COFFEE 4 PLANET ARK

Trial Report

Made possible thanks to Founding Members

ALLPRESS ESPRESSO

Genovese

GRINDERS COFFEE ROASTERS

LAVAZZA TORINO, ITALIA, 1895

TATA BEVERAGE SOLUTIONS map Coffee

Disclaimer

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Foreword

By Paul Klymenko, CEO of Planet Ark

During a study tour to Europe I asked an engineer working in the Swiss waste industry where their landfills were located. He replied there weren't any and that many countries in Europe had achieved similar. Countries with a combined population of over 150 million have virtually eliminated their need for landfills including Germany, Sweden and the Netherlands as they are all landfilling 3% or less of their waste. They are in the process of creating a circular economy and moving to a society 'beyond landfills'.

Landfills generate uncontrolled chemical reactions. In addition to emitting methane (a greenhouse gas 34 times more powerful than carbon dioxide) mainly from organics, they require long-term management for many decades to ensure that they do not pollute the environment, especially our groundwater. That is why landfills are the very bottom of the waste hierarchy. Landfills have little role in a sustainable society based on circular economy thinking.

According to the latest National Waste Report Australians currently put 40% of our waste into landfill, a total of 21.7 million tonnes, a stark contrast to Europe. That is the weight of around 410 Sydney Harbour Bridges annually! The biggest component, at around a third, is organics which includes spent coffee grounds (SCGs).

However unlike most organics such as food waste, spent coffee grounds can be relatively easily separated at source. They contain valuable chemical compounds and can also be converted into new materials with useful properties. Potential end use for Spent Coffee Grounds (SCGs) being currently researched include such diverse uses as lithium batteries, steel making and building materials.

Planet Ark has been working with the coffee industry since 2014 to help create a solution for SCGs. In 2016 Planet Ark, with the support of the City of Sydney, released a feasibility study into the collection and repurposing of SCGs in the Sydney City council area. This study showed that 93% of coffee grounds produced within Sydney are going to landfill. Based on this work we estimate that Australians consume over 6.2 billion cups of coffee each year producing over 117 million kgs of spent coffee grounds.

The Federal and State Governments have recently released the 2019 National Waste Policy, Less Waste More Resources. Product Stewardship is where a business takes responsibility for the waste its products generate, minimising the products negative impact. It is a key strategy of the National Waste Policy and to this end a review of the Product Stewardship Act is currently underway.

Coffee 4 Planet Ark will be an excellent example of Product Stewardship and positions the Australian Coffee industry as a world leader in extended producer responsibility. I'd like to thank the founding members Allpress Espresso, Genovese Coffee, Grinders Coffee, Lavazza Australia and Tata Global Beverages and the cafes who participated in this trial for making it possible. Also, I'd like to thank our Research and Development (R&D) partner UNSW Smart Centre for their important contribution.

Glossary

Throughout the report any glossary terms are italicised.

Dry Coffee Beans (DCB)
Dry Coffee Beans are the roasted beans before grinding and extraction.

Spent Coffee Grounds (SCG)
Spent Coffee Grounds are the waste product that will be collected. These are the wet grounds after extraction.

Cost of program ($/kg of DCB)
The cost of the program when displayed as a $/kg of DCB is referring to the cost of the program as a cost per kg of coffee sold into participating cafes.

Retail price of coffee
We have defined the price of a standard cup of coffee as $3.50.

Weight standard cup of coffee
We have defined the weight of grounds in a standard cup of coffee as 12g.

Acknowledgements

The Coffee 4 Planet Ark trial project would not have been possible without the generous support of those involved. Planet Ark would like to express our appreciation to the following:

- The cafes, baristas and café workers who participated in the Coffee 4 Planet Ark trial.
- The Sustainable Materials Research and Technology (SMaRT) Centre at the University of New South Wales for providing ongoing R&D support and advice throughout the trial.
- Circular Food for providing support as an end use partner and providing advice and support on the use of coffee in composting and as a soil fertiliser.
- Clean & Green Organics for generously accepting and processing the spent coffee grounds from the trial.
- Bingo Industries for managing the collection of coffee grounds and logistics of the trial.

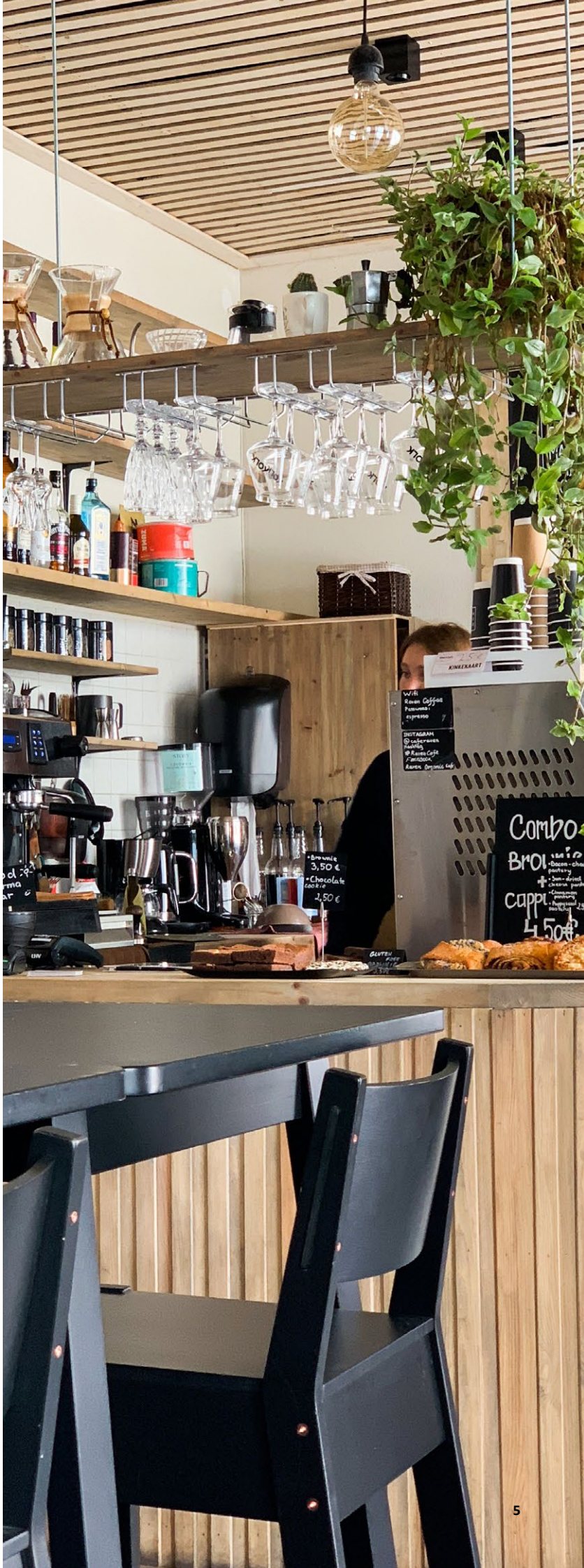
Finally, we would like to thank the Coffee 4 Planet Ark Founding Members Tata Global Beverages, Allpress Espresso, Genovese Coffee, Grinders Coffee and Lavazza Australia for providing the funding to make this trial possible.

The future of the program – Planet Ark's recommendation

The aim of this trial was to determine what a successful future program looks like and to recommend the way forward for the industry. Planet Ark and the Founding Members acknowledge that the cost of collecting and processing coffee grounds means that the rollout of a full, national program is prohibitive at this stage. For this reason we are recommending that the coffee industry commit to supporting program Option 2 outlined in more detail on page 27.

The next stage of the Coffee 4 Planet Ark program will involve stakeholders within the coffee industry investing an annual sum of $14,000 in order to fund R&D initiatives to find a viable, higher value end use for coffee grounds.

Once we have successfully found a high value end use, the key learnings from this trial can then be used to roll out a full program which is scalable and created with improvements gleaned from these key learnings. We are now calling on the coffee industry to support the next stage of this initiative in order to be part of creating a more sustainable future for the coffee industry we all love.



The future is circular

For years we have relied on a linear model of consumption where resources are taken from the earth, consumed and then disposed of. Earth Overshoot Day marks the day when we have exhausted the ecological resources and services the planet can provide for the year. In 2019 this day landed on the 29th of July, meaning in just 7 months we have used more than the planet can provide in a whole year.

The growing acknowledgement that we have an urgent need to protect our finite resources and reduce emissions has led to a global movement towards the circular economy. The circular economy shifts the way we extract resources, make, consume and dispose of products to ensure emissions are reduced and resources are efficiently used and kept in circulation as long as possible.

For the vast majority, the current model of the coffee industry firmly sits within the linear model of take, make and dispose. The energy and resources used to grow, harvest, ship, roast, package and distribute coffee are wasted when the grounds are sent to landfill after extraction.

Planet Ark is calling for the coffee industry leaders to implement circular economy principles within their core business through;

1. Designing out coffee waste and pollution: Given the nature of extracting coffee, it isn't possible to design out waste from the product, however you can open up pathways for this waste to become a resource, while also eliminating the methane pollution created from coffee grounds rotting in landfill.
2. Keeping coffee as a resource in circulation for as long as possible: Through funding R&D, coffee 'waste' will become an important resource in other manufacturing processes.

Executive summary

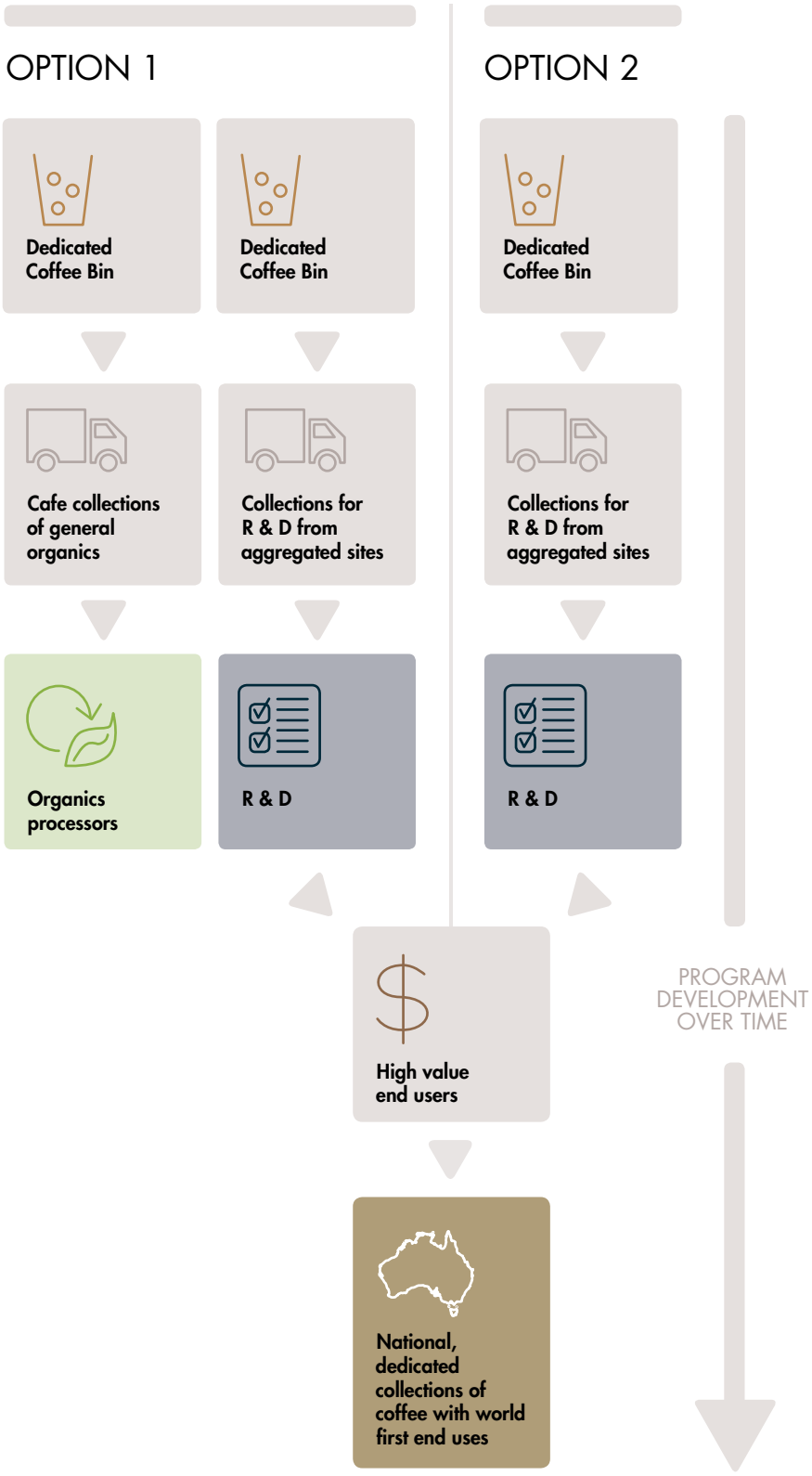
The Coffee 4 Planet Ark trial has allowed us to;

- Develop key learnings to make process improvements to support a future program roll out.
- Estimate long and short term costs for the program and highlight opportunities to reduce costs.
- Propose 2 program options going forward.

What is needed for the future program?

- A program that allows us to keep collection costs stable while we scale up cafe participation.
- Funding of R&D activities to reduce program costs in the long term.

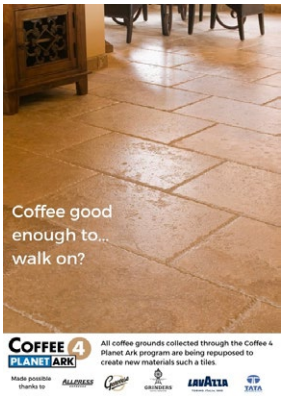
Planet Ark proposed the following 2 options shown in Figure 1 below for the future of the program. Both these options allow us to achieve the same end goal of developing a national program with high value end uses. These options are explained in more detail, including the costs of each option, from page 22. Neither proposal would increase the cost of an average cup of coffee by more than 0.4%. Through the already established R&D relationship with UNSW we are hoping to reduce this cost in the foreseeable future via world first, high value end uses such as building materials and lithium batteries.

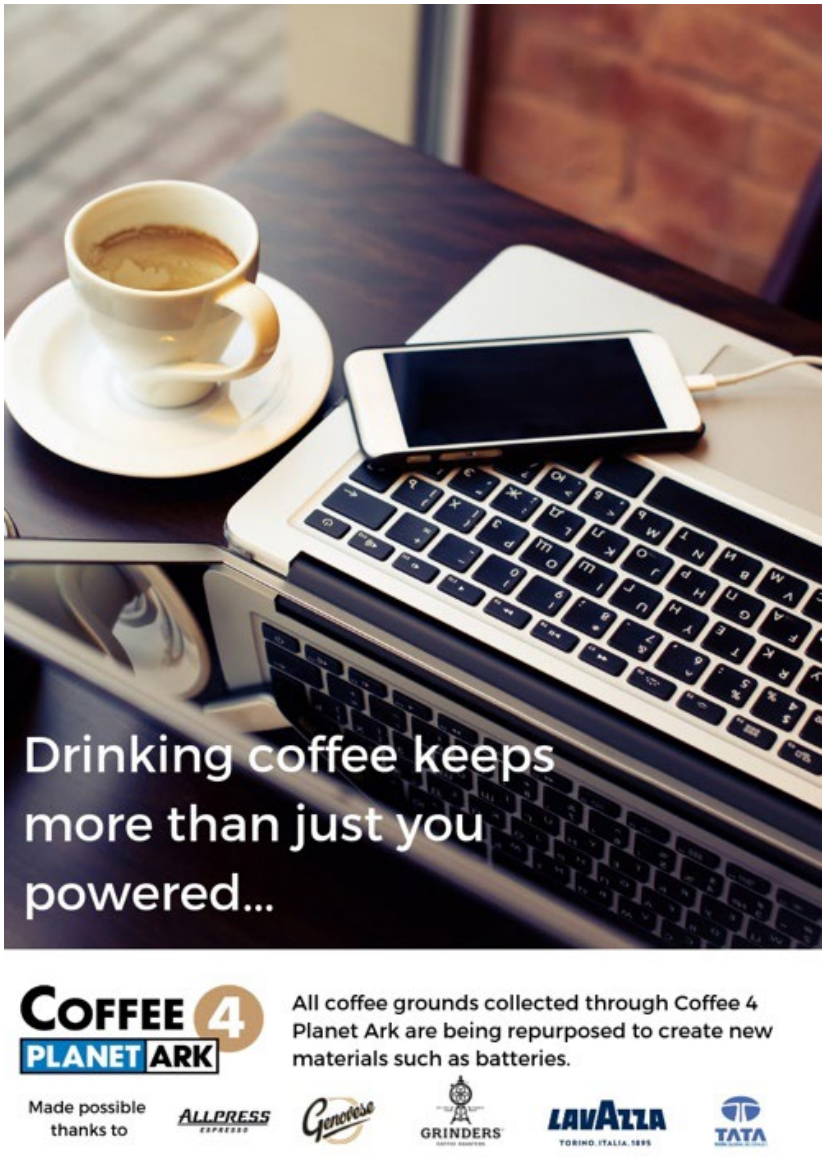


Visualise the near future…

If the Coffee 4 Planet Ark program is rolled out nationally, it would be the world's first large-scale coffee waste collection system. The program has the potential to be recognised by the Australian Government as a best practice Product Stewardship program through registration as a voluntary product stewardship scheme.

R&D initiatives are already looking into using coffee as a resource for creating building materials and batteries.





Coffee 4 Planet Ark program objectives

Primary program objective:

Develop a program that provides a national solution to coffee ground waste and provides a high value end use option to make use of the unique qualities of this waste stream.

How we will achieve this:

- Create a cost-effective collection model for cafes and other SCG waste producers which can be scaled up and rolled out nationally. Focus will be on highly populated areas of capital cities and large regional cities and towns.
- Create a R&D fund to support the creation of new, high value end use options for SCGs.

2018/2019 trial objectives

- Establish a cost for the full program including collection and logistics, program management and R&D.
- Develop a program model going forward.
- Gather key learnings for future program improvements.

Program Partners

Founding Members

ALLPRESS ESPRESSO

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TATA BEVERAGE SOLUTIONS map Coffee

Logistics Partner

BINGO INDUSTRIES

End use and R&D Partners

Circular Food — Reducing Waste, Regenerating Soil

SMaRT@UNSW Sustainable Materials Research & Technology

Trial results

Achievements

TRIAL RESULTS	ANNUAL PROJECTIONS
Over **14,000 KG** of spent coffee grounds collected and repurposed	**42,000 KG** of spent coffee grounds collected and repurposed
Over **8,500 KG** of carbon dioxide equivalent saved (CO_2-e)	Over **22,000 KG** of CO_2-e saved
Over **550,000 COFFEES** saved from landfill and repurposed	Over **1.6 MILLION COFFEES** saved from landfill

100% of respondents would like to see collections continue.

62% of respondents said that they would be influenced to choose a particular coffee supplier if they offered this service.

WHY DO CAFES AND BUSINESSES WANT TO BE INVOLVED?

"Anything that will help keep the planet green, especially when the service is free."

"Because we care about what happens to our cafe waste"

"For the planet"

"To help the environment and educate my children and others"

"It's a positive step towards sustainability"

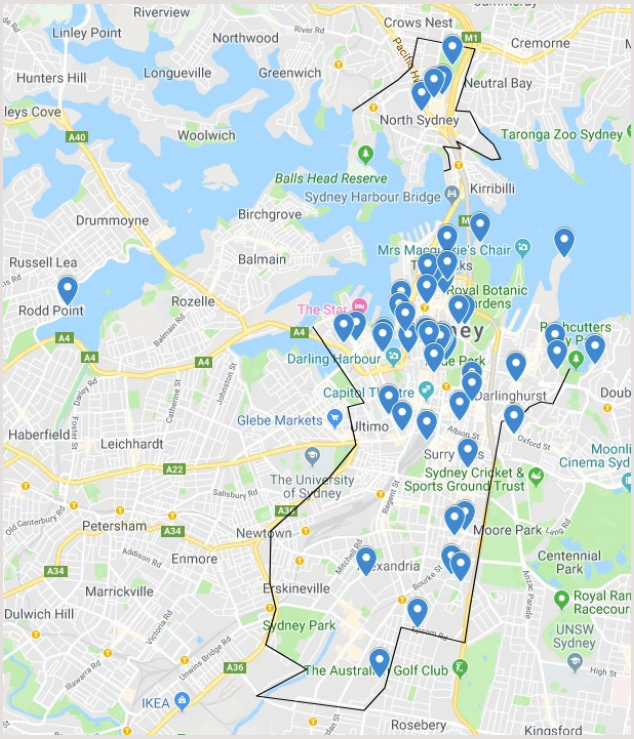
Trial Timeline

Cafe participation

The trial was held within the Sydney CBD and surrounds. This trial location was chosen as it was suspected that this would be the most challenging area for collections due to restricted truck access, loading dock access and traffic restrictions. This allowed us to get the greatest learnings from the trial to inform a national rollout where we will focus on areas with the highest concentration of coffee consumption.

The image to the right shows the trial boundary along with the locations of registered cafes. We did have one cafe register outside of the boundary (in Rodd Point) but made the decision to keep them in the trial as the location was on route to the drop off point.

58 cafes registered for the trial originally. This represented approximately 30% of the eligible cafes (within the trial boundary, over 10kg coffee purchased per week and customer of a Founding Member). Figure 2 below shows the reasons that cafes were removed from the trial. We removed 28 of these cafes, a **majority (16) were removed due to issues with access such as no 24-hour access or no security clearance for a trial period,** 4 had no space for an extra bin and 7 for other reasons (not interested, already had organics collections, change of management). **Importantly, we have only had to remove 1 cafe due to consistent contamination.**



Cafes removed from trial

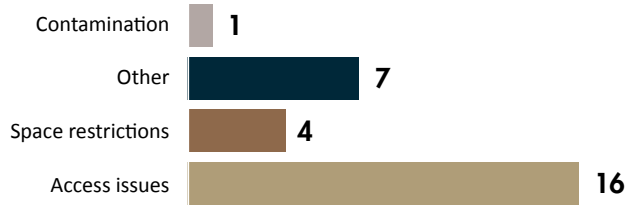


Figure 2: Cafes removed from trial

Key learning 1: Cafe Recruitment Process

Originally, feedback from some Founding Members was that some cafe customers would prefer the roaster to register on behalf of them. The impact of this was that some cafe contacts weren't aware of the details of the program. This meant that it was challenging when trying to do the site assessment, deliver the bins and attempt the first collections. This lead to Bingo needing to pick up some bins where managers or owners decided they didn't want to be involved. This resulted in a cost to the program which we need to avoid going forward. There were also a number of instances where we didn't have the most appropriate contacts for the program.

Process improvements

- Cafes must register themselves to ensure they understand the program details and requirements, accurate information is given and the best contact is provided.
- Building managers need to be engaged from the start to ensure smooth access to buildings.

Key learning 2: Registration Process

While we did get Bingo's input into the development of the registration form, we found that there was information that would have been helpful to collect or instances where we collected unnecessary information.

Process improvements

We will use these learnings to build a more effective registration form in the program roll out. Some information already highlighted to be included is:

- Primary site contact: This is the cafe manager or contact who will be contactable onsite. This may be different to the person registering the cafe.
- Further details about bin access for collections using a drop down: eg. Loading dock or street access to determine which sites will need a more in-depth site assessment.
- Details of building managers: a challenge of the trial was having cafes interested in joining the program but not have their building manager aware of this program. Going forward we want to contact any relevant building manager to properly engage them as it may be they who have the final decision in supporting the program.

Key learning 3: Anticipating barriers to participation

We found a number of barriers to cafes participating in the program. Anticipating and mitigating these where possible will lead to a greater adoption and retention of cafes.

Barrier:

- **Building management not giving security clearance to logistics partner due to this only being a trial or them having existing, long-term relationships with other waste providers.**

As some building managers indicated that they couldn't provide security clearance for a trial, we may be able to overcome this problem when we have rolled out a full, ongoing program. Going forward we will also ensure we collect the details of the building managers in the registration process, allowing us to engage them in the whole process.

Barrier:

- **No 24-hour access for overnight collections**.

Working with a general organics collector may allow customers with strict access restrictions to be put onto a daytime run.

Barrier:

- **No room for new bin**

We investigated a courier service as a solution for a smaller bin but this was not feasible due to costs. At this stage we don't have an option to handle sites that do not have room for an extra bin. This impacts a small number of cafes (7% in the trial were removed for this reason). As the program rolls out and scales up we will continue to strive for a logistics solution to overcome this issue.

Barrier:

- **Cafe already has organics collection**

Cafes who are collecting and processing their organics are already engaged in an excellent environmental practice so should be congratulated for doing so. In saying that, there is an opportunity to communicate the importance of keeping coffee grounds separate in order to make the most of this unique, source-separated waste stream. A consumer and cafe awareness campaign around the benefits of potential end uses will help to engage those cafes who are also collecting mixed organics to further separate their grounds.

Collections

After a challenging start to collections, we decided that we would start tracking the results once our collections became more consistent and program improvements had been implemented. The full trial collection results that are presented in this report are from the 22nd of October 2018 to the 28th of February 2019.

We achieved an average weekly collection success rate of 68%.

A majority of unsuccessful collections were cafes not putting their bins out. Follow ups with cafes revealed that customers either hadn't filled their bins so they didn't put them out or simply forgot to put their bin out that night.

We implemented a text service reminder for cafes and this improved collections. Moving forward into a future program we will establish whether our chosen logistics provider can offer a text notification as part of their service. Feedback from busy cafe workers has been that a text is the most appropriate way to contact them.

Again, we were happy to report that we only had to remove one cafe for consistent contamination. This was pleasing to see as low contamination is essential for any cost effective product stewardship program.

100%
of respondents found it eaasy to put their coffee grounds into the dedicated bin.

85%
of respondents found the weekly collections convenient. Comments were that they would have preferred collections 2 times a week.

84%
saw no issues having a coffee ground bin on their premises.

Key learning 4: Improving site assessments

In the initial weeks of the trial we had some challenges with collections which lead to delays and a number of missed collections for cafes. We identified the issues that lead to this with Bingo.

Key learning 5: Improving collection communications

We found a majority of missed collections were due to cafes forgetting to put their bins out. Improved communications with cafes has the potential to improve collections through reminders.

Process improvements

- 14 working days between cafe registrations and bin delivery will ensure logistics partners have enough time to contact cafes and arrange a site assessment.
- Cafes will be made aware at registration that a site assessment must take place before their bin will be delivered so they can anticipate a call to arrange this visit.
- No bin will be delivered without a full site assessment taking place.

Process improvement

- We implemented a text reminder service. Feedback was that this was a suitable way to communicate with busy cafe workers.
- We also agreed that the logistics partner should contact any cafe who have had 2 consecutive failed collections.

Communication to cafes

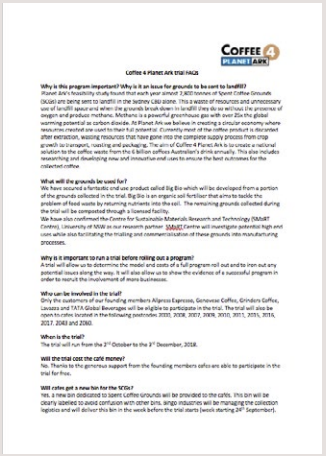
We diversified the way we communicated with cafes throughout the trial to help determine the best way going forward.

We established an online ‘one stop shop’ portal for cafes to register and to download information sheets and promotional materials. This site is optimised for mobile for ease of use for busy cafe workers, managers and owners. The info sheet, promotional material and FAQ documents can all be downloaded from this site.

Cafes were also visited and hand delivered a Coffee 4 Planet Ark info sheet, FAQ document and a promotional poster featuring their coffee roaster.

92%

of cafe respondents were happy with the information provided about the trial.



Key learning 6: Communication Frequency

We received feedback from cafes that they were receiving too many calls regarding the program.

Process improvements

Improvements in the registrations and collection processes will reduce the need for this communication in the initial weeks. We also implemented a text service for reminders of collection days and this has worked well for busy cafe owners and managers.

Key learning 7: Promoting cafe involvement

Upon collecting feedback from cafes we found that all of those who promoted their involvement did so by word of mouth. While this is an excellent outcome and we are very happy cafe owners are sharing the story with customers there does seem to be more opportunity to promote via over-the -counter material.

Process improvements

While the above promotional material was available to cafes, there is a need to communicate the material more effectively to ensure cafes make use of it and increase brand awareness of the program to consumers. EDMs or text notifications could be an effective way to do this.

Key learning 8: Engaging cafes

Another challenge was working with some cafes that were not fully engaged in the program so were therefore difficult to contact.

Process improvement

Out of convenience to cafe owners and staff, some cafes were registered by the roaster on behalf of the cafe. This led to some out-of-date information at registration and some contacts who weren't engaged in the program. We plan to overcome this challenge through having cafe owners or managers strictly register themselves so they have an understanding of what will be required of them.

Cost of the trial

The trial was run within the inner city of Sydney as this was the highest concentration of cafes and would allow us to experience a program with the most difficult collections. The chosen trial boundary provided challenges such as liaising with building managers for access, increased time taken to complete collections due to accessing loading docks and restricted daytime truck movement within the CBD. **When compared to collections in non CBD areas, such as Alexandria, we found that it took longer to complete collections within the CBD therefore costs were higher using our current collection model.**

To run this program in its current state with 30 cafes involved would cost $6.51/kg of *DCBs* sold into participating cafes. This is 8c per cup of coffee and 2.23% of the *retail price of coffee*.

Program costs when scaled up

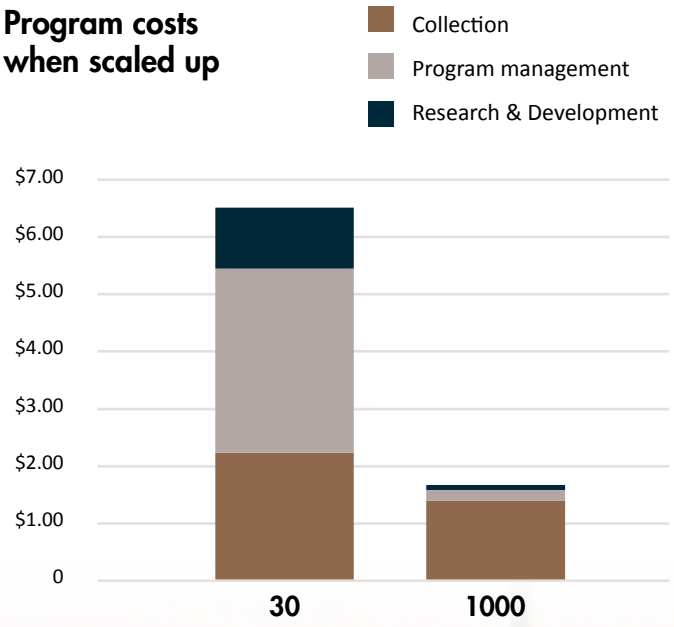


Figure 3: Projections of program costs when the program is scaled up

Key learning 9: Costs

A major key learning out of the trial was that when the program is scaled up, collection costs account for approximately 85% of the total cost of the program.

Process improvements

This learning has shown that reducing and keeping collection costs stable will have a big impact on the total cost of the program. For this reason we have proposed a new collection model that will allow us to better control collection costs going forward. This system is explained in detail on page 17.

Key learning 10: Minimum coffee volumes

During the trial we allowed cafes to join if they went through a minimum of 10kg of *DCBs* per week. Due to the cost of collections per bin we have found that this minimum amount is too low so financially unfeasible.

Process improvements

Going forward cafes will have to go through a **minimum of 25kg *DCBs*** in order to be included in the Coffee 4 Planet Ark collection system. This minimum 25kg *DCBs* would not apply to single locations who aggregate their grounds eg. a shopping centre. We will reassess this limit over time with the aim to include lower limits in the future.

Costs: Collection only

Collection costs account for a majority of the cost of the program, approximately 85% of the costs when the program is scaled up to a feasible size. For this reason in this coming section we are going to discuss and compare the costs for collection only as they have the potential to have a big impact on the full costs of the program. The minimum program management and R&D costs are fixed.

The collection costs discussed below do not include program management and R&D.

Using the current collection method and collecting from 30 cafes, our collection costs are currently $2.24/kg of dry coffee beans or 8c per cup of coffee, accounting for 2.23% of the *retail price of coffee*. Our aim is to develop a collection model with collection costs of $0.80 or less than 1c per cup of coffee, accounting for 0.27% of the *retail price of coffee*.

Figure 4 below shows the cost projections for our current collection model in Sydney. This graph shows that the price fluctuates as we scale up cafes as multiple trucks are needed to complete these collections.

Collection costs – Current Sydney collections

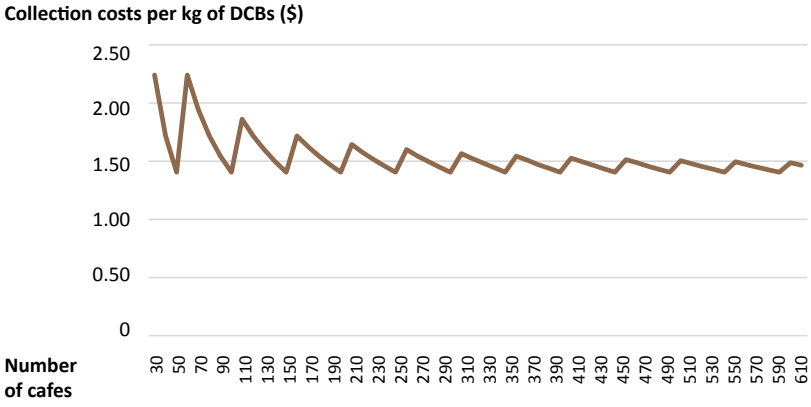


Figure 4: Projection of collection costs for our current collection model

We have anticipated that this cost will be too expensive, and the fluctuation of costs proves a risk to the program. Therefore we have modelled an alternative collection system that will ensure collection costs remain feasible and stable as we scale up to a critical mass of coffee. More details on this collection system are outlined on page 17.

Aggregated collections

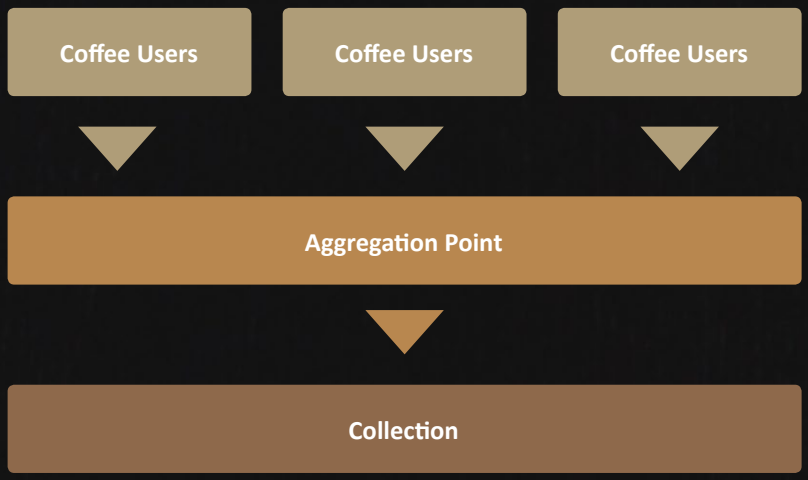
We have found that the collection costs account for the majority of the full program costs. Therefore a more simple, cheaper collection model will greatly improve the feasibility of a future program.

We modelled a system where we are collecting from an aggregated point, for example a shopping centre with high volumes. This found that the collection costs could be reduced to approximately $0.50/kg of *DCBs*. This accounts for less than 0.6c per cup and 0.17% of the *retail price of coffee.*

Melbourne corporate collections

Tata Global Beverages via their Map Coffee brand joined as a Founding Member to allow us to run a separate trial in Melbourne to have the grounds from their corporate customers collected and recycled.

Map Coffee uses reverse logistics model to collect and consolidate their grounds. Cost modelling for this system has shown that the collection costs sit under $0.50/kg of *DCBs* sold, again accounting for less than 1c per cup of coffee and 0.17% of the *retail price of coffee*.



This model could be repeated for other companies if they could also aggregate their grounds as TATA Global Beverages is currently doing for their corporate customers.

Using these findings we are able to model that we could potentially offer 2 cost models for members: those who aggregate their grounds and those with regular collections from cafes or other establishments who sell coffee.

Table 1: Comparison of cafe and aggregated collections.

Comparisons of collection costs			
Type of collection	**Cost/kg of coffee beans**	**Cost per regular coffee**	**Percentage cost of a regular coffee**
Current collections from cafes	$2.24	2.6c	0.77%
Collection from aggregated point	$0.50	0.6c	0.17%

Learnings from coffee grounds aggregation are having an immediate impact with customers. One great example of this is a large, multi site customer who is facilitating having collection bins at their main building for coffee grounds to be taken directly to their destination. It's a model we predict will be quickly adopted once benefits are shown industry wide.

It is important to note that a major finding of this trial is that the ability to aggregate SCGs, such as for Map Coffee customers in Melbourne or other models such as reverse logistics, significantly reduces this cost and also improves the footprint of the collections.

Future program

Future costs

An aim of the trial is to develop a cost for the full program as a cost per kg of *DCBs* sold into participating cafes. When the program has been fully developed, this amount will cover the full ongoing costs of the program including all collection and logistics, program management and research and development costs.

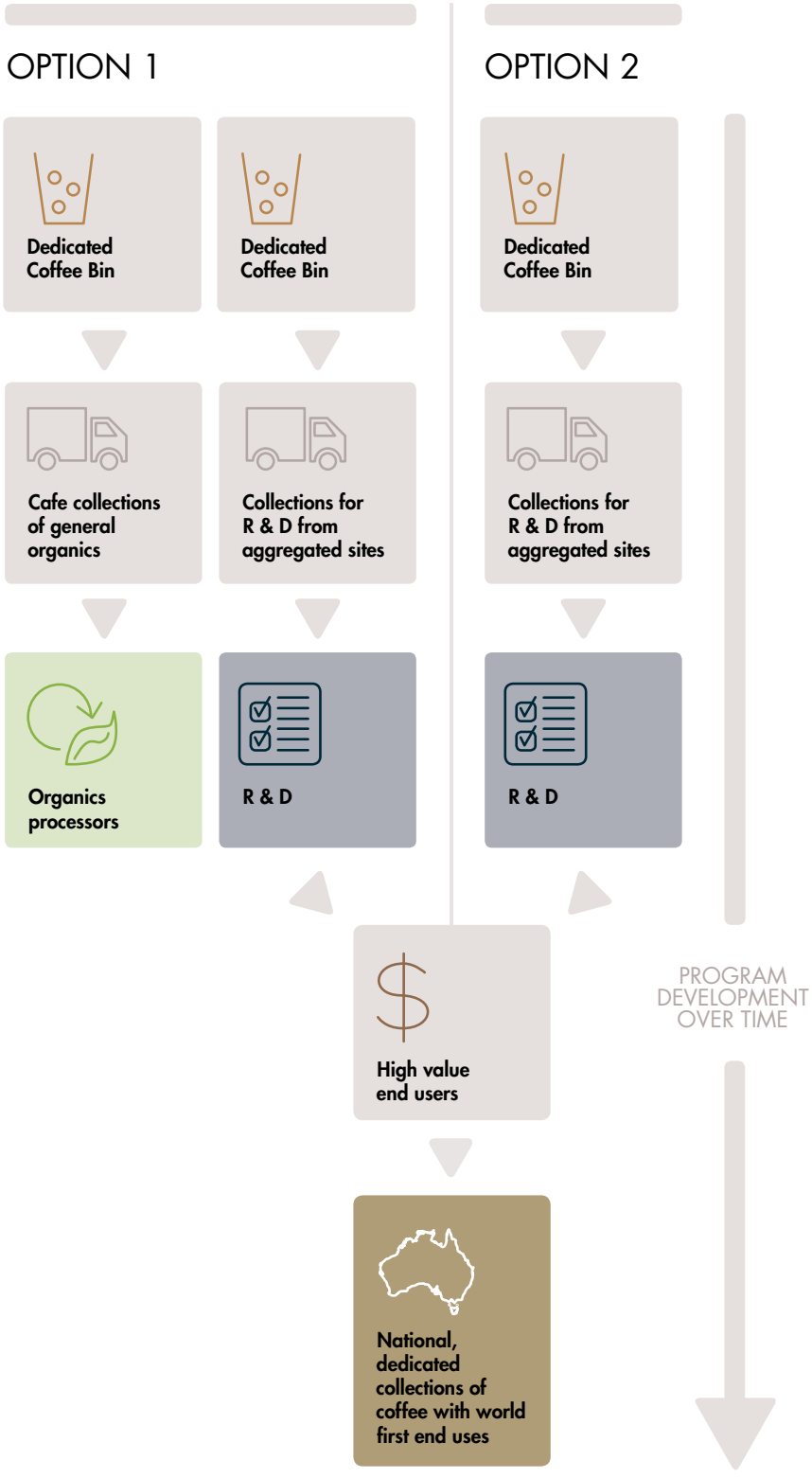
The confirmed amount will be billed to Program Members based on the *DCBs* purchased by their participating cafes. Program Members will supply Planet Ark with the sales data for their participating cafes and will be charged based on this total figure.

Program members will supply PA with purchased amounts of participating cafes

Planet Ark will charge program members based on this number

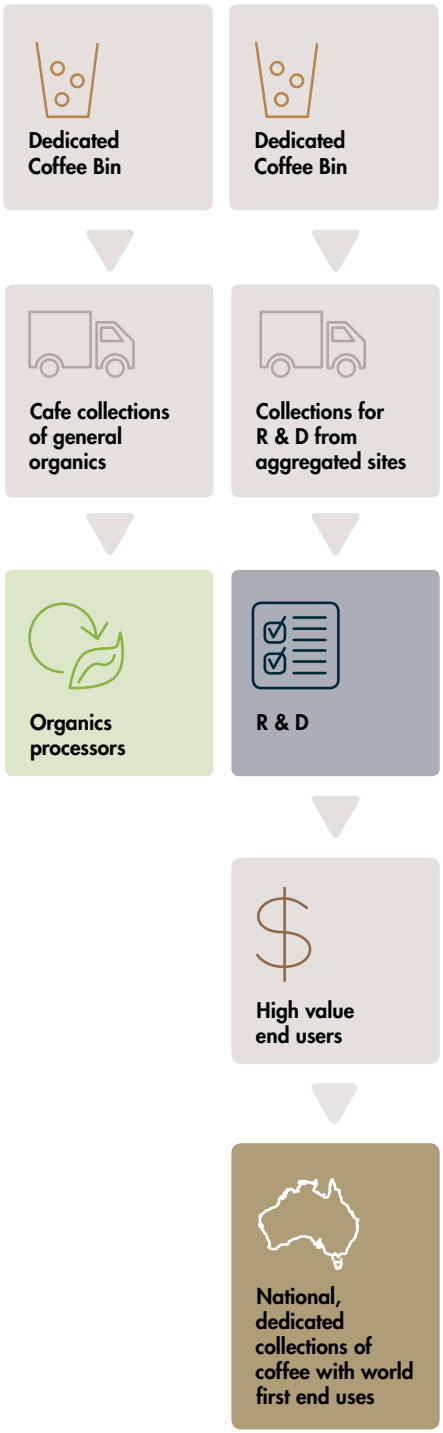
Options for future programs

We propose 2 options for the future of the program, both of which allow us to reach our end goal of creating a national collection program with high value end uses.



Proposed future program: Option 1– full program

OPTION 1



	Year 1	Future years
Fixed ($)	$40k - $10k Cost dependent on number of industry participants	NA
Variable ($/kg of DCBs)	$0.80	$0.97 Final determination of this cost at end of year 1

Table 2: Program Option 1 costs in year one and subsequent years of the program.

Year 1 cost explanation

In order for Planet Ark to run a viable program we need to cover a weekly cost of collection, program management and minimum dedicated R&D costs. In the long term all these costs will be included in the $/kg amount for the whole program. In the first year, until we scale up to a significant volume, we aren't able to cover our costs in this method due to the relatively low volume of grounds that will be collected.

For this reason we propose a model with a one-off cost to cover the program management and R&D costs for the first year. Collection costs will be charged as $0.80 per kg of *DCBs* sold into participating cafes. This is less than 1c or 0.27% of the *retail price of coffee*.

The one-off cost is significantly reduced with more participation for the industry.

Number of members	One-off cost per member
5	$ 40,000
6	$ 33,333
7	$ 28,571
8	$ 25,000
9	$ 22,222
10	$ 20,000
15	$ 13,333
20	$ 10,000

Future years cost explanation

From the second year of the program we will switch to a model where we will build all costs (collection, program management and R&D) into a $ amount per kg of *DCBs* sold into participating cafes.

Based on a minimum of 1,000 cafes participating, our estimate is that the program will cost $0.97 per kg of *DCBs.* This is 1.1c or 0.33% of the *retail cost of a cup of coffee*. The graph below shows the viability of running a program for $0.97 when scaled up to minimum of 1000 cafes for example.

Figure 6 below shows the financial flows for the Coffee 4 Planet Ark program.

Cost reductions when program scaled up

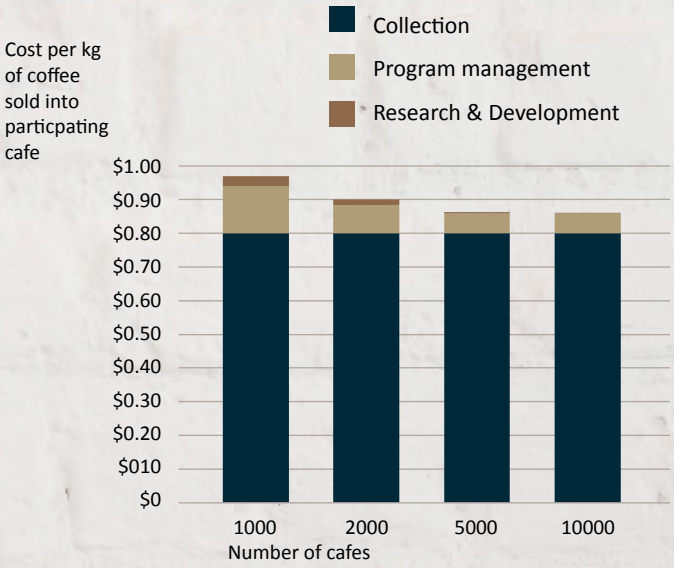


Figure 5: Breakdown of full program costs when program scaled up

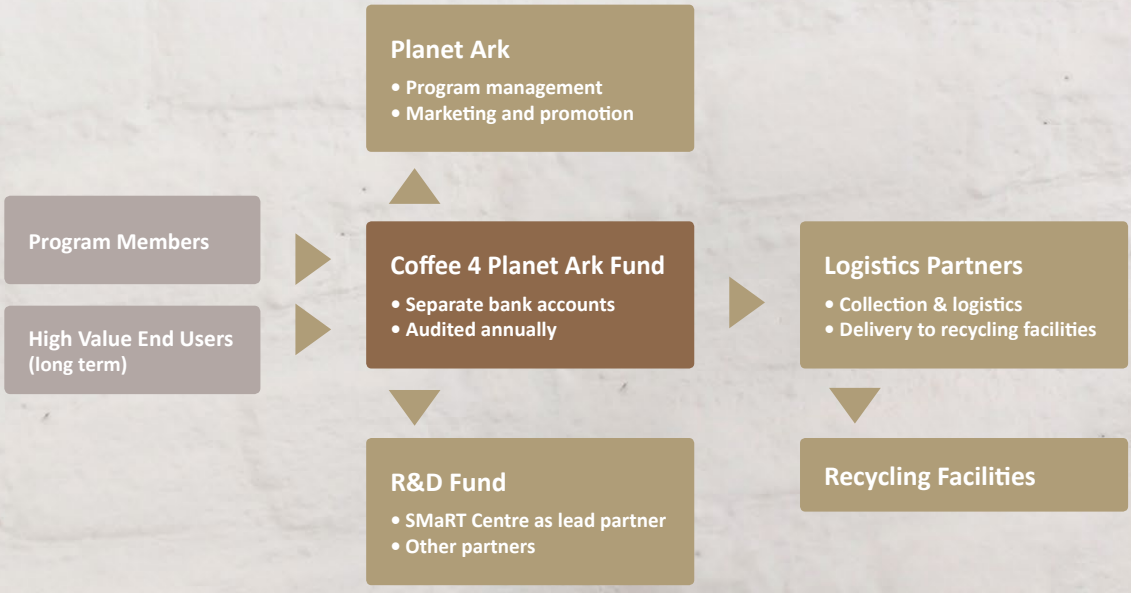


Figure 6: Coffee 4 Planet Ark financial flows

Switching to a general organics collection

The findings from our trial show that with a small number of cafes, the $/kg program cost is high. While this was anticipated at the beginning of the trial, we have found that the use of a dedicated truck is not feasible until we have a large network of participating cafes.

We propose that we switch collections to a general organics collection system until such time as we either:

- **Have a confirmed value for the spent coffee grounds through R&D. OR**
- **Have scaled up to allow for a full run of coffee collections.**

The benefit of this approach is that it will allow collections to begin anywhere that organics collectors currently service and will ensure collection costs remain consistent no matter the number of cafes we have involved.

Dedicated coffee bins will still be used but these bins will be collected in a truck with other organics. We will also be sourcing a site that can offer us a high volume, single stream of coffee grounds, for example a shopping centre or airport, for R&D purposes.

The graph below shows that, even with a small number of cafes participating, a model using a general organics collector allows us to keep collection costs stable until the program is scaled up. Note this graph is comparing collection costs only and doesn't take program management and R&D into account.

Comparison of current collection vs general organics collection costs

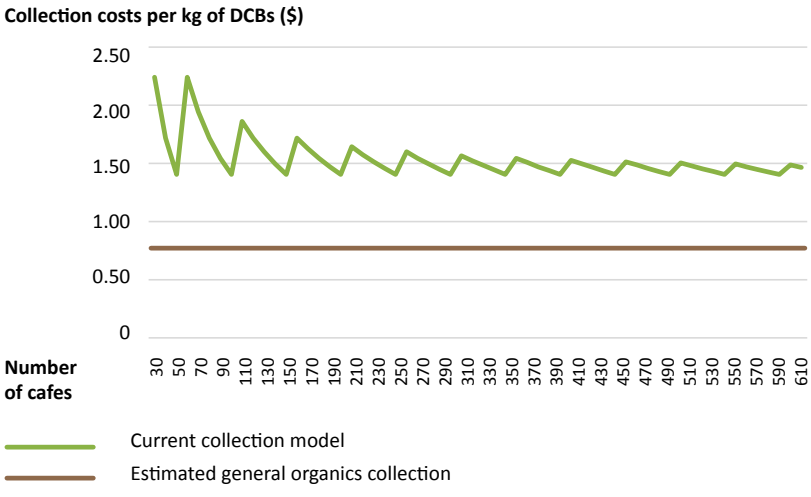


Figure 7: Projection of collection costs for current collections vs proposed general organics collections.

Benefits of this system

- *SCGs* will be kept out of landfill, reducing emissions by 600kg of carbon dioxide equivalent (CO_2e) per tonne of coffee collected.
- Data will continue to be collected regarding volumes needed to trial coffee as a resource in manufacturing once we have reached the volume required.
- The program can be scaled up while keeping the collection costs stable.
- Behaviour of cafe employees separating coffee grounds will continue to be developed.
- Marketing and promotion of the program can continue and drive program uptake.

RISKS	MITIGATION
Grounds won't be separated from organics in the collection truck. This may lead to confusion for cafe workers and owners who don't understand why they are carefully separating grounds. It also means that we aren't able to give grounds to end users easily and will need to change the process to a dedicated truck when there is a demand for the spent coffee grounds.	Transparent communication with program participants will allow us to explain that mixed organics collections are a temporary measure while we scale up the program. Education and updates about any R&D progress will help to explain the importance of keeping grounds separate to program participants.
We will need to change over the collection model once we scale up to make it feasible to use a dedicated truck.	We will have control over when this change will occur and with how many cafes. It will be possible to slowly roll out dedicated trucks depending on the demand for single stream SCGs to control the impacts of the cost of the program.
Cafes may include their other organic waste in their collections which we will then be paying for. It will be hard to monitor this.	A strong education campaign into the benefits of keeping the grounds separate, and open and transparent communication regarding the benefits of separation. We will also look to randomly audit bins and liaise with cafes if this is an issue going forward.

Selection of logistics provider

In the full program roll out we will be putting our collection and logistics agreements out to tender. The tender requirements may include the following:

- Competitive cost of collections and logistics.
- Ability to service multiple locations.
- Assessment of end use (eg. composting or anaerobic digester).
- Environmental credentials.

Proposed future program:
Option 2 - R&D

OPTION 2

Dedicated Coffee Bin

Collections for R & D from aggregated sites

R & D

High value end users

National, dedicated collections of coffee with world first end uses

COST
Annual membership fee: $14,000 per member

In the event that the industry decides against the collection system at this stage, there is an option to temporarily stop collections from cafes and focus on R&D. Any income increase from additional uptake of members would result in more funding towards R&D, hence speeding up the outcomes.

Under this model we would look to secure a partner with a high volume of aggregated coffee who could supply any potential R&D trials, such as a shopping centre or airport.

Figure 8 below shows the potential impact of R&D developments on the full program costs. It outlines 3 potential scenarios:

- The removal of tipping costs
- High value end use (1): Coffee valued at $100/T. This assumes coffee is used as a lower value material such as building material.
- High value end use (2): Coffee valued at $200/T. This assumes coffee is used as a higher value material such as in battery production.

This shows that in the future it is feasible to run a full program at a cost of between $0.80 and $0.85 when scaled up and with investment into R&D. Further reductions in program costs will also occur as we scale up over time.

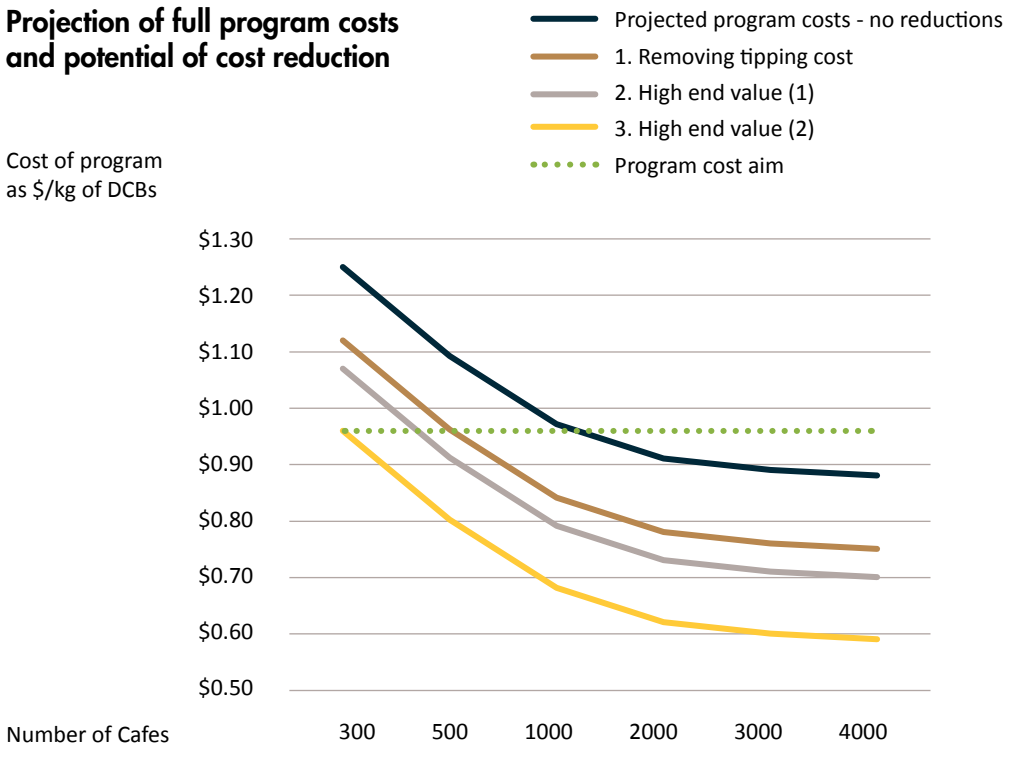


Figure 8: Potential to reduce program costs through R&D developments.

Program Governance

Figure 9 below shows the governance for the future program.

Importantly, we will be establishing an industry advisory committee to guide the future development of the program.

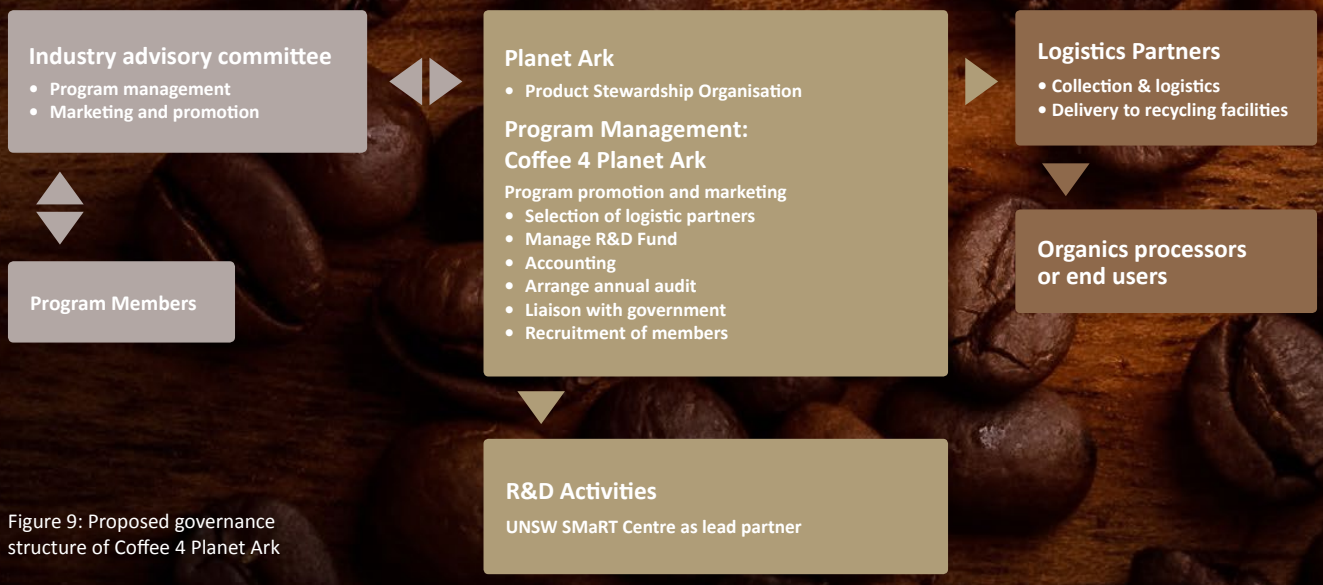


Figure 9: Proposed governance structure of Coffee 4 Planet Ark

Conclusion

Planet Ark sees a future where the impacts of all products – including an end of life solution – are considered in their creation and consumption. Planet Ark calls on the coffee industry to support a voluntary product stewardship program for coffee.

The production nature of spent coffee grounds means they are a single, source-separated and generally uncontaminated resource steam. A barista extracts the coffee with the grounds disposed into a knock tube which can then be emptied into a separate bin. By keeping the grounds separate, we can easily take advantage of coffee grounds' useful properties.

This trial has allowed Planet Ark to propose a business model which can effectively scale up a national collection system for coffee grounds. The next stage will focus on bringing down program costs through applied R&D to develop and commercialise a high-value end-use.