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Recycling Programs Economic Impact Assessment

Alberta Recycling Management Authority

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Report for Alberta Recycling

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Disclaimer

Executive Summary

The Alberta Recycling Management Authority (Alberta Recycling) was established to provide a "sustainable Alberta Recycling solution for designated materials that is a model of excellence, environmentally responsible, and economically viable."[1]

Alberta Recycling is a delegated administrative organization (DAO) under the Designated Material Recycling and Management Regulation, passed in 2004,[2] tasked with operating recycling programs for designated materials, which now include:

- Paint (including containers);
- Electronics;
- Tires; and
- Used Oil (including oil filters and containers).

Alberta Recycling has enabled Albertans to recycle millions of units of electronics, tires and litres of paint as well as billions of litres of used oil over the past nearly thirty years. The electronics, tires and paint programs diverted approximately 74,965 tonnes in total from landfill in 2017-2018.

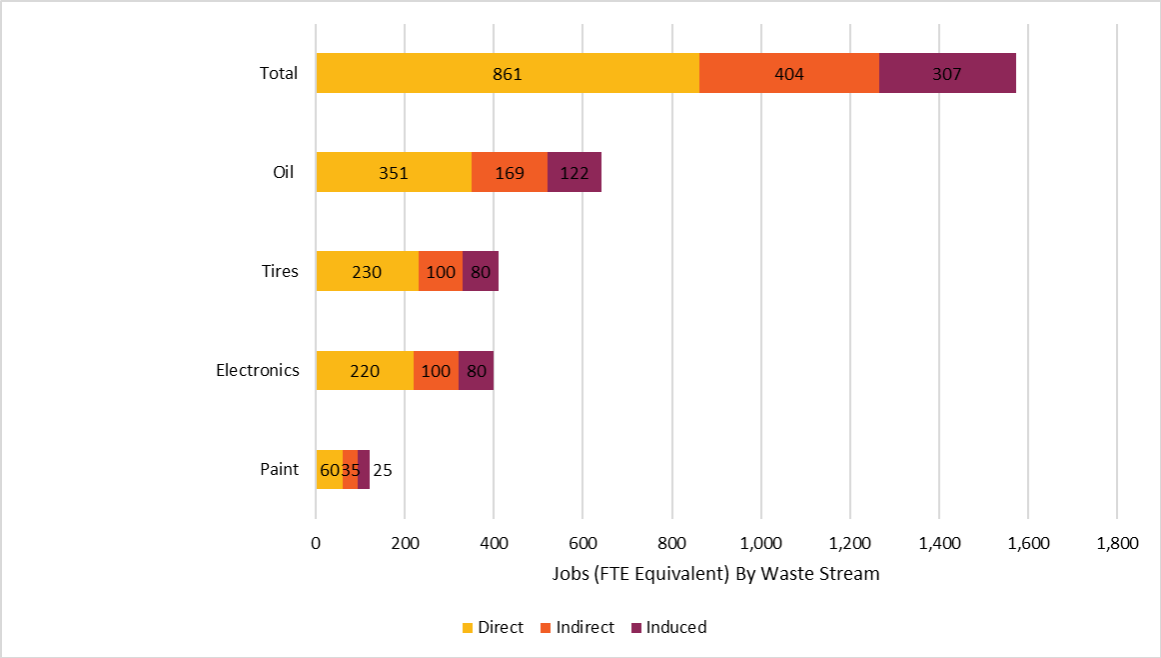
Alberta Recycling programs provide environmental, social and economic benefits to Alberta. Eunomia Research & Consulting, Inc. (Eunomia) conducted an evaluation of the programs to examine the economic impact across the whole value chain, including downstream impacts and to quantify the benefits they provide to the Alberta economy and all Albertans.

Interviews were conducted with all available organizations involved in the processing and the local downstream recyclers of products from material returned though the Alberta Recycling programs. These interviews formed the basis for modelling the total full-time equivalent (FTE) jobs created and gross value added (GVA) to the Albertan economy.

Currently, the Alberta Recycling programs are responsible for 1,570 FTE jobs across the four material types, as well as $180 million in GVA. Figure E 1 provides a breakdown of jobs created across the four Alberta Recycling programs.

[1] https://www.albertarecycling.ca/about/vision-mission-goals/
[2] http://www.qp.alberta.ca/1266.cfm?page=2004_093.cfm&leg_type=Regs&isbncln=9780779792108

Figure E 1: Current FTE Jobs Created, by Program



Source: Eunomia calculations.

Across the programs, the four material types have a combined downstream job intensity of 13 FTE jobs per 1000 tonnes in the downstream portion of the value chain. Paint is the greatest contributor to this conclusion, on a per tonne basis, as it has downstream job intensity of 11 FTE jobs per 1000 tonnes of material. However, the tonnage in the paint program is such that the total amount of jobs in the remanufacturing sector is lower than those of the other programs.

In addition to quantifiable economic impact, the Alberta Recycling programs drive innovation and allow local companies to create products within the province without requiring the use of virgin materials.

Especially notable in their value chain benefits are the tire and paint program, both of which process recycled materials and create new consumer-ready end-products, all within Alberta. The paint program re-blends leftover latex paint into new paint and has innovated a process to use dry latex paint as an input in cement manufacturing. Tire processors create tire derived aggregate for civil engineering projects or mulch, or crumb that is used in the manufacturing of roofing tiles and playground flooring.

The Alberta Recycling programs facilitate the existence of these industries within the province. The intensity of jobs per tonne in processing (10.9 jobs/1000 tonnes) and downstream manufacturing (19.2 jobs/1000 tonnes) in the paint program highlights the

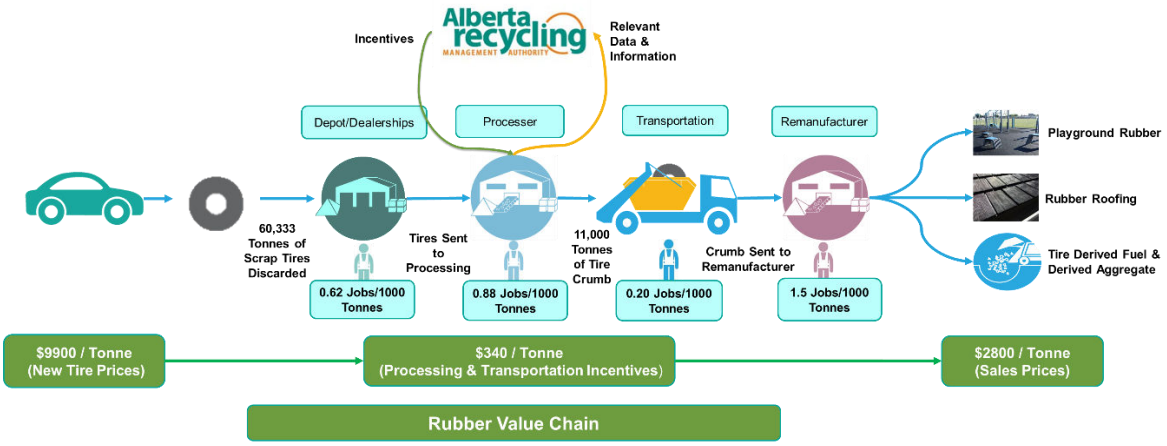
industry created by the existence of the Alberta Recycling program. This contrasts with the electronics program, which does not have much local downstream manufacturing, where the processing job intensity (20.5 jobs/1000 tonnes) is much greater than the downstream manufacturing job intensity (1.5 jobs/1000 tonnes).

The programs are product stewardship programs and funded by environmental fees placed on products when they are sold. These fees cover incentives to registered collection sites and processors.

In addition to changing the fee structure, the benefits of the Alberta Recycling programs could be amplified by expanding the scope of the materials collected. Under an expanded system with a broader scope, the Alberta Recycling programs would be responsible for 1,805 FTE jobs and $204 million in GVA.

Recycling of old, unusable products is an essential component of a circular economy. By transforming products into new products that are placed on the market, not only is waste diverted, but virgin materials are saved, providing a win-win for both the economy and the environment. The tire program is an example of a best practice, illustrated in Figure E 2.

Figure E 2: Tire Crumb Best Practice[3]



Alberta Recycling already provides a valuable service to all Albertans as well as to the local recycling industry that has sprouted around the existence of its programs. From recycling to creating downstream manufacturing jobs, expanding both the scope of the existing programs and expanding its contributions would allow the organization to amplify its impact and continue to create a better environment and economy for all Alberta.

[3] Crumb incentive information supplied by Alberta Recycling

Contents

1.0 Introduction

The Alberta Recycling Management Authority (Alberta Recycling) was established to provide a "sustainable Alberta Recycling solution for designated materials that is a model of excellence, environmentally responsible, and economically viable."[4]

Alberta Recycling is a delegated administrative organization (DAO) under the Designated Material Recycling and Management Regulation, passed in 2004,[5] tasked with operating recycling programs for designated materials, which now include:

- Paint (including containers);
- Electronics;
- Tires; and
- Used Oil (including oil filters and containers).

Alberta Recycling has enabled Albertans to recycle millions of units of electronics, tires and litres of paint as well as billions of litres of used oil over the past nearly thirty years. Together, the programs diverted approximately 74,965 tonnes from landfill in 2017-2018.

The Alberta Recycling programs are product stewardship programs funded by regulated environmental fees that are charged to producers and suppliers on the sale of these materials into Alberta.[6] These fees are passed onto consumers by producers and suppliers and added to the sales costs of new materials. Specific fees are described in each program description, Sections 2.0 through 5.0, below.

Alberta Recycling programs consistently outperform similar programs operating in Canada. In the period between 2011 and 2016, Alberta Recycling programs performed better than the average in terms of material collected and cost:

- The Paint Recycling Program recovered 10% more material than average at a cost that was 23% lower;
- The Tire Recycling Program recovered 47% more material than average at 3% lower cost; and
- The Electronics Recycling Program collected 15% more material than average at a 4% lower cost.[7]

[4] https://www.albertarecycling.ca/about/vision-mission-goals/
[5] http://www.qp.alberta.ca/1266.cfm?page=2004_093.cfm&leg_type=Regs&isbncln=9780779792108
[6] http://www.qp.alberta.ca/1266.cfm?page=2004_093.cfm&leg_type=Regs&isbncln=9780779792108
[7] 2017-2018 Alberta Recycling Annual Report

Alberta Recycling programs provide environmental, social and economic benefits to Alberta. However, the full value of these programs cannot be appreciated without an analysis of their economic and employment impacts. In 2018, Eunomia Research & Consulting, Inc. (Eunomia) conducted an evaluation of the recycling sector in Alberta. While the Alberta Recycling programs were included in this analysis, that report did not examine in great detail the downstream impacts of the Alberta Recycling programs.

This study goes further in exploring the whole value chain associated with the Alberta Recycling programs to quantify the benefits that these programs provide to the Alberta economy and all Albertans.

Though Alberta Recycling's programs perform better and more cost effectively than those in other provinces, the scope of materials collected is narrower. The narrow scope, especially in the electronics program, limits the potential impact of the program to increase recycling. This fact highlights the opportunity for expansion that would amplify the impact and further the benefits across the province, increasing the recycling rate, decreasing material sent to landfill and reducing the reliance on virgin materials to manufacture new products.

1.1 Methodology

1.1.1 Data Collection

In order to determine, as accurately as possible, the economic impacts associated with the Alberta Recycling programs, first-person interviews were conducted with as many organizations as possible across the value chain. For those organizations with which interviews were unable to be scheduled, assumptions were made based on the data gathered as well as information provided by the Alberta Recycling team. Appendix A.4.0 details the organizations that were contacted as part of the assessment.

1.1.2 Economic Impact Assessment

This section summarizes the approach taken to calculate the current economic benefits of the Alberta Recycling programs.

In common with other studies, the economic impact of recycling is measured in terms of the contribution recycling activities make to:

- employment; and
- overall economic contribution, measured as GVA.

1.1.2.1 Employment

In order to calculate the overall economic benefit of current recycling activities, an understanding of the tonnage recycled by program is needed. Alberta Recycling reports on the tonnage recycled through its programs every year. The annual progress reports were used to determine total tonnage recycled through each program.

Direct employment at processors, manufacturers and collectors was determined through interviews and assumptions, based on tonnage processed of organizations that did not provide details. Employment within the program varies widely among the players. While some jobs, such as office administration, may be full-time roles directly supported by the program, others, such as the drivers collecting the material may only have a portion of their time associated with supporting the Alberta Recycling programs specifically. However, the hours spent by individuals engaging with the system are used to calculate the number of full-time equivalent (FTE) jobs.

Direct employment is not the only employment benefit derived from the Alberta Recycling programs. Direct employment produces ripple-effects through the economy which create additional benefits. The first of these are indirect impacts which represent;

> *"the accumulation of purchases from other industries…that are needed to provide for the level of economic activity specified in the direct effects."*[8]

Indirect jobs can be created through activity associated with the direct functioning of the system (e.g. a recycling plant purchasing processing equipment). All indirect jobs calculated are those which occur within Alberta as a result of the Alberta Recycling programs.

The second category are induced effects which are based on;

> *"the change in income that would occur from the direct and indirect economic activity."*

Induced effects are changes in household consumption arising from changes in employment and associated income (which in turn results from direct and indirect effects) in Alberta. For example, these may include additional spending by workers at the processing plant with their wages, as well as additional spending by equipment manufacturers with income received from sales to the plant.

By taking a ratio of direct, indirect and induced to the initial direct effects one can arrive at an economic impact multiplier.[9]

[8] Connecticut Economic Resource Center Inc. (2012) The economic impact on Connecticut from Recycling Activity

[9] In this study an economic impact multiplier of 1.77 is applied to estimate the indirect and induced effects.

1.1.2.2 Gross Value Added (GVA)

The Gross Value Added (GVA) measures the value of goods or services added in a sector of the economy. The economic impacts of the jobs created through the Alberta Recycling programs can be quantified by using salary data and using a standard multiplier.[10,11]

The GVA can also be used with standard tax rates to estimate the revenue that the government gains through income taxes.

2.0 Electronics

2.1 Current State

Electronics are collected in Alberta at depots as well as from retailers, such as Best Buy. Surcharges for electronics range from $1.20 to $10.00 for televisions and computer equipment and are paid by consumers at the point of sale.[12] The Electronics Designation Regulation of 2004 sets out maximum fees that can be placed on electronic products through the bylaws approved by Alberta Recycling.

In all, the province has 372 registered electronics collection sites run by municipalities and Indigenous Communities.[13]

Once collected, these electronics are then transported to registered electronics processors who disassemble the electronics and sort the various parts by material. There are currently six registered electronics processors operating across Alberta.[14] This process is largely manual and requires dedicated laborers who work to recover the commodities inside electronics, including valuable precious metals. Smaller electronics processors will process all material through their Alberta facility, whereas larger processors will later use mechanical processing for commoditized materials, utilizing economies of scale to process remaining materials more cost efficiently. Ecycle Solutions, one of the largest electronics recyclers in Alberta, runs a shredding plant in Ontario, so secondary processing occurs at that facility.

[10] Sources for average salary data NY Bureau of Labor: https://labor.ny.gov/stats/lswage2.asp
[11] Conservatively assumed 70% of GVA is compensation of employees
[12] https://www.albertarecycling.ca/recycling-programs/electronics-recycling-program/
[13] 2017-2018 Electronics Recycling Program Progress Report, Alberta Recycling
[14] https://www.albertarecycling.ca/processors/registered-electronic-processors/

Then, the materials are sold or disposed of according to the best recycling methods available for each. Additionally, end markets for most material outputs from electronics recycling are sold on international commodity markets outside of the province.

2.1.1 Total Tonnage

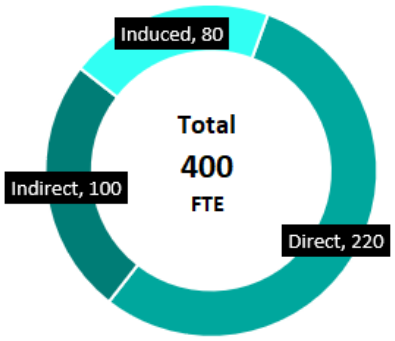
In total in the 2017-2018 year, there were 11,992 tonnes collected through the electronics program. This corresponds to approximately 602,000 units of TVs, computers and monitors.[15] Since 2004, 9 million units of electronics have been collected through the electronics recycling program.

The tonnage of certain electronics materials collected, including glass and plastic, has fallen in the past few years on a year-to-year basis, due to lower sales and product design changes including multi-functional units, light weighting and miniaturization (including decreasing supply of cathode-ray-tube televisions and monitors). This trend is consistent among the other electronics recycling programs across Canada.

2.1.2 Employment

Through the Alberta electronics recycling program, there are approximately 220 people directly employed in Alberta, as seen in Figure 2-1. Altogether, there are 400 total FTE jobs associated with the electronics recycling program in Alberta. The Alberta electronics recycling program generates 1.1 FTE jobs/1000 tonnes in collection, 2.6 FTE jobs/1000 tonnes in transportation, 21.4 FTE jobs/1000 tonnes in processing and 3.0 jobs/1000 tonnes in downstream manufacturing, as shown in Figure 2-2.

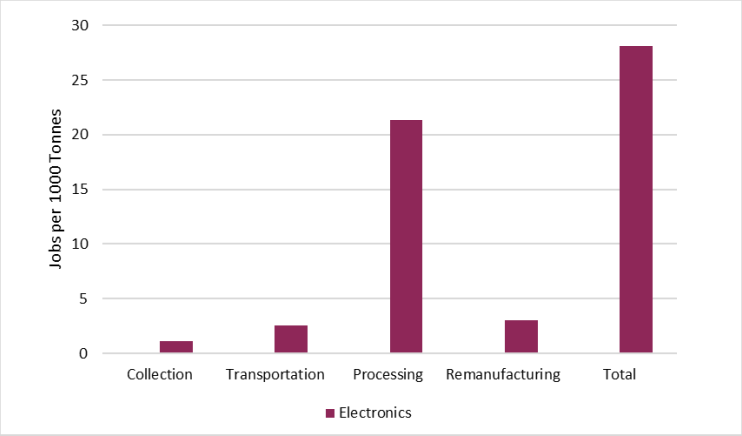
Figure 2-1: Jobs Created by Alberta Electronics Recycling Program



[15] 2017-2018 Electronics Recycling Program Progress Report, Alberta Recycling

Source: Eunomia calculations.

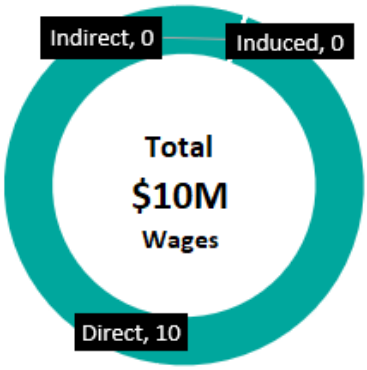
Figure 2-2: Electronics Jobs per Thousand Tonnes by Process



2.1.3 Economic Impact

Associated with the jobs created through the electronics recycling program, $10 million in wages are paid to employees, which contribute to a healthy economy in Alberta. Figure 2-3 illustrates the breakdown for direct, indirect and induced wages paid to employees associated with the program.

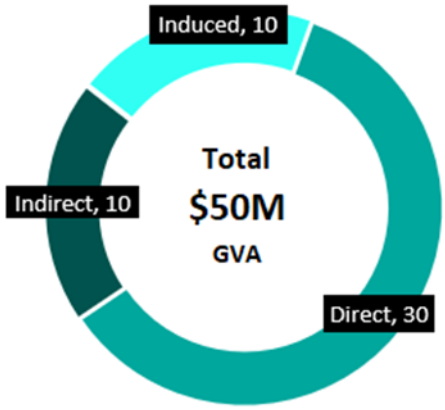
Figure 2-3: Total Wages Paid Associated with the Electronics Recycling Program



Source: Eunomia calculations.

Through the current Alberta electronics recycling program, the GVA, including indirect and induced impacts is approximately $50 million, $30 million of which is directly associated with employment by the processors of the program, as shown in Figure 2-4.

Figure 2-4: Gross Value Added of Electronics Recycling Program



Source: Eunomia calculations.

In Alberta, the Electronics Recycling Program generates about $1 million in taxes for the government through the jobs associated with the system.

2.1.4 Case Study: CPE Plastic Recycling

CPE Plastic Recycling

CPE Plastic Recycling, established in 2017 processes material collected from retailers and depots in Calgary, purchased from the collector URA. Two employees manually break down 10-20 tonnes of recycled electronics per month into their component parts.[1]

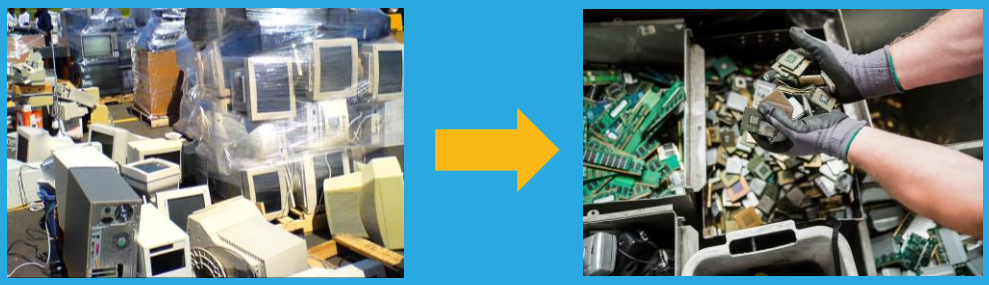


Photo sources: ucnj.org/; https://www.tryc2.com/e-waste-recycling/

After breakdown, CPE sells the valuable items, which include toner, LCD glass and circuit boards, to fellow electronics recycler (and one of the largest in Canada), GEEP. Baled plastic is sold to plastics recyclers.

CPE goes through 240 tonnes of plastic a year. This relates to 1 job in collection, 1 job in transportation, 5 jobs in processing and 1 job in downstream manufacturing. The GVA associated with CPE is just under $1 million.

CPE is partnering with another small electronics recycler, Hi-Tech Recycling, to apply to Alberta Recycling for assistance in funding the purchase of a shredder, which would allow the organizations to scale up their processing operations and create a larger electronics processing industry within Alberta.

Additionally, CPE looks forward to the potential expansion of the electronics recycling program to include small electronics such as microwaves and stereo equipment, which will provide them with much more raw material and allow them to scale.

2.2 Modernization

According to processors, the discussion on expanding the electronics program has been ongoing for the last decade. According to Alberta Recycling's 2017-2018 Electronics Recycling Program Progress Report, 75% of Albertans support expansion of the program.[16] Small, household electronics such as microwaves, toasters and stereo equipment are often cited as good candidates for inclusion in the program, with processors indicated that they already have the tools to handle such materials and that including them in the program would help to increase their business.

Indeed, many provinces in Canada already include such items in their electronics recycling programs. An overview of the scope of programs across Canada can be found in Appendix A.2.0. British Columbia has the most comprehensive program, which includes IT equipment and medical devices, among others, with Alberta's program being one of the most limited.

2.2.1 Additional Tonnage

Most electronics programs in Canada collect a wider list of designated electronics than Alberta (with the exception of floor standing printers), and most add audio/visual products. Using estimates of additional electronics placed on the market,[17] there is a potential increase of 12,300 tonnes that could be collected, if these materials were added to the Alberta program. Recovery rate estimates of 25%, 50% and 75% are shown in Table 2-1, below. Assuming a recovery rate of 50%, the additional recycled tonnage would relate to landfill cost savings equivalent to $1.3 million.[18]

Table 2-1: Estimated Weight of Electrical and Electronic Products Sold into Alberta Market (2012) and Estimated 50% Recovery Rate

Electronics Category	Estimated Units Sold into Alberta Market 2012	Estimated Tonnes Sold into Alberta Market 2012
Small Appliances	5,020,400	16,500
Audio visual	2,227,500	5,600
Telecom	763,900	800

[16] https://www.albertarecycling.ca/about/reports/

[17] Estimates of potential diversion through an expanded electronics program in Alberta are based on values developed for Alberta Recycling by Kelleher Environmental in 2012, in anticipation of expansion of the electronics program at that time. The list of products used for development of the estimates was the same as that used by EPRA and Canadian Electrical Stewardship Association (CESA) in BC.

[18] Refer to Morrison Hershfield 2014: Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs in BC, for further information on how avoided landfilling costs are estimated.

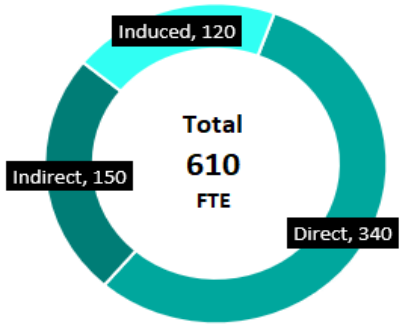
Electronics Category	Estimated Units Sold into Alberta Market 2012	Estimated Tonnes Sold into Alberta Market 2012
Power Tools	384,500	1,600
Total	8,396,300	24,500
Assumed recovery rate of 25%		6,200
Assumed recovery rate of 50%		12,300
Assumed recovery rate of 75%		18,400

Source: Estimates developed for Alberta Recycling by Kelleher Environmental, all numbers are rounded

2.2.2 Employment

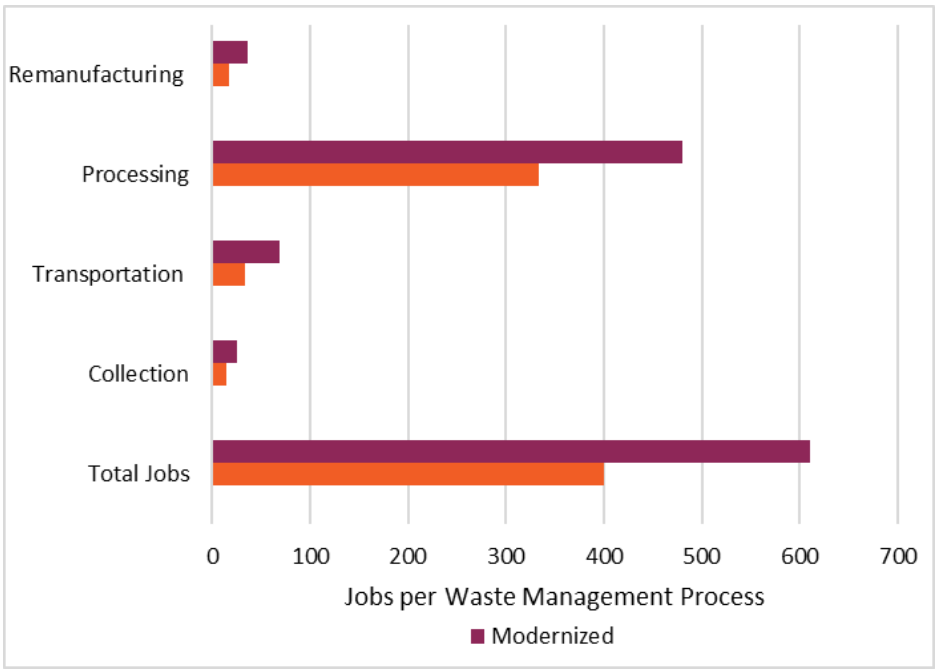
With an increased scope of the electronics recycling program, the jobs associated with the program proportionately increase. Assuming a 50% recovery rate of the items described above, there will be a diversion of an additional 12,300 tonnes of electrical and electronic products. This will lead to an increase in the direct, indirect and induced jobs. The number of jobs associated with the program increases 53%, from 400 jobs today to 610 jobs in the future, as seen in Figure 2-5. Figure 2-6 provides a breakdown of those jobs across each stage of the value chain. If considering 75% recovery, the number of jobs created rises to 760 FTE jobs.

Figure 2-5: Potential Jobs from Electronics Recycling Program Under Modernization with 50% recovery



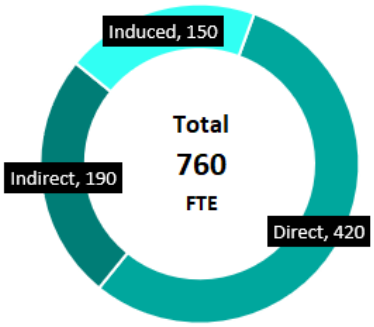
Source: Eunomia calculations.

Figure 2-6: Jobs across Value Chain of Electronics Program Currently and Under Modernization with 50% Recovery.



Source: Eunomia calculations.

Figure 2-7: Potential Jobs from Electronics Recycling Program Under Modernization with 75% Recovery

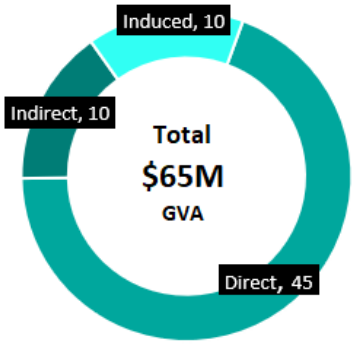


Source: Eunomia calculations.

2.2.3 Economic Impact

Like employment, with the increase in scope and tonnage associated with an expanded electronics recycling program, there will be an increase in the associated GVA and tax revenue. Through the increase, there will be a new potential total GVA of $65 million. Tax revenue rises from $1 million currently to a future potential total of $1.8 million.

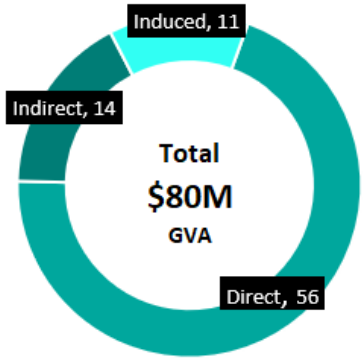
Figure 2-8: GVA under modernization with 50% Recovery



Source: Eunomia calculations.

If we assume a recovery rate of 75% where total FTE jobs rises to 760, the total GVA increases to $80 million.

Figure 2-9: GVA Under Modernization with 75% Recovery



Source: Eunomia calculations.

2.2.4 Case Study: eCycle Solutions

eCycle Solutions

eCycle Solutions is one of the largest electronics recyclers in Canada. Incorporated in Alberta in 2005, they now have plants in British Columbia, Ontario and Quebec in addition to Alberta. In total, eCycle processes about 35,000-40,000 tonnes a year of electronics waste per year, with about 5,000-6,000 tonnes of that coming from Alberta.

Like CPE, most of the breakdown of electronics is by hand, in order to recover the most valuable components, like circuit boards and toner. eCycle also has a shredder at a centralized facility in Ontario to which it ships much of the commodity materials there for processing.

In addition to collecting discarded electronics from depots across Alberta, eCycle has a partnership with Best Buy, Visions Electronics and Staples to collect discarded electronics from their stores.

Overall, eCycle employees approximately 250 employees, but only 25-40 (depending on the season) of those are in Alberta. They have a ratio of about 8 plant workers for every manager on staff. In direct, indirect and induced employment, eCycle's Alberta based tonnage relates to 6 FTE in collection, 13 FTE in transportation, 100 FTE in processing, and 7 FTE in downstream manufacturing.

In terms of economic benefit, eCycle is responsible for $1.4 million in GVA.

Of the material that they collect, eCycle estimates that there is approximately 96% diversion from the landfill, though some additional by-products may go to the landfill through further processing downstream (i.e. slag from the smelter).

Due to the nature of the commodity material that are created from their recycling process, very little of eCycle's product is sold in Alberta, save for some steel that is easily recoverable. Most material needs to be shredded and goes to Ontario plant, from which it is shipped to approved local and international markets.

3.0 Paint

3.1 Current State

The paint recycling program, managed by Alberta Recycling, has led to a growing paint recycling industry in Alberta. Beginning in 2008, Albertans have been able to return their leftover paint and paint containers for recycling. The Paint and Paint Container Designation Regulation of 2007 set maximum surcharges for paint and paint containers for producers and suppliers, which were adopted through the Paint Recycling Bylaw by Alberta Recycling and are passed on to the consumer as environmental fees on products sold. [19]

Surcharges on paint are charged based on volume containers sold, as described in Table 3-1.

Table 3-1: Paint Surcharges

Volume of Paint Container	Surcharge Amount
100ml to 250ml	$0.10
251ml to 1L	$0.25
1.01L to 5L	$0.75
5.01L to 23L	$2.00
Aerosol paint containers, all sizes	$0.10

Source: https://www.albertarecycling.ca/recycling-programs/paint-recycling-program/eligible-products-fees/

There are 317 municipal recycling depots set up by municipalities and Indigenous Communities throughout the province that accept paint and containers for recycling.[20]

Alberta Recycling has approved four registered processors[21] to collect and process paint dropped off at the depots. There are also additional "paint roundup" events targeted to commercial generators to collect large quantities of discarded paint on select days from April through October at locations around the province.[22]

It is possible to resell some returned latex-based paint that is in good condition as a recycled product with little processing. Remixing, blending and repackaging is all that is needed to create a useable and profitable product from much of the paint returned through the

[19] http://www.qp.alberta.ca/1266.cfm?page=2007_200.cfm&leg_type=Regs&isbncln=9780779803835
[20] https://www.albertarecycling.ca/about/quick-facts-sheets/
[21] https://www.albertarecycling.ca/processors/registered-paint-processors/
[22] https://www.albertarecycling.ca/news/commercial-paint-recycling-events/

Alberta Recycling program. According to Calibre, a downstream paint processor, approximately 70-80% of the paint that they take in can be used in this way.[23]

Though it is new, the paint recycling program has been a catalyst for recycling innovation. Through the Alberta Recycling program, new uses have been created for the paint that is not of suitable quality for reuse. Innovations from paint processors have yielded new uses for discarded paint. KBL and Calibre, through their joint venture, ReNue Recycling,[24] analyzed the components of latex paint and determined that the ingredients were similar to those for cement feedstock. They created a process to use latex paint that is too dry or of poor quality as an input for the cement industry. This effectively commoditized old paint as a desired resource, rather than a source of waste to be discarded. [25]

Oil-based paint that is returned through the program is used in the energy-recovery process through incineration.

Finally, metal and plastic paint containers are sent to appropriate recyclers for material recycling. Plastic paint containers are made into plastic lumber and metal are made into construction materials such as rebar. The diversion of these materials from the landfill further adds to Alberta's recycling rate, capturing material that would otherwise be discarded.

3.1.1 Total Tonnage

In 2017-2018, a reported 848 tonnes of oil paint, 1,939 tonnes of latex paint, 120 tonnes of paint containers and 628,916 aerosol spray cans which is equivalent to 72 tonnes were collected and processed. This corresponds to approximately 2.2 million litres of paint recycled.

Since 2008, a total of 24 million litres of paint and five million spray cans have been recycled through the program.

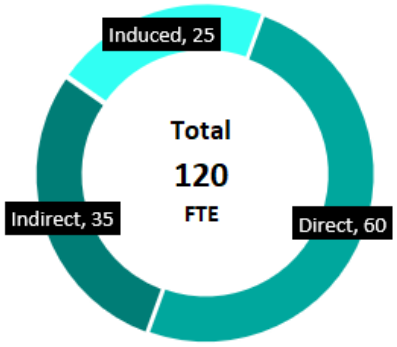
3.1.2 Employment

Through the Alberta paint recycling program, there are approximately 60 people directly employed in Alberta. Figure 3-1 shows the breakdown of the 120 total FTE jobs associated with the paint recycling program into those that are direct, indirect and induced. The Alberta paint recycling program generates 1.1 jobs/1000 tonnes in collection, 4.5 jobs/1000 tonnes in transportation, 19.2 jobs/1000 tonnes in processing and 10.9 jobs/1000 tonnes in downstream manufacturing, as shown in Figure 3-2. The intensity of jobs in processing and

[23] Interview with Robert Hicks, Calibre, 7/8/19
[24] http://renuerecycling.com/
[25] http://www.kblenv.com/news-and-events/history-of-paint-innovative-environmental-stewardship-in-a-paint-can/

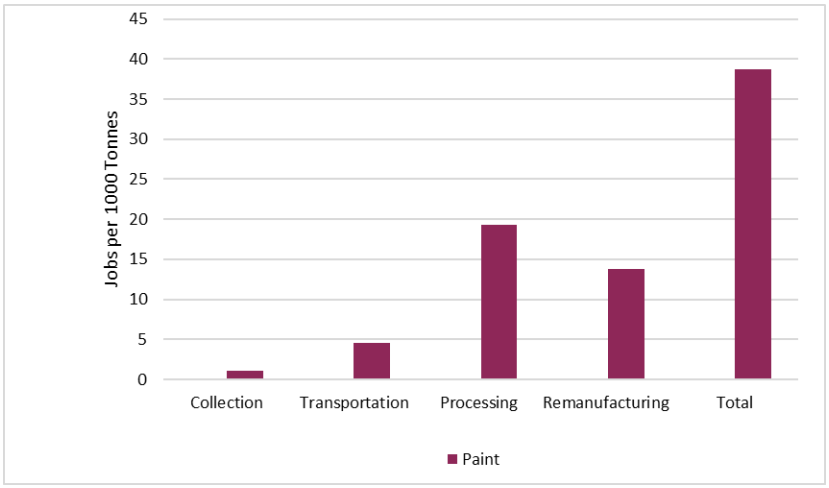
downstream manufacturing highlights the industry created by the existence of the Alberta Recycling program.

Figure 3-1: Jobs Created by Alberta Paint Recycling Program



Source: Eunomia calculations.

Figure 3-2: Paint Jobs per Thousand Tonnes by Process

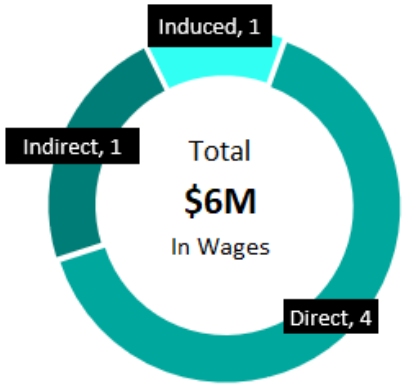


Source: Eunomia calculations

3.1.3 Economic Impact

Associated with the jobs created through the paint recycling program, there are approximately $6 million worth of wages paid to employees at the registered processors and in associated positions. Figure 3-3 illustrates the breakdown for direct, indirect and induced wages paid to employees across the paint processing value chain.

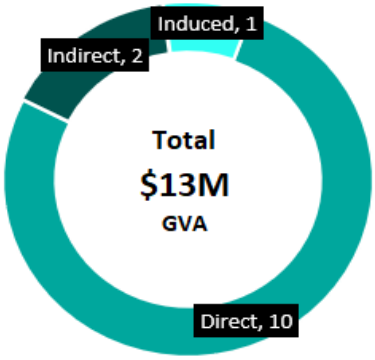
Figure 3-3: Total Wages Paid Associated with the Paint Recycling Program



Source: Eunomia calculations.

Through the current Alberta paint recycling program, the GVA is approximately $13 million, including indirect and induced impacts. Of that total, $10 million is directly associated with employment by the registered processors of the program, as shown in Figure 3-4.

Figure 3-4: Gross Value Added of Paint Recycling Program



Source: Eunomia calculations

3.1.4 Case Study: Calibre Coatings

Calibre Coatings

Calibre Coatings is a paint recycler and manufacturer with locations both in Edmonton and Calgary. They have been in business for 12 years and have 10 employees, two of which are management.

Calibre produces approximately 640,000 litres of paint per year, about 75% of which is through material from the Alberta Recycling program. The remainder of their product comes from Product Care Recycling, another stewardship program that operates across 9 Canadian provinces. This paint is used to produce their "ecocoat" paint product.

Through direct, indirect, and induced employment. Calibre is estimated to be responsible for 1 FTE jobs in collection, 4 FTE jobs in transportation, 18 FTE jobs in processing and 10 FTE jobs in downstream manufacturing. Calibre is also responsible for around $3 million in GVA.

Calibre Coatings does not collect from depots, but receives its product from registered processors, such as DBS and EnviroSort.

The majority of the paint that Calibre receives is remixed and made into new, customer-ready paint products. Calibre worked with fellow paint recycler KBL, in their joint venture, ReNue Recycling, to pioneer a new recycling process for latex paint that was unable to be made not new product. Instead, it is used as an input in cement manufacturing. All paint containers are sent to plastic and metal recyclers. Less than 2% of the product that they take in goes to the landfill.

Calibre sells their product, ecocoat, both to distributors for placement in retail stores and directly to customers online and at their locations in Calgary and Edmonton.

3.2 Modernization

The paint recycling program is inarguably successful, but there is still more that could be done to increase the impact of the program. Alberta Recycling is reviewing types of material coming in to the program for recycling that are not currently eligible under the Regulation. This review may lead to a potential program expansion. Data on additional tonnage, employment, and economic impact is not available at the time of this report.

4.0 Tires

4.1 Current State

The Alberta tire recycling program began in 1992 with the collection of passenger car tires. The program expanded to begin collecting off-the-road, medium truck and speciality tires in 2011. Environmental fees are charged on tires at the point of sale and vary based on the type of tire, as described in Table 4-1. Maximum surcharges are designated in the Tire Designation Regulation, which expires in 2021, and are mirrored in the Alberta Recycling bylaw.[26] Fees have been fairly stable over the course of the program, with the last increase made on medium truck tires in 2011, when the surcharge was raised from $4.00 to $9.00.[27]

Table 4-1: Tire Surcharge Amounts

Tire Type	Surcharge Amount
Car and light truck tires	$4.00
Specialty, industrial and other tires	$4.00
Medium truck tires	$9.00
Off-the-road tires	either $40, $100 or $200 depending on the rim size

Source: https://www.albertarecycling.ca/recycling-programs/tire-recycling-program/eligible-products-fees/

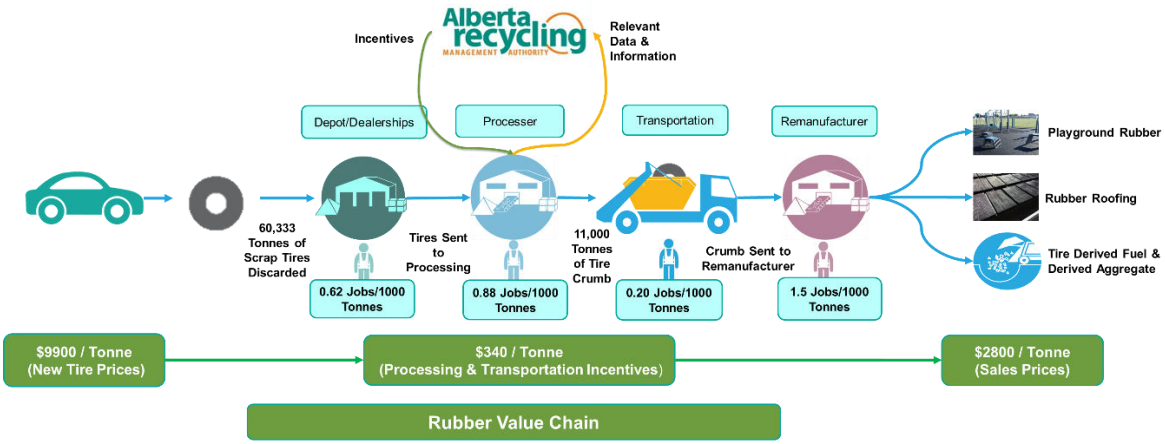
About half of the collected tires were processed into crumb. This crumb is used to make products like playground surfacing and roofing shingles. The other half was processed into

[26] http://www.qp.alberta.ca/1266.cfm?page=2004_095.cfm&leg_type=Regs&isbncln=9780779803842
[27] https://www.alberta.ca/release.cfm?xID=30133EDABB871-D9E7-7F44-3B95ACCB78FE0AE1

tire derived aggregate for use by municipalities as drainage material in landfills and in road construction.[28]

Figure 4-1 illustrates the value chain of the Tire Recycling Program, showing the evolution of tires from scrap to crumb to new materials. As the material is processed, its value increases and there are jobs created at each stage.

Figure 4-1: Tire Recycling Program Value Chain



Source: Eunomia interviews and calculations

As of 2017-2018, a reported 70% of crumb is shipped for use outside the province[29]. Uses of tire crumb confirmed during the survey and interview process are included in Table 4-2.

Table 4-2: Tire Crumb Use in Alberta

Company	Activity
Champagne Edition	Use recycled crumb to produce industrial matting, sidewalk and sound barrier panels
GPI Outdoor Flooring	Use recycled crumb and pure sifted recycled rubber to produce playground flooring, athletic pitches and sidewalks
Park N Play	Use recycled crumb for playground surfaces
PlayQuest	Use recycled crumb for playground surfaces

[28] https://www.albertarecycling.ca/recycling-programs/tire-recycling-program/
[29] 2017-2018 Alberta Tire Recycling Program Progress Report, Alberta Recycling

Company	Activity
Softline Solutions	Use recycled crumb to produce sports facility playing surfaces and playgrounds and moulded rubber structures in playgrounds
Euroshield Roofing (G.E.M.)	Produce injection-molded rubber roofing shingles using tire crumb purchased from AERP

Source: Eunomia interviews with companies

4.1.1 Tonnage

In 2017-2018, a reported 60,333 tonnes of tires were collected and recycled through the program from 3,060 tire and vehicle dealers across the province.[30] According to Alberta Recycling, in 2017, residents and businesses recycled 6.03 million scrap tires, which is equivalent to 90% of all car and truck tires that were discarded.[31] Since 1992, 117 million tires have been collected through the program.

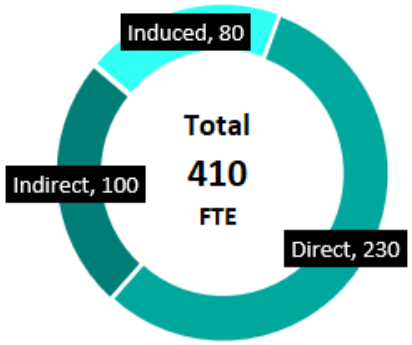
4.1.2 Employment

There are approximately 230 people directly employed in Alberta through the tire recycling program.

Of the 410 FTE jobs created overall, 230 of those are directly related to the program including those employed at processors and haulers, as illustrated in Figure 4-2. The Alberta tire recycling program generates 1.1 jobs/1000 tonnes in collection, 1.5 jobs/1000 tonnes in transportation, 2.9 jobs/1000 tonnes in processing and 1.3 jobs/1000 tonnes in downstream manufacturing, as seen in Figure 4-3.

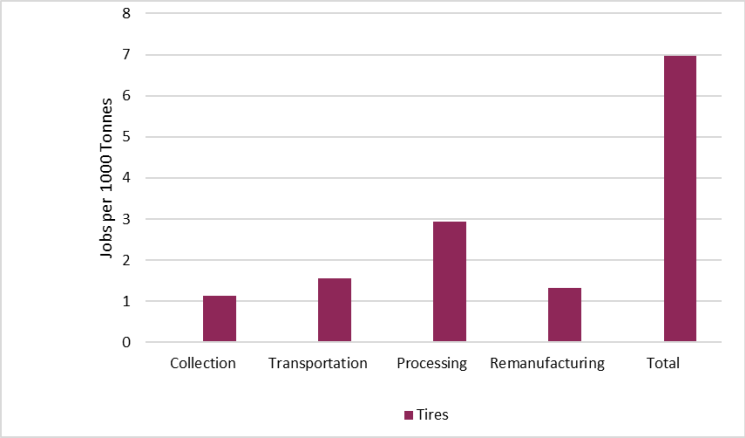
[30] 2017-2018 Tire Recycling Program Progress Report, Alberta Recycling
[31] https://www.albertarecycling.ca/recycling-programs/tire-recycling-program/eligible-products-fees/

Figure 4-2: Jobs Created by Alberta Tire Recycling Program



Source: Eunomia calculations.

Figure 4-3: Tire Jobs per Thousand Tonnes by Process

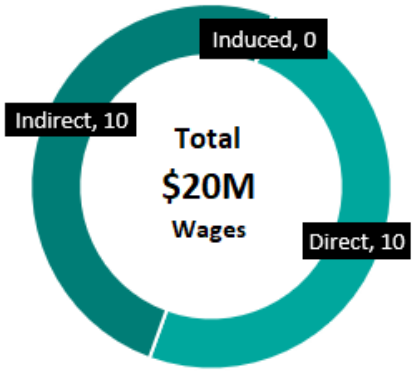


Source: Eunomia calculations

4.1.3 Economic Impact

Wages associated with the jobs created through the tire recycling program, direct, indirect and induced, total approximately $20 million. Figure 4-4 illustrates the breakdown for direct, indirect and induced wages paid to employees associated with the program.

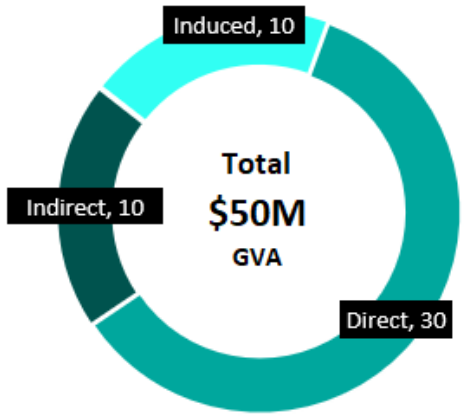
Figure 4-4: Total Wages Paid Associated with the Tire Recycling Program



Source: Eunomia calculations.

Through the current Alberta Tire Recycling Program, the GVA, including indirect and induced impacts is approximately $50 million, $30 million of which is directly associated with employment by the processors of the program, as shown in Figure 4-5.

Figure 4-5: Gross Value Added of Tire Recycling Program



Source: Eunomia calculations.

4.1.4 Case Study: Euroshield Roofing

Euroshield Roofing

Euroshield Roofing is a manufacturer of roofing tiles and one of the largest producers of new products from tire crumb in Alberta. Their roofing tiles are made by an injection-molding process, of which approximately 70% of their input is recycled rubber from the Tire Recycling Program.[1]

Euroshield Roofing uses a just-in-time inventory system, so they work with their supplier, AERP, to ensure that they have a steady stream of crumb, but never an excess. Euroshield is able to make 550 roofing tiles from every tonne of crumb that they process. On average, the final product is sold for $3.50 per square foot of tile.

About eight managers and office workers support 20-40 plant workers, depending on the season, that keep the plant in operation 24/7 to ensure that production matches the demand of their customers all over the world. While all the materials and processing for Euroshield Roofing is concentrated in Alberta, only approximately 35% of their products are sold in the province, as they have more supply than the Alberta market demands.

Through direct, indirect, and induced employment, recycling tire crumb from car tires is responsible for 12 FTE collection jobs, 16 FTE transportation jobs, 31.4 FTE processing jobs, and 5 FTE manufacturing jobs. Recycling tire crumb is also responsible for just under $1 million in GVA.

Euroshield Roofing invests nearly $500,000 in their business every year and tries to design products that stay on the cutting edge, and, with the support of Alberta Recycling, are hoping to design new products in the future.

4.2 Modernization

From its beginnings collecting only car tires to the inclusion of specialty, medium truck, and off-the-road tires, the tire recycling has managed to collect 112 million scrap tires since 1992.[32] Though this is impressive, there is some potential for additional material to be included within the program.

Aviation tires are currently accepted in the following programs in Canada:

- Manitoba: Aircraft tires 30kg or under; and
- Ontario: Aircraft tires but not commercial aircraft tires.

Alberta Recycling can investigate how to include aviation tires within its program.

Agricultural tires have been collected in Ontario since 2009 and in Saskatchewan since 2018. Agricultural tires should be added to Alberta's tire recycling program.

Alberta Recycling staff has had various meetings with industry in the past about adding giant mining tires to the program. The feedback has been that industry wants to manage their own tires. At this time (and based on Board direction), Alberta Recycling would not be looking to expand the program to include mining tires.

4.2.1 Additional Tonnage

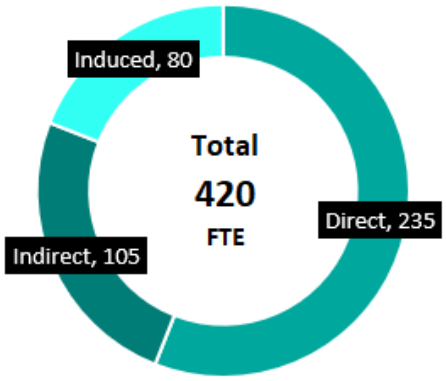
There is potential for aviation tires and agricultural tires to be formally added to the existing program. However, the discarded volumes are not large and are only estimated to amount to 300 to 400 tonnes a year for aviation tires and 1,400 tonnes for agricultural tires. Diverting an additional 1800 tonnes of tires would relate to $190,000 in landfill cost savings

4.2.2 Employment

Though there is a modest increase of less than 2,000 tonnes of tires if the program were expanded to include aviation and agricultural tires, this correlates to an expanded number of jobs in the program. Through this increase, there would be approximately 10 FTE jobs added to the program across direct, indirect and induced levels. This produces a potential total of 420 FTE jobs in the program with the additional materials, as highlighted in Figure 4-6. Figure 4-7 shows the breakdown of jobs across the value chain under the current program and an expanded program.

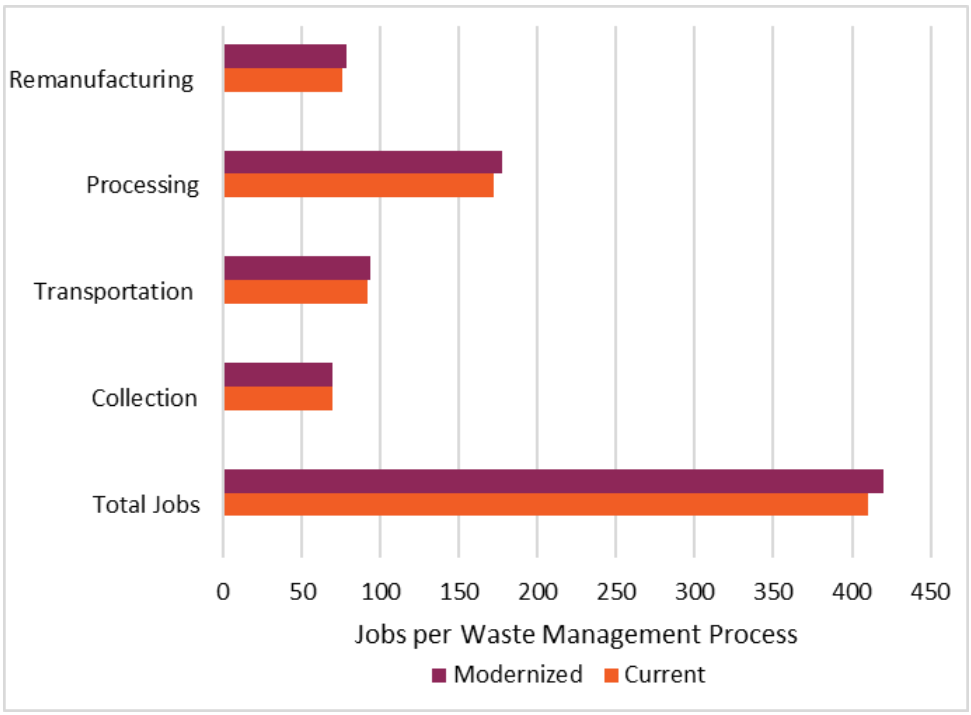
Figure 4-6: Potential Jobs Created from Tire Program Under Modernization

[32] 2017-2018 Tires Recycling Program Progress Report, Alberta Recycling



Source: Eunomia calculations

Figure 4-7: Jobs across Value Chain of Tire Program Currently and Under Modernization.

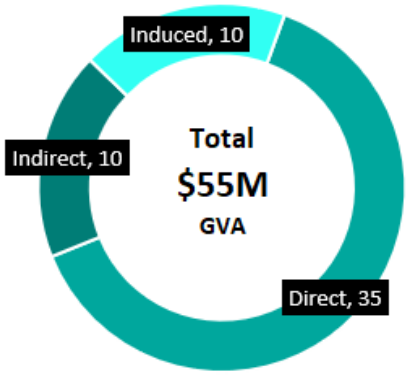


Source: Eunomia calculations

4.2.3 Economic Impact

As with jobs, there is a modest increase in GVA and tax revenue by expanding the program to include agricultural and aviation tires, with $5 million in GVA and $0.05 million in tax revenue added, for totals of $55 million and $1.55 million, respectively.

Figure 4-8: GVA from Tire Program Under Modernization



Source: Eunomia calculations

5.0 Used Oil

5.1 Current State

The used oil recycling program has been in operation since 1997 and encompasses the following:

- High quality used lubricating oil;
- Oil filters; and
- Plastic oil containers.

The current Lubricating Oil Material Designation Regulation was passed in 2018, when governance of the used oil recycling program passed from the Alberta Used Oil Management Association to Alberta Recycling.[33] The Alberta Recycling bylaw uses the maximum surcharge amounts laid out in the regulation. These surcharges have not been increased in over twenty years are passed onto consumers at the point of sale as environmental fees and are shown in Table 5-1.

[33] http://usedoilrecycling.com/auoma-program-transfer/

Table 5-1: Surcharge Amounts for Oil Products

Product Type	Surcharge Amount
Lubricating Oil	$0.05 per litre
Oil Containers	$0.05 per litre of container size
Oil Filters	
Less than 203 mm (8") in length	$0.50
203 mm (8") or larger in length	$1.00

Source: https://www.albertarecycling.ca/recycling-programs/used-oil-recycling-program/eligible-products-fees/

Residents can drop off their used oil products at 230 recycling depots around the province, which will be collected for recycling.[34]

In addition, those with large quantities to recycle can arrange for a pickup with a local Registered Collector for quantities of more than 20 litres or 20 oil filters.[35]

Lubricating oil that is of sufficient quality, such as automotive oil, is re-refined into new lubricating oil. Lower quality used oil is processed into a fuel that can be used by pulp mills, cement plants, asphalt plants, and other industrial applications. Oil filters are transformed into construction materials such as rebar and pipe, with any residual oil captured. Plastic oil containers are turned into pellets and recycled into new products such as new containers, guardrails, fence posts and railway ties.[36]

5.1.1 Tonnage

In the 2017-2018 year, there were 110,738 tonnes of materials collected through the used oil recycling program in Alberta.[37]

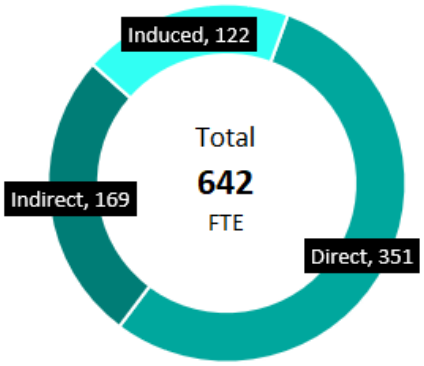
5.1.2 Employment

Through the Alberta used oil recycling program, there are approximately 351 FTE jobs directly created in Alberta. In addition to the 351 FTE jobs directly created, those that are indirectly created and induced by the program number 169 and 122, respectively, leading to a total of 642 FTE jobs created through the program's existence, as shown in Figure 5-1. The

[34] 2017-18 Used Oil Materials Recycling Program Progress Report, Alberta Recycling
[35] https://www.albertarecycling.ca/recycling-programs/used-oil-recycling-program/registered-used-oil-collectors/
[36] https://www.albertarecycling.ca/recycling-programs/used-oil-recycling-program/eligible-products-fees/
[37] 2017-18 Used Oil Materials Recycling Program Progress Report, Alberta Recycling

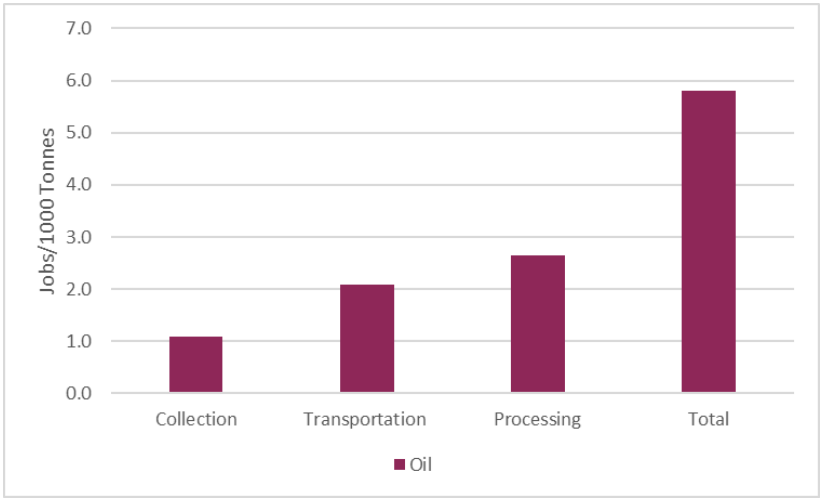
Alberta used oil recycling program generates 1.1 jobs/1000 tonnes in collection, 2.0 jobs/1000 tonnes in transportation and 2.6 jobs/1000 tonnes in processing. There is not sufficient data to determine the downstream manufacturing job intensities, as described in Figure 5-2.

Figure 5-1: Jobs Created by Alberta Used Oil Recycling Program



Source: Eunomia calculations.

Figure 5-2: Oil Jobs per Thousand Tonnes by Process

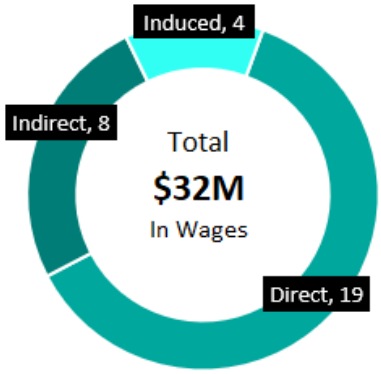


Source: Eunomia calculations.

5.1.3 Economic Impact

Associated with the jobs created through the used oil recycling program, wages are paid to employees of the program. Figure 5-3 illustrates the breakdown for direct, indirect and induced wages paid to employees associated with the program. In total, approximately $32 million in wages can be associated with the program.

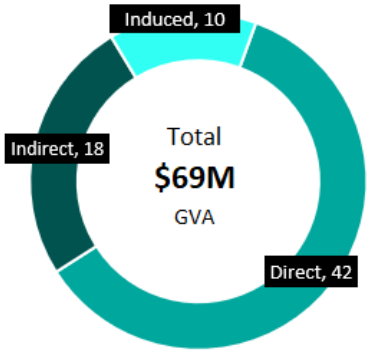
Figure 5-3: Total Wages Paid Associated with the Used Oil Recycling Program



Source: Eunomia calculations.

Through the current used oil recycling program, the GVA, including indirect and induced impacts is approximately $69 million, $42 million of which is directly associated with employment by the processors of the program, as shown in Figure 5-4.

Figure 5-4: Gross Value Added of Used Oil Recycling Program



Source: Eunomia calculations.

5.2 Modernization

The used oil recycling program has collected the most material of any of Alberta Recycling's programs over time. Yet, the scope remains limited when compared to similar programs in other provinces. Currently, Alberta collects the narrowest list of products of existing programs. Alberta should expand its program to match the most comprehensive programs in the country. A list of products collected across provinces is provided in Appendix A.3.0.

The Alberta used oil program already collects a higher per capita rate of used oil (19.53 kg/cap) compared to other provincial programs, although the collection rate varies significantly across the country based on local oil usage. The program could be expanded to include antifreeze and windshield washer fluid containers, which is collected in BC, Quebec, and other provinces.

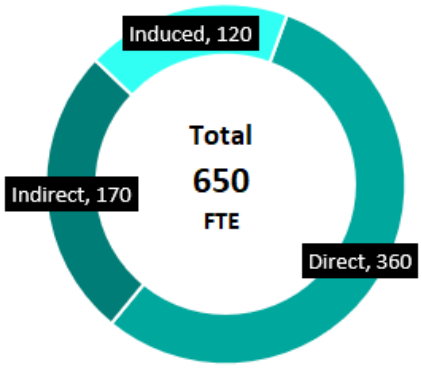
5.2.1 Additional Tonnage

Actual recovery of antifreeze and windshield washer fluid containers varies widely in the provinces in which it is collected. An estimated 77 tonnes of antifreeze containers (all plastic) would also be collected based on pro-rating data on antifreeze containers collected from Manitoba, where 38,700 kg of containers and 389,200 litres of anti-freeze were collected. Diverting an additional combined 848 tonnes of antifreeze and antifreeze containers would relate to $86,900 in landfill cost savings.

5.2.2 Employment

With an increase in scope to include antifreeze containers in the materials covered under the used oil recycling program, tonnages will rise, but by a relatively small amount compared to the large amounts currently collected by the program. This leads to an increase of 8 FTE jobs, as most of the haulage and processing needs would take advantage of existing infrastructure. This leads to a potential total of 650 FTE jobs, as seen in Figure 5-5. Figure 5-6 illustrates the intensity of processing jobs in the used oil recycling value chain in both the current and modernized, expanded programs.

Figure 5-5: Potential Jobs Created from Used Oil Program Under Modernization



Source: Eunomia calculations.

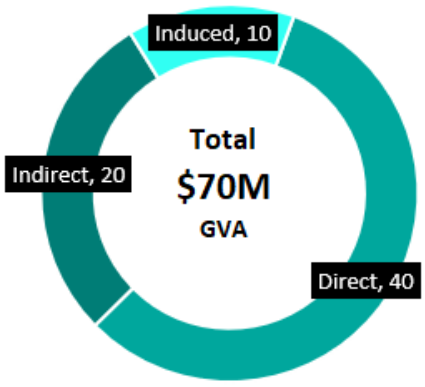
Figure 5-6: Jobs across Value Chain of Oil Program Currently and Under Modernization

Source: Eunomia calculations.

5.2.3 Economic Impacts

Given the increase in employment, the approximate increase in GVA under the modernized program is approximately $1 million additional for a total of $70 million, with an increase of $0.02 million in tax revenue for a total of $2.02 million.

Figure 5-7: GVA from Used Oil Program Under Modernization



Source: Eunomia calculations.

6.0 Conclusion

Alberta Recycling programs fill an essential role within the recycling infrastructure of Alberta. Alberta Recycling programs have developed partnerships with industry and spread awareness to residents on the importance of recycling. Also, while other recycling programs across the province vary widely in their coverage, Alberta Recycling provides service consistency for its stewardship programs across the province to all residents.

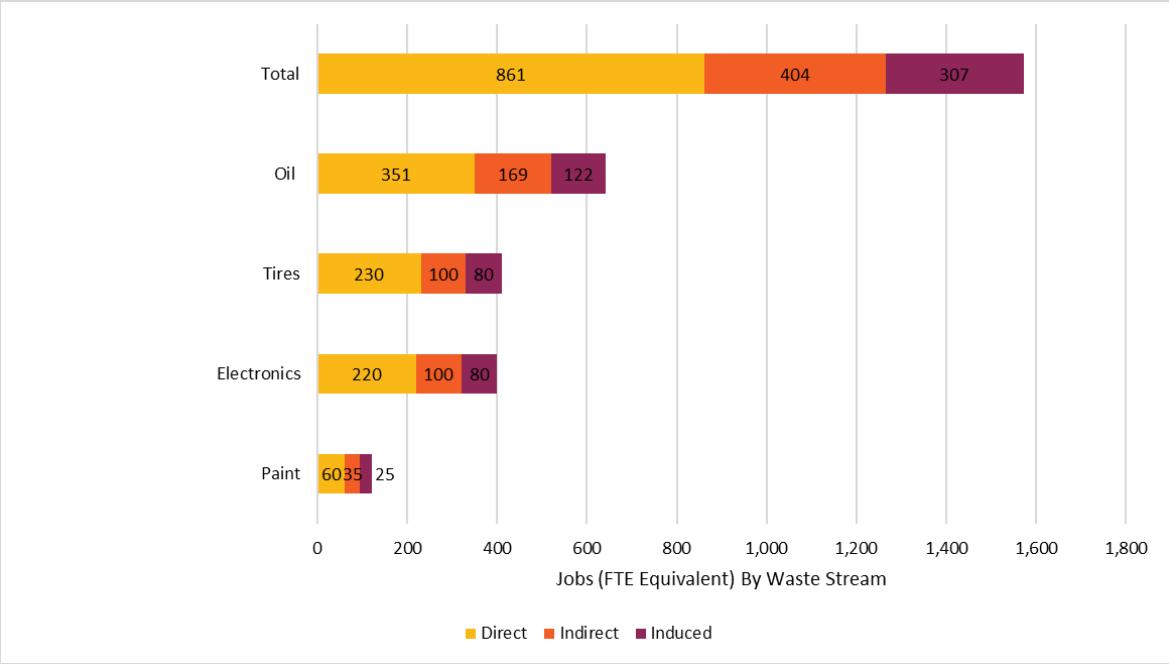
For nearly thirty years, the Alberta Recycling programs have remained consistent and expanded the boundaries of what is considered recyclable, leading Albertans to be some of the most successful recyclers across the globe. The Alberta Recycling programs have a significant downstream impact and create a sustainable value chain that generates jobs and have a disproportionately large economic impact.

Yet, recyclable waste is still being landfilled; there is still missed economic opportunity.

The more material diverted for recycling, the greater the potential for new processing and manufacturing facilities to be developed, more jobs to be created and greater economic opportunity in Alberta.

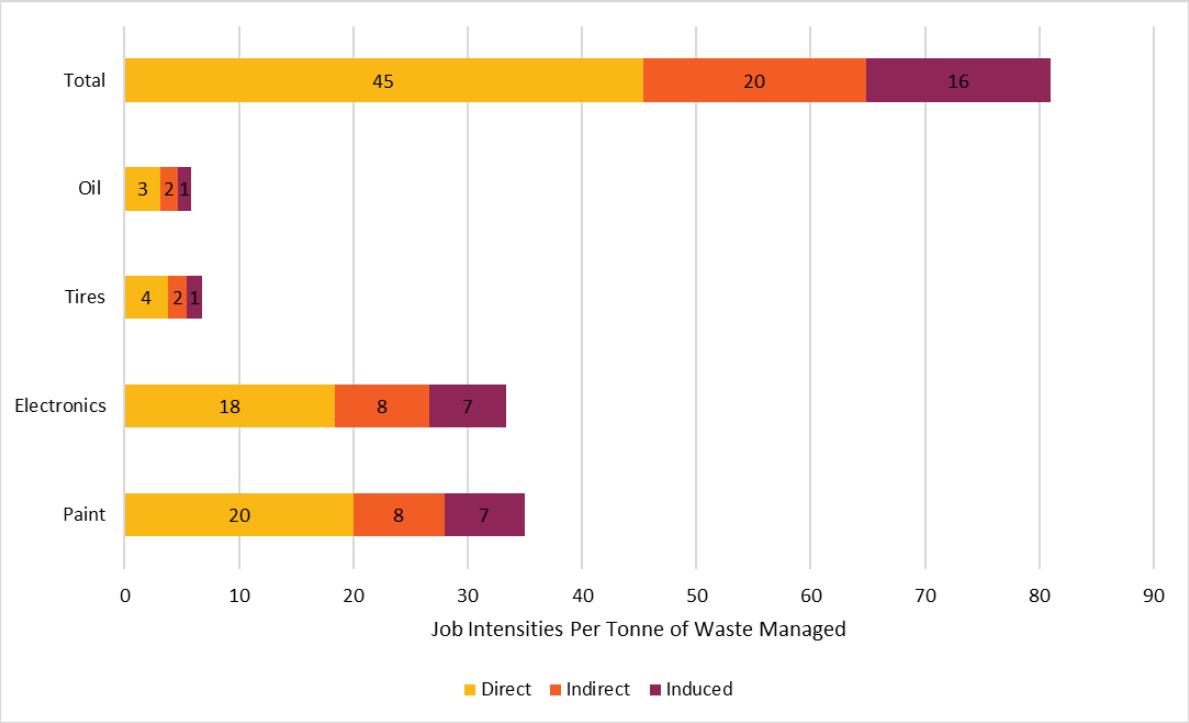
Currently, through the four Alberta Recycling stewardship programs, there are approximately 1,570 FTE jobs created. When looking at the $180 million GVA that is added to the economy, one begins to appreciate a more complete picture of the total impact that the programs have on the Alberta economy. A summary of the jobs created is provided in Figure 6-1.

Figure 6-1: Current FTE Jobs Created, by Program



Though the paint program has the lowest absolute number of FTE jobs created, it has the highest job intensity, when analyzing the number of jobs created per tonne of waste managed, as seen in Figure 6-2.

Figure 6-2: Job Intensity Per Thousand Tonne of Waste Managed, by Program

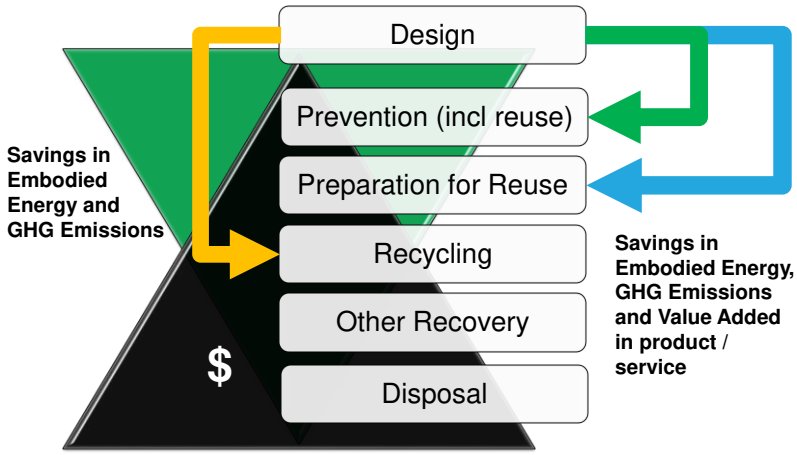


Of all the Alberta Recycling programs, the paint program is especially notable in its recycling efficiency, in that much of the leftover latex paint that is brought to depots, which would otherwise be discarded, is re-blended into a new paint that is suitable for the same purpose as the original material. Though this is not quite a circular process, as dried paint cannot be reused or broken down into its component parts, it is an innovative process that produces little waste and has lower energy intensity than recycling methods that involve greater transformation.

This program has also driven innovation, as the companies involved in the program created a new process to incorporate latex paint that is unsuitable for re-blending into cement feedstock – proving that reuse is possible even for materials that are not suitable for their original purpose.

While the Alberta Recycling programs are not yet circular, they are moving materials up the waste hierarchy, shown in Figure 6-3. A successful example of this impact is tire crumb used to produces roofing tiles and playground surfaces. While this is not a closed-loop process, it does result in additional manufacturing jobs that are local to Alberta and replaces virgin materials such as plastic and rubber.

Figure 6-3: The Waste Hierarchy

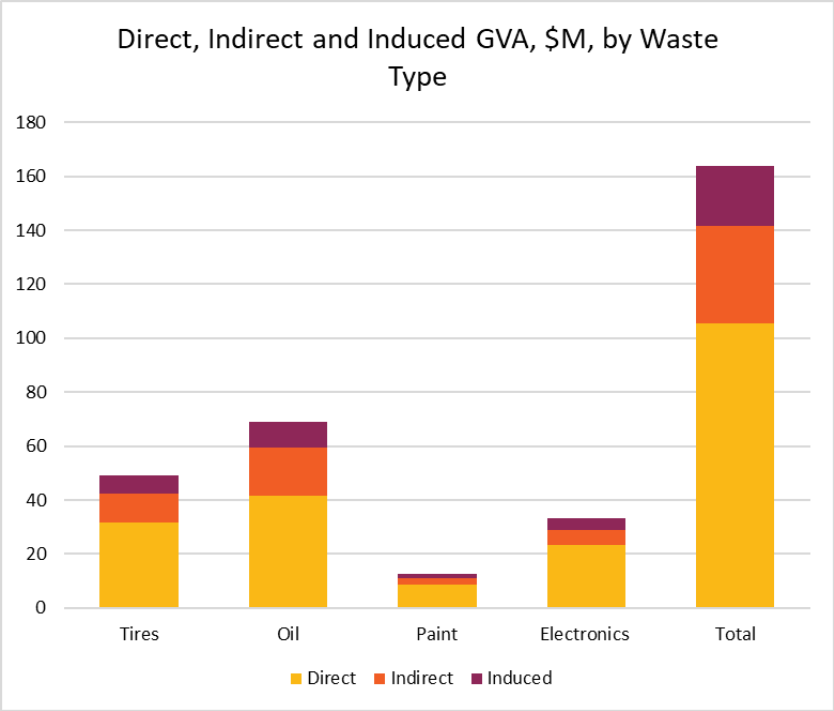


Source: Eunomia

It is worth noting that both of these examples rely on material from the Alberta Recycling programs that is low in contamination. Tires and paint are also costly to transport making local markets more of a necessity if secondary material is to compete with primary. The Alberta Recycling programs are able to facilitate the existence of these industries within the province.

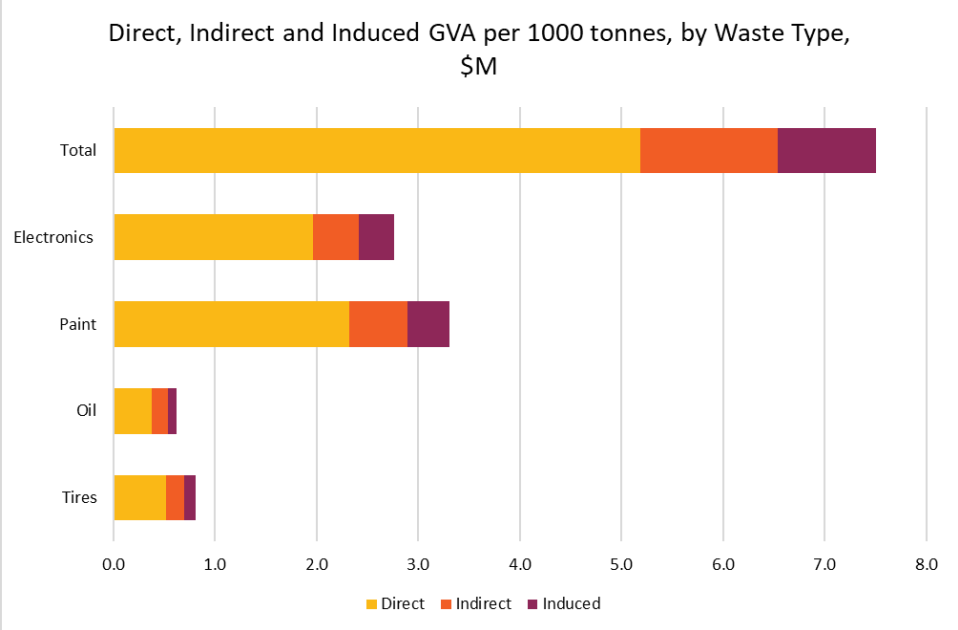
Figure 6-4 provides a snapshot of the GVA of each Alberta Recycling program, which in total amounts to $182 million, due to organizations and associated impacts involved in the Alberta Recycling programs.

Figure 6-4: Gross Value Added ($M), by Program



When looking at intensity per tonnes, Figure 6-5 shows that the electronics program contributes the most to the economy for each tonne processed.

Figure 6-5: GVA per 1000 tonnes ($M), by Program



Undoubtably, the Alberta Recycling programs provide a valuable service to all Albertans. Not only do they enable the recycling of materials that would otherwise be sent to the landfill, but they have an enormous economic impact that benefits the local economy and creates jobs.

6.1 Toward the Future

The modernization of existing Alberta Recycling programs through expanding the scope is a relatively simple step that would expand the impact of those programs while providing a greater benefit for both consumers and those involved in the processing of the material. Immediate expansion of the scopes of the existing programs would be well-received by both the industry and the public.

Under a modernized system with additional tonnage, as described above, the Alberta Recycling programs would be responsible for 1,805 FTE jobs and $204 million in GVA.

Going one step further, Alberta Recycling could push for programs for other materials, such as agricultural plastics and a regulated HHW program.

Table 6-1 summarizes the materials and recycling programs that could deliver additional economic benefits to Alberta. The table includes: the total additional tonnes; the direct, indirect and induced additional jobs that would be created; and the additional GVA, tax and material revenue.

Table 6-1: Economic Benefits from Additional Recycling Programs for Alberta Recycling

Additional Material	Incremental Tonnes Diverted Through Best Practices	Direct, Indirect and Induced Jobs (FTE)	Direct, Indirect and Induced GVA, $M (per annum)
Mattresses	7,000	500	60
Textiles	16,900	150	20
Carpet	13,300	119	10
Agricultural Plastics – Grain Bags	875	5	0
Agricultural Plastics – Other Film & Twine	6,325	20	10

Source: Eunomia and Kelleher Environmental Calculations

Looking towards the future, current program surcharges should be examined and potentially raised. Funding to support markets has plateaued or decreased due to inflationary impacts, which has led to some downstream manufacturers being unable to

make a profit and others switching to virgin materials. With only limited fees coming in, it is more difficult to support the development of local end markets.

Enhancements towards a circular economy would also incorporate a range of more or less well defined ‘circles’ through which suggested materials should be managed, with the ‘tighter circles’ being the most preferred ones. Considerable progress has been made over recent years in managing more materials in a more circular manner; however, more can be done to ensure that less ends up as residual waste.

Recycling of old, unusable products is an essential component of a circular economy. By transforming products into new products that are placed on the market, not only is waste diverted, but virgin materials are saved, providing a win-win for both the economy and the environment.

Alberta Recycling already provides a valuable service to all Albertans as well as to the local recycling industry that has sprouted around the existence of its programs. From recycling to creating downstream manufacturing jobs, expanding both the scope of the existing programs and expanding its contributions would allow the organization to amplify its impact and continue to create a better environment and economy for all Alberta.

APPENDICES

A.1.0 Recycling Program Job Details

Table A 1 provides a breakdown of the direct, indirect and induced jobs associated with the electronics program.

Table A 1: Jobs and Wages Created Through the Electronics Recycling Program

	Direct	Indirect	Induced
Jobs (FTE)	220	100	80
Wages ($M)	10	0	0

Source: Eunomia calculations.

Table A 2 provides a breakdown of the direct, indirect and induced jobs associated with the paint program.

Table A 2: Jobs and Wages Created Through the Alberta Paint Recycling Program

	Direct	Indirect	Induced
Jobs (FTE)	60	35	25
Wages ($M)	4	1	1

Table A 3 provides a breakdown of the direct, indirect and induced jobs associated with the tire program.

Table A 3: Jobs and Wages Created Through the Alberta Tire Recycling Program

	Direct	Indirect	Induced
Jobs (FTE)	230	100	80
Wages ($M)	10	10	0

Source: Eunomia calculations.

Table A 4 provides a breakdown of the direct, indirect and induced jobs associated with the used oil program.

Table A 4: Jobs and Wages Created Through the Alberta Used Oil Recycling Program

	Direct	Indirect	Induced

Jobs (FTE)	351	169	120
Wages ($M)	19	8	4

Source: Eunomia calculations.

A.2.0 Electronics Programs in Canada

Table A 5 details the products collected by electronics programs across Canada.

Table A 5: Electrical and Electronic Products Collected in Recycling Stewardship Programs Across Canada

Electrical or Electronic Product Category	BC	YT	NT	AB	SK	MB	ON*	QC	NB	NS/ PE	NL
Desktop Computers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Large Battery-Powered Ride-On Toys	✓	-	-	-	-	-	-	-	-	-	-
Portable Computers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Small Battery-Powered Ride-On Toys	✓	-	-	-	-	-	-	-	-	-	-
Display Devices ≤ 29” All-in-one (AIO) computers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display Devices 30-45" All-in-one (AIO) computers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display Devices ≥ 46” All-in-one (AIO) computers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Desktop Printers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floor Standing Printers	✓	-	✓	✓	✓	✓	✓	-	-	-	-
Computer Peripherals	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓
Personal/Portable Audio/Video Playback and/or Recording Systems	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Electronic Toys	✓	-	-	-	-	-	-	-	-	-	-
Home Audio/Video Playback and/or Recording Systems	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Home Theatre in a Box	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Vehicle Audio and Video Systems	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Non-Cellular Telephones and Answering Machines	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Cellular Devices and Pagers	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓

Electrical or Electronic Product Category	BC	YT	NT	AB	SK	MB	ON*	QC	NB	NS/ PE	NL
Countertop Microwave Ovens	-	✓	-	-	✓	✓	-	-	-	-	-
IT and Telecom Equipment	✓	-	-	-	-	-	-	-	-	-	-
Musical Instruments	✓										
Medical and Monitoring Equipment	✓										
Micro Toys Electronic	✓										
Time Measurement Devices	-	✓	-	-	-	-	-	-	-	-	-
Weight Measurement Devices	-	✓	-	-	-	-	-	-	-	-	-
Air Treatment Appliances	-	✓	-	-	-	-	-	-	-	-	-
Garment Care Appliances	-	✓	-	-	-	-	-	-	-	-	-
Personal Care Appliances	-	✓	-	-	-	-	-	-	-	-	-
Kitchen Countertop Heating and Cooking Appliances	-	✓	-	-	-	-	-	-	-	-	-
Kitchen Countertop Motorized Appliances	-	✓	-	-	-	-	-	-	-	-	-
Kitchen Countertop Appliances for Making Hot Beverages	-	✓	-	-	-	-	-	-	-	-	-
Small Floor Cleaning Devices	-	✓	-	-	-	-	-	-	-	-	-
Full Size Floor Cleaning Devices	-	✓	-	-	-	-	-	-	-	-	-

Source: Province program review

A.3.0 Used Oil Programs in Canada

Table A 6 details the products collected by used oil programs across Canada.

Table A 6: Products Accepted in Used Oil Recycling Programs Across Canada

Product Category	AB	BC	MB	SK	QC	NB	PEI
Lubricating Oil	✓	✓	✓	✓	✓	✓	✓
Containers HDPE or Metal	✓	✓	✓	✓	✓	✓	✓
Containers Non-Metal or Non-HDPE	✓	✓	✓	✓	✓	✓	✓

Product Category	AB	BC	MB	SK	QC	NB	PEI
Filters < 8" or All Sump Type Filters	✓	✓	✓	✓	✓	✓	✓
Filters ≥ 8"	✓	✓	✓	✓	✓	✓	✓
Glycol/Antifreeze Concentrate		✓	✓	✓	✓	✓	✓
Glycol/Antifreeze Premix		✓	✓	✓	✓	✓	✓
Glycol/Antifreeze Container		✓	✓	✓	✓	✓	✓
Diesel Exhaust Fluid Container			✓	✓			
Brake Cleaner Aerosol Container					✓	✓	✓
Lubricant Aerosol Container					✓	✓	✓

Source: Provincial program websites

A.4.0 Organizations for Data Collection

Table A 7 through Table A 10 detail the organizations contacted to as part of this study. The organizations highlighted in green responded with data or were interviewed; those in red were unresponsive.

Table A 7: Electronics Program Organizations Contacted

Electronics		
Collection	**Processing**	**Use/Retail**
Hi-Tech Recycling		
	TechnoTrash	
Ecycle Solutions		
SCRI		
	CPE Plastic	
GEEP		

Table A 8: Paint Program Organizations Contacted

Paint			
Collection	**Processing**	**Manufacturing**	**Use/Retail**
EnviroSort/Clean Harbors			
DBS			
	Calibre		
	Full Circle (plastic containers only)		
Recycle Systems (paint cans only)			
KBL			
Aevitas			

Table A 9: Tire Program Organizations Contacted

Tire			
Collection	**Processing**	**Manufacturing**	**Use/Retail**
Liberty			**GPI Outdoor Flooring**
AERPI			**Softline Solutions**
			Champaign Edition
G.E.M			
		Euroshield Roofing	

Table A 10: Used Oil Program Organizations Contacted

Used Oil			
Collection	Processing	Manufacturing	Use/Retail
	Merlin Plastics (containers only)		
Safety-Kleen			
L&P			
Pat's Off Road			
Terrapure			
GFL Environmental			
RPM Environmental (containers only)			
Pnewko			
Summit Environmental Services			
Tervita			
Van Brabant Oil			
Clean Harbors			
Newalta Grande Prairie			
RB Williams			