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GREENING THE ECONOMY

LESSONS FROM SCANDINAVIA

A COMPENDIUM BY THE INTERNATIONAL INSTITUTE FOR INDUSTRIAL ENVIRONMENTAL ECONOMICS (IIIEE) AT LUND UNIVERSITY



Introduction

The concept of a "green economy" is rapidly gaining interest around the world. However, the idea is not new. It appeared in 1989 in the book "Blueprint for a Green Economy".[1] During the 1990s and most of the 2000s, the green economy was not a widely used term. But it gained a new lease of life after the financial crisis of 2008 when governments and industries around the world needed to respond to economic recessions while also furthering environmental and climate protection goals. In 2012, an updated book called "A New Blueprint for a Green Economy" was published.[2] There are many initiatives that have been launched around the world to green economies.

This compendium explores greening the economy on four levels – individual, business, city, and nation. We will look at the relationships between these levels and give many practical examples of the complexities and solutions across the levels. Scandinavia, a pioneering place advancing sustainability and combating climate change, is a unique starting point for learning about greening economies. We will learn from many initiatives implemented in Scandinavia since the 1970s that are all potentially useful for other countries and contexts. Throughout this compendium, you will find many examples with links to relevant websites, documents and films.

1 Pearce, D., Markandya, A. & Barbier, E. (1989) Blueprint for a Green Economy. New York: Earthscan.

2 Barbier, E. & Markandya, A. (2013) A New Blueprint for the Green Economy. New York: Earthscan.



The International Institute for Industrial Environmental Economics (IIIEE) at Lund University in Sweden is an international centre of excellence on strategies for sustainable solutions. The IIIEE is ideally suited to understand and explain the interdisciplinary issues in green economies utilising the diverse disciplinary backgrounds of its international staff. The IIIEE has been researching and teaching on sustainability and greening the economy since the 1990s and it has extensive international networks connecting with a variety of organizations. This compendium draws on the knowledge and experience of the IIIEE.

Visit the IIIEE website

Greening the Economy: Lessons from Scandinavia is a Massive Open Online Course or MOOC. This compendium supports participants in this MOOC, but it is also an introduction to greening the economy in general. In the MOOC, you can meet a variety of different professors and experts in different fields of knowledge. Each with a particular insight from their academic background and experience that is relevant to the overarching topic of greening the economy. The MOOC brings together this range of insights from different disciplines to gain a bigger picture, and therefore a more holistic understanding of key concepts, strategies, and processes in the transition to a greener economy.

Visit the MOOC website

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Green economies

WE WILL LOOK AT THE KEY ISSUES THAT A GREEN ECONOMY SEEKS TO ADDRESS AND THE UNDERLYING CONCEPTS AND DEFINITIONS OF A GREENER ECONOMY.



Individual choices

WE WILL LOOK AT THE INDIVIDUAL LEVEL AND HOW INDIVIDUAL CHOICES CAN HELP OR HINDER PROGRESS TOWARDS A GREEN ECONOMY.



Business strategies

WE WILL LOOK AT THE BUSINESS LEVEL AND HOW COMPANIES AND ORGANISATIONS CHOOSE STRATEGIES THAT CAN HELP TRANSITIONS TO A GREEN ECONOMY.



Sustainable cities

WE WILL LOOK AT HOW PLANNING AND DESIGNING CITIES CAN HELP ACHIEVE A GREEN ECONOMY AND UNDERPIN SUSTAINABLE DEVELOPMENT.



National policies

WE WILL LOOK AT HOW NATIONAL GOVERNMENTS CAN ESTABLISH POLICIES TO PROMOTE A GREENER ECONOMY ACROSS THE DIFFERENT LEVELS DISCUSSED IN THIS COMPENDIUM.

”In all of the Scandinavian countries and most of the EU countries, we have had very ambitious legislation for environmental protection since the 1970s. This has not hampered economic growth.”

It is possible to combine environmental and economic goals. When it comes to climate change, for example, Sir Nicholas Stern has put a price tag on inaction. For most environmental issues and the investments necessary, we have similarly come to realise that we can make money and profits also by being environmentally friendly. For humanity and for the sake of the planet, this is good business and good investments. Sweden is one example proving that economic growth can be combined with, for example, reduced greenhouse gas emissions and high industrial efficiency.

In fact, in all of the Scandinavian countries and most of the EU countries, we have had very ambitious legislation for environmental protection since the 1970s. This has not hampered economic growth. Instead, environmental and economic goals have been combined. It is a good example of how to share the associated costs and burdens. We have divided the costs of the investments and reforms between the EU countries.

Europe is a success story also when it comes to living up to our Kyoto Protocol commitments. We have been delivering on our commitments in a way that has not disrupted competition between EU countries. This can be a model for the rest of the world, which was in fact one of the ideas behind the Kyoto Protocol. Still, of course, policies aimed to help people live more sustainably will have to be adapted to specific country contexts.

Most of the reforms and practical solutions implemented in European countries could be spread and applied elsewhere, as long as they are technically feasible, based on scientific best practices, and applied in a way that engages people. This way, change is brought about in a democratic and inclusive way. Putting a price tag on some of these reforms will help to illustrate that there is a cost to inaction as well.

From an international perspective, Scandinavia is considered leading when it comes to greening the economy, but I would like to see more courage among business leaders and political leaders. We cannot rely entirely on market forces or capitalism to offer the solutions. We need to demonstrate how political leadership can be combined with the use of market forces – we need both. We also need to make sure that we engage all different actors in this process.

To progress towards a green economy, we need long-term targets. We need to invest in renewable energy in order to create the frameworks necessary and the prospects for all actors involved to invest and use the latest technology. We will see a lot happening at the local and regional level, and in cities. I have big hopes for cities, and the ways in which they engage in different projects, such as environmentally friendly buildings, investing in wind power, and innovative transportation systems. This is where a lot of the force for change will be found in the future.

Margot Wallström



Margot Wallström

Swedish Minister for Foreign Affairs, former Environment Commissioner in the EU, Vice President in the European Commission, and former special representative for Ban Ki-moon in the UN. Also former chair of the board at Lund University in Sweden.

A sound understanding of the economics of climate change is needed in order to underpin an effective global response. “The Economics of Climate Change” also called the Stern Review is an independent and comprehensive analysis of the economic aspects of this crucial issue.[3] It was conducted by Sir Nicholas Stern, Head of the UK Government Economic Service, and a former Chief Economist of the World Bank. The Stern Review showed the costs of inaction on climate change.

Check out the summary of “The Economics of Climate Change”

3 Stern, N. (2007) The Economics of Climate Change. Cambridge: Cambridge University Press.

The Kyoto Protocol is a treaty that was negotiated in 1997 at the city of Kyoto, Japan and came into force in 2005. The Kyoto Protocol is a legally binding agreement under which industrialized countries will reduce their collective emissions of greenhouse gases compared to the year 1990. There are ongoing negotiations to develop a new international treaty on climate change.

Check out the details about the Kyoto Protocol



Stavanger harbour, Norway



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Green economies



Many governments, communities, businesses and international organisations would like to develop green economies that can result in economic growth, social equity and at the same time reduce environmental risks. But how? Scandinavia, a pioneering place advancing sustainability and combating climate change, is a unique starting point for learning about greening the economy. This section begins with explaining wicked problems and leads into discussions on the green economy. ▸

1.1 WICKED PROBLEMS

Environmental challenges (such as over consumption, waste, and climate change) are sometimes referred to as wicked problems. These problems are complex and they have many causes and dependent factors influencing each other, making it difficult to target the linkages of the causal factors. Wicked problems exist in global systems, and they often interact with each other in unpredictable ways. It can be hard to identify the real problem, and hence, its solution. Attempts to address wicked problems therefore often result in unforeseen consequences.

The complexity and size of the systems involved mean that our understanding of environmental problems is constantly evolving. Rather than chasing one clear solution, we have realised that we need many different responses. We are still learning what works and what does not, and why this is the case. Wicked problems consequently often involve a number of policy failures and long learning processes on the way to finding successful responses.

While technology is certainly one response, it is important to remember that wicked problems are socially complex and involve changing behaviour. They do not lie conveniently within the responsibility of any one organisation, sector or area of study – wicked problems cross both governance boundaries and academic disciplines. Studying these issues and the concept of greening the economy, as a potential response, therefore requires a holistic approach.

Problems for which no agreed-upon solution is identifiable can be called “wicked”. Pursuing solutions is more of a political than a technical exercise. Examples of wicked problems include climate change and ensuring sustainability development. In contrast, widely agreed upon problems for which the most efficient solution can be identified and pursued can be labelled as “tame”. Problems of natural sciences and engineering often fall into this category, for example, choosing methods of treating waste-water. Some social and public policy problems are also tame, for example, installing sewer lines. Pursuing solutions is more of a technical nature.



1.2 WHAT IS THE GREEN ECONOMY?

The term "green economy" is not a new one. It first appeared in 1989 in the book "Blueprint for a Green Economy".[4] During the 1990s and most of the 2000s, the concept of a green economy was not widely used. But it gained a new life after the financial crisis of 2008 when many governments around the world needed to stop economic recession while also furthering environmental and climate protection goals. In 2013, an updated book called "A New Blueprint for a Green Economy" was published.[5] Today, there is growing interest, activities and publications on greening the economy.

In particular, the concept of a green economy has gained resumed attention at international political and economic forums. One reason is that some international organizations, most notably, the United Nations Environmental Program (UNEP), in the late 2000s proposed that financially supporting environmental and climate activities could also help to stimulate economic growth. UNEP has defined a green economy as generating increasing prosperity while at the same time reducing our environmental impact – in essence, it is possible to meet the need for development and at the same time respect the limits of local, regional and global environmental systems.

> UNEP has described the green economy as one "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities".
>
> Read more from UNEP:
>
> Towards a Green Economy



Of course, this general definition can be interpreted in a variety of ways. More narrow interpretations of a green economy often include proper pricing of so-called environmental externalities, which is an economic concept that refers to uncompensated (negative) environmental effects of production and consumption. Some interpretations call for adopting the polluter pays principle, which means that those companies and individuals who are responsible for environmental impacts should be made to bear the costs. Others call for financial investments in renewable energy and energy efficiency, which both generates jobs and reduces greenhouse gas emissions.

Wider interpretations of a green economy assert that current levels of consumption and production in industrialised countries are inherently unsustainable and that radical changes are required to avoid the collapse of planetary ecosystems. One such idea is "de-growth", which implies deliberately reducing economic output in order to decrease pressure on the environment. This is a hotly debated concept, but it certainly encourages us to think more critically about the economy and impacts on the environment.

Several other concepts are related to the idea of a green economy. Sustainable development is perhaps the most notable of these terms. It is the notion that meeting the needs of the present generation should not compromise the ability of future generations to meet their own needs. Another approach is called "ecological modernization" and it is the idea that clean and environmentally-friendly industries can help develop and modernize industrial societies enough to avoid detrimental environmental degradation. Lastly, the concept of green jobs emphasises that the environmental sector, and particularly clean energy, can significantly contribute to new employment opportunities.

There is still a lively debate about what constitutes a green economy and how to effectively green our existing economic and industrial systems. In Scandinavia, there are strong efforts to build an economy which is prosperous, low-carbon and environmentally friendly. This has involved many different stakeholders in society. But what does greening the economy mean here in Scandinavia? And what lessons can be learned from Scandinavia for the rest of the world? Check out these perspectives on greening the economy from an economist and a politician on the next pages.

4 Pearce, D., Markandya, A. & Barbier, E. (1989) Blueprint for a Green Economy. New York: Earthscan.

5 Barbier, E. & Markandya, A. (2013) A New Blueprint for the Green Economy. New York: Earthscan.



An economist's take on the green economy

KLAS EKLUND

Professor and author. Former Chief Economist of the SEB Bank and economic advisor for the Swedish Government.

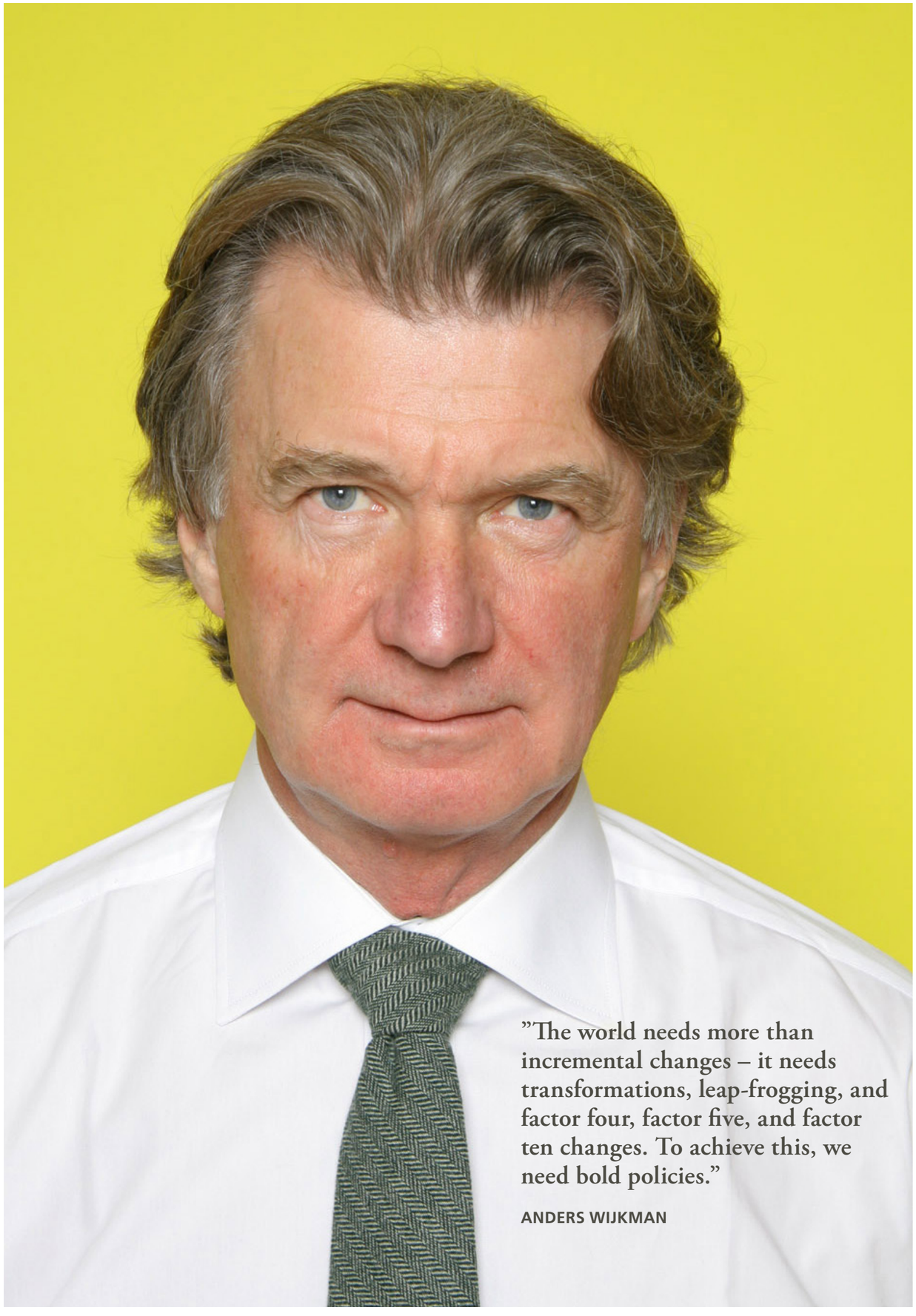
From an economic point of view, a "green economy" implies using taxes, subsidies and fees in a strategic and systematic way. Scandinavian countries have come quite far doing this, compared to most other countries. One reason why greening the economy is important to Scandinavians might be that we, in general, have a strong love for nature. We are sparsely populated countries and we live close to the forests and lakes. This may also explain why we tend to accept tough economic policy tools aimed to clean and protect the environment, such as high energy taxes.

In Sweden, we have some of the world's highest taxes on carbon dioxide. We also have a long-ranging programme for central and district heating, and our cities are often fuelled by biofuels and biomass. In Denmark, there are strong subsidies for wind energy. Sweden also has an ambitious programme for deposit-refund of old cans and bottles, which is engrained in the national psyche. There are a number of policies like this that are accepted and part of everyday life throughout the Scandinavian countries.

Nevertheless, long-term, there is absolutely no way we can handle climate change and other environmental challenges unless we develop new technologies. Businesses and industry have the main responsibility here, but they will not act without being influenced by politicians. We have high taxes on energy, petrol, carbon dioxide, and a number of other economic instruments in order to push, budge, squeeze and force industry to keep moving forwards.

Scandinavia has been quite successful in this regard, but not nearly successful enough. One explanation might be that industries are competing on a global level, which means that export industries are exempt from certain taxes. We need global solutions – Scandinavian countries and companies cannot do this on their own.

As an economist, I think that we need to focus on aligning our wallets and our social ambitions. If the wallet pulls you in one direction and your social ambition in the other, unfortunately, the wallet usually wins. It is crucial that policies directed towards greening the economy include well-constructed economic tools, including taxes and fees. This helps individuals to pull in the same direction as environmental policies.



”The world needs more than incremental changes – it needs transformations, leap-frogging, and factor four, factor five, and factor ten changes. To achieve this, we need bold policies.”

ANDERS WIJKMAN







A politician’s take on the green economy

ANDERS WIJKMAN

Author and former politician in the European and Swedish Parliament.

One of the problems we are facing today when pursuing a greening of the economy is that we do not have a clear-cut definition of the concept “green economy”. One of our biggest challenges is to adopt a systemic view and to integrate environmental challenges, climate challenges and social challenges. If we do not, I do not think we will succeed.

In Scandinavia, economic incentives are a key to greening economies, since most companies, households and individuals are guided by their wallet. At the same time, we also need other types of policy instruments in place. There are, for instance, chemicals that we simply have to ban. There are good examples of that in Sweden, but even here, we still have a long way to go.

Since national governments cannot agree, we have to look for other actors. Cities are very important actors and key to greening the economy. There are beautiful examples from around the world, where cities have taken the lead. The Swedish city of Växjö has, for example, done a lot in order to reduce their environmental impact, especially carbon dioxide emissions. Another example is the well-developed public transport in many Scandinavian cities, which is going to be even better developed in the near future.

We are also starting to see that companies who take the lead in environmental consciousness and have adopted action plans for this, also tend to be the best run and most profitable companies. Nevertheless, despite many good examples of this, it is not sufficient. Business models have to change. This is where we have a huge problem. Businesses still earn revenue primarily by selling more stuff, which tends to translate to increasing degradation. Even though we have accomplished higher degrees of efficiency, this is consumed as we are constantly growing.

Alternative business models can, for example, mean that consumers lease and rent products instead of owning them. This could give an incentive to companies to produce better products in new ways – products that last longer, can be easily recycled, reused, and remanufactured. It would bring down energy and material consumption, and even greenhouse gas emissions, enormously! Companies like H&M and IKEA are looking at this, as they have realised that we cannot go on constantly increasing stuff.

The world needs more than just incremental changes – it needs transformations, leap-frogging. To achieve this, we need bold policies. The technologies are there, so it is very much a question about how our economies are organised and the incentives involved. For example, the way taxes are organised is very important. The most radical solution now would be to remove taxes on labour and make it cheaper to hire people. Unemployment is very high all over the world, in particular amongst young people. Instead, we need to tax resource use and pollution. We should tax the things that we do not want – and not the good things that we want.

Meanwhile, in a globalised economy, there are limits to what an individual country or agent can do. We need rules of the game at the international level, which are really lacking today. We cannot impose completely different legislation on Swedish companies, than on their main competitors. Instead, we have to work on all levels in society.

1.3 EVOLUTION OF THE GREEN ECONOMY CONCEPT

The term "green economy" is based on multiple conceptual grounds. In fact green economy as a concept has evolved from, and been influenced by, many different schools of economic thought. This section provides a brief overview of how the concept has evolved.

The green economy concept is not new, but it became popular outside of academic circles right after the 2008-2009 global financial crisis. The crisis was driven by numerous interrelated issues, including the subprime housing market, the credit crunch, the lack of regulation of financial markets, and the total collapse of large financial institutions. Some scholars also argued that unsustainable patterns of production and consumption also were key drivers of this crisis.

The economic downturn that followed encouraged numerous pledges to reform current economic systems towards a path much less damaging to society, the environment and the financial system itself. As a result, numerous countries implemented green economy stimulus packages to re-invigorate production and consumption, particularly in the short term. At the time, the available definition of green economy was provided by UNEP. In its simplest expression, UNEP has argued that "a green economy is low-carbon, resource efficient and socially inclusive".

The question remains - what does a green economy really entail? As mentioned earlier, conceptual choices about a green economy can cover a wide spectrum, from larger aspects of sustainability to narrow concerns about environmental pollution. However, there also seems to be consensus about what a green economy should incorporate; and this points to job creation, poverty alleviation, reduction of greenhouse gas emissions, investments in natural capital and ecosystem services, improvements in social equity and human well-being, and also increases in resource efficiency.

The conceptual background of the term green economy can be traced to many different schools of economics and other disciplines. First, one can argue that the term was initially linked to agricultural economics. This was done during the so-called "Green Revolution" in agriculture that occurred between 1940 and 1970. At that time, agricultural economists were studying and analysing the issues that the "Green Revolution" brought to this economic sector, and they used the term green economy to refer to the positive impacts that research and technology development had on agricultural productivity.

The Green Revolution

Scientific advances in plant breeding and agricultural technology resulted in signficant productivity increases and yield potential for the major crops like rice, wheat and maize in developing countries. This has been called the "Green Revolution".

Food and Agriculture Organisation of the United Nations (FAO): Lessons from the "Green Revolution"



Welfare economics has also influenced or contributed to the development of the term green economy. This school of economics is concerned with the effects of economic activities on welfare or well-being. From a general point of view, welfare or well-being is often understood as the state of being healthy, happy, or prosperous; either as individuals or as a group. Welfare economics also provides the basis for the "market failure" concept, which can be simply understood as the idea that if incorrect price signals are sent, market economies fail to achieve efficiency. Another aspect that is also captured by both welfare economics and the term green economy is economic inequality, that is, the uneven distribution of income and wealth.

Natural resource economics is another school of thought that has helped to frame or develop the green economy concept. This school of economics deals basically with the supply, demand, and distribution of renewable and depletable resources. A key objective for natural resources economics is to find ways to manage resources efficiently and sustainably so that they are available to future generations. In principle, a green economy should guarantee the capacity of natural capital that provides resources and environmental services in the long run. The physical accounting of environmental resources is a key element in natural resource economics, which is also emphasized by the term green economy.

Another conceptual milestone in relation to the term green economy can be found in the early foundations of environmental economics. When the environmental revolution took place in the mid-late 1960s, economists claimed that "the economics profession was ready and waiting"[6]. At that time, environmental problems had been illustrated in books like "Silent Spring", which documented the negative effects on the environment resulting from the indiscriminate use of agrochemicals.

Read about the legacy of "Silent Spring" by Rachel Carson some 50 years after its publication

Silent Spring's Legacy

6 Cropper, M. L., & Oates, W. E.. (1992). Environmental Economics: A Survey. Journal of Economic Literature, 30(2), 675–740.



For environmental economists pollution is understood as a negative externality, take air pollution for example. If an economic activity is reducing air quality, the health or welfare of a third party may suffer as a consequence. Environmental economists attribute this to the absence of prices for environmental assets like clean air, biodiversity and clean water. Environmental economists were aware that any form of economic activity could cause not only benefits, but also costs. Early work on economic answers to environmental problems supported the use of the term "green economics" for analysing environmental problems and the management of natural resources from an economic point of view.

Relying on the idea of sustainable development and also on the theory, the methods and the policy options provided by environmental and natural resource economics, Pearce, Markandya and Barbier framed the term green economy in the late 1990s around technology innovation, resource efficiency, natural capital, ecological risks and human development. This work was summarised in their book "A New Blueprint for a green economy".[7] This work stressed different aspects of a green economy, including environmental protection, economic management of environmental concerns, economic valuation of environmental change, and also the role of prices for environmental protection. In the revised edition of the book[8], the term green economy is anchored to three key areas: accounting for the environment, valuing the environment, and policies for environmental protection.

Energy economics, particularly the area that focuses on renewable energy and energy efficiency, can also be said to be contributing to or shaping the term green economy. This is because most policies encouraging a green economy have heavily targeted the clean energy sector. So investments in low-carbon technologies and climate mitigation strategies have been quickly portrayed as key components for the transition to a green economy. Sometimes similar concepts, like the Low-Carbon Economy and the Clean Energy Economy are also used to refer to a green economy. Under energy economics, we can argue that a green economy focuses on how the economic system can pursue growth by bringing

7 Pearce, D., Markandya, A. & Barbier, E. (1989) Blueprint for a Green Economy. New York: Earthscan.

8 Barbier, E. & Markandya, A. (2013) A New Blueprint for the Green Economy. New York: Earthscan.



together economic, environmental, social, and technological aspects through the expansion of clean energy production, distribution and consumption. Lately, there has been growing attention to the term "green energy economy."

Finally, ecological economics, where priority is given to sustainability and the economy as a subsystem of the ecosystem, also influence the term green economy. For instance aspects of ecological scarcity and social equity included in the green economy term have also been put forward by ecological economics. There is a growing body of knowledge that shows the rapid loss of ecosystems services. This situation has encouraged investment in and conservation of natural capital, which is also a critical aspect for the modern interpretation of the term green economy. Building upon other schools of economics, ecological economists have also advocated for the economic value of ecosystem services and resources. Seminal work by Herman Daly has also stressed the idea of a "steady state economy", in which the use of materials and energy, so-called "throughput", in the economy is minimised.

Ecological Economics

Conventional or neoclassical economics, according to ecological economists, does not reflect adequately the value of essential factors such as clean air and water, species diversity, or social and generational equity. To address this, ecological economists advocate a transdiscplinary approach.

Find out more about ecological economics:

Interview with Robert Costanza

In view of the theoretical background for the concept, the green economy has over time evolved to become a very rich and intriguing concept, with the links between resource efficiency, job creation, pollution prevention, clean energy technologies, poverty alleviation, greenhouse gas emissions, and natural capital, among several other issues. The implication for policy points to a need for substantially more ambitious and integrated measures if a meaningful transformation to a greener economy is to be delivered.



1.4 LITTLE ACTIONS AND BIG CHALLENGES

An everyday example can help illustrate why greening the economy is so important and how our little actions add up to some big challenges. You and your friends are out for lunch. Although most do not consider it at the time, the situation involves a range of decisions and choices that all contribute to larger scale factors impacting the future of our planet. Your choice of lunch place, how you got there, how the restaurant owners have chosen to run their restaurant, and the government choice of how to regulate aspects relevant to this type of restaurant are all significant to the level of impact on the environment. Let us explore this further.

The decision is sushi for today's lunch. On the one hand, by eating sushi you contribute to the restaurant owners trying to run a business, as well as the fishing sector which supports the livelihoods of millions of people worldwide. On the other hand, you are not the only one eating fish – billions around the world rely on fish as a staple source of protein. In total, 130 million tonnes of fish is consumed each year, contributing to reducing fish stocks. Most fish cannot replenish their stocks at this rate. Currently, 50 percent of fish stocks worldwide are nearly fully depleted and another 30 percent on their way towards depletion.[1]

Food and Agriculture Organisation of the United Nations (FAO)
The FAO is focused on achieving food security globally. The FAO has identified 14 thematic areas in which it can support countries in arriving at new goals on sustainable development.

Visit the FAO website

1 Food and Agriculture Organisation of the United Nations (FAO). (2014) Fisheries, Aquaculture, Oceans and Seas. URL: http://www.fao.org/post-2015-mdg/14-themes/fisheries-aquaculture-oceans-seas/en/

If this trend in the depletion of fish stocks is not reversed, future generations may not be able to eat fish to the same degree, and we will see detrimental impacts on marine ecosystems at large. This compendium will introduce you to different alternatives available for reversing this trend – different ways of greening the economy. For example, we as consumers can consider how much and what fish we eat. We can develop business strategies and government policies to ensure that fish and other products are consumed more sustainably, and that vulnerable marine resources are exploited with reason. Even cities have a role to play here.

Beyond sourcing the raw materials for producing the sushi, running the restaurant – hot water, lights, heaters, and dishwashers – requires energy. Depending on how this energy is produced and supplied, this could have a negative impact on the environment. Depending on where you are, a majority of the energy used for heating and electricity is produced using fossil fuels. Burning fossil fuels releases greenhouse gases to the atmosphere which contribute to climate change. According to the International Energy Agency (IEA), electricity and heating production accounted for 41% of the total global greenhouse gas emissions in 2010.[2] Moreover, fossil fuels are finite resources that one day will run out if we continue extracting them.

International Energy Agency (IEA)
The IEA is an organisation which works to ensure reliable, affordable and clean energy for its member countries and beyond. Its four main areas of focus are energy security, economic development, environmental awareness, and engagement worldwide.

Visit the IEA website

2 International Energy Agency. (2012) Carbon Dioxide Emissions from Fuel Combustion. Paris: IEA.



A new problem arises after lunch – the waste you have generated and how it is managed. Even if waste is disposed of properly, which far from all of it is, the amount of waste we generate is daunting. Every year, over 11 billion tonnes of solid waste is collected worldwide.[3] Some of it is still valuable and can be reused. Maybe you had a can of soft drink with your lunch? Producing aluminium cans is an extremely energy consuming process, involving mining, refining and smelting of bauxite. Recycling the can saves almost all (about 95%) of the energy it would take to produce a new one. Recycling, reusing, and ideally, reducing waste, are key components to greening the economy.

The concept of planetary boundaries was invented by Johan Rockström at the Stockholm Environment Institute (SEI). In 2009, a group of scientists identified and quantified a set of planetary boundaries within which humanity can continue to develop and thrive for generations to come. Crossing these boundaries could generate abrupt or irreversible environmental changes.

Visit the SEI website

When you and your friends have left the restaurant and need to get back to work or school, yet another problem arises. Like energy generation, our current modes of transportation rely heavily on fossil fuels. Global car use is increasing rapidly, which leads to increased congestion as well as local and global pollution. This compendium looks at how we can meet our mobility needs while minimising negative impacts on the environment – all as part of greening the economy.

As illustrated by this simple example, it is clear that our overall impact on the environment and on fundamental global planetary processes is too high – greening our economies is essential. Why, then, do we act in these ways, if we know that they have such negative aggregate impacts? Having access to energy, food, modern conveniences and getting where we need to go are all part of basic economic development. They are part of a natural desire to live better, happier and more comfortable lives. As the world economy has grown and developed in the last two hundred years, we have seen amazing gains in life expectancy and increased standards of living for a lot of people. Economic development in itself is not a bad thing.

Nevertheless, as we have seen, this economic growth and development has been in tension with our environment. Ultimately, our economy relies on a healthy environment. It is essential to find ways to ensure economic development without excessive negative effects on the environment. Finding a better balance is the core aim of greening the economy. In 2013, the United Nations Industrial Development Organisation (UNIDO) produced a film with Yann Arthus-Bertrand – a visually stunning depiction of the challenges facing our planet. Why not take a look?

Check out a film (by UNIDO and Yann Arthus Bertrand) on finding the balance by greening the economy

3 United Nations Environment Program (UNEP). (2011) Waste: Investing in Energy and Resource Efficiency. URL: http://www.unep.org/greeneconomy/

1.5 WHY SCANDINAVIA?

This compendium gives examples from Sweden, Denmark and Norway, which together is Scandinavia. So why focus on Scandinavia? For many people around the world, Scandinavia makes an impression of being a "green" and prosperous place. At the same time, many Scandinavians are disappointed that not enough is being done about environmental problems, and concerned that Scandinavia has such a large ecological footprint. Ecological footprint refers to the size of environmental impact of a person, a product, an organization, a city or a country. In the 2010 ranking by the World Wide Fund for Nature (WWF), Denmark had the 3rd largest ecological footprint in the world, Sweden the 13th and Norway the 17th. Scandinavia clearly still has more to do.[9]

Read more from the Global Footprint Network

Ecological Footprint Index

Meanwhile, Scandinavian countries have a high standard of living and well-being. The key is clearly to balance this way of living with the associated impacts it has on our environment. There are a number of different objective indicators, for example the Better Life Index by the Organisation for Economic Cooperation and Development (OECD), which shows that Scandinavian countries are performing well. Scandinavian countries and cities are also rated among the top ten of the Global Green Economy Index. Furthermore, an ecological footprint is just one way to measure. It is worth noting that using this measure, Sweden still has a footprint that is lower than its bio-capacity, which means that it is able to sustain its own footprint.

One explanation for the Swedish situation is its geographic and historic circumstances. It has an abundance of natural resources, a favourable climate, good soils for agriculture, and waterways for hydroelectric dams. The country has not experienced wars or organized violence in the last centuries, contrary to many other regions. Sweden is lucky to have these conditions.

While geography and history have clearly played a role, Scandinavia also has some of the most advanced environmental policies and legislation in the world. The countries in Scandinavia have been experimenting with policies and practices to green their economies since the 1970s. Although many policies have not been more than experiments, and some not even successful, these experiences still serve as valuable lessons. Scandinavia has made progress in addressing many environmental problems.

There is, for example, little visible pollution in Scandinavia. Cities are relatively green and safe and much of the countryside is unspoiled. Still, some are concerned that pollution has simply been "exported" to other countries. Scandinavians use electric appliances, wear clothes, eat food and drive cars that are produced in global supply chains. The local environment is spared, but the Scandinavian way of living still affects the environment globally.

In an attempt to address these concerns and reduce overall footprints, the design, production, and consumption of environmentally friendly products is commonly encouraged in Scandinavian countries. Governments and businesses are working with policies to reduce environmental impacts at all levels. In all, Scandinavia is a good place to start looking for solutions for how to try to green the economy. It has a tradition of transparent societies where most types of information are widely accessible. Much can be learnt by exploring what has been done, what is still being done, and the challenges that remain in this region.

Better Life Index
This index allows you to compare well-being across countries, based on topics the OECD has identified as essential, in the areas of material living conditions and quality of life.

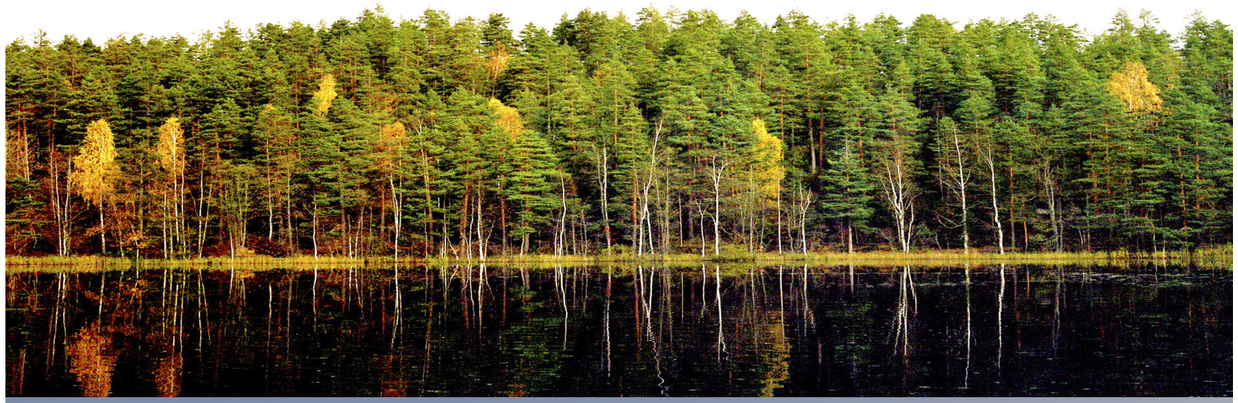
Visit the Better Life Index website

Global Green Economy Index
This index combines in-depth analysis of national green performance with perception of that performance. The index evaluates the green reputations of countries as judged by expert practitioners and benchmarks these perceptions against measures of national green performance.

Visit the Global Green Economy Index website

9 World Wide Fund for Nature (WWF). (2010) The Living Planet Report: Biodiversity, Biocapacity and Development. URL: http://www.footprintnetwork.org/en/index.php/GFN/page/the_ecological_footprint_how_countries_compare







Stockholm, Sweden

1.6 CLEANER AND GREENER PRODUCTION

Let us take a step back and explore the historical development of our attitudes towards interacting with natural ecosystems and with human health, and the technologies used. What is "cleaner production"? Fundamentally, it tells us that the way we have been producing is not as good as it should be. Whether from a product design point of view or from a management point of view, the concept implies we need to find ways to prevent the problems rather than only treating the symptoms of the problems.

Read more from UNIDO

Cleaner Production

Cleaner production has two main surrounding principles. Firstly, the polluter pays principle that implies that a company, individual or other actor who pollutes the environment or causes harm, should pay for the consequences. Cleaner production ties to this principle by adding that we may instead be able to prevent that problem altogether, already at the source. Secondly, cleaner production is closely related to the precautionary principle. In essence, a company that comes up with a new product or technology has to test it at a small scale, before introducing it on the market, in order to avoid unintended consequences.

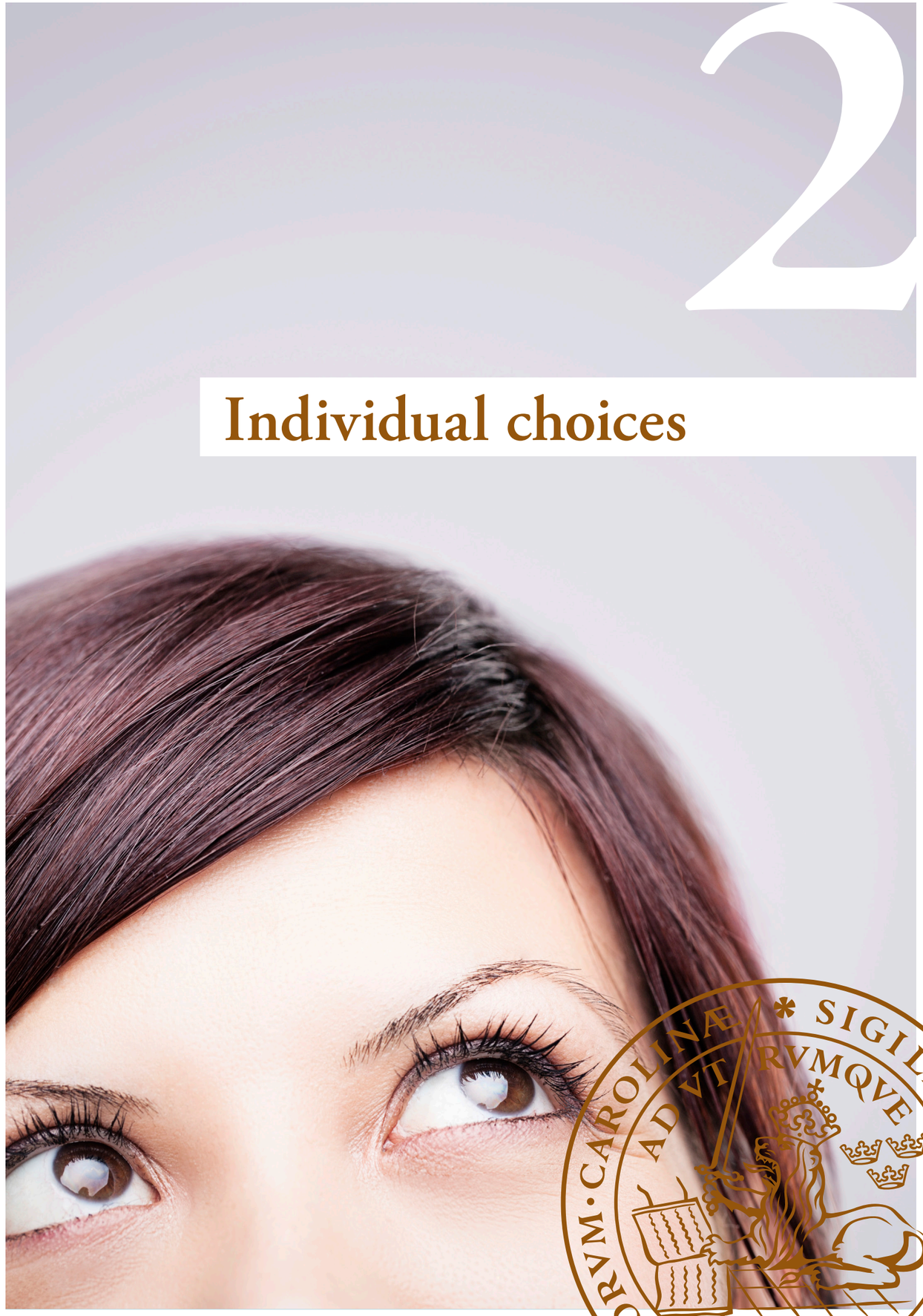
Read more from the Encyclopaedia of the Earth

Precautionary Principle
Polluter Pays Principle

Cleaner production has become influential. Not only did companies in different parts of the world begin to adopt these kinds of changes. Universities all over the world began teaching this practice. Governments developed policies to promote preventative approaches, and a number of scientific journals were founded to publish documents illustrating that these approaches work in real-life companies. They show that there are ways through policy, education and the economic system to help bring about the changes, ensuring that prevention will play an increasingly important role.

Fundamentally, pollution prevention is a change from the attitude that dilution is the solution to pollution. It encourages us to look at the source of the problem and see how we can prevent it from occurring in the first place. These changes, ultimately, require an attitudinal change and they are strongly linked to greening the economy as a whole. We need to find and prevent the problems at the source. Corporate, political and community leaders and others can be facilitators of change. Changes in attitudes, changes in procedures, changes in products, and changes in economies. ■





2

Individual choices



Greening the economy at the consumer level

Consumption by states, businesses and households is currently at unsustainable levels. In fact, it is becoming increasingly clear that our patterns and levels of consumption, in combination with our production processes, are responsible for the deteriorating state of the environment. This section explores our role as consumers in greening the economy – the choices we make, the options we have, and other ways in which we can take part in and drive change.▶

2.1 DRIVERS FOR CONSUMPTION

On the 19th of August 2014, we marked what has come to be called the Earth Overshoot Day. This date marks the day when the human footprint of consuming ecological resources exceeds what our planet is able to generate in one year. It means that for the rest of the year we are living in deficit, exploiting nature's future budget. With time, Earth Overshoot Day is occurring earlier and earlier each year.

Read more from the Global Footprint Network

Earth Overshoot Day

What is your own individual impact? Find out how many planets it takes to support your lifestyle by testing a footprint calculator.

Visit the Global Footprint Network website

Three domains – food, mobility and housing – are responsible for 75-80% of environmental impacts arising from household consumption. More specifically, 30% of impacts stem from housing, in particular from heating systems, 30% from transport, especially car use and flights, and 25% from food and drinks, where red meat and dairy have the largest impact on the environment.[1]

Addressing the environmental consequences of our daily purchasing choices is clearly essential in terms of greening the economy. To enable this change, we need to understand the driving forces of consumption and devise strategies for shifting societies towards more sustainable consumption patterns and levels, and ultimately, towards more sustainable lifestyles.[2]

One of the major drivers of consumption is the fundamental belief of our current economic system that continuous economic growth is possible (and desirable) in a finite world. Economic growth is generated through market competition and increased productivity that leads to decreasing prices on products, which stimulates consumption. Increased productivity also results in higher incomes, leading to a growing purchasing power of individuals, which, stimulated by advertising, also leads to increasing consumption levels.

Current economic and political institutions and policies encourage people to believe that the pursuit of a higher material prosperity and a higher GDP (or Gross Domestic Product) is the expected behaviour – even our duty. Within this economic growth framework, existing consumption policies focus on protecting consumer sovereignty, monitoring health and safety features of products, and providing consumers with information through eco-labelling and campaigns. Sustainable consumption policy instruments targeting individuals are mainly of a voluntary nature, while economic and regulatory policy instruments are relatively rare.

Technological advances also drive consumption. On the one hand, they enable design and provision of more efficient products, production processes and technologies. On the other hand, new technologies and products create additional needs and wants, stimulating consumption directly, or, indirectly, create conditions that require people to consume more.

1 Backhaus, J., Breukers, S., Mont, O., Paukovic, M. & Mourik, R. (2012) Sustainable Lifestyles: Today's Facts and Tomorrow's Trends. URL: http://www.sustainable-lifestyles.eu/

2 Sanne, C. (2005) The Consumption of our Discontent. Business Strategy and the Environment, 14, 315-323.

One example is the car. Not only has it provided mobility and saved people time, the car has also led to people travelling longer distances as it has allowed them to live further away from work, shopping, friends and family. While the focus has been on improving the efficiency of the car itself, for example by reducing its weight or shifting to alternative fuels, the efficiency of the system surrounding its use has been overlooked. Entire national infrastructures have been built to enable and stimulate car use. As a result, cars are embedded into everyday life and people are often locked into using them, especially outside cities. However, a growing movement of social innovation and collaborative consumption is currently devising alternative ways of using cars and capitalising on their idling capacity through car pools and ride sharing.

Identity is another important driver of consumption. We purchase goods and services not only to fulfil our needs through the specific qualities and functions provided, but also for symbolic or identity value. We use material goods in social conversations and in order to position ourselves in the social hierarchy. Much of our consumption is also habitual, as people follow daily routines without constantly making deliberate choices. These routines and everyday practices are often shaped or conditioned by surrounding infrastructure and by expectations of prevailing social institutions, such as norms, values and cultures. It is therefore important that infrastructures and institutions enable and promote sustainable lifestyles and not consumerism.

In our consumer culture, material possessions are often perceived as a measure of success and power, and they are often seen as the main contributing factor to well-being. However, evident to most of us and according to many surveys, it is not only material possessions that matters to people, but also access to education and health services, meaningful jobs and time spent with family and friends.[3] At the macro level, growing GDP does contribute to increased subjective well-being to a certain point, after which the two begin to decouple. It is important to find a broader definition of well-being that includes pro-social values, such as resilient and equitable communities, health, education and personal development, peace and stability, and environmental and social justice.

> **"We need to focus on aligning our wallets and our social ambitions. If the wallet pulls you in one direction and your social ambition in the other, unfortunately, the wallet usually wins."**
>
> **KLAS EKLUND**
>
> *Professor and author. Former Chief Economist of the SEB Bank and economic advisor for the Swedish Government.*

Existing policy instruments targeting consumption patterns of individuals through information and eco-labelling can help consumers make better choices. However, we also need to understand the context within which those choices are made. The actions of individuals and organisations need to be backed up by society-wide strategies for developing institutions and infrastructure that enable sustainable lifestyles.

2.2 CONSUMERS AND ECO-LABELS

Individuals can take a range of different measures when striving for more environmentally conscious lifestyles. Examples include using long-lasting products; choosing biking, public transportation or walking, instead of using the car; and simply reducing consumption levels overall. One important aspect is our consumption of products that we buy in the shop and the services that we use. But it is often difficult for consumers to know which product is the more sustainable alternative. As consumers, we need information, and there is a lot of environmental information the conscious consumer can use as guidance.

3 Backhaus, J., Breukers, S., Mont, O., Paukovic, M. & Mourik, R. (2012) Sustainable Lifestyles: Today's Facts and Tomorrow's Trends. URL: http://www.sustainable-lifestyles.eu/

ENERGY LABELS

There are energy labels for energy-consuming products, such as computers, washing machines, heat pumps and light bulbs. Energy labels explain how energy efficient these appliances are to use. In other words, consumers can save on electricity costs from paying attention to energy labels.

ENVIRONMENTAL LABELS

Producers also make self-declared environmental claims, highlighting certain aspects of a product that have important environmental features, for example that the product is recyclable or produced from recycled material. Consumers then have the right to ask the producers for justification of this claim.

FOOD LABELS

There are labels on food as well that can guarantee environmentally sound farming practices that do not use artificial fertilisers or pesticides. The Marine Stewardship Council is another well-known kind of food label used for fish and seafood products.



This type of product information tells consumers about certain environmental aspects of products. To analyse their overall environmental performance, however, and compare it with other alternatives, we need to consider the entire lifecycle of the products. This entails analysing all phases that the product goes through from "cradle to grave", and what environmental impacts arise in each phase.

The first phase is the extraction and refinement of raw materials, for instance mining and manufacturing, production processes of various components, and assembling of different components to final products. The second phase is the use phase – the period when the product is used by the consumer. The final step is the disposal of the product for recycling or waste. Investigating all phases is important.



IPAT or I = P x A x T is the lettering of a formula to describe the impact of human activity on the environment. Human Impact (I) on the environment equals the combination of P = Population, A = Affluence, and T = Technology. This describes how a growing population, affluence, and technology contribute towards our environmental impact.

Environmental labelling, or eco-labelling, is a concept where products and services are labelled according to the environmental performance of their lifecycles. This includes analysing the environmental impacts that occur in the different lifecycle phases and how they relate to each other. Eco-labelling is positive, meaning it distinguishes the best-performing products in a defined product group. It is also voluntary – producers decide if they want to use the eco-label or not, which they can do if their products are among the best in their product group.

One example of an eco-labelling scheme is laundry detergent for household use. The eco-label requires, for example, that the detergent contains less harmful chemicals released to the wastewater, compared to other alternatives. It also looks at how efficient the detergent is at low temperatures, to minimise the energy needed to heat the water. These aspects involve the use phase of the detergent, although their properties are determined already in the production of the product – resulting in lifecycle thinking.



Eco-labelling is also run by an independent body. This way, defining which requirements the best products must meet is not dependent on producers, authorities, consumer groups or other lobbying actors. These requirements are collected in criteria documents for each product group and should be readily available online from the eco-labelling system.

Since the 1990s, eco-labelling has spread in Scandinavia, which is probably the region in the world where you find the most eco-labelled products in stores. There are a few eco-labels that are well-recognised among consumers. You can visit their websites to investigate what product groups that can be labelled, which products are already labelled, and the criteria documents that show which requirements eco-labelled products and services have to fulfil.

In the Nordic countries (Sweden, Denmark, Norway, Finland and Iceland) there is a common eco-labelling system. The Nordic Eco-label is a voluntary eco-labelling scheme that evaluates the impact of products on the environment throughout the whole life cycle.

Visit the Nordic Eco-label website

To some, the wide range of different labels is overwhelming and may create confusion when trying to make conscious purchasing decisions. Studies have shown, however, that most consumers actually are aware, and make use, of only a few of the labels, for instance, the few well-recognised labels on the Scandinavian market. Consumers often disregard other labelling which they do not recognise, illustrating that the multitude of labels could only be a minor problem.

2.3 MIND THE GAP

How do individual consumers actually behave in the grocery store? How do we make choices? And, how can these choices be influenced to become more sustainable? You might have noticed that sustainability has entered the supermarket aisles. Retailers across the world have started to approach sustainable consumption in one way or another. In many countries, various green product labels have been introduced to make it easier for consumers to choose sustainable options.

Certifying a product and putting a label on it means higher demands on its performance and therefore often a higher overall production cost. Furthermore, producers often have to pay a rather significant price for using the label and to be part of the certification scheme. All in all, producers, distributors and retailers may need an economic incentive to offer and promote these types of products. Labelled products therefore usually come with a price premium and the market may initially be dependent on consumers' willingness to pay this premium for labelled products, until sufficient volumes are sold to balance the extra costs.

Here is one problem. Consumers have proven to be less willing to pay for sustainability than what surveys have suggested.[4] While consumer surveys often indicate a high concern for sustainability among consumers, in reality, it has proven difficult for retailers to convince the majority of consumers to pay extra for sustainable product credentials. This discrepancy between attitude and behaviour is called the attitude-behaviour gap and illustrates that the classic perception that consumers act rationally according to their attitudes is not always true. It has been shown that the attitude-behaviour gap is especially evident in cases of cognitive dissonance – when our behaviour is in conflict with our values.[5]

One example is when we drive our car although knowing it is polluting the environment, or eat red meat several times per week despite knowing the climate and health-related issues. Sometimes, these dissonant situations can be uncomfortable, and our brain often tries to resolve the contradiction by adjusting our values rather than our behaviour. We begin to

4 Auger, P. & Devinney, T. (2007) Do What Consumers Say Matter? The Misalignment of Preferences with Unconstrained Ethical Intentions. Journal of Business Ethics, 76(4), 361-383.

5 Kollmuss, A. & Agyeman, J. (2002) Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? Environmental Education Research, 8(3), 239-260.



justify in various ways why we in fact need to drive the car, and that we at least eat vegetarian once a week. This phenomena is well-known in psychology, although less so among policy makers. Consequently, policy interventions focusing on adjusting consumer behaviour by changing attitudes, for example in the grocery store, is not always successful.

Most consumers have a limit to how much energy or time they want to spend on decisions in the store. In fact, grocery shopping is to a large degree habitual. Ask yourself, how much of your grocery shopping is based on conscious decision-making, and how much is a quick, routinized act, often based on past behaviour? This poses yet another challenge to businesses and organisations working with sustainability. Many have realized that changing consumer behaviour merely by providing information and trying to convince the individual consumer is difficult. They have therefore begun to adapt their approach.

WWF provides guides for consumers on sustainable seafood that tell you which seafood to enjoy and which seafood to avoid.

Visit the WWF website

One interesting example is by the World Wildlife Fund for Nature (WWF), who have tried to influence our consumption of fish for a long time. By introducing a "street light system" for fish species, they try to convince the consumer to mainly purchase species with a "green light" (including labelled fish or otherwise sustainably harvested stocks). Species ranked as a "yellow light" indicate that they should be consumed with caution, whereas species with the "red light" should be avoided.

The WWF realizes how difficult it is to influence enough consumers to adopt this guideline. Therefore, they also work with retailers to try to change consumer behaviour. In Sweden, the WWF has managed to convince all major retailers to only sell green and yellow listed fish, making it difficult for consumers to access red listed fish. Most consumers will not bother to go through this trouble and will instead pick the more sustainable choice.

This practice is called "choice editing" – removing certain "unwanted" products from the range of choice or changing it to contain only "wanted" alternatives. Choice editing is practiced in many fields of consumption. In Sweden, for example, chlorine as a cleaning agent was "choice edited" away from supermarkets in the 1990s. Toilet paper is another example. These days, it is hard to find toilet paper that is not sustainably certified in Swedish supermarkets. However, consumers do not accept choice editing in all consumption aspects. Usually, consumers put a value on their freedom to choose, and it may be risky for supermarkets to try to restrict it.

A nudge means a friendly, little push in a green direction. GreeNudge is an organisation in Norway with the goal to initiate, fund and promote research into behavioural change as a climate measure.

Visit the GreeNudge website

Another approach is therefore to more subtlety encourage certain choices and discourage others. This is called "nudging", which is a term used to describe attempts to change non-deliberate human actions. It is a way of changing the conditions of a situation in order to make people's rational actions correlate to the desired behaviour. A well-known example of nudging, exercised for many years, is the design of stores. The placement of products in a store has proven to make a huge difference on consumer choice. The "best" places are at eye-height and along the consumers' path through the store.

The amount of shelf space given to a product category is also of great importance. Greater shelf space for more sustainable products increases the chance that consumers choose them. There is no interference with people's attitudes, no price differences, no change in the types of products sold – simply a rearrangement of conditions to subconsciously steer consumers' choices. If the aim for example is to sell more organic produce, for example, these goods could be placed in the best and most strategic places of the store.

Of course, consumers are also influenced through in-store advertising. By promoting sustainability in the store, a retailer increases the likelihood that customers think of sustainability when they choose products. This is called "priming" – certain values and preferences are subtly reinforced in the store to improve the likelihood of a desired action, or purchase in this case. If retailers focus on price in in-store marketing, customers are more likely to focus on prices, as they are stimulated by the information surrounding them. If retailers focus on social and environmental messages, consumers may focus more on sustainability when shopping for their groceries.

As we can see, sustainable consumption depends on many factors, many of which are beyond the individual consumers' conscience. Whether markets will become more sustainable in the future still partly depends on consumer preferences, of course. It also depends on broader factors, such as market regulation and societal pressures on businesses to guide consumers in the right direction. Purchasing sustainable products in the store is a start, but engaging in the societal debate and putting pressure on governments and businesses is just as important for those of us who want to make a difference.

2.4 LIVING GREEN IN PRACTICE

While adjusting our consumption may accomplish a great deal in terms of greening the economy, it is evident that people need to be part of the solution also in other ways. To bring about sufficient and long-lasting change, we need deeper changes in our lifestyles. Individuals can take leadership of this change when they have room to be innovative.

Sustainable solutions, such as wind turbines, may meet resistance if they are introduced into people's lives suddenly and without notice. People are often unlikely to accept so called "templates" of sustainable lifestyles, but need to discover sustainable solutions for themselves. Generic templates are furthermore probably not applicable in all different environments and life circumstances in which people live. Experts can devise new technologies and solutions, but they still need to be tailored to local contexts and diverse needs.

We need to harness people's own inventiveness. People have an innate need to feel competent and "in charge". Serious environmental problems like climate change threaten this feeling of control. If people feel capable of making a difference and a valuable contribution with the skills that have, they are more likely to want to be part of the solution, rather than part of the problem.



Citizens can be innovators of new solutions. Inventions can be spread commercially via companies. Others can be spread via local, or online, communities. Some are now so established that they have become part of local folklore. For example, in Sweden, people often shovel snow over the foundation of their house, which serves as insulation against the cold. Composting of food waste is another widespread example from the Scandinavian countries. Although today organized by local governments, it is mirrored from good examples set by activist citizen groups in the 1970s and 1980s.

Citizens can also join forces to learn about and acquire more sustainable solutions. For example, group purchasing of solar panels is rapidly spreading in the Scandinavian countries. It actually started in Finland, where solar panels have little support and enjoy no government subsidies. The first group was set up by a pioneering citizen who found other individuals interested online. As a group, it was easier to get a more comprehensive understanding about which solar panels were available and at what cost. A group can also organize information events, they can collect tenders from companies, and they can help each other through the process of purchasing and installing the solar panels. Since this first pioneering example, many citizen groups like this have popped up.

Citizens can also teach each other. Examples from peers are often more relevant to ordinary people than expert advice, which can be confusing and even contradictory at times. So called open homes is a concept tapping into this notion. Originating in the UK, it encourages those who for example installed a new heating system or made other green improvements in their homes to open their doors to their neighbours. Visitors can ask about practicalities, such as how much the improvement cost, if the technology was difficult to obtain and install, if there has been any disruption, or how the owners fitted the new heating system into their life. User experiences can be useful information for people with different lifestyles, those spending a lot of time at home for example, versus lifestyles where people are away for long periods of time.



Want to know more about the myths of consumption? For the Nordic countries (Sweden, Denmark, Finland, Norway and Iceland) research funded by Norden has investigated sustainable consumption.

Read more from Norden

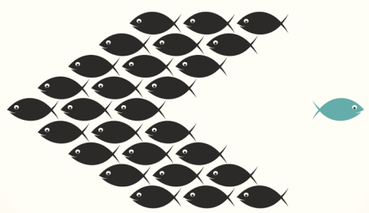
Nordic Policy Brief: Improving Nordic Policy-making by Dispelling Myths on Sustainable Consumption

Positive examples of green lifestyles can also be shared online. One example is the organisation called Green Apes. It is a social media platform where you can share the small green actions you make every day and gain rewards for them in a game-like environment. Green Apes is an interesting way to share information in an online community.

Visit the Green Apes website

Individuals can serve as examples and become leaders, but they need to find ways to multiply their good examples and get others to join in. This is where the public sector and community groups can help, by making good examples visible and replicable. Over time, leading individuals can team up with others in order to build political power and make the overall context more supportive for similar initiatives. One example of this is the global Transitions Network. Here, people can gain resources, peer support and good ideas for how to partner with local authorities in order to make their own town or village more sustainable.

Visit the Transitions Network website



All of these examples show that ordinary citizens can be part of the solution. Not only the already environmentally conscious, highly educated or the young – many people have competences that can be useful for more sustainable lifestyles. For example, urban gardening associations recruiting urban gardening "veterans" to host "novices" who would like to learn about gardening. The novices help out with the heavier jobs and at the same time, learn how to grow their own vegetables. Who better to learn from than people with practical experience in your own neighbourhood?

2.5 MYTHS ABOUT CONSUMPTION

Here we address four common myths about consumption, consumers and the impact of consumption on the environment. The four myths addressed here demonstrate that it is important to understand the complexity of consumption, as well as the need for systemic solutions where all actors contribute in order to enable sustainable lifestyles.

MYTH #1: GREEN CONSUMPTION IS THE SOLUTION TO ENVIRONMENTAL PROBLEMS

"Green consumption" is an important strategy that aims to improve the efficiency of production processes and to design, sell, and purchase environmentally and socially sound products. Increasing efficiency is essential and must continue; but it is not sufficient. Also "green" products have environmental impacts, and increasing consumption levels tend to outpace most efficiency improvements achieved in the production phase. Green consumption helps us slow down environmental problems associated with our consumer society, but it cannot alone prevent or avoid them.

The myth promotes the misleadingly optimistic view that technological solutions will be sufficient to achieve sustainability. It detracts attention from the need to tackle challenging issues, such as the prevailing culture of consumerism and materialism that is closely linked to excessive resource use and harmful environmental impacts. While green consumption is one strategy for reducing environmental impacts, it also has to be sustainable. Efficiency strategies need to be complemented by sufficiency strategies, such as sharing products instead of owning them, shifting consumption of products to environmentally sound services, and promoting the culture of up-cycling and product repair.





MYTH #2: IF EVERYONE DOES A LITTLE, WE WILL ACHIEVE A LOT

This common "if everyone" slogan highlights that everyone's contribution is significant, and that others are taking equal responsibility for their behaviour and making changes. Small changes are an important starting point, as people need to feel that they are doing something good and that they are part of the change. However, it is a misconception that small individual changes will lead to significant aggregate results. In reality, the sum of small individual changes usually only results in small improvements overall. As a result, people often have difficulty seeing how small actions in the household may help solve global environmental problems.

This may lead to scepticism. They may also feel that their "green" actions, like recycling paper, justify inaction in other areas, like driving a car instead of using public transport. Small changes by many do make a difference, but it is essential to communicate that larger changes are also necessary. Policy makers and civil society should emphasise the relative importance of personal changes, while aiming for larger reforms. Positive encouragement and providing a realistic picture of the scale of change required in society are vital.

MYTH #3: PRIVATE OWNERSHIP IS MORE DESIRABLE THAN SHARING

Our society is built on the institution of ownership – we own more and more products. However, many people are concerned about the space these products take up in their homes, the time it takes to maintain or replace them and the necessity to own all these goods. Although product ownership is increasing, collaborative consumption of all kinds of products is making a revival. For example, through swapping events and online trading of second-hand goods, community libraries for equipment, and city rental schemes for cars and bicycles.

The Scandinavian countries have several traditional systems for sharing products, such as public libraries and common laundry facilities, which are being enhanced by new innovative forms of collaborative consumption. Several innovative companies are demonstrating the large-scale potential to increase sharing and redistribution of existing resources and products. Reusing products and materials not only cuts material costs, it also helps avoid environmental impacts associated with production of new products.

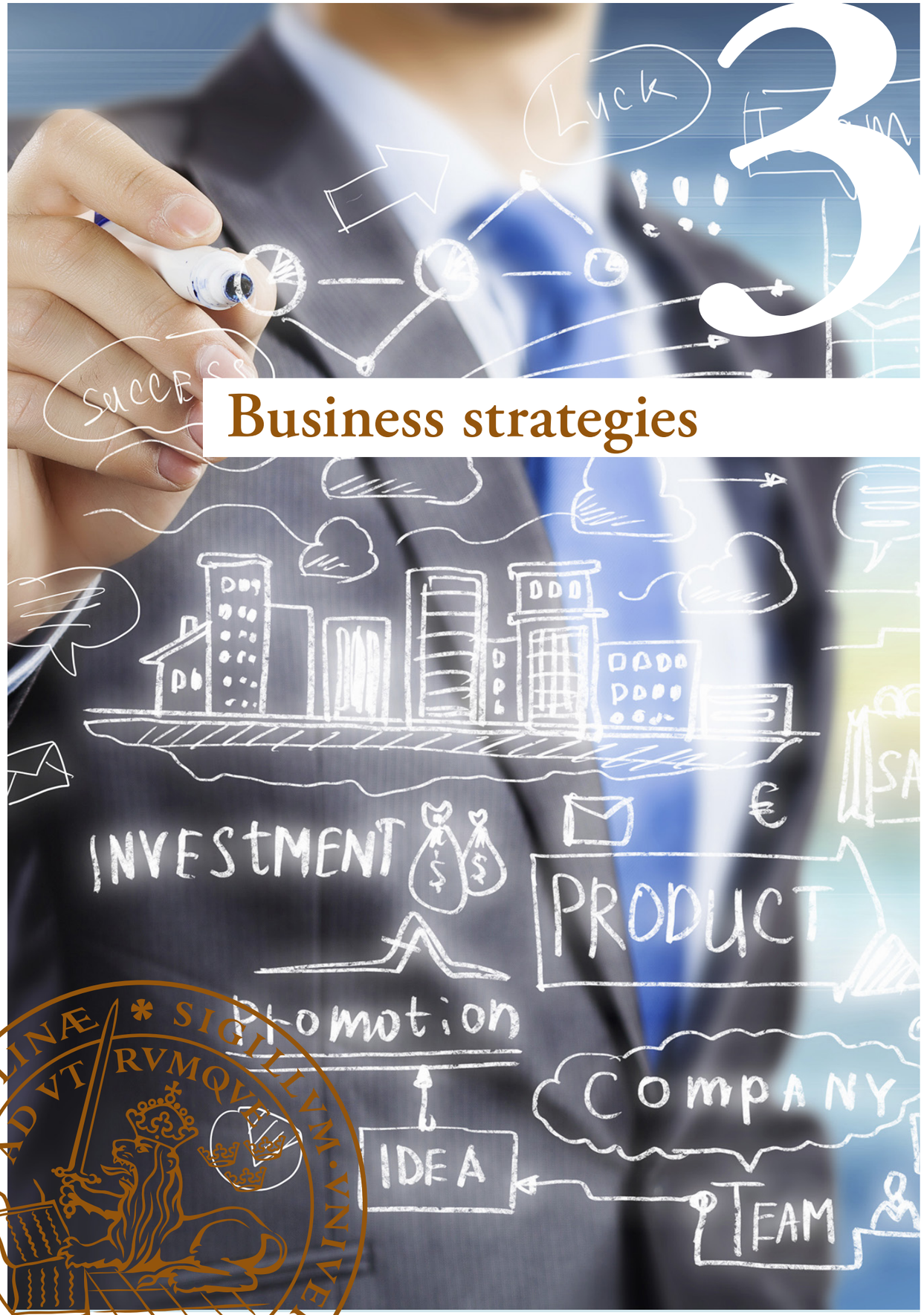




MYTH #4: CONSUMERS SHOULD LEAD THE SHIFT TO A SUSTAINABLE SOCIETY

Yes, consumers have some responsibility for the consequences of their consumption and lifestyles, not least judging from the fact that they cause 40% of the overall environmental impacts in society. However, it is often governments who drive mass shifts in culture, consumption and production patterns. There is a false perception that consumers drive markets, and that businesses are simply responding to demands. Both businesses and policy makers are choice architects, offering and limiting options for consumer actions. Dominant societal values, practices and social norms are shaped by different policies through regulation, infrastructure, pricing mechanisms and the education system.

Many stakeholders, including businesses and consumers, call upon governments and policy makers to show leadership in sustainable consumption issues. Sustainability needs to be addressed as a fundamental necessity of our life, not offered as a retail option. As we saw earlier, many consumer behaviours are "locked-in" by infrastructural constraints, pricing, and social conventions. Governments therefore need to enable and promote sustainable lifestyles by setting policy frameworks within which businesses can innovate for sustainability and individuals can exercise their consumer and citizen rights for healthier, happier and more sustainable lives. ■



Greening the economy at the business level

After exploring how we as individuals can contribute to greening the economy through consumption and innovative spirit, this section ventures into the corporate world and the role of companies in the transition to a green economy. It starts with business fundamentals and then moves into green business strategies and processes. It is imperative to examine upstream, in-house and downstream activities of companies to green economies both locally and globally. ▸

3.1 BUSINESS FUNDAMENTALS

Companies play a critical role in greening the economy. In order to achieve the transition, corporate practices and decisions must be aligned with broader social and environmental needs and priorities. We depend on companies as they, in the end, have the direct power to make decisions regarding what, how and where to produce and distribute their goods. These decisions are important for the individual company, but also for society at large as they impact key parameters of a green economy, including carbon emissions, resource efficiency and human well-being. Companies also play a key role in enabling other actors to contribute to a green economy. For example, we often rely on companies to provide information that allows consumers to make more sustainable choices.

Because the decisions and practices of companies have such a large impact, one can argue that businesses have a moral obligation to contribute to greening the economy. We all need to contribute to the change, including businesses, in order to avoid detrimental environmental and system degradation. However, moral beliefs are far from the only driver for corporate action. While we need companies to change their practices in order for our society to thrive, increasingly, companies will also need to adapt to ensure competitiveness and growth.

Read more from UNEP

The Business Case for the Green Economy: Sustainable Return on Investment

Drivers for corporate initiatives to support a transition to a green economy can be divided into two broad categories – drivers related to changes or limits in our natural systems, and drivers related to requirements and expectations from influential stakeholder groups. In the first category, examples of drivers include reduced availability (and thus increased cost) of critical raw materials, forcing companies to pay attention to resource efficiency and to look at recovery of raw materials from the waste stream.

In the second category, we find stakeholder requirements and expectations related to company performance on issues related to sustainability. In Scandinavia and across the globe, we see evidence that stakeholder groups and others increasingly pay attention to corporate sustainability performance. It is anticipated that this trend will grow even stronger as there is an element of reinforcement between the first and the second category. When pressure on ecosystems and natural resources increases, we can expect key stakeholders such as policy-makers and consumers to strengthen their expectations and requirements on companies.

A stakeholder can be defined as an individual or a group of individuals with interests that may either affect, or be affected by, an organisation. For a company, key stakeholder groups include for example customers, employees, capital providers, suppliers, the community in which the company is operating and the decision makers of public policy.

We can think about drivers for corporate sustainability along a continuum – from requirements to opportunities. Ultimately, however, corporate ability to recognize and appropriately respond to these types of drivers will determine the ability of these firms to thrive and survive in the long run. All companies need to take a strategic perspective on climate change, sustainable development and greening the economy. This requires attention to business strategies and upstream, in-house and downstream activities of a company.

3.2 GREEN BUSINESS STRATEGIES

A company can navigate with regards to the environmental issues that it is faced with, in order to pursue competitiveness. Essentially, companies can view environmental issues either as a risk or an opportunity. Traditionally, businesses often perceived environmental management as a cost and a risk. Companies were reactive and the strategy to address environmental issues was to install end-of-pipe technology, for example capturing pollutants leaving the factory. This strategy meant additional cost and additional resource use.

With the introduction of the preventive paradigm, it became clear that preserving the environment could be a corporate opportunity and involve financial savings. Under this mind set, pollutants are viewed as an inefficiency in the process, and the core question is why they arise. Solutions are sought by making the process more resource efficient. Eco-efficiency, while simple in practice, has come to dramatically change the reality of environmental management. It has turned the environment from a cost into an opportunity to save money. It has engaged most of the workforce rather than only a few individuals, and it has integrated the environment with the operations and development of production processes.

This integration has introduced optimisation opportunities also for other business functions, such as design, marketing and sourcing. This has extended the reach of environmental management throughout the lifecycle of the product. Ecodesign of products, green marketing and managing environmental impacts in the supply chain have become common features of environmental business strategy. This indicates another paradigm shift in environmental management: the move to lifecycle thinking. In 2010, a project called The Secret Life of Things (SLOT) was started by Leyla Acaroglu, which aims to inspire and engage people with the hidden environmental impacts of everyday things, using fun short animated films.





Check out a film (by SLOT and Leyla Acaroglu) on lifecycle thinking

The extension of the boundaries for corporate environmental management is in line with the shift in understanding of production and consumption as a system involving many different organisations and parts – often in different geographical and legal contexts. For business strategies this means, among other things, a variety of stakeholders to relate to, especially customers, owners, suppliers and employees. Meanwhile, the complexities of environmental issues make the situation more complicated.

One core question is – can companies generate business value from environmental management? Or, does it pay to be green? The answer is of course – it depends. Or rather – yes, if you are clever, and lucky. A better question is – when does it pay to be green? Or, as companies increasingly have to ask themselves – can we afford not to be green?

To answer these questions, we must understand that the environmental impacts of organisations are only one of many things that businesses have to manage, and – if managed well – may generate business value. As with health, safety and quality, environmental issues have special characteristics – one being that many environmental issues are not necessarily valued as competitive elements in the market. Environmental management includes many small efforts and some larger.

Are customers willing to pay extra for green products? Some, for sure, but far from everyone. Thus, customer action is only part of the driver for environmental management. Even in a relatively environmentally aware region as Scandinavia, it is clear that customers are not able to integrate environmental issues in decision-making to the extent that is needed to address key environmental problems. Consequently, a business striving to green its operations may pursue three key strategic options: 1) Making the production lean and green and thereby creating a cost advantage; 2) Going beyond present legal requirements to add value for employees, investors and other stakeholders; and 3) Branding the products with environmental arguments for increased customer value.

In addition, rearranging the business model altogether can give an opportunity to combine environmental improvements with increased business value. One example is to lease a product rather than selling it. These types of

business models are likely to become more common in the future. With the large environmentally driven transformations facing our society today, there will be many opportunities to use green credentials to gain competitive advantages.

3.3 GREENING UPSTREAM

Looking back only a few decades, the boundary for corporate responsibility was typically drawn around the physical facilities that a company owned, and the environmental and social impacts directly related to the activities within those facilities. Indeed, in the early 1990s, when the sports company NIKE was first confronted about working conditions in their supply chain, their initial response was "we don't own the factories". NIKE soon realised that stakeholders, such as consumers and NGOs, had new ways of conceptualizing the scope of corporate responsibility. That scope is today, for many, closely aligned with the lifecycle of products. If it is "bad" to own a factory which pollutes or abuse human rights, then it is also "bad" to use or make a profit from the goods produced in that factory.

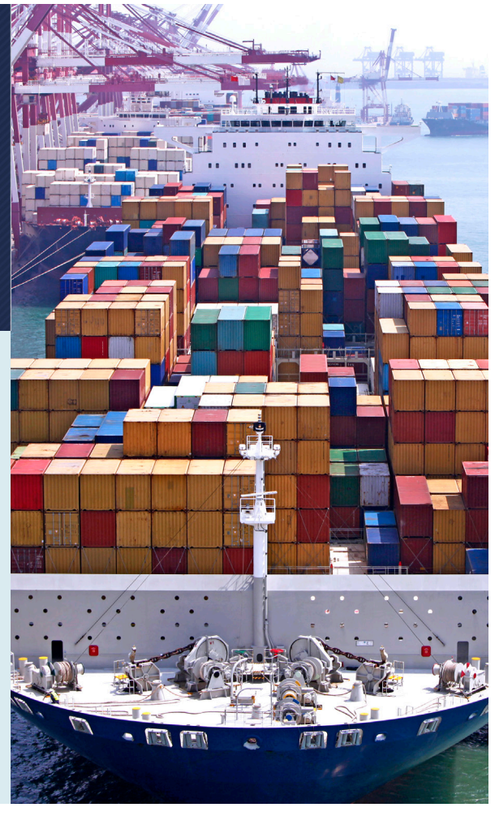
Historically, supply chain management was typically focused on reducing costs and risks, improving quality and service levels, and increasing the speed and agility by which the buying company could respond to changes in customer demand. Today, an increasing number of companies have extended this focus to also include addressing sustainability issues within the supply chain.

The term supply chain is often seen as starting with the organizations that extract or produce raw materials, and ending when the product reaches the consumer. In the supply chain, materials, components and products flow downstream as they change hands from suppliers to buyers. A financial flow travels upstream as the buyer pay the supplier for delivered goods. To ensure that all this works, information needs to flow in both directions.

There are two key points to remember when thinking about the management of environmental and social impacts in the supply chain. Firstly, issues do not always arise in the first tier. Indeed, when the sports company PUMA analysed the environmental profit and losses arising throughout their supply chain, they found that 85% of the cost arose from impacts beyond the first tier. Secondly, as you may have guessed, real supply chains rarely resemble a neat chain, but rather a complex and intertwined web. The supply chain of a medium or large sized company often involves high numbers of organisations, sometimes up to tens of thousands in the first tier alone. These are often dispersed across the globe. Furthermore, each one of these organizations has its own unique characteristics and capabilities.



A company's supply chain is commonly divided into different tiers. The first tier represents those companies that provide our business with parts, materials and services directly into our manufacturing, for example fabric and buttons to our clothes manufacturing. Second tier suppliers are those companies who provide parts, materials and services to our first tier suppliers, for example the thread and plastic. Third tier suppliers provide our second tier, for example with dying colour, and so on. Looking this far back into our supply matrix, we realise that a very large number of companies are involved in the making of our products. Also, the further back we look, the more complex it becomes to try to implement, and follow up on, our own environmental principles, demands and criteria.





How do companies work with sustainability upstream? Say a company, let us call it Tiny Inc., sells baby clothing with an ambition to run a sustainable business. The first challenge they are likely to face is understanding which environmental and social issues are relevant for the company. Since these are likely multiple and complex, Tiny Inc. needs to prioritise. The next challenge can be to translate the company understanding of what is "bad", to definitions of what is "good". If Tiny Inc. does not want their products to be produced in factories with poor working conditions, then what is the definition of good working conditions? By what criteria should Tiny Inc. assess their suppliers and the products that they buy? Luckily, today, there is a range of organisations which Tiny Inc. can consult, who have developed standardized criteria and guidelines for good practice related to sustainability issues.

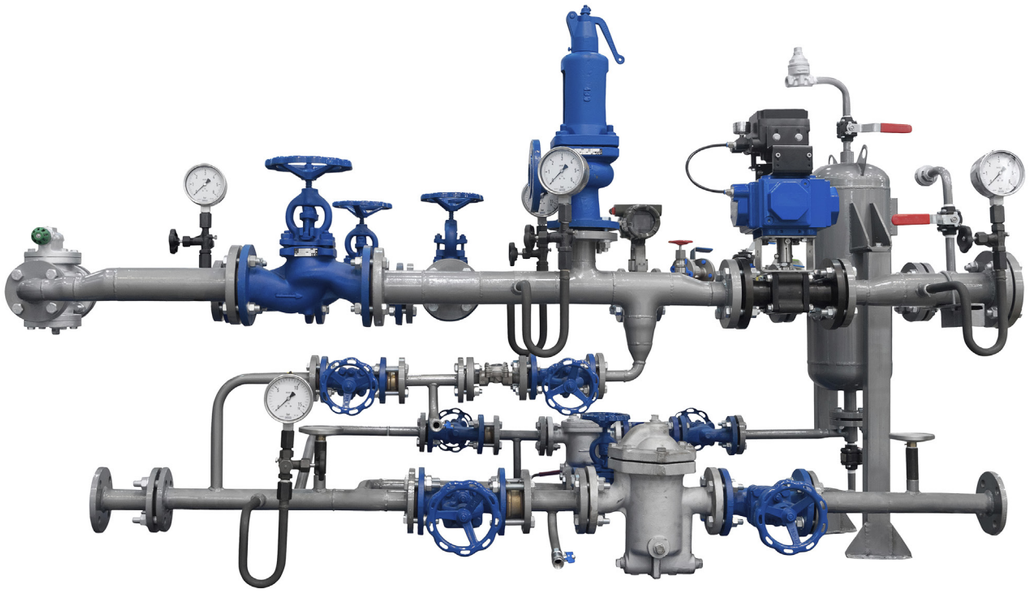
Once the company knows what it wants to achieve in terms of improved sustainability performance in the supply chain, they need to consider how to achieve these objectives. What can they do to influence the practices and decisions of relevant actors in the supply chain? How can they verify that their practices actually meet defined sustainability requirements? The issue of control or verification can require both expert knowledge and significant resources, as sustainability related performance almost always needs to be verified on-site. The company cannot, for example, look at the delivered garment and determine whether the workers who made it were treated fair or not. Nor can they determine how the cotton was farmed or how the waste water from the dye house was treated. Tiny Inc. and other companies are faced with many challenges, but also many opportunities for improvement.

When we learn about what companies do to address their sustainability performance upstream, it is clear that there is no universal solution suitable for all issues, all companies and in all contexts. There is a wide range of approaches available, some of which are aligned with traditional supply management practices. Let us use the Swedish fashion retailer H&M as an example to illustrate a few different approaches.

H&M are today working to address several issues, partly as a result of evolving stakeholder expectations. We will focus on two of them here. H&M's main approach to improve working conditions in garment production involves direct interaction with suppliers in the first tier. H&M have a Code of Conduct for suppliers, detailing what they expect from these suppliers in terms of legal compliance, occupational health and safety, workers' rights, and the environment. H&M employ specialists who monitor compliance with these requirements, and work together with suppliers to help them improve their levels of compliance. H&M have also used more indirect approaches to deal with challenges in the supply chain. For example, engaging with political decision-makers in countries where they have factories to try to raise the legally stipulated minimum wage in the country.

As many other retailers, H&M also works to address negative environmental impacts associated with the farming of cotton. One of the strategies used is to contribute to expanding the market for organic cotton. As a result, H&M have become one of the world's largest users of certified organic cotton. However, they are not directly interacting with the cotton farmers. In this case, H&M rely on an independent party to define the sustainability criteria, and to verify that relevant actors along the chain comply with these criteria.

Our expectations on companies have clearly changed and expanded. Today, companies need to pay attention to sustainability aspects upstream to a much larger extent than before. Over the last two decades, an increasing number of companies have started to develop and implement a range of approaches. However, there is still a lot to learn about how companies can do this both effectively and efficiently.



3.4 GREEN PROCESSES

Although working upstream with your service providers and suppliers is of great importance, there can be no greening of an economy without making serious efforts in-house to increase the efficiency in the use of resources and to reduce waste and inefficiencies. And it is not enough to try to make environmentally conscious choices about which resources to use – these resources have to be used wisely. Industry has the leading role, both by providing solutions for other sectors of society and by increasing the efficiency of their own operations.

Industries can work together to provide solutions and find opportunities in their waste and operations through industrial symbiosis. One of the most famous examples of this is in Kalundborg in Denmark.

Check out a film on Kalundborg in Denmark

While resource efficiency is a core strategy for the greening of industry, it can also reduce costs and thereby increases competitiveness. This type of "win-win" solutions has become a key element for encouraging environmental efforts in industrial organizations. The basic process involves establishing a resource efficiency programme in the organization, for example energy efficiency, water or raw materials of some sort. Actual measures to implement will range from simple ones, such as turning off equipment not in use, to more complicated and demanding developments of technology and procedures. This range of possible measures implies that some things can be implemented with little background and experience, while others need specialized qualification – there is not one solution for all.

Resource efficiency gains are mainly generated by focusing on the production process. This is in contrast to the traditional practice of end-of-pipe solutions where no productivity gains were made and environmental measures were generally costly. A good understanding of the production process is a prerequisite for efficiency gains – understanding where and why resources are lost. Perhaps surprisingly, many companies lack a good understanding and overview of their own processes.

Once the company has clearly outlined the details of their operations, a management system is necessary to advance further. This may include monitoring the resource efficiency in the process and initiating Plan-Do-Check-Act thinking, which implies setting specific targets, assigning responsibilities and following up on the respective measures. Adopting an environmental management system may be suitable. The International Organisation for Standards (ISO) has established standards for environmental management. ISO 14001 is a common framework applied in Scandinavia, which is now one of the leading regions for ISO 14001.

Want to learn more about environmental management systems and ISO 14001?

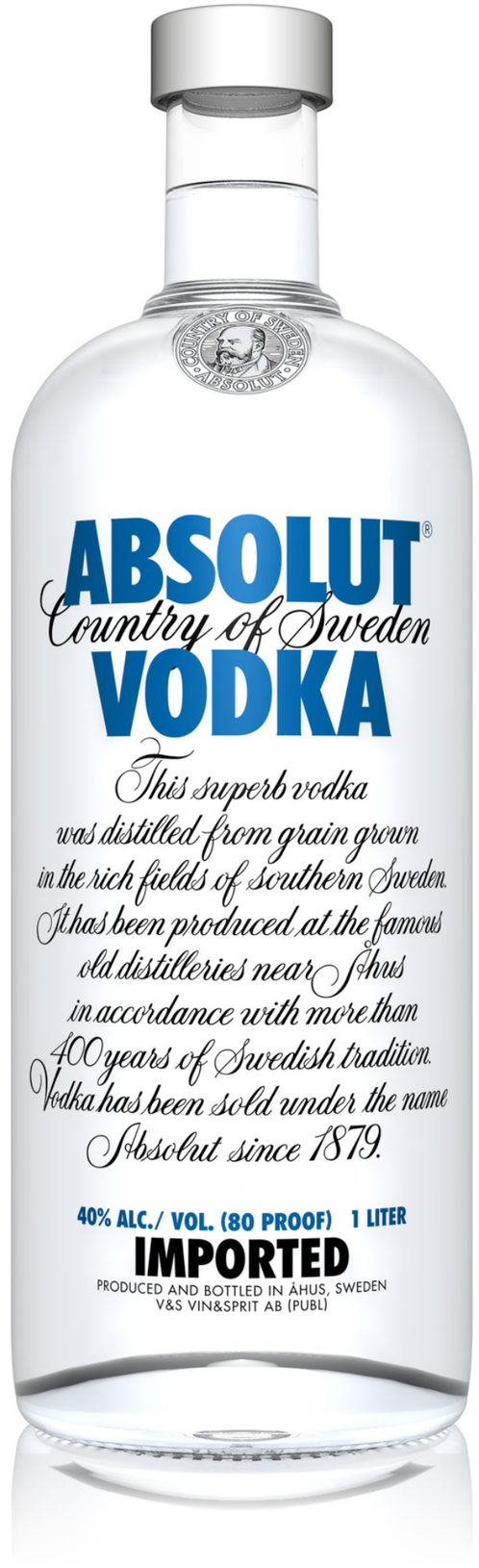
Visit the ISO website

The production site of Absolut Vodka is located in Sweden. All vodka for Absolut is produced here. Producing alcohol is a highly energy intense process, for example running the large amount of distillation required. The production of alcohol in the Absolut plant is based on wheat from the surrounding areas. After some preparation, the wheat is fermented and distilled to produce the final product. Energy costs are significant in the production and the company has therefore been working to reduce their energy consumption substantially over the last two decades.

Back in 1996, more than 5 kWh was used to produce one litre of alcohol. Through a series of changes in the production process, Absolut is now down to 1.3 kWh per litre. When reviewing this improvement process in more detail, there have been some major cuts in the consumption curve, followed by a slower reduction rate over several years. The more substantial reductions stem from major overhauls of the production process, including replacing entire distillation units. Introducing mechanical vapour recompression is another major improvement, where secondary vapour from distillation is compressed and reused to fuel the process again.

The improvements are not only new technology, however – the optimisation has been driven by a continuous attention to efficiency in the daily operations with detailed monitoring and follow-up of the process. All in all, Absolut has achieved a more than 75% cut in the use of energy to produce one bottle of vodka. The case of Absolut Vodka offers several interesting lessons. Firstly, a continuous and long-term effort involving the entire staff is essential to reach significant improvements. Secondly, considerable improvements can be made by combining a few larger technical advances with many smaller optimisation steps, including monitoring and controlling.

The extensive energy savings achieved at Absolut Vodka may not be possible elsewhere. Nonetheless, reductions of energy use will always be possible and will often be a key contributor to making resource efficiency attractive from an economic perspective. Finally, optimising resource efficiency is not necessarily a quick-fix – there are several challenges involved. Nevertheless, it constitutes the backbone of a corporate greening strategy.





3.5 VIRTUAL MOBILITY AND E-MATERIALISATION

While reviewing the physical streams in and out of the organisation are important, going digital offers companies (and the rest of society) interesting opportunities to save energy and resources – and to cut costs. Moving bits in the digital world requires a fraction of the energy it takes to move atoms in the physical world. Producing a digital copy requires significantly less resources than it takes to produce a physical product. Think for example of streaming music instead of buying records or CDs, reading e-books instead of paperbacks, reading your news in your phone or on a tablet, or getting your invoices and receipts electronically.

This de-materialisation, or e-materialization, is a way of doing more with less. A physical product is replaced by an electronic or digital service, providing the same or a similar function.

Digital solutions also enable people to do and to get access to things without having to physically go to a certain place. It enables instant communication with people around the world. It enables "telework" – working from home or from any other place outside the regular office. It also gives students access to a multitude of educational resources that they never had access to before, and the ability to attend schools and universities around the world. These digital replacements of physical movement are referred to as virtual mobility.

Virtual mobility can influence our travel patterns on a large scale. An employee who regularly does "telework" two days per week can cut their weekly commute by 40%. Companies and organisations investing in quality virtual meetings systems commonly save about 20-30% of their business travel. Some companies report much higher savings. In fact, driving one hour by car emits as much carbon dioxide as talking on the phone for one full year!

Efforts to make our transport systems more sustainable, including public transport, cycling, and using alternative fuels, have so far not been sufficient to turn the trend. Virtual mobility can offer companies and organisations a greener option to cut transport emissions and costs. This is a true win-win solution. But as with most interesting ideas, there are certain challenges.

For example, all digital services need physical products and an ICT (or Information and Communications Technology) infrastructure in order to work. This includes servers, computers, telephones and fibre optic cables. These products need to be manufactured, they require electricity, and they turn into electronic waste when replaced. The lifecycle of IT products is relatively short and resource demanding. It is estimated that the ICT sector generates about 2-3% of all carbon dioxide emissions globally, about the same as the aviation industry.[1] While their life-spans are getting shorter, the amount of IT products is also rapidly growing.

Another challenge is that if we want virtualisation to reduce our energy and material consumption, it has to substitute or replace something else, like e-books and online newspapers replacing physical books and newspapers. This reduces the need to produce and distribute printed paper products – the vision of the paperless society. However, these environmentally promising gains have often failed to meet expectations. Although we are increasingly reading information online, we have continued to buy books and newspapers. The digital alternative is then a complement, not a substitute, to the physical one.

Many people still prefer to print electronic documents in order to read the texts on paper. In this case, we are experiencing a generating effect, resulting in even higher consumption of paper. The effects of substitution, complementarity and generation all takes place in parallel, but we are now noticing that since a few years back, the substitution effect is becoming relatively stronger. For example, fewer newspapers and paper books are being sold and people no longer send postal letters and cards to the same degree, as they are replaced by digital solutions.

1 Gartner Group. (2007) Estimates ICT Industry Accounts for 2% of Global Carbon Dioxide Emissions. URL: http://www.gartner.com/



Another challenge is the rebound effect. By making things more efficient, we are saving energy and time. The problem is that these saved resources are often used for other consumption, resulting in reduced net savings. Sometimes the entire saving is consumed by the alternative behaviour. For example, when business meetings are held online, costly and time consuming business travel is avoided, saving the company both time and money. However, the time saved will likely be used for more work, and the money likely used to consume other products and services, including travel.

Does this mean that the digital revolution is a lost eco-efficiency opportunity? Not necessarily, as long as we recognise its potential and utilize it accordingly. In fact, e-materialization and virtual mobility offers many options. If we as a society are to change old habits and promote climate-friendly solutions and greening the economy, we need to support this development at all levels – national and local government, businesses and individuals.

In Sweden, for example, the government has adopted a green ICT strategy urging state agencies to buy resource and energy efficient products. This strategy also promotes virtual meetings while introducing disincentives for business travel. Furthermore, TeliaSonera, a large Swedish and Finnish ICT company, has worked strategically to reduce business travel for ten years by replacing it with virtual meetings. The company started by scrapping its travel policy and introducing a meeting policy instead. Since then, the company has cut travel costs by 65% and reduced flights by 73% per employee.[2] While there still are challenges to be overcome, virtual mobility and e-materialisation can help companies and organisations become more eco-efficient, enabling society to take a great digital leap forward towards a greener economy.

2 Voytenko, Y., Arnfalk, P., Lindeblad, P., Klintman, M. & Mont, O. (2013) Virtual Meetings: Implications and Reporting. Lund: Lund University.

3.6 ECO-DESIGN

Another corporate strategy for greening business operations is to reconsider the product or service altogether. Looking back at the history of environmental law and policy, many new laws emerged during the 1960s. From then, an increasing number of regulations have emerged that address production processes in factories. They include air and water emission standards, banning of chemicals, and permits for businesses which put limits on their emissions and promote the uptake of new technologies. These policies have now had an effect. Air emissions from industrial countries have significantly reduced in the last 50 years, despite increased production levels. In fact, emissions of some pollutants are only a fraction of what they used to be.

Today, we see an increasing focus on the environmental impacts of products and their emissions over the entire lifecycle. All stages in the lifecycle of a product have environmental impacts, often including social impacts. For example, emissions from mining operations in the extraction and refinement stage, poor working conditions in the production stage, emissions from energy generation when using the products in the use stage, and contamination from hazardous substances and methane leakage from waste landfills in the waste stage. Another concern with products is that we use more and more of them in our households, products which often get larger and larger in size. Consequently, our energy use is increasing.

In response, governments have recently started to initiate more comprehensive policy packages to regulate environmental impacts across product lifecycles. This includes restrictions on chemicals used in products, for example to enable better recycling, establishing standards for energy efficiency to reduce household energy consumption, and requirements on producers to set up systems for collection and recycling of products, so called Extended Producer Responsibility (EPR). The concept of EPR originated from the International Institute for Industrial Environmental Economics (IIIEE) at Lund University in Sweden.

Read more from the IIIEE

Extended Producer Responsibility: An Examination of its Impact on Innovation and Greening Products

Policies aiming to improve product lifecycle performance are likely to be expected in the future. It therefore makes sense for businesses to improve the environmental performance of products. There are several reasons why businesses may want to engage with so-called “eco-design”. While complying with present and upcoming regulations is one driver, another may be to save costs. For instance, by using recycled materials as input in manufacturing. Companies can also engage in eco-design to attract customers interested in products with green attributes, as some customers are willing to pay a price premium for green products. Obtaining eco-labels can be one strategy for businesses who want to reach these consumers.



Eco-design is an umbrella term that incorporates several sub-strategies that companies can apply. The key for the designer is to be aware of the lifecycle impacts of the product and to reduce these impacts by smarter design solutions. Often, products which require energy in the use phase have substantial environmental impacts. Making products more efficient through product design can therefore generate considerable improvement of their overall footprint. This could be done by, for instance, improving the magnetic properties of motors so they need less energy, or reducing the energy used when products are in standby mode. Recycling of materials in waste products can also be beneficial, and can be improved by a design that makes products easy to disassemble and recycle when they become waste.

Product design can also supplement dematerialisation, for instance by reducing packaging or using lighter materials. Furthermore, a designer can choose materials that have the best environmental properties, or design for longevity. One way to achieve this is to enable upgrading of the product, for instance by modular design. In some cases, the product may even be replaced by a service. Some examples of this include streaming films instead of purchasing DVDs. Due to customer requirements and expected legislation, engaging in eco-design is likely to become more important. It is likely that we will see more innovative solutions in the future.

3.7 GREENING DOWNSTREAM

After exploring what the company can do upstream and in-house to green its operations, it is important to look at greening downstream activities. How can businesses influence the choices that consumers make in the marketplace? There are a number of approaches, including choice-editing, priming and giving products better or more shelf space. From a business perspective, however, these practices impose some risks. For example, if a store removes a certain product, it might risk losing customers to a competitor that still offers this product. Priming or advertising sustainability values in your store, may risk putting conventional products at a competitive disadvantage.



Furthermore, good shelf space is usually given to the best selling products or to suppliers that can pay a fee to ensure that their products are granted this space. Better shelf placement would therefore most likely be given to conventional producers with a higher turnover. What can businesses do when attempts to promote sustainable consumption clashes with the business rationale to stay competitive and to earn higher profits? How can businesses bridge the gap between promoting sustainable consumption and enhancing their competitiveness? Independent eco-labelling and eco-branding are at the forefront of addressing both business and societal needs for sustainable consumption.

Eco-labelling is sometimes criticized for being inefficient in promoting sustainable consumption. It is a marketing tool that informs and assures consumers about the sustainability performance of products, but information provision is not always sufficient to change consumer behaviour. Nevertheless, independent eco-labelling can still be used by firms, rather than consumers, in order to create a market for green products.

From this perspective, eco-labelling can still be viewed as an important element of a corporate strategy to promote sustainable consumption. Firstly, third-party eco-labelling can help businesses reduce costs and risks associated with greening a supply chain. For instance, resource intensive tasks of defining sustainability criteria, educating and training suppliers, and verifying supplier compliance can be outsourced to independent eco-labelling organizations. Outsourcing verification also removes the risk from the company to be blamed by various stakeholders if non-compliance with sustainability criteria is revealed.

Secondly, eco-labelling can be designed with the purpose of mainstreaming sustainably produced goods, rather than positioning them in a niche product segment charging a price premium. UTZ Certified is an eco-labelling scheme that has been developed by companies with the purpose to promote sustainable consumption. It allows firms (such as Dutch retailer Ahold and Swiss retailer Migros) to mainstream the market for sustainably grown coffee. Today, 100% of the coffee sold by these retailers carries the UTZ Certified label. This strategy resembles choice editing, although on a larger scale, where unlabelled goods can no longer be found on the shelves of supermarkets. While no price premium is charged, it also implies no trade-offs for consumers. Swedish supermarket chain ICA follows the success of the Dutch and Swiss retailers, with all of its privately branded coffee also being UTZ Certified.

UTZ Certified stands for sustainable farming and better opportunities for farmers, their families and our planet. UTZ Certified enables farmers to learn better farming methods, improve working conditions and take better care of the environment.

Visit the UTZ Certified website

Another approach is eco-branding. Eco-brands are private product segments with higher sustainability performance than conventional choices. They are increasingly common among large European retailers, including major supermarket chains in Sweden, such as ICA and COOP. Initially, offering private eco-brands was a “mimetic” strategy by retailers, imitating other market actors’ sustainability commitment. Today, the number of private green product lines is increasing, with more retailers announcing their commitment to offer “best-in-category” eco-friendly products under private brands.

”The circular economy is a big topic and an opportunity from a resource efficiency perspective, closing loops of material in our supply chains, but also to connect with our customers, offering services that can prolong the life of our products and add value to our customers.”

Per Stoltz
Sustainability Developer
IKEA

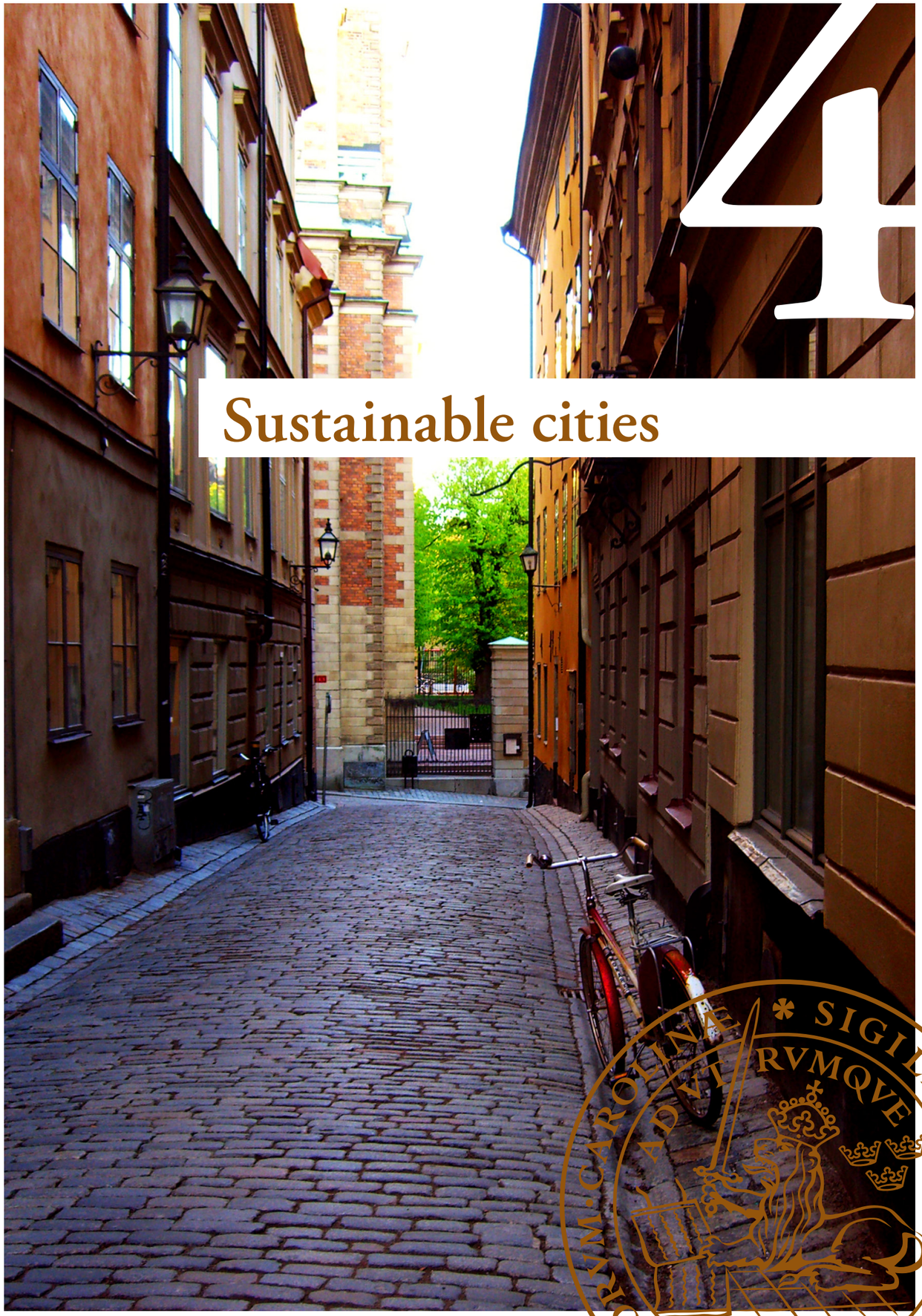


Establishing a private eco-brand gives retailers an incentive to engage with the development of markets for eco-labelled products, since it helps making their eco-brand more competitive. In particular, private eco-branding helps companies reduce sourcing costs for more sustainable products, while at the same time allowing them to pursue differentiation from other eco-labelled products. This differentiation mechanism allows retailers to protect their investments into green market development from competitors with access to the same eco-labelling schemes.

European retailers have reported that their private eco-brands have a greater resonance with consumer demand for sustainability compared to third-party eco-labels. Since private retailers have a clear focus on their specific market, their eco-brands allow faster incorporation of constantly evolving consumer demands, concerns and expectations into product lifecycle performance. For example, in comparison to some eco-labels, private eco-brands are not only focused on addressing sustainability concerns. They also account for a number of other consumer preferences, such as good quality, taste, and health benefits. Eco-brands therefore allow companies to target a broader spectrum of customers and go beyond the smaller audience of so-called “green consumers”.

Eco-brands also appear to make sustainable consumption more affordable for consumers. For instance, supermarket chain COOP in Sweden has implemented a policy not to charge a higher price premium for its private organic brand, called Änglamark, than for conventional products. Similarly, French supermarket Carrefour provides privately eco-branded products for different budget categories. Finally, it is common that privately eco-branded products carry multiple eco-labels. For instance, Änglamark coffee is labelled as both organic and fair trade. This illustrates how the private scheme accounts for various sustainability concerns, which further enhances consumer trust in green products.

Eco-labelling and eco-branding can be crucial elements in a competitive downstream business strategy to promote sustainable consumption. By providing a range of services to enable and verify sustainability compliance in the supply chain, third-party eco-labelling can remove the corporate need for resource intensive engagement with suppliers when trying to green a product assortment. Eco-branding can help firms develop the sales of eco-labelled products by making them more market-oriented. At the same time, product differentiation based on eco-branding can generate higher profits. Consequently, third-party eco-labelling and eco-branding are complementary in facilitating a corporate engagement with greening downstream. ■



4

Sustainable cities



Greening the economy at the urban level

Cities are key drivers in the transition to greener economies and sustainable urban development. Cities can lead the way, for example, by adopting green municipal policies and planning. They are also arenas for collaboration between different actors of society active in greening the economy through other channels. This section introduces some of the ways in which greening can take place at the city level, starting with an overview of processes of sustainable urban transformations. ▸

4.1 PROCESSES OF SUSTAINABLE URBAN TRANSFORMATION

The 21st century has been called the "urban century" by UN-Habitat (the United Nations agency responsible for sustainable human settlements) and by many others.[1] In fact, over 50% of the global population now lives in urban areas, and this trend will continue.[2] The urban century not only refers to the fact that more and more people are living in cities, but it is also increasingly recognized that policies by international bodies and national governments need to be implemented at the city level in order to have an impact. The strategic importance of cities in relation to sustainable development and the green economy is one example.

Cities play a dominant role in global consumption, production and pollution, and are associated with several major environmental issues, including air pollution, greenhouse gas emissions, waste, and poverty. At the same time, the concentration of people, activities and resource use in cities brings potential for efficiency increases and multi-purpose solutions combining different sustainability goals. UNEP (the United Nations Environment Programme) is just one of many international organisations turning their attention to cities to reduce problems and enhance opportunities. Cities are centres for innovation and creativity, fostering great potential for change.

Read more from UNEP

Cities: Investing in Energy and Resource Efficiency

1 UN- Habitat. (2008) State of the World's Cities 2008/2009: Harmonious Cities. London: Earthscan.

2 UN- Habitat. (2010) State of the World's Cities 2010/2011: Bridging the Urban Divide. London: Earthscan.

The emerging concept of sustainable urban transformation places a strong emphasis on structural transformation processes. These are broad and multi-dimensional, and have the potential to generate radical change.[3] They can effectively direct urban development towards sustainability. The concept furthermore entails understanding cities as a source of possibilities for sustainability, promoting active collaboration among diverse stakeholders, and integrating different perspectives and bodies of knowledge and expertise.

There are three key areas to discuss when it comes to sustainable urban transformation – governance and planning, innovation and business, and lifestyles and consumption. Importantly, governance refers to the act of governing, rather than government itself. Governance involves multiple public and private actors in debates, conflicts and power struggles, as well as interactions between international, national, regional, and local levels. Governance relates to processes and decisions that seek to define actions, grant power and verify performance. Government, on the other hand, refers to formal structures or systems by which a state or territory is organised and governed.

Governance and planning: Effective strategic planning and integration of policy instruments is essential. Such efforts should be interconnected across sectors and adapted for specific urban and national policy conditions to ensure empowerment, engagement and collaboration of relevant stakeholders. In order for strategic planning to be effective, however, three key policy challenges have to be taken into account: 1) Policies must be ambitious but politically and economically realistic; 2) Policies must be developed quickly and with flexibility for rapidly changing urban conditions; and, 3) Contradictory policies have to be eliminated.

3 McCormick, K., Anderberg, S. & Neij, L. (2013). Sustainable Urban Transformation and the Green Urban Economy. In: R. Simpson & M. Zimmermann (Eds.) The Economy of Green Cities. Dordrecht: Springer.

Innovation and business: There are significant challenges in reconciling economic growth and maintaining or restoring local and global environment. Innovation and clean technology are key parts of a green economy, but also for fostering urban competitiveness in a globalising economy. Sustainable urban economic development must encourage symbiotic relationships among industries, governments, universities and citizens to ensure sustainable management of human, ecological and economic capital.

Lifestyles and consumption: Negative implications of overconsumption are particularly evident in cities. UN-Habitat suggests that harmony within cities is dependent not only on prosperity and the benefits thereof, but also on equity and sustainability. By defining an improved quality of life and creating visions of sustainable lifestyles, it will be possible to outline how to design, support and govern more sustainable cities where people have a good life.

Intelligently designed cities can respond to the major environmental, social and economic challenges of the 21st century. There are many great examples in Scandinavia – like Copenhagen and Stockholm. WWF (the World Wide Fund for Nature) concludes that depending on how we develop and manage urban infrastructures, they could become either a driver for environmental destruction or a key source of ecological rejuvenation. Cities therefore represent both a complex challenge and an amazing opportunity for greening our economies and advancing sustainable development!

4.2 CLIMATE GOVERNANCE AND URBAN EXPERIMENTS

As our cities grow, and the effects of climate change become more serious, municipal governments and other actors have become more concerned about what cities can do to combat the risks of climate change and to reduce their impact on the changing environment. When cities first started to respond to climate change in the 1990s, the focus was on actions taken by municipal governments on a largely voluntary basis. Plenty of plans and policies were developed to help cities meet ambitious targets for reducing greenhouse gas emissions by over 20% in under a decade. Municipal governments found themselves constrained, however, in what they could accomplish through these routes alone.

From the early 2000s, we can identify a new wave of action. Over the past decade, we have seen a greater range and diversity of cities getting involved with responses to climate change. A number of city networks (such as ICLEI – Local Governments for Sustainability and the C40 Cities Climate Leadership Group) formed, through which municipal governments co-operate internationally, and a whole host of partners from the private sector to civil society are getting involved in trying to address climate change at the urban level.

Part of the reason for this shift is a change in how climate change is seen as a policy problem. Rather than focusing on targets for reducing greenhouse gas emissions, we now see an increasing emphasis on the need for decarbonisation – that is, for uncoupling economic growth and social



Copenhagen, Denmark

Read more from WWF

Reinventing the City: Three Prerequisites for Greening Urban Infrastructures

Copenhagen has the ambition of becoming a carbon neutral capital city by 2025. This goal is supported by a municipal strategic climate action plan with more than 50 initiatives. The London School of Economics (LSE) has identified Copenhagen as a Green Economy Leader. A major example of sustainable city solutions in Copenhagen is the increased mobility through integrated transport and cycling solutions.

Read more from LSE

Copenhagen: Green Economy Leader Report

ICLEI – Local Governments for Sustainability

ICLEI is a leading network of over a thousand cities, towns and metropolises committed to building a sustainable future. The ICLEI mission is to build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability through cumulative local actions.

Visit the ICLEI website

C40 Cities Climate Leadership Group

C40 is a network of megacities taking action to reduce greenhouse gas emissions. With 70 affiliated cities, C40 works with participating cities to address climate risks and the impacts – both locally and globally.

Visit the C40 website

The London School of Economics (LSE) has also produced a report on Stockholm as a Green Economy Leader. It shows that Stockholm took early action to build a green economy. In fact, environmental policies and infrastructure investments in the metro systems and district heating have been important to Stockholm for over 40 years.

Read more from LSE

Stockholm: Green Economy Leader Report



well-being from the use of fossil carbon-based fuels. As this requires more systematic change across urban areas and infrastructure networks, there has been a shift in how and where climate governance is taking place in the city.

As urban climate responses come to focus on decarbonisation and a more diverse range of cities and actors get involved, we can find examples of climate governance not just in city halls, or in the corridors of private sector organisations, but also in the mundane design and operation decisions being made in the provision of everyday services – like waste, water, transport and energy. Decisions about whether we heat buildings to 21 degrees, or how much space we allow for bikes on the streets, are also climate decisions and political decisions.

development which aims to be carbon neutral. Over in Copenhagen, many climate innovations are also underway, including new measures to increase the amount of cycling used as a proportion of modal share.

For many, these types of experiments might seem rather ephemeral because they are small in scale and often short term – like a field of flowers blooming, they are here today, gone tomorrow. Nevertheless, research suggests that they are now so common that we have to take them seriously as a site of climate governance. We need to understand how and why urban actors are using this approach rather than traditional methods of urban planning and policy to tackle climate change.

> **”Cities are really an exciting place at the moment. Many different actors are starting to see the city as a critical area for action. We see not only traditional urban actors, like policy makers and urban planners, but increasingly more unconventional actors, like IT companies, banking or community groups.”**
>
> **Harriet Bulkeley**
> *King Carl XVI Gustaf Guest Professorship of Environmental Science*
> *Lund University*

Looking at climate governance in this way has helped us to recognise a new phenomenon – the growth of urban experiments designed to respond to climate change. But what does this language of experimentation mean? It is not the same as the kind of experiment we might be used to – one carried out in a controlled laboratory environment by a professional scientist. Rather, it is a more common way in which we use the term experiment, when we are trying out something new, for example, a new haircut or a fashion look. Cities are experimenting with responses to climate change as a way of “trying on for size” new approaches to developing technology, organising society, and planning urban development.

A survey conducted for a research project funded by the UK Economic and Social Research Council has found that in 100 global cities, there are over 630 different urban climate change experiments taking place.[4] Interestingly, no region of the world is more or less likely to have such experiments taking place in its cities – it seems that experimentation as a response to climate change is now a global phenomenon.

There are, for example, many kinds of urban experiments throughout Sweden. In the capital Stockholm, there are innovations with smart grids and smart housing taking place. In Malmö, some of the most radical approaches to urban planning that have put decarbonisation on the agenda are taking place in the Western Harbour and in the new Hyllie

Check out a film on Stockholm in Sweden

Why is experimentation taking place as a means of governing climate change at the urban scale? Here are three related explanations. First, municipal governments have limited powers to act on climate change alone and need to develop projects or specific interventions that attract other organisations to work with them. Second, private sector and community actors also find urban environments an important site for action, but lack the power or capacity to intervene at the level of the city as a whole. Finally, projects that might have taken place in the past without being thought about in climate change terms are increasingly seen through a climate change lens – in a sense, climate change has come to be a ubiquitous reason for taking different and disparate forms of action at the urban level.

Like any response to climate change, urban experimentation is political – some agendas and interests are promoted over others, while others are marginalised. Many mainstream actors are involved in experimentation – from municipal governments to private sector interests and international development funding. This may mean that experimentation provides a means through which they can continue to replicate business as usual, and some would argue that this will lead to the same patterns of urban development that have led to the problems of climate change in the first place. It may also means that experimentation can provide a window through which the approaches and practices of these organisations can be changed.

4 Castán Broto, V. & Bulkeley, H. (2013) A survey of urban climate change experiments in 100 cities. Global Environmental Change, 23(1), 92-102.



Turning Torso in the Western Harbour, Malmö, Sweden





”We need to move beyond efficiency thinking and adopt structural transition policies. The mobility system is a great example. Yes, we have significantly improved the efficiency of the combustion engine, but it will not be enough to de-carbonise the transport and mobility system. Not even moving to a different technology, the electric car for example, will be enough. If we all keep driving, we will still have traffic jams, huge demand for natural resources, and much of the external costs associated with the transport and mobility system. The real challenge is to re-think our transport and mobility system which demands a transitions thinking. What is driving needs for mobility? How can we re-think the role of public transport and cycling? Of course, the car will have a role to play, but do we all need it, or can we adopt car sharing in a more fundamental way?”

Hans Bruyninckx
Professor and Executive Director
European Environment Agency



4.3 URBAN INFRASTRUCTURE AND PLANNING

Municipal and city planners are challenged with how to plan structural transformations and they are exploring how urban infrastructure can play a part in greening the economy. Urban infrastructure is the basic physical and organizational structures needed for the operation of a city or urban area. It is also the services and facilities necessary for society and the economy to function. This can include infrastructure for water, waste, shelter, energy, telecommunications, and mobility, including streets, buildings, sewers, parks and energy systems. Importantly, urban infrastructure can advance sustainability and green economies, or, adversely, it can lock in unsustainable systems and prevent sustainable urban transformation.

The Green City Index measures the environmental performance of more than 120 cities around the world. Developed by the Economist Intelligence Unit and Siemens, it offers insights into how to create sustainable and green cities.

Read more about the Green City Index

To learn more about infrastructure and planning, urban mobility is a good example to examine. Clearly, there are problems with transportation infrastructure in many cities related to congestion, accidents, local air pollution and greenhouse gas emissions. At the city level, there is the ability to plan, change and improve infrastructure for mobility. For example, policies and planning that deter less sustainable mobility options, like areas that are closed to cars or an introduction of congestion charges to discourage the use of cars. Urban planning can also encourage more sustainable options like electric cars, convenient public transport options, and biking infrastructure.

In 2013, there were over 5,000 electric vehicles in the urban area of Oslo in Norway.[5] Electric vehicles in Norway are powered by hydro-electricity, resulting in low emissions, improved air quality and less noise. The city council hopes to grow the numbers of electric vehicles through innovative policy and additional infrastructure, for example by continuing to add to the over 700 public and free charging stations already provided in the city. The City of Oslo leads by example in buying only zero emission electric vehicles for its municipal fleet. Electric vehicles are also encouraged through city transport rules allowing them to use bus transit lanes as well as national level taxes on fossil fuels and road charge exemptions for electric vehicles. Of course, electric vehicles help with reducing emissions, but congestion still remains a challenge. For this reason, the City of Oslo is also working with its public transportation system.

Check out a film on Oslo in Norway

Greener city planning encourages people to act sustainably without thinking about the environment. For example, in Copenhagen, most people bike for the convenience of it, rather than its environmental benefits. In fact, the top two reasons for biking in the city are said to be convenience and health. The environment is number three. This is made possible by making biking as convenient as possible and giving it priority in planning across Copenhagen.

Urban planning prioritising cyclists can, for example, provide traffic lights for cyclists that change as they approach an intersection, and designate sections on city intersections for cyclists to stop. The City of Copenhagen has introduced multiple bike lanes for different speeds, waste bins designed for bikes, paths separated from car lanes, and direct routes via bike lanes making it faster to go by bike than by car. City councils around the world can create similar conditions in order to promote changes in mobility behaviour.

Naturally, individuals and businesses are also required to make decisions that help the city in these efforts. This can be a long process. The City of Copenhagen has been implementing sustainable structural transformation for more than 50 years. In the past, the city was focused on planning for increasing car traffic, but in the 1960s, they decided to take car traffic out of its main street. Since then, Copenhagen has made continuous changes with less emphasis on cars and more on people, all towards the goal of becoming the best city in the world for people by 2025. The planning choices make sense for the environment, they make sense for the people living in the city, but they also make sense from an economic perspective. The city found that the total cost of air pollution, accidents, traffic congestion, noise, and wear and tear on infrastructure resulted in a net social loss when travelling by car. By contrast, riding bikes resulted in significant health benefits and an overall net social gain.



Kristianstad in Sweden offers yet another interesting example of innovative urban mobility solutions with low environmental impact. The city was lacking fuel for industry, heating and transport, and turned to the resource they had in plentiful supply – waste from food processing and dairy farms. When viewed together, these two problems were in fact one problem and one solution. Agricultural waste can be a resource if turned into biogas. In Kristianstad, buildings are now heated through a district heating system using biogas. The biogas is also used to fuel the city busses and large parts of the local car fleet. Agricultural residues have been a suitable solution in Kristianstad not only because of its agricultural conditions, but also thanks to clear goals, planning, and a process that has involved many different actors.

Check out a film on Kristianstad in Sweden



5 C40. (2013) Driving Action. URL: http://c40.org/blog_posts/driving-action-oslos-electric-vehicle-strategy-leading-the-way



Although subways require major investments – and often several decades of planning and preparation – once in place, they offer fast and convenient transport for millions of passengers annually. For instance, in the metropolitan area of Stockholm, with a population of about two million people, over 320 million subway trips are made annually.[6] Buses offer another good alternative. In order to make bus trips more attractive, building designated bus lanes helps to decrease bus travel times and improve reliability of bus services.

6 Stockholm Business Region. (2014) This is Stockholm: Public Transportation. URL: http://www.visitstockholm.com/en/Good-to-know/Getting-around/

Through planning and targeted city policies, cycling rates in Copenhagen have continued to increase. In 2011, 37% of city residents commuted to work by bike every day, in comparison to 27% by car.[7] The goal is to continue to increase the number of bike commuters. In fact, the new issue for city planners is congested bike lanes! Another move towards a more sustainable transportation system is therefore to build and transform city infrastructure to promote public transport. This can include building new subway lines as Copenhagen and Malmö have done, or expanding the existing network as Stockholm currently is doing.

In order to make public transport a competitive alternative that can take you conveniently from your front door to your intended destination, the connection between different sustainable transport modes needs to be as seamless as possible. An important challenge is to build transport hubs where, for example, bus, train and subway stations are located next to each other, preferably with access to convenient bicycle parking nearby. Another possibility is to integrate information and communication technology with public transport and to provide passengers with real-time information and other online services.

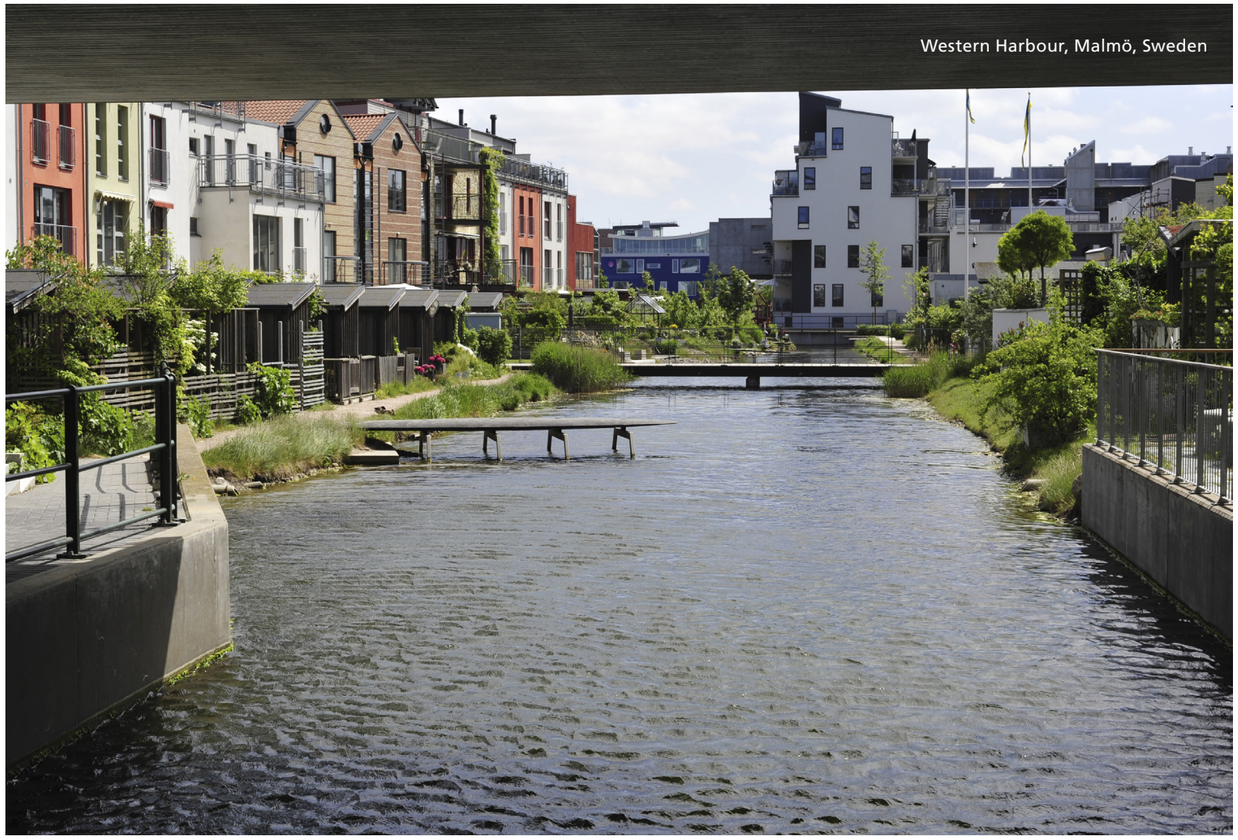
Evidently, sustainable urban infrastructure can become reality. Here, we have presented many examples of urban mobility in Scandinavia – electric vehicles, public transport, and infrastructure for bikes. Nevertheless, making this structural transformation requires smart and long-term planning, political commitment and collaboration between local and national governments.



Photos courtesy Department of Transport (DOT)

Visions can also be applied when experimenting with changes in existing cities. For example, the City of New York in the USA has, in collaboration with Danish architecture firm Gehl Architects, experimented with visions of its city squares. In 2009, Times Square was closed to cars and developed into an open area with cafes and bicycle lanes. The idea was to experiment with the concept by initially only using paint and temporary furniture, and then evaluate the results for successive stages. Based on the positive feedback, the city is now continuing to refine Times Square as a new sustainable space in the centre of the city. Similar experiments bringing sustainable visions to life are being developed in many cities today.

Learn more about Gehl Architects and Times Square



Western Harbour, Malmö, Sweden

4.4 VISIONING FOR CITIES OF THE FUTURE

What will future cities look like? In order to move in a more sustainable direction, we need to think about and visualize future sustainable cities, and then identify what actions are needed in order to realize these visions. Visions and ideas about the future can show us how to change direction and move towards sustainability. They are powerful tools for mobilizing individuals and organizations towards creating greener cities. For example, many cities experience poor air quality, toxic emissions, noise and degradation of natural resources that lead to serious environmental and health problems. Bold visions for the future can help respond to these challenges.

Many urban visions highlight alternative city structures, new modes of transportation, and new types of exciting buildings, for example vertical greenhouses. It is also important that local communities define sustainability from their perspective to make sure their vision is appropriate to the local context and accepted by the community. Visions can be used as a point of discussion among different stakeholders and, in turn, be further refined by their input.

Visions are not only about the distant future, but can be used to accelerate near-term changes and involve technology and systems that are available right now. For example, green roofs can reduce the negative impacts of heavy rain and provide insulation to cool down buildings in summer and keep them warmer in winter. In addition, they can also improve air quality and provide space for biodiversity in urban areas. Green roofs are already being used and developed in many cities around the world, especially in Sweden. A good example from one city can be used as a vision for other cities.

Various methods have been developed and are applied to construct visions and to discuss what actions should be taken in order to realize those visions. Ideally, the vision-making process should begin with a discussion between the city and different actors regarding problems that need to be addressed, for example pollution and climate change. One possible method is known as back-casting. Essentially, this involves working backwards from a vision to identify necessary system shifts and potential barriers – if we want to realize a certain vision, what actions must be taken to connect the future vision to the present reality?

A back-casting study can also demonstrate the tension between short term actions and long term goals. It can identify steps in the transition processes that cannot be reached without adopting more radical changes than the ones implemented. In this way, back-casting can challenge cities to assess whether their current policies really align with their future visions and ambitions. Visions can challenge our conceptions of what is possible. At the same time, long term visions are an underlying foundation for advancing sustainable urban transformation. Visions can be utilised to build and bind a network of actors towards a common aim, and they can serve as a bridge between different perspectives and contribute to knowledge sharing between actors.

It is also important to evaluate the variety of actions possible to achieving a vision. By evaluating, we can see if policies and actions are successfully moving a city towards its goals. The development of the Western Harbour in Malmö, Sweden, provides a good example of how evaluation can improve the process of sustainable urban transformations. The vision is to transform this area into a sustainable district. Each stage of the development has been evaluated in order to provide insights for the next stages. For example, the first stage placed relatively tough energy efficiency requirements for buildings. The requirements were lowered in the second phase, and in the third phase combined with tougher voluntary requirements. This way, the experimental construction at the start was developed into more mainstream actions that are now used in other areas of Malmö.

4.5 SUSTAINABLE NEIGHBOURHOODS

Sustainable lifestyles and neighbourhoods can have an impact on sustainable urban development overall. The lifestyles of eco-villages (often developed in rural contexts with strong sustainability principles) are increasingly utilised in mainstream practice in sustainable urban development in Scandinavia. In contrast to rural eco-villages, cities and sustainable neighbourhoods concentrate higher numbers of people in one area, which enables more sustainable services like public transportation and recycling.

We have introduced the example of the Western Harbour in Malmö, Sweden, as a leading sustainable neighbourhood. The Western Harbour was formerly contaminated industrial land which housed a variety of warehouses and factories. The area has since been re-designed as a new neighbourhood with good public transport links and pedestrian and cycle ways to discourage car dependency. There are a mix of buildings for different uses around squares where people can gather. There are systems for managing waste and water sustainably, and renewable energy technologies integrated in the area.

7 Green, J. (2014) The City is Big. URL: http://dirt.asla.org/2014/02/10/jan-gehl-the-city-is-big/

While this neighbourhood is a good example of designing, planning, and innovating with technology, it also shows some of the remaining challenges and tensions between living a good life and living a greener life. For example, for all of its advances, the levels of individual consumption in this neighbourhood are still high and people generally still eat a typical western diet, for example, high in meat which is related to high greenhouse gas emissions. While the Western Harbour has certainly become greener, there is more to be done.

Measuring and comparing different urban contexts is a complex process where local conditions of neighbourhoods need to be taken into account. To compare micro environments, like sustainable neighbourhoods, requires combining several methodologies and use interdisciplinary approaches. To identify "best practices" among sustainable neighbourhoods furthermore requires determining what it is that makes them sustainable? Here, we define four key principles characterising sustainable neighbourhoods.

Energy systems: Most sustainable neighbourhoods have shared ownership of renewable energy technologies and low energy demands. For example, residents can build and live in passive energy-saving multi-dwelling buildings. They can have adopted innovative solutions to reduce resource use and stimulate recycling, and they manage water and waste resources sustainably.

Socio-economic balance: Sustainable neighbourhoods often have local – and organic – food cooperatives which are run by residents. These neighbourhoods often have a strong "social ecology" element that includes direct democracy, transparency and tolerance. They can have trading systems in which local goods and services are traded without the use of money. Furthermore, they have a strong emphasis on the local economy and the local community.

Transport and mobility: Many sustainable neighbourhoods have efficient public transport connections and might not even allow cars in the area. They promote cycling and walking, and they plan for a compact building layout in order to minimise travel distances. Transport and mobility is therefore closely connected to the urban design and planning of sustainable neighbourhoods.

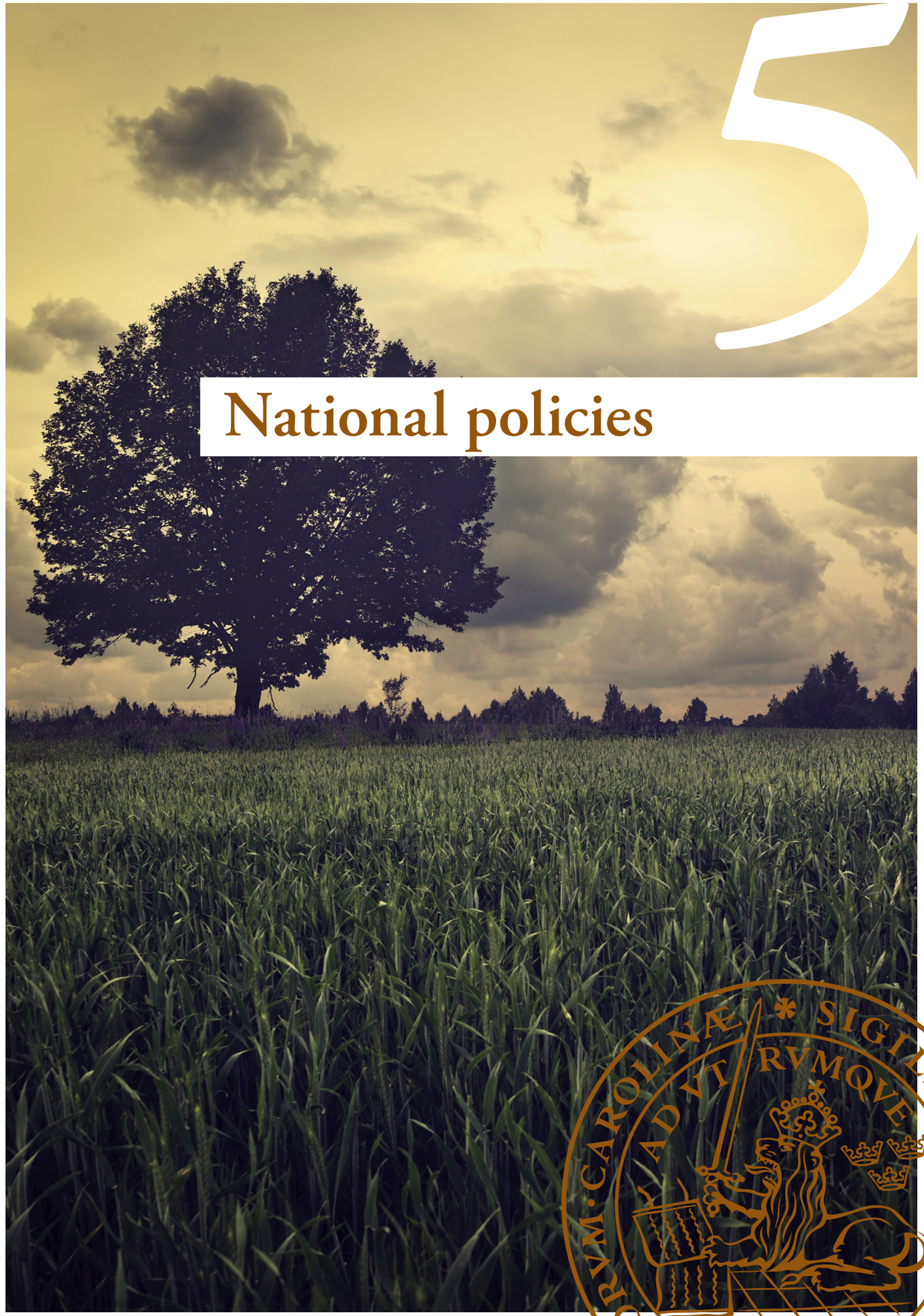
Urban design: Most sustainable neighbourhoods have multi-purpose community spaces that promote a variety of social activities, such as central plazas where people can meet, green spaces, public spaces, pedestrian streets, and bike trails. Overall, the design of sustainable neighbourhoods is critical to achieving goals on energy, socio-economic balance and transport. ■



Check out a film on Malmö in Sweden



Copenhagen Central Station, Denmark



5 National policies





Greening the economy at the state level

In this final section, we address the roles of the state and of policy-makers in facilitating the shift towards a greener economy. We look specifically at various types of mechanisms available for governments when designing environmentally related policies. National policies can play a significant role in greening the economy and in relation to individual choices, business strategies and sustainable cities. ▶

5.1 POLICY INSTRUMENTS AND INCENTIVES

Imposing policies at the national level is an attempt by policy-makers to change or to reinforce certain behaviours. This will determine whether or not you as a society will reach the goals you have set. As a government, you may want to change the behaviour of companies, for instance in their role as producers and sellers of products, or of individuals, as citizens and as consumers, or of any other group of actors in society. It is necessary to create strong enough incentives to influence these actors and to convince them to do what is required.

Different policy instruments have been shown to have various strengths and are associated with various societal challenges. As a legislator, you may or may not know what the best solution is from a policy perspective. For instance, you may know that you need to reduce emissions of heavy metals to air, but you may not know the most efficient way of doing so. Should the polluting companies install filters? Should they change their raw materials? Should all companies take action, or only the ones with the highest emissions? In this case, the government often needs to set the targets, but allow the identified companies to choose the best way of reaching these targets.

Governments also face problems when controlling whether companies and citizens do what has been asked of them. How much control is required, and does this depend on the nature of the intervention introduced? In addition, governments are of course also limited by political realities. Will the parliament accept the proposals for new regulations or new environmental taxes that have been put forward by the government? Will various lobbying groups block the approaches?

While the practical reality of designing policies generally is rather complex and demands considerable understanding of the particular situation that should be regulated and influenced, creating incentives through policy interventions is easily explained and systematised. The most common approach is to divide policy instruments into three different types: regulatory, economic and informative. We can explore how these instruments work by using an analogy from everyday life, for instance, from how we raise our children. Let us assume that we want our children to clean up their rooms, or to brush their teeth regularly. To achieve our goals, we can address the children in various ways.

Regulatory: First, we can try to force them to do it, saying you must clean your room today, otherwise you are not allowed to go to your friend's house tonight. This is similar to a regulatory or administrative instrument. These instruments tell obligated parties what they must do or what they are not allowed to do. The rules are typically linked to a sanction that will be imposed if the regulation is not followed. For an industry, examples of regulatory policy instrument could be a prohibition to use certain toxic substances, or a prescription to reduce emission level below a specified standard.

Economic: We can also use other approaches when raising children. We sometimes give financial incentives, saying if you brush your teeth every day, you will get one euro every week. Or, we may say if you do not clean up your room today, we will deduct from your weekly allowance. This exemplifies what we often call economic or market-based instruments. These instruments do not prescribe what must be done, but rather add a financial implication so that obligated parties can make their own decisions about how to act, but then could face an extra cost or extra payment depending on their actions. Examples of economic instruments for industry include taxes, subsidies, tradable certificates, etc.

Informative: Finally, we can try to change behaviours by explaining the consequences of various actions. We can tell our children what will happen if they do not brush their teeth, or explain that if the parents will have to do everything at home, they will be too tired to play with the children, to take them to a football game, and so on. This is all about information and communication. Sometimes providing the information is enough to change behaviour, or at least is a necessary part of the policy mix. Governments can also provide information to industry and citizens to help them make informed choices about their behaviour. Informative instruments allow for them to take voluntary action in response to the information.



In Denmark, national policies and local initiatives are working together to achieve ambitious environmental and climate goals. Interestingly, two Danish islands – Samsø and Bornholm – are leading the way.

Read more about Samsø
100% Renewable Energy

Read more about Bornholm
The Smartest and Greenest Grid



Bornholm, Denmark

Policy-makers use similar approaches when trying to steer the behaviour of companies or organisations Regulatory instruments are used to tell them what they must and must not do. Economic instruments are used to encourage and discourage them by financial incentives. Lastly, we know that if we provide better information about the opportunities and consequences of various actions, many companies will understand that they will be better off changing their technologies, routines and approaches. The art of policy-making is to choose the right set of policy instruments for the specific problems we want to address. As we are facing big environmental challenges, this will require clever – and brave – policy-makers today and in the coming years.

5.2 ECONOMIC INSTRUMENTS AND PRICE SIGNALS

Economic instruments, also called market-based instruments, are used to encourage the transition towards a green economy. Economic instruments are widely used to solve environment-related issues. This group of policy instruments works through price mechanisms and market signals that attempt to change the economic conditions and behaviour of a given group of actors in society. These types of instruments provide economic incentives to consumers and industry to reduce their environmental footprint efficiently, and to encourage technological innovation that is more compatible with the environment.

The main foundation of economic instruments is that markets and prices can be powerful tools to work in favour of the environment. It is recognised that markets need to be fixed, or even created, in order to solve environmental problems. To do so, economic instruments confront producers and consumers with the same incentives they face in every-day markets – prices. In terms of greening the economy, prices are needed that convey information and send incentives to economise and make efficient use of resources. Prices are also needed that better reflect the true socio-economic costs of production and consumption.

Think of cars as an example. What kind of economic incentives can we implement to make eco-friendly cars more attractive for buyers? And what kind of economic disincentives can be introduced to make conventional cars less attractive? Using economic instruments can provide incentives to car manufacturers to reduce the negative externalities related to conventional cars, such as the release of carbon dioxide emissions. At the same time, we can use economic instruments to provide incentives to consumers to put a higher value on the positive externalities associated to eco-friendly cars, like low or zero emissions. Five main categories of economic instruments will be introduced here.



ENVIRONMENTAL TAXES AND CHARGES

In this category, a tax or charge is levied on the amount of pollution that producers or consumers generate and the estimated damage caused by this pollution. In Scandinavia, there are multiple applications of environmental taxes and charges, for instance in waste water, municipal solid waste and traffic congestion. In an attempt to tackle congestion in Stockholm, and to improve the environment in the city centre, a congestion charge was introduced in 2007. In addition, Sweden has a road tax for new cars based on their weight and the amount of carbon dioxide they emit. Cars that are considered eco-friendly, often compact cars running on ethanol or electricity, do not pay this tax.[1]

With these economic incentives in place, drivers are encouraged to use public transportation instead, and/or to buy eco-friendly cars. What is more, in an attempt to tackle climate change, Sweden has implemented some of the highest carbon dioxide taxes in the world. These instruments also raise state revenues that can be used to offset taxes on labour and capital, fund and support the implementation of abatement measures such as waste water treatment plants, or be a financing source for other economic instruments, such as subsidies for clean technologies or public transportation.

1 Swedish Portal for Green Cars. (2014) Tax Exemption. URL: http://www.miljofordon.se/



DEPOSIT-REFUND SCHEMES

These schemes are a combination of a charge and a rebate. Consumers are asked to pay a charge when purchasing potentially polluting products, and obtain a refund when returning the product to an approved centre for recycling or disposal. A key goal of deposit and refund schemes is to provide incentives to prevent the improper or illegal disposal of polluting products, such as lead-acid batteries, electronics or beverage containers. For example, Norway has a mandatory deposit-refund system for cars. You pay a deposit when buying a new car and get the deposit back when you return an old car to an authorized scrap business (approximately 300 euros in 2015).[2] This scheme gives incentives to reuse, recycle and properly dispose of vehicle parts.

2 Norwegian Customs and Excise Authorities. (2015) Scrapping. URL: http://www.toll.no/en/international/english/motor-vehicles/annual-motor-vehicle-tax/



ENVIRONMENTAL SUBSIDIES OR PAYMENTS

This is a payment by the government to consumers or producers, aimed to stimulate the development and implementation of environmentally friendly technologies, such as wind turbines or solar photovoltaics, or the provision of ecosystem services, for example biodiversity conservation. In fact, payment for ecosystem services can also be considered within this category. This specific approach works under the premise that those who provide environmental services, like farmers or landowners managing their land for climate change mitigation, should be compensated for doing so. Those who receive the benefits of these services should likewise pay for their provision.

There are numerous applications of environmentally-driven subsidies in Scandinavia. Applications range from financial support for research and development, to the specific implementation of energy efficiency technologies, such as triple glazed windows, or subsidies for eco-friendly cars. This category also includes the removal of subsidies, so-called perverse or environmentally harmful subsidies. In this area, growing attention has been paid lately to the removal of subsidies that support the use of fossil fuels due to concerns about the negative effects of climate change.

Learn more about divestment from fossils fuels and what it means for society, the economy and the environment.

Visit the Fossil Free website





TRADABLE PERMIT SCHEMES

Under this type of economic instrument, a given target is established by an authority, and permits or certificates are allocated or auctioned among participants of the scheme. This target can take the form of an overall level of pollution, for example for greenhouse gas emissions, or a given amount of renewable energy or energy savings. Firms that can meet the target at low costs have an economic incentive to sell their surplus of permits to other firms that find it expensive to meet their targets. Alternatively, firms that find it costly to meet their target are likely to buy permits from firms that can meet their targets inexpensively. For example, the owners of electric cars could sell their pollution permits to drivers of conventional cars. Users of conventional cars could buy these permits and continue driving, but they could also drive less in order to meet their emission target.

Tradable permit systems can also be implemented in the form of quota systems. Norway has such a system in place to help manage fishing more sustainably.

Check out a film on Norway



LIABILITY RULES

This category of economic policy instruments provides incentives to producers to prevent, or to take into consideration, the potential environmental damages that can result from their activities, such as oil production or mining. Liability rules aim at preventing environmental damages, restoring environmental quality, and ensuring that there is compensation available for damages resulting from dangerous activities. Applications can range from contaminated land to the breach of emission standards to oil spills. For example, in Sweden the last car owner could be liable for the expenses involved in removal and clean-up of an illegally disposed car (in addition to any relevant criminal charges).





In theory, the introduction of economic instruments is expected to help us achieve a given policy goal at least-possible costs. This is because economic instruments often provide greater decision power or flexibility to actors than regulatory instruments. With regulatory instruments, for instance a technology standard, the choice mainly belongs to the regulator. In other words, a regulator tells a company how much it is allowed to pollute, and the technology to be used to achieve those limits. Very little flexibility is given to the polluter and thus forcing polluting companies to take on equal shares of the burden of pollution control, regardless of the costs they individually face. In contrast, economic instruments provide incentives to reduce pollution, but they do not define the specific technologies required to reduce pollution. This level of flexibility is given to the polluter.

Let us take an example and assume that we introduce a tax on waste water. On one hand, actors facing high costs to reduce their waste water may choose to pay the tax. On the other hand, actors facing low costs to reduce their waste water may choose to install abatement equipment. In this case, the tax aims to make the reduction of pollution more attractive to "low-cost polluters" than to "high-cost polluters". This situation reduces the total costs of environmental compliance. However, it is important to say that in cases where abatement costs are similar for all polluters, regulatory instruments may be a better policy choice. Another example is carbon trading schemes or taxes, which are often used as ways of pricing carbon for greenhouse gas reductions needed to address climate change. The National Bureau of Economic Research (NBER) in the USA is just one of many organisations that have studied carbon pricing.

Read more from NBER

The Promise and Problems of Pricing Carbon: Theory and Experience

In the last decades, there has been a growing interest for, and implementation of, economic instruments for environmental protection. Research shows that a mix of ambitious policy instruments is often required, including regulatory approaches and information programmes, in order to change the behaviour of producers and consumers. Despite notable success in certain areas, evidence shows that economic incentives are not the solution to all problems in environmental policy. There are numerous market and political barriers, including behavioural failures, which need to be addressed. If we want to move towards a green economy, we need a comprehensive and well-designed mix of ambitious policy instruments.

Denmark is recognised as a world leader on renewable energy, particularly wind power. The International Renewable Energy Agency (IRENA) has documented how economic instruments like taxes and feed-in-tariffs helped to make Denmark a pioneer in wind energy.

Read more from IRENA

Wind Power Report for Denmark



Brendan Gillespie
Head of Environmental Performance and Information Division
OECD

"There is a strong consensus on environment in Scandinavian societies which translates into it not being a major source of conflict between political parties. In general, there is a lot of cross-party support for environmental issues, more so than in many other countries. This has enabled Scandinavian countries to establish some quite ambitious environmental policies. Another striking feature is the wide use of environmentally related taxes and other forms of economic instruments, which generally are very efficient policy instruments. The very open governance systems in Scandinavian societies have also enabled full participation of business, industries and environmental groups in the formulation of policies – another very important factor in implementing efficient and effective environmental policies."

5.3 POLICY FOR WASTE AND RESOURCES

To illustrate deposit-refund schemes, the laws mandating such systems for one-way beverage containers (also known as "bottle bills" in the USA) are further examined. To better understand why such systems have been introduced by legislators, it is beneficial to recall how packaging for beverages has developed over time. Not that long ago, a glass bottle was a highly valuable item. The value of the bottles explains why breweries were keen on getting their bottles back in order to reuse them. Actually, the bottle was more valuable than the contents. In order to get the bottle returned, customers had to pay a deposit when buying the beverage. The deposit was returned as a refund when handing back the bottle after use – a financial incentive to secure the participation of customers.

Breweries continued to almost exclusively use refillable glass bottles into the mid-20th century. At that time, our ability to manufacture bottles, and also metal cans, had advanced and we were able to produce bottles at such a low cost that it was no longer interesting to get them back and refill them. The handling and washing of returned bottles was already considered less attractive than using one-way containers.

A couple of decades later, in the 1970s, we had already begun to doubt the environmental and resource implications of the throw-away society. We were worried about over-consumption of energy and the lack of resource efficiency, and we were observing how one-way beverage containers largely contributed to littering in streets and in nature. Governments, pushed by environmentalists and others, started to make plans for regulating the use of one-way containers.

One of the leading approaches was to use the economic incentive built into the deposit-refund system and to mandate an introduction of such systems also for non-refillable beverage containers. The first systems were introduced in Canada and the USA in the 1970s, while in Europe the systems have been introduced from the 1980s and onwards.

Sweden introduced a deposit-refund system for aluminium cans for beer, soft drinks and mineral water in 1984. The introduction followed a fierce debate about whether to prohibit the use of one-way containers or to support voluntary recycling collection schemes. In the end, the decision was made that a deposit-refund system, guaranteeing a high collection rate, would be appropriate and would not be much inferior to refillable glass bottles from an environmental and energy point of view.

Contrary to the systems in Canada and the USA, the role of the Swedish government was minimised. The legislation introduced basically demanded two things – first, that all cans sold in Sweden were part of a deposit-refund system, and second, that a high collection rate was achieved. The latter is now defined as a 90% return rate. While the system initially only covered aluminium cans, it later came to include all metal cans and plastic bottles for beer, soft drinks and mineral water. Nevertheless, deposit-refund systems are controversial and often met with opposition. The main arguments put forward are related to costs and unnecessary duplication of collection systems for recycling. There are, consequently, good reasons to look at and address some of these arguments.

Costs: Costs with deposit-refund systems are related to the administration of the system and the work done, mainly in the shops, to make collection and payments possible. In the Swedish system, every shop is compensated for their efforts. The amount of compensation is decided by the owners of the system, that is, the retailers and the breweries.

> Where does the money come from to maintain deposit-refund systems? Actually, deposit-refund systems create their own money. This is done in two main ways. The containers collected can be sold to recycling facilities, and, if someone is not returning the empty container, the system can keep the unredeemed deposit. For aluminium cans, these two revenue streams are enough to cover all costs. For plastic bottles, the material value is considerably lower and these revenues are not enough. The solution is to add an extra fee to the price of the plastic bottle. The fee is so low, however, that most consumers are unaware of it.

Duplications: In countries with well-functioning collection of waste separated for recycling, there is a concern that deposit-refund systems are unnecessary duplications. Although the collection rates of other recycling systems are similar to the ones of deposit-refund systems in a few countries, this is generally not the case. Typically, deposit-refund systems guarantee the highest return rates.

Two other features of the deposit-refund systems are put forward as important advantages. Firstly, they supply pure material streams for recycling, to the degree that it actually can be used again for the same purpose. For example, old aluminium cans can become new aluminium cans, and old bottles can become new. Secondly, deposit-refund systems create an incentive to pick up littering containers. Actually, the littering problems related to these types of containers have largely been resolved in Sweden today.

Deposit-refund systems in the Scandinavian countries have, in all essential ways, been successful experiences. However, the resistance against such systems is still significant and many industries and retailers are lobbying heavily against them. In Europe, four countries have introduced deposit-refund systems since the year 2000. In the USA, ten states introduced such systems in the 1970s and 1980s. Disregarding the resistance from various lobbying groups, deposit-refund systems continue to attract the attention of governments and environmentalists. We will certainly see many more proposals for introducing deposit-refunds systems in various countries in the coming years – and with them new debates.









5.4 GREEN PUBLIC PROCUREMENT

Governments and policy-makers can also look to their own operations for ways to encourage a shift to a greener economy, for example through green public procurement. The term "green procurement" refers to when public organisations integrate environmental or sustainability concerns in their choice of products and services. The term "green public procurement" refers to the type of environmental policy instrument that aims to encourage green procurement practices within public authorities. It is a policy instrument encouraged by both international and national organisations.

The primary benefit of green public procurement is its potential to influence the market overall – the value of all purchases taking place in the public sector in Scandinavian countries is about 19% of the GDP.[3] Environmental benefits can be hard to trace back to specific green procurement practices, and it is not yet fully known where the largest environmental result can be obtained with the lowest cost. There are nevertheless several convincing examples. For instance, if all IT purchases in Europe were procured with the green procurement criteria for energy efficiency used by the City of Copenhagen, four nuclear reactors could be closed down.

Sweden has been developing criteria, guidance and tools for procurement for over two decades. In fact, the Swedish example has been influential in both the European Union and elsewhere as identified by the Nordic Council of Ministers These criteria are available online, sorted according to product areas, product groups and individual products. They allow for different levels of green ambition and are adjusted to fit into different steps in the procurement process. These include qualification requirements for the supplier, minimum technical specifications for the product, bonus criteria, and, in some cases, even on-going requirements after the purchase.

Read more from the Nordic Council of Ministers

Technology Procurement in Sweden

Denmark and Sweden have been considered forerunners when it comes to putting green public procurement into practice. However, even if green procurement is advancing both in policy and in practice, concerns have been raised that the statistics are over-optimistic. In fact, studies have shown that green procurement in practice does not always extend very far into the procurement process. Some argue that it is easier to ask for the sustainability credentials of the suppliers, rather than to enter the product level and for example compare hazardous chemicals.

Using green procurement criteria can furthermore be a complex process. In some countries, governments try to facilitate green procurement by requesting that products have certain eco-labels. In the European Union, however, requesting a particular eco-label in procurement is not allowed in order to avoid discrimination of products and suppliers. Instead, the European Union is now working to make green procurement easier by developing criteria common for all countries, with the purpose to clarify to suppliers what will be expected of them in the future. This development is taking place in close cooperation with eco-labelling.

Green public procurement clearly has potential to generate large-scale shifts in the market by encouraging supply of greener products and services. However, there are many challenges. Governments are still learning about how to best use this policy instrument. Again, the most suitable way forward seems to be a combination between different policies and schemes, both at the national and international level.

5.5 POLICY FOR LIGHTING PRODUCTS

Energy efficient lighting is getting a lot of attention with potential savings for energy and greenhouse gas emissions, but also with the shift in technology. These aspects as well as how policies are driving them, are examined here in the context for policies in action. Lighting products are an increasingly important waste stream in society that can contribute to negative environmental impacts, if not handled correctly.

We often do not realise how important light is to us. However, it is easy to realise that much of our lives depends on the availability of appropriate light. The shift of light during the day regulates our bodies, and inappropriate light can severely damage our health in a number of ways.

Our need for light also has an important influence on how we are using natural resources in society – in particular, how we use energy. With the traditional incandescent light bulbs, used for over a century, our light sources have accounted for approximately 20% of all the electricity consumed in homes.[4] By using more energy-efficient light sources in Europe, there are significant estimated savings.

Such potential savings have, of course, attracted the attention of policy-makers and various policy instruments have been used to promote a shift to more energy-efficient light sources. Information has been a major approach in this context. Consumers have been told about the potential for saving energy and, consequently, money, by using low-energy light bulbs. Since 1998, most lamps placed on the European market have had to have the European energy label on its packaging.

Consequently, a prohibition of the use of old incandescent light was introduced from 2009. The legislation began by banning the use of non-clear (also called frosted) incandescent lamps, and from 2009 to 2012, various types of clear lamps have gradually been phased out, starting with lamps of 100W and more, including 25W and 40W lamps in 2012.[6]

It is often difficult for a government to introduce this type of ban of a product or a chemical. It requires a high level of consensus about the need for the restriction before it will be politically accepted. One main reason is that products are often sold on global markets. Banning a specific type of product has implications around the world in the sense that it can restrict trade between countries. As free trade is an important part of international agreements, you need significant evidence to introduce restrictions.



The European energy label indicates how energy-efficient a light bulb is on a scale from A to G with A marking the best performers and G the worst. Traditional incandescent light bulbs would typically belong to classes E to G, while the most common energy-efficient replacements would belong to group A. Since some years, group A is also divided into three levels covering A, A+ and A++. The energy labels are easy to understand, but have not necessarily played a major role when it comes to shifting the consumption towards more energy-efficient lamps.

Today, the most interesting replacements are compact fluorescent lamps and LED lamps. Using a compact fluorescent lamp means that you are saving in the order of 75% of the energy and you can use the same lamp ten times longer. By selecting a good LED light, you will save even more – up to 80% of the energy – and you will typically be able to use it up to fifteen times longer than an old light bulb.[5]

These seem to be convincing arguments, but many national governments and the European Union felt that the change was still not quick enough and decided to combine the informative instruments with the use of a regulatory instrument.

It is often necessary to start with less intrusive policy interventions, such as, for instance, eco-labels. Through these measures, you can build a better understanding of the need for change, allowing the market to gradually adjust to it. With time, the resistance towards a change will be reduced and you can make a more forceful intervention. However, shifting to new products often means introducing new problems. The shift from incandescent light bulbs to compact fluorescent lamps involves such a challenge in the form of mercury.

3 Swedish Competition Authority. (2011) Facts and Figures on Public Procurement. URL: www.msr.se/en/

4 International Energy Agency (IEA). (2006) Light's Labour's Lost: Policies for Energy Efficient Lighting. Paris: IEA.

5 American Department of Energy. (2014) How Energy Efficient Light Bulbs compare with Traditional Incandescents URL: http://energy.gov/energysaver/articles/how-energy-efficient-light-bulbs-compare-traditional-incandescents

6 European Commission. (2009) Changes: Bulbs and Packaging. URL: http://ec.europa.eu/energy/en/

All fluorescent lamps contain a small amount of mercury. For countries using coal-fired power plants, this amount of mercury may not add to the total national emissions of mercury, as mercury is also released when burning coal. For other countries, however, among them the Scandinavian countries, mercury emitted when disposing of or breaking fluorescent lamps adds to the total releases of mercury. As a countermeasure, Scandinavian countries have introduced collection systems and recycling processes for used lamps to extract the mercury together with various useful materials. These systems are designed based on the principle of extended producer responsibility.

Extended Producer Responsibility (EPR)

EPR is "a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to take-back, recycling and final disposal of the product"[7]

The focus is on *prevention* of environmental problems at source via the provision of incentives for changes at the design phase of a product's life. In theory, the incentives are provided though the delegation of responsibility to manufacturers. In Scandinavian countries there is EPR legislation covering a variety of end-of-life products and material including electronics, batteries, packaging, cars, among others.

Read more about the impact of EPR on innovation and greening products

7 Lindhqvist, L. (2000) Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems. Lund University.

Most experts in this field anticipate a gradual shift to LED lights. Not only due to the possibilities for additional energy-saving, long durability and avoiding mercury emissions, but also to the huge flexibility provided by well-designed LED solutions. In a school, for example, LED introduces the possibility to, with relatively easy measures, use various colour changes in the lighting. This can, for instance, boost morning energy levels among children and teachers, or be used to calm children down at times with high excitement and noise levels. In the same way, you can achieve positive effects in hospitals and in elderly care, where good light can help maintain sound daily rhythms, making it easier to sleep and even improving appetite. While this type of applications are novel, and scientists still disagree on many aspects, LED lights offer huge promises and we can expect much attention here in the coming years.





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