Policy recommendations to unleash the power of circulating materials

Every year 2.5 billion tonnes of waste are generated in Europe (European Commission, 2015a). A circular economy will lower these amounts, decrease EU dependency on input of raw material and reduce environmental burdens. Waste prevention and reuse should be top priorities, but more innovation in material recycling is essential to achieve a circular Europe. This policy brief summarizes the main recommendations to reach higher circularity of materials, based on the NEW_InnoNet project comprising XXX European stakeholders.

To enforce the change specified in the Paris agreement actions preventing climate change is urgently needed, and actions supporting the use of raw materials more effectively is a major opportunity also for this. Less than half of the waste generated was reused or recycled in 2014 (European Commission, 2015a). In addition, a considerable part of the recycling did not allow for more than one recycling loop. This indicates a large potential for increased circularity of materials.

The Horizon 2020 project NEW_InnoNet envisions a circular economy in Europe by the year 2030, with a high rate of material recycling from end of life vehicles (ELV), waste electric and electronic equipment (WEEE) and plastic packaging waste (PPW), and where recycled material is used as input material for high grade applications.

Innovation in material recycling requires collaborative efforts and joint action of industry, policymakers and research. Material recycling – as a means for more circular economy – crosses many borders between sectors and value chains. Only through collaboration, innovation in material and recycling prospers and is not obstructed by barriers such as (obsolete) regulations or lack of enforcement.

In addition to collaboration, a well-informed, mature market for secondary raw materials is required to ensure that innovations reach the phase of exploitation. Measures have to be taken to achieve this market, especially acting on price balance between raw materials with virgin or recycled origin and procurement initiatives.

The recommendations in the policy brief are based on findings from the project[1] as well as on additional input from stakeholders.

The policy actions of highest priority are listed here. More suggestions are presented in the enclosed “Further policy recommendations”. In parallel to these policy actions, more research and innovations actions should also be launched, as suggested in the NEW_InnoNet strategic research and innovation agenda.

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Recommendations

Policy measures should be taken to deliver sufficient supply and generate demand through the right price for raw materials, design improvements, well-functioning monitoring, and guidance to and enforcement of legislation.

The right pricing for raw materials. Adjustments in price to either make virgin raw materials more expensive or subsidies to make recycled materials cheaper are needed.

Design for circularity needs incentives. The eco-design and EPR directives should be sharpened and widened to really deliver design that trigger material circularity.

Monitoring and traceability of materials is a necessary step to ensure quality and volume in recycling. The EC should support and enforce coherent and complete data collection. Only such coherence can make targets efficient and ensure the quality of secondary raw materials.

Guidance and dissemination of good practices, in combination with enforcement of legislation. National, regional and local authorities should be better equipped through guidance, monitoring and enforcement actions.

[1] Earlier reports from the NEW_InnoNet can be found on www.XXXXXXX

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Innovation, investment and other horizontal measures

- **The right pricing for raw materials.** Today we see low prices for e.g. some critical metals and plastics. This entails that the recycling industry does not develop or invest in the technology needed to sort or recycle these materials. Recycled materials generally follow the pricing of new materials so for example when the price on raw-oil is low it is a fact that the prices for recycled plastics decreases. However the process to recycle will be the same and all of a sudden not profitable anymore. Adjustments in price to either make virgin raw materials more expensive or subsidies to make recycled materials cheaper are needed. Other options are to set higher landfill rates or to implement tax-cuts or investment support in recycling technologies.

  The responsibility for this action should be taken by DG XXX

- **Traceability.** To be able to recycle plastics to a larger extent it is necessary to increase the traceability of the materials – hence letting information on additives etc. follow the product through the value circle. This is to make sure that the recycler can guarantee that the materials provided are meeting the quality demand of the producer. Policy actions can be to step-wise make demands on traceability in products but also to work with the product/waste legislation.

  The responsibility for this action should be taken by DG XXX

Product design

- **Design for circularity – expand and enforce the eco-design directive**. In the Circular Economy Package (COM/2015/0614 final) the Eco-design directive is highlighted as one area of action and although the work has already started, one of the challenges is that Eco-design legislation currently focuses only on energy-related products, for different reasons leaving out for example vehicles and plastic packaging as well as numerous other product groups. To increase motivation towards design for circularity, it would relevant to broaden the scope of Eco-design legislation. A true design for circularity needs to address also the use of recyclates, e.g. through mandatory targets for circulated materials in new products. This could also inspire new and innovative product solutions.

  The responsibility for this action should be with those responsible for the eco-design directive, i.e. DG XXX.

- **Make use of the EPR- directives as a basis for design for circularity.** Although promotion of eco-design is one of the objectives of EPR, most of the current EPR systems do not incentivize design for recyclability, reusability or longer-lasting products. There are only a very few exemptions, which may for example have eco-design related targets or higher fees for non-recyclable products or materials or give bonus for recyclability. In this context also questions on content of hazardous substances, demands on labelling and traceability of products etc. could be evaluated as well as demands on using circulated material in products.

  The responsibility for this action should be with those responsible for the EPR directive, i.e. DG XXX

Waste Management

- **Enforce recycling targets to be met and EPR-legislation to be implemented.** Throughout EU there are different levels of fulfilling the set legislations. To ensure a development towards higher grades of recycling the EU commission should enforce the existing legislation in each member state. Also the actions need to handle, in parallel, a waste management for circularity of materials from new products as well as the legacy of older products not fulfilling current chemical legislation, etc. Eventually more focus could also be put on the quality of recycling in order to ensure that materials stay in a high-quality loop as long as possible.

  The responsibility for this action should be with those responsible for the EPR directive, i.e. DG XXX

- **Achieve coherent and relevant data.** The European legislation should be improved and enforced to ensure coverage of monitoring, comparability of the data between countries and possibility to track the actual recycling rates. Regulation (EC) No 2150/2002) on Waste Statistics[2] leaves room for interpretations of definitions and gives little guidance on which methods to use. This entails that the data presented is not comparable. Harmonised measurement methods are needed. To further follow the transition towards a circular economy other data is also needed, like data on reuse, remanufacturing etc.. Unregistered collection and treatment leads to lacks in statistics and poor data availability complicating both political planning and evaluation of the feasibility of recycling actions.

  The DG XXX in cooperation with Eurostat should have the overarching responsibility for this action.

From waste to resources

- **Guidance on existing and coming legislation and spreading of good practices.** Stakeholders emphasize that the legislation as such (waste legislation as well as product legislation) is difficult to understand and interpret why more guidance is needed (Stenmarck et al., 2017). Lack of clarity of legacy materials in REACH is a direct 'show stopper' for more recycling, at present speed of implementation the COP21 goals will not be met. Therefore it is suggested to create easy to understand explanations/guidelines on how to interpret the legislation, its meaning in practice, and what actors are required to do in order to assure that they are in compliance. Many companies have little knowledge on policy and regulations for other actors in the value circle which leads to the risk that they unconsciously complicate for the other actors.

[2] Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics.

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Furthermore knowledge on coming legislation is often scarce and preparation for coming demands is therefore hard. (Sahlin et al., 2017) This can also be supported by guidance and increased communication. In addition to this, to ensure harmonisation, conflicting implementations of EU directives should be resolved at national level and national policies for an internal market for secondary material should be all integrated in one scheme.

- **Monitoring and enforcement of current legislation.** In order to discourage illegal activities increased monitoring of fulfilment of current legislation is requested as well as stronger enforcement. Inefficient monitoring of waste collection and treatment leads to material ending up in unknown destinations and unregistered treatment, which in worst cases causes severe damages to both people and the environment. ELVs are for example currently 'leaching' to noncompliant actors and unregulated and illegal export. It is estimated that more than 25 per cent of the total WEEE is illegally exported and that about 30 per cent ends up at non-compliant treatment plants (Huisman et al., 2015). To increase the monitoring and to make sure existing regulations are followed would increase the amount of materials taking the right way in the system giving larger amounts of material to recycling.

The responsibility for these actions should be taken by DG ENV and EEA.

About NEW_InnoNet

NEW_InnoNet is a European project and stakeholder platform within the context of Horizon 2020. Between 2014 and 2017, the project conducted bottleneck analyses, drafted roadmaps and identified promising use cases for circular economy in the sectors automotive, electronics and plastic packaging. The analyses – and close interactions with 175+ stakeholders – resulted in a Strategic Research & Innovation Agenda (SRIA). The NEW_InnoNet SRIA emphasizes the need for more innovation in recycling in order to quickly and effectively unleash the true power of circularity of materials, in addition to necessary actions on waste prevention, reuse and remanufacturing.

The aim of this policy brief is to complement and strengthen the SRIA by adding additional policy actions to the research and innovation actions suggested in the agenda.

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Further policy recommendations

This part of the document has a similar structure as the Circular Economy Package (COM/2015/0614 final). Given the scope of the New_InnoNet project some of the sections are left fairly empty. We have chosen to still keep the headings for clarity.

Production

Product design

Product design aspects, complex and fast changing design and composition, were identified as one of the most important categories of barriers of recycling and remanufacturing (NEW_InnoNet 2016a, NEW_InnoNet 2016b). The product design today is strongly driven by performance requirements, improvement of cost-efficiency, and consumer expectations, which do not emphasize recyclability or reusability. So there are not any strong incentives for producers to design for recycling, reuse, disassembly and remanufacturing. Policy makers could create those incentives.

A shift towards a design for circularity concerns ***developing products for which the end-of-life treatment has been accounted for already at the product design phase***, as well as ***circulated materials actively included*** in product designs. This can contribute to high recycling efficiency with minimum losses in the recycling chain and also enable high-grade applications for recycled materials. Important aspects to consider include, for example, the choice of materials and how the materials are combined and joined together, identifiability and accessibility of hazardous parts, components and fasteners etc. Trough design for circularity, bot supply of and demand for recycled materials will benefit.

In addition to the suggestions above, the following actions need to be taken from a policy perspective:

- **Investigate the possibility of demands on using circulated materials in production.** To increase recycling a pull from the market side is needed, hence the work can not only focus on collecting the material and calculating the recycling rates, a need and a market for the collected materials is also required. To set mandatory demands on producers to use circulated material in new products will be one way to support the strengthening of this market.

  We suggest that the responsibility of such guidelines and their use are within DG Growth

- **Creation of design guidelines for material recycling and reuse of components.** With guidelines the manufacturers and designers can in a more structured way act on design for circularity. The creation of these guidelines should involve actors throughout the value circle and would thus also contribute to increased opportunities for collaboration. The use of such guidelines could further be encouraged in e.g. public procurement.

  We suggest that the responsibility of such guidelines and their use are within DG GROWTH...

- **Enforce and encourage the work with developing standards.** A work that has already started through e.g. the European Commission already contacting the European Standardisation Organisations and requesting horizontal/generic methodologies for material efficiency aspects for eco-design calculations (EC 2015). CEN and CENELEC have started the work and created CEN-CENELEC joint working group (JWG10), (ECOS 2016). The aim is to have the methodology standards ready by March 2019. The standardization work needs to address also other product groups than electronics. This work could be supported by the initiatives of national authorities and industry associations focusing on development of methodologies and basis for standardization.

  We suggest that the responsibility of such guidelines and their use are within CEN

Production processes

No specific policy recommendations generated from the NEW_InnoNet project, due to its scope. However current production processes for raw materials and parts are based on homogeneity of input. Improvements of production processes to deal with the specific characteristics of circulated materials are a cornerstone for the circular economy.

Consumption

No specific policy recommendations generated from the NEW_InnoNet project, due to its scope. Also consumption and consumer practices are acknowledged to be of importance for the circular economy.

Waste Management

In the Circular Economy Package (COM/2015/0614 final) it is stated that waste management "plays a central role in the circular economy: it determines how the EU waste hierarchy is put into practice. The waste hierarchy establishes a priority order from prevention, preparation for reuse, recycling and energy recovery through to disposal, such as landfilling". It is important to not leave the highly important task of prioritizing the waste hierarchy order and the measures to be taken to achieve this under the heading of waste management. The responsibility for this should be on all parts of the value circle and for policy makes the major challenge at this stage is to make the waste hierarchy a considerable "problem" for designers, manufacturers, trade and also procurement.

In the policy brief we focus in this section on collection, sorting and recycling, as well as monitoring of these, as the other parts of the value circle are handled under other headings.

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Effective collection

To enable circular material flows, ***effective collection concerns utilizing appropriate, easily-available and cost-effective collection systems where user behaviour has been taken into consideration.*** For most of the waste streams well-functioning separation is a crucial part of the collection system both with respect to the volume and quality of the collected materials/products.

Optimised sorting and recycling technologies

For optimised recycling of materials, the realization of effective and flexible sorting and recycling techniques adapted to process discarded products entering the end-of-life chain are necessary. In addition, losses are minimised, removal of hazardous materials and components is efficient and minimum losses in quality of the recovered materials is achieved. This is to a large extent supported by the R&I actions exploring new technologies etc. suggested in the research and innovation agenda.

To get these technologies actually to the market, incentives are needed to create and establish and strengthen this market as described earlier.

Effective monitoring

Due to lacks in monitoring system, different coverage of monitoring, different monitoring points, etc. the national rates are poorly comparable and it is difficult to know both how much waste is available and what is actually recycled.

Effective monitoring relates to having relevant and common methods for measuring the overall performance in order to create transparency and credibility for stakeholders. There is a need to create common methodologies for calculating and monitoring recycling rates between member states and related material flows in different parts of the value chains. Some of this work is already taking place, like the Commission's proposal for a amending the directives on ELV (2000/53/EC), battery (2006/66/EC) and WEEE (2012/19/EU) (COM(2015) 593 final). This amendment already proposes some improvements to the current legislation with the aim to improve quality, reliability and comparability of European battery, WEEE and ELV statistics. The existing amendments include laying down a methodology and format for data reporting, introduction of a data quality check report and Commission review and assessing national reports and reporting methodologies every third year.

In addition to the suggestions above the following actions need to be taken from a policy perspective:

- **Development of material-specific recycling targets for products.** Many of the materials are disappearing in the bulk material – like weight of plastics in comparison to the weight of metals in a car or rare earth metals on a printed circuit board. To develop specific targets for these materials gives a potential opportunity to enhance the recycling of for example critical and precious metals and plastics.

The responsibility for this action should be taken by DG XXX.

From waste to resources

Harmonization of legislation and implementation of extended producer responsibility systems

In the bottleneck analysis of New_InnoNet (NEW_ InnoNet, 2016a) poor harmonization of legislation and implementation between different EU-countries was highlighted amongst legislative bottlenecks. Currently there are significant differences in implementation of extended producer responsibility between EU member states, because the EU legislation provides only the global framework and member states are responsible for more detailed regulation and implementation. This leads to large differences in implementation of legislation, unequal demands for actors. Although EPR schemes have significantly improved waste collection there are large differences in performance levels between member states.

Amendment of EU legislation based on the experience of current EPR implementation is essential for more harmonized implementation of the legislation, and for improved overall performance. This fact has also been identified in the BioDeloitte study on development of guidance on EPR (BioDeloitte 2014). Among others the report proposes that the definition and objectives of EPR should be clarified and the responsibilities and roles of each actor should be clearly defined throughout the whole product life cycle. The conclusions of the study have been taken into account in the proposed amendment of Waste directive (2008/98/EC) which presents general requirements for implementation of Extended Producer Responsibility. The aims of the proposal are to reduce cost, and boost performance, ensure a level playing field, and provide incentives for producers to take better account of recyclability and reusability.

The amendment of the directive is a clear improvement of the current situation. However, it provides a framework, and more information about the good practices would still be needed to help the national authorities and actors in finding practical solutions and to proceed towards more harmonized implementation of the legislation.

In addition to the suggestions above the following actions need to be taken from a policy perspective:

- Annual binding reporting requirements for producers regarding recyclability, reusability and share of recycled material. An investigation of the possibility of annual binding reporting requirements for producers regarding recyclability, reusability and share of recycled material in the products should be made. By forcing producers to report data on recyclability and reusability they will need to know the data hence they will also put focus on these aspects. This could be handled within the producer responsibility systems.

The responsibility for further developing and follow up of the producer responsibility system should stay with DG EN but preferably be done in collaboration with DG Enterprise / growth and EParliament

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Innovation, investment and other horizontal measures

Well–functioning market

To be able to create a flow for materials all parts of the thought circle needs to work. What we now see is a focus on collection and sorting but in fact we also have a lack of market, so no matter how much waste that is collected it will not find its way back to products.

Well-functioning market for circulated raw materials concerns the ***accomplishment of an effective and established market including innovative business models for recycled materials*** that can compete with virgin raw materials as well as with landfilling and energy recovery. A well-functioning market also concerns the absence of noncompliant actors and illegitimate handling of secondary raw materials

In addition to the suggestions above the following actions to be taken from a policy perspective in relation to this are:

- **Work and develop strategies in procurement.** Through procurement both demands on recycled materials/ reusable products etc. can be set as well as using innovation procurement to increase use of circulated material. In order to strengthen the market, public actors could make a first act and make demands in their procurement. By ensuring a long-term market for recycled materials and circular flows the interest in investments can grow and the setting for innovations will be more attractive.

The responsibility for this action should be taken by DG Growth, DG Industry and DG EP

Guidance, monitoring and enforcement of current legislation

Supporting policies and legislation are needed to stimulate material recycling and their reiterative utilization. This also concerns harmonized legislation and policies and the enforcement of these to create fair conditions throughout the EU, and preferably globally. It also includes effective monitoring, having common methods for measuring the overall performance and fulfilment of legislation, such as recycling rate for different value chains in order to create transparency and credibility for stakeholders. This will create a “levelled playing field” in EU.

In addition to the suggestions above the following actions to be taken from a policy perspective in relation to this are:

- Redefine the definition of waste and provide guidance for the use of it. The definition of waste is not suited for the circular economy. In the borderline between waste and products there are many uncertainties of when a product becomes waste and vice versa. Different interpretations are made sometimes on a local level and this makes it difficult for companies (both producing and recycling companies) to develop methods to increase circularity. Developing of end-of-waste criteria is one way to go creating clear user guide lines is another option. Further guidance is also needed on the differences between by-products and waste.

The action is relevant for DG XXXX

Support demonstration and investment

Due to the complexity of recycling of materials, R&D of systemic and technical solutions is still needed. Adoption of the developed technological solutions by industry is a specific challenge. In this case, this is even more challenging than usual due to the uncertainties linked to the feasibility of the investment. E***conomic support for demonstration facilities is a potential incentive*** for enhancing the implementation of technologies. The economic support should partly be targeted towards SMEs since many solutions are found there (the existing Horizon 2020 calls are too much of an administrative burden).

Cooperation

Cooperation is seen by many stakeholders as one of the keys to reaching circular economy (Sahlin et al., 2017; NEW_InnoNet, 2016b; Wahlström et al., 2017). Cooperation between producers, recyclers and reusers is one thing but also cooperation between the government, industry, municipalities, researchers etc. is needed. One of the aspects here is that continuous knowledge transfer is necessary in our rapid transforming world. Creating a common language and understanding for each step in the value circle is also key.

Policy makers can push and facilitate the cooperation process (Sahlin et al., 2017) especially by giving incentives to producers to find cooperation with recyclers. From the recycling industry perspective the need is already clear. Policy makers can act as catalysers in terms of facilitating spreading good examples on product design, initiatives for reuse etc. and by supporting platforms focusing on these issues.

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