

R&W|UK

RESOURCES & WASTE UK

Championing the future of resource management

Managing the Risk from Secondary Raw Material Price Movements

September 2015

Introduction to Resources and Waste UK

Resources and Waste UK (R&WUK) is the newly created partnership between the Chartered Institution of Wastes Management (CIWM)¹ and Environmental Services Association (ESA)². It is a unique partnership of the professional institution and trade association at the heart of the sustainable resources and waste management industry in the UK. It has been created to form a single voice in the interests of championing the future of resource management.

This report has been prepared by Eunomia Research & Consulting for R&WUK. Eunomia wishes to express its' thanks to Jacob Hayler from the ESA, and Chris Murphy and Pat Jennings from the CIWM for their direction as well as to the stakeholders consulted as part of the research.

¹ CIWM is the professional institution for the UK's resource and waste management sector. It has approximately 6,000 individual members based predominantly in the UK, 2,500 of which are Chartered Waste Managers

² ESA is the trade association for the UK's resource and waste management sector. We work with our members to transform waste and resource management across the country. This work helps enable our members to turn Britain's waste into valuable resources, whilst continually protecting the environment.

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Foreword

Steve Lee, Chief Executive, R&WUK

The UK resources and waste sector has come under severe pressure over the last 12-18 months. Volatile market conditions coupled with low prices for secondary raw materials (SRM) have challenged the financial viability of the sector, resulting in the closure of recycling facilities. The loss of recycling capacity and uncertain business environment have put the UK's entire recycling supply chain at risk, while putting even more pressure on the ability of the UK to meet its 50% recycling target for household waste by 2020.

The issue of price risk management is important to both CIWM and ESA members and to all players involved in UK recycling; from local authorities through to private waste contractors and reprocessors. It is one that R&WUK highlighted in its recent Priorities for the new UK Government report.

This report has been commissioned by R&WUK to study the issue of fluctuations in the prices of SRM, and how price risk can be better managed. The imperative to recycle is driven by legislation and Government policy while the commercial environment within which this activity takes place is governed by global commodity markets. With no ability to directly influence SRM markets and prices, and ever tighter constraints on national and local government budgets, the spotlight falls not only on the financial and regulatory measures that could be employed to mitigate the risks but also the way in which risk and value is shared throughout the supply chain.

While these are challenging issues, the present difficulties in the SRM markets make this a particularly pressing matter, and the prize for getting it right is bigger too. Being better able to manage the risks related to SRM price fluctuation will help create more attractive conditions for investors, stimulate UK recycling markets, and provide a more stable basis on which the UK can progress towards the longer term 'circular economy' goals of resource efficiency and security.

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This report from Eunomia will be used by R&WUK as a source document for the preparation of a Position Statement and Action Plan, the objective being to identify what actions the industry itself – and R&WUK in particular – must take in response to the importance and urgency of these issues. These actions can only serve as coping mechanisms over the relatively short term. R&WUK will also discuss the report and Action Plan with UK Governments as they will need to be a part of any longer term solutions. In this regard, R&WUK are gratified that both Whitehall and the devolved governments have shown an interest in this work.

R&WUK is committed to working with the key stakeholders across the industry to take the recommendations proposed in this report forward for the mutual benefit of the whole supply chain.

R&WUK would like to thank ESAET for funding this work. R&WUK acknowledges that ESAET take no responsibility for the content or conclusions and recommendations arising from it.

Executive Summary

Introduction

This report examines the issue of price fluctuation risk for Secondary Raw Materials (SRMs) and its impact on the UK recycling supply chain. It has been prepared against the backdrop of a general downward trend in SRM prices from the highs of 2011/12, a squeeze on contract margins for waste management companies, significant budget cuts for local authorities, and challenging operating conditions for some parts of the UK reprocessing sector.

The issue at stake here is how the UK can continue to drive higher levels of recycling, potentially up to 70% of municipal waste by 2030 if forthcoming EU Circular Economy proposals maintain the level of ambition currently being discussed, originally set out at a time when uncertainty over SRM price trends and volatility is undermining the entire value chain.

The pressure is coming from both ends of the recycling supply chain, affecting both demand and supply of SRMs. Global economic trends, most notably the slowdown in the BRIC (Brazil, Russia, India, China) economies and the stuttering recovery in Europe, are impacting on demand for commodities, leading to falling prices for both primary commodities SRMs. At the same time, the drive for higher recycling rates is increasing SRM supply, and since recycling performance tends to move in one direction, supply is relatively unresponsive to demand. Falling demand relative to supply, in turn, allows end users to be more selective in respect of quality, with China's Green Fence providing a good example of how concerns for quality can send ripples back up the supply chain.

The growing significance of recycling in the management of waste is increasing the extent to which the costs of waste management are affected by commodity markets. As a result, cost models and contractual frameworks which fail to recognise and manage the increased exposure to unstable commodity prices could be seen as outdated. It is becoming increasingly difficult to set long term contract prices which accurately capture the expected

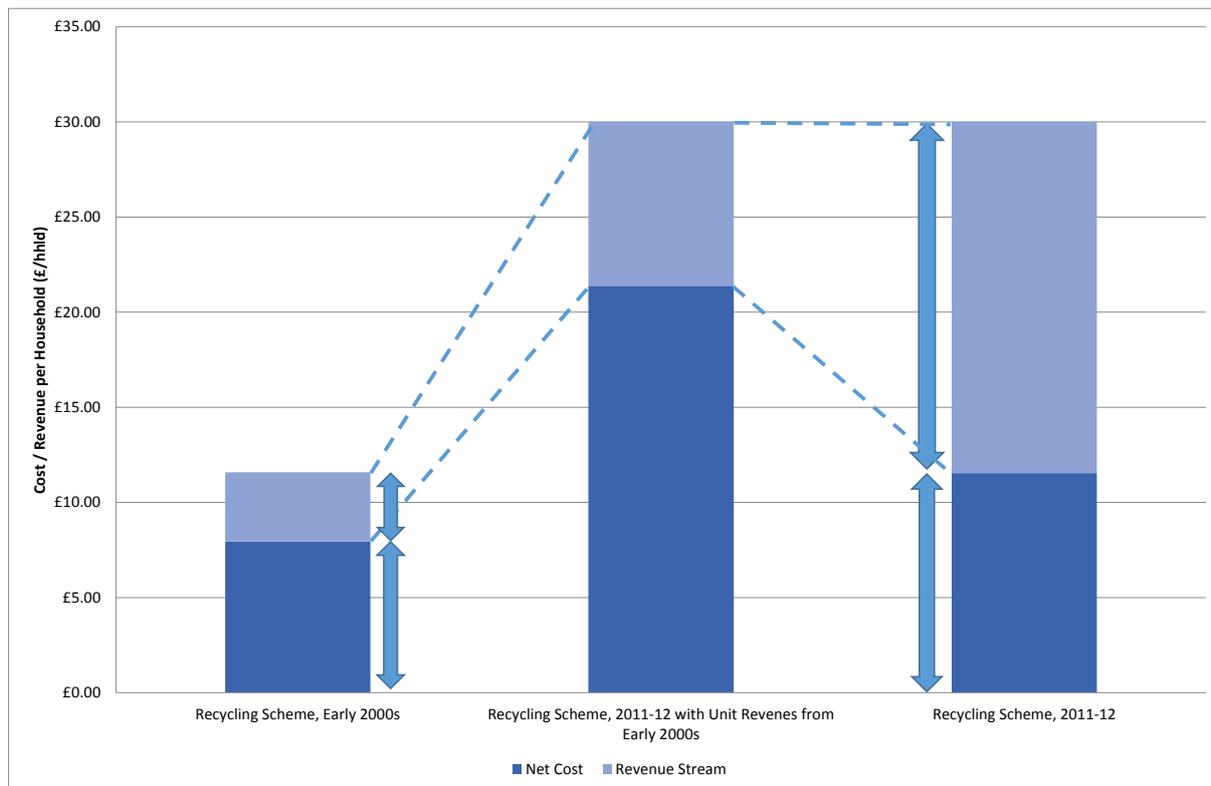
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revenues received over the life of the contract whilst delivering value to the parties to the contract. This development affects local authority collection contracts in particular, both because of the typical contract life and because the net costs of the service have been increasingly influenced by SRM revenues as recycling rates have risen.

Figure E-1 highlights the impact of higher recycling rates on the costs of providing a household waste recycling service on a per household basis. Higher service levels in 2011-12 require higher per household service costs than those in the early 2000s, when a relatively narrow range of materials were collected and recycling rates were lower. These higher costs are offset, however, to a significant degree by the increased revenues received for recyclates (though depending on the unit revenues). The left-hand and middle bars show the change in net revenues assuming no change in revenues per tonne from sale of SRMs. The middle and right-hand bars in the chart show the effect on net costs of higher revenues per tonne: net costs to authorities in 2011-12 would have been 100% higher if recyclate prices had not risen during the previous decade. The difference in net costs between the two bars demonstrates the enormous influence that SRM prices exert on the net costs of collection contracts now that much higher recycling rates are being achieved.

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Figure E-1: Net Cost and SRM Income Comparison



Source: Eunomia Research & Consulting Ltd

The implications for local authorities, private collection and treatment contractors, and the reprocessing sector are significant. The UK market has witnessed some high profile contract failures in recent years where the contractor has failed to anticipate subsequent price falls for commodities which have undermined its ability to maintain the service, and where the contract itself is not structured to manage this risk. The UK reprocessing sector, meanwhile, has also been in turmoil recently with the closure of several major plastics and paper plants. In the case of plastics, evidence suggests that end-users have switched consumption away from SRMs as the price for primary material has fallen. The absence of meaningful mechanisms to ensure the environmental costs of the use of primary materials, as opposed to SRMs, are reflected in prices continues to depress demand for SRMs relative to primary commodities. In the absence of first-best solutions to address this market failure, there is a case for intervention to support demand for SRMs.

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Unless this systemic failure in the value chain for recycling is addressed, it is likely that the UK will struggle to meet both its near-term recycling targets and longer term ambitions to improve recycling rates. It will also struggle to develop more circular economic approaches that put valuable secondary materials back into the product cycle. Not only will increased SRM price risk mean that the market may find it increasingly difficult to accept longer term fixed price collection contracts, but the lack of certainty over contract and material revenues will also constrain investment by recycling operators and reprocessors in the new services and infrastructure that will be needed for the future.

This is not a problem unique to the UK: SRMs are traded widely, and the factors influencing matters in the UK are felt just as keenly in other countries. Recent news reports have highlighted symptoms of the same problem in North America.³ Indeed, the National Waste & Recycling Association and the Solid Waste Management Association of North America combined forces in April of this year to issue an advisory to parties contracting for the processing of recyclables collected from the municipal stream.⁴

Solutions for the short and long term

Price formation in the SRM market is a complex system and there is, therefore, no silver bullet to tackle the causes of the fluctuation in prices. Focusing on two main price risk management mechanisms – the use of risk-sharing mechanisms within contracts and the use of market-based financial instruments – the report identifies a number of possible approaches for the shorter- and longer-term.

In terms of the former, the report argues that greater risk sharing in the supply chain for household recycling could help, in the short term, to ensure that local authorities continue to have access to a competitive marketplace. Local authorities have an interest in benefiting from the revenue resulting from the sale of SRMs, not least since the revenue has become increasingly significant in

³ See <http://www.theguardian.com/environment/2015/jun/27/recycling-unprofitable-oil-china-dollar>

⁴ Solid Waste Management Association of North America and National Waste & Recycling Association (2015) Joint Advisory on Designing Contracts for Processing of Municipal Recyclables, 17th April 2015.

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offsetting contract costs. The key is to ensure sufficient benefit is derived from the sales revenue, whilst ensuring that the contractor remains incentivised to collect and deliver to the market quality materials, and is not being asked to shoulder a level of risk that jeopardises their ability to deliver a commercially viable service. If contractors are asked to take all risk on SRMs by bidding a 'day one price' that is maintained for the contract duration, it is possible that few will bid in the future because of the risk of significant losses (and potential contract default) as a result of unforeseen SRM price fluctuations.

Better management of the risk would encourage more competition and the achievement of best value for local authorities procuring recycling collection contracts and mitigate against contracts being agreed that are unsustainable from the contractor's perspective.

Of course, the decision on how to achieve best value will ultimately fall to each individual local authority. The scale of this issue, given higher recycling rates, means that authorities should examine the implications of SRM price risk carefully when deciding on how much risk to retain in-house or pass to their contractor. Equally, waste management contractors should be looking to work in greater partnership with their local authority clients by improving transparency around the SRM price element of the contractual relationship.

In the longer term, the UK (and the European Commission) needs to explore a range of financial and legislative options for ensuring stable and sustainable recycling markets, with the aim of stimulating demand for SRMs. The Commission has made clear its intentions in this regard in the past through the Roadmap to a Resource Efficient Europe.⁵

Previous attempts to establish financial mechanisms to help manage the price risk associated with recycled materials have been largely unsuccessful. The variability of waste materials, perceived lack of rigorous specifications, relatively small-scale quantity of materials, and low market liquidity (in basic terms, there have not been enough traders participating in the market) have

⁵ Roadmap to a Resource Efficient Europe (2011) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 20.9.2011, COM(2011) 571 final

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all combined to make this a challenging area for the development of financial mechanisms.

This report revisits some of that work to investigate whether the timing might now be right for the UK to look at hedging instruments to mitigate SRM price risk in the longer term, and suggests a number of areas that could be explored. While the opportunities for individual risk management through exchange-traded future markets or over the counter mechanisms remain unclear and would require further work, the report identifies alternative approaches where the risk is managed centrally. These include fund-based approaches which seek to aggregate authorities' collections and pool the SRM price risks, or by revising the Producer Responsibility regime to allocate price risk to the part of the supply chain which appears best placed to manage it.

Recommendations

With the above findings in mind, the following recommendations are proposed:

Recommendation 1

Establish appropriate models for risk allocation and sharing between local authorities and waste collection / sorting companies through a collaborative approach. To that end, it is proposed that a task-oriented, cross-sectoral working group is established, with input from relevant government departments and agencies, to build on work already done in this area and bring forward clear proposals on the following:

- the establishment of some underlying principles of risk sharing mechanisms between contracting parties; and
- on the basis of these, developing a series of model contract clauses that can be used, or adapted, for all of the common recycling service arrangements.

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Recommendation 2

The development of any guidance and model contract clauses should be accompanied by appropriate support to local authorities and waste management companies to ensure the rationale and consequences of their use are well understood. R&WUK should explore, with appropriate industry bodies and local and national government representatives, how this support can best be delivered.

Recommendation 3

At a UK level, consideration should be given, in light of the current review of the existing Producer Responsibility for packaging regime, to the role that the PRN system can play in improving the value proposition for recycling and creating a supply chain that is more resilient to price volatility and market risk (research to be published by CIWM in Autumn 2015 is intended to inform this debate further). The viability of alternative mechanisms, such as the Belgian scheme for producer responsibility for packaging outlined in this report, should also be explored. At an EU level, the wider role of Producer Responsibility and other 'pull' mechanisms in underpinning healthy market demand and prices for SRM should form part of the UK's response to the European Commission's Circular Economy consultations and future discussions.

Recommendation 4

A working group should be established, possibly under the auspices of R&WUK or a similar representative body, to further investigate the possibility and practicability of developing an investment fund of the nature discussed in this paper, the intention of which would be to smooth the impact of future SRM price risk for local authorities.

Introduction

Purpose of report

This report is aimed at investigating ways of managing the issue of fluctuations in the prices of Secondary Raw Materials (SRM), with a focus on both the role of the contractual relationship between local authorities and waste management companies and on longer term market-based options. Some of the mechanisms investigated and discussed also have relevance to similar services being conducted by in-house operations (DSOs, or direct service organisations).

Consequently, the report mainly considers price fluctuations for the materials that make up the bulk of a typical household collection round and for which there is a well-established market i.e. paper, card, aluminium and steel, glass and PET and natural HDPE plastics.

Although the report is aimed predominantly at local authorities and waste companies, the information will also be of interest to other members of the SRM supply chain as well as government. As will become clear, SRM prices are exerting increasing influence on the costs of delivering services, but their variability also has implications for the viability of reprocessing enterprises. The intention is to stimulate debate, and also, to make recommendations for further work that could be taken forward by actors within the supply chain, and by government, to assist in improving management of this issue going forward.

More detailed analysis and consideration of the issues discussed here can be found in the Technical Appendix that accompanies this report.

SRM price fluctuation

All markets are susceptible to price fluctuation in both the short and long term, mainly as a result of changes in supply and demand (linked either to the state of the economy, or the market for competing products / development of new substitutes).

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OECD research suggests that the monthly fluctuation in SRM prices is around three times greater than that for primary raw materials.⁶ These markets are usually considered to be susceptible to cyclical price movements because of the relatively low elasticity of supply in the short-term. In other words, those who have invested in production are not always keen or able to immediately respond to price signals when prices are moving up, or down.

This may be a particularly acute problem in respect of local authority recycling markets: local authorities cannot turn their recycling collections on and off as market prices rise and fall, and storing materials at times of falling prices in the hope those prices will rise may be costly, and is, under most circumstances, impractical both in operational and risk terms. The norm, therefore, has been for local authorities to offer contracts for a service configuration over a period of around seven to ten years. Over such a period, the movement in SRM prices can be considerable, not just 'from start to finish', but also throughout the intervening period.

As recycling has increased, this fluctuation in prices for SRMs over the term of typical local authority recycling collection contracts has become a significant risk management challenge.

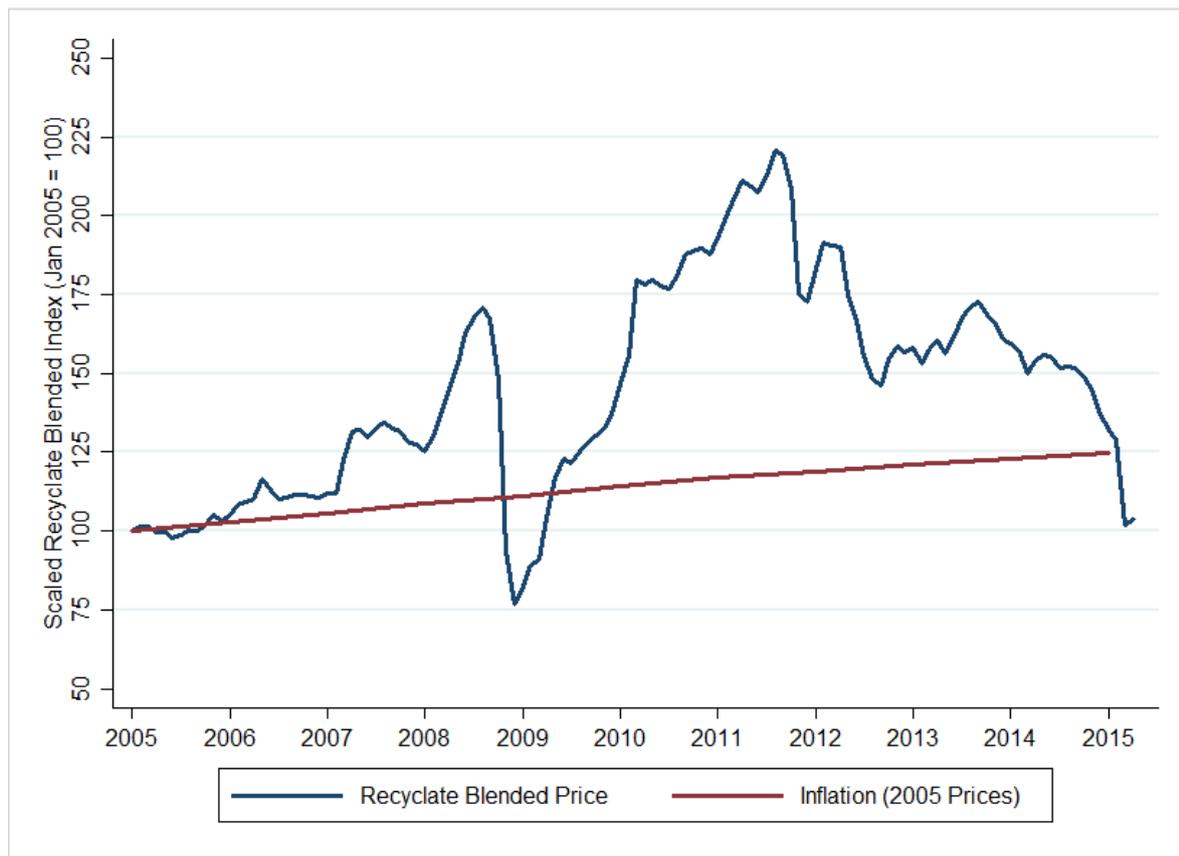
Collection and sorting contracts that are being procured in the current period are being agreed in the context of a drop in SRM prices since the highs of 2011/12 (Figure 1). As such, the ability of SRM revenues to offset some of the costs of collections has been eroded and the net costs (the costs net of the revenues from selling SRMs) of service provision are on the increase. Some evidence for this can be found in the price evolution for contracts under successive Gate Fees reports from WRAP.⁷

⁶ OECD (2005) Improving Recycling Markets, paper for the Working Group on Waste Prevention and Recycling, September 2005. p. 29.

⁷ See <http://www.wrap.org.uk/content/comparing-cost-alternative-waste-treatment-options-gate-fees-report-2015>

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Figure 1: Dry Recyclate Blended Price Index



Source: Eunomia Research & Consulting Ltd.⁸

SRM Supply Chain

This report is mainly concerned with the impact of SRM price risk on local authorities and waste management companies. Whatever the nature of the recycling service, whilst the input costs (in the form of labour, fuel, energy and equipment, insurances etc.) might remain relatively stable,⁹ the revenues associated with output SRM sales are inherently unstable, giving rise to uncertainty in the costs, net of revenues, of service delivery. There have been and continue to be efforts made by representative bodies to improve the situation for local authorities such as the provision of advice on the sale of SRMs by WRAP and the development of an advice and brokerage service to

⁸ Note: the Recyclate blended price line represents movements from a 2005 baseline (January 2005=100) rather than actual price. Prices were derived from LetsRecycle and weighted using an estimate of the current composition of kerbside collected domestic recycling for our target materials.

⁹ Although fuel prices vary, much of the cost of fuel used in vehicles is associated with fuel duty, so that a significant proportion of the price is, relatively, invariant as compared with the commodity price of the fuel.

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support authorities in Scotland, with plans for a similar service in Wales.^{10,11} As far as we are aware, however, these mechanisms are designed to secure value for materials sold, rather than address price fluctuations.

The instability of SRM prices also affects other parts of the supply chain and the views of a number of reprocessors for the main SRMs were consulted for this report. The reprocessing and production parts of the chain vary in the ways they seek to manage risk, as does their capacity to absorb this risk as a result of the nature of their operations. A representation of the supply chain is shown in Figure 2.



Source: Eunomia Research & Consulting Ltd

¹⁰ Available at: <http://www.wrap.org.uk/content/approaches-marketing-dry-recyclables-local-authorities>. Last accessed 03/06/15

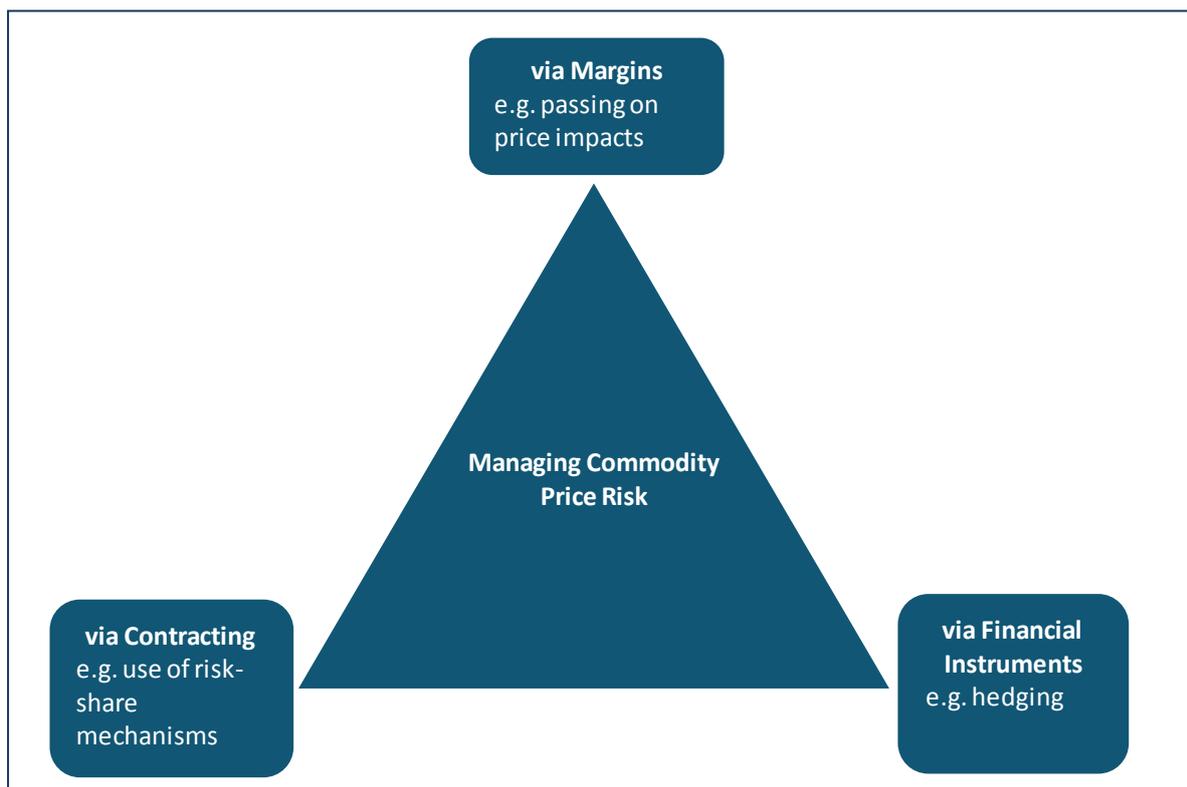
¹¹ See: <http://www.zerowastescotland.org.uk/brokerage> Last accessed 10/08/15

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Mechanisms for managing price risk

Broadly speaking there are three main options available to SRM supply chain actors to manage the risk associated with commodity price fluctuations as shown in Figure 3.

Figure 3: SRM Price Risk Management Mechanisms



Source: Eunomia Research & Consulting Ltd

The use of margins to pass on price fluctuation risk through the prices charged for collected and reprocessed SRM transfers the risk down the supply chain and could be seen to reflect the existing situation to a certain degree. Given that, relative to other primary raw material-based supply chains, margins in the SRM supply chain are tight and inflexible, sole reliance on this mechanism does not appear to be a viable solution for the future.

We are, therefore, focused in this report on how the other two mechanisms of a) risk-sharing contracts in the shorter term and b) financial mechanisms in the longer term (specifically the use of hedging via exchange-traded futures contracts or over-the-counter equivalents) can be used by supply chain actors.

Why are fluctuating SRM prices an issue?

There is no foreseeable reason to expect that fluctuations will cease to be a feature of commodity prices in years to come. The question is, why does this matter, and why does it appear to have become more important in recent years?

A simple comparison in the monthly value of a typical basket of kerbside-collected recycled material collected over a 24-month period in 2002/3 with the monthly value for the same 24-month period in 2011/12 (Figure 2) shows the extent to which the fluctuation in prices and the change in quantities collected has led to an increase in the extent to which the total value of the materials varies between even these relatively recent periods. The magnitude of the variation has increased more than five-fold.

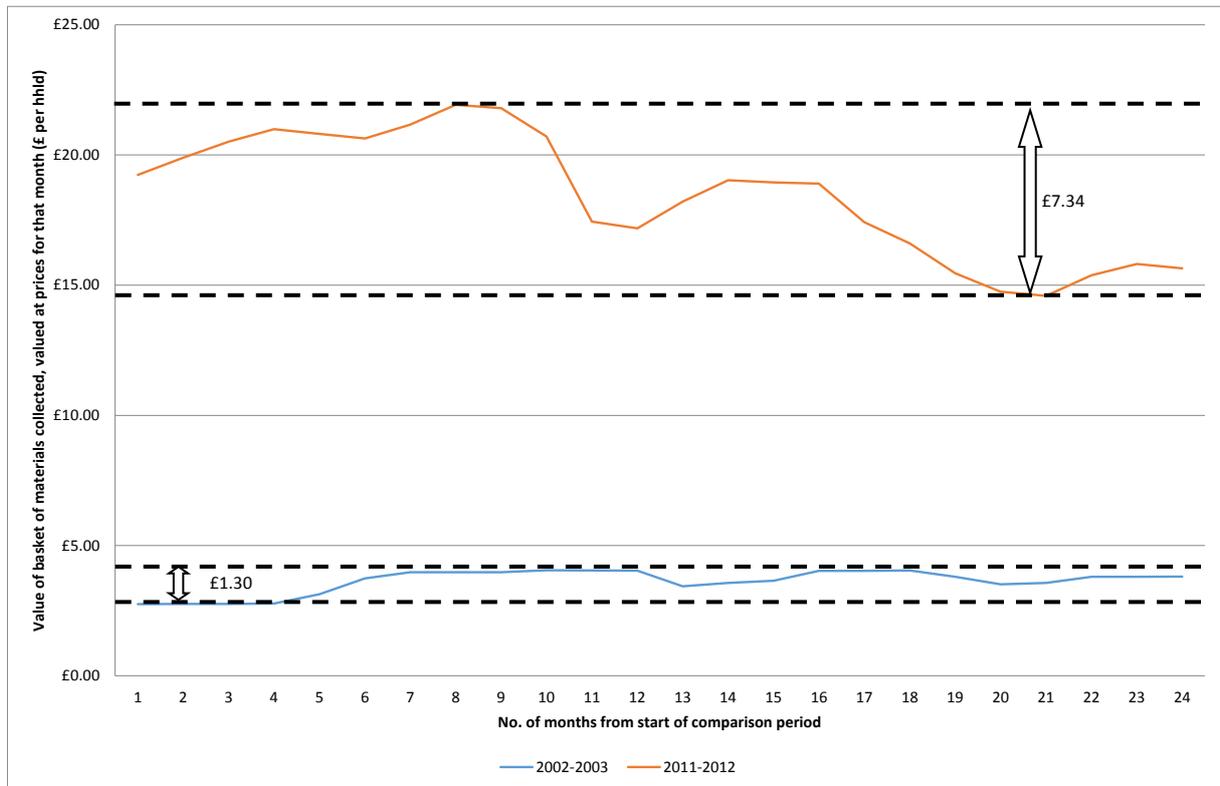
When local authorities procure services that include collection of materials for recycling, or sorting of materials that have already been collected for recycling, then at the most simplistic level, one can distinguish between two components determining the net cost of the provision of the service:

1. the gross costs of providing the service itself – i.e. the costs incurred in collecting the waste materials in the manner specified by the contract, or the costs of conducting a sorting operation in the manner specified, or both; and
2. the revenues from the onward sale of materials collected and/or sorted as a result of applying that collection and /or sorting service.

Taken together, the gross costs minus the revenues determine the net costs of the service being provided.

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Figure 4: Comparison of SRM Price Fluctuation (2002/3 and 2011/12)¹²



Source: Eunomia Research & Consulting Ltd

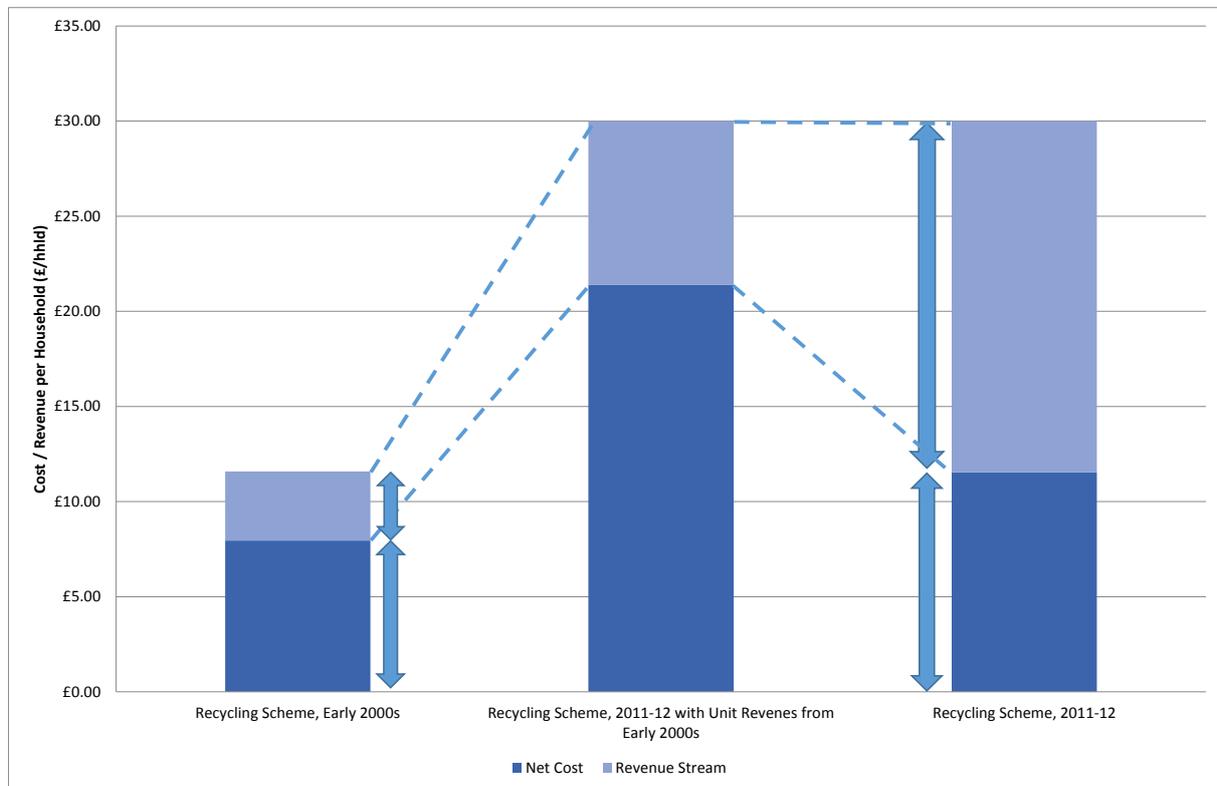
The contribution that income from materials makes to the net cost of collection, at least in situations where SRM prices do not fall to historically low levels, has also increased in recent years. This is illustrated by Figure 5, which highlights the impact of higher recycling rates on the costs of providing a household waste recycling service on a per household basis. Higher service levels in 2011-12 require higher per household service costs than those in the early 2000s, when a relatively narrow range of materials were collected and when recycling rates were lower. These higher costs have been offset, however, to a significant degree by the revenues received for recyclates (though depending on the unit revenues). The left-hand and middle bars show the change in revenues assuming no change in revenues per tonne from sale of SRMs. The middle and right-hand bars in the chart show the effect on net costs of higher revenues per tonne: net costs to authorities in 2011-12 would have been 100% higher if recyclate prices had not risen during the previous decade. The difference in net costs between the two bars demonstrates the enormous

¹² Prices derived from LetsRecycle (<http://www.letsrecycle.com/prices/>) and weighted using an estimate of the current composition of kerbside collected domestic recycling.

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influence that SRM prices now exert on the net costs of collection contracts now that much higher recycling rates are being achieved.

Figure 5: Net Cost and SRM Income Comparison¹³



Source: Eunomia Research & Consulting Ltd

A further illustration of the influence of the revenues on the net costs of the contract is given in Figure 6. This shows how the net contract costs are significantly influenced by material values: at current prices, some 15%-25% of net costs for collection / collection and sorting contracts are offset by material revenues. To put this another way, material revenues on average now subsidise around 20% of the costs of delivering the service on behalf of local authorities. This is more significant than one of the other main collection cost price fluctuations, namely fuel costs, which typically make up only around 10% of overall service costs. A 10% movement either way in fuel (which, unlike

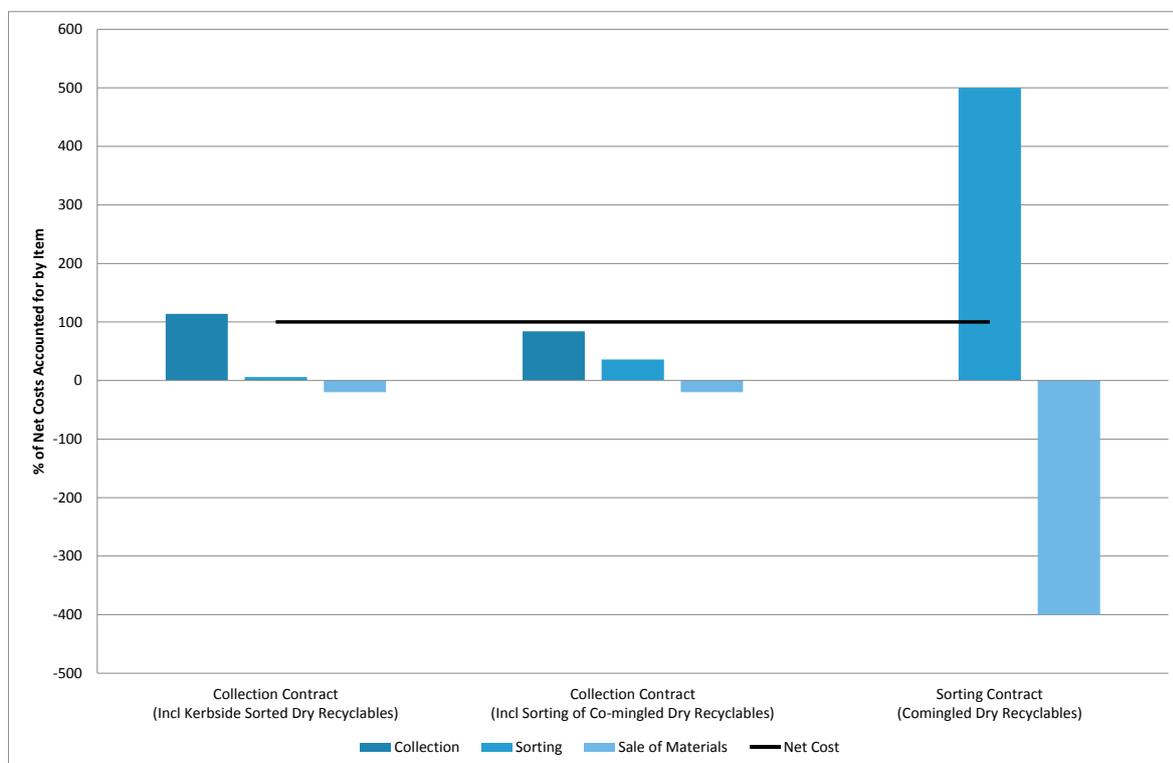
¹³ Recycling collection cost figures derived from WRAP's Indicative Cost and Performance report, materials prices were derived from LetsRecycle (<http://www.letsrecycle.com/prices/>) and weighted using an estimate of the current composition of kerbside collected domestic recycling for our target materials.

(WRAP (2008) Kerbside Recycling: Indicative Costs and Performance. Available from: <http://www.wrap.org.uk/sites/files/wrap/Kerbside%20collection%20report%20160608.pdf> and WRAP (2015) Local Authority Waste and Recycling Information Portal. Available at: <http://www.wrap.org.uk/content/local-authority-waste-and-recycling-information>

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SRMs can in any case be hedged), therefore, has a relatively small impact of just 1% on overall costs.

Figure 6: Cost and Revenue Streams in Relation to Net Costs for Different Contract Types



The situation is similar for sorting contracts, though when expressed as a percentage of net contracts costs, the issue appears to be more extreme. In this case, material revenues have in the past been sufficient to completely offset the costs of operating the sorting infrastructure. Hence, in the late noughties and in the early years of this decade, high material revenues (and excess sorting capacity in some regions) led to some authorities being paid for co-mingled materials under their contracts with MRF operators.

These challenging conditions are not solely due to increased SRM price fluctuations. They also reflect ongoing changes in the nature of the collection systems that have been introduced in the UK. Household recycling rates in England, for example, have increased from just over 10% at the start of the last decade to over 40% today and the quantity of dry recyclables collected through door-to-door collections on a per household basis has risen dramatically. There are also significant changes in the composition of the material collected. These changes are the result of evolving collection systems,

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other factors such as national and local communications, and more systemic trends in consumption, such as the decline in newspaper consumption and the increase in on-line shopping, which have led to a shift in the fibre mix collected.

It is clear that the net costs of the delivery of the service are more heavily dependent on the revenues from sale of materials than was previously the case and, as a result, more susceptible to fluctuations in the prices of SRMs (since these determine the magnitude of the revenue stream).

In the context of a collection contract which is being let by a local authority for a period of (for example) seven years, there are a variety of different situations which could arise. The following examples give the two extremes.

1. The local authority lets a contract for the collection service only. In this case, it takes ownership of the material collected and takes 100% of the risk on the prices received for the materials. The authority, through a procurement exercise, enables prices for the collection service to be bid competitively by service providers.
2. The local authority asks bidders to price the contract net of material revenues, with the contractor taking 100% of the risk and retaining all revenues.

In the former example, there is little or no certainty for the local authority in terms of its SRM revenue and net position, and hence it's budgeting. In addition, if contractors have access to markets which facilitate favourable deals, the potential to take advantage of this is foregone. The collection contractor, on the other hand, is not exposed to the risk associated with the quality of what is collected, or collected and sorted. This leads to a similar outcome, in terms of risk, to one where an authority operates an in-house collection service, and takes responsibility for, and carries the risk associated with, marketing the collected materials.

In the latter case, where no adjustment mechanisms are in place, the contractor is then faced with the situation of having to price the contract in such a way that the stream of revenues from the contract matches its own

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risk-adjusted return over the life of the contract. In the current market conditions, the contractor's risk could be seen as potentially prohibitive for a commercial concern to carry. The local authority may have greater budgetary certainty, but this may come at a higher price. It may also reduce competition since potential bidders may be unable to accept this risk at a reasonable price for the local authority. This could result in the contract ultimately failing to transfer any risk from the authority if the successful bidder is subsequently unable to fulfil its contractual obligations due to market price trends. There is some evidence, on the ground, of this currently occurring in the market, albeit not always solely related to the matter of price-related risk. Partly as a reflection of heightened risk to themselves, several contractors are now saying that they are not willing to bid for contracts where they must accept all of the price risk.

Understanding the limits of these extremities on the spectrum lies at the heart of this paper. In the absence of adequate risk sharing models, and faced with unanticipated fluctuations in prices, businesses may have to manage operations through periods of fluctuating, and sometimes, negative margins which may persist for periods longer than businesses are able to sustain; whilst in times where prices are increasing faster than operational costs, contractors could gain inflated profits (with authorities foregoing substantial revenue streams).

Figure 7 shows what might have happened if, for illustrative purposes, partners had agreed to fix the price on the day when the contract commenced. The area between the price curve and the dashed line indicating the contract price gives an indication of the balance of benefits to the contractor: above the dashed line for each contract option, the contractor gains, and below the dashed line, the contractor loses. From these scenarios it is clear that:

1. under Contract 1, the contractor would have made gains in all months other than those when the banking crisis was at its deepest;
2. under Contract 2, losses in the first two years would have been offset by gains over the next two, before losses were incurred in the later years; and

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3. under Contract 3, there would have been no period (thus far) where the contractor did not make a loss.

Under Contract 1, the local authority would have foregone upside potential for revenue over (most of) the duration of the contract. In Contract 2, its contractor may have struggled in the first two years, but may have been able to weather the downside, although this might be increasingly difficult in the later years of the contract. From the authority's point of view, the contractor's ability to sustain the losses would have implications for its ability to continue under the contract in its initial form. Under Contract 3, unless the contract was priced with a considerable profit margin, it seems likely that it would quickly become unsustainable.

Figure 7: Impact of Fixing Contract Prices at Different Times



SRM price risk is not about to disappear, and it is clear that for different reasons, neither local authorities nor contractors are in a viable position to take 100% of the risk in the current market conditions. The question is, therefore, how it might best be managed in such a way that contractors are encouraged to bid for contracts, whilst local authorities benefit appropriately

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from the sale of SRMs? The following sections look at the two main SRM price risk management mechanisms which are the focus for this report.

Sharing price risk

Local authorities

Relative to other actors, local authorities have the greatest degree of influence over the type and quality of material that is sold as SRM. Other than through the extent to which their contracts are able to determine the quality of the SRM, however, they are unable to influence the overall underlying value of the SRM across the whole supply chain. They may, on the other hand, be in a position to influence the value that they themselves receive for the SRMs which are sold, both in terms of how they are marketed and how the revenues are shared between the authority and the contractor.

Financial structures, governance and annual budget-setting processes have, in the past, meant that most local authorities have not been geared up to proactively manage the financial risks specifically associated with SRM price fluctuations. That is not to say that dealing with variable income and expenditure is completely unfamiliar; there are examples from other service areas (e.g. winter gritting and treasury management) that exhibit considerable fluctuation on an annual basis, and local authority reserves are often used as a buffer to deal with unplanned increases in expenditure or reduced revenue.

That said, however, with rapid growth in the kerbside collection of recyclables over the last 15 years, local authorities have, where they have contracted out their collection services (approximately 45% of UK authorities), shown a preference for transferring the majority of the risk and the upside opportunity to their collection and sorting contractors.

In effect, this has meant tendering for fixed-price (albeit inflation index-linked) contracts for periods linked to the lifetime of key service assets such as collection vehicles. As a result of the changes to the structure of the recycling market and SRM price fluctuation discussed in the previous section, the potential for material values and market attitudes to impact on the market for collection and sorting services has also grown. The substantial downturn in SRM values since 2011 has put further pressure on contracts of this type.

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Variable levels of understanding regarding the significance of the issue of SRM price fluctuation amongst local authority officers responsible for commissioning and procuring recycling services is a further factor here. Consultees for this report did agree, however, that in general terms awareness is greater in those authorities that collect recycling via a kerbside sort system and those that deliver recycling services in-house, than in those that outsource their collections and those that collect co-mingled material.

Indeed, although transfer of SRM price risk to service providers has been the norm, it has been far from universal and over time there have been many examples of authorities trading their own materials (and taking 100% of the price risk), contractors trading materials on the authority's behalf (again with the authority assuming 100% of price risk) and many and varied mechanisms for sharing price risk between authority and contractor. Indeed, before the 2011 downturn there was growing interest from authorities in participating in what had, for some considerable time, been seen as mainly an upside risk.

Given current attitudes within the collection and sorting markets and the need for authorities to generate short to medium-term savings, authorities that are in the run-up to retendering collection and sorting services are faced with some difficult decisions. Such authorities have traditionally favoured certainty of future service expenditure over looking to increase the share of SRM price fluctuation to which they are exposed. However, the option of transferring 100% of SRM price risk at a day one contract price that will generate savings for the authority simply doesn't exist at the current time. Service providers are basing prices on lower day one material revenue assumptions and are pricing in more risk linked to further softening. Some MRFs have closed, and eroded margins mean that market participants are currently unable to engage in previously seen levels of aggressive pricing and SRM risk-taking. This leaves authorities with a difficult choice between higher day one prices for new fixed-price contracts and participating in an increased proportion of SRM price risk.

Some waste management company representatives have suggested that the issue of SRM price risk share with local authorities has become an increasingly important consideration when deciding whether to bid for contracts. This is, at the very least, an indication that competition could be affected by the local

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authority attitude towards risk sharing. Addressing this issue requires local authorities to carefully consider two aspects of the current relationship. The first is the level of risk they are able to share with operators, as well as related issues such as the method by which that risk is shared (e.g. equal, or graded, share of income, gain share, with or without floor/ceiling or index tracker, excess profit share arrangement, etc.). The second is the contract term. There is, for example, an argument in favour of looking at shorter contract terms or more frequent price review mechanisms to allow both parties to be more confident about being able to take advantage of the changing state of the SRM market over a shorter timescale.

These same waste management company representatives discussed the merits of decoupling the procurement of collection and sorting service delivery from the sale of materials, with the implication being that the former would be more suited to fixed-price (or at least inflation index-linked) payment mechanisms and the latter to risk share mechanisms.

The problem with this in practice is that unless the two activities are procured as separate contracts (or at least through separate 'lots' within one procurement process), the separation would not be meaningful. This is because unless the two could end up being awarded to separate suppliers, the 'service element' and the 'materials element' would still have to be evaluated together, leading to precisely the same issues as we have now, with the 'service' and 'materials' risks effectively being bundled. An approach that could see one contractor collecting and/or sorting and another trading material would add operational and commercial complexity and could cause more problems than it solves.

However, the introduction of greater transparency in pricing between the 'service cost' and 'material trading' elements of contracts where a single contractor has responsibility for both aspects would be likely to improve the operation of the collection and sorting markets.

Recent attempts have been made to address the issue of awareness and understanding of the issues discussed above; one such is the guidance on

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Approaches to Material Sales first published in 2014 by WRAP.¹⁴ The guidance addresses issues such as price setting mechanisms and allocating risk within the terms of a recycling or collection contract and includes example contract clauses. It also provides some case study examples of authorities that have used a range of approaches including various risk sharing models and the use of reserves to manage the impact of SRM price fluctuations.

There would seem to be a case, however, for doing more to ensure that those responsible for the procurement of recycling services within local authorities have a better understanding of the issue and impacts of SRM price volatility and how it might be best managed via contracts to ensure that authorities can derive maximum financial benefit from their material on a risk-adjusted basis. This is likely to become a more pressing concern as local authorities are urged to make further cuts in their budgets, requiring them to interrogate all services (again) to ensure that they are delivering value for money.

As well as the production of guidance for local authorities, the development in Scotland of an advice and brokerage service for local authorities suggests that there is an appetite (at least within Scotland, and also Wales which has plans for a similar advisory service), for further intervention to support local authorities to maximise the benefit they can derive from the value of SRM. The extent to which such mechanisms are able to deal with price fluctuations remains to be seen. One option worthy of further consideration could be the use of centrally managed investment funds as a means to hedge against SRM price fluctuation such that funds are available to local authorities to smooth out the impact of price fluctuations over a reasonable period. This is discussed in more detail later in this paper.

Waste management companies

As discussed above, waste management companies entering into seven to ten year collection and / or sorting contracts with local authorities would typically be required (in the absence of some review mechanism, or an approach to sharing risk on SRM revenues) to anticipate future fluctuation in SRM prices

¹⁴ Available at: <http://www.wrap.org.uk/content/approaches-marketing-dry-recyclables-local-authorities>. Last accessed 03/06/15

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over the contract term in order to set a price that they hope will cover the fluctuation.

These companies have a view on price risk that reflects both the contract period, and, on a day-to-day basis, the period over which they retain ownership of the materials they trade with reprocessors. This period is often of the order of weeks, or a small number of months, so price fluctuations over shorter periods of time can be important. Given the complexity of the price formation mechanisms in play, there is clearly little impact that action by waste management companies on their own can have to reduce this volatility.

Sharing a larger proportion of the price risk with local authorities is one option that has been discussed above; and alongside the risk share ratio that either party is willing to accept are other key interrelated factors such as the risk share mechanism and the length of contract.

Companies engaged in collection and sorting could, at least for some materials, enter into longer-term agreements with reprocessors. This raises questions as to appropriate risk-sharing structures for the deals made between these two parties; to the extent that reprocessors enter into risk-sharing mechanisms with waste management companies, they would need to take care not to expose themselves to excessive risk in their own markets so as to ensure that the health of their own business is not compromised. The most obvious example would be some form of hedging mechanism that the reprocessors were engaged in to reduce their own exposure to price risk, but this would have its own transaction costs. Another possibility would be an agreement between reprocessors and the consumers of their output, but that simply moves the requirement to manage the risk a step further down the supply chain.

Reprocessors

Whereas local authorities are closest to the point at which material that might become SRM is collected, reprocessors are closest to the point at which SRM is then used for production of goods and services; indeed, reprocessors are essentially manufacturers of some form of finished product. In that regard at least it could be argued that they are closest to the point of demand, whilst

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local authorities are closest to the point of supply (though of course, in a truly circular economy, there is not quite such an obvious beginning and end to the supply chain).

Reprocessors are at the sharp end of global competition in both the secondary and primary raw material markets, and as such are subject to the full force of demand and SRM sale price volatility. Cost of production for UK reprocessors is, arguably, both less flexible than the cost structures of primary raw material producers, and may be higher compared to some overseas producers (e.g. Far East) who benefit from lower land, labour, energy and disposal (of contrary materials) costs. They are also, much like waste management companies, unable to adequately flex production to keep in step with demand since the supply of material is almost completely unresponsive to changes in price. Some materials are more easily stockpiled than others, of course, although for many reprocessors fixed production costs and investor financing arrangements mean that cash flow can be an issue and warehousing for a lengthy period (waiting for prices to increase) is not feasible.

Some reprocessors use hedging as a means to insure against at least some of the price fluctuation and clearly, the more successful reprocessors are in smoothing the impact of this fluctuation, the greater the potential may be to manage this further along the supply chain. There is an argument that reprocessors have the best knowledge regarding how SRM prices are set (better at least than local authorities and waste management companies), being closest to the sale of material to manufacturers: as such if hedging or futures markets or similar are to be used for managing SRM price risk, then reprocessors are better placed than some supply chain actors to take advantage of these mechanisms.

If such mechanisms were available and functioned well, then in principle one could imagine a situation where contracts between local authority and waste management companies are set up in conjunction with back-to-back contracts / agreements between the waste management company and a range of reprocessors. Such an approach would reduce the exposure of the supply chain to the impacts of price fluctuation, though it might do so at a price.

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Manufacturers of goods and packaging

The actors who would seem best placed to influence, and to some extent manage, the risk associated with fluctuating prices of SRMs would appear to be the users of those materials, i.e. manufacturers of goods and packaging. However, while they have to manage risks associated with raw material input pricing as a central part of their business, the risks related to SRM price fluctuations may be managed within the wider objectives of their business and this may not always involve taking actions to support the rational development of SRM markets. The question then arises as to whether there might be mechanisms that could be deployed to secure their more active participation in the development of SRM markets, helping to reduce the impact on prices of increasing supply of SRMs.

In the prevailing policy environment in the UK, manufacturers of goods and packaging are obliged, as part of the packaging supply chain, to discharge their obligations under the Producer Responsibility (Packaging Waste) Regulations. This mechanism amounts to a system of tradable compliance credits for which the value of credits fluctuates in line with the tightness of the supply / demand balance for Packaging Recovery Notes (PRNs). As such, the PRN value – which drives (or should drive) what producers pay for compliance – is not linked to the price for SRMs, and so no risk of this nature is accounted for or shared via the mechanism.

Others have hinted at the potential for using minimum recycled content standards for different goods and packaging. Voluntary agreements in this respect appear to have lost a degree of credibility since the dairy industry weakened its commitment in respect of the use of recycled materials in milk bottles. An alternative could be to address this through the Eco-Design Directive, but such an approach would likely be time-consuming as the Directive deals with products and packaging on a case-by-case basis.

The role of government

Government representatives consulted for this report (UK and the devolved administrations) are well aware of the issue of price fluctuations in the UK SRM market and the implied risks. All the national governments would like to see a

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strong and sustainable recycling and reprocessing sector attracting increased inward investment to retain as much SRM value as possible within the UK. There are, however, obvious differences in approach to supporting this aim, with the governments in Wales and Scotland exhibiting a stronger appetite for intervention from the centre (e.g. work on infrastructure requirements in Wales, beverage container deposit refund schemes in Scotland, and materials marketing advisory / brokerage services in both) compared with England and Northern Ireland.

There is a consensus, however, between government, local authorities, waste management companies and reprocessors on the need for government to play a role in setting consistent long-term targets, policies and strategy to provide certainty for supply chain actors and investors. There is also recognition that with regards to end markets, the role of producer responsibility, as well as future targets, will be influential in driving the supply chain. Therefore other contextual elements, such as the upcoming Circular Economy package from the European Commission, will also play a significant role going forward.

Summary

Ultimately, it seems likely that a fundamental part of improving the existing situation will be an adjustment in market norms towards local authorities and waste management company service providers sharing the up and downside of the SRM price risk element of their service contracts. Although there are instances of this sharing of risk to be found, they have tended to be developed in isolation. For a wider uptake, a framework would be needed in which local authorities have confidence, ideally one that is linked to strategies that local authorities can use to manage the impact of price fluctuation. This suggests a strong case for local authorities to come together with waste management companies to jointly work on model contractual mechanisms that can be used to better apportion risk and reflect a realistic trade-off between price certainty, risk share, contract term and price review mechanisms.

Market mechanisms

Market / price information providers

Local authorities wishing to establish contracts with waste management companies and/or reprocessors that include SRM price risk share mechanisms linked to published price indexes have in the main tended to rely on information such as that compiled by Letsrecycle and WRAP's Materials Pricing Report (MPR). These provide spot-price information (i.e. the current market price at the time of publication) for a range of SRMs.¹⁵ Though such indices are useful, since they are dependent on price information voluntarily provided by buyers and sellers they are relatively less reliable than financial trade exchange-linked indices, where the price information is derived directly from actual sales through the exchange. For specific SRMs, there are also well established providers of global price discovery information such as Platts (aluminium), The Steel Index, and FOEX for recovered paper.¹⁶ Regionally recognised indices like EUWID (paper) are also commonly used for the purpose of price discovery.¹⁷

Whilst these indices are managed by organisations with no direct link to actual trades of SRMs or associated financial instruments, others, such as the Plastiker and PlastEurope indices (plastic), are managed by bid/offer listing boards and derive price information from the bid and offer data listed, and in some cases, from transacted, or closing, prices reported by their members. The range of services offered by providers varies from market to market – The Environment Exchange's recovered paper market, for example, does not publish a price index, but offers price information to its members, who are additionally provided with material quality and delivery specifications for collected and delivered contracts traded.¹⁸

¹⁵ <http://www.letsrecycle.com/prices/> ;
<http://www.wrap.org.uk/content/materials-pricing-report>

¹⁶ www.platts.com;
<https://www.thesteelindex.com/>;
<http://www.foex.fi/index.php?page=fag>

¹⁷ <http://www.euwid-paper.com/>

¹⁸ <http://www.t2e.co.uk/recovered-paper.html>

Local authorities and waste management companies wishing to refer to price indices in contract price mechanisms need to be selective in which indices are used, taking care to select those that are (in order of preference) as closely related as possible to actual trades, or bid-offer prices or that sample as wider range of sellers and buyers as available.

If there were more established exchange-traded markets for SRM then this would in theory provide better price discovery information for supply chain actors to use when managing price risk. The reasons why such markets are not currently as well established as those for primary raw materials are discussed in the next section.

SRM exchange-traded futures markets

Futures markets refer to financial markets on which buyers and sellers can trade futures contracts, commonly referred to as 'futures'. These are legally binding agreements between two parties to buy and sell a particular quantity of asset at a predetermined price (the futures price), on an agreed date in the future. In this context, delivery of the asset is guaranteed by a futures exchange.¹⁹ Futures markets for SRMs have remained largely undeveloped among registered trading exchanges. By way of an example of how such exchanges have fared, the Chicago Board of Trade's Recyclables Exchange ran between 1995 and 1999 and functioned with a bulletin board format (with optional material quality specifications) for listings of scrap metal cans, plastics (HDPE, PET), glass, rubber and paper. Negotiations were carried out offline, and the exchange was intended to provide for the initial steps towards creating a futures market. However, it developed more as a spot market, and was eventually closed due to insufficient traded volumes. Subsequent analysis of the exchange's failure highlighted:

1. a poor delivery mechanism for trades over long distances;
2. a lack of specification and quality guarantee among all traders;
3. a lack of price transparency and reliability; and

¹⁹ Due to the participation of indirect (financial) traders, and because the mechanisms are used as a means to establish some certainty in terms of sales revenue, physical delivery, or purchase, of goods usually only occurs for a small proportion of trades.

4. at that time, a lack of trust and ease of use associated with the Internet.²⁰

These characteristics of failure suggest a set of preconditions for a functioning futures market for SRMs. These preconditions, along with others such as volume of transactions, a well-established and functioning spot market with good price information and sufficient volatility to attract speculators, suggest that futures exchanges may be more practical for some SRMs (e.g. metals, paper and some plastics) than others. What is of interest, therefore, is whether the above pre-conditions could, in principle, now be overcome where previously they presented obstacles.

For futures markets, obstacle number 4 (above) has already been largely overcome. In respect of obstacles 1 and 2, it might be possible to overcome these if one accepts that the aim of the trading floor is to trade in 'positions' rather than in the physical material.²¹ This would mean that most traders were looking to close out positions before they led to either physical delivery or acceptance of the material concerned.

To the extent that one accepts this, then the essential feature of a specification of the contract for which futures were being traded might be that it was capable of being delivered (in other words, the quality could not be 'unreasonably high') in the event that traders used the market for physical trading. There would also need to be warehoused stocks of material which fulfilled this specification to allow for the eventuality that positions were not closed out. The value of this contract would be expected to be sufficiently close to the bulk of SRM being physically traded.

²⁰ The National Recycling Coalition Inc. (2000) *The Chicago Board of Trade Recyclables Exchange: Evaluation of Trading Activity & Impacts on the Recycling Marketplace*, 2000

²¹ In futures trading, a 'position' refers to a particular strategy taken by market actors. For example, a producer/commodity owner runs the risk of losses from a possible decrease in commodity market prices in the future. To mitigate ('hedge') against this risk, he would take an opening position (strategy) of 'going short' (i.e. selling futures at the current futures price) in the futures market for delivering the commodity at a future date. However, close to the date of delivery, if the prevailing commodity price declines as expected (leading to a decrease in the commodity futures prices as well), he would take an opposite 'closing position' of 'going long' (buying back the futures at the new lower price). Thus, he makes a profit from selling futures at the higher price and buying them back at the lower price without having to actually deliver the commodity on the futures contract. This profit could then be used to offset the losses he would incur in the physical market due to the decreased commodity price.

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Obstacle 3 might be overcome only if there was sufficient liquidity (i.e. volume of trades) in the market. In this respect, it is difficult to know how this would unfold were such a market to be established: in principle, there is a greater quantity of SRMs being traded than ever before, and so the question arises as to whether buyers and sellers would see the merit in such a market. In the circumstances we are considering, the interests of the authority and the contractor are not dissimilar in relation to futures markets: they are both sellers, and are looking to anticipate the future value of the SRMs they are collecting and sorting from households (and businesses). The question is, therefore, whether such a market would attract 'buyers' or speculators for the local authority and contractor positions in sufficient volume for it to function. Such markets tend to develop on the back of trades where intermediaries (brokers) are already playing a role in transactions.

There would of course be transaction costs incurred in engaging in such markets. Furthermore, evidence from more mature markets (such as oil) suggests that the risk premium (i.e. the additional price paid to cover the risk exposure) on hedging further out in time is likely to be higher than the premium for shorter maturity periods.²² The same study notes that the total open interest position (i.e. the number of contracts that have not been settled) in the main futures markets for oil represents around 30 days of oil production, the figure being similar for other commodities. Whilst this might understate the extent of hedging overall (since it does not account for Over the Counter transactions), it does include the activity of speculators, which is thought to account for around 30% of all open interest positions.^{23,24} The suggestion is that even in mature markets, hedging is not undertaken as widely as might be expected.

²² See E Borensztein, O. Jeanne and D. Sandri (2009) *Macro hedging for commodity exporters*, IMF Working Paper WP/09/229.

²³ OTC transactions represent a decentralised market linking buyers and sellers one to one for commodities not listed on an exchange,

²⁴ Speculators are high-risk traders looking to make high short-term profit from fluctuations in the market price of commodities, rather than underlying value of the commodity. Speculators are typically risk-loving traders of financial instruments, as opposed to hedgers. They bet against the movement of prices in order to try and profit from anticipated fluctuations.

Hence, although there are good reasons to believe that the interest in markets for SRMs is growing, the level of interest in the market to ensure the viability of the market could not be guaranteed. Equally, it remains the case that perhaps the only way to discover whether this is, or is not, the case may be to conduct empirical 'experiments' in establishing such markets. After all, it seems clear that there are likely to be some actors in all countries who are potential actors in SRM futures whilst the interest in hedging on primary material prices is much more concentrated in some countries than in others (reflecting resource endowments).

Further information on current SRM futures exchanges can be found in the Technical Appendix to this report.

Using existing futures markets as surrogates

Regardless of which actor, or actors, might use hedging to mitigate SRM price risk impacts, there is an interesting question as to whether there are existing futures markets that could be used to hedge for specific SRMs. An analysis of price correlations with relevant substitute primary commodities for the period January 2001 and January 2015 revealed a small number of relatively strong correlations (>0.8) for a number of the main SRMs derived from domestic recycling collections (Table 1).

These correlations tell us something about the extent to which price movements are similar, but they do not tell us what the strength of correlation would need to be to justify using the surrogate market as a reliable hedge. For example, it may be that divergences in prices occur at crucial times for relevant parties so that the value of the market as a hedging mechanism is lowest when it is most needed. The full results of the correlation analysis can be found in the Technical Appendix to this report.

Steel cans show a stronger correlation with an unrelated product (primary copper), compared to the associated primary input of iron ore (0.77) and the finished product - steel rebar (0.74). The strongest correlation for aluminium cans was with primary aluminium (0.64).

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Table 1: SRM/Primary Commodity Price Correlations

SRM	Primary Commodity (Correlations)	
Steel Cans	Primary Copper (0.8052)	
HDPE Natural	Crude Petroleum (0.8804)	Virgin HDPE (0.8929)
Clear PET	Crude Petroleum (0.8691)	Virgin PET (0.9394)
News & Pams	Wood Pulp (0.8698)	Hard Logs (0.8487)
Mixed Paper/Card	Wood Pulp (0.8127)	

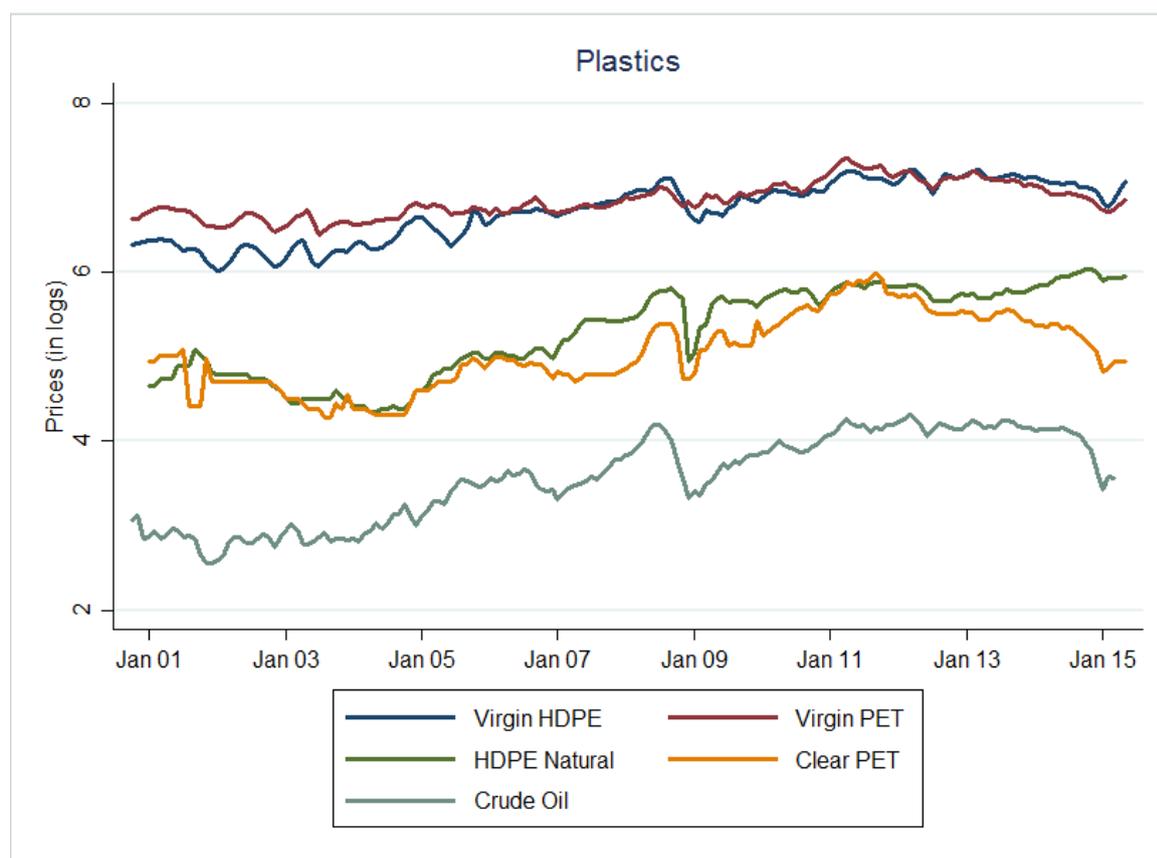
Source: Eunomia Research & Consulting Ltd

Figure 8 shows the price trend for primary and secondary plastics and crude oil showing the relatively strong correlation between primary and secondary PET and between secondary HDPE and crude petroleum.²⁵ Interestingly, there is a negative correlation between primary and secondary HDPE, although it is acknowledged that the time period over which the correlation was assessed is relatively short.

²⁵ For SRM price definitions see: <http://www.letsrecycle.com/prices/>

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Figure 8: Commodity Price Correlations for Plastics



Source: Eunomia Research & Consulting Ltd

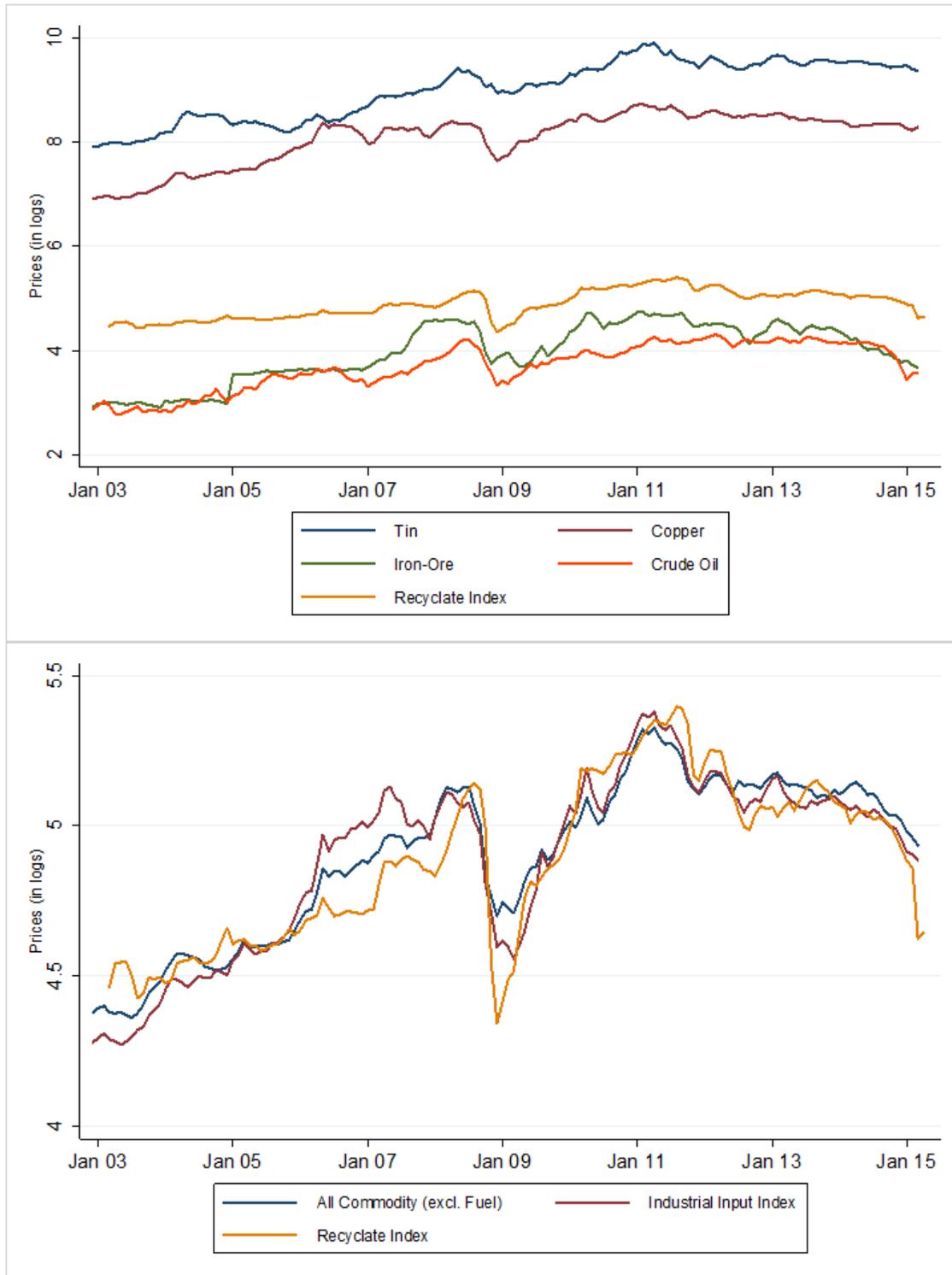
An alternative approach to looking at individual SRM prices in isolation is to use a 'blended value' approach for a mix of SRMs that is representative of the overall household recycling stream. Accordingly we compared this 'recyclate index' with prices for a range of different primary materials, finished products and other macroeconomic price indices – see Figure 9.²⁶ The recyclate index was most closely correlated with the IMF All Commodity (excluding fuel) and Industrial Input Indices (0.92 and 0.91), then with tin (0.90), iron-ore (0.897) and copper (0.899) and finally crude petroleum (0.88).²⁷

The bottom panel of Figure 9 shows that, the movements of all commodity prices (excluding fuel) and the index of industrial input prices are very similar to the recyclate blended price.

²⁷ www.imf.org/external/np/res/commod/External_Data.xls Last accessed 05/06/15

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Figure 9: Recyclate Blended Price Index Comparison



Source: Eunomia Research & Consulting Ltd

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Generally, it might be expected that the index for a weighted basket of commodities is more likely to track indicators of the general health of economies since the index will smooth out some of the specificities in the price movements of individual commodities. To the extent that hedging mechanisms are being sought for a basket of commodities, therefore, it might be possible to consider resorting to futures markets for commodities such as crude petroleum, given the apparent strength of linkages between the basket index and petroleum prices. This would, however, require some further investigation, not least to understand whether the divergence in price movements is random, or relates to specific events when market prices are changing rapidly (during which, if the mechanism is to be considered suitable for use as a basis for hedging, the alignment would need to be strong).

Alternative mechanisms

Over the counter instruments

The use of exchange-traded futures contracts for hedging against future price fluctuation risk requires strong institutional capability for executing effective trading strategies. Where this capacity or expertise is not available, tailor-made arrangements, made directly with financial intermediaries rather than exchanges, could provide an attractive alternative option. They involve lower overheads and reduce some of the risk associated with the value of exchange-traded futures contracts not moving directly in line with the underlying commodity values, although credit risk from debt default is higher than for exchanged-traded instruments.

These Over the Counter (OTC) arrangements can involve different trading instruments e.g. forward contracts, commodity swaps or commodity binds/loans, or hybrid approaches, depending on the investment or hedging objectives.²⁸ Of these, commodity swaps are of interest since an OTC provider may be attracted to a market involving both end-users and producers of the commodity; in this case local authorities and waste management companies on the supply side, and reprocessors or manufacturers on the demand side.

²⁸ IMF. 2001. Hedging Government Oil Price Risk. November 2001. Available at: <https://www.imf.org/external/pubs/ft/wp/2001/wp01185.pdf> Last accessed 05/06/15

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This provides a natural hedge for the OTC institution by people seeking to benefit from price movement in either direction.

Collaborative investment funds

Rather than individual actors within the supply chain entering into their own individual risk management mechanisms, an alternative approach could be to involve a central body acting to manage risk centrally.

Some interesting insights are available from commodity dependent developing countries, whose budgets effectively vary over time as commodity prices rise and fall (and especially where major companies are still within public ownership). Many developing countries receive a large share of their national income by exporting a single commodity. These countries are severely exposed to the fluctuations in commodity prices that tend to be very volatile and persistent. One of the best-known examples of a country seeking to mitigate price-risk related to commodity-linked income is Mexico, which uses OTC hedging arrangements to guarantee a future fixed income per barrel. Given that the Mexican government relies on oil revenue for around a third of its federal budget the stakes in such a strategy are high: the continuation of its hedging programme suggests that such a strategy offers a reasonable insurance against future volatility for this crucial source of earnings.²⁹

Some other developing economies' governments have accumulated a buffer stock of assets in commodity-stabilisation funds.³⁰ To some extent, the funds saved and invested are intended to deal with the exhaustion of commodity resources, but they are also used as precautionary savings against uncertainty in domestic output, or in the price. Sovereign wealth funds may be established, and invested. This means that those countries are effectively deferring some income, accepting a lower level of income into their current budgets, but generating income in another form through a fund, whose capital value may also grow over time.

²⁹ See Ton S. van den Bremer and Frederick van der Ploeg (2012) *How to Spend a Windfall: Dealing with Volatility and Capital Scarcity*, prepared for the CBRT-IMFER Conference on "Policy Responses to Commodity Price Movements", Istanbul, 6-7 April, 2012

³⁰ Andrew Berg, Rafael Portillo, Shu-Chun S. Yang, and Luis-Felipe Zanna (2012) *Public Investment in Resource Abundant Low-income Countries*,

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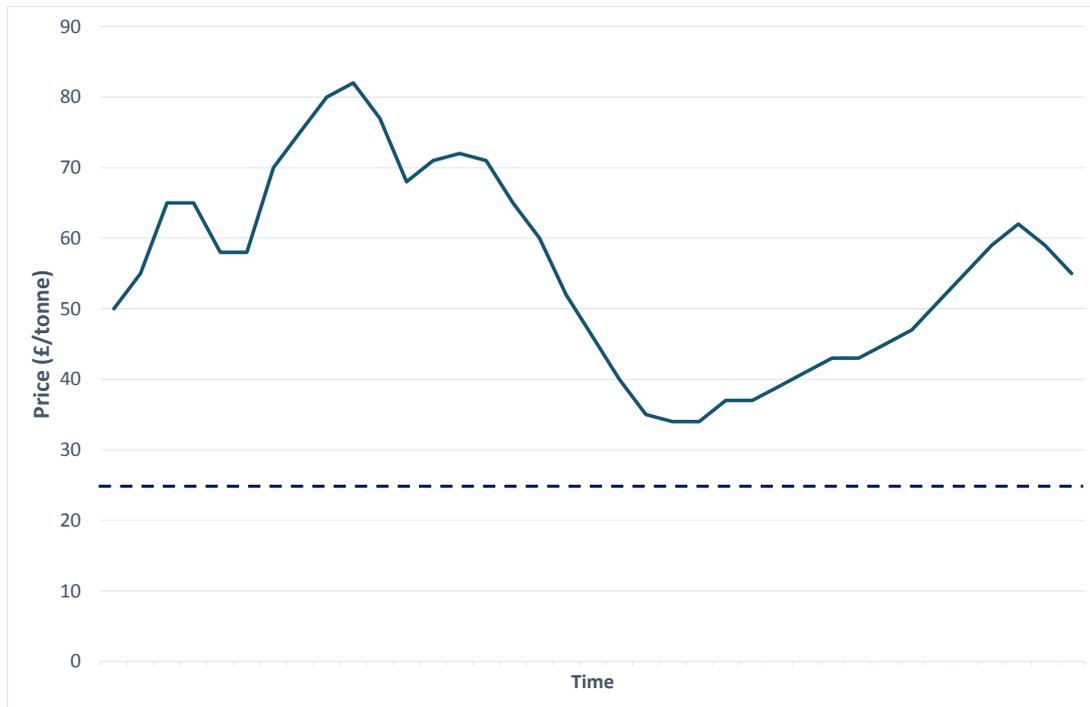
One possible option for managing SRM price risk (in a manner inspired by such examples) could be for local authorities to set aside some revenues in times of higher prices and maintain a fund themselves which could be invested where the authority does not have an urgent need for investment itself. Managing a fund in this way might, however, be expensive for an individual authority. It might also be difficult for authorities to withstand the temptation of accessing all funds, especially at times when budgets are tight.

An alternative would be to develop a fund which is collectively managed, and into which authorities could channel revenues over and above a specified level. The costs of managing the fund would, as a result, be shared across those inputting into it. The fund would increase by varying amounts over the period depending upon the prevailing SRM price. So, for example, in Figure 10, the fund could take revenues over and above a level of £25 per tonne.

A third option would be to have the fund working on an 'in or out' basis whereby revenues from very high SRM prices are invested into the fund and the fund effectively 'pays out' to its investors when prices are very low. Price fluctuation between these two points would continue to be absorbed via risk share mechanisms within the contract, allowing for the continuation of the incentive for contractors to proactively seek to maximise prices within this middle 'band' (Figure 11).

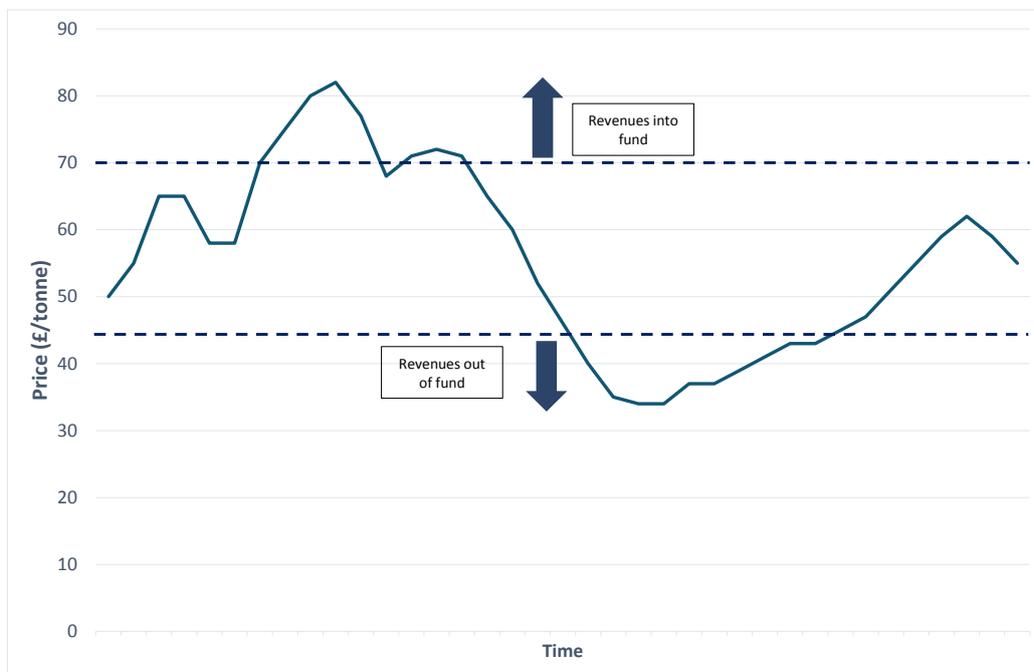
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Figure 10: Potential Basis for Investment Fund Derived from SRM Revenues



Source: Eunomia Research & Consulting Ltd

Figure 11: Potential Basis for Investment Fund Derived from SRM Revenues



Source: Eunomia Research & Consulting Ltd

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The fund could, in turn, conduct a number of activities, including:

1. using over the counter instruments to hedge on the value of SRMs (e.g. purchase put or call options at times of falling or rising prices)³¹. To do this as a collective fund rather than as an individual local authority would reduce the transaction costs relative to the nature of the hedge being sought; and / or
2. investing in assets designed to generate an adequate return over the medium to long term. Investments with good growth potential over the long term could include, for example, a targeted 'green fund' in renewables.

The revenues devoted by local authorities to the fund would essentially determine their stake in the fund, allowing for capital and revenue payments to be made in line with their holding of units in the fund. An investment fund of this nature run on behalf of local authorities, backed by government guarantee would have the effect of enabling local authorities to accept some certainty of budgeting for the main service, albeit at a higher net service cost, in exchange for revenues derived from investments over the longer term. In this situation, it might be that an appropriate contract structure would be for the contractor to be incentivised to maximise revenues from SRM sales through a percentage share of sales revenues.

Recognising that local authorities will continue to have a range of attitudes to risk, this mechanism would potentially allow local authorities as a sector to take on an increased proportion of price risk through their contracts with waste management companies and reprocessors, thereby allowing the overall SRM price risk to be spread more widely across the supply chain. There are a number of principles and issues that would need to be accounted for in designing such a fund, including:

- given the recent downward trend of many SRM prices, the fund is likely to require initial seeding to establish;

³¹ This is akin to the example of Mexico mentioned above.

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- some form of government backing is likely to be required in the event of managed investments delivering insufficient returns;
- stakeholders would have a financial stake in the fund (i.e. it would appear on their balance sheet);
- the fund would need to be designed in such a way that it could be funded from returns from the full range of different local government recycling collection service and contract terms, including the range of contractual risk share mechanisms;
- the fund should also be open to local authorities with in-house recycling services that are selling materials direct to reprocessors; and
- local authorities and their contractors would retain some exposure to the up-side and down-side risk (according to the agreed proportional risk share agreed with the contractor) in order to continue to incentivise the realisation of maximum value from the recycle.

Evidently, such a fund could face obstacles in its establishment, not least that it would require government backing at a time when the political appetite for market intervention is low. The appetite for using the fund would also need to be gauged. As mentioned above, some seeding of the fund would likely be necessary (though it could be that channeling funds into already-existing sources of funding, including the Green Investment Bank, could be considered). Local authorities might also need to accept a 'one-off' increase in their implied contract price, although the timing might affect the magnitude of this: the fact that prices are currently lower than they have been may mean that this differential might be smaller now than it would be at times of higher SRM prices.

Producer Responsibility

As noted above, manufacturers are, in principle, well placed to manage the risk of price fluctuations of SRMs since they have to purchase raw materials – primary and / or secondary - for their businesses. The existing mechanism for producer responsibility places few demands on producers, however, other than that they (or their compliance scheme) should ensure that sufficient

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evidence, in the form of PRNs and PERNs, has been purchased to discharge their obligation.

The situation is very different in some other countries. Notably, in Belgium, the producer responsibility system has the following features:³²

1. the scheme for household waste collection is a single not-for profit private company (Fost Plus);
2. the scheme pays, to local authorities, the full cost of collection, sorting and communication;
3. the scheme markets materials and generates revenues from the sale of collected and sorted material; and
4. recycling contracts are the outcome of tenders from Fost Plus and most of the recycling is carried out in Belgium.

The scheme thereby assigns greater financial responsibility to producers, as well as allowing the producers to offset some of their costs through SRM sales revenue. This revenue, in turn, leads to changes in the fees being charged to producers in order to fund the system: fees go up when SRM prices, and hence revenues, are low, and vice versa. This implies that producers' fees increase at times when their raw material prices are lowest, so that there is a counter-cyclical nature to the fees being charged to producers.

Such an approach could be considered in the context of the ongoing review of the existing UK Producer Responsibility regime. In the past, reviews of the existing scheme have tended towards the view that if the system is delivering compliance, no change is required. There may be good reasons, however, why the scheme could benefit from change, not least that targets are increasing (and may increase further) and there is growing pressure on local authority budgets. It should be noted that under this mechanism, there is no reason why waste companies could not still be charged with marketing of materials they collect as contractors to the waste companies. They would, however, be expected to remit this (or a defined share of it) to the scheme.

³² William Vermeir (2011) *Fost Plus: Results and Conditions for Success*, Waste Management and Use of Economic Instruments and Performances, European Commission Stakeholder Event – 25 October 2011.

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It is also worth noting that Article 8 of the Waste Framework Directive (2008/92/EC) suggests that Member States may take measures to ensure extended producer responsibility to encourage (inter alia) reuse and recycling. Member States have implemented such schemes across a wide range of materials beyond packaging, WEEE, batteries and ELVs (see Table 2).

Table 2: Materials targeted by producer responsibility schemes across the EU

tyres	waste mineral / motor oils / lubricating oils
oil filters	waste cooking oils
junk mail	Furniture
agricultural plastics / film	waste pharmaceuticals
expanded polystyrene	plastic bags
disposable cutlery	car batteries
photographic chemicals	textiles
construction waste	waste from hazardous pesticides
graveside candles	

Source: based on E. Watkins, D. Hogg, A. Mitsios, S. Mudgal, A. Neubauer, H. Reisinger, J. Troeltzsch, M. Van Acoleyen (2012) *Use of Economic Instruments and Waste Management Performances, Report for DG Environment*, 10 April 2012, and supplemented with Eunomia input.

Implementing such measures is, in principle, possible for most of the recyclable materials in the local authority waste stream. This suggests that opportunities exist for passing on financial responsibility for recycling and, with it, the price-related risks associated with marketing of SRMs.

Summary

Price formation in the SRM market is a complex system and there is, therefore, no silver bullet to tackle the causes of the fluctuation in SRM prices. This fluctuation can have an upside: recycling companies and reprocessors, as well as local authorities, have enjoyed the benefits of a decade or so of rising prices in the not too distant past. Perceptions change significantly in periods of price falls, however, or in periods when rise and fall oscillations are more rapid. Experience indicates that SRM markets are likely to exhibit these tendencies in future.

In a fixed-price contract where the contractor bears the risk on SRM prices, timing relative to SRM price cycles, as well as the price at which the contract is agreed, can become the key factor driving profitability. The fact that the position in any 'cycle', and its longevity, are not known at the time the contract is concluded makes investment in the development of a sustainable supply chain inherently challenging. This basic fact has to be set alongside the pressures being placed on already squeezed local authority budgets.

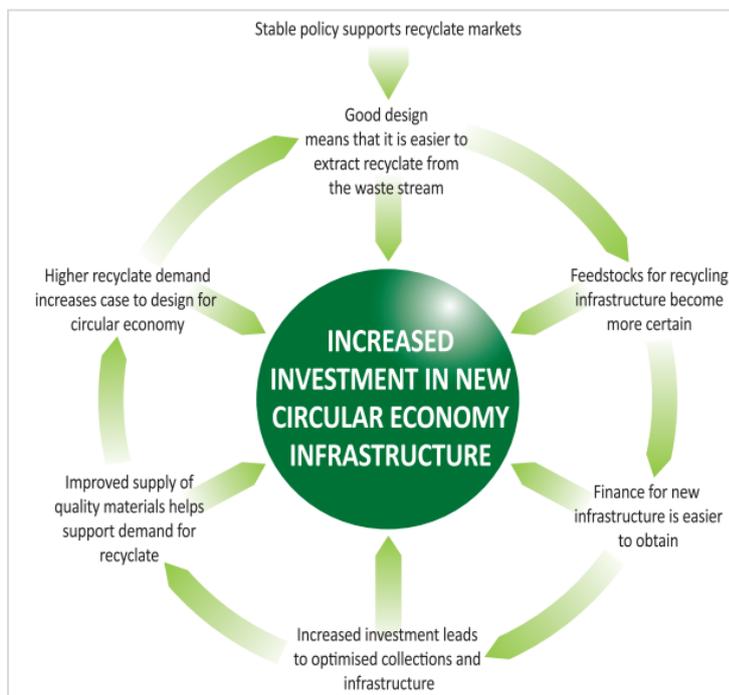
In such circumstances, local authorities have an interest in benefiting from the revenue resulting from the sale of SRMs, not least since the revenue has become increasingly significant as a share of contract costs. The key for local authorities is to ensure sufficient benefit is derived from the sales revenue whilst ensuring that the contractor remains incentivised to deliver quality materials, and is not shouldering a level of risk that jeopardises their ability to deliver the service.

Further, the aim of doing something about this issue would benefit both local authorities and contractors and in so doing benefit the wider supply chain. Better management of the risk will encourage competition and the achievement of best value and sustainable service provision for local authorities procuring recycling collection contracts and ensure that those contracts remain viable for private sector providers.

The ESA's 2013 report on the circular economy set out a vision of a stronger UK domestic reprocessing sector that is more resilient in the face of global

commodity price fluctuation and less reliant on export markets to sustain increasing recycling rates (Figure 12).³³

Figure 12: De-Risking Investment



Source: ESA

In order to realise this vision, and in light of the issues discussed in this paper it is in the interests of local authorities, waste management companies and reprocessors to come together, to work on better managing and allocating risk in the contracting process between local authorities and waste management companies alongside the exploration of other mechanisms for managing the risk.

Longer term, there is the question of using SRM exchange-traded futures or OTC alternatives to help manage price risk. Although most of the obstacles to establishing such exchanges cited in this report could, in our view, be overcome, some doubts remain as to whether such exchanges would be used sufficiently to become established mechanisms for hedging. This question is only likely to be resolved through periodic attempts to establish such markets, which would require collaboration between representatives of the SRM supply

³³ 2013. ESA. Going for Growth – A Practical route to a Circular Economy. Available at http://www.esauk.org/esa_reports/Circular_Economy_Report_FINAL_High_Res_For_Release.pdf Last accessed 29/05/15

chain and the global financial sector. Given the uncertainty around the feasibility and ultimate success of such mechanisms in addressing the price risk that is the subject of this report, we have not recommended this as an approach in this instance, but neither would we suggest that it should be ignored. As markets for SRMs are expected to continue to grow, such exchanges may well develop in the years ahead without any large-scale co-ordinated intervention.

We have made a recommendation in the next section, however, regarding further work to investigate the feasibility of some form of centrally-managed investment fund which would be open to local authorities to participate in as a means to smooth out the impact of SRM price fluctuations.

Some further exploration of the role of an amended Producer Responsibility scheme for the UK would also be worthwhile, with a view to understanding how the price risk burden and costs to the supply chain as a whole could be more equitably shared with the end users of the SRM. Findings from a CIWM research project into Producer Responsibility for packaging, due out this autumn, could be fed into this discussion.

Finally, the issues discussed in this report are not just confined to the UK; they impact on supply chains within and across EU Member States (as well as elsewhere), and as such a co-ordinated approach at an EU policy framework level, linked to the Circular Economy agenda is clearly required. Through this report and related activities, R&WUK will continue to raise the profile of the impact of SRM price risks on the broader supply chain both within UK and beyond.

Recommendations

The following recommendations are offered as a basis for better management of SRM price risk. These are not ordered in terms of their desirability, rather:

- the first two offer means to address the issue of volatility in the short term;
- Recommendation 3 could be considered as a possible approach in the short term (which might have implications for the approach to recommendation 1); and
- Recommendation 4 implies a more profound change which would address matters in a more fundamental way. Even if the change was announced in the relatively short term, it might take time to implement.

Recommendation 1

Establish appropriate models for risk allocation and sharing between local authorities and waste collection/sorting companies through a collaborative approach.

To that end, it is proposed that a task-oriented, cross-sectoral working group is established, with input from relevant government departments and agencies, to build on work already done in this area. The group would seek to bring forward clear proposals on the following:

- the establishment of some underlying principles of risk sharing mechanisms between contracting parties; and
- on the basis of these, the development of a series of model contract clauses that can be used, or adapted, for all of the common recycling service arrangements.

These clauses would be based on a number of criteria, including

- continuing to ensure a transparent and non-discriminatory procurement process;
- encouraging and enhancing competition;

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- incentivising collection of high quality recyclate and the maximisation of sales revenue;
- ensuring that innovation is not constrained; and
- dealing with future fluctuations in the quantity and composition of collected / sorted recyclables.

Recommendation 2

The development of any guidance and model contract clauses should be accompanied by appropriate support to local authorities and waste management companies to ensure the rationale, and consequences, of their use are well understood. R&WUK should explore, with appropriate industry bodies and local and national government representatives, how this support can best be delivered.

Recommendation 3

At a UK level, consideration should be given, in light of the current review of the existing Producer Responsibility for packaging regime, to the role that the PRN system can play in improving the value proposition for recycling and creating a supply chain that is more resilient to price volatility and market risk. The viability of alternative mechanisms, such as the Belgian scheme for producer responsibility for packaging outlined in this report, should also be explored. Some key features of a comparable scheme would be as follows:

1. a single scheme rather than multiple compliance schemes;
2. a not for profit entity with producers being accorded a central role in governance;
3. the scheme reimburses local authorities for the financial costs of the service; and
4. the scheme has responsibility for managing the sale of materials collected by the collection schemes it supports.

Such a mechanism would effectively place the management of SRM price risks in the hands of manufacturers of goods and packaging who are, by virtue of

their involvement in buying primary and secondary raw materials for their businesses, much better placed to manage this than either local authorities or their contractors. Note that DSOs would also benefit from this arrangement.

At an EU level, the wider role of Producer Responsibility and other 'pull' mechanisms in underpinning healthy market demand and prices for SRM should form part of the UK's response to the Commission's Circular Economy consultations and future discussions. Article 8 of the Waste Framework Directive already allows for Member States to implement extended producer responsibility schemes where they strengthen (inter alia) reuse and recycling.

Recommendation 4

A working group should be established, possibly under the auspices of R&WUK or similar representative body, to further investigate the possibility and practicability of developing an investment fund of the nature discussed in this paper, the intention of which would be to smooth the impact of future SRM price risk for local authorities.



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