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Directorate-General Environment



Preparing a Waste Prevention Programme

Guidance document

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Contents

PREAMBLE	4
1. INTRODUCTION	5
1.1. CONTEXT.....	5
1.2. DEFINITIONS	6
1.3. STRATEGIES.....	10
2. POLICY FRAMEWORK	12
2.1. RELEVANT EU Strategies and initiatives.....	12
2.2. THE WASTE FRAMEWORK DIRECTIVE	13
2.3. INTEGRATION OF WASTE PREVENTION INTO OTHER POLICY AREAS	14
2.4. EXAMPLES OF NATIONAL AND REGIONAL WASTE PREVENTION PLANS	16
3. PLANNING A WASTE PREVENTION PROGRAMME	22
3.1. GETTING STARTED.....	24
3.2. PHASE ONE: ASSESSING THE SITUATION	25
3.3. PHASE TWO: SETTING PRIORITIES	26
3.4. PHASE THREE: ELABORATING A STRATEGY	28
3.5. PHASE FOUR: PLANNING & IMPLEMENTATION	29
3.6. PHASE FIVE: MONITORING PROGRESS.....	30
4. POLICY OPTIONS	36
4.1. STRATEGIES FOR WASTE PREVENTION	36
4.2. KEY STAKEHOLDERS	41
4.3. KEY WASTE STREAMS.....	44
4.4. WASTE PREVENTION STRATEGIES BY ADMINISTRATIVE LEVEL.....	48
5. FURTHER RESOURCES	53
5.1. PUBLICATIONS	53
5.2. USEFUL LINKS.....	54
6. Annex A: Principle Approaches to Identify the most Efficient measures for a waste prevention Programme	55
6.1. THE STAKEHOLDER AGREEMENT APPROACH.....	55
6.2. THE PLANNERS APPROACH – STRUCTURED ANALYSIS PROCEDURE	58

PREAMBLE

This handbook is designed to support EU Member States and other interested parties take advantage of the many opportunities in waste prevention and resource efficiency.

The revised Waste Framework Directive requires the Member States to create national waste prevention programmes by 12 December 2013. The objective of these programmes is to present a coordinated national approach to waste prevention, delineating targets and policies, and aiming to decouple economic growth from the environmental impacts of waste generation.

National waste prevention programmes should support Member States in decoupling economic growth from the environmental impacts of waste generation. With this in mind, short, mid-term, and long-term targets may be useful. The stabilisation of waste generation is a key preliminary aim, followed by targets for absolute reductions over five to twenty years. Progress should be monitored and stakeholders engaged throughout the development and implementation of programmes.

The objective of this handbook specifically is to clarify important concepts in waste prevention for national, regional and local authorities and to direct users to the most suitable waste prevention options for a given type of waste and administrative level. In addition to this objective, this document suggests a framework to help national authorities develop a waste prevention programme.

A transition towards waste prevention behaviour and an improved use of resources requires an integrated mix of measures. A range of best practices is highlighted throughout this handbook and examples of national and regional programmes employing an effective mix of measures are described in section 2. Detailed resources on waste prevention theory and practice are listed at the end of the handbook.

A separate guidance¹, accompanied by a number of best practice examples, has been prepared to address a specific problem of food waste prevention, which has been identified as one of the major priorities in the Resource Efficiency Roadmap, due to its relevance and its impacts on the environment, greenhouse gas emissions and global food security.

The Commission intends, together with European Environment Agency, to evaluate and compare the national Waste Prevention Programmes in 2014.

The present handbook reflects the views of DG Environment and as such is not legally binding: Binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union.

¹ http://ec.europa.eu/food/food/sustainability/index_en.htm

1. INTRODUCTION

1.1. CONTEXT

Waste is a key environmental, social and economic issue and a growing problem, the amount of waste generated in Europe continuing to rise each year. Approximately 3 billion tonnes of waste - 100 million tonnes of it hazardous - are thrown away in the European Union annually. This amounts to about 6 tonnes of solid waste for every European². Waste management has become increasingly sophisticated, as separate collection and recycling facilities have become commonplace and landfill and incineration standards have become more rigorous. However, rising global consumption patterns are putting increasing pressure on ecosystems and waste infrastructure. Growing waste loads point to inefficiencies in production, distribution and consumption processes, as well as money wasted. Given the increasing risk and public concern over climate change, it bears considering that active waste is one of the principal generators of methane, a potent greenhouse gas. Hazardous waste continues to present a public health problem. Waste represents resources (energy, paper, oil, precious metals, etc.) of which we have a limited quantity. A new perception of resources is key to tackling the waste problem.

The link between economic growth and waste generation is beginning to weaken in the EU. The generation of municipal waste per capita has slightly decreased in the EU-27 since 2000 (-4%), while the GDP increased by 33% between 2000 and 2010³. Exceptionally, waste generation in new Member States has remained relatively stable by weight since the 1990s. This may be due to a reduced incidence of heavy mining and construction waste and increased lighter paper and packaging waste.

Decoupling economic growth from the environmental impacts associated with waste generation is a key objective of the EU's revised Waste Framework Directive (Directive 2008/98/EC). Stabilising waste generation is no longer enough, waste growth in the EU must now reverse.

Waste prevention, the most efficient option in approaching this goal, can contribute to:

- reduction of environmental impacts induced by waste management, e.g. greenhouse gas emissions reductions, methane released from landfill sites in particular, as well as carbon dioxide from incineration
- improved resource efficiency through energy savings and reduced material use, as well as the "hidden" environmental impacts of resource extraction, manufacturing and distribution

² EUROSTAT and European Environment Agency statistics:

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Waste_statistics

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_%E2%80%93_GDP

³ Municipal Waste Generation, European Environment Agency assessment, 2008:

http://themes.eea.europa.eu/IMS/IMS/ISpecs/ISpecification20041007131809/IAssessment1183020255530/view_content

- reductions in the production of hazardous waste and therefore improved conditions for public health

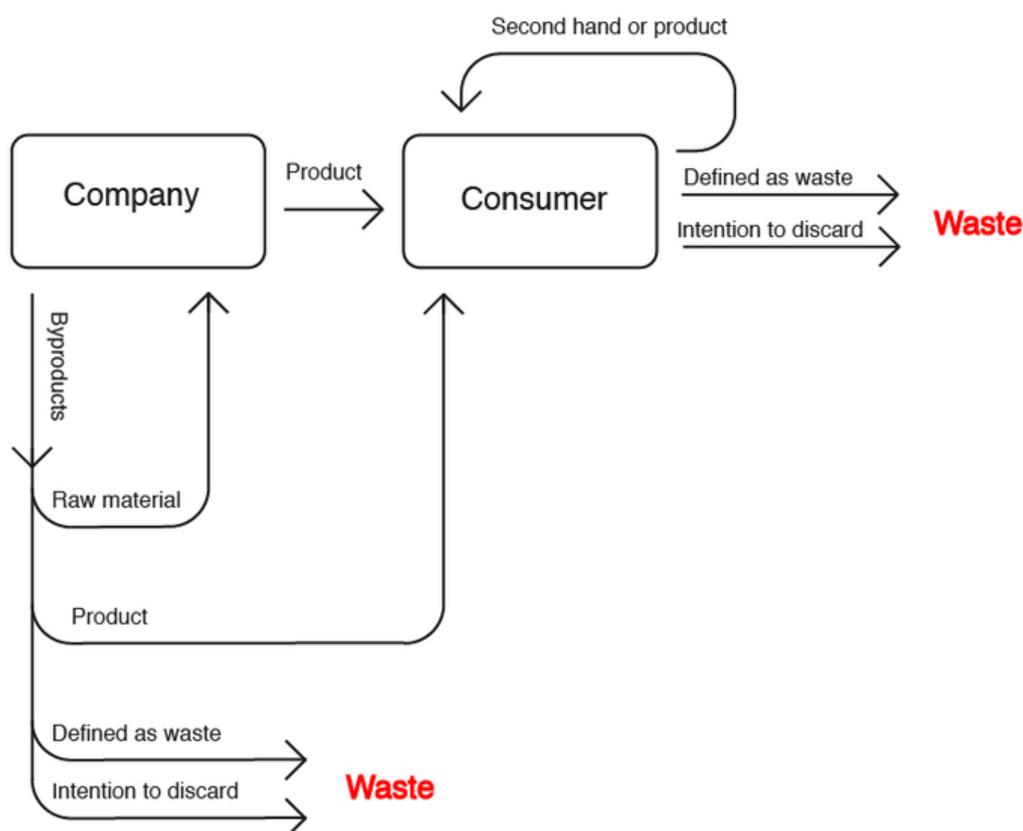
A broad objective, waste prevention affects and depends on a very wide range of stakeholders. It benefits from national targets and local authority engagement, but it depends fundamentally on changes in the attitudes and behaviour of households and businesses and on new paradigms in industrial processes and product design.

1.2. DEFINITIONS

Waste

Waste is defined in the Waste Framework Directive as an object the holder discards, intends to discard⁴. The table below illustrates how materials as transformed by companies and consumers may ultimately become waste.

Figure 1: Illustration of EU legal definition of waste



End-of-waste criteria have been developed by the European Commission for specific waste streams to determine when waste that has undergone recovery processes ceases to be waste. While an important application of resource efficiency policy, materials recovery for re-input into the

⁴ Waste Framework Directive, Article 24:

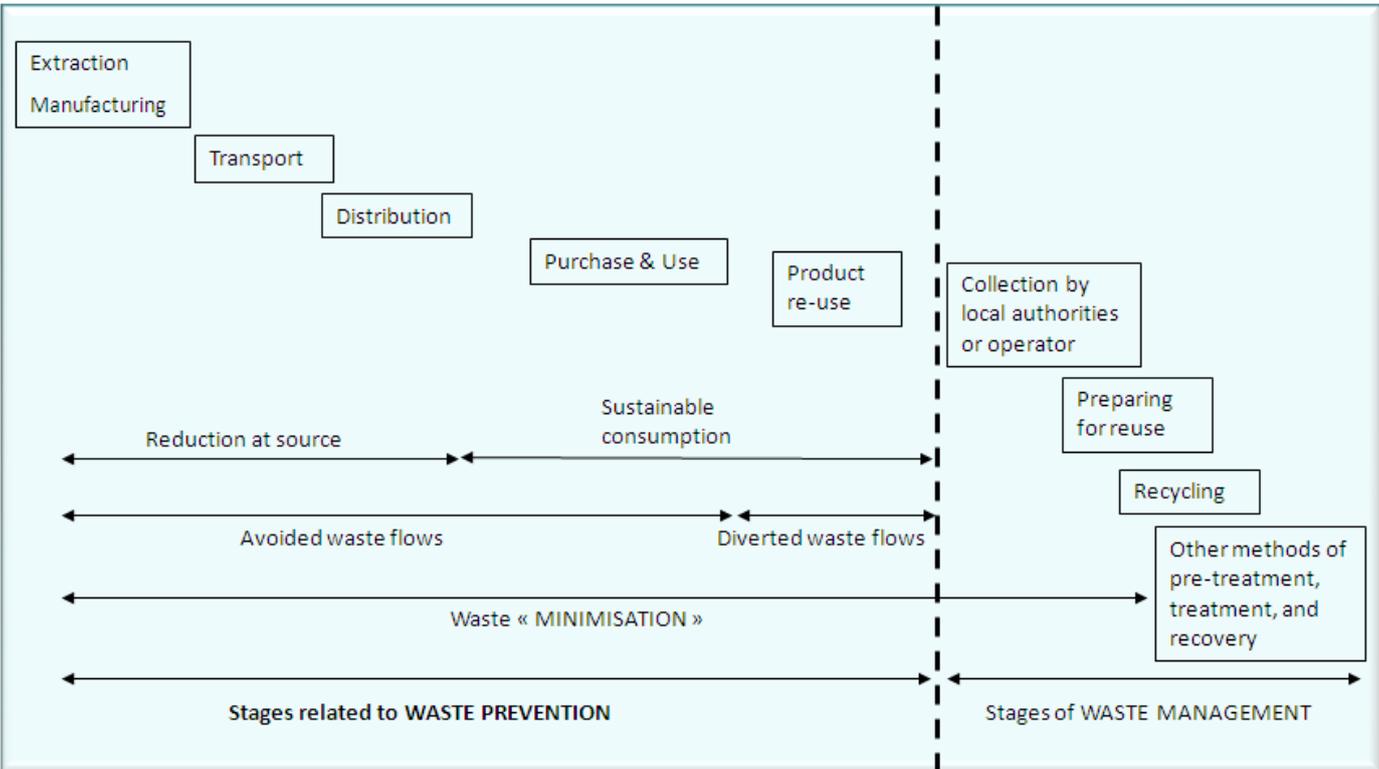
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF>

manufacture of products is not considered as waste prevention for the purposes of national waste prevention programmes. There is a clear distinction, clarified in the Waste Framework Directive, between waste and by-products of production processes that can be integrated into the creation of new products or exported for use elsewhere. Waste remains something that has been voluntarily or necessarily discarded.

Waste prevention

Waste prevention encompasses a range of policy options and has a broad range of benefits. Targeting at-source waste production, it reduces the amount and toxicity of waste before recycling, composting, energy recovery and landfilling become options. Waste prevention also includes measures to reduce the adverse impacts of the generated waste on the environment and human health. Waste prevention can be achieved by reducing the quantity of material used in the creation of products and increasing the efficiency with which products, once created, are used. Preventing waste by limiting unnecessary consumption and by designing and consuming products that generate less waste are forms of **strict avoidance** of waste. Waste prevention also encompasses actions that can be undertaken once a product reaches its end-of-life: rather than discarding the product, the final user should consider re-use, repair or refurbishment as options. Extending a product’s lifetime or considering options like reuse are forms of prevention though **diversion of waste flows**.

Figure 2: Illustration of definition of waste prevention⁵



⁵ Adapted from ADEME, the French Environment Agency, 2008

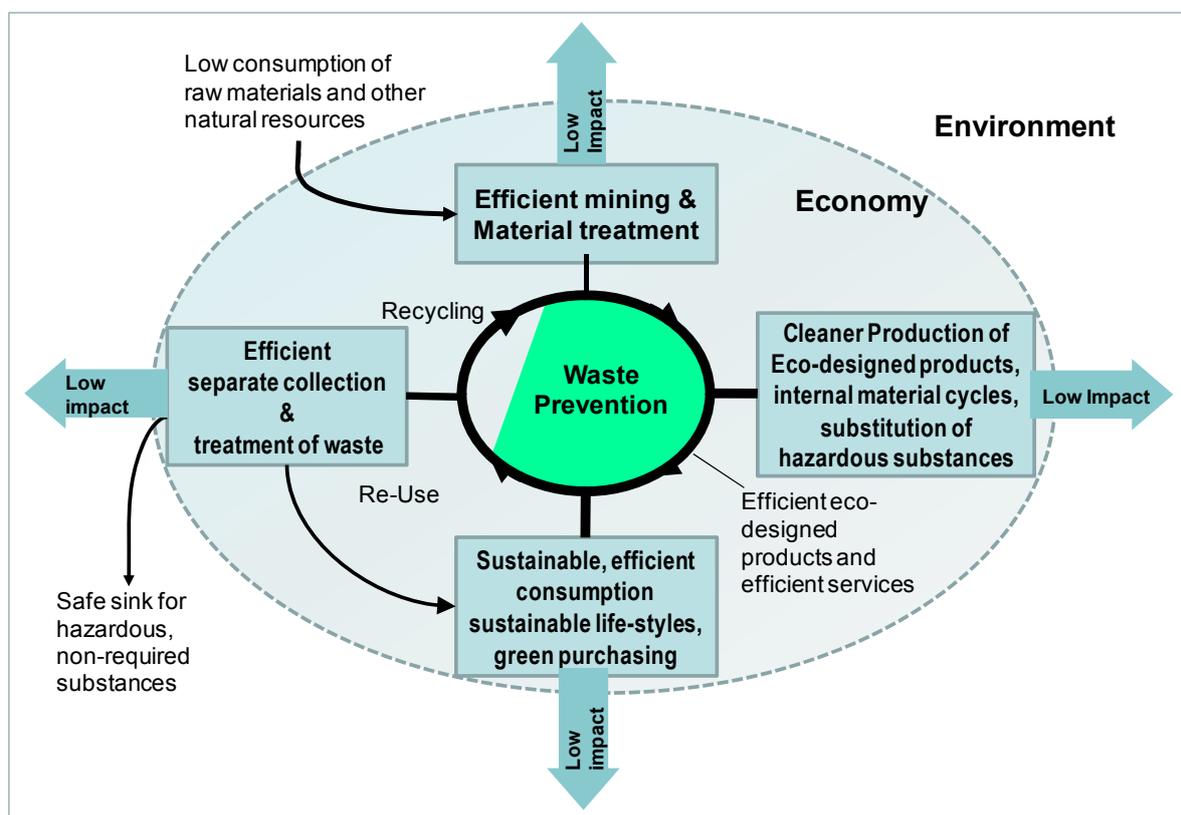
Qualitative prevention

Reducing the hazardous content of waste, rather than impacting the total volume of waste, is considered as qualitative waste prevention and contributes to reducing human and environmental exposure to hazardous materials.

Scope of a comprehensive waste prevention programme

A waste prevention programme has its origin in the waste management sector, its scope, however, comprises the whole economy, all material flows and products used by a nation, from their respective cradles to their discarding. Thus, a comprehensive waste prevention programme should not only concern the waste management sector but also the mining sector and productive industries, designers and service providers, the public and private consumers (see Figure 3). Consequently, all economic sectors may be stakeholders in the waste prevention programme and its preparation.

Figure 3: Scope of Waste Prevention (adopted from EEA 2007⁶)



⁶ EEA - European Environment Agency (2007): Belgrade Report 2007 - Chapter 6: Sustainable Consumption and Production (SCP) and Waste Management. Copenhagen.

The EU waste hierarchy

The waste hierarchy (as defined in Article 3 of the Waste Framework Directive) ranks waste management options in terms of their environmental impact. Waste prevention is the first tenet of the hierarchy and represents the most efficient and sustainable use of resources. Re-use is an important part of this tenet, because it keeps products in the consumption sphere for a longer period and thus avoids the creation of waste. Re-use implies that a product is used again for the same purpose for which it was originally conceived.

Next in the hierarchy, 'preparing for re-use' contributes to the same purpose, but deals with products which have already been discarded by their last owner and are therefore formally waste according to the definition provided in Article 3(1) of the Waste Framework Directive. This hierarchy level was introduced to make waste operators aware of the potential to divert products from the waste stream, as their sorting, cleaning and repair allows them to be used by someone else. Preparing for re-use is therefore regarded by this handbook as contributing to waste prevention in a wider sense; therefore promotion of re-use is included in the present guidelines.

Please find an illustration of the EU waste hierarchy below:

Figure 4: EU waste hierarchy



The lifecycle approach

Policy options undertaken under the framework of waste prevention aim to reduce the overall environmental impacts of the generation and management of waste. In order to evaluate these impacts, the life-cycle approach, that considers impacts from the extraction of raw material to the end-of-life of a product or service, shall be applied. When justified by life-cycle thinking, specific waste streams may depart from the waste hierarchy.⁷

⁷ As provided for in Article 4(2) of the Waste Framework Directive

Lifecycle thinking⁸ is stimulating a fundamental change in product design wherein the consumption of resources and the environmental impact of products created during all phases of their production, distribution, use and disposal are considered from the outset. **Extended Producer Responsibility (EPR)** is a strategy that encourages producers to consider the lifecycle of its products at the design stage, by widening their responsibility for the products they create to include their post-consumer end-of-life.

Lifecycle thinking in product design is part of the broader paradigm of **resource efficiency** – the use of “natural resources in the most effective way, as many times as possible, while minimising the impact of their use on the environment”⁹.

Materials Flow Analysis (MFA) provides an analytical framework for measuring the energy and resources used by a given economy. Relationships between human activities, material flows and environmental impact can be analysed using MFA tools, which include accounting mechanisms and indicators. **Sustainable Materials Management (SMM)** provides a new way of interacting with materials, repositioning wastes as potential resources and moving towards to cradle-to-cradle thinking. Defined by the OECD Working Group on Waste Prevention and Recycling in 2005, the approach considers environmental impact, economic efficiency and social equity in materials use and waste management.

Material efficiency (ME) describes the use of materials in a way that reduces the consumption, production or disposal of materials relative to previous processes. ME prevents waste while avoiding problems relating to the definition of waste, focusing on the lifecycle approach.

1.3. STRATEGIES

Waste prevention strategies available to Member States fall into three broad categories, implying different levels of involvement by public authorities: information, promotion and regulation.

Informational strategies, aimed to change behaviour and make informed decisions, include:

- Awareness campaigns
- Information on waste prevention techniques
- Training programmes for competent authorities
- Ecolabelling.

Promotional strategies, incentivising behavioural change and providing financial and logistical support for beneficial initiatives, include:

- Support for voluntary agreements
- Promotion of reuse and repair

⁸ Joint Research Centre JRC publications on Life Cycle Thinking: <http://lct.jrc.ec.europa.eu/>

⁹ WRAP: www.wrap.org.uk/wrap_corporate/about_wrap/resource_efficiency.html

- Promotion of environmental management systems
- Clean consumption incentives
- Promotion of research and development.

Regulatory strategies, enforcing limits **on waste generation**, expanding environmental obligations and imposing environmental criteria on public contracts, include:

- Planning measures
- Taxes and incentives, such as pay as you throw schemes
- Extended Producer Responsibility policies
- Green Public Procurement policies
- Ecodesign requirements.

These strategies are complementary and can be integrated into other relevant existing policy areas, such as sustainable consumption and production policy, environmental policy or waste management policy, or can compose a stand-alone national waste prevention programme. Economic instruments - if well designed and accompanied by complementary measures – can contribute very effectively to waste prevention and should be taken into consideration.

Waste prevention can be approached in many different ways and this handbook discusses relevant measures for targeting key stakeholders and key waste streams. People, and the need for behaviour change, are the key to waste prevention however, and insight into consumer and business behaviour will enhance the efficacy of selected measures. An integrated mix of measures is ultimately required to substantially address the waste problem and change the way resources are managed.

2. POLICY FRAMEWORK

2.1. RELEVANT EU STRATEGIES AND INITIATIVES

EU Sustainable Development Strategy (SDS)

One of the key challenges highlighted in the renewed EU SDS of 2006 is to improve the management and avoid the overexploitation of natural resources. Its main targets are to avoid the generation of waste and to enhance the efficient use of natural resources.

The Thematic Strategy on Waste Prevention and Recycling

The Thematic Strategy on the Prevention and Recycling of Waste adopted in 2005 sets as long term goal for the EU to become a recycling society that seeks to avoid waste and uses waste as a resource. To this end, the Strategy sets out key actions to modernize the existing legal framework and to promote waste prevention, reuse and recycling, with waste disposal only as last resort. The Commission has published a report in January 2010 on the implementation of the Strategy highlighting the accomplished progresses and remaining challenges, notably in terms of waste prevention¹⁰. This report highlights the importance of the use of economic instruments, notably to favour prevention and improved waste management in line with the waste hierarchy.

The Sixth Environment Action Programme (6EAP)

The 6EAP (2002–2012) sets out the EU's key environmental objectives. One of the overall goals is to decouple resource use and waste generation from the rate of the economic growth. The programme mentions an overall reduction in the volumes of waste generated through waste prevention initiatives and a significant reduction in the quantity of waste going to disposal. It further encourages reuse and aims to reduce the level of hazard, giving preference to recovery and especially recycling, making waste disposal as safe as possible, and ensuring that waste for disposal is treated as close as possible to its source. The 7EAP is currently in preparation; one of its objectives is to implement the orientations detailed in the Roadmap on Resource Efficiency.

Action Plan on Sustainable Industrial Policy (SIP) – Sustainable Consumption and Production (SCP)

SCP is about achieving more with less. In July 2008, the European Commission adopted, through coordinated efforts of DG ENV, DG ENTR, and DG TREN, an Action Plan on SIP and on SCP to support the economic competitiveness of the EU industry through improved energy and resource efficiency, as well as an improved capacity to develop appropriate technological solutions.

¹⁰ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0013:FIN:EN:PDF>

Resource Efficiency Roadmap

The European Commission has set out a roadmap aimed at transforming Europe's economy into a sustainable one by 2050. The Roadmap to a resource-efficient Europe¹¹ adopted in September 2011, outlines how a resource efficient growth can be achieved, identifying the economic sectors consuming most resources and suggests tools and indicators to help guide action in the EU and at international level. In particular, the roadmap states that waste has to be regarded as a resource to be fed back into the economy and a higher priority needs to be given to re-use and recycling and incentives for waste prevention and recycling have to be created. In particular, the Roadmap includes the following "aspirational targets" for waste management, to be achieved by 2020: waste generation should be reduced in absolute terms, re-use and recycling should reach the 'maximum feasible' level and be economically attractive, energy recovery should be limited to not recyclable waste and landfilling should be virtually eliminated.

2.2. THE WASTE FRAMEWORK DIRECTIVE

The Waste Framework Directive was established in 1975 and provides a legal framework for all EU waste legislation. It has been updated repeatedly in response to changes in the waste burden and waste management tools. The revised Waste Framework Directive of November 2008 seeks to position the EU as a 'recycling society', with broad aims "to avoid waste generation and to use waste as a resource"¹². Article 29 of the Directive calls for the creation of waste prevention programmes, aiming to break the link between economic growth and the environmental impacts associated with the generation of waste.

With this goal in mind, Article 29 of the Waste Framework Directive requires Member States to:

- Establish waste prevention programmes by December 2013
- Assess existing national waste prevention measures
- Define national waste prevention objectives
- Evaluate the suitability of the strategies for inclusion in national waste prevention programmes
- Take appropriate measures to promote product re-use
- Support the establishment and development of re-use and repair networks, as well as public procurement criteria and quantitative objectives for re-use
- Determine qualitative or quantitative benchmarks for waste prevention measures
- Adopt targets and indicators, if appropriate, to monitor and evaluate the success of waste prevention measures and progress towards objectives

¹¹ See: http://ec.europa.eu/environment/resource_efficiency/about/roadmap/index_en.htm

¹² Waste Framework Directive 2008, Article 28:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF>

- Review and revise waste prevention programmes at least every six years.

By the end of 2014, the European Commission will present a report on prevention and propose measures, if appropriate, including waste prevention and decoupling objectives, to be achieved by 2020. National waste prevention programmes may need to be adapted to meet these new targets.

Article 28 of the Directive calls Member States to create waste management plans, assessing the national situation and the success of existing waste policies and planning the necessary measures to provide a sufficient waste management infrastructure which is in line with the waste hierarchy. Waste prevention programmes may be integrated into this plan or into environmental or sustainable consumption and production programmes, but in this case, the waste prevention programme should be clearly identified and intelligible as a separate programme.

In addition, Article 8 authorises Member States to establish extended producer responsibility compliance requirements for producers, manufacturers, processors or distributors, including free take-back programmes and public disclosure obligations on product reusability and recyclability. It also officially introduces the waste hierarchy as an order of preference for waste management and policy for the minimisation of environmental impact, with the provision that this may vary for specific waste streams.

2.3. INTEGRATION OF WASTE PREVENTION INTO OTHER POLICY AREAS

2.3.1. WASTE PREVENTION AS A CROSS-CUTTING AREA OF POLICYMAKING

Waste prevention is a cross-cutting area of policymaking and has direct relevance to a considerable number of already established policy areas, both in the field of the environment (e.g. environmental management systems) as well as specific primarily non-environmental areas (such as innovation policy), which have good potential to decrease the amount and/or the adverse impacts of generated waste, both at EU and Member State levels.

Examples of **policies with direct relevance to waste prevention in environmental areas at the EU level** include, inter alia, the European Commission's Communication on Integrated Product Policy (IPP), the integrated Pollution Prevention and Control Directive (IPPC), the regulation on the Eco-Management and Audit Scheme (EMAS) and on the EU Ecolabel, the Ecodesign Directive, the REACH Directive, the Environmental Technologies Action Plan (EATP), the Sustainable Consumption and Production and Sustainable Industrial Policy (SCP/SIP) Action Plan and the European Commission's Communication on Green Public Procurement (GPP).

Given the potential relevance of waste prevention to a broad range of "traditional" policy areas, as described above, when planning waste prevention programmes, the questions of **policy integration** and **policy coherence** must be paid special attention (please see definitions below).

The concepts of environmental policy integration and policy coherence defined

Environmental policy integration (EPI), according to the European Environment Agency (EEA), refers to a continual process ensuring environmental issues are reflected in all policymaking. This generally demands changes in political, organisational and procedural activities, so that environmental issues are taken on board as early as possible and considered continuously during implementation. The result of EPI should be an overall improvement in policy and its implementation, in line with sustainable development objectives.

Policy coherence, according to the Organisation of Economic Co-operation and Development (OECD), can be defined as the systematic promotion of mutually reinforcing policy actions across government departments and agencies, creating synergies that aid the achievement of agreed objectives.

2.3.2. HORIZONTAL AND VERTICAL INTEGRATION AND INTEGRATION ALONG THE LIFE-CYCLE STAGES OF PRODUCTION AND CONSUMPTION

The integration of environmental aspects into other policy areas, namely **horizontal integration**, has long been recognised as important in the EU. In this area considerable effort has been made both at the EU and Member State level, by forging high level political commitments via the definition of national sustainable development strategies (NSDSs) and various sector-specific environmental strategies at the Member State level as well as with the gradual introduction of policy impact assessment requirements at both the EU and Member State level. However, evidence shows that progress in general has been limited and the real potential of EPI is yet to be taken advantage of (see e.g. EEA 2005, IEEP 2006 and CEC 2007). Policies with close relevance to waste prevention in primarily non-environmental domains include those which define the structure of the economy, the directions of economic and social progress and the development of infrastructure, all of them creating the “framework conditions” or the context of waste prevention. Examples of policy areas in this respect include economic development, industry and agriculture, transport and infrastructure, innovation, technical standardisation, employment, education, consumer relations and consumer protection, housing and public health.

When planning for waste prevention policies, the question of **vertical integration**, namely integration amongst the different levels of governance, such as EU, national, regional and local levels should also be given special importance. The challenge in this respect is how policies at the different levels of governance could mutually reinforce each other by taking into consideration the competencies for policy-making of the different structures implied.

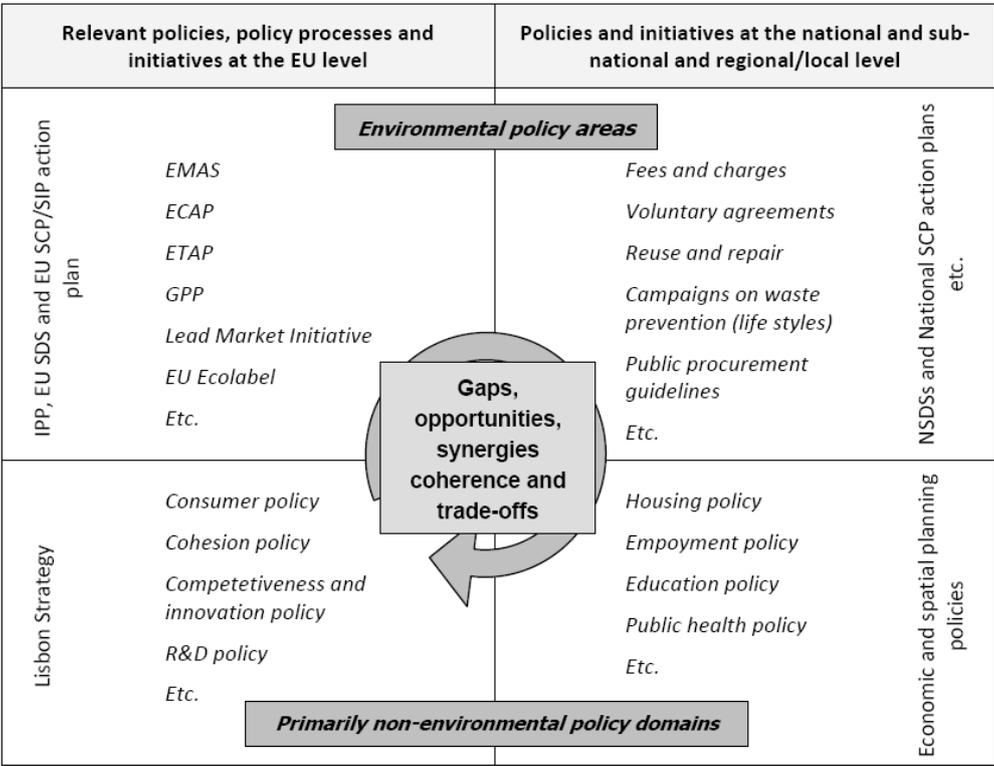
In the particular context of waste prevention, however, integration must go beyond the concept of EPI and should include also the **integration of policies along the life-cycle stages of production and consumption**, namely how a product is designed, manufactured, made available to the consumer and finally used. A typical example would be the creation of a better link between “supply” and “demand side” policies, such as EMAS, the EU Ecolabel and GPP, the EU Ecodesign in terms of EU policies (note the need for integration at the same time in the other two dimensions as well, i.e. horizontal and vertical integration).

The particular challenge of policy integration and coherence in the context of waste prevention plans is that the different dimensions of integration (i.e. horizontal, vertical and integration along the life-cycle) should be considered at the same time. Therefore, parallel with opportunities to create synergies and improve policy coherence, there will be also several trade-offs to be considered.

One of the key questions which could therefore be useful to consider when preparing national waste prevention programmes is what gaps and opportunities exist for waste prevention concerning policies already in effect and policies being planned, how to ensure the coherence of relevant policies and create synergies as well as what trade-offs to tackle in this context.

In particular, waste prevention should be part of an integrated reflection leading to waste management policies contributing to the respect of the waste hierarchy, in conjunction with the waste management plans and the planning of investments.

Figure 5: Waste prevention as a cross-cutting policy area: focus on gaps, opportunities, synergies and coherence as well as on trade-offs when planning for waste prevention



2.4. EXAMPLES OF NATIONAL AND REGIONAL WASTE PREVENTION PLANS

This section describes a number of national and regional waste prevention plans already in place, notable for their diversity of approaches and objectives.

2.4.1. AUSTRIA

The Waste Prevention and Recovery Strategy of Austria 2006-2011¹³ aims broadly to promote resource conservation and reduce the generation of greenhouse gas emissions, hazardous waste and other pollutants. Scientific research on construction and industrial waste, recycling and extended producer responsibility was commissioned and a stakeholder group of waste management experts and interest groups was actively consulted. The strategy focuses on:

- The minimisation and reuse of construction and demolition waste
- The promotion of Material Flow Analysis for products
- The development of reusable packaging

The strategy is implemented at regional level through the Austrian Provincial Waste Management Plan, which calls for regional authorities to:

- Analyse the waste generated locally and design waste prevention campaigns based on local circumstances
- Stimulate public engagement through awareness campaigns
- Promote household composting
- Publish guidelines for product hire, repair and resale
- Minimise waste in public works and increase use of recycled construction materials
- Introduce EMAS to local businesses to support business waste reduction

2.4.2. CALIFORNIA

California's landmark 'Integrated Waste Management Act' of 1989 required that the state's 450 jurisdictions divert 25% of waste from landfill by 1995 and 50% by 2000. This objective required the introduction of waste prevention measures. The California Integrated Waste Management Board was created to oversee the 92 million tonnes of waste the state generates annually; the Board also issues grants and loans to cities, counties, businesses and organisations who develop programmes to meet the state's reduction, reuse and recycling targets. By 2005, California was diverting 52% of its waste from landfill annually.

The Board maintains the Waste Prevention World website, the source of the most comprehensive waste prevention information online. The website¹⁴ features:

- Definitions of waste prevention terms and tools
- Guides on waste prevention for households and for offices
- A database of reusable alternatives for common single use products

¹³ Further information available at: www.bundesabfallwirtschaftsplan.at/article/archive/16758

¹⁴ Further information available at: www.ciwmb.ca.gov/WPW

- The Waste Prevention Information Exchange: a directory of relevant resources and documents on waste prevention which is continually updated by users
- Comprehensive resources for businesses, including information on grants, loans, awards, all relevant waste legislation, market development programmes, green purchasing, materials exchange platforms and waste assessment tools, as well as business case studies, factsheets and waste prevention posters and pamphlets for offices

The website's interactive nature and its exceptionally thorough resources have made it a useful tool for California counties and businesses, some of which hold national records in waste prevention achievements.

2.4.3. ENGLAND

The Waste Strategy for England was published by DEFRA in 2007¹⁵. The strategy describes the context for waste prevention and management in terms of 'One Planet Living', explaining that if every country used natural resources at current UK levels, it would take three planets to meet demand. Given this outlook, zero growth goals are not sufficient. The waste strategy is part of the UK's wider framework of the carbon and resource management. The objectives of the new strategy, as relates to waste prevention, are to:

- Strengthen incentives for households, businesses and local authorities to reduce waste
- Decouple waste growth from economic growth and emphasise waste prevention and reuse over other waste management strategies
- Develop agreements with producers of specific waste streams to reduce waste and increase recycling
- Reduce household waste generation by 29% by 2010 and by 45% by 2020

The strategy features greater targets for recycling and energy recovery.

2.4.4. FINLAND

Finland's National Waste Prevention Programme¹⁶ was developed to reduce the generation of waste and minimise its harmful impact on human health and the environment. Released in 2009 as part of the Finnish National Waste Plan for 2016 entitled 'Towards a Recycling Society', the programme aims to:

Improve the material efficiency of products, by:

- Incorporating material efficiency criteria into product standards, in consideration of natural resources used and waste generated during product lifecycles, noting particularly any hazardous waste created

¹⁵ Further information available at:

www.defra.gov.uk/ENVIRONMENT/waste/strategy/strategy07/pdf/waste07-strategy.pdf

¹⁶ Further information available at: www.environment.fi/default.asp?contentid=322125&lan=en&clan=en

- Increasing consumer access to information about durability through product labelling
- Expanding the service centre for material efficiency, which provides advisory services to businesses, government authorities and households, to include the administration and promotion of product-specific material efficiency agreements and product labelling
- Including minimum requirements for product durability, updating and repair in public procurement criteria

Increase the material efficiency of industry and construction, by:

- Developing reuse infrastructure for products and building components
- Testing sectorial agreements as an instrument for product material efficiency
- Expanding support services for SMEs on waste management and material efficiency
- Clarifying the organisation of waste prevention advisory services, with provisions for waste under producer responsibility in particular

Extend the useful life of buildings, by:

- Promoting regular building maintenance and resource efficient building renovation to increase the useful life of buildings and thus decrease the generation of construction and demolition waste
- Promoting an environmental classification system for the construction of new buildings

Reduce the generation of household waste and boost consumer interest in eco-efficient products and services, by:

- Improving the provision of waste prevention advice and information at municipal level, financed by waste levies according to the polluter pays principle
- Providing national advisory services on material efficiency

2.4.5. IRELAND

The National Waste Prevention Programme of Ireland¹⁷, launched in 2004, is managed by the Environmental Protection Agency (EPA). Updated in 2008 with the publishing of the EPA's 'Prevention Plan 2009-2012', the programme has adapted to meet the requirements of the 2008 revised Waste Framework Directive. The programme considers a significant change in the attitudes and behaviours of people, whether at work or leisure, as the key to a successful waste prevention strategy. The updated plan points to opportunities in current economic uncertainty, as consumers begin to value reuse and repair over convenience. The key features of Ireland's national waste prevention programme are:

¹⁷ Further information available at:

www.epa.ie/downloads/pubs/waste/prevention/Prevention%20Plan%202009-2012%20FINAL2.pdf

- The **Local Authority Prevention Demonstration Network**, building local authority capabilities to assisting commercial and community waste prevention activity, through funding, training and networking opportunities.
- The **Green Business Initiative (GBI)** promotes resource efficiency through reduced wastage of materials, consumables, water and energy. The initiative provides supporting services for businesses through an online site assessment, benchmarking tools, telephone and on-site assistance.
- The **Green Hospitality Awards**, a GBI programme recognising and promoting waste prevention and emissions reduction achievements in hotels, and expanding to include restaurants, catering enterprises and hospitals.
- The **National Hazardous Waste Management Plan**, spanning 2008 to 2012, aims to reduce hazardous waste generation, curtail unreported hazardous waste disposal, reduce exports of hazardous waste and to minimise the impact of remaining hazardous waste materials.
- The **Packaging Waste Prevention Programme** helps Irish businesses minimise their use of packaging materials and promotes achievements in packaging reduction through the Repak Awards
- The **Green Home Programme**, building on the existing Green Schools Programme, provides information on waste prevention and energy efficiency for households.

2.4.6. JAPAN

Japan created its waste management initiative, 'A Sound Material Cycle Society', as part of the 3R Initiative launched at the G8 Sea Island Summit in 2004¹⁸. 'A Sound Material Flow Society' is defined as one which 'environmental load is reduced' and the 'consumption of natural resources is minimised'.

Japan's 3Rs are heavily weighted towards waste prevention. The emphasis of the Japanese programme from the outset is on eco-design and life-cycling thinking, not only in the 'Reduction' and 'Reuse' sectors of activity. The third R, 'Recycling', considers waste as a resource in itself, rather than a waste management challenge. The plan was developed in response to the increasing volumes of waste generated in Japan, on-going rapid industrial development, and the limitations imposed by Japan's relatively small land mass.

Features of the 3R Initiative:

- The 3R Initiative is governed by framework legislation, the 'Fundamental Law for establishing a Sound Material Cycle Society', and a related package of laws on waste management, green purchasing, and on specific wastes, including packaging, biodegradable materials, electronic waste, construction waste and automobiles
- Increasing business and public awareness is a major feature of the strategy

¹⁸ Further information available at: www.env.go.jp/recycle/3r/en/outline.html

- Partnerships between business and industry with universities and research institutions have been strengthened or developed to work on eco-design and waste control issues
- The Initiative sets clear targets, and evaluates progress using indicators based on 'Material Flow Accounts', focused on productivity, cyclical use rate and final disposal quantities
- In addition to its national programme, Japan plans to establish the 'Asia 3Rs Research and Information Network' for policy and best-practice sharing in the region.

Japan expects success to depend on the institution of 3R programmes at local level. Broad factors for success have been identified:

- Governance and legislation
- Education and awareness building
- Technology issues, including eco-design and environmental management systems
- Financial issues, namely those taxes and subsidies that influence waste generation

3. PLANNING A WASTE PREVENTION PROGRAMME

A waste prevention programme should not be a mere list of top-down-measures prescribed by the national government but a plan which integrates the interests and concerns of interested and affected parties (stakeholders) based on a commitment to carry on the programme.

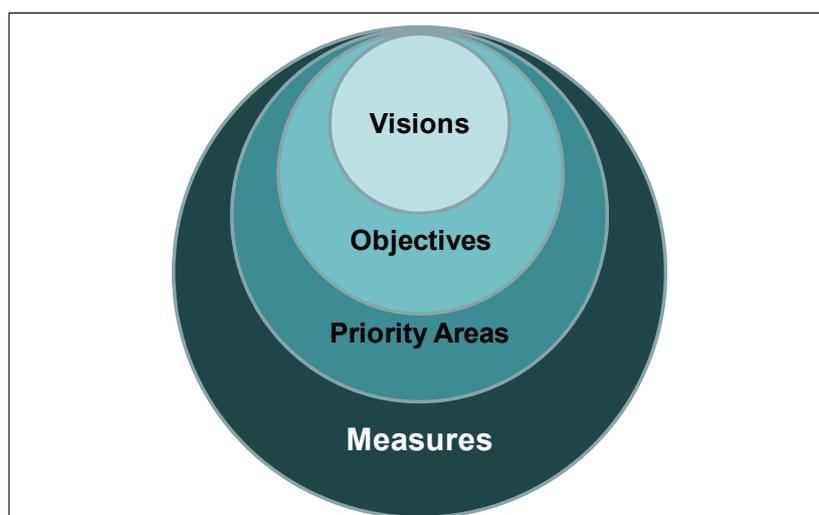
There are hundreds of potential or existing waste prevention measures, instruments and initiatives which could be integrated into the programme. The main task of the programme therefore is to provide a global vision and a framework that builds up on existing initiatives and to add the most efficient and effective complementary measures.

For dealing with such a large number of options while providing a vision and a focus, it is advisable to follow a multistep approach (see Figure 6)

- from a vision of how the total economic system of a nation which generates waste can and should work in for example 10 years
- to defining the objectives which shall lead the programme
- to setting the priority areas on which the programme should focus
- to selecting and combining the measures which shall bring about efficient low environmental impact material systems.

In each of the steps the scope should be opened up first to include all efficient options and then narrowed down to the most effective options. **Annex A** provides some further explanation on how this can be done in practice.

Figure 6: Development path for preparing the waste prevention programme (adopted from BMLFUW 2007¹⁹)

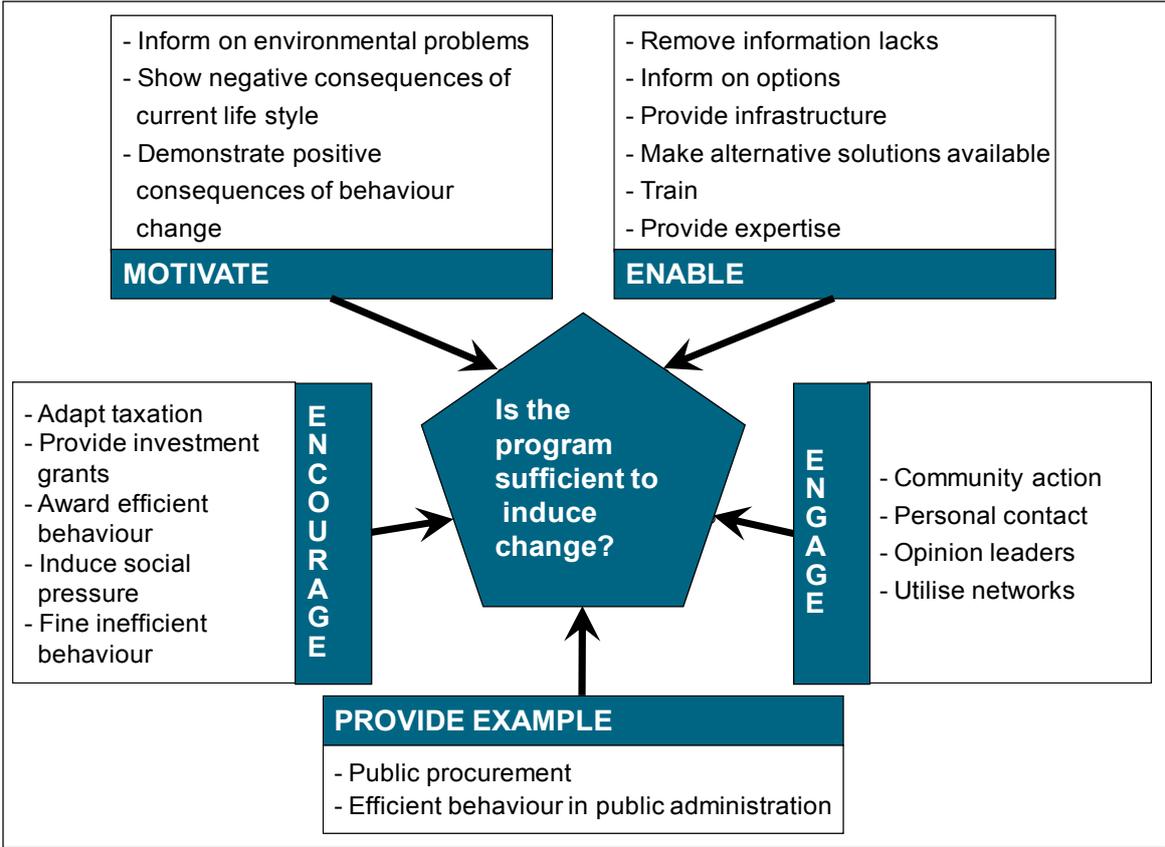


¹⁹ BMLFUW - Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (2007): MUT Masterplan Umwelttechnologie. Wien. <http://www.umwelt.net.at/article/articleview/56024/1/18005>.

The selected objectives and measures shall allow the waste prevention programme to fulfil its task, i.e.:

- To motivate interested and affected parties for becoming more resource efficient and using less pollutants
- To get them involved and to encourage them
- To enable them by giving example and by other means (see Figure 7).

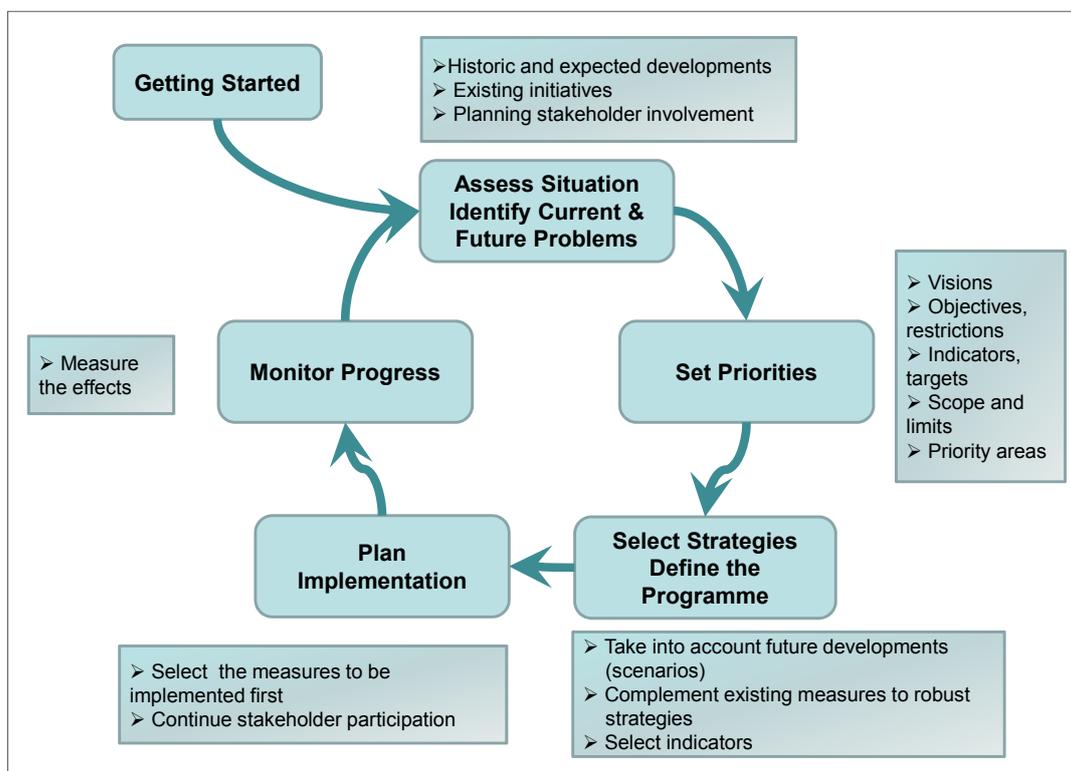
Figure 7: Tasks of the waste prevention programme (adapted from Jackson 2005²⁰)



While recent uncertainties regarding raw material prices and future resource availability, as well as the adoption of the Waste Framework Directive, may have triggered the preparation of waste prevention programmes, this should be regarded as a continuous process of programme preparation, implementation, monitoring, evaluation and adaptation as shown in Figure 8.

²⁰ Jackson, T. (2005): Motivating sustainable consumption. Sustainable Development Commission, Stirling, UK.

Figure 8: The Waste Prevention Programme as an on-going process



3.1. GETTING STARTED

There are two main factors which contribute to the success of the programme:

- The quality of the knowledge base and
- The commitment of decision makers as well as the interested and affected parties to carry the programme on.

Therefore the preparation of the waste prevention programme should start by following two steps

1. The establishment of a knowledge base on:
 - the historic and expected future development of material and waste flows and their environmental impacts
 - on efficiencies of material use, potentials to efficiency improvements and ecologic/technologic/economic/social barriers which inhibit improvements
 - on instruments to overcome these barriers and their effectiveness;
2. The establishment of a project team which includes:
 - Core decision makers
 - Experts for the technical/socio-economic analyses, project organization and workshop moderation
 - Stakeholders, who on the one hand represent a broad range of opinions, concerns and interests and on the other hand, are willing to identify common ground and to contribute to waste prevention.

The size of the project team should be large enough to cover a broad range of views and interests, however, small enough to allow plenary discussions and integration of opinions. A team of 30 to 35 persons seems to be a reasonable size. It is not necessary that stakeholder experts represent the

official opinion of their organisations. They should rather feed in their own expert opinion. However, they should be among the opinion leaders of their organisations.

3.2. PHASE ONE: ASSESSING THE SITUATION

An initial assessment of current waste prevention performance, using available data on waste and waste prevention, is an important starting point. There are evident difficulties in measuring waste prevention, but certain statistics can be reliable in charting progress on defined objectives. The following statistics are helpful in assessing the current status of waste prevention and for creating baselines:

- Quantities of collected waste per person, quantities of hazardous waste generated per person
- Public awareness of and declared actions for waste prevention
- Use of waste preventing services e.g. repair and reuse centres, home composting²¹
- Consumption of ecolabelled products
- Percentage of citizens covered by pay-as-you-throw (PAYT) schemes
- Products covered by producer responsibility schemes, etc. .

In addition to waste cycle data, information on national demographics, socio-economic characteristics, available infrastructure, existing waste management and reuse systems and trade and manufacturing activities should be collected.

An analysis of existing policies in place at national, regional and local level is crucial in determining which policies are working and in identifying thematic areas which have not yet been addressed. Consider the range of initiatives used and their results so far in assessing what works well locally and what should be expanded. An inventory of existing producer responsibility policies for example will be essential before expanding this policy area. There may be opportunities to forge partnerships between waste prevention programmes operating at different administrative levels and to develop synergies between regional programmes. Trade-offs between measures, unintended consequences of existing measures, and competition for existing infrastructure and services should also be considered here.

Research on motivations and barriers to waste prevention behaviour has been conducted in recent studies, for instance by Defra²². National authorities have much to gain by identifying the key barriers and drivers for change in waste prevention behaviour specific to their country, as these will help guide the selection of measures implemented.

The involvement of stakeholders from the outset is essential both in gathering data and taking stock of measures already in use. The inclusion of relevant stakeholders and the general public in the

²¹ Home composting could be regarded as waste prevention in a wide sense (see section 3.6.2)

²² Household Waste Prevention Evidence Review, Defra's Waste and Resources Evidence Programme: http://randd.defra.gov.uk/Document.aspx?Document=WR1204_8366_FRP.pdf

elaboration of waste prevention programmes is furthermore enshrined in Article 31 of the revised Waste Framework Directive. Through the launch of a formal consultation, stakeholders involved in existing waste prevention activity or relevant fields will be identified or will identify themselves. The members of the consultation will be key resources in the subsequent phases of programme development and their continuous involvement will ensure that the programme designed will be relevant, useful and achievable.

3.3. PHASE TWO: SETTING PRIORITIES

This preliminary phase in the development of a waste prevention programme allows authorities to define their overall approach, the role of participating bodies and the goals the programme will pursue. This is also the time to think about the **strategic vision** of the programme and how waste prevention fits into and contributes to a sustainable society. The following section guides you through decisions on priorities, scope and targets to make when formulating a programme.

Scope

- Define whether the waste prevention programme will be an integrated part of the national or regional waste management plan, the national or regional environmental strategy or whether it will exist independently, as required by Article 29 (1) of the Waste Framework Directive 2008/98/EC.
- Will the programme address waste prevention by:
 - ➔ Stakeholder (e.g. Households, Businesses)
 - ➔ Waste Stream (e.g; Biodegradable, Paper, Hazardous)
 - ➔ Phases of Lifecycle (Design, Production, Consumption)

National Plan, United States

The Waste Minimisation National Plan is a voluntary programme that has major goals on reducing hazardous wastes. It focuses on reducing certain chemicals in wastes rather than the quantity of wastes as a whole. The targets are to reduce the amount and toxicity of the most persistent, bio-accumulative and toxic constituents by 25% by 2000, and by 50% by 2005.

Targets

Waste prevention programmes should keep in mind the general aims of breaking the link between economic growth and the environmental impact of waste generation and moving towards a zero waste economy. Within this framework, quantitative goals with clear deadlines are helpful in mobilising a shift towards waste prevention attitudes and practices or towards more efficient management of materials. Targets should take into account existing trends in waste generation and the existing infrastructure and services that can help public authorities achieve selected goals.

The following steps may be useful in determining appropriate objectives:

Step one: Geographical scale of targets

Quantitative targets for are helpful at national, regional and local level. Countries with strong regional authorities may wish to operate waste prevention programmes at this level. An ambitious national target accompanying a major awareness campaign is useful in increasing the visibility of the measure and in stimulating the collection and monitoring of waste prevention evidence.

Step two: Quantitative or qualitative targets

Quantitative targets, reductions in collected waste and increases in declared public awareness for example, are useful tools at all geographical levels. Results might be measured as weight of avoided waste or greenhouse gas emissions, or a combination of both. There is not necessarily the same direct ratio between avoided waste generation and avoided emissions for all waste types. The benefits of one tonne of avoided aluminium waste and one tonne of avoided concrete waste, for example, differ significantly.

The Courtauld Commitment

The Courtauld Commitment, a voluntary agreement between manufacturers, retailers and packaging associations led by WRAP in the UK, achieved its aim of zero growth in packaging in 2008.

Qualitative targets are particularly helpful when targeting difficult waste streams. Goals of preventing the use or creation of hazardous materials and of reducing the hazardous content of waste generated in production processes effectively specifically address business and industry.

Step three: Data collection

When determining any type of target, consider whether the data required to substantiate results is already available. Does this data exist at national, regional and local level? Is currently unavailable data difficult to collect?

Step four: Timeframe

What is the time horizon of the programme and the initiatives taken? How does this time period relate to other relevant waste plans or initiatives? Is the time horizon sufficient to attain the desired results? Consider whether ambitious goals over a longer timeframe or achievable short-term goals suit the general approach and priorities of the national programme.

Step five: Voluntary or obligatory targets and instruments

Targets may be shared goals committed to through voluntary agreements, or requirements for certain sectors accompanied by penalties for non-compliance.

Step six: General or focused targets

General targets may be expressed in terms of reductions in waste collected by authorities for landfilling and recycling or reductions in greenhouse gas emissions created through waste management (in million tonnes of carbon dioxide equivalent).

Sector specific targets may focus on households and businesses separately, as the waste burden produced and the channels for providing information and training may differ. In general, the smaller

the sector of focus chosen, the more accurately results can be measured and the greater the proportion of individuals affected by the campaign within the given parameters.

Targets may focus on key waste streams, accompanied by strategic awareness campaigns or regulatory measures. Paper, packaging, electric and electronic appliances, biodegradable and construction and demolition waste lend themselves well to individual targets.

3.4. PHASE THREE: ELABORATING A STRATEGY

This phase of the strategy involves measures to ensure that the programme put in place is well suited to the particular circumstances of the Member State and that it will be widely accepted and engaging. Stakeholder involvement is crucial to the success of programme and the achievement of goals. Early involvement in the process is very important in order to secure ownership of the programme.

- At this developmental stage, an invitation to brainstorming sessions or workshops is a useful way to launch stakeholder involvement.
- Identify the stakeholders involved in each sector and at each administrative level. This may include: other policy makers, regional and local authorities, communities, non-profit organisations, researchers, behaviour change specialists, business and industry professionals, trade organisations and consumer groups.
- Determine the role for key stakeholders. Advisory committees or sector panels will normally give the best interaction between stakeholders and public authorities. However, since such committees or panels can be time consuming and costly, it is important to decide whether this type of involvement is helpful for all activities.
- Will there be a permanent role for key stakeholders? Will a wider group of stakeholders be consulted during the design stage of the programme?
- The general public can be involved through a public consultation on the proposed programme.

A list of practical questions, which could help identifying opportunities for waste prevention policies from the perspectives of policy integration and policy coherence, is provided below:

- What are the relevant priorities in the sustainable development strategy, other overarching strategies or policies (e.g. national environment policy) and/or the waste management plan of the country in question?
- Which policy areas are under revision or development (or will be under revision or development soon) and what opportunities exist for the integration of the aspects of waste prevention in these areas?
- Which institutions are in charge of the relevant policy areas? Who is in charge of the relevant areas? Which relevant strategies or action plans have been prepared in these areas and what are the objectives, targets and indicators defined in them, relevant to waste prevention?
- How could these different policy areas contribute to the achievement of waste prevention objectives and targets?

- What particular policies are in place in the areas in focus and what gaps and opportunities exist for integration of waste prevention aspects into these policies?
- Are policies in place to address a particular waste stream or product group coherent? Are there policies in place which particularly hinder waste prevention?
- What are the opportunities for creating synergies amongst the relevant policies and to improve their coherence? What are the associated trade-offs to be tackled? What is the next opportunity for the revision or amendment of the relevant policies?
- What relevant initiatives are in place by business, civil society or academia and which of these could be supported by governmental policies?

Methods for improving policy integration and coherence through national waste prevention programmes include:

- Expert groups or committees in charge of the development of national waste prevention programmes should schedule meetings or form sub-groups to discuss and explore opportunities for policy integration and the improvement of the coherence of policies. The ultimate objective of this dedicated work should be to design a work programme with strategic goals and mechanisms to monitor them on the issue of policy integration and the improvement of the coherency of policies. This work programme should clearly identify policy areas in the focus of policy integration work on the short, mid and long terms and be in the centre of national waste prevention programmes.
- One of the main tools for the integration of waste prevention aspects into other policy areas is impact assessment. It is therefore recommended that relevant impact assessment guidelines and training cover waste prevention issues.
- National sustainable development strategies are also an important vehicle of policy integration as they usually connect a large number of relevant policy areas with the ultimate aim of achieving sustainable development. The topic of waste prevention therefore should clearly be identifiable in any national sustainable development strategy.

Available policy options are discussed in detail in section 4.

3.5. PHASE FOUR: PLANNING & IMPLEMENTATION

Given the general approach selected in phase two, authorities should determine which policy options to include in the programme and at which levels they will be administered. Section 4.4 of this handbook provides detailed information on policy options suited to national, regional and local authorities and which measures to implement in targeting key stakeholders and waste streams.

- A time-schedule showing the expected duration of the different stages and the expected finalisation date of the programme should be made.
- The time-schedule should pay special attention to the different stages of the waste prevention programme. The different stages of the programme will differ, but a minimum split up in planning, decision, implementation and evaluation of the results might be relevant.
- It has to be underlined that the waste prevention programme must be established no later than 12 December 2013 according to Article 29(1) in the Waste Framework Directive

2008/98/EC. This implies that the planning and the decision of the programme have to be finalised at this date, but not the implementation and evaluation.

- The revision of the waste prevention programme has to be done at least every sixth year, i.e. at latest by 2019, cf. Article 30 in the Waste Framework Directive 2008/98/EC. The Waste Strategy for England, for example, provides a good example of an evolving programme, promoting on-going adaptation to new ideas and new intelligence as well as continued dialogue and collaboration with a wide range of stakeholders.

3.6. PHASE FIVE: MONITORING PROGRESS

A widely recognised rule in environmental policy is that “what is not measured is not managed”. Developing indicators and benchmarks is therefore essential in tracking progress on objectives and targets and to evaluate the efficacy of waste prevention policies.

However, past experience in EU countries has shown that difficulties in measuring waste prevention using reliable indicators have limited the efficacy of waste prevention measures. This is often the result of the inherent difficulty in measuring ‘prevented’ waste, as opposed to measuring waste recycled or waste sent to landfill. Addressing the different environmental impacts associated with the quantity of waste (e.g. tonnage) in certain waste streams presents another problem.

3.6.1. BACKGROUND ON WASTE PREVENTION INDICATORS

Main goals of waste prevention indicators

Indicators for waste prevention allow public authorities and businesses to:

- Identify the priority waste streams to be tackled
- Monitor the degree to which policy objectives are achieved

A waste prevention indicator should demonstrate whether certain activities (e.g. food consumption, housing construction activities) are improving over a period of time in terms of material and waste intensity throughout their lifecycle. Benchmarks, furthermore, are useful in establishing baselines or reference points enabling countries or organisations to evaluate their performance in relation to the best practice.

Current situation

Waste prevention indicators are in demand but widely accepted models do not yet exist on an international scale. There are however increasing initiatives on a local and sometimes national level, targeting different waste streams and using a variety of methodologies. Usually tonnage of waste generated, waste recycled and waste sent to landfill per person or household per year, as well as GDP, provide an initial base for analysis.

If quantitative targets are included in the policy objective, the indicator is often defined at the same time. If quantitative targets cannot be defined or if they need to be made more precise, indicators, showing whether the qualitative and quantitative objectives are met, are important to monitor progress in the adopted waste plan.

Note that changes in the annual generation of waste can be caused by a wide range of factors, including changes in population size and GDP and therefore reductions cannot be automatically attributed to waste prevention activities.

Principles for effective indicators

Effective indicators should focus on clearly defined waste streams and will use an accepted protocol for waste measurement. The indicators designed for monitoring progress should, to the extent possible, be:

- **Relevant** (when considering the objective which is to measure waste prevention results)
- **Accepted** (in particular by targeted stakeholders)
- **Credible** (the confidence that the users and stakeholders place in the indicator)
- **Easy** (in terms of quantification and follow-up over time with regard to data availability issues and in terms of communication towards the targeted group)
- **Robust** (data quality, scope and representativeness)

In some cases more than one indicator is necessary to monitor an objective.

Typology of waste prevention indicators

The Organisation for Economic Co-operation and Development (OECD) has been addressing the issue since 2000 and delineates three types of indicators constituting the 'Pressure-State-Response' model:

- Pressure indicators, including MFA indicators 'total waste generation' and 'direct material input' and relative pressures revealed by plotting GDP or population against waste generation
- State indicators, measuring the change in the impact of waste on environmental factors such as air, water or soil quality
- Response indicators, measuring the impact of introduced programmes or policies on waste generation

Indicators by nature can be:

- **Descriptive indicators**, describing the development of a variable over time if presented on an absolute scale. These are typically state pressure or impact indicators.
- **Performance indicators**, often demonstrating the distance to the target. These are typically state, pressure or impact indicators clearly linked to policy responses; for example, an indicator measuring the amount of bio-waste landfilled compared to a base year or a diversion target.
- **Efficiency indicators**, relating drivers to pressures. These provide insight into the efficiency of products and processes in terms of resources, emissions and waste per unit output.
- **Policy effectiveness indicators**, relating the actual change of environmental variables to policy efforts; as such, they are a link between response indicators on one hand, and state, pressure or impact indicators on the other.

Figure 9: Example of national performance indicators in the United Kingdom²³

National level performance indicators – progress to date			
Indicator	Desired direction of travel	Actual direction	Progress
Carbon dioxide equivalent emissions from waste management and recycling (tonnes) ¹	↓		
Household waste per head after re-use, recycling and composting (kg) ²	↓	↓ (22% decrease from 2000/01 to 2006/07)	☺
Household re-use, recycling and composting (%) ³	↑	↑ (Year end Sept 2007=33%)	☺
Waste arisings – (by key sectors – municipal, commercial and industrial, construction and demolition) (tonnes) ⁴	↓		
Municipal waste recovery (%)	↑	↑ (Year end Sept 2007=44%)	☺
Waste re-used, recycled or composted – (by key sectors – municipal, commercial and industrial, construction and demolition) (%) ⁵	↑		
Energy recovered from waste (tonnes of oil equivalent) ⁶	↑	↑ (3% increase 2005 to 2006)	☺
Waste landfilled – (total and by key sectors – municipal, commercial and industrial, construction and demolition) ⁷	↓		
Total non-municipal/non-inert waste landfilled (tonnes)	↓	↓	☺

Indicator	Desired direction of travel	Actual direction	Progress
Biodegradable municipal waste landfilled (tonnes) Target	↓	↓ (7% decrease 2005/06 to 2006/07)	☺
Hazardous waste arisings (tonnes) ⁸	↓	↑ (14% from 2004 – 2006)	☹
Hazardous waste recycled/recovered (%)	↑	↑	☺
Serious waste-related pollution incidents – broken down by type, land, air, water	↓	↓	☺
Levels of flytipping and other illegal waste activity ⁹	↓	↑ (+5% – from 2005/06-2006/07)	☹
Public awareness of recycling (% – committed recyclers)	↑	↑	☺

3. 6. 2. EXAMPLES OF INDICATORS FOR THREE KEY WASTE STREAMS

Waste prevention indicators for household waste

Household waste is generated by the domestic activities of households and is made up of two main components: waste from daily or routine activities in households, such as paper, food and packaging

²³ Waste Strategy Annual Progress Report 2009/09:
www.defra.gov.uk/environment/waste/strategy/documents/waste-strategy-report-08-09.pdf

waste, and waste from intermittent activities, for example, disposal of clothing, furniture, white goods, computers and garden waste. The wastes from daily activity are collected daily, every week or every two weeks, and they are either collected separately (glass, paper, cardboard, plastic, metal and food waste) or as mixed waste. The wastes from intermittent activities are normally only collected every two weeks, every month or quarter, and are collected separately as garden waste and WEEE or as bulky waste including different larger waste items from the households.

Generation of waste from households includes only the waste that actually leaves the households' property. Garden waste or food waste composted at home is not collected, which means that in practice this waste generation is not registered. In this way home composting could be regarded as waste prevention.

Possible core elements

A household waste prevention indicator should demonstrate whether certain household activities (such as the consumption of food or durable goods) are improving in terms of material/waste intensity throughout their lifecycle. It should also indicate whether effective prevention policies creating incentives for prevention have been adopted. The following core elements can be used to create several different indicators to monitor progress and make comparisons between Member States:

- 1. The amount in tonnes of total waste generated (preferably without garden waste);**
- 2. Household expenditures on selected consumption categories;**
- 3. Number of total households and the number of single households;**
- 4. Number of households covered by incentive schemes, such as PAYT schemes.**

These indicators will provide information on the **waste intensity of daily household** activities expressing whether the typical functions in a household are achieved with less waste generated and **if citizens (households) respond to different policy measures.**

Waste prevention indicators for biodegradable waste

Biodegradable waste is defined in the Landfill Directive 1999/31/EC as “any waste that is capable of undergoing anaerobic or aerobic decomposition such as food and garden waste, and paper and paperboard”. The definition includes many waste materials, including for example the biogenic part of textile waste. The term ‘bio-waste’ is defined more restrictively in the Waste Framework Directive 2008/98/EC as: “Biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants”.

The biodegradable part of the mixed ordinary waste or of the mixed household waste has to be defined, if the production and consumption of biodegradable products are to be related to the total amount of generated biodegradable waste. Therefore, each country will have to define how much biodegradable waste is included in mixed waste.

The Landfill Directive includes binding targets for how much municipal biodegradable waste is allowed to be landfilled. By 2016²⁴, a maximum of 35% of the total municipal biodegradable waste generated in 1995 will be allowed to be landfilled. Indicators tracking landfilled biodegradable waste would help Member States meet their obligations to document the fulfillment of the Landfill Directive.

The most important household waste stream from the prevention point of view is food waste, due to its very high impact on environment from a life cycle perspective²⁵. Therefore reduction of food waste should be the core any biodegradable waste (or bio-waste) prevention activities.

Possible core elements

A biodegradable waste prevention indicator should demonstrate whether the activities in the society regarding the production and consumption of biodegradable products are improving in terms of material and waste intensity through their life-cycle.

As a first step, taken data availability and considerations combining best available and best wanted indicators, it is suggested to apply a combination of the following core elements in order to cover pressures in relation to drivers and measuring effects of policy responses as appropriate:

- 1. Consumption of food products;**
- 2. Generation of food waste (excluding food industry)/or generation of biodegradable waste from household;**
- 3. Number of households and single households.**

By using these three core elements it is possible to create several different indicators in order to monitor progress and make comparisons between different Member States. These indicators will provide information on the **bio-waste intensity of households** expressing whether the amount of food and bio-waste from households are avoided by buying less food that will be thrown out unused.

Waste prevention indicators for construction and demolition waste

Construction and demolition waste (CDW) arises from activities such as the construction and refurbishment of buildings and civil infrastructure, total or partial demolition of buildings and civil infrastructure, road construction and maintenance. In certain countries materials from land leveling are also regarded as CDW. CDW makes up approximately 25% of all waste generated in the EU, with a large proportion arising from the demolition and renovation of old buildings. It is made up of numerous materials including concrete, bricks, wood, glass, metals, plastic, solvents, asbestos and excavated soil, many of which can be recycled in one way or another.

Possible core elements

The following core elements can form the basis of several different indicators to monitor progress on CDW prevention and to enable comparisons between Member States:

²⁴ By 2020 for following Member States: Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Ireland, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and the UK

²⁵ See e.g. BIO IS: Preparatory Study on Food Waste across EU-27:
http://ec.europa.eu/environment/eussd/pdf/bio_foodwaste_report.pdf

1. **Domestic extraction of construction materials;**
2. **Construction and demolition waste generated;**
3. **Physical activity of the construction sector.**

These indicators will provide information on the **waste intensity of the construction industry** expressing whether ongoing construction activities are conducted by using less materials and generating less waste in contrast to the economic and/or physical functions provided by the sector. A comprehensive overview of suitable indicators can be found in the study "Evolution of (bio) waste generation/prevention and (bio) waste prevention indicators"²⁶.

²⁶ http://ec.europa.eu/environment/waste/prevention/pdf/SR1008_FinalReport.pdf

4. POLICY OPTIONS

Waste is generated in many different contexts, as a result of industrial processes, commercial and consumer activity. Ways of tackling and preventing waste in these realms are unsurprisingly heterogeneous. Following an assessment of the array of waste prevention measures in use, we will here present the range of available policy options in terms of informational, promotional and regulatory strategies.

There is currently a higher incidence of informational and promotional strategies, though it is anticipated that regulatory strategies will become more important if goals and requirements for waste prevention are implemented at national level.

While strategies can be implemented by different levels of governance and target different groups of stakeholders, the wider goal is to permanently change the way individuals think about the products they consume and to increase awareness of the resources consumed and wastes generated. Permanent changes in attitudes and behaviour will affect how individuals generate waste at home, in the workplace, as commuters, tourists and decision-makers.

4.1. STRATEGIES FOR WASTE PREVENTION

4.1.1. INFORMATIONAL STRATEGIES

Waste prevention depends on broad shifts in attitudes and behaviour, which evidently cannot be legislated, but can be encouraged through a succession of measures. The first category thus focuses on awareness-raising, through information strategies addressed towards the general public and towards businesses.

Informational strategies help individuals and enterprises to:

- Acknowledge the waste problem
- Understand the stakes involved
- Internalise a waste prevention ethos
- Access relevant information and training
- Take advantage of available tools and resources

Informational strategies, aimed to change behaviour and enable making informed decisions, include:

Awareness campaigns

Drawing public attention to waste prevention is a fundamental first step in stimulating behavioural change. Effective awareness campaigns often focus on a specific waste stream and offer practical, easy to follow guidance on waste preventing actions.

Recycling has been readily adopted as a daily habit, and is accompanied by a *feel-good* factor associated with doing something *green*. Waste preventing actions are in fact much more environmentally beneficial, but often not as obvious. Using materials more efficiently and buying less

go relatively unseen. Campaigns may choose to focus on *visible* actions, such as the use of canvas bags instead of plastic bags, the use of ‘no junk mail’ stickers or the implementation of home composting. A successful example here is the Stop Pub campaign in France, which received 2.6 million requests for ‘no junk mail’ stickers in the first year of its campaign.

To encourage reuse for instance, Member States should inform the public about existing reuse facilities and the quality of reused products, as well as on practical and logistical aspects, for example, where to take reusable goods and how to handle and store them with care.

Campaigns that have tackled less visible waste prevention activities successfully include ‘Love Food Hate Waste’ and the Real Nappies campaign in the UK, the promotion of new lifestyles in Vienna (expenditure on services and culture instead of products), and the campaigns for tap water instead of bottled water in Portugal and Italy.

The European Week for Waste Reduction (www.ewwr.eu) is a pan-European initiative featuring multiple awareness raising actions addressed at businesses, schools, local authorities and associations. This broad campaign was launched in 2009 and is taking place in 25 countries in 2012 (20 in the EU).

Information on waste prevention techniques

In support of awareness-raising activities, targeted information on waste prevention techniques should be made available to specific users, such as businesses, industries, households and organisations will have specific needs for particular types of guidance, tools and resources. Methods for the provision of waste prevention information include:

- Online information portals, providing a range of practical information on waste prevention techniques. These are more suitable to consumers. Eunaofaçoilixo.com in Portugal, for example, delineates prevention techniques by rooms in the household.
- Online tools, facilitating the calculation and tracking of waste data and the development of a waste prevention plan. These have been offered for local authorities, through the WRAP Waste Prevention toolkit²⁷, and to businesses, through Ireland’s GreenBusiness.ie.
- Information Centres, providing hands-on support through telephone helplines and on-site visits. WasteCap²⁸, a non-profit network in the USA, offers a range of services to help businesses ‘transform waste into resources’.

Training programmes for competent authorities

The inclusion and support of stakeholders is integral to the success of waste prevention programmes. A plan should be set in place to ensure that the various administrative levels of authorities responsible for the implementation of the programme have the appropriate training. These in turn can ensure that training programmes are in place that engage and take advantage of the skills of relevant stakeholders. Examples of successful training programmes include the Local Authority Prevention Demonstration Programme in Ireland, WasteCap waste auditing and materials efficiency training and mentoring programme in the United States and the Ecoprofit cleaner production workshops in Austria.

²⁷ www.wrap.org.uk/applications/waste_prevention_toolkit/restricted.rm

²⁸ www.wastecapwi.org

Ecolabelling

Ecolabels, in particular the EU Flower, help consumers identify products that fulfil environmental criteria including material efficiency and limits on packaging and hazardous materials, thus providing waste prevention information directly to consumers at the time of purchase.

4. 1. 2. PROMOTIONAL STRATEGIES

Promotional strategies stimulate a waste prevention aware community to take specific actions and provide the financial and logistical support to facilitate this. These strategies simplify or incentivise behavioural change. Beneficial promotional practices include:

Support for voluntary agreements

Voluntary commitments to waste prevention targets are generally sector specific, highly effective in achieving agreed goals and increase public awareness of the issue, as voluntary environmental actions undertaken by businesses are frequently well-publicised. Voluntary agreements, as defined in the EU Packaging Waste Directive, entail a “formal agreement concluded between the competent public authorities of the Member State and the economic sectors concerned, which has to be open to all partners who wish to meet the conditions of the agreement”²⁹. Support through funding, promotion activity and logistical support for voluntary agreements is highly recommended, in the absence of national targets for waste prevention or where agreements pursue much more ambitious goals where national targets exist. The Courtauld Commitment, as a leading example, has brought together retailers and suppliers representing 92% of the UK grocery market to deliver absolute reductions in packaging and food waste. The initial aim of zero packaging waste growth has already been achieved.

Promotion of reuse and repair

Reuse and repair centres already exist in more than 10 EU Member States, as independent facilities or in regional or national networks. They provide a crucial service by extending the life of a wide range of consumer products and have significant potential in diverting consumer waste from landfill. Often they are operated by social integration enterprises working with disadvantaged groups such as the long-term unemployed, who are trained in technical repair skills, thus also serving a social function. Organised networks of repair and reuse centres are advisable as part of any waste prevention plan, and can play an integral role in local waste management systems run by public authorities, whether they are operated on a local, regional or national level.

Effective promotion of reuse and repair is strengthened by the provision of early access to the waste streams for reuse centres, as well as appropriate handling and storage conditions. This is part of ‘preparing for reuse’ in the waste hierarchy and supports the overall aims of waste prevention.

Networks of reuse centres exist at national level in France (3 national networks), the Netherlands (1 national network), Spain (1 national network), Austria (1 national network), Ireland and the UK (7 national or regional networks), at regional level in Belgium (2 regional networks), Finland, Germany and British Columbia, with strong examples at local level in Strasbourg, Vienna, Frankfurt, Bilbao, Bristol, Dublin, Brussels and Rome.

Promotion of environmental management systems

An environmental management systems (EMS) is a tool providing a structure for evaluating an organisation’s environmental impact, and aids in increasing material efficiency, long-term planning

²⁹EU Packaging Waste Directive: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31994L0062:EN:NOT>

and often in reducing costs. The proliferation of EMS is the key tool in addressing business, packaging, industrial and construction and demolition waste. The EU EMAS tool can be widely promoted at larger administrative levels; local authorities may choose to develop or promote simple evaluative tools for specific sectors. Concordia University in Canada, for example, uses a waste and recycling audit tool that analyses campus waste output with the help of student volunteers.

Clean consumption incentives

Clean consumption incentives differ from taxes as economic instruments by motivating waste preventing behaviour without imposing a penalty. The Business Waste Prevention Fund of Alameda County in California, for example, offers a stipend of up to \$100,000 for investments in waste prevention projects. Successful recipients have purchased reusable shipping and packaging materials that have created huge annual financial and waste savings.

Promotion of research and development

Research can help national authorities identify priorities and frame waste prevention programmes to address major issues and take advantage of existing infrastructure and opportunities. The EU has been supporting research projects aiming to develop tools and policies for waste prevention and minimization in the context of the Framework Programmes for Research and Technological Development for a number of years. The outcomes of these projects could help national authorities and decision makers in the selection of more integrated and sustainable waste management systems. Investment in economic and social research formed the first phase of development for the National Waste Prevention Programme of Ireland, organised through the EPA STRIVE Programme. The annual National Waste Report helps to inform waste prevention policy and provides detailed information on the composition of municipal waste streams.

4. 1. 3. REGULATORY STRATEGIES

Regulatory strategies, enforcing limits on waste generation, expanding environmental obligations and imposing environmental criteria on public contracts, include:

Planning Measures

Certain waste products or substances can be excluded from landfill through disposal bans, obliging producers to recycle materials or eliminate them from production processes. Other planning measures include public disclosure requirements on pollutants, increased liability for hazardous material and more stringent standards for facilities creating industrial and hazardous waste.

Business and industry frequently require environmental permits to carry out their operations. Waste generation, separation for reuse and prevention activities can be required as conditions of permit approval. This type of measure will be conducted at whichever administrative level is already responsible for environmental permitting.

Pay-as-you-throw systems with variable rate pricing for waste collection by weight or volume have been implemented in several EU Member States, Canada, the United States, Japan, Taiwan, Korea, Thailand, Vietnam and China. This measure is useful in extending consumer responsibility for the products bought and wasted. Usually organised by local authorities along with local waste management companies, pay-as-you-throw systems have had varying levels of success and should take into account public opinion as well as existing municipal waste infrastructure in assessing feasibility.

Research on consumer behaviour and socio-economic demographics that impact waste prevention is an important starting point in preparing a national programme. Research and development on many facets of resource efficiency and sustainable materials management supports systemic waste

prevention in the long-term. The commissioning of or subsidies for research is therefore a notable planning measure to consider.

Taxes and incentives

Waste taxes, fees and charges can be used to incentivise waste preventing behaviour and encourage the development and use of environmental management systems that increase material efficiency. Taxes are compulsory and do not offer a benefit to the taxpayer proportional to the sum paid. Taxes and fees can be levied on specific waste streams, the carbon-based packaging tax in the Netherlands for example, or on final quantities of waste collected, as in a pay-as-you-throw (PAYT) system.

These systems when effectively applied can have a significant impact both on prevention and on the participation of the citizen in separate collection schemes. Some Member states are promoting or introducing such systems at national or regional level. Several examples and success stories are described in a recent study published by the Commission³⁰. PAYT systems should be systematically envisaged in prevention programmes due to their proven effectiveness.

Tax incentives can be used to promote reuse and repair by exempting reuse and repair centres from certain taxes or by applying reduced taxes on the sale of reused goods. Subsidies or incentives that increase the market penetration of eco-efficient products are other important measures to consider.

Extended Producer Responsibility (EPR) policies

Producers usually do not bear the cost of collection and disposal of their products once they reach their end of life, and thus do not have an incentive to ensure that product components are easily repairable, reusable or recyclable. Extended producer responsibility policies aims to shift some of the cost of disposal back to producers and thus impel investment in material efficiency, to reduce the eventual quantity of waste, and in ecodesign, to extend the lifecycle of the materials employed. Policies may be specific to certain industries or waste streams. Packaging producer responsibility systems have been established in a number of Member States. In the UK, for example, producers have to pay to recyclers via packaging waste recovery notes. In some industries this policy may be best executed at supranational level, to simplify requirements for producers operating in several countries.

EPR policies should link the cost of disposal of a given waste product as closely as possible to the particular producer responsible for its creation, as collective systems for the management and treatment of products subject to EPR fail to provide the intended incentives to the original producer. Several examples and success stories are provided in a recent publication of the Commission³¹.

Green Public Procurement (GPP) policies

Government authorities at any administrative level should strongly consider including waste prevention criteria in their calls for tender and contracts, as part of a green public procurement policy. Waste prevention measures may also include the promotion of green purchasing policies for private enterprises.

To integrate GPP policies into waste prevention plans, the longevity and reparability of purchased products should be emphasised, and the option to purchase an agreed percentage of reused products should be considered. Links to more detailed information on GPP can be found in Chapter 5 of these guidelines.

³⁰ See: http://ec.europa.eu/environment/waste/pdf/final_report_10042012.pdf

³¹ See http://ec.europa.eu/environment/waste/pdf/final_report_10042012.pdf

Ecodesign requirements

Governments may select particularly problematic waste streams and apply a supply side policy, such as an ecodesign requirement to increase the durability, reparability and recyclability of products that would otherwise be landfilled. Finland, for example, has an ecodesign requirement for electrical and electronic equipment as part of its National Waste Plan.

4.2. KEY STAKEHOLDERS

In attempting to reach the widest possible audience, it can be useful to address certain groups of stakeholders who share similar consumption patterns and can be targeted through specific channels. Attaining a general level of public awareness of the environmental impacts of waste and of simple methodologies for waste prevention is a vital first step. In the following section we look at how to address households, businesses and public authorities separately, identifying the types of waste created by each group, key products to address, and successful approaches for introducing and sustaining waste prevention.

4.2.1. HOUSEHOLDS

Households produce waste in the consumption phase of the lifecycle of products, generating specific problematic waste products which are identified individually in the section below. Household waste is diverse in its composition, and many of its components can be addressed more effectively earlier in the supply chain. The amount of WEEE, for example, can be reduced through ecodesign and extended producer responsibility policies, as well as after the generation of waste through increased reuse and repair activity, retailer take-back programmes and expanded recycling. There is scope to extend the life of many other household waste products from landfill by developing or expanding reuse and repair facilities (please see section 1.4.1).

Types of waste produced

Households generate a complex array of waste products in most waste streams, producing notably food scraps, garden cuttings, magazines, newspapers, junk mail, nappies, batteries, plastic bags, construction waste, dust, WEEE, furniture and discarded clothing.

How to promote waste prevention in households

Informational strategies are likely to form the basis of waste prevention policy towards households. Products in household waste streams that can be effectively targeted include food, garden clippings, junk mail, nappies, batteries, plastic bags, EEE and textiles. These are constructively addressed through awareness campaigns accompanied by easy to follow instructions for reducing and/or reusing each waste product.

In considering the reduction of landfilled hazardous waste a form of prevention, awareness campaigns targeted at households that encourage the separation and appropriate disposal of hazardous materials, such as cleaning products, batteries, paints, pesticides, compact fluorescent light bulbs and WEEE, should be an integral part of household prevention programmes. Furthermore, the promotion of the substitution of less hazardous products should be included here. The EU Ecolabel, for example, makes it easy to identify products with reduced hazardous properties in a range of categories, including paints and cleaning products.

Nappies are responsible for over a tonne of landfilled waste per infant, and are as such a key waste product not addressed by general guidelines. Many parents are not aware of the extent of the environmental impact caused by disposable nappies or that there is an effective alternative, thus

awareness campaigns are a useful first step in addressing this issue. The financial case for reusable nappies is convincing, saving up to €600 per infant. However, the initial investment, as with many environmental choices, is significant. Subsidies and tax incentives can help offset the initial cost, in the same way that they are applied to energy efficiency or renewable energy investments. The environmental impact of laundering nappies instead of throwing them away, in terms of greenhouse gas emissions and waste water generated by washing machines, might be considered here in terms of the best choice across the product lifecycle, and as such reusable nappy campaigns should also promote the use of energy efficient washing machines and low temperature cycles.

4. 2. 2. BUSINESS AND INDUSTRY

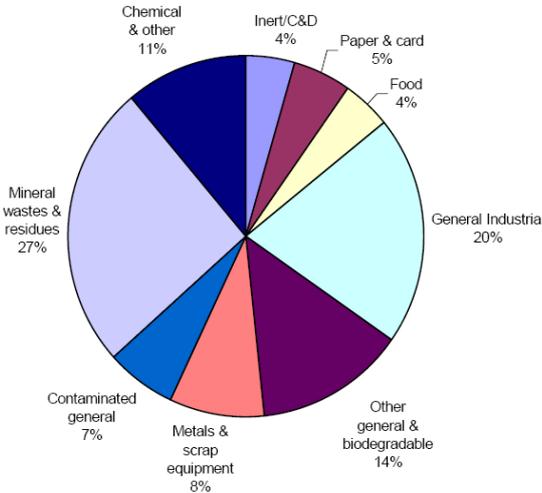
Implicated at the conception and production phases of the lifecycle of products, business and industry make decisions that affect the environmental impact of products throughout their lifespans. In addition to those wastes generated by employees in the workplace, acting as consumers, the opportunities for designers and manufacturers to prevent waste at multiple levels are immense. A transition to sustainable consumption and production thus begins with ecodesign, through policies incentivising lifecycle considerations, providing accessible information and training for businesses, and through extended producer responsibility requirements that make conception-phase decisions more cost-effective. In addition to ecodesign considerations, business waste prevention strategies will focus on green purchasing strategies, reuse and repair infrastructure, and information on waste prevention techniques provided through an integrated informational resource. Industry specific policies will consider opportunities for industrial symbiosis and sustainable materials management, developed below.

Types of waste produced

Non-industrial businesses create specific waste products in significant quantities, worthy of special mention are ink cartridges, paper waste, office furniture and WEEE in addition to food and packaging waste created by staff members.

Industrial waste streams generated are diverse but include common elements in large quantities that may be either reduced at source or reused in other production processes. The following chart details the composition of industrial waste produced in the UK.

Figure 10: Breakdown of materials composing industrial waste



Considering the scale of production, measures addressing industrial waste will generally be at national level, or occasionally at regional level.

How to promote waste prevention in businesses

Business and industry in the production phase can benefit from organised materials sharing through publicly funded programmes, such as the National Industrial Symbiosis Programme (NISP) in the UK. Industrial symbiosis can help businesses expand production while reducing their extraction of natural resources, generation of waste materials and overall environmental impact. NISP and similar programmes provide a framework for identifying materials and resources that can be efficiently exchanged between businesses at regional and national level.

In addition to design and production capacities, businesses are consumers of scale and make purchasing decisions that have notable market impact. Raising business awareness of the merits of green purchasing, increasing the visibility of ecolabelled products, and the provision of guidance on establishing a green purchasing strategy that considers durability, toxicity and packaging content, are together important steps in supporting waste prevention in offices and workplaces. Organisations such as the Buy Smart Network (www.buysmartbc.com) can help businesses identify ways to reduce expenses, meet strategic sustainability goals and access relevant suppliers.

The promotion and facilitation of reuse and repair is also highly relevant for businesses, and can be operated in collaboration with facilities aimed at households. The creation of infrastructure to enable the sale and exchange of office furniture and equipment, through a physical depot or an online platform, practically addresses business waste pressures on local landfills, as well as reducing WEEE by extending the life of office computers and electronic equipment.

Informational portals, such as www.greenbusiness.ie in Ireland or Waste Prevention World (www.ciwmb.ca.gov/wpw) in California, offer an innovative way of addressing a range of business waste prevention opportunities and provide an integrated informational resource for any interested party. Waste prevention portals might include:

- the dissemination of industry-specific best practices
- access to web-based waste audit tools
- support for voluntary agreements and group target setting
- step by step information on simple workplace waste preventing actions
- guidance on how businesses can support their customers in waste preventing choices
- a forum for businesses to share experiences

Monitoring business awareness and engagement in waste prevention activities through regular surveys is an interesting indicator of the success of policy measures. The Flemish waste agency OVAM, for example, helped SMEs invest in a range of sustainability programmes with clear environmental and economic benefits. OVAM monitored attitudes of businesses involved towards eco-efficiency over the course of the three year programme, finding an increasing awareness among businesses that ecologic and economic benefits can be achieved in unison.

4. 2. 3. PUBLIC AUTHORITIES

Critical stakeholders in waste prevention, public authorities are the originators of a majority of prevention programmes and have unmatched prevention potential, given their unique opportunities to influence every level of sustainable production and consumption, by stimulating the market of ecolabelled or environmentally preferable goods, by engaging and requiring designers to consider waste prevention across the lifecycle of products and by helping industry reduce waste, increase efficiency and change the way they think about materials. As a trusted source of information, public authorities should utilise their potential to inform their constituents and influence behaviour where possible for the benefit of the environment.

Types of waste produced

Public authorities produce wastes similar to those generated by households and businesses, can influence and regulate the wastes created by other major stakeholders, and are responsible for the collection, disposal or energy recovery of most wastes eventually produced. In terms of their role in waste management, public authorities pay special attention to hazardous waste streams, and reductions in quantitative and qualitative waste will be a central goal in this respect.

How to promote waste prevention among public authorities

Given the wide range of measures that public authorities can engage in for the promotion of waste prevention, it is important to identify key elements on which to concentrate resources and present a cohesive strategy that addresses multiple flows in materials cycle.

The provision of informational resources is a particularly useful function fulfilled by public authorities in advancing waste prevention performance. The support for voluntary agreements might also be singled out, in that authorities can perform an intermediary role in enabling target setting across industries that can create significant national level results. The full range of measures available to public authorities is described according to administrative level in section 4.4.

4.3. KEY WASTE STREAMS

It is particularly useful to address certain waste streams, because they account for large proportions of the total waste burden or because they can be easily and efficiently reduced. The proportion of these wastes account for will vary to some extent based on national circumstances. Therefore, it is important to look at a breakdown of waste generation before setting priorities. Certain key waste streams are relevant and merit the attention of most if not all Member States. We address each below using the most pertinent policies for tackling them.

4.3.1. BIODEGRADABLE WASTE

Biodegradable waste originates from plant or animal matter and distinguishes itself by its ability to be broken down by other living organisms. For the purposes of waste prevention, biodegradable waste involves food scraps and garden waste. These waste products are generated principally by households and businesses and, if targeted individually, present enormous waste prevention potential.

At domestic level, the prevention of food waste can be addressed first of all by raising public awareness of the quantities of usable food discarded, the financial losses this represents, and the environmental impact of collecting and treating this waste. Constructive information on waste prevention techniques can help households better plan their food purchases, keep food supplies fresher for longer periods, make better use of leftovers and can make a noticeable difference to household expenses. The Love Food Hate Waste Campaign (www.lovefoodhatewaste.com), selected as a best practice in the prevention of biodegradable waste, can be taken as a model here of the range of guidance that can be provided.

Effective awareness campaigns on the prevention of food waste will integrate waste preventing habits into individual behaviour so that actions at home, in the workplace and at leisure are consistent. Good practices are often linked to specific situations and are often abandoned when they become less convenient.

The hospitality industry faces specific waste prevention challenges. Hotel guests can generate up to a kilo of waste per person per day, making the environmental impact of tourism substantial. Food

scraps make up almost 40% of total waste in the hospitality industry, often near 50% in restaurants. The greater Porto region launched a project initiated by waste management company Lipor, presenting reduced serving sizes providing for nutritional balance, in addition to economic benefits. Given its elevated waste prevention potential, the hospitality industry has been targeted separately by some waste prevention programmes, including Ireland's Green Hospitality Award.

Changes in public behaviour, relating to the efficiency of consumption of purchased food, can be monitored using surveys of household and workplace practices and indicators demonstrating changes in habits, and these can direct further investments in specific measures based on their success in the region of implementation.

Smart gardening techniques such as 'grasscycling', where grass clippings decompose on lawns as fertiliser instead of adding to household waste, grass-mulching lawn mowers and slow growing grass seeds can help reduce the amount of yard waste generated and disposed of. The promotion of smart gardening, through awareness-raising or through incentives, can be a helpful measure for local authorities, as practiced in the suburban region of Zaventem, Belgium.

The promotion of home composting, along with the preparation of guidelines and the provision of composting bins, and separate collections programmes may help to reduce the amount of food waste – by raising the citizens awareness about the amounts and types of food waste disposed.

More information on identification and analysis of existing initiatives on food waste prevention may be found in the report: [Preparatory Study on Food Waste across EU-27](#) available at the website of DG ENV.

4.3.2. PAPER WASTE

Paper waste is produced primarily by homes and businesses, and within this waste stream specific products are prevalent or easily targetable. This section focusses on unaddressed mail, catalogues, office paper, newspapers and magazines.

A key waste paper product at household level, the ubiquity of junk mail can be undermined through the implementation of comprehensive, easily accessible and well publicised opt-out strategies, in addition to mailbox labels to be mandatorily honoured by postal services. Measures to reduce junk mail should include:

- A well-executed awareness campaign, reaching the widest possible target audience, in this case households. Campaigns will clearly explain the amount of junk mail produced nationally and by household per year and the environmental impact of those statistics.
- The provision of practical, systematic information on waste prevention techniques, in this case the distribution of 'no junk mail' stickers and clear guidance on how to remove your name from mass mailing databases.

The Stop Pub campaign (www.ademe.fr/stoppub) in France provides a model of activity in this area, organising information for use by NGOs, individuals and businesses and elaborating extensively on the context of the problem.

Much more effectively, 'opt-in' systems attempt to eliminate junk mail by allowing households to select and receive only those mailings they are interested in. Having worked well in reducing spam in email inboxes, this measure has significant potential to reduce paper waste.

Catalogues and telephone books add to the paper waste burden of households and can be avoided using measures similar to unaddressed mail, specifically through the creation of a publicly accessible database allowing households to choose which publications they receive. A significant problem in the United States, Catalog Choice (www.catalogchoice.org) has made it easy to set mail preferences for

retail catalogues, which currently are distributed in the region of 19 billion per year and account for 53 million trees in the US market alone.

There are numerous practical steps that can be taken to significantly reduce office paper waste, from double sided paper policies, making revisions online, printing envelopes without labels, preventing paper jams, and reusing one-sided paper as notepaper. Office paper reduction campaigns can be effective in offices of any size and should be encouraged in offices of all sizes! Precise guidance on setting up an office campaign should be made widely available; an excellent example is provided by the California Integrated Waste Management Board.³²

The structured promotion of online books, newspapers and magazines has not yet been widely adopted as a waste prevention policy, but the dematerialisation of the news media, as well as the promotion of electronic book devices, could be very helpful as part of the prevention of paper waste.

4.3.3. PACKAGING WASTE

Packaging refers to all materials whose purpose is the containment, protection, shipping or presentation of goods, from their natural condition to saleable form, as handled by the producer or the consumer. Packaging is often divided into three broad categories: primary packaging referring to the principal material enveloping the product, secondary packaging grouping products together and tertiary packaging being used for shipping and handling. Packaging waste is generated at all levels of the supply chain, but principally by consumers as the end user. Packaging waste policies may address tertiary packaging use with distinct measures as it is involved in a specific phase of the lifecycle and may implicate different stakeholders.

The conception phase holds the widest possibilities for prevention, as quantities of waste can be designed out at every step of a product's lifecycle and at all three levels of the packaging that accompanies it. The two main options for public authorities here will be requirements for ecodesign criteria in the development of new products and the promotion of ecodesign using online tools, training programmes and incentives created by Extended Producer Responsibility policies. Both types of policy should encourage packaging minimisation at all levels.

It should be noted, however, that some primary packaging contributes to the reduction of food waste. Morrisons supermarkets in the UK have conducted packaging research which identifies which fresh produce lasts longer when wrapped and which does not.³³

There are ample opportunities for tertiary packaging reduction that have not yet been widely adopted. The use or optimisation of reusable distribution materials can lead to notable waste reduction and financial savings; plastic pallets for example are much more durable than wooden models, offering ANG Newspaper Company in California a 125% return on their investment as well as the prevention of 37 tonnes of wood waste. Increasing the longevity, reducing the volume and eliminating single use shipping and handling materials can provide waste prevention opportunities in very large quantities and a shift towards this approach can be required or encouraged through incentives and subsidies. Reductions in tertiary packaging should however ensure that this does not result in a high level of damaged products.

Enabling target setting through voluntary agreements provides a major opportunity for national authorities to further industry-wide change on packaging at all levels. Bringing manufacturers,

³² www.ciwmb.ca.gov/BizWaste/FactSheets/Campaign.htm

³³ www.morrisons.co.uk/Corporate/Press-office/Corporate-releases/Morrisons-launch-Great-Taste-Less-Waste-campaign-to-save-families-up-to-600-per-year/

packaging associations and major retailers together under a shared goal of packaging reduction has already had effective results in the UK.

Regulatory options for authorities include extended producer responsibility policies, as proposed recently in Canada, and taxes by volume, as introduced in 2007 on primary and secondary packaging in the Netherlands.

At consumer level, informational strategies motivating consumers to buy products with minimised packaging content are appropriate, as well as efforts to normalise the purchase of bulk goods and expand facilities for their purchase.

Waste prevention measures to address packaging waste will be organised mostly at national or supranational level. Local authorities play a role in stimulating public awareness and interest in packaging minimisation or avoidance and can support national efforts by demonstrating the demand for lower levels of packaging to manufacturers.

4. 3. 4. ELECTRICAL AND ELECTRONIC WASTE

Waste Electrical and Electronic Equipment (WEEE) is a rapidly growing waste stream and is addressed by the WEEE Directive, which sets targets for the collection, reuse and recycling of electrical and electronic equipment. Article 7 of the WEEE Directive, furthermore, obliges Member States to prioritise the reuse of whole appliances.

Some WEEE is classified as hazardous waste, notably those products containing cadmium, asbestos, PCBs, lead, ozone depleting substances and cathode ray tubes. The safe collection and recycling of WEEE can therefore contribute to qualitative waste prevention.

The reuse of WEEE is the preferred recovery option however, as the environmental impact of a product is minimised by using it for as long as possible. The demand for second-hand electrical and electronic equipment is significant in the EU and the expansion of reuse networks can help meet this demand. Simplified access of reuse networks to WEEE collection sites furthermore facilitates the identification of those products that can be most easily repaired and reused.

Extended Producer Responsibility (EPR) policies help internalise the end-of-life cost of WEEE. EPR policies that link producers directly to the products they have created, rather than those imposed on the industry as a whole, can significantly reward those producers who take steps to green their supply chain and increase the durability, reparability and recyclability of their products. EPR is thus an essential incentive for ecodesign, promoting waste prevention across product lifecycles.

4. 3. 5. HAZARDOUS WASTE

The classification of a waste as hazardous or non-hazardous is done in the EU on the basis of the Decision on the List of waste in conjunction with Annex III to the Waste Framework Directive, which defines the properties that render waste hazardous. EU Member States already have structures for the management of hazardous waste in place; strategies to reduce its generation and to increase its safe collection and disposal should be actively pursued for their very relevant environmental benefits.

The separate collection of hazardous waste is required by the Waste Framework Directive (Article 18: ban on the mixing of hazardous waste) and contributes to reducing the quantity of hazardous material in the residual waste fraction. Reducing the hazardous content of products is qualitative waste prevention insofar as it decreases the total quantity of hazardous waste released. Eliminating hazardous substances from products altogether remains an overarching objective to be pursued by public authorities and by industry.

Requirements or incentives for eco-redesigns of products with hazardous content are a positive initial step. The promotion of environmental management systems that help identify inputs and generation points of hazardous waste, furthermore, can help companies measure and reduce their hazardous waste production. Training and subsidies for the establishment of targeted EMS are two ways public authorities can encourage their incorporation into manufacturing processes.

Effective collection or drop-off facilities are essential to the management of household and SME hazardous waste management. Cities like Copenhagen and Helsinki have developed specific collection infrastructure and services for household hazardous waste (e.g. stationary containers, door-to-door collection vehicles). Local authorities may also offer specific low-cost collection services to businesses qualifying as “small quantity generators”, a measure, currently in use in California, available to producers of 99 kilos or less hazardous waste per month.

In addition to better management of existing hazardous wastes, the promotion of less or non-hazardous alternatives through informational campaigns should be part of any household hazardous waste strategy. Alameda County in California, for example, provides a range of recipes for homemade alternatives to normally toxic household products, including oven cleaners, paint strippers and pesticides, on its Stop Waste website (www.stopwaste.org/home/index.asp?page=585#All-Purpose). Ecolabelled products furthermore limit the toxic content of products and are easily identifiable by the consumer. Campaigns at any administrative level to increase the visibility of ecolabelled products will thus have a positive impact in reducing consumer exposure to and disposal of hazardous waste.

4.4. WASTE PREVENTION STRATEGIES BY ADMINISTRATIVE LEVEL

This section describes possible measures particularly suited to application at local, regional and national level.

4.4.1. MEASURES FOR LOCAL AUTHORITIES

Awareness campaigns are often particularly effective on a smaller scale. Municipal waste data is generally available at local level and can therefore be effectively linked to selected targets. Shared goals can be audibly promoted by local ‘champions’ and striving towards such goals can contribute to and benefit from community spirit. While there are clear benefits to engaging local businesses, the biggest gains in waste prevention are likely to be at household level. Appropriate waste streams, targets and policy instruments for local authorities are described below.

Suggested target waste streams: Household, Biodegradable (especially food waste)

Examples of targets:

- Stabilising collected waste against a recent benchmark
- Making absolute reductions in waste levels within 5-10 years
- Increasing community awareness of waste prevention

Suitable instruments:

- Baskets of measures for city-wide or community action plans

Local authorities have demonstrated success setting and meeting targets for the prevention of household and biodegradable waste and may want to focus efforts on these waste streams. City-wide waste prevention programmes, such as those in Vienna and Helsinki,

usually feature a range of waste prevention measures and are effective in tackling waste issues specific to urban residents.

- Awareness campaigns

Awareness campaigns should be simple, highly visible and inclusive rather than judgemental. Suggested behavioural changes should be easy to adopt and should be explained step by step if necessary. Stakeholders should be invited to help in the development of the campaign and may act as intermediaries in increasing its visibility. Themes may include the promotion of tap water over bottled water, the use of canvas grocery bags or general household waste prevention techniques. Local authorities may invite schools to create student waste prevention groups as part of awareness efforts towards young people. Examples of successful campaigns at local level include Helsinki's 'It's smart with less waste' campaign and Munich's three phase waste prevention campaign.

- Training programmes

Training programmes provide the necessary know-how to help businesses, communities and local authorities launch local waste prevention activities. The Local Authority Prevention Demonstration programme in Ireland for example operates tailored Prevention Training Courses, in addition to funding and logistical support (please see box below). In support of its home composting programme, local authorities of Turin offer trainings to households on the installation and maintenance of healthy compost facilities.

LAPD Prevention Training Courses

Ireland's Environmental Protection Agency and the Clean Technology Centre, responsible for environmental research and waste prevention advisory services, have developed an accredited Prevention Training Course as part of the Local Authority Prevention Demonstration Programme, to equip local authority staff with the knowledge and technical skills needed to design, implement and manage waste prevention strategies in their constituencies.

- Pay-As-You-Throw schemes

PAYT schemes (or variable charging) are primarily an important tool for local authorities to boost separation at source by citizens. It has also proven to be successful in terms of reduction of overall municipal waste production. PAYT schemes simply transpose the "Polluter Pays" principle applied to waste as costs are linked to the amount of generated waste. Different systems are implemented in Europe: costs charged to citizens can be based on the weight or the volume of the waste, the collection frequency, or on a combination of these factors.

- Clean consumption incentives

There are excellent examples of local incentive programmes that have had significant effects, such as the Business Waste Prevention Fund in California or the cash-back scheme for reusable nappies in Milton Keynes (UK). These can be considered as pilot programmes that, having achieved positive results at local level, may be considered for regional or national application.

Business Waste Prevention Fund

The Stop Waste Partnership of Alameda County, California, operates a competitive financial award of up to \$100,000 for business investment in waste prevention projects. Relevant areas for investment include optimisation of manufacturing processes to limit scrap waste, the purchase of bulk, reusable, durable pallets and containers to reduce packaging, and improved mechanisms to estimate food supplies to reduce spoilage.

- Promotion of reuse and repair

Reuse and repair centres operate in the EU at local, regional and national level; the scale of reuse networks depends on national circumstances. Facilitating reuse centre access to municipal waste can help increase the quantity of waste diverted from landfill, and these can be embedded in local waste management structures. Waste that can be reused or repaired can thus be identified at the earliest stage and in the best possible condition.

Local authorities also play an important role in informing local residents about reuse activities: how materials are collected, where they can be deposited, how to contribute materials in good condition, and where to purchase reused products.

4.4.2. MEASURES FOR REGIONAL AUTHORITIES

Centres for the exchange and reuse of construction and demolition waste are particularly effective at local level, given the convenience for businesses and the significant transportation costs avoided. Measures for regional authorities

Many effective regional practices originate from strongly decentralised nations, Flanders, Piedmont and California being strong examples. Suggestions of practices for implementation at regional level are described here, though choices will depend on the size and governance structure of regions in each Member State.

Suggested target waste streams: Business, Paper

Examples of targets:

- Stabilising collected waste against a recent benchmark
- Increasing business waste prevention engagement
- Reducing unaddressed mail by 10-20%

Suitable instruments:

- Awareness campaigns

At regional level, awareness campaigns might choose to focus on unaddressed mail and workplace behavioural change. 'Junk mail', as well as unwanted catalogues and phone books, is one of the major sources of household and paper waste. Campaigns should focus on gaining broad public awareness of the scale of the problem, providing a straightforward method for opting out of unwanted publicity and achieving stated reduction objectives. Objectives may be the number of households that opt not to receive unaddressed mail or that attach a 'No junk mail' sticker to their post box, or can be expressed as a percentage reduction in household paper waste.

There are excellent tools available to promote workplace waste prevention, including waste audit software, 'paperless' office guides, promotional materials and factsheets by business sector. Campaigns aiming to raise workplace awareness and provide supporting resources, such as those provided by Greenbusiness.ie, the Stop Waste Partnership and the California Integrated Waste Management Board, are particularly manageable at regional level, allowing for the aggregation of resources on the one hand, and the targeted pursuit of objectives on the other.

- Promotion of reuse and repair

The creation and support of reuse and repair infrastructure is a highly efficient means of extending product lifespans. While reuse centres operated independently are becoming increasingly common, regional networks of state supported reuse facilities with integrated repair services have a much wider reach and establish reuse and repair as a credible alternative to landfill disposal.

- Green Public Procurement

Economies of scale and the establishment of trusted supplier lists make the institution of green public procurement policies at regional level attractive. Kolding in Denmark, for example, has demonstrated success forging partnerships between regional and local authorities in purchasing strategies.

4. 4. 3. MEASURES FOR NATIONAL AUTHORITIES

Effective national waste prevention programmes will incorporate a mix of measures at all administrative levels. Given that a majority of waste prevention measures can be implemented at national level, national authorities should use the above considerations and their own research in selecting aspects of the national programme that can be effectively devolved to regional and local authorities. Economic instruments such as taxes and financial incentives are often designed and implemented at national level, though certain decentralised regions may apply these based on their level of fiscal independence. Certain measures, such as Extended Producer Responsibility or Ecodesign policies, may furthermore be legislated supranationally.

Suggested target waste streams: Packaging, Industrial, Hazardous, Construction & Demolition

Examples of targets:

- Achieving absolute reductions in supply chain packaging waste of 5% within five years and seeking to eliminate it completely over 25 years through reusable shipping materials
- Reducing the amount and toxicity of persistent, bio-accumulative and toxic components of hazardous waste by 25-50% over 5-10 years
- Halving construction and demolition waste over 5-10 years

Suitable Instruments:

- Awareness campaigns

National level awareness campaigns may choose to focus on a waste stream that is managed nationally, such as hazardous waste. Campaigns focused on the collection of waste oil for example reduce the amount of hazardous waste released into the environment. The promotion of the use of ladybirds instead of pesticides also results in qualitative waste prevention.

- Training

Educational programmes for schools may be managed at local level, but a national directive on waste prevention activities at schools is recommended. This may be integrated into wider environmental education programmes. 'My first book on Environment, Waste and Recycling', an educational programme in Serbia and Montenegro, is an easily replicable example here.

- Voluntary agreements

Support for voluntary agreements in specific industries is best achieved at national level, key examples including the EPA WasteWise programme, the Courtauld Commitment and the National Industrial Symbiosis Programme.

- Promotion of environmental management systems

The promotion of environmental management systems and guidance on their implementation is most efficiently provided at national level, with the option to offer industry specific tools as well. The promotion of the EU tool EMAS may take place at any administrative level as necessary.

- Clean consumption incentives

Subsidies or incentives may be applied to product servicing and repairs, or other measures such as the Finnish subsidy for wrecking end-of-life vehicles. Prizes such as the ecodesign award in Australia and the Green Hospitality Awards in Ireland encourage resource efficiency by publicising best practices.

- Taxes

Packaging, construction and demolition and hazardous waste are key areas for national intervention. Fiscal measures include the Danish tax on batteries and accumulators and the Dutch carbon-based tax on packaging. It is not yet clear if the Dutch packaging tax was sufficiently ambitious to incentivise the ecodesign of packaging.

- Extended Producer Responsibility

Necessarily applied nationally, successful examples of EPR programmes include several systems such as the Swedish packaging, WEEE and waste paper EPR policy, the Belgian packaging responsibility system, etc.

- Incentives for municipalities

Relations between central authorities and local authorities are also essential to ensure the success of prevention programmes. In some Member States or Regions (like the Walloon Region of Belgium for instance), effective systems combining incentives and penalties have been established for municipalities, according to targets in terms of waste generation. In other Member States, PAYT schemes are either promoted or imposed to the local authorities by the central administration³⁴.

³⁴ See: http://ec.europa.eu/environment/waste/pdf/final_report_10042012.pdf

5. FURTHER RESOURCES

This methodological guide offers a procedure for planning and implementing a national waste prevention programme and provides a detailed introduction to the types of policy options available for such a plan. It is hoped that the selection of best practices highlighted provide inspiration that can be translated by policymakers for their national context. Measures that have been used to promote waste prevention or minimisation successfully for many years are described along with measures to improve resource efficiency at all stages of product lifecycles. This paradigm shift towards sustainable consumption and production, as opposed to waste reduction and management focused policies, presents an ambitious structural challenge requiring gradual transition. In this document, lifecycle oriented measures are concentrated at national level and focus on industrial processes, but as part of the process of continuous improvement in national waste prevention programmes, will likely develop to address all phases of production and consumption. This handbook aims to help Member States integrate waste prevention as a major national goal, and lay the groundwork for the development of a more resource efficient society.

The waste prevention website of the European Commission contains exhaustive information on this study and will outline a plan for information-sharing between Member States, supporting shared progression towards common goals in this area.

This and other useful informational resources are listed below.

5.1. PUBLICATIONS

- Use of economic instruments and waste management performances:
http://ec.europa.eu/environment/waste/pdf/final_report_10042012.pdf
- PreWaste project: <http://www.prewaste.eu/>
- The Waste Framework Directive:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF>
- Report on the Thematic Strategy on Waste prevention and Recycling:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0013:FIN:EN:PDF>
- 'Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste' European Commission, 2005:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0666:FIN:EN:PDF>
- 'Strategic Waste Prevention', OECD Reference Manual, 2000:
[www.oecd.org/olis/2000doc.nsf/LinkTo/env-epoc-ppc\(2000\)5-final](http://www.oecd.org/olis/2000doc.nsf/LinkTo/env-epoc-ppc(2000)5-final)
- 'Measuring Materials Flow and Resource Productivity', OECD Synthesis Report, 2008:
www.oecd.org/dataoecd/55/12/40464014.pdf
- 'Establishing the behaviour change evidence base to inform community-based waste prevention and recycling', Technical Report commissioned by Defra, 2007:
http://randd.defra.gov.uk/Document.aspx?Document=WR0504_5409_FRP.pdf

- 'International waste prevention and reduction practices', Final Report commissioned by Defra, 2004: www.eeb.org/activities/waste/waste_prevention/International-waste-prevention-practices-October2004.pdf
- 'Household Waste Prevention Evidence Review', A report by Defra's Waste and Resources Evidence Programme, 2009: www.defra.gov.uk/environment/waste/documents/hw-waste-evidence-review-summary-091013.pdf

5.2. USEFUL LINKS

- Waste Prevention on the European Commission Website: <http://ec.europa.eu/environment/waste/prevention>
- European Topic Centre on Waste (including abstracts of national and regional waste prevention programmes in English): <http://scp.eionet.europa.eu/facts/WPP>
- European Environment Agency: www.eea.europa.eu/themes/waste
- California Integrated Waste Management Board Waste Prevention World: www.ciwmb.ca.gov/wpw
- WRAP Waste Prevention Toolkit: www.wrap.org.uk/applications/waste_prevention_toolkit/restricted.rm
- Beyond Recycling: www.beyondrecycling.net/index.html
- INFORM: www.informinc.org/summaries_waste.php
- ACR+, The Association of Cities and Regions for Recycling and Sustainable Resource Management: www.acrplus.org
- Green Public Procurement: http://ec.europa.eu/environment/gpp/index_en.htm
- European Week for Waste Reduction: www.ewwr.eu
- Miniwaste (Life+ project): www.miniwaste.eu

6. ANNEX A: PRINCIPLE APPROACHES TO IDENTIFY THE MOST EFFICIENT MEASURES FOR A WASTE PREVENTION PROGRAMME

6.1. THE STAKEHOLDER AGREEMENT APPROACH

One way of preparing a waste prevention programme is by means of a consensus (or rather compromise) finding approach between the involved stakeholders. This approach features a workshop series which starts with the identification of the core problem and ends with a list of waste prevention measures which are supported by the majority of stakeholders (see Figure 11):

1. In the first workshop the current problems of the waste management sector and the economy as a whole with respect to material and waste flows, their treatment and environmental impacts are discussed. The discussions are based on analyses of development in waste and material flow arisings and compositions, as well as on experience with existing initiatives. It is the aim to define the core problems which shall be addressed by the waste prevention programme.
2. The second workshop is fully dedicated to the future. A broader view on how the society and the economy could work in 10 to 20 years coming. Then the tasks of the material flow economy and the waste management sector to cover the needs of the society in future shall be discussed. Likely future problems and options to address them identified. The workshop shall lead to an optimistic vision, on how the future material flow system can work and on what will have been achieved by the management systems. This vision shall be shared by a majority of the workshop participants.
3. The vision of how a positive future could be forms the basis for the formulation of the programme objectives. While the main objective is already defined by the waste frame directive (decoupling of economic growth from environmental impacts of waste generation), it might be necessary to break this main objective down to more tangible and possibly measurable sub-objectives. Here also criteria should be defined which will allow to decide if a certain measure/instrument is fit for supporting the objectives. In addition indicators may be defined and selected with which later on to measure the effectiveness of a measure and the success of the programme as a whole.
At this stage of the development process also the guiding principles for the programme should be agreed. Annex A shows some guiding principles which could be selected.
4. While it is the aim to reduce the environmental impact of the material flow system as a whole, it is not efficient to spread the available resources equally over all material types, products, production processes and economic sectors. It is necessary to focus the available resources on the most important areas. For what is most important different criteria can be applied. Among these criteria are:

- amount of material/waste flow
- hazardousness of material/waste flow
- annual growth rate
- material/waste/sector with highest waste prevention, resource efficiency improvement potential
- material/waste/sector which causes the most stringent problems
- material/waste/sector which has the highest importance for the economy as a whole.

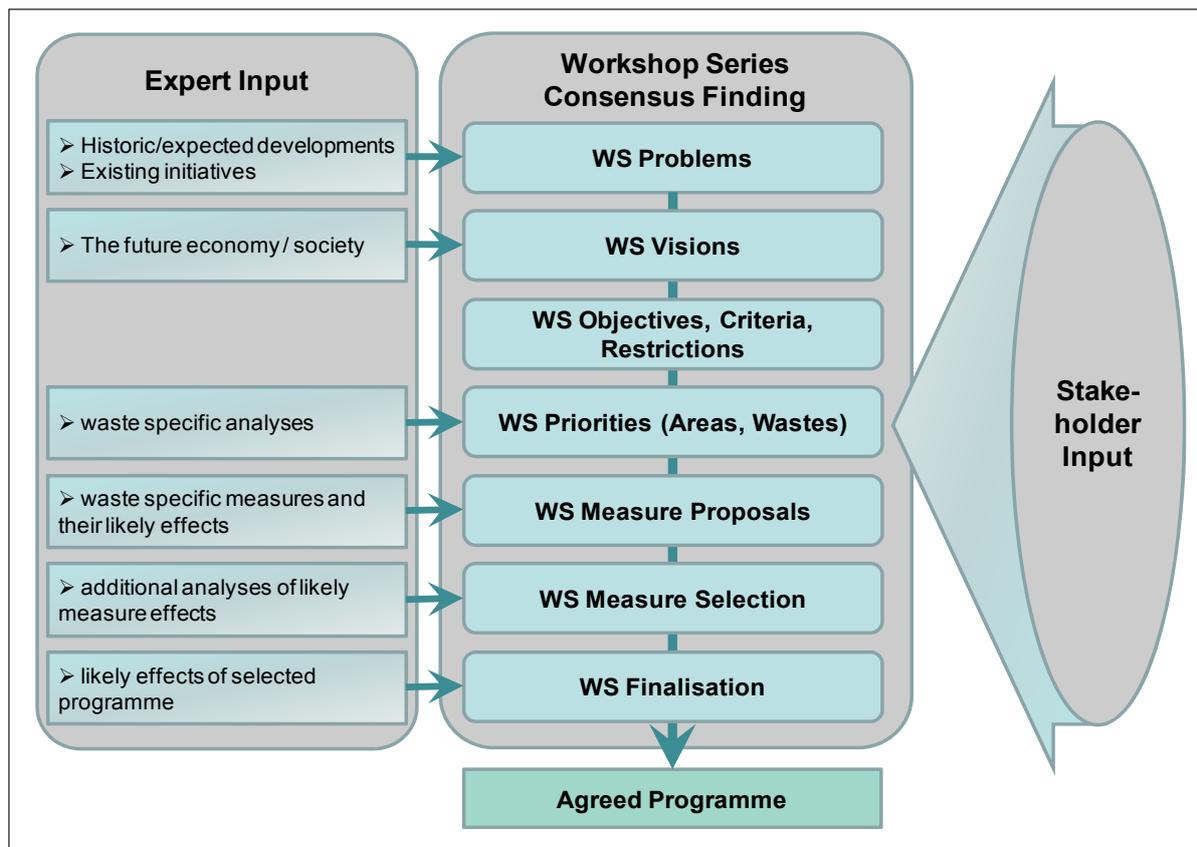
There is some discussion, which are the sectors with the highest waste prevention potential. While some experts refer to the sectors with the highest material and waste flows others refer to the consumers' sectors which create the demand and thus influence all material and waste flows.

5. When the priority areas are agreed, the consensus finding process can turn towards its core task, the selection of the measures which are part of the waste prevention programme. It may be possible to fulfil this selection step in only one workshop. However, experience has shown that it generally is more advisable to have the measure proposal and measure selection spread over at least 2 workshops. Basis for this task is a good overview of the measures/instruments which have been already applied in the country as well as the measures/instruments which are going on or are about to be started by public and private institutions on local, regional and national level. Also a good understanding of success factors is required. The first step of measure selection is to open up to new and possibly more unconventional ideas on how to improve the performance of the priority areas. Lists of measure types (see Annex IV of waste framework directive 2008/98/EC) and descriptions of initiatives which have been performed in other countries may be used as sources of inspiration.

When selecting the measures, it should be kept in mind that the waste prevention programme has to fulfil a number of tasks (see Figure 7). The programme should contain at least one measure for each of these tasks and for each priority area.

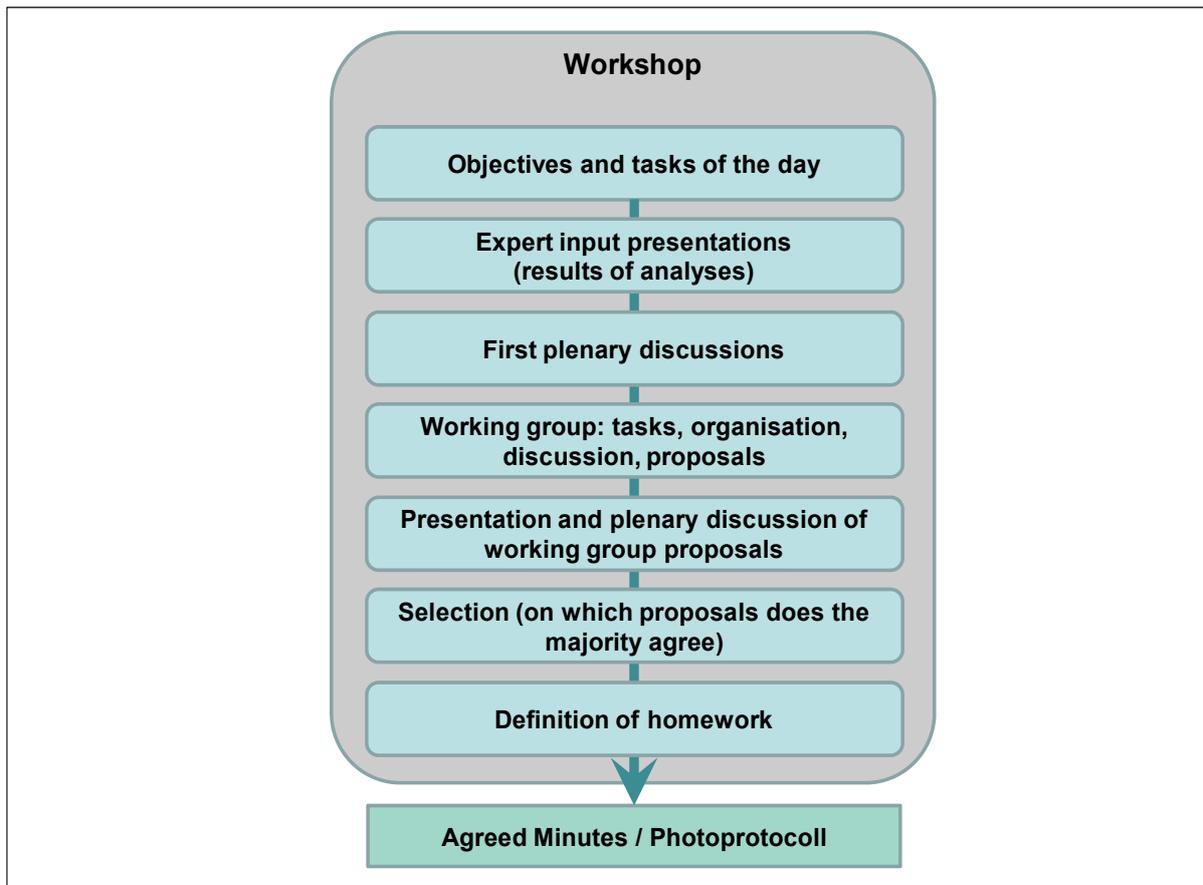
6. When the measures have been agreed and combined to concise strategy and a concise programme it is time to get a wider circle of interested and affected parties involved. This can be done by sending the draft programme to further institutions and experts and/or putting it on the internet for comments. After having received these comments the team should decide if and how the programme should be altered. As last step of programme preparation a final text version of the programme is edited.

Figure 11: Scheme of the Stakeholder Agreement Approach



In each workshop technical analyses, expertise and opinions from stakeholders and results of former discussions, and a task description for the respective day forms the input of the workshop (see Figure 12). The input is openly discussed in the plenum of stakeholders, decision makers and experts. Then smaller working groups deal with finding answers to specific core questions, which then are presented to and discussed within the plenum. When all proposals are on the table (or rather on the flip charts), a selection process is used to identify those proposals which are seen as most important (vision, objective, priority area) or most effective (measure, instrument, strategy) by the majority of the stakeholders. In the last phase of the workshop the next steps and the homework till the next workshop are agreed.

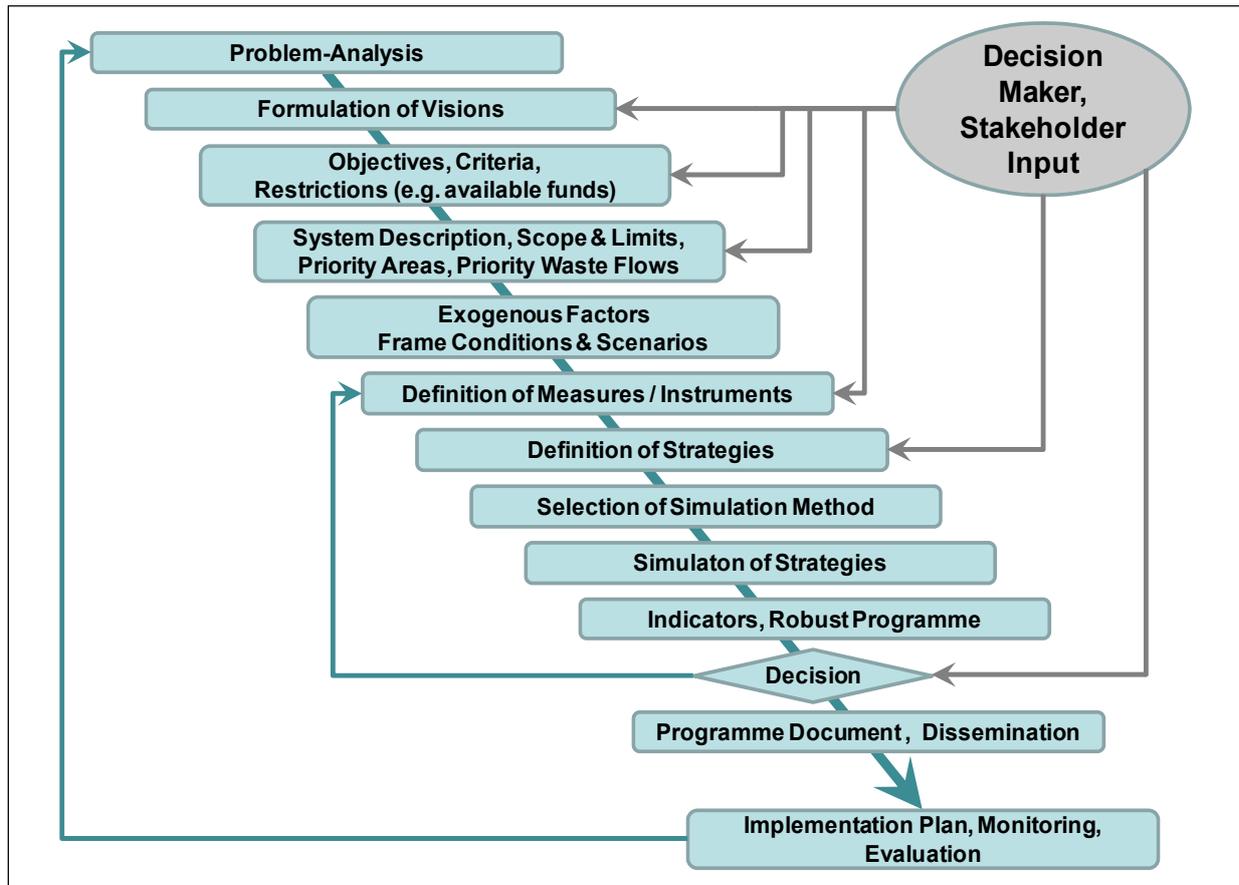
Figure 12: Exemplary sequence of a workshop



6.2. THE PLANNERS APPROACH – STRUCTURED ANALYSIS PROCEDURE

The stakeholder process is supported by the input of dedicated waste prevention planners. They follow a similar, however, more detailed scheme from problem analysis, via visions and objectives, to priorities and a selection of a robust combination of measures. This scheme is shown in Figure 13 and carries the name Structured Analysis Procedure.

Figure 13: Structured Analysis Procedure for Preparing a Waste Prevention Programme (adopted from Verbundplan et al. 1996³⁵)



While all the aspects which have been discussed as concerns the nature of the waste prevention programme and the stakeholder process need also to be taken into account by the planner, there are some more additional considerations, which the planner has to observe.

1. It is the task of the planner to support the decision makers and the stakeholder process by:
 - revealing core problems and cause-impact-relationships
 - evaluating existing and possible future measure with respect to their efficiency, effectiveness and, if possible their cost-benefit-ratio
 - visualising the consequences of options available today on future system development.

2. Several types of criteria and indicators are available for evaluating the effectiveness of measures and the programme as whole (see Figure 14 for non exhaustive examples). There is a tendency that those indicators which most closely would describe the achievement of the objective (such as total macroeconomic system costs or total life cycle environmental impacts) cannot be measured directly but need to be derived by complex modelling calculation. Usually it will cost a couple of years and high levels of uncertainty to gain these indicators. Therefore as proxy, frequently more accessible indicators are used. The simplest type of indicator would not show the effect of the measure or programme but only the intensity of implementation (e.g. how many persons were reached by an information programme).

³⁵ Verbundplan, IER-Stuttgart & Institute Jozef Stefan (1996): Integrated Resource Planning for the Rational Use of Energy in Slovenia. Klagenfurt.

When selecting the indicator, when selecting a model, when describing the material flow system and when simulating the effects of the measures and the effects of the programme the planner should not try to catch all in as great detail as possible, but he/she rather should strive for catching 90 % of the effect with 10 % of the effort. It is the art of planning to simplify without losing the essence.

3. Describing the material and waste flow system can be done in many ways, by just a table of material and waste flow, by text, by a process oriented material flow scheme and model (see Figure 15 for an example) or by a macroeconomic input-output model. That method and level of detail should be chosen which best serves the task with the resources available. The model shall describe the scope and limits of the material flow / waste system under investigation. The focus of the model should be on the priority areas and priority material / waste flows.
4. When having prepared the system model it may be necessary to simulate future development paths of the model. Here it is necessary to discern which factors influencing the system development:
 - cannot be influenced by the decision maker, however, are likely to take a narrowly predictable path – these exogenous factors provide the frame assumptions;
 - cannot be influenced by the decision maker and may take different development directions (such as economic growth) – these exogenous factors need to be allocated to scenarios;
 - can be influenced by the decision makers and thus be subject of the measures and the programme.

For the uncertain part of future system development which cannot be influenced by the decision maker usually two scenarios are developed, one of moderate growth and one of prosperity.

5. As support for the decision if a certain measure should be selected for the programme one simply can describe the likely effect of the respective measures as well as positive and negative consequences on the development of the material flow system, based on expert judgement.
6. A more elaborate model would be to develop simulation algorithms for the selected material flow system model and to simulate the effect of the measure, or a certain mix of measures (of a strategy) on material flow system development. It could be calculated, if the proposed strategy reduces for example the total system costs or the environmental impacts as compared to a Business as Usual Strategy in both scenarios (see Figure 16). The measure mix (strategy) could be altered till a measure mix is found which results in the lowest macroeconomic costs and environmental impacts in both scenarios. This strategy can be seen as being robust and is presented to the stakeholder process.

If it is not possible to develop a model and simulation algorithms, it is also possible to do the simulation of the measure mix for the two scenarios just “orally” based on expert judgement. An alternative also would be to just let the stakeholders judge if the respective measure or measure mix influences the material flow system development positively (with respect to lowered environmental impacts) or negatively.

7. When the planning work is finished, the planner may support the decision maker in formulating the text of the prevention programme, in disseminating it and in planning the implementation and monitoring of the programme.

Figure 14: Advantages and Disadvantages of Optional Waste Prevention Programme Indicators

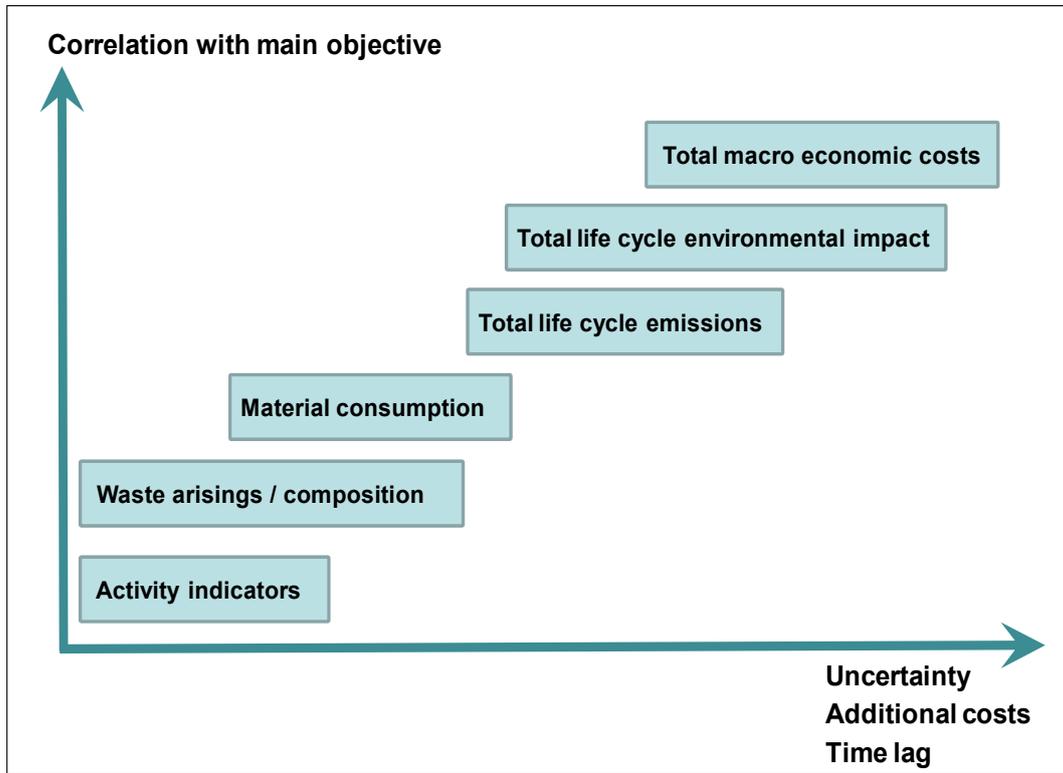


Figure 15: Material-Flow-Analysis-Type System Model on Food

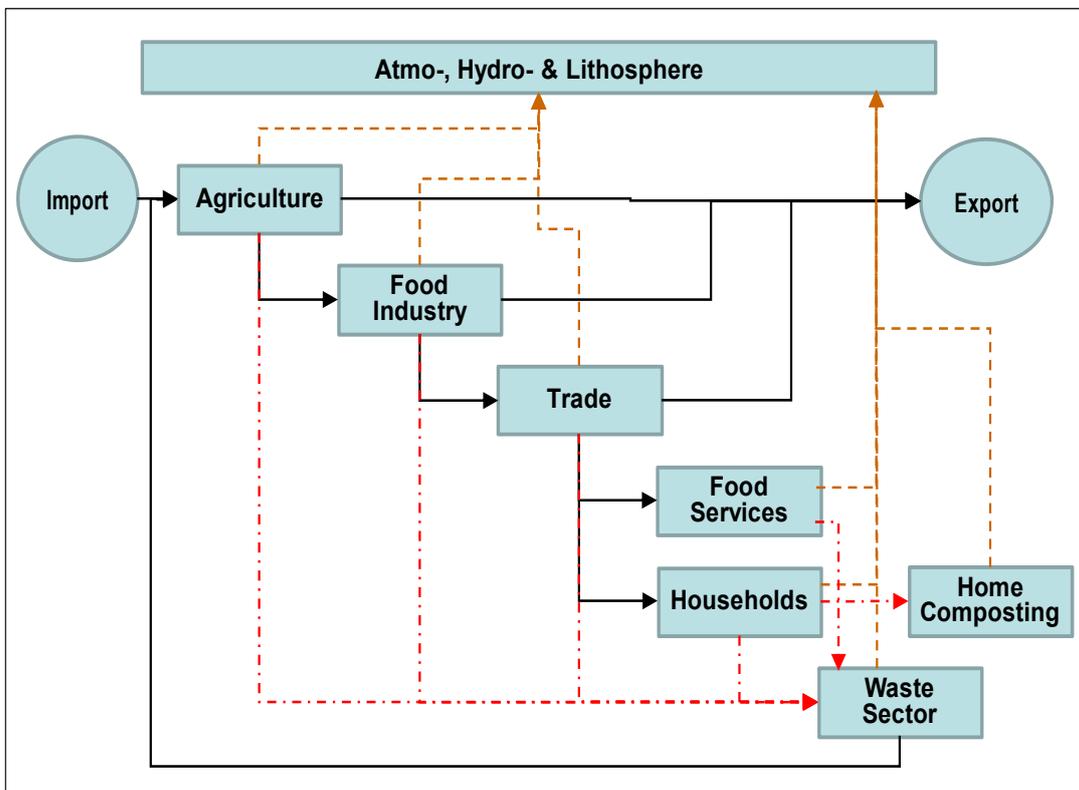
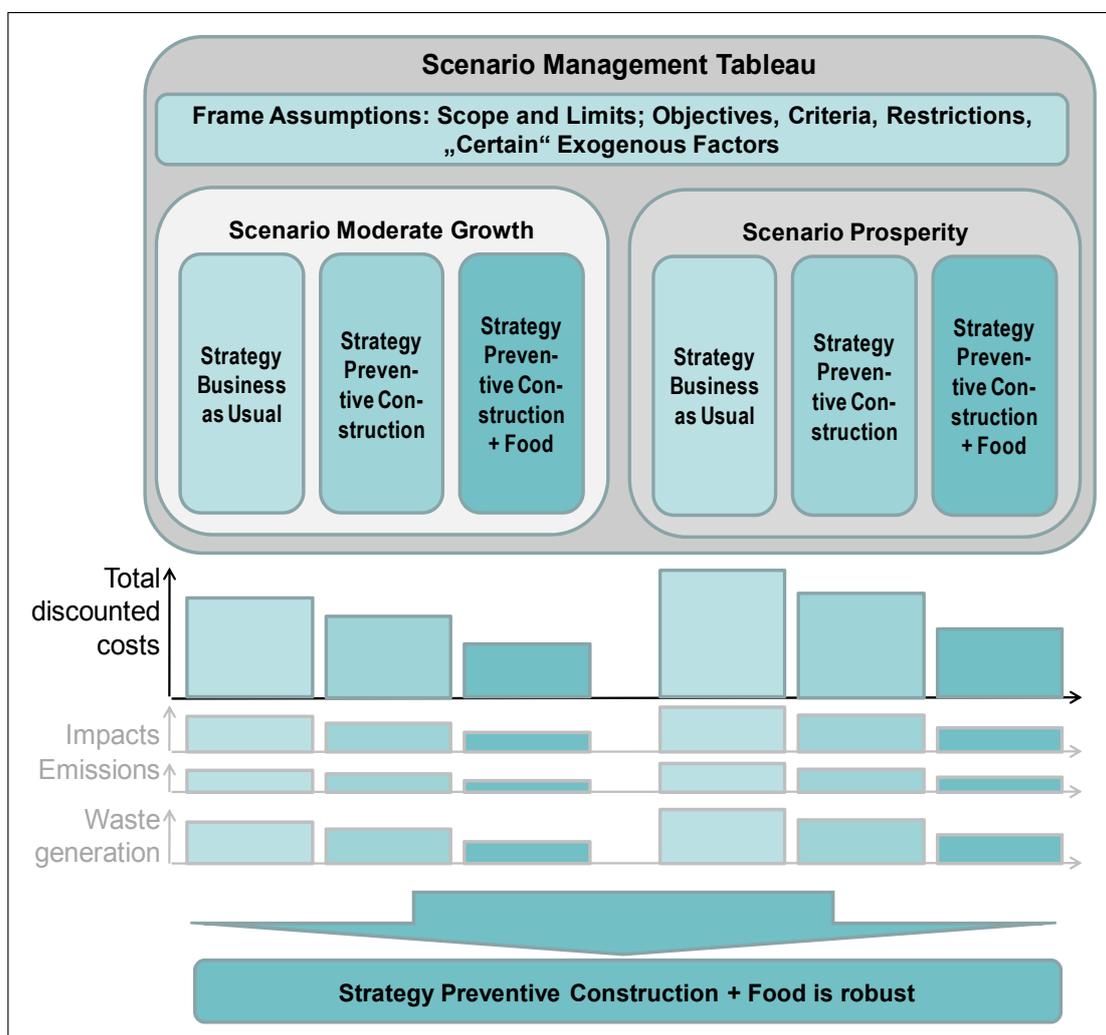


Figure 16: Scenario Management Tableau for Identifying Robust Strategies for an Uncertain Future (adopted from Verbundplan et al. 1996³⁶)



³⁶ Verbundplan, IER-Stuttgart & Institute Jozef Stefan (1996): Integrated Resource Planning for the Rational Use of Energy in Slovenia. Klagenfurt.