



FINAL REPORT

Revenue sharing arrangements between MRFs and councils from the NSW Container Deposit Scheme

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Executive summary

The CIE and A. Prince Consulting (APC) have been asked to provide advice to NSW Office of Local Government (OLG) on the refund sharing agreements between material recovery facilities (MRFs) and local councils. These refund sharing agreements are a temporary provision to ensure that refunds for containers deposited in kerbside bins are returned to the community, prior to new contracts for processing of kerbside recyclable materials being entered into.

The key task of this project has been to advise on the refund share that a MRF should receive to ensure that they can cover the direct and indirect costs of the NSW Container Deposit Scheme (CDS). As a secondary task, the project also seeks to advise on what CDS refund shares would enable MRFs to continue to be viable given recent difficulties in the markets for recycled materials.

Framework for evaluating refund shares

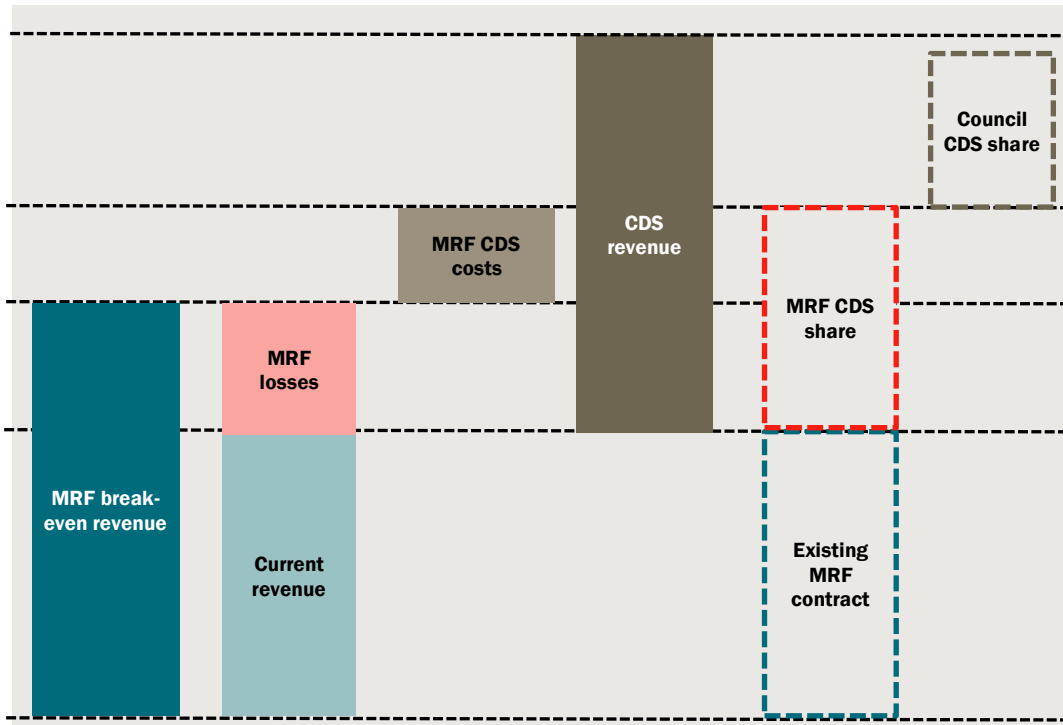
The impacts of the CDS on a MRF include:

- 1 direct administration and compliance costs
- 2 a change in the volume of materials processed, and particularly higher value materials, as some containers are diverted from kerbside recycling to collection points. This:
 - reduces the gate fees that a MRF collects
 - reduces the variable costs for MRFs to process material
 - reduces the materials available for MRFs to sell (in some cases materials are sold at a negative price)
- 3 a potential change in the markets available for MRFs to sell into. For example, higher quality glass collected through the CDS collection points may substitute for lower quality glass collected by MRFs
- 4 an increase in revenue because of revenue available from container refunds.

It is our expectation that negotiations will not proceed smoothly unless issues of MRF viability are also part of the CDS refund sharing discussions or dealt with at the same time. The markets for commodities that MRFs produce have been influenced by changes in China's acceptance of material, as well as longer term issues in recycling of glass domestically. Addressing issues of feasibility could be done through the CDS refund share, or through a variation to gate fees, but should be addressed only once. Note that the largest part of viability issues for MRF reflects changes in paper markets, as this is the largest share of MRF materials, although mixed plastics markets have also been impacted by China's policies. Even though not all these impacts are related to commodities eligible for the CDS, the viability of a MRF needs to be considered in total.

Reflecting the above, our approach to how a refund share could work is set out in chart 1. That is a MRF would receive a refund share to enable it to remain viable and to cover its CDS-related costs. The council would receive the remainder.

1 Components of the CDS refund share for a MRF



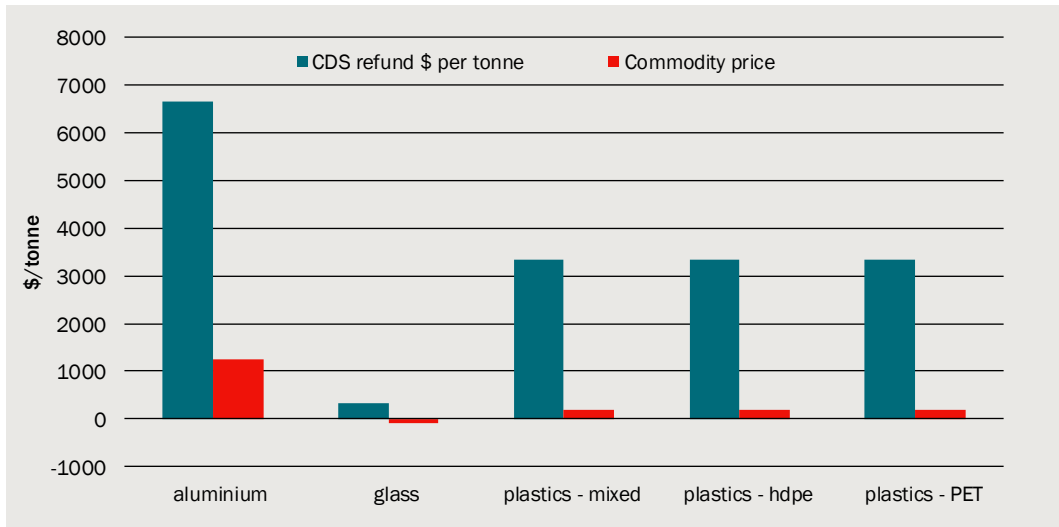
Data source: The CIE.

Before turning to estimated refund shares, it is clear that the revenues from the CDS will dwarf the CDS-related costs for a MRF.

- A comparison of CDS revenues from containers versus their value as commodities is shown in chart 2. The CDS refund represents an enormous increase in the value of containers. For example, aluminium has a value of over \$6000 per tonne from the CDS, compared to a value of \$1250 per tonne as a commodity. The variation for other CDS eligible commodities is similarly large.
- A typical MRF's material will generate CDS refunds of \$150 to \$200 per input tonne. This compares to operating costs (excluding waste disposal and transport) of ~\$100 per tonne. That is, the CDS revenues are very large relative to MRF costs (and their existing revenue streams).
- The largest part of CDS-related administration costs is paid for by Exchange for Change, and already taken out of the refund returned to a MRF. The administration and compliance activities left for a MRF are fairly limited.

These factors indicate that the dominant part of negotiations around CDS refunds will be issues of viability of recycling, rather than the CDS costs box shown in chart 1 above.

2 CDS revenue and underlying commodity price

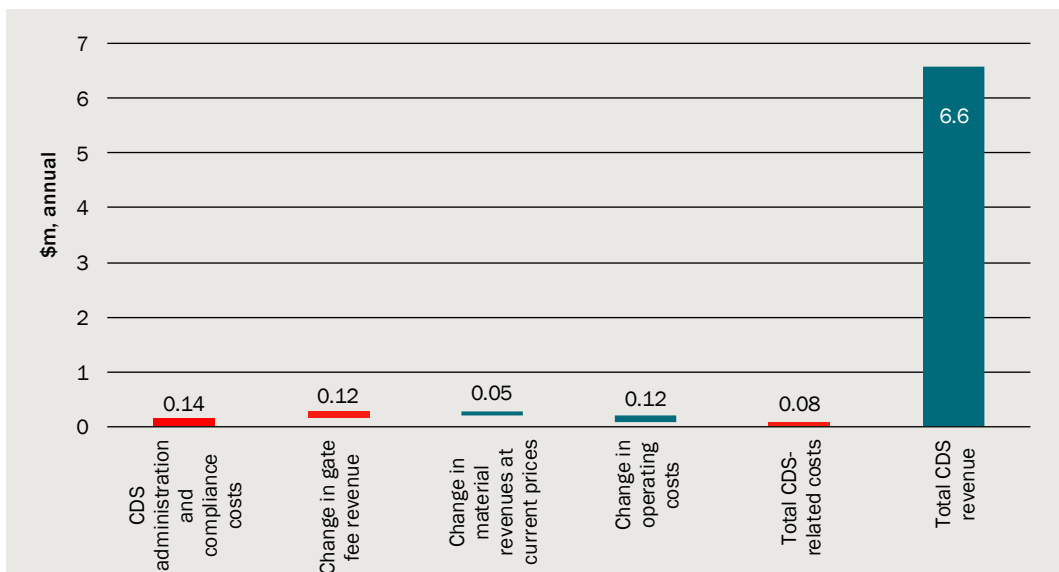


Data source: The CIE.

Estimated refund shares for a MRF to cover impacts of the CDS

The impact of a CDS on the revenue available to a MRF is vastly larger than the impact on its costs. For a hypothetical MRF, chart 3 shows the relative magnitude of different impacts. The net costs for this MRF are about 1 per cent of the revenues. That is, for each 10 cents, 0.1 cent would be required to cover the impact of the CDS on a MRF. This outcome is not surprising, given that the CDS represents a very large premium over the price of the commodities — the revenue increase if this hypothetical MRF retained all the CDS refunds would be 167 per cent.

3 Costs of CDS relative to the revenues for a hypothetical MRF

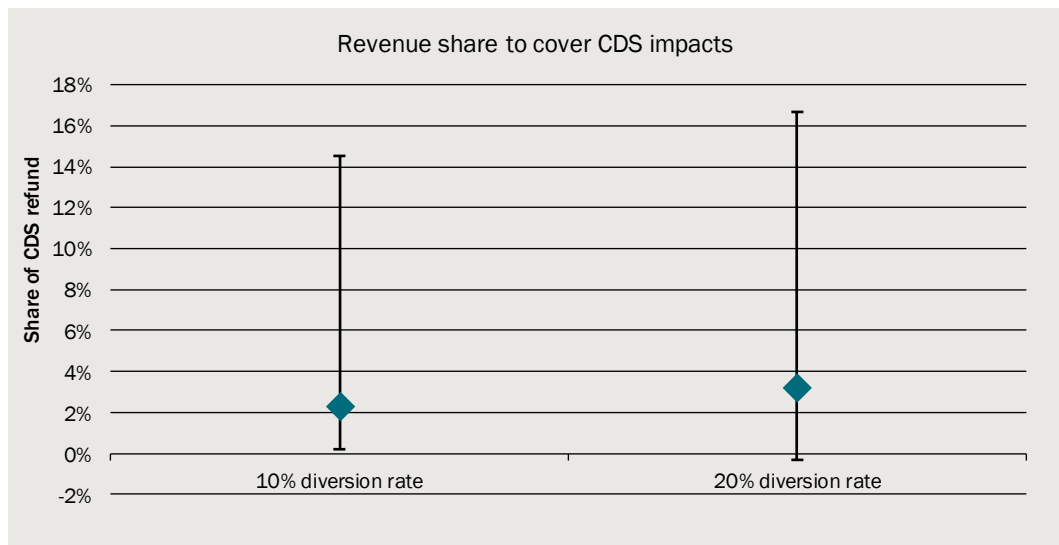


Note: This uses a MRF with annual processing of 60 000 tonnes per year, a diversion rate for all materials of 20 per cent and 50 per cent of operating costs being variable.

Data source: The CIE.

Turning to actual MRFs, we see somewhat higher refund shares to offset the impacts of the CDS on each MRF for which we have estimates (chart 4). This reflects the smaller MRFs in the sample, and the fixed nature of compliance and administration costs. It also reflects one MRF directly counting containers, which requires additional software and capital equipment. For the median MRF, the refund share remains low at 2-3 per cent, to offset the CDS impacts.

4 Refund shares across different MRFs to cover CDS impacts



Data source: The CIE.

- The share of the CDS refund to compensate a MRF for the impacts of the CDS will be less than 5 per cent for any medium to large MRFs (processing more than 50 000 tonnes per year)
- For smaller MRFs, refund shares to cover CDS-related costs may be higher (5-10 per cent typically) and higher again where a direct method of counting containers is used (15 per cent)

Estimated refund shares for a MRF to be viable

The viability of MRFs is a much more substantive issue than the direct CDS-related costs that are the focus of this project. Many MRFs are not able to recover their costs at current commodity prices. A viable industry will require additional revenue streams, either from the CDS or from changes to gate fees. Viability is a difficult issue to measure, and will change as commodity prices move. The extent to which recent commodity price issues are temporary or longer lasting is not clear.

To consider MRF viability, we measure the refund share that would leave each MRF for which we have data able to cover its operating costs *should current commodity market conditions continue*.

- If 10 per cent of CDS eligible materials are diverted from kerbside recycling, the median MRF would be able to cover its operating costs with a refund share of 40 per cent.

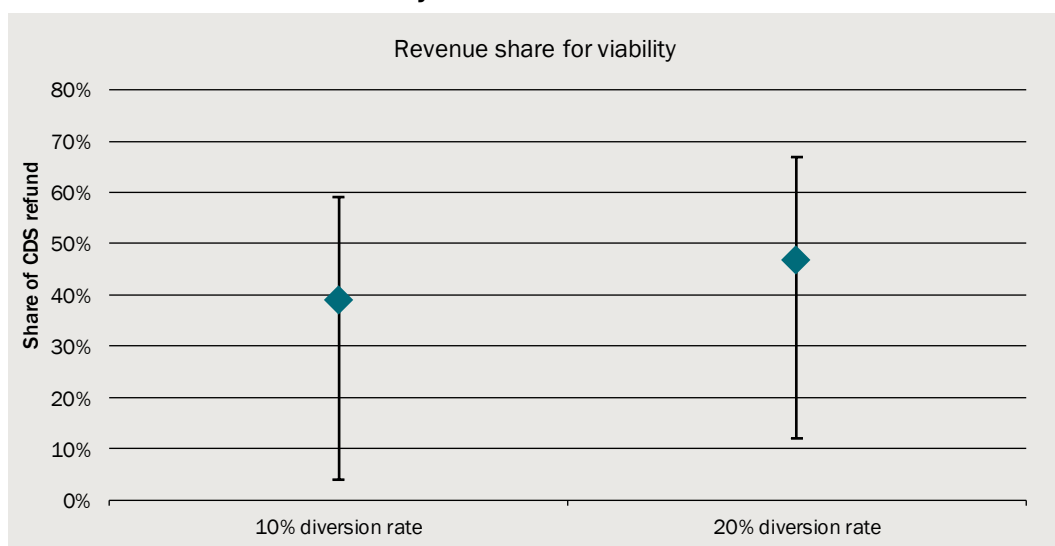
- This increases to almost 50 per cent if the diversion rate of CDS is 20 per cent
- The range amongst MRFs is large, with some MRFs viable in the sense of covering their operating costs with shares of 10-20 per cent and others only viable with shares of 60-70 per cent.

In the longer term, a viable MRF will need to cover more than just their operating costs, as it will also have to cover depreciation and a return on their capital invested.

These measures of viability reflect current commodity market conditions and MRF operating practices. MRFs will adapt to undertake further processing of materials to increase their revenues from commodity sales, but this will also cost more. The extent to which poor commodity market conditions will persist is not known.

The different outcomes for different MRFs reflects the choices MRFs have made about how they process materials, the gate fees or rebates they have offered, as well as the types of materials that they have as inputs and commodity market conditions (including regulatory arrangements in key markets such as China).

5 Refund shares for MRF viability



Data source: The CIE.

Our recommendations regarding viability are as follows.

- **Issues around viability do not necessarily need to be addressed through the CDS, but in our view do need to be addressed in some way by councils to ensure that CDS (and other) material continues to be processed.**
 - **If councils instead choose to vary the gate fee from that in the contract to ensure viability, then the CDS share for a MRF should reflect only its CDS-related costs. That is viability should not be addressed through both a gate fee change and a higher share of CDS refunds than required to offset CDS-related impacts**
- **The impacts of commodity price changes on MRFs have been very different, and viability issues are also very different.**

- A 50 per cent refund share would lead to most but not all MRFs being viable, as well as covering their CDS-related impacts, based on current commodity prices and information provided by MRFs
 - This would be equivalent to an additional gate fee of ~\$60 per tonne, which is about the same as the decline in commodity value as measured by VISY's trading data, and within the estimates of price changes provided by MRFs
 - The extent to which commodity price changes are temporary or permanent is very difficult to know. A council may wish to retain the option to re-examine the CDS refund share as market conditions change, which would bring upside and downside risk for a council
- Where a council bears costs related to commodity risk already, such as a risk sharing contract, then that council should not reflect any risks it has already borne in the CDS refund share paid to a MRF

Other issues for refund sharing

At a high level, the two paths for a refund sharing agreement are:

- 1 Decide on a particular refund share now, with risks that the refunds available and costs to a MRF will be different to those expected.
- 2 Develop a process or protocol for determining the refund share at the end of each quarter or year.

Reflecting the uncertainty about CDS impacts, and that these will change over time, we recommend using a protocol rather than an upfront agreement, as long as the council has the skills and resources to be able to verify the operation of the protocol over time. The protocol could follow a similar approach to estimating impacts as set out in this report, but replacing estimates with actual data wherever possible.

We also recommend that information is provided to ensure transparency of refunds.

- Councils should have access to data on the material output shares of the MRF that their material goes to, in order to be able to approximately verify the refund the council should receive
- If councils agree to a model or process for estimating refunds on an ongoing basis, rather than a share, then the model would need to be transparent to councils and MRFs to ensure that refunds could be verified and ideally third-party auditing would be required for data used in the model

Other issues for ensuring viability of the sector

Recent issues for MRFs highlight the vulnerability of the existing contracting models to commodity market conditions and overseas regulatory changes. We would expect that MRFs will respond by repricing these risks higher in new contracts. Considering alternatives to better manage risks, such as risk sharing, may lead to better pricing for councils and a more sustainable sector.

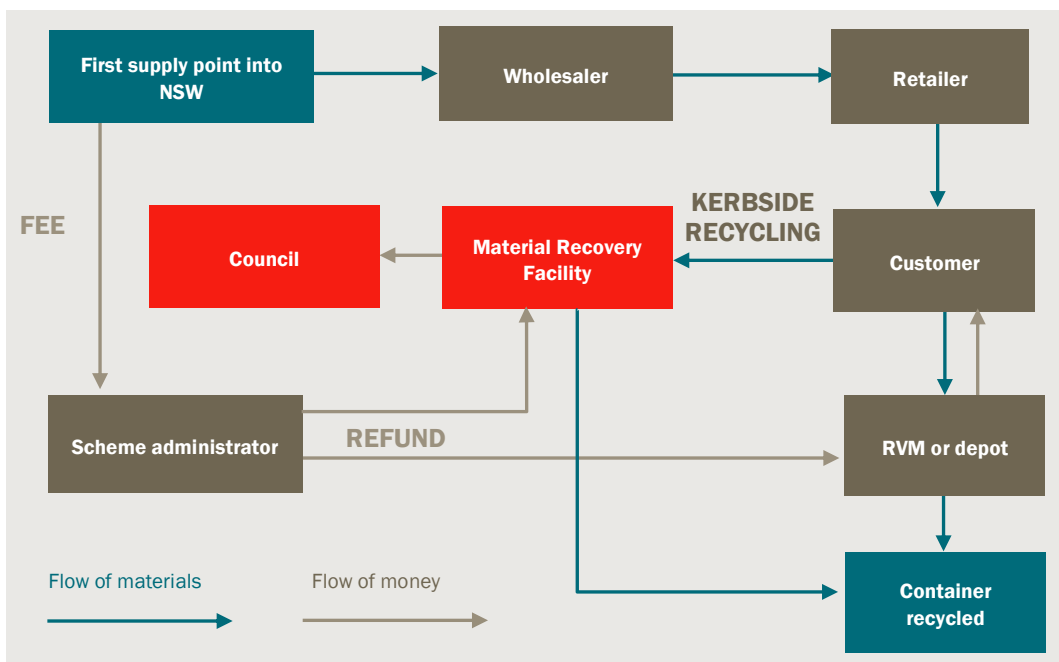
1 Introduction

The NSW Container Deposit Scheme

The NSW Container Deposit Scheme (CDS), Return and Earn, commenced on 1 December 2017. The scheme allows for containers returned to collection points to earn a 10 cent refund and for containers recycled by materials recovery facilities (MRFs) to also receive a refund that will be shared between MRFs and local councils. The cost of the scheme, including the refund, will be paid for at the point of first beverage supply into NSW. This obligation could fall on a manufacturer of beverages in NSW, on any entity within NSW that supplies into NSW or any entity outside NSW that exports to NSW (e.g. interstate manufacturer, wholesaler or retailer).

Our understanding of how the scheme works is set out in chart 1.1. Materials Recovery Facilities (MRFs) are referred to in Division 3 of the *Waste Avoidance and Resource Recovery Container Deposit Scheme Regulation 2016*. Under the scheme there is an obligation for the Scheme Coordinator to pay a refund to Material Recovery Facilities (MRFs). This refund value will be based on the number of eligible beverage containers collected and processed for recycling by the MRF operator, estimated by using a method specified in a Processing Refund Protocol.

1.1 Overview of NSW Container Deposit Scheme

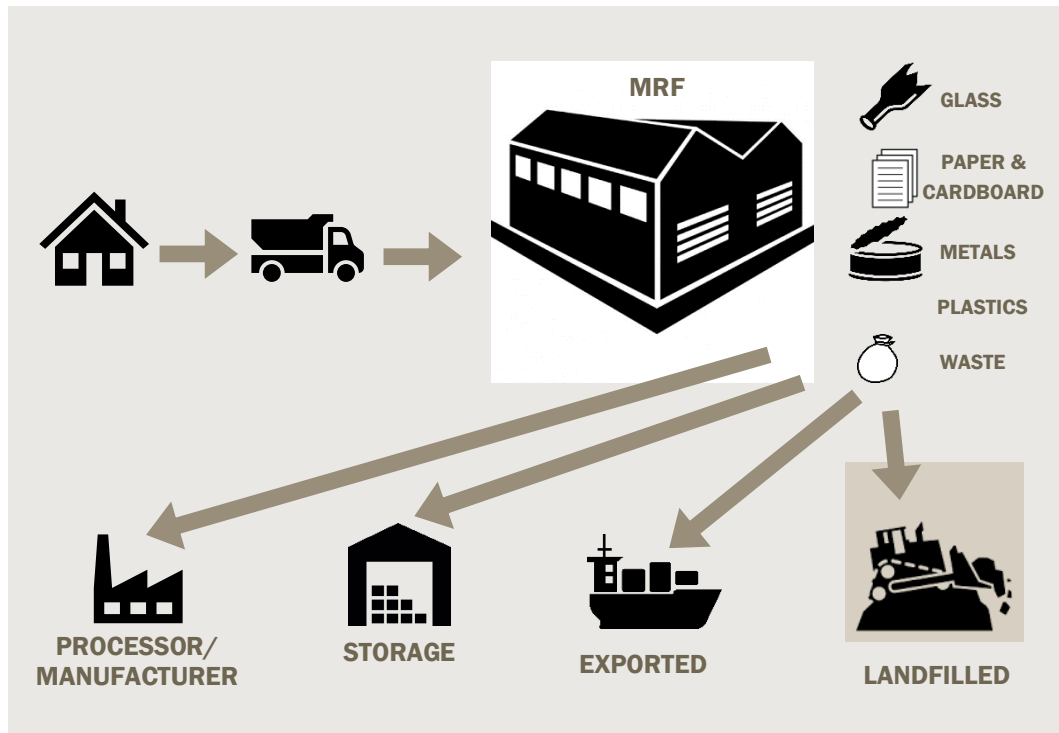


Data source: The CIE and APC.

The role of a MRF in recycling

A MRF is essentially a facility for sorting co-mingled recyclables into different types of commodities. The commodities used are then transported for further processing or to manufacturers for use. A schematic is shown in chart 1.2.

1.2 What a MRF does



Data source: The CIE and APC.

The financial arrangements for a MRF could include:

- a processing agreement with a council — in this case, the council separately contracts with a collector and a MRF. The collector does not own the material at any point
- a contract only with a collector — in this case, the council pays a collector to pick-up kerbside recyclables. The material is then owned by the collector and they make their own arrangements with a MRF. In practice a collector would normally align the contract with a MRF to the contract they have with the council, to reduce their risk.

In NSW, MRFs come in a variety of sizes, process in different ways and operate under different business models.

- Size — the largest MRF operating in NSW is the VISY facility at Smithfield, which services over 30 councils (and is capable of processing more than 200 000 tonnes per year), while small regional facilities may process less than 10 000 tonnes per year.
- The extent to which processes are automated or manual — larger MRFs tend to use automated processes for sorting, while smaller MRFs particularly in regional areas tend to use hand sorting.
- The range of materials produced — a MRF can sort to different levels of product categories. For example, one MRF may produce a mixed plastic, while another may

sort plastic into HDPE, PET and other plastic. Similarly, one MRF may produce a single output of glass, while another may produce glass of different colours and different sizes.

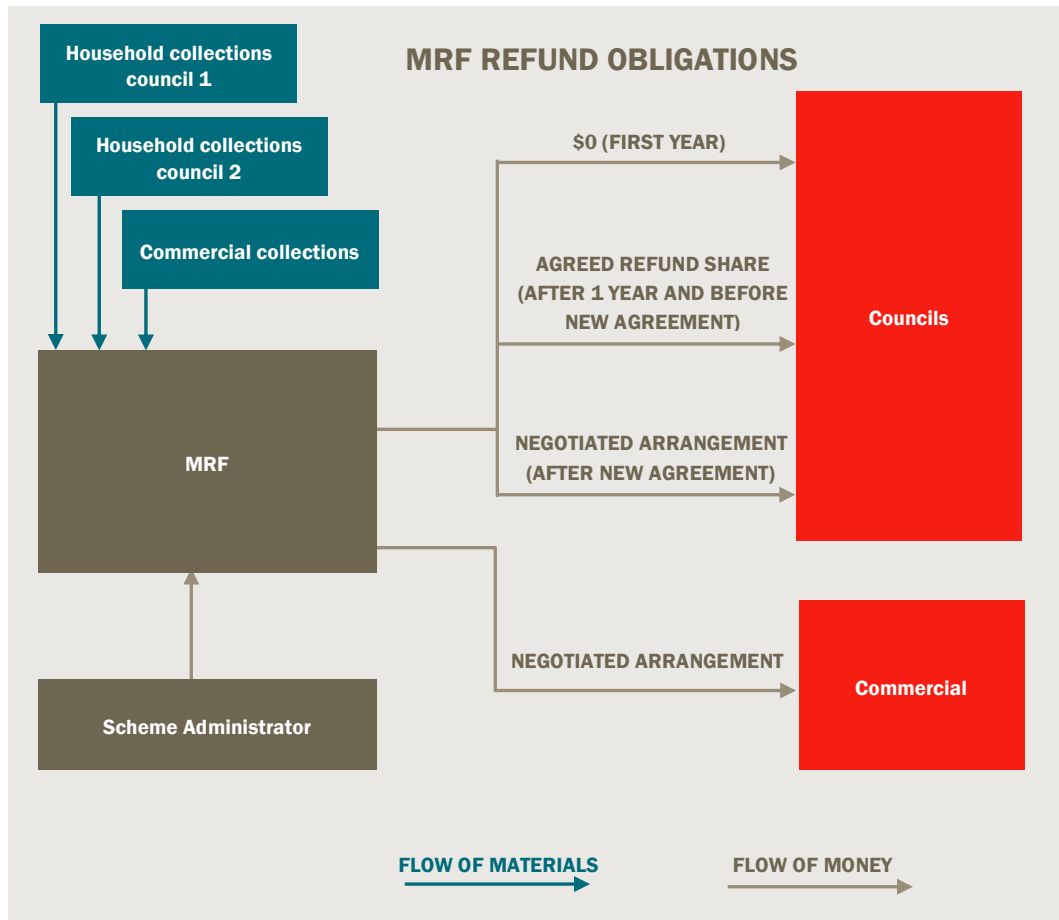
Refunds available to MRFs

MRFs will be able to claim a refund for containers deposited through household collections and through other collections. There are interim arrangements in place to ensure that councils receive some part of the refunds, prior to new contracts being negotiated. The arrangements for different types of collections and at different time period are as follows:

- Containers collected from household recycling:
 - for the first 12 months all refunds are collected by MRFs. MRFs may choose to provide some of this revenue back to councils as part of a refund sharing agreement. If no agreement is reached then this revenue is retained by a MRF
 - after 12 month but before a new agreement between a MRF and council, refunds will only be paid to a MRF if there is either a refund sharing agreement with the council or council has notified the EPA in writing that it considers that in the circumstances it is fair and reasonable that there is no such agreement in force
 - after a new agreement between a MRF and council made after the commencement of the CDS, any refunds will be part of the agreement.
- Containers collected from other (commercial) recycling:
 - all refunds will go to the MRFs
 - whether these lead to reductions in commercial prices for material entering MRFs (or payment for such material) will depend on the extent to which the refunds are passed back. This in turn will reflect the amount of competition between MRFs for commercial waste streams.

A schematic of these arrangements is shown in chart 1.3.

1.3 Containers collected by MRFs and refunds available



Data source: The CIE and APC.

The refund for a MRF is estimated using the MRF protocol. The refund is equal to:

$$R = \sum_i Q_i \cdot CF_i \cdot D - A$$

Where:

- R is the refund to the MRF
- Q_i is the tonnes of outputs of commodity i
- CF_i is the container factor for commodity i. That is, the estimated number of container per tonne of output
- D is the refund amount (10 cents per container), and
- A is the MRFs share of administrative costs.

Note that a MRF will be paid one amount by the scheme administrator for their containers each quarter. The MRF will then have to split this amongst different councils and non-council collections in order to apply a refund share. For example:

- suppose a MRF had a refund sharing arrangement where the MRF kept 10 per cent with council A and 20 per cent with council B
- the MRF receives \$100 from the scheme administrator in refunds

- the MRF has to divide up how much of this \$100 is from each of its input waste streams. However, the amount of containers in each input waste stream will not be known
- the share attributed to each of the input streams will influence the amount left for the MRF — for example in table 1.4, the MRF receives \$32 under one allocation of containers across inputs and \$42 under a different allocation

1.4 Share of contained from each source and revenue for MRFs

	Refund share to MRF	Scenario 1		Scenario 2	
		Share of materials	Refund to be paid by MRF	Share of materials	Refund to be paid by MRF
	Per cent	Per cent	\$	Per cent	\$
Council A	10	40	4	20	2
Council B	20	40	8	50	10
Commercial	100	20	20	30	30
Revenue to MRF from \$100 refund			32		42

Source: The CIE and APC.

The MRF can only claim a refund where material has been recycled and not landfilled. In particular the regulations state:

A processing refund is not payable in respect of any container that has not been:

- recycled by the claimant, or
- delivered to a recycling facility in Australia or consigned for transport to a recycling facility in a foreign country.¹

And

A material recovery facility operator must not permit any container in respect of which the operator has made a claim for the payment of a processing refund to be disposed of to landfill.²

Note that the regulations appear to allow for refunds of material that is stored, as long as it is stored at a recycling facility. The definition of recycled by a claimant may need clarification — for example, if a claimant turned glass into glass sand, but had no purchasers of this glass sand then it is not clear if this would count as being recycled.

This project

The purpose of this project is to understand how refunds from containers collected at a MRF should be divided between MRFs and councils. This will inform the refund sharing agreements negotiated by councils and MRFs. To inform this, the project measures the

¹ Waste Avoidance and Resource Recovery (Container Deposit Scheme) Regulation 2017, section 19.

² Waste Avoidance and Resource Recovery (Container Deposit Scheme) Regulation 2017, section 20.

share of refunds that would leave a MRF indifferent between its current position and its position with the CDS. This is called the 'profit-neutral refund share'. It also sets out broader issues around viability of processing of kerbside recycling.

The method for measuring the profit neutral refund share is set out in later sections of this report.

The CIE and APC would like to thank NSW MRFs and the Waste Contractors and Recycling Association (WCRA) for their invaluable assistance during the project.

2 *Framework for evaluating impacts*

Objectives for sharing of refunds

The NSW Container Deposit Scheme aims to provide a financial incentive for resource recovery and litter reduction, by placing a 10 cent refund on each eligible container returned to a collection point. Purchasers of eligible beverages will end up paying the amount required to fund this refund and administration costs when they purchase a beverage. They, or whoever else returns the container then earns the refund.

To encourage higher levels of recovery and litter reduction requires that those making decisions to recover containers receive the refund. This is straightforward for containers deposited directly at container collection depots or reverse vending machines. However, for kerbside collection this is a more complex issue. The person depositing their container in a kerbside recycling bin will not directly receive revenue from the refund. They may indirectly receive a financial benefit if revenue is received by councils and flows back in the form of lower waste charges or better community services. Additional revenue from kerbside recyclables may also encourage councils to change their waste management strategies to increase the recycling of containers. This is muted to some extent because the number of containers per tonne of outputs is based on a state-wide average figure, rather than specific to a MRF or council area.

A MRF is responsible for sorting mixed recyclables into different components for sale. This can be done in different ways, such as manual or using machines or a combination, and with different levels of sorting, such as sorting into mixed plastics, or further sorting into specific types of plastics. Revenue from the CDS refunds may marginally change the incentives for MRFs if different output streams have different amounts of containers however, what governs the separation is the end markets for the material. To attract the refund the material must be able to be recycled.

The incentive impacts of different mechanisms for sharing of refunds are likely to be minimal, and do not provide any clear direction on the rationale for refund sharing.

A more useful viewpoint is to consider how a competitive market would allocate the CDS refunds. Suppose that a number of potential MRFs bid for a council contract without the CDS. Their bids reflect the revenues that they consider sufficient to pay the costs of operating a MRF and the risks associated with this. Now consider how these bids would change as a result of the CDS:

- the MRF would account for any of the costs and revenues associated with the CDS
- this would be reflected in a bid that continued to leave the MRF with revenue that that they consider sufficient to pay the costs of operating the MRF and the risks associated with this.

That is, other conditions equal, at the point when contracts are renegotiated, MRFs would be expected to bid to a point where they could cover the costs and risks associated with the CDS, and no more.

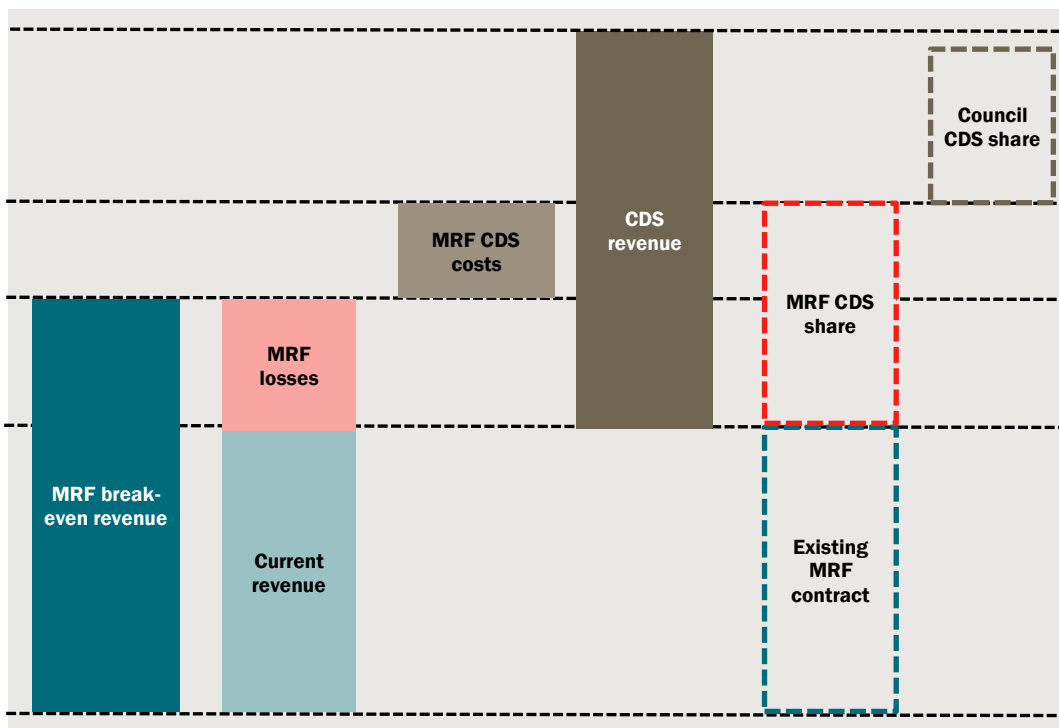
- **The starting point is to estimate the share of the CDS refund that would lead to the same profit for a MRF as if the CDS had not occurred**

One alternative viewpoint that has been put forward in discussions with MRFs is that MRFs have borne the commodity risks on the downside and that the CDS is equivalent to a commodity risk on the upside. While the CDS is an upside risk, it is not a commodity price issue, but a regulatory issue. However, this view can be used to extend the consideration of how a re-contracting arrangement if undertaken now would work.

- 3 As above, a MRF would account for the CDS refunds and the CDS-related costs in their bids for a contract
- 4 They would also revise their expectations of commodity prices, given issues related to the China National Sword and difficulties in finding markets for glass. These issues are discussed in detail in chapter 4.

This would broaden the refund share to MRFs to cover MRF losses from commodity market conditions and MRF CDS-related costs, as shown in chart 2.1. As part of the report we provide advice on the MRF losses and MRF CDS costs — it is up to individual council negotiations as to how much a council wishes to include MRF losses. Note that including a refund share for a MRF related to MRF losses is only relevant if this has not been addressed elsewhere, such as through a gate fee variation.

2.1 Components of the CDS refund share for a MR



Data source: The CIE.

Note that it could be anticipated that a MRF would consider a refund share that left them with no gain as 'unfair'.³ In this case, they may not take part in the refund sharing agreement, meaning that no refunds would be available for material collected at the kerbside. Where the MRF is likely to have a long term interest in goodwill from the council then issues of fairness will be less important, and it is unlikely a MRF would not make a refund sharing agreement. However, it should also be recognized that the negotiating position in which MRFs and councils are placed is highly artificial and will tend to push towards outcomes where fairness is important for resolution.

Commercial waste

Some MRFs receive commercial waste that will include containers eligible for the CDS. Examples are collections from the hospitality sector including hotels, restaurants and cafes.

If there is a competitive MRF sector, then over time the refunds available from these collections will be passed through as lower waste charges for businesses. This process may take some time, and while it occurs, MRFs are likely to gain a revenue increase from container refund revenue.

Types of impacts of the CDS on a MRF

The impacts on MRFs of the CDS include:

- direct administration and compliance costs
- a change in the volume of materials processed, and particularly higher value materials, as some containers are diverted from kerbside recycling to collection points. This:
 - reduces the gate fees that a MRF collects
 - reduces the variable costs for MRFs to process material
 - reduces the materials available for MRFs to sell (in some cases materials are sold at a negative price)
- a potential change in the markets available for MRFs to sell into. For example, higher quality glass collected through the CDS collection points may substitute for lower quality glass collected by MRFs
- an increase in revenue because of revenue available from container refunds.

³ For example, see the Ultimatum Game experiment in economics. In this game, the first player (the proposer) conditionally receives a sum of money and proposes how to divide the sum between the proposer and the other player. The second player (the responder) chooses to either accept or reject this proposal. If the responder accepts then both receive the designated shares. If the responder does not accept then no-one receives anything. Even with substantial shares offered, a responder will often object to shares less than 50 per cent on the basis of fairness.

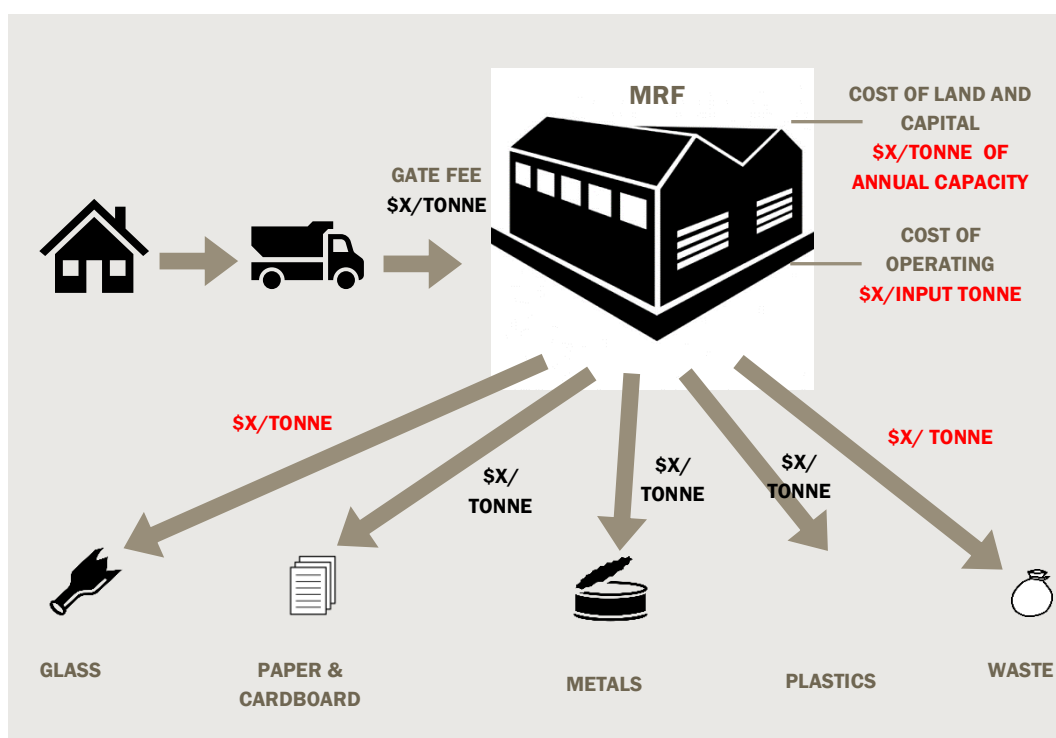
MRF financial model

To estimate the impacts on MRFs and the revenue share between councils and MRFs, we have developed a MRF financial model. This traces the costs and revenues available to MRFs over the economic life of a MRF and on an annual basis. A MRF's costs and revenues comprise three main components:

- revenue from a gate fee paid by waste on being delivered to the facility — not that depending on commodity prices, this fee could be zero or waste could also be paid to be dropped at the facility
- costs associated with the facility, including capital and operating costs
- revenues and costs from the disposal of material — this will be positive for most commodities and negative for residual waste that has to go to landfill. In some cases, there may also be a cost to dispose of other commodities such as glass.

A schematic of the costs and revenues is shown in chart 2.2, with red items being costs for a MRF and black being revenues for a MRF.

2.2 Revenues and costs of a MRF



Data source: The CIE and APC.

The impacts of the CDS can be traced through these channels. This is done mathematically in Appendix A. In terms of the revenue and cost types above:

- if the CDS reduces the volume of materials going to kerbside recycling then this would:
 - reduce revenue from gate fees
 - reduce revenues and costs from the sale/disposal of commodities

- reduce operating costs to the extent that these vary with the amount of tonnes processed
- in addition, the CDS adds a new revenue stream from CDS refunds.

Process for gathering information

To develop the data for the MRF financial model we have:

- reviewed public reports on commodity prices and operating costs
- used data on Australian exports to provide commodity export prices
- used data provided by NSW EPA on material volumes through MRFs
- undertaken a consultation process with MRFs, including:
 - a workshop run by the Waste Contractors and Recyclers Association (WCRA)
 - one-on-one consultations with five MRFs, and subsequent liaison about costs and revenues.

Note that we have not reviewed audited financial information from the MRFs.

To report results we use ranges from consultations and do not report any information provided by MRFs as commercial-in-confidence.

3 *Impacts of the CDS on a MRF*

The CDS has four types of impacts on a MRF.

- 1 The CDS leads to compliance and administration costs
- 2 The CDS may change the material volume and composition that a MRF receives. This changes both costs and revenues
- 3 The CDS may change the markets available to MRFs, such as the glass market
- 4 The CDS generates revenues through eligible containers that remain in kerbside recycling.

This chapter discusses these impacts and the types of magnitudes.

Administration and compliance costs (Impact 1)

MRFs will face some additional compliance costs to seek refunds from the CDS. These include costs for preparing a claim, preparing Annual Recycling Statements and obtaining Independent Assurance of these. The types of costs will depend on whether a MRF seeks to directly count containers or to use eligible container factors — counting of containers, which is possible for some regional MRFs that hand sort, involves additional costs for counting machines and software.

The set of activities MRFs will have to undertake are shown in table 3.1.

3.1 Activities required of MRFs because of the CDS

Activity	Is this a new activity
Measure the quantity and source of materials received at a MRF	No, except for designating any scheme material (i.e. material that has already received a refund)
Measure the quantity delivered from the MRF, by output material type	No
Report monthly (within 14 days from the end of the month) the number of eligible containers delivered from the MRF by output material type	Yes, only relevant for MRFs that count containers rather than use eligible container factors
Prepare claim for refund each quarter	Yes
Assistance and facilities for the sampling auditor and their team	Yes
Prepare Annual Recycling Statement	Yes
Maintaining records supporting each claim for seven years	Yes
Pay for Independent Assurance Report	Yes

Activity	Is this a new activity
Assistance and facilities for any assurance initiated by the Scheme Coordinator	Yes
Assistance and facilities for EPA compliance audits or inspections	Yes

Source: NSW EPA 2017, *Container Deposit Scheme: Material recovery facility processing refund protocol*, July; The CIE and APC.

For case study MRFs, we have tested the size of these costs. Estimates are highly preliminary, because MRFs have not had to go through CDS processes as yet over a substantial time frame. In particular:

- no MRF has an Independent Assurer as yet — our estimates are based on discussions with a small set of possible assurers, and indicate a cost of \$50 000 to \$150 000 for an Independent Assurance Report
- a number of MRFs had not yet been audited, and hence did not know the time of costs involved. It is also likely that audit related time costs for MRFs will fall as auditors gain experience in how a MRF works.

It is clear that the direct compliance and administration costs are fairly small. Across the MRFs:

- the compliance costs in terms of staff time ranged from \$6000 to \$60 000 per year. This covered time for additional reporting to Return and Earn, assisting with audits and sampling. On a per input tonne basis, these costs ranged from \$0.3 to \$6.0, with an average of \$2.6 per input tonne.
- In one case additional infrastructure and software was required to directly count eligible containers. The cost of this amounted to \$3.3 per input tonne (including capital costs amortised over ten years and operating costs).

Note that there are also larger administration and compliance costs incurred by Return and Earn as part of sampling and auditing. These costs are removed from the refund available to a MRF.

Changes in material volumes (Impact 2)

The impact on a MRF from changes in the volume of material processed will reflect their existing commodity shares, the amount of diversion of eligible containers away from kerbside recycling, the prices of commodities, gate fees and cost structures. In total, the impact represents:

$$\underbrace{\Delta\pi}_{\text{Change in profit}} = \underbrace{\Delta Q \cdot p}_{\text{Change in gate fee revenue}} + \underbrace{\sum_i \Delta Q_i \cdot P_i^0}_{\text{Change in commodity revenue}} - \underbrace{\Delta Q \cdot c}_{\text{Change in operating costs}}$$

Where

- $\Delta\pi$ is the change in profit from the change in material volume. This is made up of:

- A change in gate fee ($\Delta Q \cdot p$), which equals the change in total input tonnes into the MRF multiplied by the gate fee (p), which could be positive or negative — a positive gate fee means the council pays a MRF for taking material and a negative gate fee means a council receives a rebate
- A change in revenue from the sale of commodities ($\sum_i \Delta Q_i \cdot P_i^0$), which is the sum over each commodity i , of the change in the tonnes of output of the commodity (ΔQ_i) multiplied by the price of the commodity in the absence of the CDS (P_i^0)
- A change in costs ($-\Delta Q \cdot c$), which equals the change in the tonnes of product input multiplied by the variable cost of processing each input tonne (c).

The components required to estimate these changes are set out below.

Material in kerbside recycling

There are a range of estimates about the material shares in kerbside recycling bins. These include audits of bins, which are based on looking at inputs, and MRF reporting to EPA and for consultations for this project. Paper and cardboard and glass are the two largest material components for a MRF from all sources, although the ranges for importance vary. The most critical commodities from a CDS perspective are plastic, aluminium and glass. Aluminium is less than 1 per cent for all data sources (generally about 0.7 per cent), plastic ranges from 6-8 per cent and glass from 26-40 per cent.

For scenarios, we use data from consultations with MRFs.

3.2 Material shares from kerbside recycling

Material	2011 kerbside audits ^a	Average of APC estimates from various audits	MRA 2012 ^b	MRF data collected by EPA	MRF consultations
	Per cent	Per cent	Per cent	Per cent	Per cent
Paper and cardboard	55	41	59	43	47
Glass	30	35	26	40	34
Plastics	8	6	7	7	6
Other metals	2	2	2	3	2
Aluminium	1	1	1	1	1
Other	4	13	5	6	10
Total	100	100	100	100	100

^a NSW EPA 2014, *Domestic kerbside waste and recycling in NSW: Results of the 2011 waste audits*, June. ^b Mike Ritchie and Associates 2012, *The impacts (costs/benefits) of the introduction of a container deposit/refund system (CDS) on kerbside recycling and councils*, prepared for the Local Government and Shires Associations of NSW.

Source: As noted above.

Diversion rates from households

The refund revenue available from the CDS to MRFs will depend on how many containers continue to go through MRFs rather than being deposited directly at container collection points. There is no clear idea of the extent to which this diversion might occur.

A range of estimates are shown in table 3.3, which range from close to zero to almost all material.

Our expectation is that the diversion from kerbside will be substantially less than the numbers reported in South Australia, because of the maturity of the SA scheme, large number of collection points in SA, higher share of households with space to store material and less time consuming transport task. The diversion rate will be likely to change in NSW over time, as expected in the consultation RIS. They will also be different for different MRFs, although this will not be taken into account in refund calculations because there will be one container factor for each output material across the whole of NSW.

The first data on the amount of containers that are continuing to go through the MRFs should be available after the first quarter of claims by MRFs and sampling by the NSW EPA (i.e. sometime in March). However, given that the diversion rate will change over time, to the extent that it changes the share of revenue a MRF should receive, this should be calculated after data is available each quarter.

- **The refund share should reflect actual data on the diversion of CDS material away from MRFs in NSW, as measured by the eligible container factors and composition of MRF outputs**

3.3 Estimates of diversion from kerbside recycling

Study	Diversion of containers from kerbside
	Per cent
CDS Consultation RIS 2017 ^a	5-40
MRA 2012 ^b	82
Harrison 2012 ^c	82
Container deposits to date in NSW (December 2018) ^d	~10

^a NSW EPA 2017, *NSW Container Deposit Scheme: Consultation Regulation Impact Statement*, May, p. 45. ^b Mike Ritchie and Associates 2012, *The impacts (costs/benefits) of the introduction of a container deposit/refund system (CDS) on kerbside recycling and councils*, prepared for the Local Government and Shires Associations of NSW. Note that this appears to be based on SA scheme. ^c Harrison Research 2012, *CDL awareness and support research project*, prepared for SA EPA and Zero Waste SA, September. (Note CIE calculations based on Q6. ^d This is the share of the overall container market that is going through the CDS to date. This could differ from the diversion rate depending on whether containers are more or less likely to be coming from kerbside than other channels (litter, commercial/non-home consumption). This is also increasing rapidly.

Source: As noted above.

We have also considered the international evidence. While this indicates that kerbside recycling and container deposit schemes are likely to cannibalise each other to some extent, it does not indicate diversion rates.⁴

For scenarios, we show the sensitivity of results to a wide range of diversion scenarios.

⁴ See Viscusi, K. J. Huber and J. Bell 2012, "Alternative policies to increase recycling of plastic water bottles in the United States", *Review of Environmental Economics and Policy*, volume 6, issue 2, summer 2012, pp. 190–211; Beatty, T., P. Berck, and J. Shimshack. 2007, "Curbside recycling in the presence of alternatives", *Economic Inquiry*, Volume 45 No. 4, pp. 739–55.

MRF costs and cost structures

MRFs will have different costs and cost structures reflecting:

- their size — there are likely to be economies of scale in operating a MRF
- the sorting technologies that are employed — MRFs that use more manual sorting will have higher operating costs but lower capital costs, while MRFs that use more automated sorting will have lower operating costs but higher capital costs
- their labour force — wages will differ for regional and Sydney MRFs. Some regional MRFs operate as disability work providers, which impacts on wage costs.

If a MRF has costs that are largely fixed, then having less material to be processed would not reduce its costs. However, if a MRF's costs are variable (that is, change with the volume of material processed), then diversion of kerbside recycling would reduce a MRF's costs.

We do not have good information about the extent to which a MRF's operating costs are likely to vary if material is removed from kerbside recycling.

- Across MRFs, MRFs that are larger have larger costs — this indicates that in general, the costs of operating a MRF vary according to its size
- MRF contracts are structured in a way that indicates that costs are mainly variable — that is, gate fees are per input tonne, so when input tonnes go up the amount paid by a council will increase. Such a structure is consistent with costs largely being variable.
- A number of MRFs indicated that the amount of paper is what drives their costs, as the processes are operated to the point at which a paper stream of sufficiently high quality is extracted. In this case, there would be no reduction in costs from having less glass, aluminium or plastic in the system.
- Even MRFs that mainly used manual sorting indicated their costs are fixed — this is highly unlikely.

For running scenarios, we allow for operating costs of \$100 per tonne (excluding costs of disposal of residual waste and transport) and assume that 50 per cent of these operating costs are fixed and 50 per cent are variable. Note that this assumption does not make substantial differences to the estimated CDS share for a MRF.

Changes in gate fees

The gate fee paid by NSW councils varies, with some councils receiving a rebate (a negative gate fee) and others paying a gate fee. For the purposes of scenarios we use a gate fee of \$50 per tonne for kerbside and \$70 per tonne for commercial. This will be at the high end for metropolitan areas but at the low end for regional areas.

Changes in commodity revenues

The change in commodity revenue will reflect the amount of diversion of different commodities and the price attached to a commodity.

- For aluminium and plastic, prices are positive, so material removed by the CDS leads to lost revenue for a MRF
- For glass, the price is negative. The more material removed from kerbside recycling the better from the perspective of a MRF.

The commodity prices used for scenarios are shown in table 3.4. These represent a typical price received currently. Note that the prices received for materials are very different across MRFs depending on the quality of material that they are providing and their location.

3.4 Commodity prices used for scenarios

	Used
	\$/tonne
Paper and cardboard	50
Aluminium	1250
Other metals	100
Glass	-75
Plastics - average	200

Source: The CIE and APC.

A detailed discussion about commodity price is set out in chapter 4.

Impact on market prices received by MRFs (Impact 3)

Potentially, the average price received for commodities from MRFs could change as a result of the CDS. This could be because:

- within a commodity type, the containers may be cleaner than non-container material. This could mean the output material with the CDS has a lower quality and a lower value
- the CDS provides a cleaner stream of materials to manufacturers than comes from a MRF, which then leads to manufacturers not requiring material from MRFs.
 - the extent to which this occurs will depend on the depth of the market
 - for most commodities, notably aluminium and plastic, the market for material is sufficiently global that a change in NSW flows can be safely presumed to have no impact on market prices
 - the exception is glass, where CDS glass could conceivably reduce the demand for non-CDS glass and lead to lower glass outputs for those MRFs that continue to send glass to Glass Recovery Service (GRS) and then onto Owens-Illinois, a bottle manufacturer.

For most MRFs in NSW, glass is turned into products such as glass sand. For a small number of MRFs, material goes to GRS and then onto Owens-Illinois to be used in bottle manufacturing. CDS glass would be preferable for bottle manufacturers as it is cleaner. However, relevant MRFs have contracts in place.

The average cost of disposing of glass to GRS versus recovering into glass sand is \$60 and \$80 respectively.⁵ The costs for GRS are the transport costs to deliver glass to GRS (\$40 per tonne (and the gate fee paid (\$20/tonne). For glass sand, the costs represent additional processing costs to crush glass, with a negligible price received for the product. A change in the ability to access a glass recovery market could therefore lead to a cost of \$20 per tonne of glass produced or less than \$10 per input tonne into a MRF.

If the market for glass sand cannot accommodate more product, then issues will arise as have already occurred for other MRFs, with glass being stored interstate in lieu of finding a local market for its use. This is a more costly option.

Note that these issues may well have occurred without a CDS, at the point at which contracts for glass recovery reached their end point. Discussions with industry suggest that higher quality standards would be likely at this stage regardless of whether or not the CDS is in place. Given this, we show the impact of a change in the glass market because of the CDS as a sensitivity.

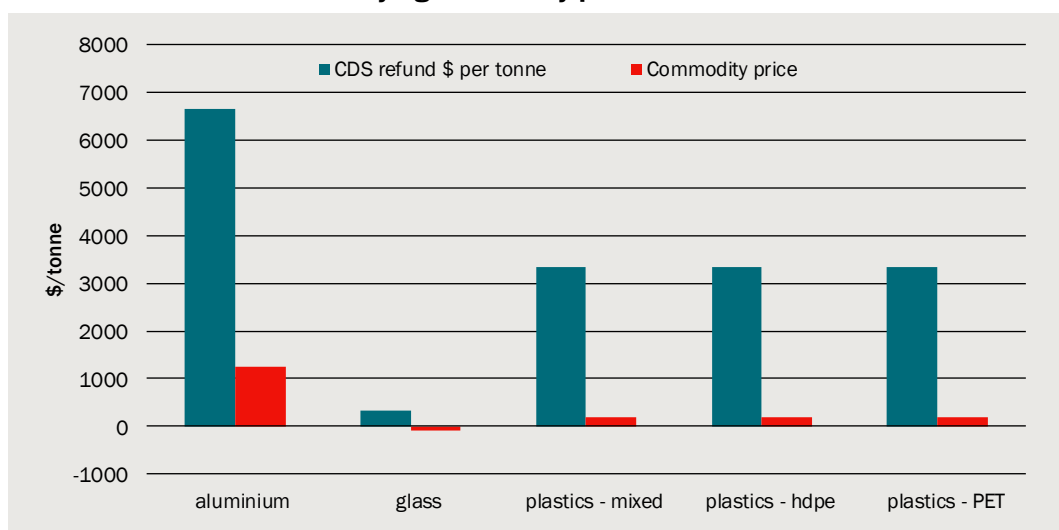
CDS revenues (Impact 4)

The revenue available from CDS refunds dwarfs the underlying price of the commodities (chart 3.5).

For example, an empty aluminium can weighs around 15 grams. This means that there are 67 000 aluminium cans in a tonne of eligible CDS material. This would provide revenue of \$6700 through the CDS. In comparison, the price of aluminium received by MRFs is ~\$1250 per tonne.

For other materials the differences are even starker.

3.5 CDS revenue and underlying commodity price



Data source: The CIE.

⁵ The CIE 2017, NSW glass recycling: Issues and options, prepared for NSW EPA.

Because the revenue impacts from the CDS are so large, this dwarfs any other cost implications arising from the CDS.

Using estimates of the material tonnes from MRFs from NSW EPA and estimates of the eligible containers per tonne, we expect that total revenue for MRFs to be in the order of \$100 million in the first year. Note that this is considerably lower than expected in Return and Earn assumptions, which assume \$47 million from kerbside recycling in the first three months of the scheme.⁶ These estimates are before estimating the amount of material that could divert away from kerbside recycling and go directly into the CDS.

In terms of the revenue per input tonne, we anticipate that the number of eligible containers per tonne of inputs into the MRF will be at least 1500 to 2000, implying an available refund of \$150 to \$200 per input tonne. That is, for a council that has 20 000 tonnes of kerbside recycling in a year, the amount of CDS refund available would be \$3-4 million per year.

The basis of revenue estimates for the CDS are shown in table 3.6. This builds up revenue from the weight of containers and the amount of material that is eligible. Note that we have also checked this against preliminary information on auditing (shown in column E). The estimates below are before diversion of material away from kerbside. This reduces the number of tonnes per tonne of material from the figures shown below.

3.6 Estimating CDS refunds, before diversion away from kerbside systems

Commodity	Average weight of a container (A)	Number of containers in a tonne of eligible material (B)	Amount of material that is eligible (before diversion) (C)	Number of containers per tonne of material (D)	Check against approximate eligible container factors (E)	Share of input tonnes (F)	Number of containers per tonne of inputs (G)
	Grams	No./tonne of eligible materials	Per cent	No./tonne of material outputs	No./tonne of material outputs	Per cent	No./tonne of inputs
Paper and cardboard	na	na	0	0	0	47.4	0
Aluminium	15	66 667	90	60 000	60 000	0.7	392
Other metals	na	na	0	0	0	2.3	0
Glass	300	3 333	60	2 000	2 000	33.8	676
Plastics							
Mixed	30	33 333	25	8 333	8 000	6.1	508
HDPE	30	33 333	2	667	600	0.0	0
PET	30	33 333	65	21 667	20 000	0.0	0
Residual	200	5 000	0	0	0	9.7	0
Total							1 576

Note: Mixed is for plastic where HDPE and PET have not been removed as yet. Column B = 1000000/Column A. Column D = Column B * Column C. Column G = Column D * Column F.

Source: The CIE and APC.

⁶ Return and Earn 2017, *Return and Earn publishes estimated costs for beverage suppliers in NSW*, 18 August.

The two main risks to CDS revenue going through a MRF are:

- 1 the diversion of material away from kerbside systems. This is likely to be radically different for different council areas, reflecting socio-economic conditions. As noted in table 3.3, estimates vary widely
- 2 that material cannot be recycled within 12 months and hence a CDS refund cannot be claimed. This is not relevant for aluminium, for which there is a market. We do not think it will be relevant for plastic containers, although there may be some short term issues in plastic markets. This could be relevant for glass. The extent to which this risk eventuates will depend on how the custody of material is enforced. Material will be sold or moved to another location from a MRF, but whether it is recycled within 12 months will be difficult to verify.

Commercial collections

Commercial collections will be subject to their own competitive pressures, and it would be expected that the value of containers will, over time, be passed back through lower gate fees. However, this is unlikely to occur in the immediate future because of commodity market conditions.

The model developed allows for the inclusion of refunds from commercial collections. However, we do not focus on this, as it is not of direct relevance to the council refund sharing.

4 *MRF viability and commodity markets*

A profit neutral sharing of refunds from the CDS would leave any MRF that is in a poor financial position in the same poor financial position. We do not think that negotiations around the CDS will proceed smoothly without directly addressing the issue of viability of recycling. This is because:

- 1 The recycling of containers is required in order to be able to collect a refund, and a MRF that is not viable will stop accepting kerbside recycling for processing at some point
- 2 MRFs perceive the CDS as an upside to offset against the current downsides impacting on the industry.

Specific issues that have impacted on viability include:

- declining prices for glass and a lack of options for recycling of glass
- limitation of waste imports by China, covering all types of waste plastics and unsorted waste paper⁷, which was initially scheduled to be put in place on 1 September 2017 but appears to have been put in place as at the start of 2018.

This chapter examines the issues in the recycling markets and provides a guide as to the magnitude of these impacts.

Markets for recycled materials

MRFs operate in world markets for some commodities, in local markets for others and in some cases in a combination of both.

Glass markets are local, as glass has a low value and is heavy, it is not typically exported although it can be exported interstate for manufacturing.

Paper and cardboard have both domestic and overseas markets. VISY is a major user of MRF paper, with its Smithfield MRF directly feeding into its paper facility at the same location. Orora also purchases a small amount of material such as cardboard from MRFs and direct from source separated paper only kerbside collections.

Plastics is more likely to be exported, although VISY also operates a NSW PET manufacturing facility that uses material from MRFs.

The market for metals is similar to plastic. Our understanding is that aluminium is generally exported.

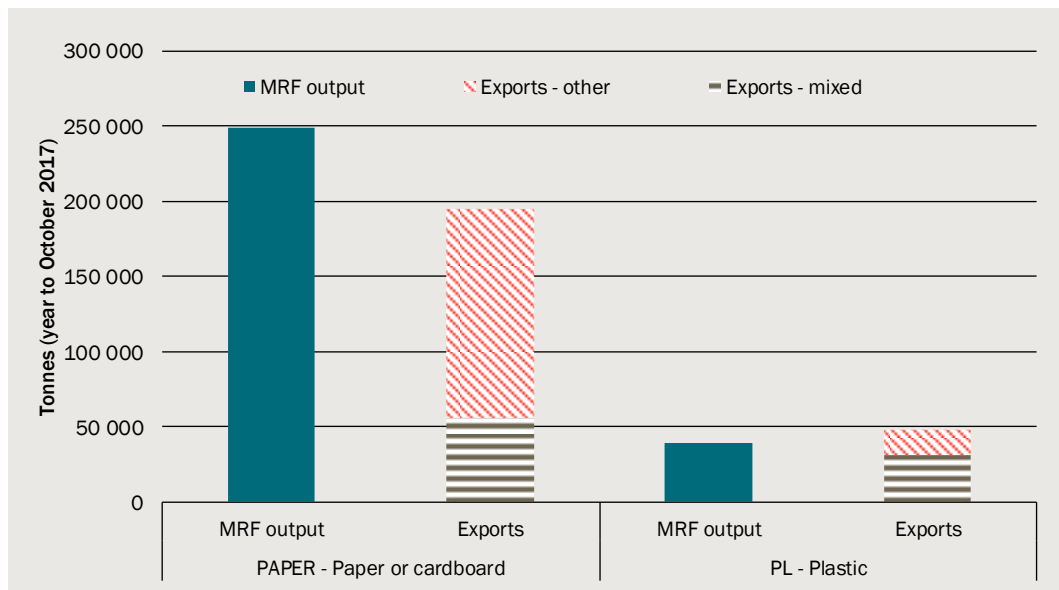
⁷ World Trade Organisation 2017, *Notification 17-3880: Committee on Technical Barriers to Trade*, 18 July 2017.

To give a sense of the amount of commodities, chart 4.1 shows the paper and plastic production of NSW MRFs versus the exports of mixed paper and plastic and other paper and plastic waste. Note that NSW waste does not all go through MRFs.

- Some councils operate a separate paper collection system. For these councils, paper collected will go directly to paper manufacturers rather than to a MRF.
- Paper and cardboard commercial collections will not go through a MRF.

Nevertheless, the extent of exports from NSW indicates that Australia is connected to other international markets for paper and plastics.

4.1 MRF outputs and NSW exports of plastic and paper waste



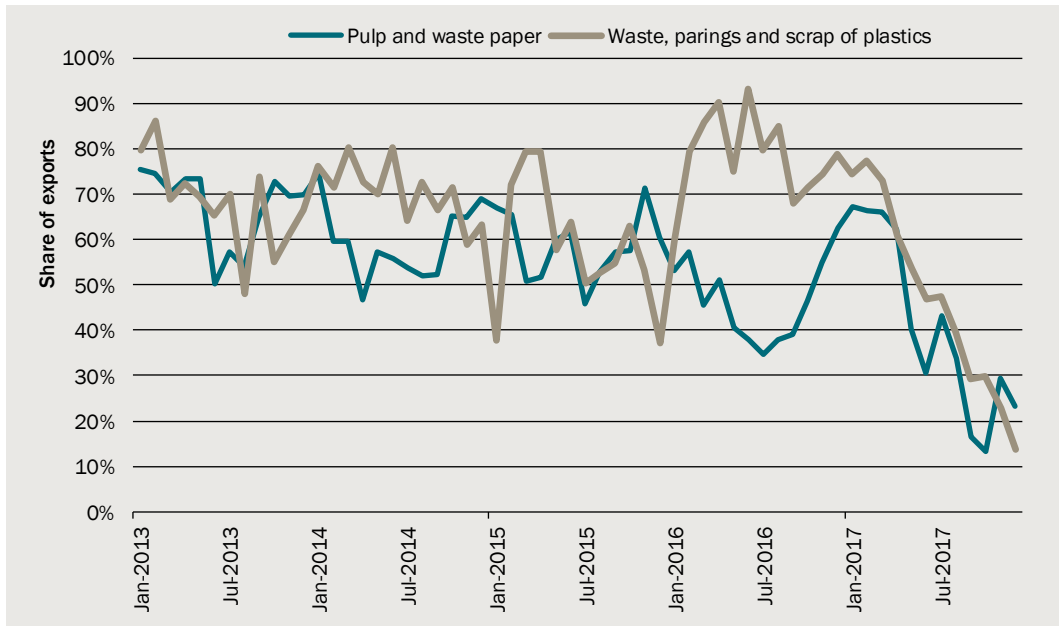
Note: For year to October 2017.

Data source: NSW EPA, Global Trade Intelligence Service.

Export markets for paper and plastic

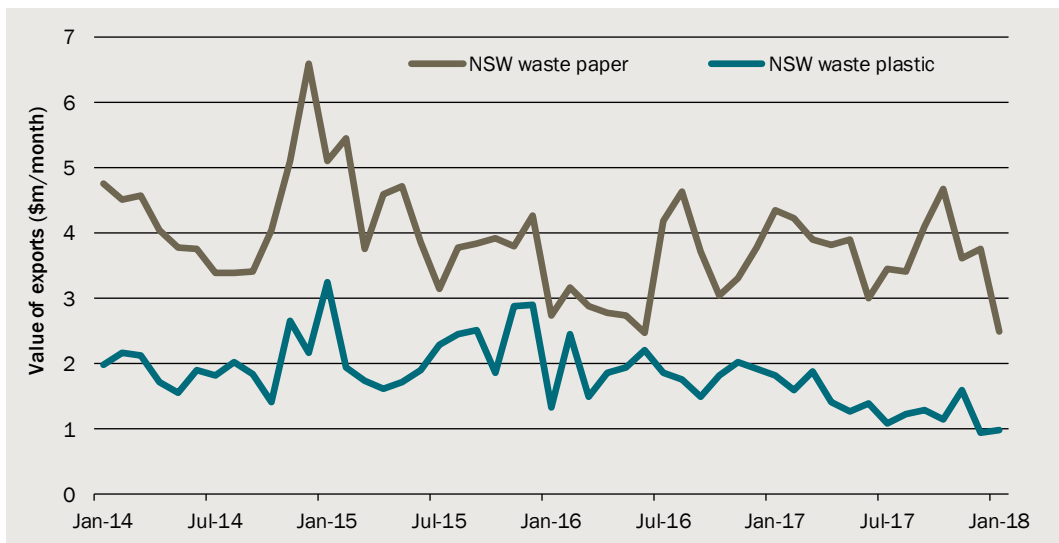
There have been substantial changes to waste exports from NSW over the last year as China's National Sword has been announced (chart 4.2). Exports to China and Hong Kong have fallen from as much as 70 per cent of NSW exports to ~20 per cent by December 2017. The falling share of exports to China and Hong Kong have not been reflected as much in falling overall export values. Waste paper exports have remained at \$3-4 million per month, but have fallen substantially in January 2018. Plastic exports have gradually fallen in value over the past two years from ~\$2 million per month to ~\$1 million per month (chart 4.3).

4.2 NSW waste exports to China and Hong Kong



Data source: ABS Stat, downloaded 9 February 2018.

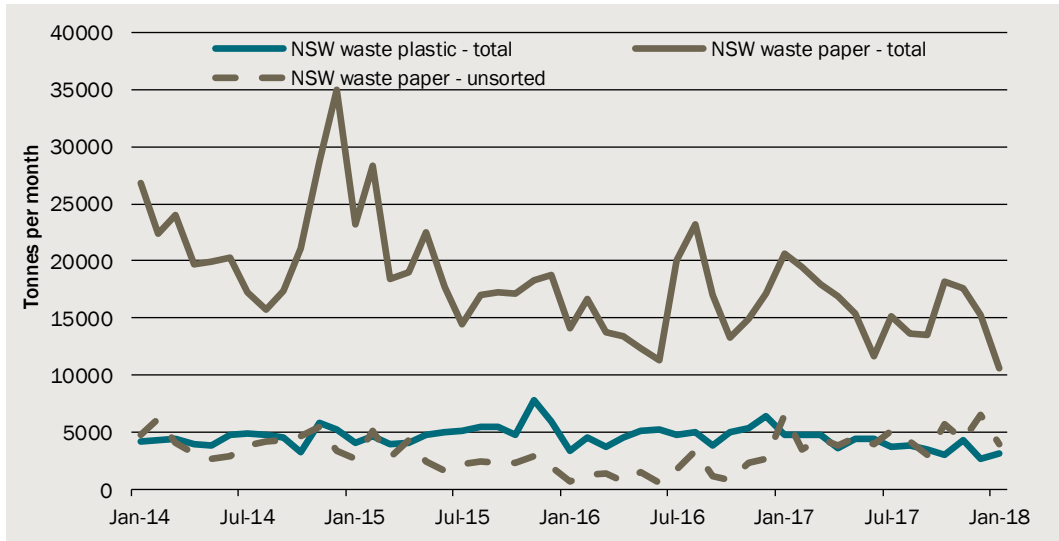
4.3 NSW waste exports, total value



Data source: ABS Stat, downloaded 9 February 2018.

In terms of quantities, total NSW waste paper exports have fallen from the start of 2014, although mixed paper exports have not. Plastic exports have fallen materially in terms of tonnes (chart 4.4).

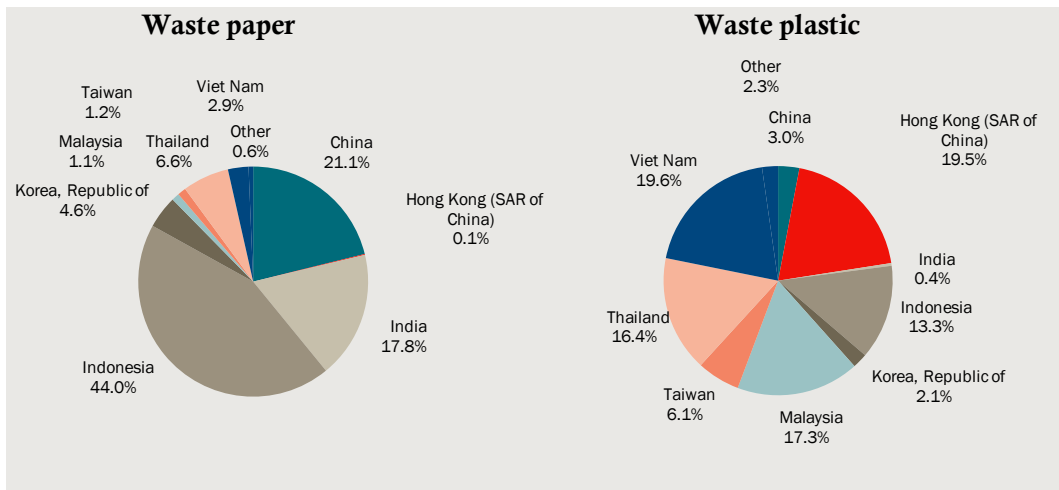
4.4 NSW waste exports in tonnes, total



Data source: Global Trade Intelligence Service.

The shift in destinations for material has differed across commodities. Paper has shifted particularly to Indonesia and India over 2017, while plastic has shifted to Viet Nam, Thailand, Malaysia and Indonesia (chart 4.5).

4.5 Export destinations for waste from NSW for last quarter of 2017



Data source: ABS Stat, downloaded 9 February 2018.

Commodity prices

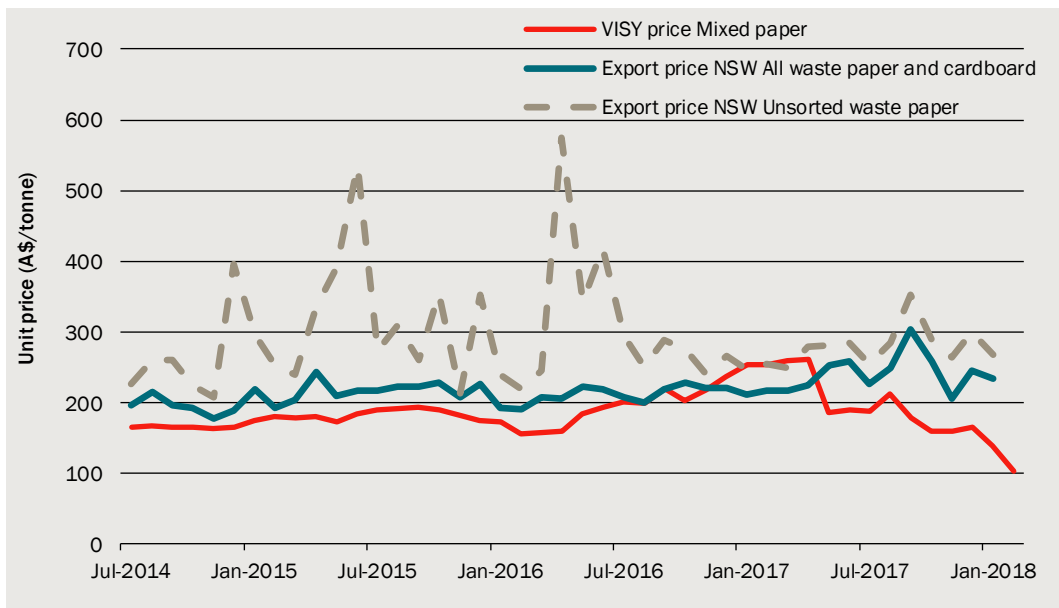
We have sought commodity price information from a number of sources, including MRFs, export data recorded as part of customs clearances and VISY trading data for its sales of mixed paper from Australia. The prices shown are all in Australian dollars. However, they are not consistent in terms of location — MRF data shown is at the MRF gate, export price data is at the port in Sydney and the location of VISY price data is not clear. The price received by a MRF will be lower than the price at the port in Sydney

(because of transport costs to the port), and this is again lower than the price received at an overseas port (because of shipping costs and customs duties).

Summaries of price indicators for paper, mixed plastic and separated plastic are shown in charts 4.6 to 4.8.

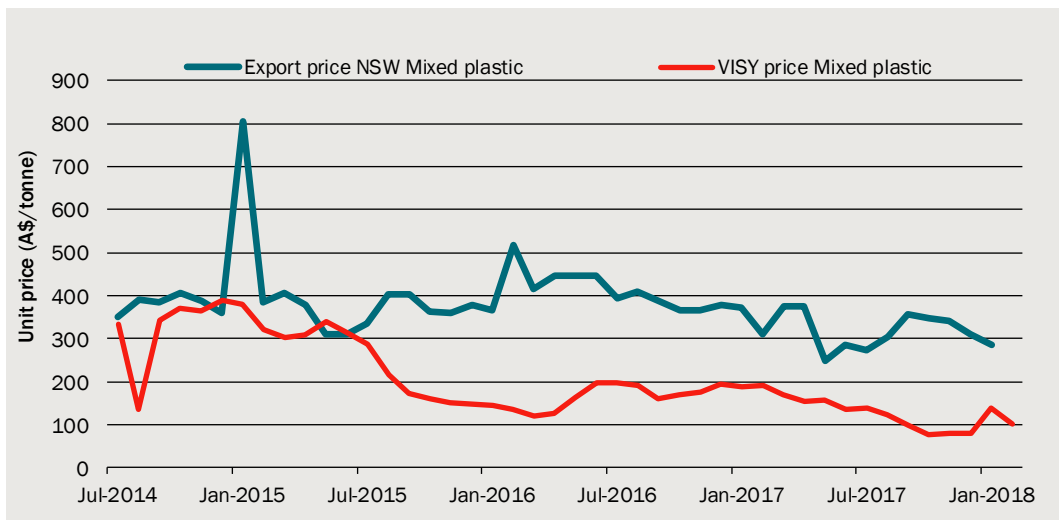
- VISY trading prices show a sharp decline in prices for all commodities from 2016/17, and particularly for paper in 2018.
- Export price data, for NSW exports, shows falls in plastic prices over the past two years, but no change in paper prices. Data is up to December 2017.

4.6 Price indicators for paper



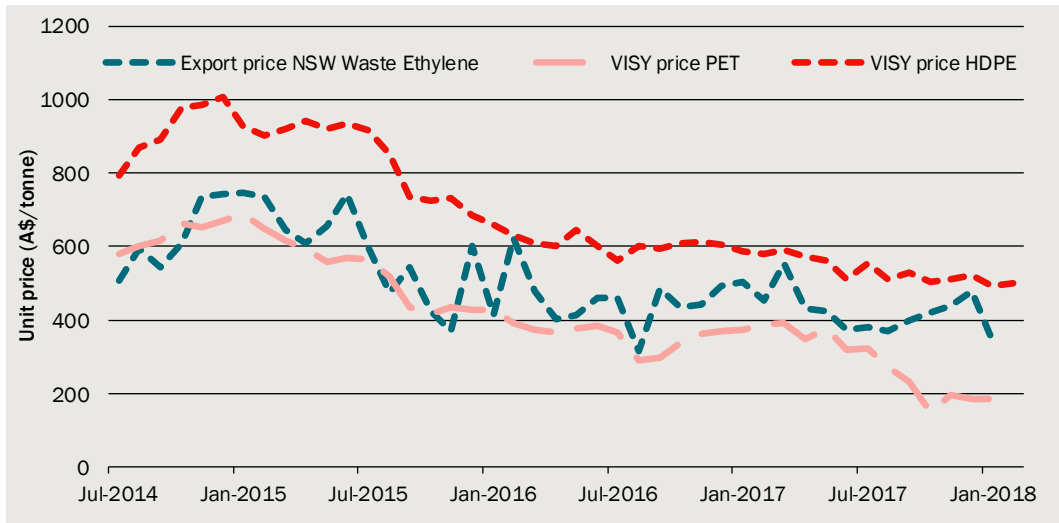
Data source: VISY; Global Trade Intelligence Service.

4.7 Price indicators for mixed plastic



Data source: VISY; Global Trade Intelligence Service.

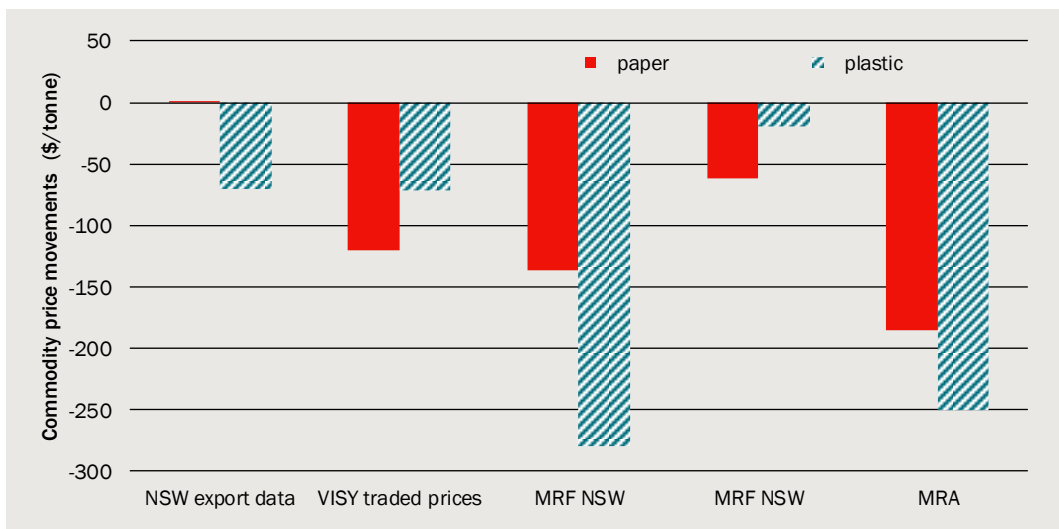
4.8 Price indicators for separated plastic



Data source: VISY; Global Trade Intelligence Service.

Looking across a broader set of prices, most indicators suggest prices have fallen substantially (chart 4.9). The export data does not show falls in prices to the same degree as other measures. It is also clear that different MRFs are experiencing very different changes in the prices that they receive, depending on which markets they have been focused on, the presence of any long-term contracts and the quality of the products that they are producing.

4.9 Commodity price changes all sources 2016/17 to February 2018



Note: NSW export data is to January 2018.

Data source: VISY; Global Trade Intelligence Service; MRFs; MRA 2018, 2018 looks like a lot of pain for MRFs and councils, Inside Waste 15 February.

Glass markets

The CIE has previously estimated that the changes to glass markets in NSW were making an impact of \$14-\$32 per input tonne on MRFs.⁸ This is a substantial impact given MRF operating costs of around or over \$100 per input tonne (excluding disposal and transport). These costs have been evident for several years. Recent contracts should have reflected these changes to glass markets. Older contracts will not have.

The estimated shares of glass being recycled in different ways is shown in chart 4.10.

4.10 Shares of glass recycling in NSW 2017



Data source: Industry Consultations and CIE calculations.

Defining viability

Viability could be defined in different ways for this project, depending on different information sources.

- The change in commodity prices — one measure of viability would be to measure the change in commodity prices since a contract was entered into. On the basis that the MRF must have considered itself to be viable when it entered a contract, the change in prices would represent a viability loss.
- Short-term viability, where revenues cover operating costs — where financial information for a MRF is available, a MRF could be considered to be viable in the short term if it can cover its operating costs.
- Long-term viability, where revenues covers operating and capital costs — over the longer term a viable MRF will have to cover the return on its capital and depreciation of its assets. This could be measured by information on capital investments or through adding a margin to the operating costs.

⁸ The CIE 2017, *NSW glass recycling: issues and options*, prepared for the NSW EPA, November.

The scenarios examined in the next chapter identify the refund shares that appear to get to the first two definitions of viability. However, it should be stressed that information on financial performance has been not been audited or verified.

5 *Scenarios for refund sharing arrangements*

Refund shares to cover CDS-related costs

To illustrate the magnitude of refund shares related to CDS-costs we use a hypothetical MRF based on the assumptions set out in previous chapters. We use a throughput of 60 000 tonnes, representing a medium size MRF. We then also show a range of impacts using actual MRFs. We show results using a diversion rate of kerbside containers of 20 per cent — that is, 20 per cent of eligible containers are diverted from kerbside recycling bins. Note that in terms of total volumes this represents about a 4 per cent reduction, as about 20 per cent of kerbside bins are eligible containers.

To illustrate the impacts, we break these up into the different components discussed in chapter 3.

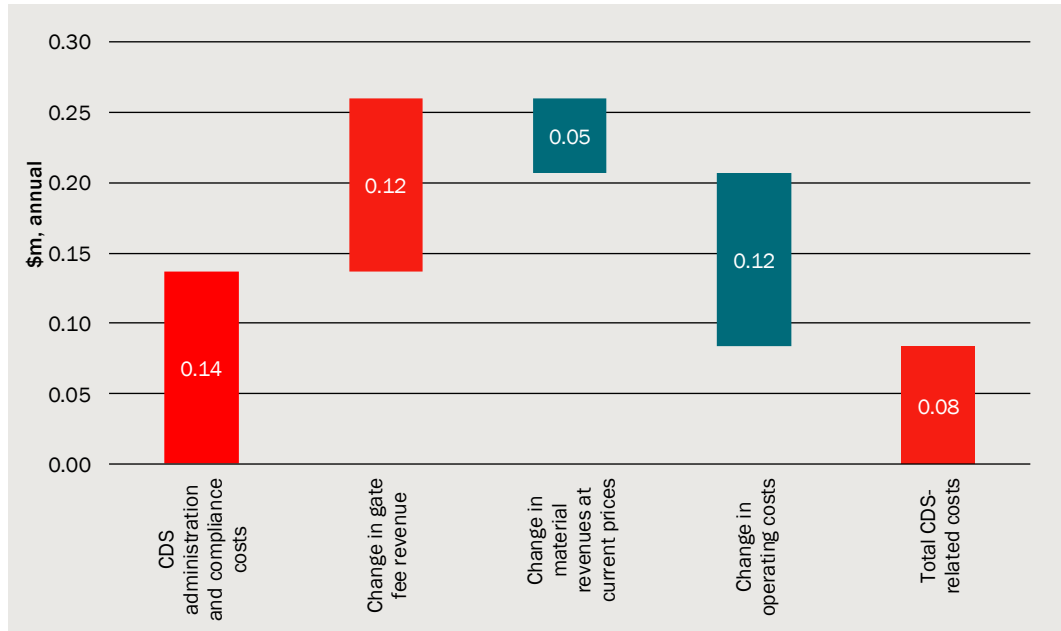
Our hypothetical MRF would face two negative impacts from the CDS — direct compliance and administration costs of \$0.14 million, and a loss of gate fee revenue of \$0.12 million. Offsetting against this are:

- the loss of materials is, at current commodity prices, a net gain — that is, because of the high quantity of glass, reducing this saves a MRF money and more than offsets the revenue loss from less plastic and aluminium. This effect is a benefit to the MRF of \$0.05 million. Note that if commodity prices were higher, or diversion occurred more for aluminium and plastic than for glass, then this effect would be a cost to a MRF
- reduced operating costs of \$0.12 million. This is based on a variable operating cost of \$50 per input tonne

In total, the MRF has a net cost of \$0.8 million from the introduction of the CDS (chart 5.1).

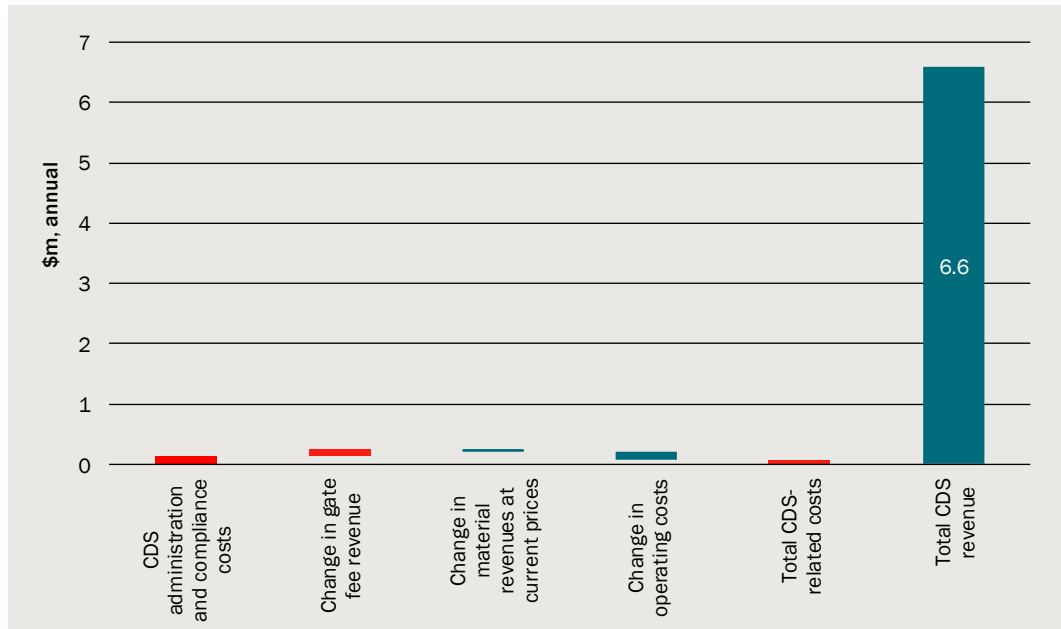
The costs of the CS to a MRF are compared to revenues from the CDS in chart 5.2. The revenue from the CDS dwarfs the costs. For this hypothetical MRF, the costs are about 1 per cent of the revenues. That is, for each 10 cents, 0.1 cent would be required to cover the impact of the CDS on a MRF. This outcome is not surprising, given that the CDS represents a very large premium over the price of the commodities, and the largest part of compliance and administration costs are borne by Exchange for Change, rather than a MRF.

5.1 Impacts of the CDS on hypothetical MRF



Note: This uses a MRF with annual processing of 60 000 tonnes per year, a diversion rate for all materials of 20 per cent and 50 per cent of operating costs being variable.
 Data source: The CIE.

5.2 Costs of CDS relative to the revenues for a hypothetical MRF



Note: This uses a MRF with annual processing of 60 000 tonnes per year, a diversion rate for all materials of 20 per cent and 50 per cent of operating costs being variable.
 Data source: The CIE.

Table 5.3 shows financial metrics for the MRF, under assumptions that:

- there is no CDS (the base case)
- a MRF keeps all CDS refunds
- a MRF receives a refund to cover the impacts of the CDS and
- a MRF receives 50 per cent of the CDS refund.

Without the CDS, the hypothetical MRF has revenues of \$4.4 million per year and costs of \$7.2 million. That is, it makes a net operating loss. This is because we have used commodity prices reflecting current prices.

If a MRF retained all CDS refunds (commercial and residential), the revenue of the MRF increases from \$4.4 million to \$11.6 million — an increase of 167 per cent. Costs stay about the same, comprising higher administration and compliance costs, but lower operating costs because less material is processed.

The refund share to cover a MRF's CDS-related costs is 1.3 per cent. This is the third scenario.

Finally, under a 50 per cent refund share, and assuming a MRF retains none of the commercial refunds, the MRF would have revenues of \$7.6 million, compared to costs of \$7.2 million. That is, it could cover its operating costs even with existing commodity price lows persisting. This outcome would not lead to longer term viability for the hypothetical MRF, because a margin of 5 per cent would not be sufficient to cover capital costs (depreciation and a return on capital).

5.3 Financial metrics for a MRF under different scenarios

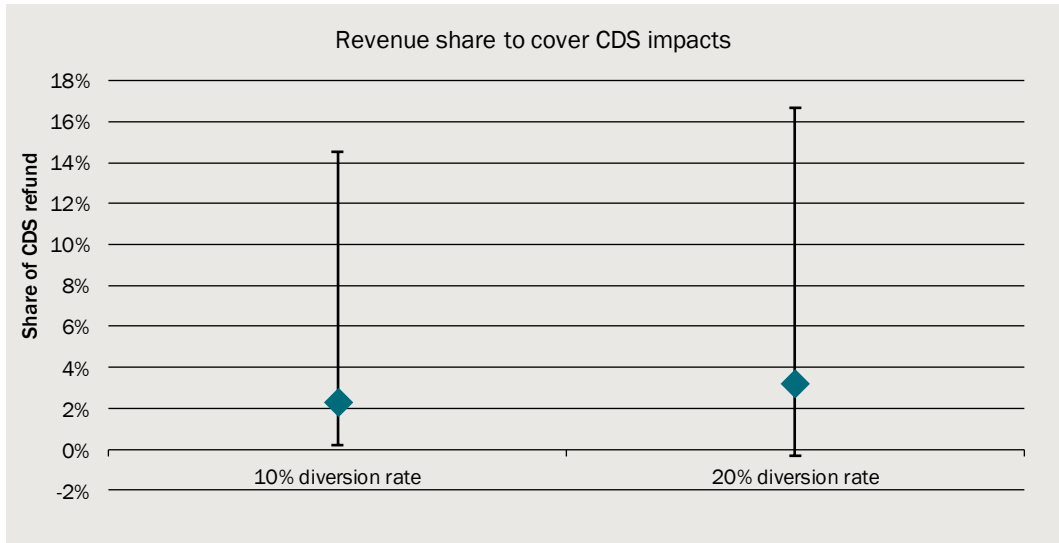
	Base case (no CDS)	With CDS and no revenue sharing	With CDS and revenue sharing @ 1.3%	With CDS and revenue sharing @ 50%
	\$m	\$m	\$m	\$m
Revenue	4.4	11.6	4.4	7.6
Operating costs	-7.2	-7.2	-7.2	-7.2
Operating profit	-2.8	4.4	-2.8	0.4
<i>Other information</i>				
Profit margin (%)	-64%	38%	-64%	5%
Tonnes processed per year (000)	60.0	57.5	57.5	57.5
MRF CDS revenue as a gate fee equivalent (\$/input tonne)		125	2	63

Note: This uses a MRF with annual processing of 60 000 tonnes per year, a diversion rate for all materials of 20 per cent and 50 per cent of operating costs being variable.

Source: The CIE.

Turning to actual MRFs, we see somewhat higher refund shares to offset the impacts of the CDS on each MRF. This reflects the smaller MRFs in the sample, and the fixed nature of compliance and administration costs. It also reflects one MRF directly counting containers, which requires additional software and capital equipment. For the median MRF, the refund shares remain low at 2-3 per cent, to offset the CDS impacts.

5.4 Refund shares across different MRFs to cover CDS impacts



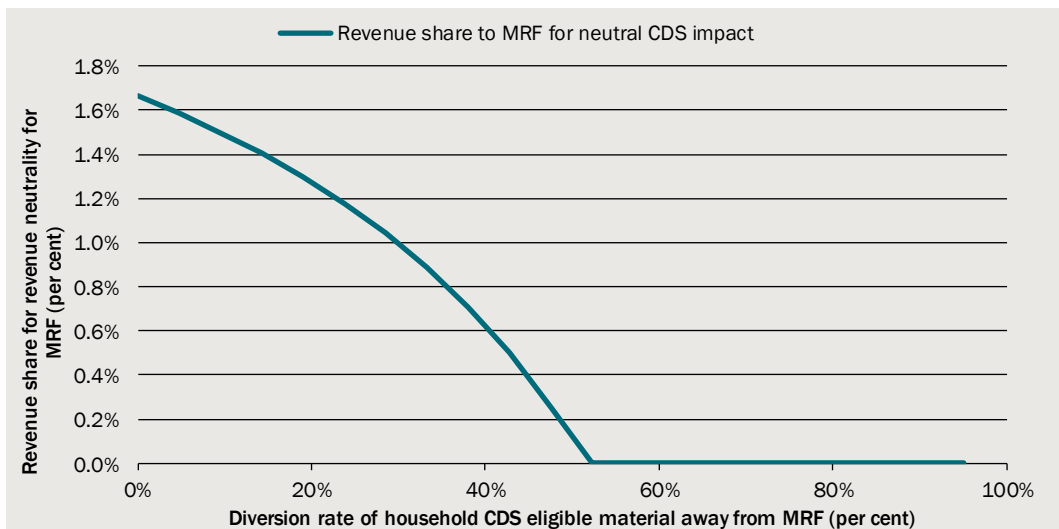
Data source: The CIE.

Sensitivity analysis

Changes in the diversion rate

Typically, as the diversion rate of material increases out of kerbside recycling, it would be expected that a MRF would require a higher share of refunds to cover its costs. This is true for many of the MRFs that we have considered. However, for the hypothetical MRF, the more diversion the better for the MRF. This is because the MRF benefits from having less material that it has to dispose of at a loss, such as glass. Hence the MRF needs no share of the refund at all to offset the CDS impacts, as the CDS has overall positive impacts on the MRF at higher levels of diversion (chart 5.5).

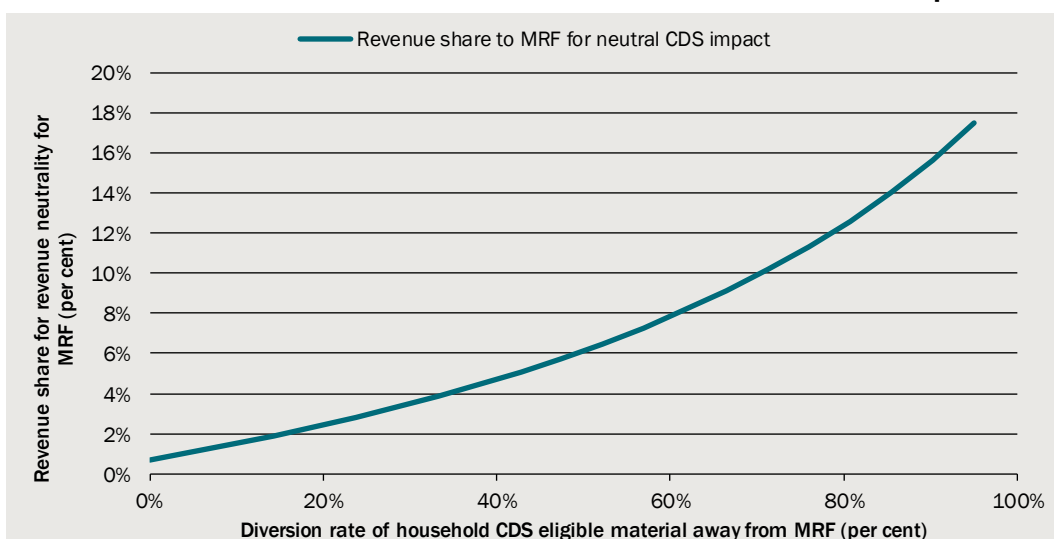
5.5 Refund share for different material diversion rates



Note: This uses a MRF with annual processing of 60 000 tonnes per year and a diversion rate for all materials of 20 per cent.
Data source: The CIE.

It is likely that aluminium and plastic will be diverted more readily from kerbside recycling than glass, because they will be easier for people to deposit directly. In chart 5.6 we show the refund share that leaves a MRF with the same profit with or without the CDS, assuming a diversion rate of glass of 10 per cent, and diversion rates of plastic and aluminium varying along the x-axis. In this case, the refund share for a MRF to cover the CDS impacts gradually increases as the diversion rate increases. At 40 per cent, the level anticipated by the CDS Regulation Impact Statement, the share for the hypothetical MRF would be ~5 per cent.

5.6 Refund share for different material diversion rates for aluminium and plastic



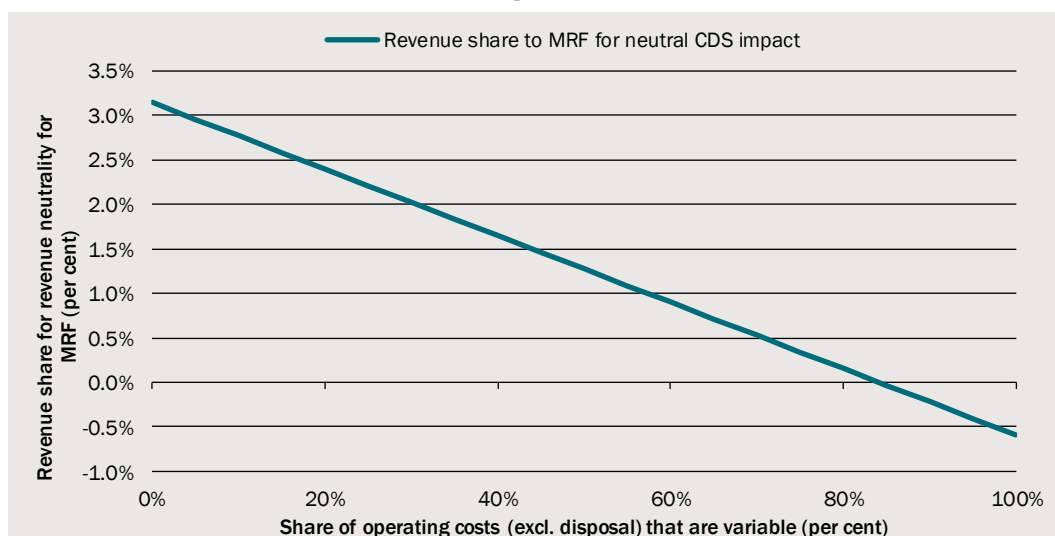
Note: This uses a MRF with annual processing of 60 000 tonnes per year and a diversion rate for all materials of 20 per cent.
Data source: The CIE.

If a MRF's compliance costs are high, and the materials it obtains from containers are worth more, then the profit neutral CDS refund share for a MRF can be very high at high diversion rates (80 per cent and above). However, we do not anticipate this level of diversion to be relevant for NSW in the short to medium term.

Changes in share of costs that are variable

If costs do not decline with the lower amount of material processed, then this increases the amount of the refund a MRF would be required to retain to cover its CDS-related impacts. Varying the share of costs that are variable from 0 per cent to 100 per cents gives the refund shares in chart 5.7. If all costs are fixed, the refund share for our hypothetical MRF would be ~3 per cent, with a diversion rate of 20 per cent from kerbside recycling. If costs are all variable, then the hypothetical MRF would not be negatively impacted by the CDS.

5.7 Refund share for different operating cost structures



Note: This uses a MRF with annual processing of 60 000 tonnes per year and a diversion rate for all materials of 20 per cent.
Data source: The CIE.

Inclusion of commercial collections

Commercial collections will also have eligible containers. Refunds from these are not subject to refund sharing agreements. However, over time it would be expected that gate fees for commercial collections would fall from what they otherwise would have been, to reflect the extra revenue available from CDS refunds. Note that this does not appear to be happening at the moment, and commercial gate fees are increasing rather than decreasing, as MRFs seek to reduce the amount of material they process because of difficulties in finding markets for it.

If the refunds available to a MRF from commercial collections are included, and it is assumed that commercial gate fees do not fall as a result, then the refund share for our hypothetical MRF would become negative. To remain at the same profit level, a MRF would be able to give a council 110 per cent of the CDS refund, rather than 99 per cent without commercial collections. This is with commercial collections at ~10 per cent of the MRFs inputs.

Note that the issue of commercial collections is relevant in our view primarily because the refunds from commercial collections can improve the viability of a MRF. It does not make sense for a council to receive any refunds arising from commercial collections.

Inclusion of a loss of the market for glass

If the CDS replaces a MRFs current market for glass, because material is cleaner, then we estimate that this would increase the profit neutral refund share for a MRF from 1.3 per cent to 6.2 per cent. This is based on the alternative market costing a MRF \$20 per tonne more, for all glass that a MRF produces.

Conclusions

- The share of the CDS refund to compensate a MRF for the impacts of the CDS will be less than 5 per cent for any medium to large MRFs (processing more than 50 000 tonnes per year)
- For smaller MRFs, refund shares to cover CDS-related costs may be higher (5-10 per cent typically) and higher again where a direct method of counting containers is used (15 per cent)

Refund shares for MRF viability

To consider MRF viability, we measure the refund share that would leave each MRF for which we have data able to cover its operating costs should current commodity market conditions continue.

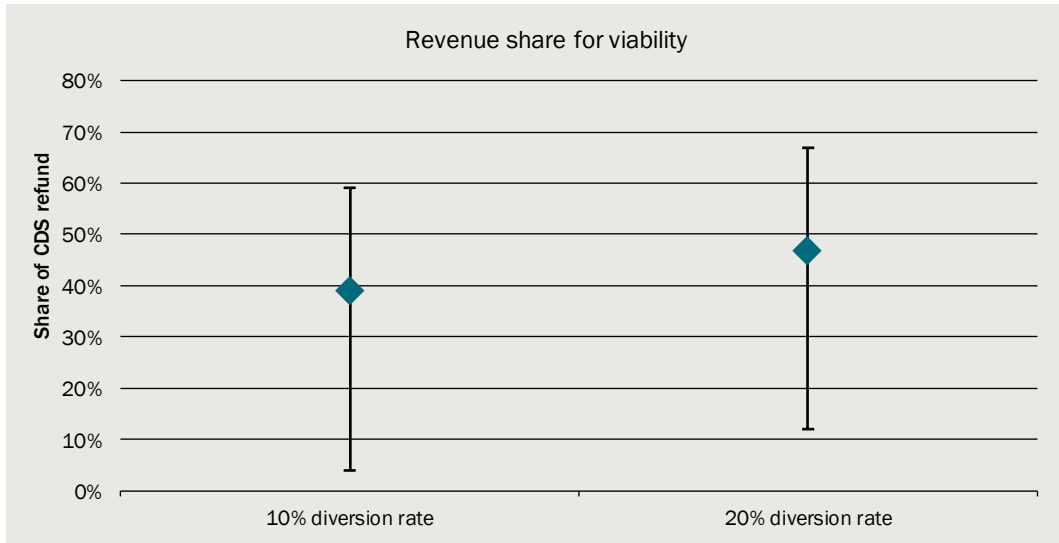
- With a 10 per cent diversion rate, the median MRF would be able to cover its operating costs with a refund share of 40 per cent.
- This increases to almost 50 per cent if the diversion rate is 20 per cent
- The range amongst MRFs is large, with some MRFs viable in the sense of covering their operating costs with shares of 10-20 per cent and others only viable with shares of 60-70 per cent.

These measures of viability reflect current commodity market conditions and MRF operating practices. MRFs will adapt to undertake further processing of materials to increase their revenues from commodity sales. The extent to which poor commodity market conditions will persist is not known.

In order to be viable in the longer term, and if commodity market conditions remain at current lows, a MRF would need a higher share of the CDS refund (or a variation in gate fees).

The different outcomes for different MRFs reflects the choices MRFs have made about how they process materials, the gate fees or rebates they have offered, as well as the types of materials that they have as inputs and commodity market conditions (including regulatory arrangements in key markets such as China).

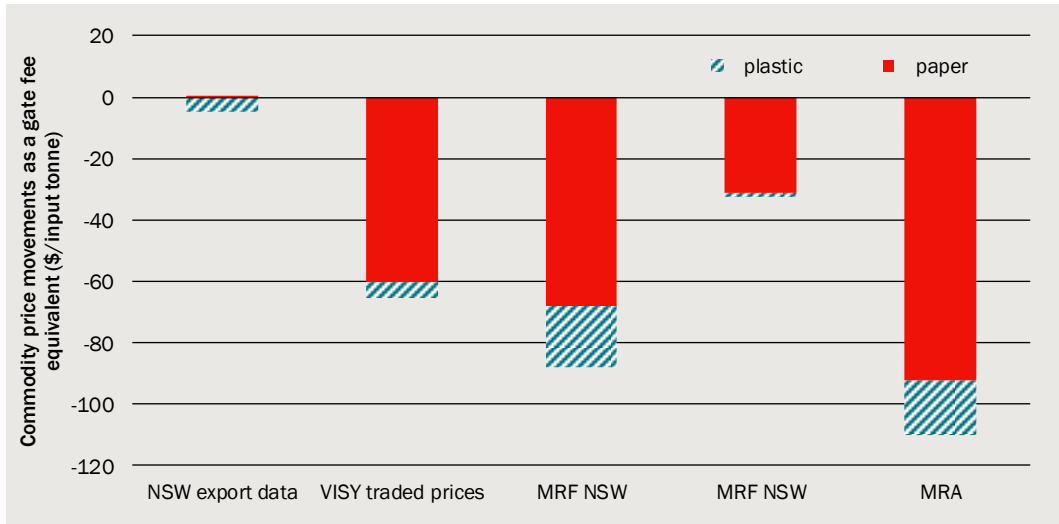
5.8 Refund shares for MRF viability



Data source: The CIE.

An alternative way of considering viability is to look at different estimates of recent negative commodity market changes. On a dollar per input tonne basis, measures range from a very small reduction (as measured by export prices) to \$60 from VISY trading prices, \$30-\$90 from information provided by NSW MRFs and an estimate of over \$100 from MRA consulting.

5.9 Commodity price movements as a gate fee equivalent, 2016/17 to February 2018

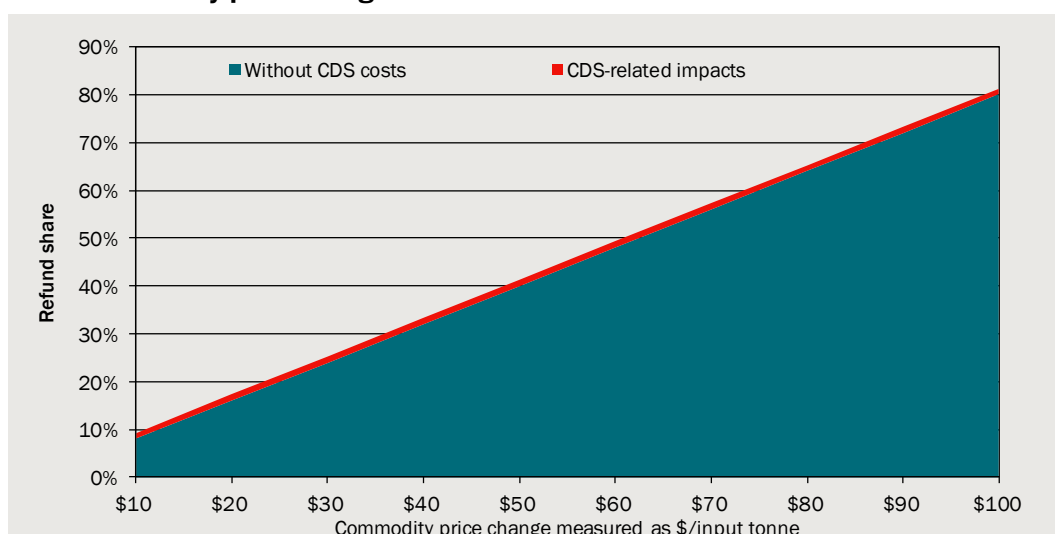


Note: NSW export data is to January 2018.

Data source: As noted in chart; CIE calculations..

Chart 5.10 shows different commodity price changes and their equivalent in terms of share of CDS refunds (with a 20 per cent assumed diversion rate of materials). For example, VISY trading price information indicates a \$60 per input tonne reduction in commodity prices from 2016/17 to today. This is equivalent to ~50 per cent of the CDS refund available to a MRF.

5.10 Commodity price changes and CDS refunds



Note: This uses a 20 per cent diversion rate of household material from kerbside recycling.

Data source: The CIE.

Other issues

Viability is a key issue to ensure that material continues to be recycled, which is necessary to obtain a CDS refund. Measuring viability is not straight forward.

- MRFs have different products and product quality
- Some MRFs have contracts for material or buyers who trust their material and offer different prices
- Some are vertically integrated and use their MRF material in their own manufacturing activities

The arrangements with councils are also not all the same. A small number of councils have already taken a share of the impacts from changes in commodity markets through risk sharing contracts. Councils may have agreed to variations in gate fees to ensure viability, or may wish to use this as a way to ensure viability, rather than using the CDS.

Conclusions

- **Issues around viability do not need to be addressed through the CDS, but in our view do need to be addressed in some way by councils to ensure that CDS (and other) material continues to be processed.**
 - **If councils instead choose to vary the gate fee from that in the contract to ensure viability, then the CDS share for a MRF should reflect only its CDS-related costs**
- **The impacts of commodity price changes on MRFs have been very different, and viability issues are also very different.**

- A 50 per cent refund share would lead to most but not all MRFs being viable, as well as covering their CDS-related impacts, based on current commodity prices and information provided by MRFs
- This would be equivalent to an additional gate fee of ~\$60 per tonne, which is about the same as the decline in commodity value as measured by VISY's trading data, and within the estimates of price changes provided by MRFs
- The extent to which commodity price changes are temporary or permanent is very difficult to know. A council may wish to retain the option to re-examine the CDS refund share as market conditions change, which would bring upside and downside risk for a council
- Where a council bears costs related to commodity risk already, such as a risk sharing contract, then that council should not reflect any risks it has already borne in the CDS refund share paid to a MRF

6 Other issues

Transparency of agreements

A MRF will receive a single quarterly refund from the Scheme Coordinator, but will source material from multiple sources. Further, a council will not necessarily even know the total refund received by a MRF. This means that a council may know their refund share (e.g. 50 per cent) but will not know what dollar number to apply that to.

A break-down of the information that will be known to a MRF and that will be known to a council is shown in table 6.1. For a council to be able to approximately estimate the refund share attributable to its own inputs would require:

- that the council knows the output composition of its MRF, to which it can apply eligible container factors to estimate a number of containers per tonne of MRF inputs
- its input tonnes, which it will know as it pays for this through gate fees.

However, this rough approximation will not work as well where a MRF receives material that is quite heterogeneous — for example, inputs from councils with a four bin system (separate paper and cardboard) and councils with three bin systems. In this case, a more complex reconciliation will be required.

6.1 Information known to a MRF and a council

Information	Known by MRF	Known by council
Total refund received by a MRF	✓	X
Total input tonnes received by a MRF	✓	X
Input tonnes received from specific council	✓	✓
Composition of material from a council	X	X
Composition of MRF outputs	✓	X
Eligible container factors (containers per tonne of outputs)	✓	✓
Information on how CDS has impacted MRF material volumes	?	X
Compliance costs related to the CDS	✓	X

Source: The CIE.

Our recommendations to improve transparency are set out below.

- **Councils should have access to data on the material output shares of the MRF that their material goes to, in order to be able to approximately verify the refund the council should receive**

- If councils agree to a model or process for estimating refunds on an ongoing basis, rather than a share, then the model would need to be available to councils and MRFs to ensure that refunds could be verified and ideally third party auditing would be required for data used in the model

Structure of a refund sharing agreement

The *Waste Avoidance and Resource Recovery (Container Deposit Scheme) Regulation 2017* (section 18) defined as refund sharing agreement as follows.

refund sharing agreement means an arrangement between a local council and a material recovery facility operator under which the operator agrees to pay to the council a proportion of all refund amounts paid to the operator by the Scheme Coordinator on or after the Scheme commencement day in respect of containers collected in the council's area during the course of domestic waste management services.

We take this to mean that an agreement could have different proportions over time, or could specify a process or model for sharing of refunds, rather than simply a fixed proportion.

At a high level, the two paths for a refund sharing agreement are:

- 3 Decide on a particular refund share now, with risks that the refunds available and costs to a MRF will be different to those expected. This could be structured as:
 - a percentage of refunds provided to a MRF and allocated to each council that the MRF accepts material from
 - a fixed amount to be retained by a MRF, such as \$100 000 for compliance costs, and then sharing of the remainder
- 4 A process or protocol for determining the refund share at the end of each quarter or year. This could include:
 - the requirements for claiming CDS-related costs, such as invoices for Independent Assurance reporting
 - the process for estimating the change in material volumes and the unit costs or prices attached to these changes

These different approaches lead to different risks for councils and MRFs (table 6.2). A protocol leads to risks around measuring changes and validating data on an ongoing basis. An upfront refund share leads to risks because the impacts of the CDS could be very different from those expected, and because commodity market conditions will change.

6.2 Risks of alternative approaches to structuring refund sharing agreements

Risk	Refund share decided up front	Refund share determined through protocol
Diversion rates from households are lower than expected	MRF may receive too much of CDS refunds	May be difficult to measure diversion rate to use in protocol
Diversion rates from households are higher than expected	MRF may receive too little of CDS refund	May be difficult to measure diversion rate to use in protocol

Risk	Refund share decided up front	Refund share determined through protocol
Compliance more costly than expected	MRF may receive too little of CDS refund	Verification of compliance costs will be difficult for a MRFs own costs
Compliance less costly than expected	MRF may receive too much of CDS refund	Verification of compliance costs will be difficult for a MRFs own costs
Commodity markets rebound	MRF may receive too much of CDS refunds	Require good measures of commodity prices

Source: The CIE.

We would recommend using a protocol rather than an upfront agreement, as long as the council has the skills and resources to be able to verify the operation of the protocol over time.

Bargaining power of MRFs and councils

The bargaining power between MRFs and councils over the CDS may be quite different.

- MRFs often serve many councils, giving them a far larger financial incentive than an individual council around CDS (and other) contract negotiations
- The CDS negotiation is a highly artificial negotiating construct. A council and MRF are already contracted, and there is not necessarily the ability to test the market in such a situation.
- The current viability concerns for MRFs may mean that, where contract disruption is possible, a council has few options available.

Collective negotiation would be one way to reduce some of these issues.

Contracts with collectors

Some councils do not directly contract with a MRF for processing, but contract with a collector only. The collector then bears the responsibility of contracting with a MRF to accept material. Under this type of arrangement, a council could:

- have a refund sharing agreement with a material recovery facility, even though they are not directly contracted to that facility
- make an agreement (not a refund sharing agreement) about refunds with the collector, and then notify EPA that it considers that in the circumstances it is fair and reasonable that there is no refund sharing agreement in force.

The principles of how much of the revenue should be obtained by a council and for what reasons remain the same under this arrangement. However, councils may not have much transparency about the relationships between the collector and the MRF. For example, it may not be clear if refund shares intended to cover a MRFs costs or to ensure viability actually go to a MRF. A collector may seek to retain a share of the refund for themselves, even though there is no basis for their collecting any CDS refunds.

Incentives for councils and MRFs

Different financial arrangements for processing involve different incentives for councils and MRFs, and this is also the case with the CDS.

- Fixed gate fees that are lower than landfill gate fees do not provide an incentive for councils to educate residents about material that cannot be recycled. Contamination is a major cost for MRFs.
 - Across the waste audits conducted by APC over 20 years a number of common causes of contamination are seen including bagged recyclables, contaminated paper (magazines or brochures wrapped in plastic), non-recyclable plastics, containerised food/ liquid, textiles (clothing) and carpet. Underlying factors include insufficient general waste bin space, socio-economics and type of housing. Contamination rates typically range from 10 – 17 per cent and in some cases are as high as 56 per cent.
 - Some contracts have councils paying the waste costs of a MRF. This removes the above incentive issue, but will also encourage a MRF to landfill product that has a price of less than zero, such as glass, as council would bear this cost.
- A high CDS share to MRFs will provide a strong financial incentive for material to be proven to be eligible for the CDS refund. This will be the case regardless of whether the true destination is for recycling. While this outcome may be one that has a financial advantage to councils and MRFs, the credibility of the CDS scheme would be damaged if refunds are paid on material that is later revealed to have gone to landfills.

Risk sharing for contracts

CDS refunds provide another form of risk to MRFs and councils, in that they are likely to change over time, and the ability to forecast or hedge against these changes is limited. This risk adds to the already substantial risks relating to commodity markets, particularly for exporters.

The recent commodity market issues for MRFs highlight the vulnerability of the existing contracting models to commodity market conditions, and overseas regulatory changes. We would expect that MRFs will respond by repricing these risks higher in new contracts. Considering alternatives to better manage risks, such as risk sharing, may lead to better pricing for councils and a more sustainable sector.

A Technical appendix — impacts of the CDS on a MRF

The impacts of the CDS on a MRF's profits are:

$$\Delta\pi = \Delta Q \cdot p - \Delta Q \cdot c + \sum_i \Delta Q_i \cdot P_i^0 + \sum_i Q_i^1 \cdot \Delta P_i + r \cdot \left[\sum_i Q_i^1 \cdot CF_i \cdot D - A \right] - CC$$

Where

- $\Delta\pi$ is the change in profit
- ΔQ is the change in total input tonnes into the MRF
- p is the gate fee (which could be positive or negative)
- c is the variable cost of processing each input tonne
- ΔQ_i is the change in the tonnes of each output commodity, i
- P_i^0 is the without CDS price of each output commodity (in dollars per tonne)
- Q_i^1 is the quantity of outputs for each commodity with the CDS
- ΔP_i is any changes to commodity prices because of the CDS
- r is the revenue share of refunds retained by a MRF
- CF_i is the container factor for commodity i
- D is the refund amount
- A is the administration costs paid by the scheme administrator
- CC is compliance costs for the MRF associated with the CDS.

The profit neutral revenue share is the r^* where $\Delta\pi$ is set equal to zero. That is:

$$r^* = \frac{-[\Delta Q \cdot p - \Delta Q \cdot c + \sum_i \Delta Q_i \cdot P_i^0 + \sum_i Q_i^1 \cdot \Delta P_i - CC]}{[\sum_i Q_i^1 \cdot CF_i \cdot D - A]}$$

Note that where there was no diversion of materials from households away from kerbside, and no impacts on prices of commodities in the market, then this becomes:

$$r^* = \frac{CC}{[\sum_i Q_i^1 \cdot CF_i \cdot D - A]}$$

That is, MRFs recover their revenue share based on their compliance costs only.



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