ADVANCING RESOURCE EFFICIENCY IN EUROPE

Indicators and waste policy scenarios to deliver a resource efficient and sustainable Europe

EUROPEAN ENVIRONMENTAL BUREAU

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Executive Summary

In times of economic uncertainty, there is a tendency to downplay the importance of sound environmental policies. This is a grave mistake in the case of resource efficiency and waste policy. A stronger policy in these areas can generate substantial benefits which include reduced landfill and carbon emissions, higher rates of re-use and recycling of products, and greater job creation. Europe has much to gain from improving its resource efficiency.

The European Union approved the revised Waste Framework Directive (WFD) in late 2008. This legislation provided the most significant revision of EU waste management policies since 1975. It can be regarded as the primary route map for municipal and some industrial (notably construction and demolition) waste policy across Europe. It required Member States to produce and implement mandatory waste management plans and prevention programmes that could be properly evaluated.

Alongside the Waste Framework Directive[1], two other major pieces of EU legislation in waste policy, the Landfill Directive and the Packaging and Packaging Waste Directive, are subject to review. To this end, the European Commission initiated a major Targets Review Project[2]. Its aim is to align the key targets of all three Directives with the Commission's policy objectives set out in the Resource Efficiency Roadmap[3], the Raw Materials Initiative[4] and the Report on the Thematic Strategy on Waste Water Prevention and Recycling.[5]

The 2014 review of waste targets is significant for European waste and resources policy and this report is a contribution to the debate. With wide variations in waste generation and in the implementation of existing waste Directives across Europe, the ongoing challenge for the EU is to drive forward its resource efficiency agenda, reduce the environmental impact of waste, while also addressing the economic and demographic challenges faced by many Member States.

This report considers a range of resource use indicators that could be applied to measure the impact of waste and resources policy. We examine four different indicators - materials, water, land use and greenhouse gas emissions (GHG) - which will help to better understand the impact of waste policy.

We have developed different scenarios for future waste and resources targets. We advocate a range of policy tools that Member States can use to meet the more ambitious scenarios. Using published data, we make an assessment of the potential impact of each of these scenarios mapped, where possible, against the four resource use indicators used in this report. We recognise that the existing data has limitations and that several assumptions need to be made. Nevertheless, the data available gives us a fair indication of the substantial benefits that could result from greater resource efficiency, through the Waste Targets Review and subsequent legislation, in the EU.

The report provides an unusually compelling case for intervention, through regulation and fiscal instruments, that can provide economic, social and environmental benefits. It is a genuine case where market making through economic and environmental policy is justified and necessary.

An assessment of the benefits of advanced resource efficiency policies, as we have articulated them, can be found in the table on the next page:

[1] Directive 2008/98/EC of the European Parliament and the Council of 19 November 2008 on Waste and repealing certain Directives http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:EN:PDF

[2] http://www.wastetargetsreview.eu/

[3] European Commission (2011) Roadmap to a Resource Efficient Europe COM(2011)571 http://ec.europa.eu/environment/resource_efficiency/about/roadmap/index_en.htm

[4] European Commission (2008) Communication on the Raw Materials Initiative "Meeting our critical needs for growth and jobs in Europe" - COM (2008) 699

[5] European Commission (2011) Review of the Thematic Strategy on waste prevention and recycling

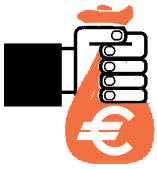
Consolidated Table of Assessed Impacts for each Scenario

	Modest Scenario	Medium Scenario	Ambitious Scenario
Avoided GHG Emissions (CO_2 equiv): food waste reduction	42.1 Mt (2025) 56.2 Mt (2030)	56.2 Mt (2025) 70.2 Mt (2030)	70.2 Mt (2025) 84.3 Mt (2030)
Avoided GHG Emissions (CO_2 equiv): reuse/preparing for reuse (textiles & furniture)	14.4 Mt (2025) 18.4 Mt (2030)	22.1 Mt (2025) 26.3 Mt (2030)	26.3 Mt (2025) 30.7 Mt (2030)
Avoided GHG Emissions (CO_2 equiv): recycling	In excess of 250 Mt	In excess of 303 Mt	In excess of 303 Mt
Avoided Water Use: textiles reuse/ prepare for reuse (wool and cotton)	26.1 Ml (2025) 34.8 Ml (2030)	43.5 Ml (2025) 52.2 Ml (2030)	52.2 Ml (2025) 60.9 Ml (2030)
Avoided fertiliser & pesticide use: cotton production	0.44 Mt (2025) 0.58 Mt (2030)	0.73 Mt (2025) 0.88 Mt (2030)	0.88 Mt (2025) 1.02 Mt (2030)
Avoided Land Use: food waste reduction	28,350 sq km (2025) 38,070 sq km (2030)	38,070 sq km (2025) 47,520 sq km (2030)	47,520 sq km (2025) 56,970 sq km (2030)
Financial savings to the householder: food waste reduction	€36.5 billion (2025) €49.1 billion (2030)	€49.1 billion (2025) €61.2 billion (2030)	€61.2 billion (2025) €73.4 billion (2030)
Monetary Value of CO_2 equiv. savings[6] : recycling targets	In excess of €2.5 billion to €9.9 billion	In excess of €3 billion to €12 billion	In excess of €12 billion
Additional Jobs from Higher Recycling and Reuse	634,769 (2025) 709,175 (2030)	713,525 (2025) 832,759 (2030)	747,829 (2025) 867,003 (2030)

BY 2030
Ambitious Scenario

84.3MT
REDUCTION IN GHG EMISSIONS
through food waste reduction

60.9 ML
WATER USE AVOIDANCE
through textiles reuse



€73.4 BLN
SAVING MONEY
through food waste avoidance

[6] Valued at €10 to €40 per tonne CO_2 equiv. (Ref. Ökopol (2008), Climate Protection Potentials of EU Recycling Targets)

As strong examples of how more ambitious resources policy could lead to environmental benefits that can be assessed by a basket of resource efficiency indicators (based on carbon reduction, land use, material use, and water use), we highlight three key policy areas: food waste reduction, textile and furniture reuse. These measures have high impacts on the daily life of European citizens, clearly identifiable and with reasonable data from which it is possible to make some assessment of potential impacts in Europe. In addition, we have also highlighted the potential impact of employment, a key economic factor and again because this is a high impact and clearly identifiable potential impact. Based on publicly available data our assessment is that the following potential impacts could be realised:

Table 1: Municipal Food Waste Reduction – Potential Impacts*

Scenario target for food waste prevention	Total tonnage prevented if target was achieved (based on 22 MS)	GHG avoidance (tonnes of CO_2 equivalent)	Financial savings to the householder	Avoided land use (square km)
Modest				
30% reduction (2025)	10.5 Mt	42.1 Mt	€36.5 billion	28,350
40% reduction (2030)	14.1 Mt	56.2 Mt	€49.1 billion	38,070
Medium				
40% reduction (2025)	14.1 Mt	56.2 Mt	€49.1 billion	38,070
50% reduction (2030)	17.6 Mt	70.2 Mt	€61.2 billion	47,520
Ambitious				
50% reduction (2025)	17.6 Mt	70.2 Mt	€61.2 billion	47,520
60% reduction (2030)	21.1 Mt	84.3 Mt	€73.4 billion	56,970

* The potential savings include the benefits linked to avoiding primary food production as a consequence of reduced food waste. This is in line with current ways of assessing food waste reduction impacts. However, the direct link between food waste reduction and reduction of primary food production is not a simple and straight cause and effect relation as EEB has often insisted upon.

In summary, an Ambitious scenario of 60% reduction in food waste by 2030 could reduce Europe's burden of land-use by an area greater than the size of Croatia, generate financial savings to European householders of over €73 billion and avoid over 80 million tonnes of GHG.

60% REDUCTION IN FOOD WASTE BY 2030
Ambitious Scenario

REDUCE EUROPE'S BURDEN OF LAND-USE

€73 BILLION HOUSEHOLD SAVINGS

80 Mt AVOID GREENHOUSE GAS EMISSIONS

Table 2: Textile Reuse/preparing for Reuse – Potential Impact based on Cotton and Wool

Scenario target	GHG emissions (tonnes of CO_2 equivalent avoided) (8 to 12.8 t per tonne range)	Avoided water usage (7,000 l to 30,000 l to produce 1 kg cotton)	Avoided fertiliser and pesticide use[7]
Modest			
15% (2025)	6.96 Mt to 11.14 Mt	6.09 Ml to 26.1 Ml	0.44 Mt
20% (2030)	9.28 Mt to 14.85 Mt	8.12 Ml to 34.8 Ml	0.58 Mt
Medium			
25% (2025)	11.6 Mt to 18.56 Mt	10.15 Ml to 43.5 Ml	0.73 Mt
30% (2030)	13.92 Mt to 22.27 Mt	12.18 Ml to 52.2 Ml	0.88 Mt
Ambitious			
30% (2025)	13.92 Mt to 22.27 Mt	12.18 Ml to 52.2 Ml	0.88 Mt
35% (2030)	16.24 Mt to 25.98 Mt	14.21 Ml to 60.9 Ml	1.02 Mt

It is assumed that the textiles being reused will predominantly be clothing and it is estimated that cotton and wool represent just over 50% of fibres used in clothing[8]. Therefore in an Ambitious scenario of 35% reuse/preparation for reuse of textiles in Europe by 2030 at least 16 million tonnes of GHG and at least 14 million litres of water usage could be avoided, equivalent to a week's worth of daily water usage by almost 30,000 people[9], based solely on the cotton and wool elements representing 50% of the reuse material stream. Clearly these figures will be higher once account is taken of the impact of synthetic fibres present in the textile waste being reused.

Table 3: Municipal Solid Waste -MSW- Recycling Targets – Potential Impacts

Scenario	GHG avoidance (tonnes of CO_2 equivalent)[10]	Monetary Value of CO_2 equiv. savings[11]
Modest		
55 – 60% recycling rate	In excess of 250 Mt	In excess of €2.5 billion to €9.9 billion
Medium		
60 – 70% recycling rate	In excess of 303 Mt	In excess of €3 billion to €12 billion
Ambitious[12]	In excess of 303 Mt	In excess of €12 billion

In summary, an Ambitious MSW recycling scenario for Europe could save in GHG avoidance the equivalent of taking around 100 million cars off European roads, approximately 40% of the European car fleet.[13]

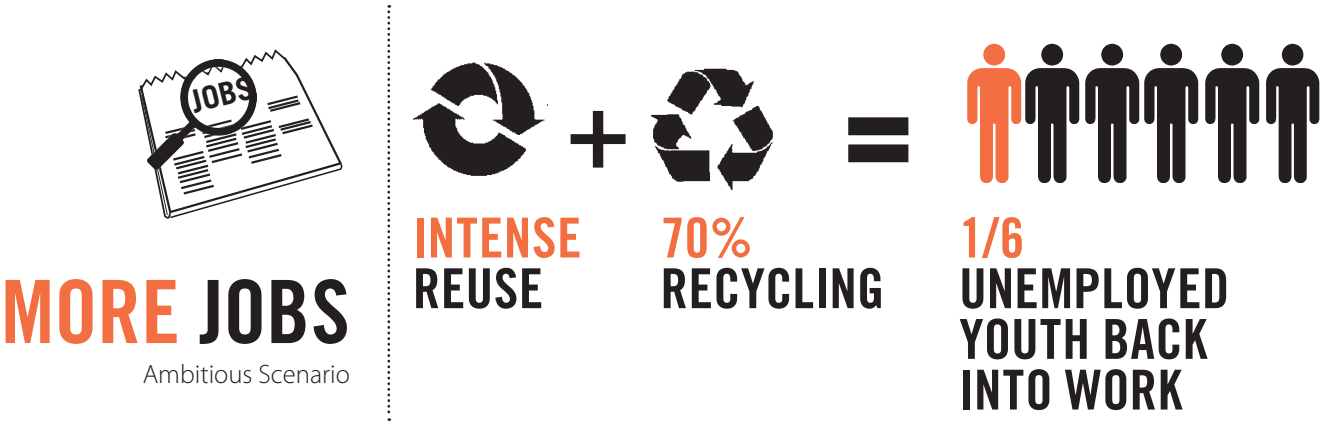
[7] Based on research from University of Copenhagen which identified 0.3 kg fertilisers and 0.2 kg of pesticides can be saved by reusing 1kg of clothing; this equates to 500 kg in total per tonne.
[8] BioIS (2009), Environmental Improvement Potential of Textiles, JRC Scientific and Technical
[9] Based on an average consumption of 150 l a day
[10] Based on the findings of the research that at 50% savings of 247 Mt could be achieved, and at 65% savings of 303 Mt could be achieved.
[11] Valued at €10 to €40 per tonne CO_2 equiv. (Ref. Ökopol (2008), Climate Protection Potentials of EU Recycling Targets)
[12] Noting that the headline target in Ambitious scenario is based on kg/capita waste generation but relies on maintenance of similar levels of recycling as the Medium scenario, therefore the same conservative estimate is used for GHG emissions avoidance
[13] Based on conservative estimates of GHG equivalence from car use and ACEA estimates of the numbers of cars in the EU in 2008 http://www.acea.be/news/news_detail/vehicles_in_use/

Table 4: Employment Opportunities – Potential Impact

Scenario	Additional jobs by 2025	Additional jobs by 2030
Modest	55% recycling – 442,350 Furniture reuse – 179,369 Textile reuse – 13,050 Total – 634,769	60% recycling – 482,570 Furniture reuse – 209,205 Textile reuse – 17,400 Total – 709,175
Medium	60% recycling - 482,570 Furniture reuse – 209,205 Textile reuse – 21,750 Total – 713,525	70% recycling[14] - 567,500 Furniture reuse - 239,159 Textile reuse - 26,100 Total – 832,759
Ambitious	60% recycling baseline – 482,570 Furniture reuse – 239,159 Textile reuse – 26,100 Total – 747,829	70% recycling baseline – 567,500 Furniture reuse – 269,053 Textile reuse – 30,450 Total – 867,003

In summary an Ambitious scenario for employment creation as a result of 70% and over recycling and intense reuse could be the equivalent of taking 1 in 6 of Europe's currently unemployed youth back into work.[15]

We hope that this contribution to European debate on the future of waste and resources policy and targets offers valuable food for thought on the potential still dormant in Europe's waste and points the way to a European future based on sound use of resources and the eventual elimination of waste.



[14] FoE (2010) baseline adjusted for accession of Croatia to EU28
[15] Based on current youth unemployment levels of around 5.7 million, http://epp eurostat.ec.europa.eu/cache/ITY_PUBLIC/3-29112013-AP/EN/3-29112013-AP-EN.PDF

Introduction to the Report Methodology

This report was commissioned by the European Environmental Bureau (EEB) as a contribution to the debate in Europe about the benefits of future of waste policy and target setting initiated by the European Commission in the context of the broader resource efficiency agenda. The aim of the project is to examine the existing data and literature on waste and resources in the EU and provide commentary in four key areas:

- the role of resource efficiency indicators in supporting waste policy, in particular by examining the potential for baskets of indicators to assess the impact of policy in a more comprehensive and sophisticated manner;
- the development of scenarios designed to suggest higher trajectories for improvements in European resource efficiency;
- the advocacy of a suite of policy tools available to Member States designed to support delivery of the targets suggested across scenarios;
- an assessment of some of the potential impacts on waste and resource use for each scenario using elements of the four key resource efficiency indicators advocated, as well as some economic indicators.

The report was commissioned by EEB and conducted by Dr Jane Beasley and Ray Georgeson, UK-based researchers and consultants with significant experience in policy making on an international and EU level. The consultants produced the research and wrote the body of the report, with input from the EEB team working on resources and waste policy.

Methodology

The methodology for the production of this report was based on maximising the valuable input of a range of industry and NGO stakeholders alongside assessment of available data on waste and resource use. We have chosen to highlight areas where data is more robust in order to extrapolate potential impacts based on more ambitious scenarios. Throughout, our approach is to err on the conservative side in making assumptions where data is limited, and always to highlight the gaps in data in the interests of transparency.

Following commissioning meetings, EEB organised a workshop for a wide range of stakeholders. This was held on November 15th 2013 as a stand-alone element of EEB's Waste Working Group meeting. As well as members of the Waste Working Group, representing NGOs and waste campaign organisations from across Europe, the meeting also benefited from the participation of several European recycling and waste industry association representatives[16] and officials from the European Commission. At this workshop, the consultants presented an early draft of the proposed scenarios, which was opened up for scrutiny and debate. Several participants at the workshop, from both NGOs and industry, contributed further information and position papers in the follow-up to the workshop. The active engagement of industry and NGO participants was an important element of the methodology for the production of this report.

In parallel with the workshop, an extensive literature review was conducted. The focus was on the major body of work undertaken for the European Commission in the run-up to the waste targets review. We also drew on the extensive work on indicators for resource efficiency (from BIOiS, Friends of the Earth Europe and the Sustainable Europe Research Institute (SERI) Vienna), and of course drew on the established datasets for the EU waste and resources performance on Eurostat. In addition, we received valuable input from a range of industry associations in the materials recycling sectors and other authoritative research agencies such as the UK Waste and Resources Action Programme (WRAP).

[16] Including: BDE, CEPI, EUROPEN, European Compost Network, FEAD, FEVE, FNAD, GEIR, RREUSE.

Following the literature review and stakeholder workshop, we then further developed the scenarios presented. They are presented in the report as possible scenarios for a more resource efficient Europe, building upon the baseline of full implementation of existing policy by 2020. The scenarios are identified as: Modest; Medium and Ambitious. For each scenario, we have identified a series of key policy objectives and targets and then assembled an overall package of policy measures that could be adopted in order to realise these scenarios. As the scenarios become more intense and ambitious, the policy measures that are advocated are expected to be used with greater intensity and number themselves, dependent on the circumstances pertaining to each Member State.

After developing the scenarios, we then sought to establish (where data was useable and more robust) elements of each scenario, where we could make a reasonable assessment of the possible impacts in terms of carbon and material use, and identified areas where clearly the benefits in terms of reduced burdens to land and water could also be realised. However, there are presently data limitations that make extended impact assessments too speculative. Where in conclusion we have presented an assessment of the overall potential impact of each scenario, this has been done using ratio estimates of impact per tonne. In addition to this, we have sought to incorporate some elements of the potential economic impact by focusing on the employment potential from the assembled scenarios. Whilst again, data and authoritative research in this area is limited, we have made conservative estimates based on a review of literature and some assumptions about employment potential in under researched areas such as reuse.

It is often and widely commented upon that the waste and resources industry and policy makers cannot always rely on the availability of authoritative data with which to make decisions. This remains a common problem and was no less of a problem for us. However, we take the approach that using the best available data and maintaining a conservative approach to its use and analysis should not be an excuse for any lack of ambition. What is clear is that the positive direction of travel needs to be maintained in the advancement of resource efficiency measures.

Therefore, in the context of this report, where we have highlighted particular resource streams for attention (largely as a consequence of the availability of more robust and useable data), these examples serve as strong illustrations of the potential for resources policy to deliver high environmental, social and economic outcomes. It does not mean that material streams not highlighted are less important or potentially less impactful, they simply suffer from poorer data provision and so we have chosen to concentrate on those where the data can be considered stronger and can have more immediate resonance for the purposes of this report.

At a recent event[17], European Commissioner Janez Potočnik, when referring to the complex debate on the plethora of resource efficiency indicators and the position of the Commission, said:

"...perfection is the enemy of the possible."

We consider that this statement could just as easily apply to the provision of waste and resources data, and therefore appeal to policy makers not to let short-term data gaps limit their thinking about the potential ambition of resource efficiency targets for Europe – we know how much there is still to do to reduce our resource impact and create a recycling society in Europe. It should be noted though that the presence of legal targets is often the catalyst itself for better data gathering and monitoring. Provided there is clarity about the setting of baseline or reference years and transparency about monitoring methodology alongside target setting, this can be used as a motivator to ambition.

Section 10 of this report contains a full listing of references used and weblinks where appropriate.

[17] Janez Potočnik speaking at the Friends of the Earth Europe seminar on resource efficiency indicators Targeting a more resource efficient Europe, Brussels, 5th November 2013 http://europa.eu/rapid/press-release_SPEECH-13-881_en.htm

Reviewing the EU's Waste Targets

The European Commission DG Environment's Targets Review Project is clearly the major event of 2014 in European waste policy development and will have significant implications for years to come.

This report is written very much in the context of the clear message of the Commission in the summary of the Targets Review Project and the Review of Waste Policy and Legislation Roadmap[18] that provides the underpinning rationale for the Review. The Review has three key elements, namely:

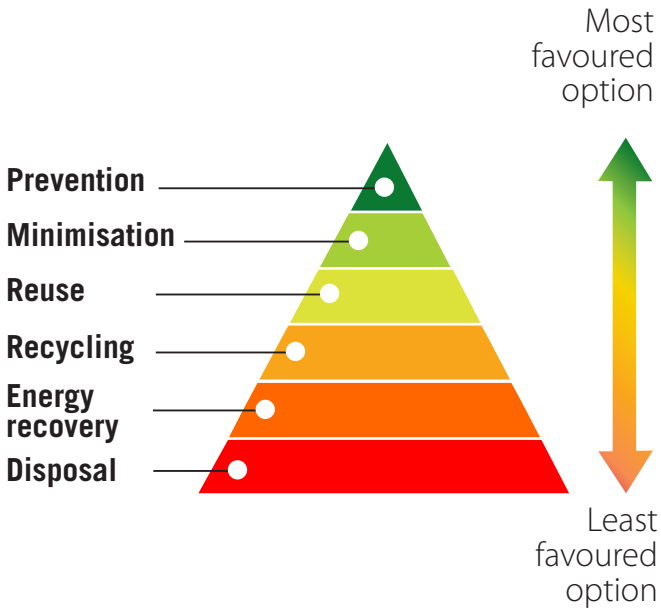
- A review of key targets in EU waste legislation (in line with the review clauses in the Waste Framework Directive, the Landfill Directive and the Packaging Directive);
- An ex-post evaluation ("fitness check") of five of the EU Directives dealing with separate waste streams: sewage sludge, PCB/PCT, packaging and packaging waste, end of life vehicles, and batteries;
- An assessment of how the problem of plastic waste can best be tackled in the context of the current waste policy framework, based on the publication of the Green Paper on a European Strategy on plastic waste in the Environment.

In doing this work, the Commission has also indicated the importance of the Roadmap to a Resource Efficient Europe in setting the direction of travel it intends for European waste policy, as summarised in the preamble[19] to the Waste Targets Review, namely:

"The Resource Efficiency Roadmap, for example, sets an aspirational target that by 2020 waste generation per capita will be in absolute decline; reuse and recycling will be at their 'maximum level'; European waste policy will have been fully implemented, energy recovery will be limited to wastes which could not otherwise be recycled and the use of landfill will have been "virtually eliminated". In light of these and other aspirations in the above Communications, there is a need to review waste targets and some of the supporting measures to ensure that they are aligned with broader European objectives in this area."

The Targets Review was subject to a comprehensive consultation[20] across Europe which, although showing variance of opinion on some key issues across different stakeholder groups, nevertheless demonstrates a clear appetite by a majority of stakeholders for the European Commission to continue to show greater ambition in the development of resources and waste targets whilst taking into account the vastly different baselines of Member States, especially in relation to more recent Member States and those with historic high dependency on and availability of landfill.

Of several salient outcomes of the consultation, it is noteworthy that a significant majority of industry stakeholders are supportive of limiting incineration to between 20% and 30% of municipal waste, alongside being supportive of striving for recycling rates of 70% or more.



[18] European Commission (2013) Review of Waste Policy and Legislation Roadmap http://ec.europa.eu/governance/impact/planned_ia/docs/2014_env_005_waste_review_en.pdf

[19] European Commission (2013) Targets Review Project, Project Overview http://www.wastetargetsreview.eu/

[20] Hogg D, Vergunst T & Elliott L (2013), Targets Review Project: Consultation on the European Waste Management Targets, Eunomia Research & Consulting, Öko-Institut e.V. & Copenhagen Resource Institute report for DG Environment, European Commission http://www.wastetargetsreview.eu/shopimages/Targets_Review_Project_Summary_Consultation_Results.pdf

Indicators for Resource Efficiency

An important element of this project is the consideration of how resource efficiency indicators can best be deployed to support waste policy tools through the effective assessment of impact and therefore the better management of policy.

There has been a lengthy and complex debate for several years about the merits of various methods for measuring the impact of the use of resources and resource efficiency. We acknowledge that there is a significant gap between the present thinking of the European Commission and the research done by various academic and other institutional bodies, which shows the advantages of a basket of indicators allowing more nuanced and sophisticated evaluation of the impact of resource efficiency policies. Presently, the Commission indicates it prefers to seek all Member States' agreement on a single headline indicator, expected to be a ratio of Raw Material Consumption (RMC) and Gross Domestic Product (GDP), which will measure imports and exports of materials in the EU. The intention is to "focus and give direction"[21] on a single indicator more likely to find short-term political acceptance and be able to be applied in all Member States.

This is a natural follow-on from the Commission's present reporting mechanisms which focuses on Direct Material Consumption (DMC) related to GDP in Europe as a proxy for resource efficiency, as recently reported in Eurostat's 2013 monitoring report of the EU's sustainable development strategy[22]. However, even in this 2013 Eurostat report, it is stated clearly that the use of DMC has limitations and cannot on its own determine the extent to which material use has been effectively decoupled from economic growth.[23] In determining the extent to which the EU has achieved absolute decoupling between 2000-2011 the report notes a 19.4% increase in resource productivity against a 16.5% increase in GDP, with almost all of the decoupling accounted for by a specific downturn in the use of non-metallic materials in the construction sector during this period; the extent to which this is attributable to economic downturn or to changes in construction techniques is not clear[24].

The point of extending this example here is to illustrate that while a headline indicator may have political and policy simplicity at its heart, it has real limitations in terms of determining what is actually happening and how particular policies may be affecting resource efficiency across the range of impacts. The limitations may act as a barrier to further ambition based on our improved understanding of the consequences of our actions.

To this end, we maintain support for the use of a broader basket of indicators which will develop better understanding of the impacts of resource use and the benefits of resource efficiency across four key areas of impact: carbon, land, material use and water. This is the approach developed by Friends of the Earth Europe[25] based on the research conducted for FoEE by the Sustainable Europe Research Institute of Vienna[26].

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[21] Carina Vopel, DG Environment – speaking at the Friends of the Earth Europe seminar on resource efficiency indicators Targeting a more resource efficient Europe, Brussels, 5th Nagepaovember 2013

[22] Eurostat (2013) Sustainable development in the European Union – 2013 monitoring report of the EU's sustainable development strategy http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-02-13-237/EN/KS-02-13-237-EN.PDF

[23] Ibid., p74

[24] Ibid., p73

[25] Friends of the Earth Europe (2010) Measuring our Resource Use http://www.foeeurope.org/sites/default/files/publications/measuring_resource_use.pdf

[26] Sustainable Europe Research Institute (2009) How to measure Europe's resource use. An analysis for Friends of the Earth Europe http://www.foeeurope.org/publications/2009/seri_foee_measuring_eu_resource_use_final.pdf

Table 5: Summary table of the FoEE/SERI proposed basket of resource use indicators

Resources use category		Product level		National level	
Materials	biotic	Material Rucksack of products	biotic	Material flow-based indicators of countries (including materials embodied in imports and exports)	biotic
	abiotic		abiotic		abiotic
Water		Water Rucksack / Water Footprint of products		Water Rucksack / Water Footprint of countries (including land embodied in imports and exports)	
Land area		Actual land use of products		Actual land use of countries (including land embodied in imports and exports)	
GHG emissions		Carbon Footprint of products		National GHG emissions (including GHG emissions embodied in imports and exports)	

In conclusion, it is clear that a basket of resource efficiency indicators would be more useful in guiding decisions on waste and resources policy. We acknowledge the short-term political constraints described by the Commission, but the effect of the downturn in the construction industry being cited as the main reason for a notional 'decoupling' of material use from GDP illustrates how the use of a basket of indicators would assist significantly in differentiating between resource use impacts generated purely by economic downturn and those generated by real improvements in resource productivity.

RESOURCE USE INDICATORS

MATERIALS

Material Rucksack of products, biotic/abiotic

WATER

Water Rucksack / Water Footprint of products

LAND AREA

Actual land use of products

GHG EMISSION

Carbon Footprint of products

Policy Tools and Approaches applied to Scenarios

Our starting point in thinking about policy tools to be applied in each of the scenarios described was the central message in the Resource Efficiency Roadmap and 7th EAP: to manage waste as a (valuable) resource, in the circular economy. There is a focus on reducing waste generation per capita and absolute waste generation, and also ensuring that energy recovery is limited to non-recyclable materials and landfill is phased out over time, essentially only available to waste that is non recyclable and non recoverable.

A more defined focus on delivering the waste hierarchy is vital, and in essence this provides the structure to the scenarios that have been developed, which propose new targets and opportunities for managing waste as a resource in the medium to long term.

When considering policy options and associated targets for the EU, is it recognised that some Member States face more challenges than others. We therefore consider that applying a multi- track approach using derogations and variable timetables to deliver against targets will better reflect the different starting positions of a diverse EU. We take the view that this should not preclude the setting of challenging targets across the EU, but that it recognises realities in a way that helps all Member States to have a fair and full stake in the implementation of Europe's objectives for resource efficiency. Those that have highest dependency on landfill may well have the biggest challenges and in Section 8 we will propose a banding system for developing timelines that can be seen as a starting point in this debate.

Approaches to aspects of the waste hierarchy

Prevention and reuse

To deliver a reduction in waste generation, a number of approaches can be applied. Reduced consumption as a consequence of moving towards a more service based economy is one way of driving this forward, as is enforcing product policy or using economic instruments to support products with durability and easier repair-ability. Setting specific targets for prevention and reuse is another approach and whilst all Member States are required to implement waste prevention programmes as part of the Waste Framework Directive, there are currently no European specific prevention and reuse targets in place, despite existing at a national level in some Member States (e.g., France, Italy, Belgium-Flanders, Scotland and Wales).

An overall waste prevention target may seem an obvious tool to use, but one which may be challenging to effectively monitor and deliver. It could be argued that if identified correctly the suite of policies and targets identified within each scenario should result in an overall reduction in waste generated per capita and in absolute terms, without the need for a separate specific target which would be challenging to monitor and indeed to set (it would require a baseline year and the use of a percentage or absolute targets which would need very clear and effective parameters and definitions to make it meaningful). However, it may be appropriate to develop prevention and reduction targets which focus on specific priority material streams. In addition, when considering prevention and reduction targets, the variations across Member States in terms of their starting points, need to be taken into consideration. Within the scenarios, the way that this has been done for food waste reduction targets is through the use of thresholds. In terms of preparing for reuse, the challenge from a data perspective is to be very clear as to what counts as preparing for reuse and how it is interpreted by reporting authorities. Double counting by local authorities and also third sector organisations which may be involved in collection needs to be avoided and there are questions over the availability of data outside local authority waste

collection systems. In addition for materials which are collected and then either reused or recycled depending on quality, open and transparent systems of accounting will need to be applied. Some organisations have experience in overcoming this challenge. RREUSE, for example, requires its network to report their statistics to national governments. For example with textiles organisations who are carrying out collection and sorting of this material must report on the tonnages they collect and sort. Identifying where the material is destined following sorting will clarify whether the textiles are being reused or recycled in the first instance.

It can be difficult to quantify the impacts of reusing products, but WRAP (UK) have developed a methodology[27] doing just this for a selection of products. The focus is on 3 environmental indicators: greenhouse gas emissions; energy demand; resource depletion, and also 2 economic indicators: number of jobs and, cost impacts. This methodology has been used in part to quantify the potential impacts of reuse targets; its limitations have been noted.

Recycling

Existing waste directives do focus on recycling, and a recycling target to be achieved by 2020 is currently in place as are specific targets for packaging materials. When considering higher targets or focusing on specific materials, it is important to take full consideration of the potential for high recycling rates to inadvertently crowd out prevention and reuse, whereby material is specifically targeted away from reuse and into recycling in order to deliver weight based targets.

The other challenge with recycling targets is to ensure that the value reported by the Member States is the true recycling figure achieved and not merely the material collected for recycling pre-reprocessing (including contaminants and rejects). Harmonising definitions and methodologies for making the calculations is essential. Within the scenarios the recycling targets proposed are based on outputs of the initial processing rather than inputs from collection. Although all Member States are engaged in recycling activities to some extent, there has been a history of downcycling taking place. From a resource perspective this means that the demand for primary raw materials is only slightly reduced, and therefore its effectiveness and role within a resource focused strategy is diminished to an extent. One way to address this is to ensure production design makes up-cycling or closed loop recycling possible. A further way to address this is to use mandatory targets for the secondary raw material content of particular product streams. This may have particular merit in sectors still in need of support of this kind – such as plastics – and less so in established and mature industries such as the metal, paper and glass sectors where technical barriers to the use of recyclate are not as common and access to consistent high-quality material is becoming the bigger challenge. A third way is to set standards for recycled material, so that they are as close as possible to virgin material.

Treatment and Disposal

Our primary consideration on these aspects of the waste hierarchy has been to package the scenarios in ways that maintain application of the hierarchy and direction of travel indicated by the Resource Efficiency Roadmap. This therefore concentrates on the elimination of direct landfill and direct incineration as an option for key elements of the resource stream, most notably untreated biowaste and clear direction on how key materials should be managed through the implementation of mandatory separate collections and bans to landfill.

We recognise that there has been considerable debate about the merits or otherwise of landfill bans for materials but we believe they have a role in certain circumstances and provide a clear market signal, while focusing attention on the use of separate collection requirements to steer materials positively into uses up the waste hierarchy, as well as greater application of fiscal instruments, which of course remain the prerogative of individual Member States to consider and apply.

[27] http://www.wrap.org.uk/content/environmental-and-economic-benefits-reuse

Approaches to targeted materials

Our starting point in this section is to acknowledge that this report focuses on municipal solid waste and does not seek to address the challenges of other waste streams (for example, construction and demolition waste), that represent larger volumes of material flow in Europe. We fully acknowledge that MSW is a modest proportion of overall waste flow in the EU, but it is still widely acknowledged to be the most challenging to manage and improve and where much legislative attention is placed. Our report therefore retains this focus.

Biowaste

Biowaste is defined by the EC as: biodegradable garden and park waste; food and kitchen waste from households, restaurants, caterers and retail premises; and, comparable food waste from food processing plants. Biowaste represents around 30-45% of municipal solid waste (MSW) in Europe.

Waste management options for bio-waste include, prevention at source, collection (separately or with mixed waste), anaerobic digestion and composting, incineration, and landfilling. How different Member States deal with this waste stream varies considerably, ranging from little or no direct policy action in some, to ambitious policies in others.

In terms of current legislative measures, under Article 22 of the Waste Framework Directive Member States should take measures to encourage the separate collection of biowaste – such as kitchen, food and garden waste – as well as it being treated in ways that ensures a high level of environmental protection. The Landfill Directive also addresses the management of biowaste[28], placing a cap on the proportion of biodegradable waste that can be landfilled.

It is generally accepted that landfilling biowaste is the least desirable option, in economic, environmental and resource management terms, but there are issues in how successfully the Landfill Directive is being implemented. Many problems in meeting the biodegradable waste diversion target have been as a result of lack of appropriate infrastructure and regulatory framework as to how the diverted biowaste should be treated.

The Green Paper on the management of biowaste in the European Union, followed by a stakeholder consultation communication[29] from the Commission to the Council and the European Parliament on future steps in biowaste management, conclude that the potential benefits of the recycling of biowaste appear to be significant, but there are still a number of challenges to address before considering an EU target for biological treatment. There have been various studies that have modelled the implications of setting recycling or collection targets and there clearly are economic and environmental strengths in going down this route. However, it is also necessary to make range of assumptions based on the data available and the predictions being made, which can undermine the proposed opinions and recommendations.

Other possible mechanisms to support what is already in place through the WFD and Landfill Directive include obligations for each Member State to use a fixed amount of renewable fertilisers (although this would need to be sufficiently defined) and/or the introduction of fiscal rules in favour of recycling, without the need to set recycling or separate collection targets.

Within biowaste the food waste element has come under increasing focus. The EC cites that the EU food and drink value chain is responsible for 17% of direct GHG emissions and 28% of material resource use. An estimated third to a half of all current food production ends up as waste. It is estimated that 90 million tonnes of food is wasted annually in the EU, despite the fact that on a local level the current economic climate has resulted in real food poverty across Member States. Recognising the importance of addressing this waste stream, the Roadmap to a Resource Efficient Europe raised a potential target of 50% food waste reduction by 2020, and a 50% prevention target on avoidable food waste by 2025 was proposed by the European Parliament early in 2012. Recognising the need for more work in this area, 2014 has been heralded as the

[28] It is acknowledged that the definition used in the landfill directive is for biodegradable waste which is more broad that the definition for biowaste.
[29] COM(2010)235 final

European Year against Food Waste, and there are many initiatives taking place at global, European, national and local level, ranging from behavioural and quantification studies to grassroots projects.

EU data for food waste can be a challenge. Some Member States have targeted this material already and therefore have a reasonably sound database. Others have little or no information. Bio Intelligence Service attempted to quantify food waste generation for those with limited or missing information and came up with the calculation for a national minimum food waste generation per capita figure of around 8% of MSW levels. In reality this figure appears to be very low when compared to data generated from national studies. Therefore Bio Intelligence Service has used a combination of data sources to attempt to identify a credible figure for per capita household food waste generation. The data shown in Annex 1 from the Bio Intelligence Service report has been used as the basis for setting the threshold level for the proposed target.

WRAP has undertaken extensive work in this area, and results of recent research show that 7 million tonnes of household food and drink waste was generated in the UK in 2012. This figure had reduced since in the initial survey in 2009, partly as a consequence of campaign work to reduce food waste and raise awareness of the issues amongst householders. Of the 7 million tonnes per annum, 60% (equivalent to 4.2 million tonnes) was considered to be avoidable, and a further 17% was potentially avoidable.

There is a clear link between disposable income and food waste, and as populations increase and there are increases in affluence, the generation of food waste, if left untapped, is set to grow. Member States are encouraged to include food waste prevention policies and targets in National Waste Prevention Programmes and some Member States are pushing forward in this area with varying degrees of success (for example France, Netherlands, Sweden, Austria have all made attempts to develop and implement food waste reduction targets).

There is much talk about effective treatment of this waste stream; however prevention of avoidable food waste needs to be at the heart of the strategy, with effective treatment targeting the unavoidable element.

Targeting this waste stream

There has been much discussion on the appropriateness of a recycling or a collection target for biowaste. From a resource management perspective focused on the main principle of reducing waste generation in absolute terms, flow of garden and green waste into collection systems to meet collection and recycling targets could be an unintended consequence. Similarly the inclusion of home composting within a biowaste recycling target would be problematic in terms of accounting, reporting and monitoring. Also, the attitude that generation of food waste (specifically avoidable food waste) is acceptable, signified by the presence of a recycling/recovery target for this waste stream would be giving out the wrong message, specifically from a resource perspective. Therefore, in light of the research outputs currently available and information garnered from consultations in relation to biowaste, a combination of a prevention target specifically focused on food to address the avoidable element (as this is a waste stream that is set to grow), coupled with a target for the separate collection of the remainder (unavoidable food and green waste), with disposal and treatment bans or caps in place to force alternative management (such as AD and composting), would potentially provide a resource management approach to this waste stream.

When targeting food waste specifically, it is recognised that there are significant variations in kg/capita/year. This reflects to an extent the affluence and social conditions of the different Member States, as well as food and purchasing habits. Recognising that there will always be an unavoidable element of food waste (around 25 to 44 kg per capita based on the work by WRAP 2012), it would be unfair and inappropriate to impose a blanket reduction target across all Member States – the current baseline must be taken into consideration and there must be an allowance for the unavoidable element. Therefore those Member States who are not generating significant quantities of food waste at present should not be required to meet the targets proposed. Based on the best current data available (refer to Annex 1), whilst accepting that those countries with the minimum percentage applied is probably on the low side, the threshold for which the target should apply is 30 kg/capita/year in the first

instance. This would allow for a margin of unavoidable food waste. It is accepted that this threshold should be subject to continual review as data on food waste becomes more universally available for Members States.

In terms of a separate collection target, this was identified in preference to a recycling target as we feel that it is inappropriate to be prescriptive as to the best approach to manage this material (above disposal), as technologies develop and local circumstances dictate to an extent the most appropriate outlet for this material (in a resource management context). Therefore we have placed the focus on ensuring effective separate collection of biowaste, clearly defined as per the Waste Framework Directive rather than as Biodegradable Municipal Waste as defined in the Landfill Directive (as paper is already accounted for and targeted separately within the Waste Framework Directive).

In addition to the target for food waste prevention and separate collection, the biowaste element of Biodegradable Municipal Waste, as defined in the Landfill Directive, is also being addressed through a revised landfill directive target. This is to further reduce the quantity of biowaste that is permitted to be landfilled, in addition to caps on the percentage of biowaste that can be incinerated. It is expected that a combination of these measures will ensure reduction where possible and more effective treatment such as anaerobic digestion will become a viable alternative as disposal routes are reduced.

Textiles

According to the European Commission consumers across the EU discard 5.8 million tonnes of textiles every year, with only 1.5 million tonnes (25%) of these post-consumer textiles being recycled by charities and industrial enterprises. The remaining 4.3 million tonnes goes to landfill or energy from waste (EfW)[30].

As a waste stream, textiles can be easily and readily reused or recycled. The market has been consistent (allowing for the some degree of fluctuation) for direct reuse in terms of pricing and demand. In addition, manufacturers are keen to access good quality material for recycling into clothing, aware that the ongoing availability of cotton and natural fibres is an issue.

Textile reuse or recycling makes environmental sense for a number of reasons. WRAP (UK) recently surmised that anything from 7,000 to almost 30,000 litres of water is required for each kg of cotton produced. According to the Water Footprint Network, 8,000 litres of water are used to make a single pair of jeans, and 2,500 litres are used for an average T-shirt. In addition, pesticides are used extensively in the making of cotton. 9 to 10% of all pesticides used worldwide are used in the cultivation of cotton, with every T-shirt involving the use of 150g of pesticides.

The reuse of textile products such as clothing offsets the need to produce new ones, saving its embodied energy, materials and chemicals. Waste and Resource Action Programme (WRAP) estimates that current reuse of T-shirts and sofas in the UK save 450,000 tonnes and 52,000 tonnes of CO_2 equivalent per year respectively. In general it is estimated that for every tonne of cotton T-shirts reused 12 tonnes of CO_2 equivalent are saved.

There are other benefits to reuse as well. Reuse is labour intensive as it involves collection, sorting, testing, refurbishment and reselling, which can be an asset in employment terms. Social enterprises working in the field of reuse also provide opportunities for retraining or new skills acquisitions for those who may be marginalised in the more traditional employment market.
There are challenges to reuse. A study by RREUSE[31] showed that between 2000 and 2005 the proportion of clothes collected that could be reused declined from 60% to 40% in Belgium and the Netherlands due to cheap and poorly designed products. This issue of quality of input material is one that needs to be taken into consideration when setting textile reuse targets; it would be unfair to set targets too high and which could not be achieved as a result of the quality of textile waste being available for collection.

Recycling of textiles also has environmental benefits. Currently, open loop recycling dominates, where fibre is used for non-clothing application such as industrial uses. This down cycles the original yarn into a textile

[30] Less is More, Friends of the Earth Europe
[31] RREUSE position paper concerning separate reuse/preparation for reuse targets, issued to EEB 2013

of lower value. Closed loop recycling on the other hand takes post consumer clothing and uses this to generate new clothing. This area is of particular interest to manufacturers keen to look for alternatives to virgin cotton sources.

From a financial and environmental perspective, reuse is the preferred option, but for lower quality material recycling may be the only viable approach. Currently, the Waste Framework Directive does not lay down percentages for recycling for textiles and at present proportions of material collected and recycled vary across Member States.

Targeting this waste stream

In line with the principle of reducing resource use and ensuring that the hierarchy is effectively implemented, a preparing for reuse target has been proposed for textiles. Originally it was considered that a per capita weight based target would be most appropriate, however this would not take into consideration the baseline in some Member States where textile waste may be a lesser issue compared to others. Therefore a percentage target has been proposed based on textile waste generation. The idea of this target is to keep textile waste out of the disposal and treatment routes as far as is practicable and encourage maximum reuse/ preparing for reuse. This would require monitoring systems to be in place, as has been the requirement for all targets previously developed within EU legislation. Those Member States which are leading the way in terms of textile collection for reuse/preparing for reuse would be encouraged to disseminate their experiences and good practice. As with all targets a baseline is required and therefore Member States would need to be clear as to the composition of their municipal waste stream. Our proposal would be for a target based on textiles in municipal solid waste, not just household waste.

In terms of defining what is meant by the target, preparing for reuse covers both reuse and also preparing material through sorting and other mechanisms ready for reuse. For textiles the logistics and environmental impact of reuse and preparing for reuse are very similar and, taking account the whole system costs of producing new garments from virgin raw material, the environmental savings in relation to waster, energy, GHG emissions are significantly beneficial from both processes.

The focus is specifically on reuse/preparing for reuse for a number of reasons. Literature on management of textile waste generally concurs that product reuse offers the best solution specifically in carbon terms, followed by recycling. This underpins and supports waste hierarchy for this material stream, and is further illustrated in Table 6.

Table 6: GHG emissions (tonnes of CO_2 equivalent) – Waste Management of Cotton and Wool Product

Management options	Cotton T-shirt (per tonne)	Wool jumper (per tonne)
Direct reuse	12.8 tonnes saving	9 tonnes saving
Preparing for reuse	11 tonnes saving	8 tonnes saving
100% recycling	Less than 1 tonne saving	Less than 1 tonne saving
100% landfill	0.2 tonnes generated	0.2 tonnes generated

Traditional markets for recycling textile waste into fibre for mattresses, carpet underlay and industrial uses are well established. Many projects that attempt to use recycled textiles and fibres, particularly for higher added value applications, are unsuccessful due to the costs incurred during the recycling process. Industry must be guaranteed a consistent and well specified source of recyclate. Through setting a reuse target it is assumed that Member States will need to support separate collection schemes, even if these are carried out by third party organisations (as is the case with many schemes at present). Any material that is not suitable for reuse may be made available for recycling.

A specific target for textile recycling has not been proposed, however it is recognised that lesser quality material will not be appropriate for reuse, therefore other approaches have been identified to ensure that recycling remains the preferred option for this material. Landfill bans and incineration caps for textiles will drive the management of waste up the hierarchy whilst not detracting from the reuse target. Again, the twin-track approach of advocating limits and bans on Biodegradable Municipal Waste (BMW) together with (in this instance) a reuse target for textiles is our favoured approach for this material. Although textiles are often collected separately, mandating a separate collection for textiles we consider too prescriptive in this instance and not necessary.

Bulky waste (specifically furniture)

The Waste Framework Directive and National Waste Prevention Programmes do address reuse and preparing for reuse, as well as taking prevention measures which will directly impact upon consumption and the use phase of a product. The question of whether it is appropriate to set a specific target focusing on reuse or preparing for reuse of this waste stream is a valid one, as it could potentially provide further stimulus and support for the development of accredited reuse and repair centres and networks. Furniture reuse schemes have been successfully put in place throughout a number of Member States although access to material continues to remain a challenge.

According to the European Federation of Furniture Manufacturers, in the EU furniture waste accounts for more than 4% of total municipal solid waste. Based on 2011 figures of 253,346,000 tonnes of MSW (Eurostat), this equates to at least 10 million tonnes of furniture waste being generated.

Furniture reuse is being proposed for a number of reasons, not just waste related, but in response to social issues, particularly recognising the important role furniture reuse plays in poverty alleviation and social programmes in many European countries. Ensuring access to discarded furniture products is vital and is seen as a fundamental requirement in tackling household poverty, providing affordable household goods to those who need them.

Targeting this waste stream

Many of the arguments made above in relation to textile reuse/preparing for reuse are appropriate here. In addition to the target we are hoping to push this waste stream up the hierarchy through landfill bans. It may be that caps at incineration facilities may also be appropriate, but at this stage we consider that market value of material and demand from the third sector, specifically in terms of targeting poverty issues through the provision of second hand furniture, will suffice.

Paper, Glass, Metals, Plastics

The Waste Framework Directive legislation requires the separate collection of paper, glass, metals and plastics to be implemented by 2015. While some Member States are choosing to interpret the detail of the requirements for separate collection in ways we consider not in the spirit of the legislation (such as the United Kingdom approach in which transposition has sought to support the UK's increased reliance on co-mingled municipal collections), there is nevertheless a clear direction of travel for most of Europe – focusing on directed separate collection of key materials in order to facilitate high quality recycling back into products within Europe and beyond.

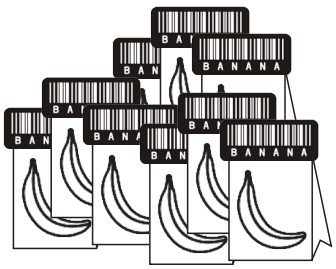
Targeting this waste stream

We believe that this approach will continue to work well for the increased capture and recycling of paper and metals (and to an extent on glass) in the European Union without additional demand-led measures to boost the use of secondary materials in products. The

supply-side remains the major challenge, ensuring high quality recyclates are available to European manufacturers as well as to legal, compliant export markets.

For plastics, we consider there is still more to do on demand-side measures and product development to deliver greater quantities of recycled content in plastic products. Great progress has been made in recent years, but much more can be done on product standards, research and development and technological advances to utilise recyclate. This is reflected in the targets we propose through all scenarios, and we consider a recycled content for plastics target a good measure to pull recyclate through, which will therefore be reflected in the increasing municipal recycling targets set in each advancing scenario. This is our favoured approach to setting a plastics recycling target – the advancing increases in the overall municipal recycling target include greater levels of plastics recycling as well as glass, paper and metals.

Packaging



Packaging recycling in Europe has improved significantly as a result of the drivers in the Packaging and Packaging Waste Directive and the clear market signals this has sent over many years. Bio Intelligence Service identified the best recycling rates for packaging to be 70 to 80%. The current country average rate for recycling of packaging is 59% (higher than the 55% target) which is a good story, but still sees a significant element of packaging heading to incineration or even landfill.

Our focus in this report has been on materials rather than packaging per se and we maintain consideration that this material focus still provides strong drivers to recycle and reuse packaging. Where significant weakness remains is in the Essential Requirements legislation for packaging. At present they are still too weak to really give an incentive to prevention of over packaging and change and improve the recyclability of certain packaging types. In addition they do not ease enforcement as revealed in the 2011 BIO IS study on essential requirements (only one or two Member States enforcing them). More clarity is needed at least regarding product to packaging ratios and quantitative assessment of recycling potentials. Furthermore, essential requirements were formulated long before the binding hierarchy of treatment (they date from 1994), and should be updated to reflect the 5 steps hierarchy, notably differentiating more between material recycling and energy recovery. This is to discourage design for energy recovery and promote further design for recycling (e.g. limiting the number of non separable/ non compatible materials/polymers in packaging). Improvement in this area, combined with a strong material focus, some improvements to recycled product development and directed separate collection, should deliver the ambitious recycling targets proposed, maintaining a material-based focus that still ensures packaging products are effectively collected and recycled.

Approaches to wider policy measures needed

In the final part of this section we consider the wider range of potential policy measures that will need to be applied in greater measure if the suggested advances are to be realised. We fully acknowledge that it is for individual Member States to determine the specific policy measures they deem necessary and appropriate to their circumstances. However, we have documented below a series of key interventions that would all be expected to feature more regularly and consistently across Europe as the ambition for a resource efficient Europe intensifies.

Extended Producer Responsibility measures

As an example, France has implemented an extended producer responsibility scheme for textiles (and also for furniture), whereby all organisations that place new clothing textile products, pairs of shoes or household linen aimed at private households onto the French market pay a financial contribution. Taking a whole life cycle approach, contributions may be reduced for textile products that have ecolabels. This money funds

an organisation whose responsibility is to encourage the further reuse, recycling and creation of value from used clothing, acting to support the collectors and sorters of textiles. Such support can be used for market development or for cost reduction, but is aimed at meeting the reuse/recycling commitments of the contributors. It also supports the employment (in sorting) of difficult-to-employ people.

The potential to further develop extended producer responsibility measures should be based on minimum standard rules across the EU. These then allow Member States to go beyond the common rules in accordance with their specific needs (e.g., clear targets associated with take back schemes, recycling and recoverability standards to be respected, modulated fees according to end of life properties of products). Examples of good practice and detailed guidance should be accessible across the EU to support Member States in developing this area.

Zero-rating VAT to encourage reuse and service based delivery models

We acknowledge that there have been many difficulties in the past with attempting to advocate differential rates of VAT in order to encourage particular actions in Europe. We believe however that there is merit in further exploring the potential for this, recognising that the European VAT Directive (2006/112/EC) does allow labour intensive services to be subject to lower levels of VAT, and therefore this ought to be increasingly applicable to reuse and repair services.

Wider use of fiscal and economic instruments – disposal taxation, fees and charges, product levies, direct or variable charging regimes

To a lesser or greater extent all the above measures are in use in the EU. The broad message in this report is to encourage greater take up of appropriate fiscal measures across Europe. In such an extensive range of options available to Member States there ought to be sufficient breadth of choice as to make additional introduction of fiscal instruments an expectation across Europe. There are many studies of the use and effect of such instruments – for the purposes of this brief discussion we refer to a comprehensive study undertaken by Eunomia in 2011 for Bruxelles Environnement[32] focused on fiscal measures for waste prevention. It suggests that widespread use of direct or variable charging would be effective (and is proven in some Member States), variable VAT could have a useful role, and product subsidies (such as washable nappies), have had very variable results. The point being that Member States need to maintain a watching brief on the use of fiscal instruments and be prepared to be innovative as our ambition for resource efficiency becomes more intense. In particular, attention should be paid to the exclusive use of landfill taxation without parallel disposal taxation on incineration, as without this there may be many instances where the desired intention to drive materials use up the waste hierarchy will not happen.

Voluntary agreements, Eco-design, recycling market development – support for R&D and commercialisation, underpinning communications and civil society engagement

We consider this group of actions to all have merit and be essential ingredients in the increased intensity needed on resource efficiency policy. However they are all areas less easily legislated for at a European level and more in the control of Member States to utilise effectively, with the notable exception of eco-design. In that instance, product policy that assists greater reuse, repair and recyclability is easier to regulate at EU level (under the Single Market), rather than at national level. Europe however could certainly commit more strategic resources to R&D and innovation programmes to further recycling market development, in particular to support technical work to incorporate greater levels of recycled content in products. However, commercialisation and implementation critically depends on good commercial partnerships and consumer awareness and willingness to embrace market changes.

[32] Eunomia Research and Consulting (2011), A Comparative Study on Economic Instruments Promoting Waste Prevention - Final Report to Bruxelles Environnement; Hogg, Sherrington, Vergunst; December 2011.

This links strongly to the need for greater and more consistent communications and civil society engagement at all levels: awareness and willingness of consumers to embrace the reuse and repair economy; consistent and persistent communication on preventing and sorting at source, separate collections and the value of recycling, including clarity for consumers on what actually happens to materials collected for recycling and their end destinations. These are key ingredients in the development of the European recycling society so clearly demanded by policy makers and integral to the change in culture and mindset needed to engage with the new resources agenda of prevention, reuse and repair and closed loop recycling.

In all these areas, the European Union can guide and assist as Member States determine how best to make their contribution to the shared objectives necessary for the success of this agenda.

ECO Plastics reprocessing plant in the UK - the world's largest plastic bottle reprocessing facility.

Scenarios for Advancing Resource Efficiency

Having documented our approach to key material streams, the application of the waste hierarchy and identified a range of applicable policy measures, we now present a range of possible scenarios for advancing resource efficiency.

This report assembles three possible scenarios for a more resource efficient Europe, based on the various political and policy debates on waste policy. For the purposes of discussion and debate, we have constructed scenarios as follows: Modest; Medium and Ambitious, designed to build upon a Baseline scenario based on the current legislative regime.

Baseline Scenario

The context for a baseline scenario assumes compliance with existing waste legislation and policy without any further ambition in targets. It is effectively a 'full implementation' scenario, based on:

- meeting the Landfill Directive target of 35% BMW to landfill by 2016 (2020);
- delivering the targets of the Waste Framework Directive including:
  - recycle or prepare for reuse 50% of household waste by 2020
  - Reuse, recycle or recover 70% of non hazardous construction and demolition waste by 2020
  - Ensuring separate collection of at least paper, glass, metals and plastics from households by 2015
  - Establishment of National Waste Prevention Programmes by December 2013;
- meeting the requirements of the Packaging Waste Directive and Essential Requirements Regulations.

It is recognised that there is an implementation gap in terms of existing waste legislation and targets, and full implementation across the range of waste Directives remains patchy at best. There clearly is value in pursuing better, more complete implementation of what is already in place and proper implementation of existing legislation should be seen as a necessity, but not a pre-requisite, for future target development. This is supported by the Commission study 'Implementing EU legislation for green growth'[33] which concludes that full implementation of EU waste legislation would save €72 billion a year, increase the annual turnover of the EU waste management and recycling sector by €42 billion and create over 400,000 jobs by 2020. This follows on from the Commission's 2011 Raw Materials Communication[34] that estimates, compared to 2004 emissions, between 146 and 244 million tonnes of GHG emissions could be avoided by 2020 through reinforced application of the waste hierarchy. This represents between 19 and 31% of the 2020 EU CO_2 equiv. emissions avoidance target. However, it is equally acknowledged that better implementation as a top priority does not have to be at the expense of setting more ambitious longer term targets, and in some instances to replace existing legislation with more appropriate approaches to deliver a more resource orientated strategy. This is an important point, as there is no evidence that improper implementation is linked to target ambition and there are several examples where Member States have had derogations to accommodate their needs in relation to a particular target. If anything, it is more the case that improper implementation is a result of lack of enforcement and on occasions unclear formulations in the interpretation of targets by Member States.

We appreciate that a starting point that assumes full implementation of existing policy will be seen by some as challenging and even controversial. However, we maintain that new formulations of policy and target setting could lever better implementation, aided by the parallel 'fitness check' on certain waste legislation being carried out by the Commission. Indeed, we would expect that new formulations of policy will effectively supersede some elements of the existing legislation, which is why we have focused on new scenarios, building upon the existing set of targets. We will now describe in more detail those three scenarios.

[33] Implementing EU Waste Legislation for Green Growth; Final Report; EC DG ENV; BIO Intelligence Service 2011
[34] EC Communication "Tackling the challenges in Commodity Markets and on Raw Materials"; COM (2011) 25 final.

Modest Scenario

The Modest Scenario builds on the existing baseline by extending the targets further towards deadlines of 2025 and 2030 and introducing some new elements. This covers:

- a modest stretch to the current municipal recycling targets, with a recommended change to the measurement to be output rather than input based;
- further reductions in biodegradable municipal waste going to landfill combined with a renewed baseline of 2010 to bring this target up to date. We would recommend maintaining the current definition of Biodegradable Municipal Waste[35], which does differ from the definition for biowaste;
- proposal for a graduated food waste reduction target based on a minimum threshold level of per capita food waste generation;
- separate collection of biowaste (as defined in the previous section) , further advancing the requirement for separate collection of dry recyclables stipulated in the base case;
- preparing for reuse target in relation to textile waste and furniture waste;
- a secondary raw material target for recycled content in plastic products, designed to be supportive of the 'twin-track' improvement in separate collection of this and other key materials;
- setting a cap on incineration of biowaste designed to complement the policy of separate collection and form a twin-track or 'pincer movement' policy effect to provide the clearest signals possible about both the desired and undesirable treatment routes for this material.

Table 7: Modest Scenario

	2025	2030
Minimum Municipal Recycling Rate*	55%	60%
Revised Landfill directive target for Biodegradable Municipal Waste (BMW)	25% of 2010 levels	20% of 2010 levels
Graduated Food Waste Reduction Target**	30% reduction	40% reduction
Separate Collection	Biowaste (from households)	Biowaste (from households)
Preparing for Reuse Target (MSW)	Textiles 15% of textile waste Furniture 30% of furniture waste	Textiles 20% of textile waste Furniture 35% of furniture waste
Proportion of secondary raw material in manufactured products	10% plastics	15% plastics
Incineration cap - Biodegradable Municipal Waste (BMW)	Biowaste –70% excluded from incineration	Biowaste – 80% excluded from incineration

[35] This includes any waste capable of anaerobic or aerobic decomposition, such as food and garden waste, paper and paperboard.

* Measured as an output, rather than a collection based input so that only recycled material (not contaminants or rejects) is counted. Recognising that this will mean a change in methodology for some, we firmly consider that this method of measuring recycling output has more integrity and consistency as it focuses on what actually gets recycled, not just what gets collected. It will be an important driver in ensuring that the efficiency of collection and sorting systems continues to improve and have the needs of the end reprocessor more firmly as a focus – remembering that recycling only happens at the point where a material is turned back into a product.

**Based on levels of food waste per capita with a threshold of 30 kg/capita below which reduction target will not apply – objective of getting high food waste generating MS to move towards those already with low food waste per capita

Medium Scenario

In our Medium Scenario we have built upon the modest scenario and further extended targets within the 2025 and 2030 timescales. This includes:

- further developing the recycling rates proposed, with the same caveat that monitoring of this target is output rather than input based;
- rather than a landfill directive target which reduces the quantity of biodegradable municipal waste which can be landfilled, measured against a point in time, we are proposing landfill bans for untreated defined waste streams. The challenge for Member States to accurately report against a reduction target (which at present is not data that is collated by the EU, rather a total landfill figure is presented each time), may be best avoided by adopting a transparent ban of the untreated target materials;
- the graduated food waste reduction target has been extended, with the proposed threshold remaining in place;
- mandatory separate collection of biowaste remains, as a natural progression to the separate collection of the four dry recyclable materials, supported by a cap on the amount of biowaste able to be sent to incineration to ensure that the most appropriate (in resource management terms) infrastructure is developed to manage this waste stream;
- extending the target on secondary materials use in plastics, where further support and market development may be useful, more challenging and necessary to deliver sustainable high levels of plastics collection as part of the overall recycling target. For the other major volume materials, such as paper and card this is not considered necessary – the drivers of separate collection and limits on biowaste to incineration should be sufficient to continue to direct supply to European manufacturers who can utilise much more quality recyclate than is often available, as well as service legal compliant export markets for these commodities. For glass, increased provision of good collections will be a main driver, as with paper, the technical maturity of the industry limits the value of mandatory recycled content targets and so they are not proposed;
- increase in the preparing for reuse targets for textile waste and furniture waste.

Table 8: Medium Scenario

	2025	2030
Municipal recycling rate*	60%	70%
Landfill bans of specific MSW	Untreated biowaste, furniture, paper/card	Untreated biowaste, furniture, textiles, wood, paper/card
Graduated food waste reduction target**	40% reduction	50% reduction
Separate Collection	Biowaste (from households)	Biowaste (from households)
Preparing for Reuse Targets (MSW)	Textiles 25% of textile waste Furniture 35% of furniture waste	Textiles 30% of textile waste Furniture 40% of furniture waste
Proportion of secondary raw material in manufactured products	20% plastics	25% plastics
Incineration cap - Biodegradable Municipal Waste (BMW)	Biowaste – 80% excluded from incineration	Biowaste – 90% excluded from incineration

* Measured as an output, rather than a collection based input so that only recycled material (not contaminants or rejects) is counted – recognising that this will mean a change in methodology for some, we firmly consider that this method of measuring recycling output has more integrity and consistency as it focuses on what actually gets recycled, not just what gets collected. It will be an important driver in ensuring that the efficiency of collection and sorting systems continues to improve and have the needs of the end reprocessor more firmly as a focus – remembering that recycling only happens at the point where a material is turned back into a product.

**Based on levels of food waste per capita with a threshold of 30 kg/capita below which reduction target will not apply – objective of getting high food waste generating MS to move towards those already with low food waste per capita

Ambitious Scenario

In our Ambitious Scenario we have developed our approach to the utilisation of overall municipal recycling rates as a policy target and focused on per capita waste arisings as a potential measure. As the package of measures and targets proposed direct all biowaste and the targeted recyclable materials away from landfill we believe this alone gives a better measure of intensity than the recycling target. This headline target is complemented by:

- further increases in reuse targets
- further increases in the graduated food waste reduction target
- higher mandatory recycled content for plastics
- capping of recyclable materials to incineration

Again, we maintain the principle of the 'pincer movement' approach to target setting and sending market signals, especially in relation to biowaste, but this equally applies to recyclables. In summary, the scenario envisages an intense package that directs material away from landfill, limits its route to incineration and steers reduction and reuse. We believe that the value of pitching an overall EU average per capita waste generation target is the focus it will offer. It encourages all to aim for significant reductions from present levels of waste generation. It also starkly illustrates the size of the challenge as well as the potential opportunity.

Table 9: Ambitious Scenario

	2025	2030
Reduction in per capita municipal solid waste (MSW) arisings	EU average 400 kg/capita	EU average 350 kg/capita
Landfill bans of specific MSW	All untreated Biodegradable Municipal Waste (BMW) and target materials	All untreated BMW and target materials
Graduated food waste reduction target*	50%	60%
Separate Collection	Biowaste (from households)	Biowaste (from households)
Preparing for Reuse Targets (MSW)	Textiles 30% of textile waste Furniture 40% of furniture waste	Textiles 35% of textile waste Furniture 45% of furniture waste
Proportion of secondary raw material in manufactured products	25% plastics	30% plastics
Incineration ban	100% of untreated Biodegradable Municipal Waste (BMW)	100% of untreated BMW

* Based on levels of food waste per capita with a threshold of 30 kg/capita below which reduction target will not apply – objective of getting high food waste generating MS to move towards those already with low food waste per capita

Assessment of impact of resource efficiency scenarios

In this section we take the various scenarios for advancing resource efficiency in Europe and using the best publicly available data we were able to identify, we have highlighted examples of how targets within the scenarios can have significant positive impacts in terms of reduced material use, GHG emissions, land take and water impact. It is important to note that this is not a comprehensive assessment of all elements of the scenarios and all possible indicators, but very much an opportunity to understand the potential through the use of examples. We have particularly highlighted food waste reduction, textile and furniture reuse as three key examples where greater action is needed, and which can be very tangible for the European public and lead to identifiable and valuable benefits for the European economy and environment alike. We have also sought to highlight economic benefits and impacts, and in particular have focused on employment as a key economic indicator.

Food waste reduction target: impacts (GHG avoidance, financial savings, avoided land use)

Through the recent work undertaken by WRAP on food waste[36] it has been calculated that for every 1Mt of food wasted, 4 Mt of CO_2 equivalents are generated[37]. This figure of 4 Mt of CO_2 is the lower end of the estimate. In fact when taking the land demand into consideration, which pushes up deforestation, the greenhouse gas emissions increase to 5.2 Mt of CO_2 equivalents for every 1Mt of food wasted. Also, the land required to produce the food and drink thrown away has been calculated as 2,700 square km[38] for every 1 Mt of food wasted. In financial terms, for every 1 Mt of food and drink wasted, this equates to a cost of £2.9 billion at 2012 prices for food and drink (€3.48 billion at an exchange rate of €1.2 for every £1.00)*.

Therefore, using these figures, it is possible to calculate the potential impact of a prevention target in relation to greenhouse gas emissions, land use and avoided costs to the householder.

Accepting that there will be an element of unavoidable food waste generation, estimated at around 30 kg/capita/annum, a number of Member States have been excluded from the benefits calculation. These were: Czech Republic, Latvia, Lithuania, Romania, Slovakia. In addition, data for Croatia was not available. Some of these Member States are presenting figures just over 30kg/capita/annum but because the data is rather arbitrary in some cases, we have allowed a margin of error and adopted a more conservative approach in calculating the impacts. It is acknowledged that adopting a target with a threshold level would require annual returns from all Member States on the per capita generation of food waste, which would need to be reviewed to establish whether the targets were applicable or not. Those who were close to the threshold would require additional monitoring. Therefore a clear methodology would need to be proposed and adopted that would support the monitoring of this waste stream. In reality, for some countries close to or under the per capita threshold, the data presented may not be a true reflection of food waste being generated and it is expected that as they monitor this waste stream the reported kg/capita will be much higher. The calculation of impacts can only

[36] http://www.wrap.org.uk/content/household-food-and-drink-waste-uk-2012

[37] GHG emissions calculated based on food wasted (rather than food purchased) and include agricultural, food manufacturing, distribution, transportation, retail, storage, preparation at home, waste treatment and disposal. Source is WRAP 2012

[38] It was reported in the WRAP research that the land required to produce the food and drink thrown away was 19,000 square km. However it was unclear whether this was referring to the total food and drink waste (i.e. 7 Mt) or the avoided element (4.2 Mt); we have erred on the side of caution and assumed it was the total food and drink wasted.

* It has to be noted that those calculations include impacts linked to reducing primary food production equivalent to the non waste food. EEB has often stated that this assumes a direct cause and effect relation between food waste reduction and a reduced production of primary food, which though theoretically understandable may not be so straight in reality. Other mechanisms, notably common agriculture policy may interfere with this simple cause and effect relation.

give a best estimate based on current data. It should be noted that the calculations are not complex, and have not taken into consideration the point at which the Member States drop below the threshold level, particularly for the higher targets in the scenarios. However we still consider that as the benefits are calculated for only 22 of the 28 Member States, and taking into consideration the potential for the data (particularly the estimates based on the BioIS work) to be lower than in reality, Table 10 represents a more conservative estimate.

Table 10: Municipal Food Waste Reduction Target: Potential Impacts

Scenario target for food waste prevention	Total tonnage prevented if target was achieved (based on 22 MS)	GHG avoidance (tonnes of CO_2 equivalent)	Financial savings to the householder	Avoided land use (square km)
Modest				
30% reduction (2025)	10.5 Mt	42.1 Mt	€36.5 billion	28,350
40% reduction (2030)	14.1 Mt	56.2 Mt	€49.1 billion	38,070
Medium				
40 % reduction (2025)	14.1 Mt	56.2 Mt	€49.1 billion	38,070
50% reduction (2030)	17.6 Mt	70.2 Mt	€61.2 billion	47,520
Ambitious				
50% reduction (2025)	17.6 Mt	70.2 Mt	€61.2 billion	47,520
60% reduction (2030)	21.1 Mt	84.3 Mt	€73.4 billion	56,970

AVOIDING LANDUSE BY 2030

Ambitious Scenario

OVER 56,000 SQ KM OF AVOIDED LAND USE

the size of Croatia

To provide some context, in the Modest scenario, avoided land use would be almost the size of Belgium by 2025, and almost the size of Switzerland by 2030. In the Medium scenario, by 2030 this would increase to land area greater than the size of Denmark and in the Ambitious scenario it would be greater than the size of Croatia.

Textiles reuse target: impacts (GHG avoidance, water avoidance, pesticides and fertiliser avoidance)

WRAP (UK) recently produced a number of case studies[39] evaluating the impact of reuse activities. They developed a methodology for assessing the impact of different waste management methods in relation to specific products. Data in relation to GHG emissions and savings to be made in terms of CO_2 equivalents in relation to cotton and wool clothing can be seen in Table 11.

[39] http://www.wrap.org.uk/sites/files/wrap/Clothing%20reuse_final.pdf, http://www.wrap.org.uk/sites/files/wrap/Office%20Furniture_final.pdf, http://www.wrap.org.uk/sites/files/wrap/Domestic%20Furniture%20chapter_final.pdf

Table 11: GHG emissions (tonnes of CO_2 equivalent) - Clothing

Management options	Cotton t-shirt (per tonne)	Wool jumper (per tonne)
Direct reuse	12.8 tonnes saving	9 tonnes saving
Preparing for reuse	11 tonnes saving	8 tonnes saving
100% recycling	Less than 1 tonne saving	Less than 1 tonne saving
100% landfill	0.2 tonnes generated	0.2 tonnes generated

Based on the above data, the potential impact of the scenarios can be identified, in terms of avoided GHG emissions, water usage and pesticides and fertilisers (refer to Table 12). Clearly assumptions have to be made: there will be a combination of natural and man-made material in the waste but we have data for cotton and wool only (refer to the note under Table 12). In addition, the figure of 5.8 Mt is used as the baseline for textile waste in Europe[40]; clearly this figure is an estimate and is subject to change, specifically when it is considered that the UK alone generates over 1 million tonnes of textile waste per annum.

Table 12: Potential impact of Textile Targets: Based on Cotton and Wool

Scenario target	GHG emissions (tonnes of CO_2 equivalent avoided) (8 – 12.8 t per tonne range)	Avoided water usage (7,000 l to 30,000 l to produce 1 kg cotton)	Avoided fertiliser and pesticide use[41]
Modest			
15% (2025)	6.96 Mt – 11.14 Mt	6.09 Ml – 26.1 Ml	0.44 Mt
20% (2030)	9.28 Mt – 14.85 Mt	8.12 Ml – 34.8 Ml	0.58 Mt
Medium			
25% (2025)	11.6 Mt – 18.56 Mt	10.15 Ml – 43.5 Ml	0.73 Mt
30% (2030)	13.92 Mt – 22.27 Mt	12.18 Ml – 52.2 Ml	0.88 Mt
Ambitious			
30% (2025)	13.92 Mt – 22.27 Mt	12.18 Ml – 52.2 Ml	0.88 Mt
35% (2030)	16.24 Mt – 25.98 Mt	14.21 Ml – 60.9 Ml	1.02 Mt

It is assumed that the textiles being reused will predominantly be clothing and it is estimated that cotton and wool represent just over 50% of fibres used in clothing[42]. Therefore an Ambitious scenario of 35% reuse/preparation for reuse of textiles in Europe by 2030 could avoid around 13 million tonnes of GHG and up to 30 million litres of water usage, equivalent to a week's worth of daily water usage by almost 30,000 people[43], based solely on the cotton and wool elements. Clearly these figures will be higher once account is taken of the impact of synthetic fibres present in the textile waste being reused.

[40] Friends of the Earth Europe (2013), Less is More: Resource Efficiency through Waste Collection, Recycling and Reuse of Aluminium, Cotton and Lithium in Europe
[41] Based on research from University of Copenhagen which identified 0.3 kg fertilisers and 0.2 kg of pesticides can be saved by reusing 1kg of clothing; this equates to 500 kg in total per tonne.
[42] BioIS (2009), Environmental Improvement Potential of Textiles, JRC Scientific and Technical
[43] Based on an average consumption of 150 l a day

Furniture reuse target: impacts (GHG avoidance)

Based on the same WRAP case studies, estimates can be made of the impact in terms of CO_2 equivalent that could be made from reusing/preparing to reuse furniture.

Table 13: GHG emissions (tonnes of CO_2 equivalent) - Furniture

Management options	Dining Table (per tonne)	Sofa (per tonne)	Office Chair (per tonne)	Desk (per tonne)
Direct reuse	0.38 tonnes generated	1.45 tonnes saved	2.96 tonnes saved	0.4 tonnes savings
Preparing for reuse	0.76 tonnes generated	1.05 tonnes saved	2.65 tonnes saved	0.2 tonnes savings

The range of values given does make it challenging to apply a total GHG figure against the furniture reuse target without access to detailed composition results. Also the data above does not take into consideration the displacement effect. For example, according to WRAP, if the desks reused were bought in place of new ones, the savings as a result of displacement would increase to 2.5 tonnes of CO_2 equiv. per tonne of desks reused. Therefore an alternative source of data was sought, to provide an overall approximate figure for furniture reuse. FRN (UK) provides a figure of 2.7 tonnes of carbon savings per tonne of furniture reused (based on landfill avoidance); they describe this figure as modest although clearly landfill is not necessarily the end destination across all Member States. As furniture for reuse is going to include the above products, plus a wide range of other items such as chairs, wardrobes etc. all with varying ranges of carbon savings and emissions, to reflect the approach taken throughout this report we opted for a very conservative estimate of 1 tonne of CO_2 equivalent saving per tonne of furniture.

In terms of the scenarios, the levels of CO_2 equivalent savings possible can be seen in Table 14.

Table 14: CO_2 equivalent Savings for Furniture Reuse Targets

Scenario Target	GHG emissions (tonnes of CO_2 equivalent avoided)
Modest	
30% (2025)	3.0 Mt
35% (2030)	3.5 Mt
Medium	
35% (2025)	3.5 Mt
40% (2030)	4.0 Mt
Ambitious	
40% (2025)	4.0 Mt
45% (2030)	4.7 Mt

Recycling Target: Impacts (GHG avoidance and the monetary value of that avoidance)

The impact of recycling targets on GHG emissions has been reasonably well researched. This statement comes with the caveat that modelling the impact of recycling on GHG emissions is complex, and the assumptions made during the modelling of the data need to be clearly understood before the data can be used on a comparative basis. For example, the composition of the waste stream is crucial in terms of the different value of CO_2 equiv. saving which can be applied (refer to Table 15), and knowing the proportions of material being recycled is essential if predictions are to be made. It is not the case that a single figure per tonne of MSW recycled can be applied, as different materials in the waste stream attract a different value.

Within our modest and medium scenarios, recycling targets of 55% to 60% and 60% to 70% have been proposed. They are more challenging than simply being an extension of the current 50% target by 2020, as the proposed scenario targets are output rather than input based. This makes it more difficult in terms of extrapolating modelling data previously undertaken in relation to different recycling targets. In addition, much of the modelling has been done based on EU27 rather than EU28 Member States. However bearing these differences in mind, it is possible to make a general broad assessment of the range of CO_2 equiv. savings possible and at least give an indication of the difference in values between the scenarios.

Table 15: CO_2 emission factors per recyclable fraction[44]

Material	CO_2 eq per tonne of landfilled fraction	CO_2 eq per tonne of incinerated fraction sent for energy recovery	CO_2 eq per tonne of recycled fraction
Paper and card	2.20	1.40	1.30
Plastic packaging	3.10	5.00	1.50
Textiles	18.00	9.00	2.002
Glass packaging	0.84	0.84	0.53
Steel packaging	3.00	1.30	0.70
White goods	3.00	3.00	0.70
Aluminium packaging	11.05	11.05	2.00
Garden waste	0.2	-0.14	-0.12
Kitchen waste	4.50	4.20	4.08

Research undertaken by Ökopol calculated the carbon savings of recycling, based on avoided primary production from primary resources and avoided emissions from landfill. Calculations were made of the current recycling rate (as of 2005), and predictions were made based on two scenarios: 50% recycling by 2020 (although this was in fact 53% for some Member States who were already achieving this level), and 65% recycling by 2020. The first scenario assumed a constant growth of 1.1% per annum, whilst the second scenario assumed the tonnage would remain stable as a result of prevention and reduction activities. A calculation was also made of the monetary value of the carbon savings. In terms of how this relates to the targets identified in the scenarios, a best estimate can be applied to reflect the recycling targets proposed (Table 16). It is worth noting that this would be a conservative estimate of the potential impact of recycling targets on CO_2 avoidance. Analyses have shown that diversion of waste away from landfill and towards recycling are the two key actions that produce greatest benefits for reducing GHG emissions.

[44] Friends of the Earth Europe (2009), Gone to Waste.

Table 16: Municipal solid waste Recycling Targets: Potential Impact

Scenario	GHG avoidance (tonnes of CO_2 equi.)[45]	Monetary Value of CO_2 equiv. savings[46]
Modest 55 – 60% recycling rate	In excess of 250 Mt	In excess of €2.5 billion to €9.9 billion
Medium 60 – 70% recycling rate	In excess of 303 Mt	In excess of €3 billion to €12 billion
Ambitious[47]	In excess of 303 Mt	In excess of 303 Mt In excess of €12 billion

Extending Landfill Directive Targets and Implementing Landfill Bans: Impacts (GHG avoidance)

It has been estimated that annual emissions from managing MSW could be cut by an additional 62 million tonnes[48] of CO_2 equiv. in 2020 if all Member States met the Landfill Directive diversion targets. Methane emissions from landfill represent the largest source of GHG emissions from the waste sector. Therefore any advances on the current target, and potentially a complete ban on untreated elements of the biodegradable waste stream will clearly have a significant, positive, impact on GHG reduction. Moving through the scenarios as the targets become more challenging, coupled with the increasing recycling rates, there will clearly be an increase in GHG avoidance.

[45] Based on the findings of the research that at 50% savings of 247 Mt could be achieved, and at 65% savings of 303 Mt could be achieved.
[46] Valued at €10 to €40 per tonne CO_2 equiv. (Ref. Ökopol (2008), Climate Protection Potentials of EU Recycling Targets)
[47] Noting that the headline target in the Ambitious scenario is based on kg/capita waste generation, but relies on maintenance of similar levels of recycling as the Medium scenario, therefore the same conservative estimate is used for GHG emissions avoidance
[48] European Environment Agency (2011), Waste opportunities: Past and future climate benefits from better municipal waste management in Europe

Recycling and Reuse Targets: impacts (Employment opportunities)

In terms of assessing the economic impacts of advancing resource efficiency, we have chosen within the limitations of this short research project to focus on employment. There is good reason for this, not least because of the continuing challenge that Europe faces to reduce unemployment, particularly for the young[49]. This approach also serves to highlight that advances in resource efficiency, especially greater levels of recycling, reuse and repair, have strong economic, as well as environmental, benefits and that these can be realised across the EU.

While the two issues of improving resource efficiency and tackling youth unemployment are not directly linked, the starkness of the structural problem that Europe has concerning youth unemployment should surely be a factor in advocating advanced resource efficiency and seeking to unlock the potential dormant in both our use of both material and human resources for the advancement of society.

This has been the motivation for much of the research undertaken previously to try and indentify the employment potential of higher levels of recycling. While it is an area in which wide variations in methodology and availability of data have resulted in similarly wide ranging findings, the key messages remain very similar – namely that recycling creates significantly more jobs than waste disposal through landfill or incineration and that reuse has the potential to create even more when measured on a per tonnes basis, given the relative labour intensity of many reuse activities[50].

In Europe, such assertions are backed by evidence. The European Environment Agency records[51] show that overall employment related to recycling of materials in European countries increased steadily from 422 per million inhabitants in 2000 to 611 per million inhabitants in 2007 – an increase of 45% between those years corresponding to an annual increase of 7%. Previous research for Friends of the Earth Europe[52] indicated that, if a municipal recycling target of 70% were reached by 2025, this has the potential (in the old EU27), on a conservative estimate, to produce 322,000 direct jobs, 160,000 new indirect jobs and 80,400 induced jobs – a total of more than 563,000 net new jobs[53]. Because of data limitations at EU level, these estimates did not include opportunities for repair, reuse and remanufacturing from furniture, WEEE or other valuable waste streams, and so they remain conservative estimates. The research also noted that if less conservative multipliers had been used, the figure for job creation based on 70% recycling could be as high as 750,000[54], but the choice was made to maintain a conservative approach.

As this research established an employment estimate based on a 70% recycling target by 2025, which effectively falls within the boundary of our Medium and Ambitious scenarios, and does not appear to have been superseded by any other pan-European attempt to evaluate the impact of recycling targets on employment, we have used it as the baseline for the estimates we make in this report of the impact of our scenarios. We have, however, supplemented this with assessments of the potential impacts of targets for furniture and textile reuse as described in the scenarios. To do this, we have made assumptions for the numbers of jobs per thousand tonnes from those elements of reuse, based on a review of the literature and assessment of established practice[55].

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[49] Youth unemployment in the Eurozone reached 24.2% in November 2013 with Spain reaching a record level of 57.7% (under 25s), part of a continuing trend of high youth unemployment especially in the southern EU countries http://www.ibtimes.co.uk/spains-youth-unemployment-rate-hits-57-7-europe-faces-lost-generation-1431480
More broadly, over 5.5 million young people were unemployed in the EU in the first quarter of 2013 and there is widespread concern about the structural damage to the European economy that this represents – see IPPR (2013) States of Uncertainty: youth unemployment in Europe for a contemporary analysis http://www.ippr.org/publication/55/11453/states-of-uncertainty-youth-unemployment-in-europe?siteid=ipprnorth

[50] Of a range of reports that build this picture, most recent and useful are:
Cascadia Consulting Group (2009), Recycling and Economic Development: a review of existing literature on job creation, capital investment and tax revenues, for King County Solid Waste Division, WA http://your.kingcounty.gov/solidwaste/linkup/documents/recycling-economic-development-review.pdf
Friends of the Earth Europe (2010), More jobs, less waste – potential for job creation through higher rates of recycling in the UK and EU, URSUS Consulting and RGR-Ray Georgeson Resources for FoEE http://www.foeeurope.org/publications/2010/More_Jobs_Less_Waste_Sep2010.pdf
Tellus Institute and Sound Resource Management (2011), More Jobs, Less Pollution: Growing the Recycling Economy in the US http://www.tellus.org/publications/files/More_Jobs_Less_Pollution.pdf

[51] European Environment Agency (2011), Earnings, jobs and innovation: the role of recycling in a green economy. EEA Report No8/2011 http://www.eea.europa.eu/publications/earnings-jobs-and-innovation-the

[52] Friends of the Earth Europe (2010), More jobs, less waste p2

[53] This research used established economic modelling techniques, co-efficients for jobs per 1000 tonnes of material and jobs multipliers utilised in established employment modelling.

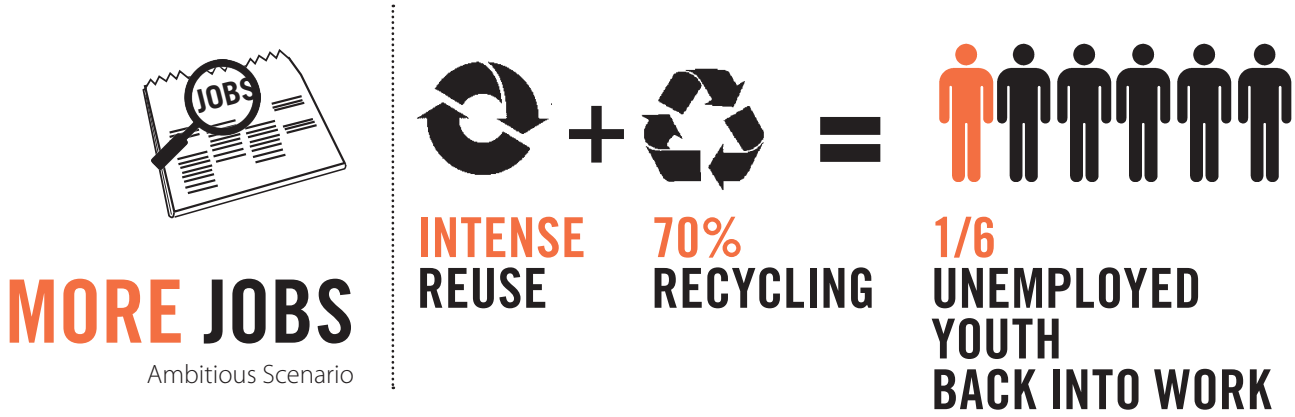
[54] Ibid., p25

The estimates presented here for the possible impacts on employment should again be regarded as conservative estimates, (as we have noted based on the limitations of data and methodology in all the research in this area), and so should be treated with caution. Nevertheless, they present a positive picture of a level of magnitude in job creation that can be realised from a much more intensive and ambitious approach to resource efficiency. The emphasis we place on ambitious reuse targets for some key materials can be seen, and again this may be an underestimate as lack of robust data sources made it challenging to make reasonable estimates for the potential future impact of repair, for example.

Our overall assessment of the impact on job creation from our scenarios is presented below in Table 17:

Table 17: Additional Jobs from Higher Recycling and Reuse: potential impacts

Scenario	Additional jobs by 2025	Additional jobs by 2030
Modest Scenario	55% recycling – 442,350 Furniture reuse – 179,369 Textile reuse – 13,050 Total – 634,769	60% recycling – 482,570 Furniture reuse – 209,205 Textile reuse – 17,400 Total – 709,175
Medium Scenario	60% recycling - 482,570 Furniture reuse – 209,205 Textile reuse – 21,750 Total – 713,525	70% recycling[56] - 567,500 Furniture reuse - 239,159 Textile reuse - 26,100 Total – 832,759
Ambitious Scenario	Recycling baseline of 482,570 Furniture reuse – 239,159 Textile reuse – 26,100 Total – 747,829	Recycling baseline of 567,500 Furniture reuse – 269,053 Textile reuse – 30,450 Total – 867,003



[55] Our assumptions have been based on established practice and reporting by several mature reuse organisations and networks, and review of previous research, referenced as follows: RREUSE (representing 20 reuse networks across 12 EU Member States report that their operations employ 42,000 FTE managing the reuse of 710,000 tonnes annually http://www.socialeconomy.eu.org/IMG/pdf/julien_fortin_rreuse.pdf . This represents 59 jobs per 1000 tonnes – we have used this as our base data for projecting furniture reuse impacts as it best reflects current EU practice. While this figure represents a basket of reuse (including some WEEE and textiles), it is reasonable to assume that much expansion of furniture reuse will come through operations that collect multi-materials and products for reuse, not exclusively furniture. Some ratios of jobs/1000 tonnes for some products are stated to be much higher (especially in WEEE), and so we think the 'mid-range' figure based on RREUSE is a reasonable assumption. For comparison, FRN UK(2013) reports 4,000 FTE managing 110,000 tonnes of reuse at 363 jobs/1000 tonnes http://www.frn.org.uk/ ; Greater London Authority (2008) Third Sector Reuse Capacity in London study of reuse in London reports 300 FTE collecting around 4,000 tonnes at 75 jobs/1000 tonnes http://www.london.gov.uk/sites/default/files/Third%20Sector%20Reuse%20Capacity%20in%20London_0.pdf ; SITA UK (2012) report Driving Green Growth took US data from the FoE (2010) report and estimated 47 jobs/1000 tonnes for product reuse http://www.sita.co.uk/downloads/DrivingGreenGrowth-SITAUK-120423.pdf . Tellus Institute (2011) p35 suggests that in the US reuse and remanufacturing account for between 7-20 jobs/1000 tonnes although there are likely to be very different basis for calculation http://www.tellus.org/publications/files/More_Jobs_Less_Pollution.pdf. The RREUSE benchmark is strengthened by the actual reporting of one of the most mature reuse operations in the EU, Komosie in Flanders. Their most recent data suggests collection for reuse of almost 60,000 tonnes in 2011 by 3,630 FTE at 60.5 jobs/1000 tonnes http://www.arge.at/file/001600.pdf
For textile reuse, we have again based our assumption on reported practice from RREUSE based on their members' operations. They report a range of 15-20 jobs/1000 tonnes and so we have used the lower end figure of 15 jobs/1000 tonnes to project an estimated impact across the scenarios for increased textile reuse.

[56] FoE (2010) baseline adjusted for accession of Croatia to EU28

In summary, we can say that a future European strategy for resource efficiency that places greater emphasis on actions further up the hierarchy, especially in reuse and repair, could become a high-employment strategy. The impact of more intense reuse on job creation potential is high – at least one-third of new resources jobs in Europe could come from reuse.

Although there is no direct comparison with which to benchmark this assertion, we noted the findings of the recent US research[57] by Tellus Institute with Sound Resource Management. They presented a 'Green Economy Scenario 2030' for the United States which was based on a 75% target for diversion from landfill in which around 13% of all the new jobs estimated were identified as likely to be in reuse. Our estimates based on European practice are higher, reflecting recent operational data and the different economic context. We nevertheless present this information for comparison in the interests of transparency.

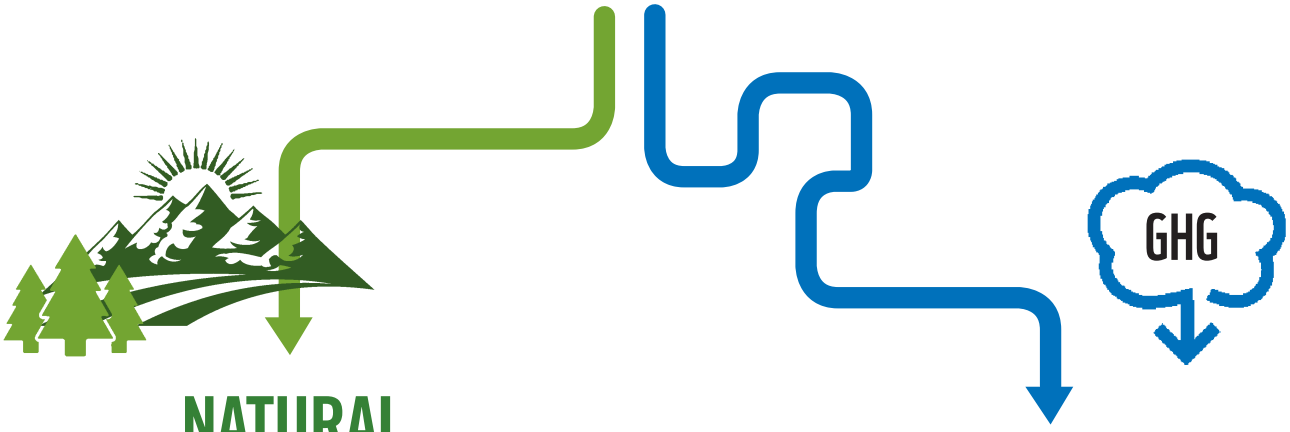
Overall Summary of Impacts

We have sought in this report to make transparent use of the best of the limited data available to present a wide ranging picture of the potential positive impacts of advanced resource efficiency targets for Europe. This includes some key examples that showcase this potential across the range of preferred resource efficiency indicators: GHG emissions avoidance, materials use, land use footprint and water use. Although it has not been possible to consider all targets and all potential impacts, mainly as a consequence of insufficient public domain data and information, what has been presented has given a clear wide-angle snapshot of what is possible when moving towards a more resource orientated strategy. In summary, when considering all the potential impacts together, the clear benefits as you move through the scenarios can be seen (Table 18).

Table 18: Potential Impacts Summary Table

	Modest Scenario	Medium Scenario	Ambitious Scenario
Avoided GHG Emissions (CO_2 equiv.): food waste reduction	42.1 Mt (2025) 56.2 Mt (2030)	56.2 Mt (2025) 70.2 Mt (2030)	70.2 Mt (2025) 84.3 Mt (2030)
Avoided GHG Emissions (CO_2 equiv.): reuse/preparing for reuse (textiles & furniture)	14.4 Mt (2025) 18.4 Mt (2030)	22.1 Mt (2025) 26.3 Mt (2030)	26.3 Mt (2025) 30.7 Mt (2030)
Avoided GHG Emissions (CO_2 equiv.): recycling	In excess of 250 Mt	In excess of 303 Mt	In excess of 303 Mt
Avoided Water Use: textiles reuse/ prepare for reuse (wool and cotton)	26.1 Ml (2025) 34.8 Ml (2030)	43.5 Ml (2025) 52.2 Ml (2030)	52.2 Ml (2025) 60.9 Ml (2030)
Avoided fertiliser & pesticide use (cotton production)	0.44 Mt (2025) 0.58 Mt (2030)	0.73 Mt (2025) 0.88 Mt (2030)	0.88 Mt (2025) 1.02 Mt (2030)
Avoided Land Use (food reduction)	28,350 sq km (2025) 38,070 sq km (2030)	38,070 sq km (2025) 47,520 sq km (2030)	47,520 sq km (2025) 56,970 sq km (2030)
Financial savings to the householder: food waste reduction	€36.5 billion (2025) €49.1 billion (2030)	€49.1 billion (2025) €61.2 billion (2030)	€61.2 billion (2025) €73.4 billion (2030)
Monetary Value of CO_2 equiv. savings[58]: recycling	In excess of €2.5 billion to €9.9 billion	In excess of €3 billion to €12 billion	In excess of €12 billion
Additional Jobs from Higher Recycling and Reuse	634,769 (2025) 709,175 (2030)	713,525 (2025) 832,759 (2030)	747,829 (2025) 867,003 (2030)

AMBITIOUS SCENARIO BY 2030



NATURAL RESOURCES SAVINGS

56,970 KM²
AVOIDED LAND USE
(food waste reduction)

60.9 MEGALITERS
AVOIDED WATER USE
(textiles reuse/ prepare for reuse)

1.02 Mt
AVOIDED FERTILISER & PESTICIDE USE
(cotton production)

GHG REDUCTION

PREVENTION

84.3 Mt
AVOIDED GHG EMISSIONS
(food waste reduction)

REUSE/PREPARING FOR REUSE

30.7 Mt
AVOIDED GHG EMISSIONS
(textiles & furniture)

RECYCLING

OVER 303 Mt
AVOIDED GHG EMISSIONS
(equals €12 BN monetary savings)*

HIGHER RECYCLING AND REUSE
ADDITIONAL JOBS
(1/6 unemployed youth back into work)

* Valued at €10 to €40 per tonne CO_2 equiv. (Ref. Ökopol (2008), Climate Protection Potentials of EU Recycling Targets)

Commentary on EU policy agenda and recommendations

We believe that one of the major challenges facing the European Union in revising waste and resource efficiency policy and targets is addressing the wide variability in baselines of Member States. Policies should carry sufficient ambition and deliverability as well as establish a sense of coherence across Europe in working towards our shared objectives for resource efficiency. Interestingly, this challenge appears to be recognised by the Commission, the industry and by NGOs alike, each acknowledging the need to utilise variable timelines for target achievement either through use of derogations or specific differential target setting. Our view errs towards standardisation of overall targets, while making more sophisticated use of derogations from Directive timelines to account for this challenge.

Clearly there is a great deal more work to be done to establish equitable bases for the establishment of derogations. One overarching approach might be to establish a banding system based on the present baseline of dependency on landfill. Below is a repackaging of the 2011 Eurostat data 'landfill league table' with a suggested banding for use in determining timelines for achievement of measures such as direct landfill bans of key materials and including untreated biowaste.

Table 19: Proposed Banding

Banding (% currently landfilled)	Countries
BAND A 0-15	Austria, Belgium, Denmark, Germany, Luxembourg, Netherlands, (Norway), Sweden
BAND B 16-40	Finland, France (EU28 is 38%)
BAND C 41-65	Czech Republic, Ireland, Italy, Portugal, Slovenia, Spain, United Kingdom
BAND D 66-90	Cyprus, Estonia, Greece, Hungary, (Iceland), Latvia, Lithuania, Poland, Slovakia
BAND E 91-100	Bulgaria, Croatia, Malta, Romania, (Turkey)

Taking this proactive approach would be a departure from previous Directive negotiations, most notably on the Landfill Directive, in which some Member States regarded themselves as in a battle with the Commission to gain concessions in the form of derogations. We feel that if, initiated pro-actively, with recognition that baseline variability is a real issue for some Member States, would contribute to greater buy-in for the overall objectives of European policy on resources.

One example of how this might be done is offered for illustration. Taking the banding suggested above, we consider that the following should be feasible:

- BAND A Member States to achieve 2025 targets by 2023 and 2030 targets by 2028
- BAND B Member States to achieve 2025 targets by 2024 and 2030 targets by 2029
- BAND C Member States to become the median and achieve in line with 2025 and 2030
- BAND D Member States to achieve 2025 targets by 2028 and 2030 targets by 2033
- BAND E Member States to achieve 2025 targets by 2030 and 2030 targets by 2035

Clearly this will be a point of debate and we offer this for that purpose. It should be noted that some of the fastest growing recycling performance in recent years has come from Member States that may surprise some observers[59] and so we believe that this flexible

approach to target deadlines will properly give all Member States a fair and challenging set of objectives that accumulate to a beneficial whole for the EU. The levels of derogation suggested in this example are not dissimilar to those that were negotiated as part of implementation of the Landfill Directive and so should not be seen as too lenient on those at a different stage of development.

At the same time, we reiterate the merit of the percentage based approach to targets (as opposed to excessive reliance on kg/capita which does not adequately take account of widely varying baselines), as a further reinforcement of the desire to maintain flexibility to adapt to the local situation in different Member States. Timelines plus percentages will offer a suitable combination for the level of flexibility required.

In addition, it should empower Member States to think ambitiously about the further policy measures they may need to embrace in order to deliver, always recognizing the demands of subsidiarity and local context. It means that a suite of underpinning policies that are available to Member States may gain wider implementation if not imposed from the centre. These are generic examples, outlined previously, all of which need serious consideration for these more ambitious scenarios to be achievable. While it is for Member States to determine the suite of policies most appropriate to their needs, the range of measures available are likely to have to find favour widely across Europe and all are well documented – Extended Producer Responsibility, use of fiscal measures to stimulate reuse and service based delivery models (such as zero-rated VAT), disposal taxation, fees and charges, product levies, direct and variable charging regimes, voluntary agreements, eco-design, communications and information for citizens, for example.

With these two important aspects to the flexibility the Member States will need now documented, there are several key conclusions and recommendations we wish to articulate:

- we believe that striving for the best ambition possible will in the long term be positive for both European civil society and its industry;
- we consider that standards for reporting and baselines for calculation should be established at the EU level and not decided by national levels;
- at EU level we wish to see a proposal that would reflect the resource efficiency agenda and while taking into account the variety of situations across Member States nevertheless decides on targets, measures and minimum standards in line with the established waste hierarchy and the commitments of the Resources Efficiency Roadmap;
- at EU level we continue to support better enforcement through more certain formulation, through requirements on minimum enforcement rules and inspection, but we discourage policy makers from using the 'implementation gap' argument about current legislation to unduly moderate the ambitions beyond the existing targets;
- we consider that, at EU level, material recovery targets are necessary to balance the energy recovery targets that exist as part of the renewable energy agenda;
- we regard the 'pincer movement' policy approach advocated to be essential at EU level, providing as it does for the constraining of overall disposal and energy recovery options (all biodegradable waste) together with positive specific target setting on higher steps of the hierarchy according to what best suits each waste stream;
- we recommend that at EU level, the proposed basket of resource efficiency indicators are used to support any policy option and refer to them in their impact assessment together with appropriate economic indicators;
- we encourage Member States to mobilise the economic and fiscal instruments that best suit them and combine them in appropriate manners in line with the waste hierarchy, e.g. not taxing one disposal option that would benefit another option lower in the hierarchy.

[59] As noted by Roy Hathaway of the UK's Environmental Services Association, writing on the Isonomia blog: "top ten countries in terms of the biggest annual increases in recycling in the period 2006-10 were – Slovenia, Poland, Hungary, Italy, UK, Czech Republic, Cyprus, Latvia, Greece and Slovakia, in that order. Increases of 5% per year in the best cases". http://www.isonomia.co.uk/?p=2308

Concluding remarks

Our purpose in this report has not been to duplicate the extensive efforts of many others who have researched and commented on the issues surrounding how we will advance resource efficiency in Europe, particularly through waste policy revision, and the nature and extent of targets, indicators and wider policy measures needed to achieve greater levels of ambition. Rather it has been to synthesise this extensive work and focus on some waste policy objectives and setting a tone for the debate that Europe needs to have about the opportunities presented to advance the resource efficiency agenda.

We recognise the challenges that exist on many levels:

- insufficient data across material and waste streams systematically captured by Member States and collated in the EU;
- variability in definitions across Member States, especially on what constitutes municipal waste recycling;
- issues about implementation of existing Directives clouding the need to focus longer-term on future challenges and levels of ambition – including the imperatives of climate change and resource security;
- linking resource and waste targets with clear eco-industrial strategies for Europe that chime with the aims of the Resource Efficiency Roadmap and support greater use of resources within the European economy, creating jobs and reducing carbon here in Europe;
- embedding behaviour change and a 'resource recovery' mindset in European civil society that is enabled across Europe regardless of boundaries and demographics;
- ensuring that the principle of subsidiarity is effectively bound into the strong framework still needed at an EU-level and giving Member States the freedom and flexibility they need to develop specific policy implementation appropriate to their situation, going beyond the minimum waste management rules and reporting standards set by EU.

We submit this report as a contribution to the necessary political and policy debate needed in Europe about our level of ambition for resource efficiency in this important year for EU waste policy. All of the above challenges can be met by European civil society and the body politic if the political will is there to recognise and attend to the imperatives we all face – of which climate change and resource security remain uppermost and urgent.

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Annex 1: Food Waste Data

	Household Food Waste (Eurostat 2006) per capita	National studies per capita	Minimum Scenario per capita	Final quantity: Household Food Waste (tonnes)	Data source	Final quantity: Household food waste (kg per capita*)
EU27	47	87	43	37,701,761	Sum of MS	76
Austria	80	95	52	784,570	Obersteiner & Schneider (2006), Asmilua (2009), BMLFUW (2009)	95
Belgium	89		40	934,760	Eurostat	89
Bulgaria	0		37	288,315	Min scenario: 8.375%	37
Cyprus	0		62	47,819	Min scenario: 8.375%	62
Czech Republic	11		25	254,124	Min scenario: 8.375%	25
Denmark	7	91	62	494,914	Danish Environmental Ministry Food Waste Report (2010)	91
Estonia	1	61	39	82,236	Calc. from SEI 2008 and EEIC 2008	61
Finland	18	17	41	214,796	Min scenario: 8.375%	41
France	47	100	46	6,322,944	Danish Environmental Ministry Food Waste Report (2010)	100
Germany	93		47	7,676,471	Eurostat	93
Greece	0	0	37	412,758	Min scenario: 8.375%	37
Hungary	5	0	39	394,952	Min scenario: 8.375%	39
Ireland	128	69	67	292,326	Irish EPA Food Waste Prevention and Home Composting Report 2009	69

Italy	46		46	2,706,793	Eurostat	49
Latvia	5		34	78,983	Eurostat	34
Lithuania	0		33	111,160	Min scenario: 8.375%	33
Luxembourg	133		59	62,538	Eurostat	133
Malta	4		55	22,115	Min scenario: 8.375%	55
Netherlands	104	133	52	1,837,599	Danish Environmental Ministry Food Waste Report (2010)	113
Poland	54		22	2,049,844	Eurostat	54
Portugal	0		36	385,063	Min scenario: 8.375%	36
Romania	0		32	696,794	Min scenario: 8.375%	32
Slovakia	15		25	135,854	Min scenario: 8.375%	25
Slovenia	13		36	72,481	Min scenario: 8.375%	36
Spain	0		49	2,136,551	Min scenario: 8.375%	49
Sweden	43	100	42	905,000	Naturvardsverket 2010	100
UK	54	110	49	7,000,000	WRAP 2012	110

Reference: Final Report - Preparatory Study on Food Waste 2010, Bio Intelligence Service
*Adjusted figure

Annex 2: MSW Data (2011)

	MSW kg per person	MSW treated kg per person	MSW generated 'ooo tonnes
EU 28	499	482	253,249 (e)
Austria	552	528	4,650 (s)
Belgium	465	460	5,125
Bulgaria	375	371	2,753
Croatia	373	371	1,645
Cyprus	658	658	560 (e)
Czech Rep	320	319	3,358
Denmark	718	718	4,001(b)
Estonia	298	257	399
Finland	505	505	2,719
France	526	526	34,336 (e)
Germany	597	597	48,805 (e)
Greece	496	496	5,607
Hungary	382	382	3,809
Ireland	623	560	2,850 (s)
Italy	535	505	32,500 (s)
Latvia	350	292	721
Lithuania	442	432	1,339 (e)
Luxembourg	687	687	356 (e)
Malta	584	536	243 (i)
Netherlands	596	502	9,947
Poland	315	255	12,129 (e)
Portugal	487	487	5,139 (e)
Romania	365	293	7,800 (s)
Slovakia	327	312	1,767
Slovenia	411	351	844
Spain	531	531	22,997 (e)
Sweden	460	460	4,350
UK	518	514	32,500(s)
Turkey	395	333	29,300 (s)
Iceland	571	530	182 (s)
Norway	483	473	2,392

legend:
e - estimated / b - break in time series / s - Eurostat estimate / i - see Metadata

Annex 3: Management of MSW (2011)

	% MSW treated			
	Landfilled	**Incinerated**	**Recycled**	**Composted**
EU28	38	23	25	14
EU27	37	23	25	15
Austria	3	35	28	34
Belgium	1	42	36	20
Bulgaria	94	0	3	3
Croatia	92	0	8	1
Cyprus	80	0	11	9
Czech Rep	65	18	15	2
Denmark	3	54	31	12
Estonia	70	0	20	10
Finland	40	25	22	13
France	28	35	19	18
Germany	1	37	45	17
Greece	82	0	15	3
Hungary	67	11	17	5
Ireland	55	5	37	4
Italy	49	17	21	13
Latvia	88	0	10	1
Lithuania	79	1	19	2
Luxembourg	15	38	27	20
Malta	92	1	7	0
Netherlands	1	38	32	28
Norway	2	57	25	15
Poland	71	1	11	17
Portugal	59	21	12	8
Romania	99	0	1	0
Slovakia	78	11	5	6
Slovenia	58	2	34	6
Spain	58	9	15	18
Sweden	1	51	33	15
UK	49	12	25	14
Turkey	99	0	0	1
Iceland	73	11	14	2

The European Environmental Bureau (EEB) is a federation of about 140 environmental citizens' organisations based in most EU Member States, most candidate and potential candidate countries as well as in a few neighbouring countries. These organisations range from local and national, to European and international. The EEB's aim is to protect and improve the environment by influencing EU policy, promoting sustainable development objectives and ensuring that Europe's citizens can play a part in achieving these goals. The EEB stands for environmental justice and participatory democracy. Our office in Brussels was established in 1974 to provide a focal point for our members to influence, monitor and respond to the EU's emerging environmental policy.

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