



Nordic Council
of Ministers

Policy Brief

Plastic Waste Markets

Overcoming barriers to
better resource utilisation



Policy Brief: Plastic Waste Markets

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INTRODUCTION

Post-consumer waste plastic is a valuable resource, but it is currently underutilised. Post-consumer plastic arises in a variety of sectors, including agriculture, construction and demolition and in end of life vehicles. The majority, however, is found as part of the household waste stream. A large share of plastic waste from households across the Nordic countries still ends up mixed together with residual waste and is incinerated, while the plastic that is collected separately from residual waste often is difficult to use for the manufacture of high quality plastics.

There are a variety of barriers that hinder the market for recycling plastics – some technical, some legislative and some logistical. Policy initiatives focusing on strengthening the market for recycled plastic can be used to help alleviate or overcome these barriers.

This policy brief outlines the main findings from the project *Plastic Waste Markets: Overcoming barriers to better resource utilisation*. The aim of the project is to provide an overview of the key barriers to a stronger and more robust market for recycled plastics, and to suggest potential initiatives that could be used to overcome these barriers and strengthen the market. The project is part of the market challenges to the Nordic Prime Ministers' green growth initiative, *The Nordic Region – leading in green growth*.

The full findings of the project can be found in the main project report, which outlines the approach used and the barriers uncovered, and provides an analysis of the potential impacts of the suggested solutions to these barriers. It also contains inspiring case studies and integrates the opinions of actors from the whole plastic waste value chain. This policy brief is structured around the barriers uncovered and the solutions suggested by the report.

RECOMMENDATIONS

The project investigated seven potential solutions for their potential to influence the plastic waste markets.

Green public procurement of products made with recycled plastic, and green public procurement of plastic products designed for easy recycling should be used to help build a large, reliable market that the plastic recycling industry can build upon, and that product manufacturers can work towards fulfilling.

This would help build a significant and stable market for recycled plastic and products that are easily recyclable. It could also provide a large stream of clean, high quality plastic waste that could feed directly back into the plastic waste recycling market. An additional benefit could be that the public becomes more accustomed to recycled plastic and drive demand for consumer goods (including packaging) that are easy to recycle or that are made of recyclable material.

GPP tends to entail higher procurement costs through additional administration, both for public authorities and businesses hoping to fulfil public contracts. The demand would also be concentrated on those product categories that are relevant for public procurement, which could drive producers to fulfil that market potentially at the expense of other more suitable product categories.

Ecodesign of plastic products should be promoted in coordination with green public procurement of plastic products. Voluntary ecodesign guidelines should be developed to help push the market and help the market develop by providing standards and certification possibilities.

This would increase market confidence in the products and help drive confidence in the recycled plastics materials. The guideline development process would bring value chain actors together to exchange knowledge and would necessitate a degree of whole value chain coordination.

Ecodesign criteria can, however, limit innovation beyond the fixed criteria and could also lead value chain actors to favour the product groups for which criteria are developed, potentially limiting the search for new designs and possibilities for using recycled material outside of the chosen products / product categories.

Certification of recycled plastic should be promoted and supported to build confidence in the plastic produced from recycled materials. Virgin plastic could be replaced by recycled plastic in many applications, but uncertainty about material quality makes manufactures reluctant to use recycled sources.

Certification would help guarantee the quality of recycled plastics and provide material traceability through the recycling system. It would provide a robust market framework for waste sorters, compounders/recyclers and manufacturers/producers to work within, and promote transparent communication through the value chain.

As with other recommended solutions, certification comes with an administrative overhead. It could also reduce flexibility in supply quality, which can be useful for applications that do not require particularly high quality input materials.

Cooperative forums (internet based as well as live events) should be used to facilitate better communication along the value chain of plastic waste. This will allow a more coordinated approach, facilitate better communication of technical requirements and assurances of quality, and result in higher quality and more recycling of plastic waste. The platforms could utilise existing networks like industry associations, or be developed specifically for the task by industry associations or national authorities.

Bringing value chain actors together will facilitate better communication of required standards from manufacturers to compounders, sorters and waste management companies, and



PHOTO: LENA HOLM CHRISTENSEN, NIRAS

similarly allow cooperation between waste management companies and manufacturers on more effective holistic solutions for designing for recyclability, ensuring that waste management process and design for recycling are aligned. Such platforms require active participation from industry, which could be fostered by using such a platform for developing certification, ecodesign and GPP criteria.

Incineration could be taxed or banned altogether, forcing or incentivising waste handlers to find better alternatives for disposing of plastic waste. A tax could be applied per tonne of waste delivered to incineration facilities based on an average plastic content, controlled over time. An outright ban on the incineration of plastics could be phased in over time to allow the waste management infrastructure time to adapt.

Either of these approaches could significantly reduce the amount of plastic waste going to incineration, and could lead to a significant increase in the amount of waste plastic being recycled: a tax would make recycling an economically better option than in the current market, while a ban would mean that waste management companies would need to find alternative outlets for plastic waste.

However, there are potential pitfalls: it is possible that, rather than the plastic waste being recycled, a large portion of exported plastic waste end up being incinerated and; increased collection without improved collection systems could lead to higher levels of contamination of plastic wastes and result in lower overall quality of recycling. In either scenario, measures would need to be taken to avoid or alleviate these issues. It should also be noted that plastic degrades over time and many plastic polymers degrade during the recycling process. Eventually, incineration with energy recovery may be the optimal treatment option for very low quality plastics that are no longer suitable for recycling.

Funding for innovation in a range of recycling technologies, including sorting technologies for municipal residual waste and source separated plastics, as well as recycling technologies, could help boost efficiencies and help the market achieve an affordable stream of clean plastic waste. Funding could be earmarked from existing innovation funding streams, or an additional facility created specifically to support the plastic recycling value chain.

Innovation funding could be a driver for cooperation along the value chain, as we have seen in other development projects, and the funding could be aimed at value chain bottlenecks, like sorting technologies for example.

Such funding can suffer from a 'picking the winner' syndrome, where potentially promising alternatives are ignored in favour of a particularly favoured technology. Similarly, it can lead to distortions in the market.

Findings – barriers / hotspots

The above policy recommendations are based on the following findings about the principle barriers preventing the further development of the plastic waste market. Here, barriers have been grouped into those related to:

- low demand for recycled plastic,
- lack of communication and coordination along the value chain,
- technical barriers to recycling and,
- legislative barriers to the market.

There is of course a certain amount of overlap and interconnectiveness between these barriers.



BARRIER 1

Low demand for recycled plastic

The price at which recycled plastic can be produced is relatively stable, while the price of virgin plastics fluctuates with oil prices: when oil prices are low, virgin plastic is preferred and when the oil price is high, the demand for recycled plastic for suitable applications increases. This volatility in the demand for recycled plastics, and the related lack of stability in the market, limits the incentive to make long term investments in recycling technology and infrastructure. The currently low oil price and consequent low price of virgin plastic was a common theme in the interviews with value chain actors.

"At the moment, that the oil prices are so low, the prices of virgin plastics and of recycled plastics are almost the same. There is only a very little (insignificant) difference in the price levels."

Interview with plastic producer (S-PP-1)

Issues concerning the quality of recycled plastics also act as a disincentive for many applications. Often, the problem is not so much that recycled plastic is of 'poor' quality, but that there is uncertainty about the technical characteristics of the recycled plastic, about the consistency with which given technical standards can be delivered, and the security of supply generally. It can be costly to redesign manufacturing processes that currently use virgin plastic to use recycled plastics, and uncertainties about feedstock quality and supply act as an effective barrier to that investment.

A lack of consumer demand for products containing recycled plastic or products that can be easily recycled has also been highlighted as a barrier. This lack of demand, combined with a relatively low price difference between virgin and recycled plastics, leads to minimal incentive to change production to use recycled plastic.



PHOTO: UNSPLASH.COM

"There are extra costs to be covered for the production of recycled plastics. It is also definitely easier to have a defined quality in plastics from virgin raw materials. It is a lot harder when you handle recycled plastic because there is no prior knowledge of what kind of additives or other chemicals are present in the waste plastic the recycler receives."

Interview with Waste Management and Compound stakeholder (S-WMC-1)

BARRIER 2

Limited market communication and value chain coordination

The waste plastic value chain is very fragmented. It comprises many actors, a diverse and often mutually exclusive range of polymers, multiple sources of feedstock and a wide diversity in the potential end uses. The quality and quantity of material flowing along the value chain is currently limited by a lack of communication and coordination along the value chain as a whole. Even though adjacent actors – say waste collectors and compounders – often have productive and collaborative relationships, much of the collected plastic still does not find its way to the optimal end use.

“There is a severe lack of communication between the actors in the value chain. The producers almost never take into account the recycling of their products (design for recycling) and do not consult with waste managers what is possible to treat effectively and what is not. There is no communication beyond two directly linked steps in the value chain. Sometimes there is a lack of communication even with the next step, e.g. what quality the recyclers demand from the waste managers. They just accept or reject the containers with plastic waste, while rarely paying for them.”

Interview with Waste Management and Compound stakeholder (S-WMC-1)

Achieving a specific quality of recycled plastic requires the correct set of procedures along the entire value chain: waste management companies need to collect clean fractions, sorters need to isolate specific polymers and to a desired cleanliness, compounders and plastics producers have to blend and create plastics with exactly the correct technical specifications to meet the needs of a particular manufacturing process and final product. Lack of communication means that waste plastics that could be utilised in a high-end application get mixed in with



PHOTO: UNSPLASH.COM

lower quality plastics and are used in less demanding applications. An example mentioned by more plastic producers is that, in their experience, recyclers don't know what polymers the producers would be willing to buy, and therefore plastic is shredded and low quality granulate is produced. This can only be sold at a very low price, whereas a more comprehensive sorting could lead to more differentiated products that the plastic producers would be interested in buying.

"Once the product leaves the company, it is very difficult to follow it through the stages of use and end-of-life in order to make sure that the product is indeed dismantled and the components are recycled properly (...) then what is the point of designing the product for easier recycling – what is the gain for the producer in doing so?"

Interview with plastic consuming business (S-PCB-1)

Similarly, design for recycling – avoiding complex composites, mixes or additives, and making products that can be easily dismantled – is futile if consumers, the waste management system and plastic sorter are not in a position to capitalise on it. The waste management industry is rarely in a position to actually take advantage of design for recycling: wastes are aggregated and treated homogeneously.

A lack of communication and coordination can also be seen in the difficulty of tracing materials through the system, making it difficult for compounders and manufacturers to rely on quality of the supplied plastics. Formal communication of quality criteria could help alleviate this barrier.



BARRIER 3

Technical barriers to recycling

Numerous technical and logistical barriers serve to limit the market for recycled plastics. These difficulties primarily lie in moving from a highly-mixed plastic waste fraction released from final consumers, to separated and clean polymer types ready for use in new plastics. This process is composed of technical and logistical steps that combine to define the quality of the final plastic material. Recycling and sorting technologies understandably mainly target plastic packaging waste, but this can limit the sorting capacity for other waste streams.

"The degradation of plastic quality should be added to the service requirements. The highest quality virgin polymers should be used only by the industries having the highest quality demands (e.g. food contact uses). Operators having lower quality requirements for their products could also use recycled plastics. This would decrease the amount of virgin plastics used."

Interview with plastic consuming business (F-PCB-1)

Separating plastic from a dirty waste stream like MSW has proved difficult, particularly if the goal is achieving high quality feedstock materials. Separately collected plastic waste provides a cleaner waste fraction, but is still composed of multiple plastic types, contains impurities (labels and glue, for example), and products composed of complex composite materials. Additives used to achieve particular technical properties also pose a problem for recycling, particularly if they are classified as hazardous, which require extra processing to remove. The over-use of carbon black as a colourant is seen as a significant barrier to recycling – the plastic can be technically difficult to sort and can only be used in other products that are black. Compacting and shredding are commonly used in the recycling chain, but this can also hinder the possibilities for high quality recycling.



PHOTO: COLOURBOX.COM

Design for recycling can help with this problem, by producing products that are composed of single polymers or common blends, and avoiding additives that limit recyclability, or by making products with single polymer components that can easily (mechanically) be separated.

It is also important to acknowledge that plastic degrades over time and with processing. The gradual degradation is caused by microbiological degradation and by the mix of different polymers and additives, labels, and other non-plastic elements in the waste stream and the inability to reliably sort and remove these. This means that there is a technical limit to the recyclability of plastics – at some point, incineration may be the most environmentally optimal option.

BARRIER 4

Legislative barriers to recycling

There are numerous legislative and administrative barriers to the market for plastic recycling. One of the main points uncovered in the project is that un-differentiated weight-based recycling targets favour recycling of heavy fractions like glass and paper (and metal, although the metal recycling industry is also profitable without policy intervention). Plastic is relatively light and as such cannot contribute as much towards meeting targets. Consequently, the market for plastic recycling is subject to less political attention.

“Legislation and instructions should be harmonized (currently there are different kinds of guidance and practices between different countries, and even between different municipalities).”

Interview with plastic producer (F-PP-1)

Diversification of waste policy and implementation is also seen by some as a barrier to better collection and sorting of waste plastic. National differences across the Nordic countries means that waste management companies and plastics producers have to become accustomed to a wide variety of different practices and waste streams. This problem is often increased by differentiated implementation at the municipal level – different methods of collection, different fractions and consequently different qualities of waste plastic.

A lack of standard criteria for characterization of waste plastics and different recycled polymers is also seen as a barrier to the market. Manufacturers are uncertain of quality and cannot design based on technical properties of a recycled plastic produced to a recycling standard.



"No new regulations are required, as the companies can find meaning in increasing the use of recycled plastics based on business models cases. If it makes sense as a business model, then the company will act towards increasing the use of recycled plastics before (and/or without) any regulatory measure comes into place."

Interview with plastic consuming business (S-PCB-1)

CONCLUSIONS

A multitude of barriers inhibit the plastic waste recycling market, many of which are interlinked and reinforce one another. Technical barriers need to be overcome, but this is difficult without investment in infrastructure and innovation, but such investments are held back by uncertainty over the supply of material, the quality of the recycled material, its competitiveness compared to virgin plastics and thus the size of the market. The volatile price of virgin plastic also presents a significant problem for the plastic recycling market, but this cannot be directly controlled. Extracting the plastic waste from municipal waste, particularly plastic packaging, is a key challenge and one that will require investments in infrastructure, but also requires innovation in sorting and treatment technologies.

Several policy initiatives could potentially help lift or alleviate these barriers. Green public procurement could be used in conjunction with certification of recycled plastics and ecodesign of plastic products to stabilise and drive the market for recycled plastics. These initiatives would also drive much needed cooperation along the value chain and help communicate requirements from manufacturers down through plastics producers, compounders, sorters and waste management companies. These initiatives could also foster a greater trust in recycled plastics, both from manufacturers and end users, driving demand.

Collaborative platforms could be used to support this cooperation and coordination, and facilitate better communication. They could also be a forum for the consultation and development process for the methods and standards behind GPP, ecodesign and recycled plastics certification.



Taxes and bans on incineration could also be used to limit the amount of useful plastic going to incineration, but any such initiative must also be supported by measures that prevent waste plastic being exported for incineration.

It is important to remember that some parts of the market for recycled plastic function well. A very substantial part of production/manufacturing plastic waste is recycled, and there are also functioning markets for other types of industrial waste, where large quantities of relatively pure and uniform plastics are available.



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