



STEPPING UP WASTE PREVENTION – CHALLENGES AND OPPORTUNITIES FOR NATIONAL WASTE PREVENTION PROGRAMMES

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Key messages

- I In addition to effectively managing waste, efforts to prevent waste must be stepped up to foster the transformation from a linear to a circular economy.
- II However, fostering waste prevention is facing challenges in relation to
 - a. Measuring costs and benefits of waste prevention activities: causal effects are difficult to establish and to monitor;
 - b. Availability of data on costs and benefits of waste prevention activities: lacking such data discourages investment into waste prevention activities and innovations vis-à-vis waste management activities;
 - c. Needed changes in behaviour: compared to waste management activities preventing waste depends much more on individuals and groups (e.g. households or firms) changing routines, practices, etc. Being a very complex task, fostering behaviour changes requires more research and knowledge.
- III First trials with measuring costs and benefits reveal waste prevention to be profitable and benefiting from flexible organisational structures, which allow for experimenting with behaviour change interventions.
- IV Making such benefits known can help incentivising further investments into waste prevention – and thus can establish an innovation culture in this field.



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What to find in this policy brief?

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RECREATE is a 5-year project running from 2013 to 2018, funded by the European Commission. It is carried out by a consortium consisting of 16 key partners from European research and industry and is led by the Joint Institute for Innovation Policy (JIIP). The overall objective of the project is to support the development of the European Union's research and innovation funding programme Horizon 2020, with a specific focus on the part *Societal Challenge 5: Climate Action, Resource Efficiency and Raw Materials*.

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Policy support needed to unlock the potential of waste prevention

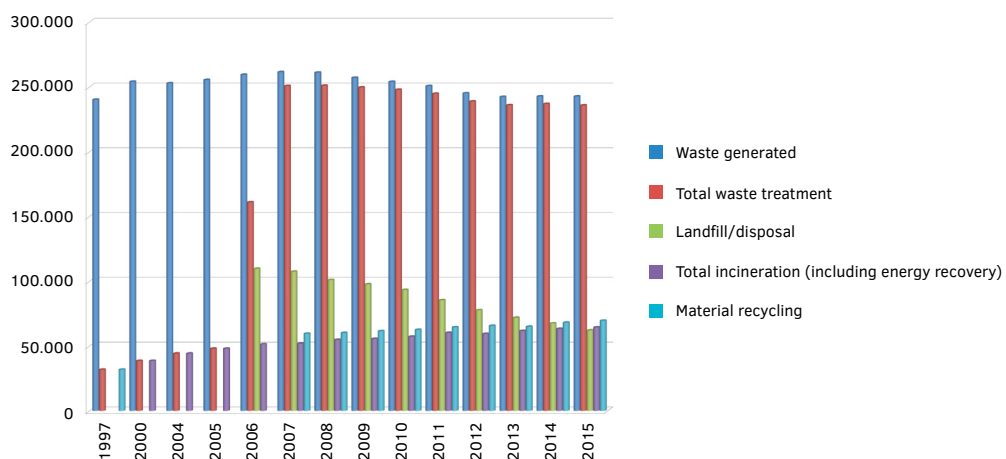
Waste prevention has the potential to protect natural resources and reduce the costs associated with waste management. However, in order to unlock its potential, the political framework needs to be more enabling and further support for research and development targeted at measuring waste prevention and behaviour change.

I What is the problem? What is the suggested innovative solution?

Municipal waste generation has been slightly increasing in the EU over the twenty years – in spite of a long history of EU waste policy, which not only achieved a significant rise in the amount of municipal waste treated, but over time also strengthened the material and thermal recovery of waste over its disposal (see Figure 1)². In the EU, municipal waste accounts for only about 10 % of total waste generated; however, due to its complex composition and its close ties to consumption patterns household waste is of very high political concern.³ It is therefore in the focus of this policy brief.

Waste is a key problem in the EU as it leads to impacts on the environment and losses of valuable physical resources as well as incurs huge costs for waste collection, disposal and associated health and environmental impacts. For instance, general government expenditure for waste management across the EU-28 amounted to 0.4% of EU-28 GDP in the period 2009 to 2015.⁵ In 2005, according to model simulations, the waste management in the EU-25 yielded external costs totalling 2.7 billion EUR from greenhouse gas and air pollutant emissions.⁶

Figure 1: Municipal waste generation and treatment in the EU-28, 1997–2015



Source: Eurostat⁴

Alongside a shift from a linear economy of take-make-waste to a circular economy, also waste prevention efforts need to be stepped up. In recent years, the public attention for waste prevention has increased. This is particularly due to ongoing discussions on specific waste streams such as plastic waste ending up in the oceans, the shipping of discarded electronic equipment to development countries or enormous amounts of food being wasted. Overall, however, the efforts and activities aiming for a transition to the circular economy primarily focus on waste management – particularly recycling – and creating markets for secondary materials rather than on waste prevention.⁷

In order to achieve a resource-efficient circular economy in the EU, much more efforts are needed to prevent waste, including changes of lifestyles, consumption and production patterns.

Waste prevention as policy goal in the EU

Waste prevention is at the top of the EU waste hierarchy as established by the Waste Framework Directive (WFD; Directive 2008/98/EC). Accordingly, prevention of waste generation is to be prioritised over recovery operations, such as preparing discarded products for re-use, as well as over recycling and energy recovery, and much more so over disposal (see Figure 2).

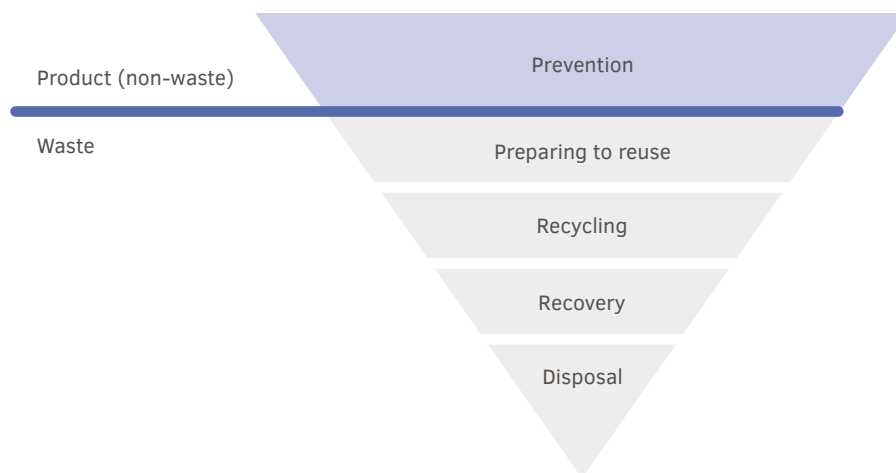
Waste prevention encompasses all actions that prevent products, substances or materials from becoming waste. This can be achieved

- **On the production side:** by reducing the quantity of materials used in the creation of products (e.g. through eco-design);
- **On the consumption side:** By increasing the efficiency with which products are used (e.g. by extending use life or sharing products);
- **At the product's end-of-life:** by preventing used products from becoming waste through re-use or refurbishment.⁹

Waste prevention is also seen as an essential component of fostering a circular economy. In its Circular Economy Action Plan from 2015, the European Commission highlights that efforts to prevent and reduce waste generation play a crucial role in moving from a linear “take-make-waste” economy to a circular economy, in which “the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised” (European Commission 2015, p. 2)¹⁰. The Commission stresses in particular the relevance of preventing food and plastic waste.

Member State action on waste prevention is required under the WFD. It obliged the Member States to set up National Waste Prevention Programmes

Figure 2: Waste hierarchy



Source: European Environment Agency 2015, 9⁸

(NWPP) by the end of 2013. Strategies for Member States to induce waste prevention encompass information (e.g. campaigns, trainings, ecolabel), promotion (e.g. providing financial and logistical support for reuse and repair; research and development) as well as regulation (e.g. taxes, ecodesign requirements). Member States are given flexibility in regard to what type of measures to include or which sectors to cover in the NWPP.

NWPP in EU Member States – challenges and struggles

By the end of 2014, 27 national and regional waste prevention programmes in 24 countries were adopted (see Figure 3).

A recent review of these programmes⁸ found that there is a lack of indicators measuring the current state as well as the progress of waste prevention, and that Member States seem to struggle with the definition of adequate targets. The struggle on defining and politically agreeing on waste prevention targets is also reflected on EU level. For instance, the Circular Economy Action Plan no longer includes waste prevention targets – in contrast to the preceding Commission’s Zero Waste Programme from July 2014¹¹, which proposed waste stream specific prevention targets of reducing marine litter by 30 % by 2020 and reducing food waste by at least 30 % by 2025.

During interviews conducted for the RECREATE project, experts from waste management authorities confirmed these findings. They mentioned several barriers that hamper the practical implementation of waste prevention measures.

One particular barrier for the implementation of waste prevention measures is the **lack of data on (economic) costs and (economic and environmental) benefits**. While waste management actions need to be legitimised against cost-benefit analysis, undertaking such an analysis for waste prevention activities is inherently much more difficult because measuring the amount of something that is avoided poses a serious limitation. In addition, causal

linkages between any waste prevention measure and waste actually avoided are difficult to establish. As a result, decision-makers lack knowledge on potential savings, investment costs and return on investment (ROI) to base investment decisions on.

Furthermore, most countries have established (large scale) infrastructure systems and administrative organisational structures for the recovery, recycling and incineration of waste. In contrast, waste prevention is most relevant at the household and business level, where **priority and structures for waste prevention** are often lacking or insufficient, because waste prevention necessitates changes to routines, practices and lifestyles and thus to production and consumption patterns.

Therefore, waste prevention policies need to create and foster a culture of waste prevention that facilitates **behaviour change** among individuals as well as groups (households; different levels, teams and units in companies) of society. This is a challenging task for policy-makers: Due to prevailing structures of waste management authorities in the Member States, knowledge on waste logistics, recycling and energy recovery dominates, whereas knowledge and (personnel) capacities as regards waste prevention and how it can be implemented in practice to foster behaviour change is scarce.

In this context, out of all 27 National Waste Prevention Programmes (NWPP) in Europe, the **Irish NWPP** has been chosen as a **good practice example**, because it shows how both the organisational structure of public waste prevention programmes and the measurement of potential effects of waste prevention measures could be improved. The Irish NWPP implemented an innovative organisational structure that fostered progress on:

- I Measuring the effects of waste prevention by means of several indicators and data collection;
- II Understanding behaviour change to improve the design of measures and interventions to effectively realise waste prevention.

II Good practice examples

In Ireland, waste generation had increased considerably in the late 1990s. For the most part, it ended up on landfills and caused negative effects on the environment. The Irish Environmental Protection Agency (EPA) recognised that in order to reduce the amount of generated waste, prevention needed to be prioritised over recycling and waste treatment, which were at that time the most prevalent strategies.¹² To achieve this, in 2004 the EPA introduced the Irish waste prevention programme, aiming to decouple waste creation from economic growth. Through this programme administrative and financial structures were created that fostered dedication to waste prevention. As setting up NWPP had become mandatory for EU Member States only in 2013, the Irish NWPP can be seen as pioneering work.

Agile organisational structure and continuous funding enables dedication to waste prevention

Core part of the Irish NWPP is the realisation of sub programmes addressing waste prevention across a broad range of target groups, waste types and industrial sectors. This is managed by a “core prevention” team at EPA with approximately 3.5 full time equivalents. The team is responsible for planning the programme implementation by deciding on measures and contracting external experts, who implement the actions in close cooperation with local authorities and other relevant stakeholders.

Through this partnership approach, networks were built with a broad range of stakeholders. This enabled to multiply the activities, to have better access to the community and to build up local expertise on waste prevention. The NWPP makes sure that the partners are trained in the knowledge and skills they need. Furthermore, the programme provides brand material for all partners. The programme’s partners work with the local people, for example showing businesses how to reduce industrial and commercial waste and householders how to reduce food waste.

“*a small number of staff (3.5 Full Time Equivalents) leveraged the funding provided efficiently and effectively to select and develop excellent Prevention Partners (14 FTEs) and novel projects at reasonable cost (Byrne and Derham 2012, p. vi).*¹³

In addition, a National Waste Prevention Committee was established, comprising a wide range of stakeholders from industry, commerce, agriculture, local authorities, non-governmental organisations and government departments. The role of the committee is to monitor the NWPP and provide strategic direction for the EPA in implementing it.

To ensure funding for the Irish NWPP, an Environmental Fund was created by EPA. The fund receives its revenue from a levy on waste going to landfill and a further levy on plastic shopping bags. Per annum, approximately € 2 million are transferred from that fund to the NWPP. Since its start in 2004, more than 25 programmes have been developed and funded by the NWPP. The programmes show an increasing degree of evolution and also integration with each other. In order to target behaviour change, the measures encompass education, awareness raising and dissemination of information as well as technical or financial assistance and guidance, demonstration projects, award of prizes.

According to the latest annual report, currently ten different programmes are in place (see Box 1 for some exemplary sub programmes).¹⁴

Box 1: Examples of sub programmes of the Irish NWPP

A “**Green Hospitality**” scheme, a voluntary project providing a step-by-step approach to reach leadership in environmental management within the hospitality and catering sector, was developed and introduced in 2008. It includes awards, audits, workshops, training and guidance provided to hotels enabling them to develop their own prevention

programme to prepare for the different levels of the award (eco, silver, gold and platinum) and thereby reducing resources use (EPA 2008). The projects under the Green Hospitality Programme have grown strongly: by 2015, a total of 330 Irish hotels engaged in the programme, representing about 33% of hotels and 55% of hotel rooms in Ireland.¹⁴

A government funded, free online re-use service “**Free Trade Ireland**” enables users to exchange unwanted items – ranging from furniture, through electronic goods, to garden equipment. Its aim is to encourage and facilitate the re-use of household and business items throughout Ireland, and in doing so, to promote re-use and waste prevention.¹⁵ The service is free and users benefit from financial savings. At the same time, the service provides benefits to the environment and contributes to the national reuse economy. FreeTradeIreland.ie was first launched in Dublin, and after four years of successful operation the service was upscaled to the national level in 2010.¹⁶

Initiated in 2009, the “**Stop Food Waste**” programme was set up to promote food waste prevention and home composting. It has been designed to empower consumers to reduce food waste by rethinking how they shop, store, cook and re-use food. The key message is that there is money to be saved through rethinking food habits. The initiative has become an established and recognised forum to promote food efficiency and composting to Irish householders and it works in partnership with local authorities, community groups, local champions and other organisations to promote food waste prevention and enable behaviour change at a local level and around the country.¹⁴

Quantifying waste prevention effects as a basis to decide on effective measures

The Irish approach is one of the few NWPPs on the European level that started to assess the waste prevention effects induced by its own activities. Prevention is measured at project level: Participating organisations that are contracted by the EPA to implement waste prevention sub programmes are asked to deliver quantitative data where possible, and qualitative where appropriate.¹⁷ The challenge here is to measure waste that, thanks to policy support, is not generated. The Irish NWPP deals with this challenge by comparing material consumption and waste arisings before and after a measure was launched. In particular, changes

of processes in businesses allow for such a comparison, while for example the implementation of measures in households is more difficult to assess through this method.

The EPA then aggregates the data delivered by the participating organisations, e.g. by sector or sub programme. Indicators used in the Irish NWPP encompass:

- “the amount of resources conserved (tonnes of material, cubic metres of water, kilowatt-hours of energy), with measurements made before and after the intervention;
- the quantity of waste prevented (tonnes of waste generated), with measurements made before and after the intervention;
- money saved (the difference in euros waste, water and/or energy costs after the intervention or change).”¹² (EEA 2016)

Through quantifying effects, the Irish EPA is able to evaluate the effectiveness of specific sub programmes and measures. It can determine which prevention activities are most effective in terms of amounts of waste avoided and can also relate this to the invested costs. As far as data are available, decisions for or against the implementation, continuation or up-scaling of NWPP programmes can be made on quantitative evidence. In fact, the EPA was able to identify large “low hanging fruits”

Box 2: Environmental effects of the Green Hospitality sub programme of the Irish NWPP

As an example, the Green Hospitality Programme uses environmental benchmark figures to measure progress made by participating hotels. Certified member organisations are obliged to annually report their benchmark figures – covering for example residual waste, food waste, energy and water consumption – to the EPA. Based on those reports, the EPA was able to calculate the following overall achievements of the participating hotels for the year 2014:

- “8,500 tonnes of waste prevented
- 45,000,000 kWh of energy saved
- 500,000 m³ of water saved
- 10,000 tonnes of CO₂ saved”.¹⁸

among the established sub programmes: initiatives with significant cost savings and remarkably low investment costs, leading to large returns on investment. On a more general level, it can be argued that being able to display quantified effects and benefits stemming from waste prevention measures incentivises further investments into such measures – and can thus establish an innovation culture in this field.

To sum up, the activities of the Irish NWPP encompass efforts in making waste prevention visible and developing methods and indicators to measure the amount of waste prevented. Thus, it achieved assessments of its economic value by relating benefits to the investments costs of the underlying waste prevention measure. This enables the Irish EPA to:

- monitor implementation progress of activities dedicated to waste prevention,
- improve and refine waste prevention programmes,
- formulate and control waste prevention targets, and
- select effective options for continuation, transfer or upscaling of such programmes.

Fostering smarter policy design to enable sustainable behaviour change

Although the importance of behaviour change for achieving a circular economy has been recognised by policy-makers (particularly in relation to food waste prevention)¹⁰, so far rather few policy measures target consumer behaviour (e.g. through pay-as-you-throw schemes, collaborative consumption or educational campaigns).⁷ It appears that existing environmental policies are ill-designed to tackle behaviour change.¹⁹ For example, a common, flawed assumption is that individuals – who are supposed to act rationally – will adopt environmentally-friendly behaviour if they are informed about environmental impacts of their consumption styles. Yet, it has been proven that the provision of information alone is not an effective means to change behaviour.²⁰

The Irish NWPP recognised that in order to design effective waste prevention policies, a better understanding of behaviour and of the mecha-

nisms underlying behaviour change was needed. As a consequence, in 2014 the Irish EPA established a research fellowship for the NWPP dealing with behaviour change challenges and solutions. This position was taken on by Dr. Simon O’Rafferty. One of his tasks was to review the existing sub-programmes of the Irish NWPP and examine their potential effectiveness in changing the behaviour of consumers, companies and communities. These findings will form a basis for discussing how to improve the NWPP’s design and foster behaviour-changing measures in the future.

In fact, O’Rafferty’s research revealed a number of shortcomings in the existing waste prevention measures. For example, the following aspects have often been neglected, yet need to be considered in order to make policy measures targeting waste prevention more effective:

- Interventions aiming to change behaviour do not unfold their effects immediately, but need time to develop and unfold;
- Individuals fulfil different roles in different contexts (e.g. at the job vs. at home) and thus behave differently depending on the context;
- Adopted behaviour change in certain situations or contexts does not automatically lead to more “green” behaviour in other situations or contexts (so-called spill-over effects);
- The belonging of individuals to a social group can be a lever for behaviour-changing approaches.

Hence, a more effective design of behaviour-changing waste prevention measures needs to understand and consider the underlying drivers and motivations of people’s behaviour, such as social norms and social practices.

The sub programme “Stop Food Waste” applies such an approach (see Box 3).

Looking across the Irish NWPPs sub programmes, it appears that besides external consulting some of the most effective measures were achieved through common learning and “peer-to-peer avenues”, i.e. businesses and householders interactively sharing

Box 3: Impacts of the “Stop Food Waste” sub programme of the Irish NWPP

The “Stop Food Waste” sub programme delivers local initiatives on the community level, addressing social norms through a combination of education, provision of easy to use information, training, local champions and peer example. ‘Stop Food Waste Challenges’, a stepwise programme to reduce individual food waste, have been run in several communities in partnership with local authorities. Participants took part in a series of workshops covering a range of issues including awareness of what is being wasted, meal planning, smart shopping, proper food storage, and composting methods. They worked in peer groups and could exchange their experiences on each theme. Eleven challenges took place in 2015, involving 135 people who achieved average food waste reductions of 35–45%.¹⁴ Another initiative of the programme trained volunteers to become local champions of food waste prevention and home composting. These champions then acted as ambassadors for food waste prevention and composting in their communities by providing information and helping to build composting demonstration sites.¹⁴

their personal experiences and successes with others. The NWPP facilitates and encourages this type of sharing by publishing reports, through active on-line forums and via organised events and seminars.^{14,18} Moreover, it was found that showing the behaviour of neighbours such as their resource consumption can have an encouraging effect on changing behaviour in the intended direction. Designing interventions that target collective behaviour could therefore make a bigger difference than individually explaining why behaviour change makes sense.

Interestingly, behaviour changing interventions could be also more cost-effective than other interventions, as they might unfold a leverage effect leading to high cost savings in the long run. As an illustration, the NWPP evaluation report estimated that if NWPP activities were immediately ceased, recurring annual savings of €10 million could be achieved by the business sector simply through maintaining the learnt behavioural change activities and practices.¹³

III Economic & environmental potential of the solution

Economic benefits of waste prevention encompass two financial savings via reducing material costs and production costs as well as through reductions in waste treatment costs.

As an illustration, in the sub programme “SMILE Resource exchange”, 85 successful synergies between businesses were reported in 2015, overall exchanging 5,000 tonnes of material. The related cost savings for businesses equalled € 1,229,201.⁹

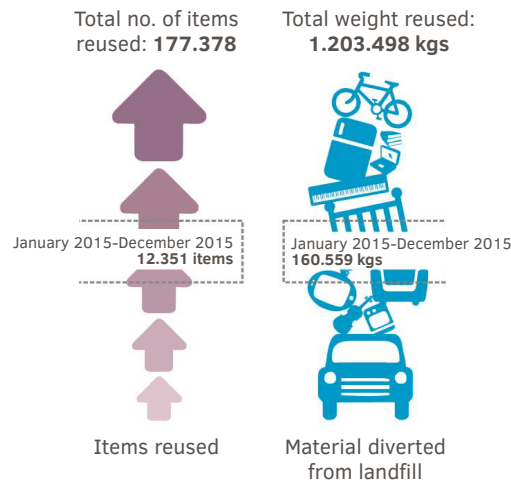
Waste prevention furthermore is related to a number of environmental benefits, such as

- Saving valuable raw materials;

- Reducing green house gas emissions related to production processes as well as to management and disposal of waste;
- Saving energy needed for both production processes and waste treatment;
- Reducing pollution of air, water and soil related to both production processes and waste treatment;
- Reducing area needed for landfills.

To give a quantitative illustration, the sub programme FreeTrade Ireland resulted in the re-use of over 12,000 items in the year 2015.

Figure 4: Achievements of the FreeTrade Ireland sub programme



Source: EPA 2016: 26¹⁴

Measured by weight, this equals about 161 tonnes of material that were diverted from landfills (compare Figure 4). The Irish EPA estimates that this is linked to CO₂ savings of approximately 1,449 tonnes.

A further benefit can be seen in additional job creation in the waste sector. While direct employment effects achievable through a publicly funded programme like the Irish NWPP are relatively modest (core team run by approx. 3.5 FTEs and external partners in an extent of 14 FTEs), research indicates that there is a considerable job potential for the upscaling

of such programmes. According to analysis by WRAP²¹, almost two thirds of jobs in the circular economy are related to waste prevention (repair, remanufacturing and servitisation activities like rental or leasing) and not to “classic” waste management activities (see Figure 5). Accordingly, large shares of the estimated job growth potential is also linked to these activities – if investments can be steered into the most promising activities, e.g. based on evidence based figures for the ROI of specific waste prevention measures.

Figure 5: Estimation of current employment effects of circular economy activities across Europe



Source: Mitchell and James 2015: 12²¹

VI Barriers and challenges to implementation

Learning from the above, several barriers and challenges were identified for the implementation of effective waste prevention measures. Firstly, barriers prevail across EU Member States, which however may be addressed by implementing similar organisational structures as in the case of the Irish NWPP. Secondly, there are a number of challenges that arose for the Irish EPA since initiating the NWPP in 2004, which need to be addressed in order to make further progress in waste prevention. Finally, current framework conditions within the EU may restrict efforts in waste prevention. The following table presents the barriers in more detail.

The innovation portrayed in the Irish NWPP helps overcoming the following barriers:

- Lack of economic data and information on other benefits related to waste prevention activities hinders investments and innovation
- Local actors lack methodologies to assess economic efficiency of waste prevention measures
- Lack of knowledge on behaviour in the context of waste and on how to induce specific behaviour change
- Lack of administrative structures (and resources) specifically dedicated to waste prevention – which prevents knowledge build-up

Specific challenges emerging from the Irish NWPP

- Improving data quality and harmonising data in order to enable comparisons and aggregations
- Limited willingness of businesses to share data with the EPA because of concerns around enforcements of regulation

- Accounting for time lags when measuring the effects of waste prevention
- Addressing rebound effects of waste prevention activities
- Methodologies needed to assess the effect of measures targeted at changing behaviour
- Lack of repeated and effective exchange possibilities with other on-going national waste prevention programmes

Restricting conditions in the broader European policy landscape

- EU Circular Economy Action Plan does not include any indicators or targets related to waste prevention
- Lack of a common definition and understanding of waste prevention hinders practical realisation of ideas by public and private sector organisations
- Potential conflict of interest: people employed in the waste management sector are not interested in implementing waste avoiding structures
- Problem of split incentives: investors in and beneficiaries of waste prevention are generally different actors (e.g. systemic eco design requires investments on the part of producers, benefits of reduced waste generation are however society-wide)
- Overall lack of understanding of behaviour and behaviour change
- Lack of EU lighthouse projects on waste prevention that help to bundle and develop knowledge, steer activities and connect stakeholder.

V Policy support needs

Fostering the implementation of waste prevention measures across European Member States requires action in European waste and circular economy policy.

Need for action in European waste policy and circular economy policy

Fostering waste prevention in European and national waste policy could benefit from the introduction of quantitative waste prevention targets. Discussions on targets are ongoing in the context of the current Circular Economy Package¹⁰. Here, the European Parliament has voted to include targets of reducing both food waste and of marine litter by 30% by 2025 and by 50% by 2050 compared to 2014.²² Furthermore, several European Member States have set quantitative prevention (=waste reduction) targets for specific waste streams, such as for municipal waste, food waste, packaging waste and paper waste, in their national waste prevention programmes.⁸

Quantitative waste prevention targets could be considered beneficial both in terms of socio-economic and environmental impacts. Based on assessing the potential impacts of setting a food waste target, the European Commission found that by 2025:

- a net benefit of around 630 million EUR across all Member States seems possible, taking into account both direct implementation cost of implementing food waste prevention programmes (e.g. staff cost, communication material costs) and the savings achieved in costs for collecting and treating food waste;
- food waste could be reduced by 157 million tonnes, equaling approximately 71 million EUR in economic value of the food waste saved;
- 21,500km² of land could be freed up for other uses due to less land needed for production food that later becomes food waste;
- greenhouse gas emissions could be reduced by 66 Mt CO₂ equivalents;
- economic savings of 3.75 billion EUR could be generated from avoiding environmental costs associated with greenhouse gas and air pollution emissions.²³

Further policy actions that could strengthen waste prevention efforts across Europe, while taking

into account national and regional differences, encompass:

- Establishing a European waste prevention agency – or stepping up the EEA's funds and capacities for waste prevention – to support Member States in their national waste prevention actions;
- Fostering the role of policies tackling behaviour change on EU level, e.g. by discussing across all DGs options of setting up a behaviour change unit at Commission level.

Need for actions in European Research and Innovation Policy

Waste prevention could furthermore be fostered through strengthening the focus of European Research and Innovation Policy on measuring cost and benefits of waste prevention and on waste prevention behaviour.

The latest H2020 Work programmes on “Climate action, environment, resource efficiency and raw materials” seem to only partly cover the waste prevention issues discussed in this brief. While the Work Programme 2014–2015 contained the call topic “WASTE-6-2015: Promoting eco-innovative waste management and prevention as part of sustainable urban development”, with a total of 29 received proposals and which appears to address some of the questions raised in this brief, the Horizon 2020 Work Programme 2016–2017 did not foresee any research work dedicated explicitly to waste prevention, other than in the context of reducing waste generation via improving recovery of secondary raw materials from different waste streams.

One of the three research projects awarded funding under the above call topic WASTE-6b-2015,²⁴ named UrbanWIN,²⁵ aims to assess the effects of waste prevention strategies through an urban metabolism approach in order to, thereupon,

- I Define objectives and indicators of communal waste prevention strategies in pilot cities;
- II Develop “a toolkit for participatory and science-based decision-making and planning for waste management that can be applied in any public authority across Europe”.²⁶

Aiming to integrate UrbanWINS findings with the insights gained from the RECREATE work underlying this brief,²⁷ European Research and Innovation Policy could further support waste prevention efforts through dedicating parts of future European research funding, as well as regional development and cohesion funding, to:

Researching (Research and Innovation Action) into

- the role of household behaviour for the design and success of waste prevention measures; strengthening the research focus on collective behaviour change (as opposed to individual behaviour change);
- establishing and testing methods for measuring behaviour change effects as well as cost and benefits of waste prevention measures;
- measuring the potential impacts of waste prevention measures and waste prevention targets;
- reflecting on and further developing policy interventions aimed at behaviour change, based on behavioural economics (e.g. nudging) and social-psychology;
- understanding rebound effects of waste prevention measures; first analyses concerning rebound effects in relation to food waste prevention show significant rebound effects if production patterns are not adjusted.²⁸

Coordinating and supporting (Coordination and Support Action) ongoing policy and civil society initiatives on waste prevention,²⁹ by integrating findings from completed and ongoing research projects, such as

- REFRESH³⁰ (Resource Efficient Food and dRink for the Entire Supply cHain); H2020 project responding to the call topic WASTE-2-2014: A systems approach for the reduction, recycling and reuse of food waste. Duration: July 2015–June 2019;
- UrbanWINS (Urban metabolism accounts for building Waste management Innovative Networks and Strategies); H2020 project responding to call topic WASTE-6-2015: Promoting eco-innovative waste management and prevention as part of sustainable urban development; letter b) Eco-innovative strategies. Duration: June 2016 – May 2019;
- LAW_PreT³¹ (Local Authorities Waste Prevention Training); Erasmus+ project. Duration: 2014–2016;

- WASP Tool³² (Development and demonstration of a waste prevention support tool for local authorities); LIFE project. Duration: October 2011–September 2014;
- PRE-WASTE³³ (Improve the effectiveness of waste prevention policies in EU territories); INTER-REG project. Duration: January 2010 – March 2013 (as the project is already completed, the CSA could build on the good practice database delivered³⁴ or the lead partner involved (Marche Region in Italy));
- and ACR+ (Association of Cities and Regions for sustainable Resource management); ACR+ mainly involves members from local and regional authorities. It is involved in several EU-funded projects on waste management.³⁵

Setting up, implementing and evaluating municipal waste prevention programmes and/or initiatives, including costs for new organisational structures or employing specific staff; for instance by³⁶

- listing this among the waste management priorities within Operational Programmes (OP)
- allowing such costs under Article 3 (1) of the ERDF Regulation as it will support the development of endogenous waste prevention potential.

The set-up and design of such research and innovation support actions should be coordinated as closely as possible with EU regional policy. As the EU's main investment policy aimed at supporting job creation, competitiveness and economic development, quality of life and sustainable development, EU regional policy provides and guides investments for all regions and cities in the EU. Its main funding vehicles are the European Regional Development Fund (ERDF), the Cohesion Fund (CF) and the European Social Fund (ESF).³⁷ Fostering early-on coordination between regional policy and research and innovation policy could improve the matching between emerging societal needs and opportunities arising from socio-technical innovation on a local and regional level – and thus could increase the impact of research and innovation actions. Such a strengthened link between regional policy and research and innovation policy could also help improve to identify, understand and cater for regional differences in policies tackling behaviour change.

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- 2) Please note that due to lacking data for waste generation and some waste treatment types the years 1998, 1999 and 2001 to 2003 have been left out of figure 1.
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