ecopol-project.eu](http://www.ecopol-project.eu)

The **INNOVATIONSEEDS** interactive portal for environmental research and knowledge repackages 100 promising EU-funded environmental R&D results to accelerate their uptake as policy measures and market success. Its navigation system provide guidance to SMEs to the most appropriate public and private funding for eco-innovation projects.

[www.innovationseeds.eu](http://www.innovationseeds.eu)

**ECOWEB** is an interactive European online platform for eco-innovation research results targeted at SMEs. It provides up-to-date information on eco-innovative technologies, applications, products, processes and knowledge from hundreds of EU-funded research projects and other sources; It is also also building a European network of key collaborators with privileges such as the testing of all platform services, offer of full platform services to their members and ambassador of the platform in their country.

[www.ecoweb-project.eu](http://www.ecoweb-project.eu)

A number of **INTERREG** programmes and projects offer interesting good practices in eco-innovative solutions and support instruments tested in European regions:

- **FRESH**  
[www.freshproject.eu](http://www.freshproject.eu)
- **Cleantech Incubation Europe**  
[www.cleantechincubation.eu](http://www.cleantechincubation.eu)
- **rECOMmend**  
[www.recommendproject.eu](http://www.recommendproject.eu)
- **DESUR**  
[www.desur.eu](http://www.desur.eu)
- **ecoREGIONS**  
[www.ecoregionsproject.eu](http://www.ecoregionsproject.eu)
- **REGIONS FOR RECYCLING**  
[www.regions4recycling.eu](http://www.regions4recycling.eu)



## List of Figures

Figure 1: Eco-innovation Wheel

Figure 2: Why eco-innovation

Figure 3: Business case for eco-innovation

Figure 4: Hidden waste costs

Figure 5: “Quick wins” in reducing emissions and waste in SMEs

Figure 6: Yearly savings potential in SMEs introducing material efficiency solutions

Figure 7: Eco-design Strategies Wheel

## List of Tables

Table 1: Environmental considerations and the business case for eco-innovation

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## About the Eco-Innovation Observatory

The Eco-Innovation Observatory (EIO) is a three-year initiative financed by the European Commission's Directorate-General for the Environment from the Competitiveness and Innovation framework Programme (CIP). The Observatory has developed an integrated information source and a series of analyses on eco-innovation trends and markets targeting business, innovation service providers, policy makers as well as researchers and analysts. The EIO was set up to inform two EU initiatives: the Eco-Innovation Action Plan (EcoAP) and Europe INNOVA.

Visit our website to get open access to our reports, interactive database with charts and maps, EU country profiles as well as good practice examples from across Europe.

[www.eco-innovation.eu](http://www.eco-innovation.eu)

This guide has been prepared by



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