Federal Income Tax Treatment of Virgin and Recycled Materials

A Discussion Paper for Consultation

December 1996

Natural Resources Canada
Department of Finance
Industry Canada
Ottawa

Canada

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This paper has been prepared by officials of Natural Resources Canada, the Department of Finance and Industry Canada as a discussion paper to provide a description of the federal corporate income tax treatment of virgin and recycled materials. Accordingly, it should be recognized that this is a working paper only and does not represent official government policy, nor does it purport to be the interpretation of the *Income Tax Act* or *Regulations* by Revenue Canada.

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Foreword

In July 1996, the Federal Government tabled its response to the Eighth Report of the Standing Committee on Environment and Sustainable Development entitled *Keeping a Promise: Towards a Sustainable Budget*. The response summarized the progress being made in fulfilment of the Red Book's promise to carry out a comprehensive baseline study of federal taxes, grants and subsidies in order to identify barriers and disincentives to sound environmental practices. The response also noted actions taken in the environmental area through budget changes relating to federal taxes, grants and subsidies, and through a number of key initiatives, including the requirement of all departments to prepare sustainable development strategies by December 1997. It confirmed the government's commitment to steady progress in this area, and announced some important next steps. In particular,

> *Natural Resources Canada, the Department of Finance, Industry Canada and Environment Canada will consult with the recycling industry in 1996 to identify possible government policy barriers to recycling activity. To initiate these discussions, the government will prepare a document describing the corporate income tax treatment of mining, forestry, and recycling activities in Canada. As a policy priority, Natural Resources Canada will also be consulting with the provinces and the recycling industry to find innovative ways to encourage recycling and promote a more efficient metals recycling industry.*

In order to promote discussion of possible tax barriers to recycling in Canada, this document provides a description of the federal corporate income tax treatment of metal mining and recycling, paper production using virgin and recycled fibres, and production of plastics using virgin and recycled resins.

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Executive Summary

Recycling is a key element of an economy built on sustainable practices. In particular, recycling is an important component of any strategy to promote efficient use of our natural resources. Canada's metals, paper and plastics industries demonstrate in their everyday operations that it makes sound economic sense to use considerable quantities of scrap material in their production processes.

In designing appropriate policies to support the goal of sustainable development, it is natural to ask whether our tax policies help to ensure equitable treatment between virgin and recycled material.

This paper seeks to promote an informed discussion of this question by describing the most important features of federal income taxation as it relates to virgin and recycled metals, paper and plastics. It is recognized that a variety of other taxes, including provincial corporate income taxes and sales and excise taxes at both levels of government, can also have a significant impact on recycling activities in these sectors. The impact of these and other taxes and regulatory or program initiatives, such as a deposit/refund mechanism, is not considered in this paper. Nor does the paper evaluate the economic and environmental benefits of recycling.

Introduction

Producers of virgin and recycled material are subject to a variety of taxes imposed by different levels of government, including income taxes, property taxes and payroll taxes. Virgin materials producers may also pay royalty-like payments to the provinces as resource owners. Thus, for example, the metal mining industry pays mining taxes or royalties and the logging industry pays stumpage fees or logging taxes.

This paper describes the federal corporate income tax treatment of virgin and recycled materials producers in Canada. The tax burden, in a given year, of companies engaged in each activity depends on two principal elements: the deductions or write-offs that are allowed in computing taxable income for that year, and the tax rates that are applied to the resulting amount.

The *Income Tax Act* (ITA) allows businesses to deduct costs incurred in generating an income. In general, costs incurred on a good or service for which all the benefits are received in the current tax year, may be fully deducted during that year. Thus, for example, costs of raw materials and energy, as well as salaries and wages paid to company employees, are written off each tax year at 100%. On the other hand, expenditures incurred in the current tax year that provide benefits over a longer period of time are not allowed this treatment. Instead, they may be written off over several years at prescribed rates which are determined, taking into consideration, among other things, the expected economic life of the acquired asset. In this way, for example, computer software costs may be written off over a shorter period of time than computer hardware costs which, in turn, may be written off over a shorter period of time than buildings, and so on.

There are some 40 classes of depreciable assets identified under the ITA, each class with its appropriate rate of capital cost allowance (CCA). Revenue Canada (RC) requires corporations to report capital expenditures each year on each asset class. This allows RC to keep up to date each corporation's "pool" of undepreciated expenditures for each asset class, a given percentage of which pool may be deducted against income in each tax year. Rates of CCA vary; most manufacturing equipment may be written off at 30%, while buildings belong to an asset class with a 4% CCA rate. Some classes have special rules so that assets within the class have separate pools. New mines are an example of a "class within a class".

With respect to tax rates, both the virgin and recycled materials streams are affected by adjustments to the statutory corporate income tax rate. In the case of mining, for example, the effective tax rate is less than the statutory tax rate because of various adjustments, the most important of which is the resource allowance, a deduction provided *in lieu* of granting a deduction for provincial mining taxes or royalties. Businesses carrying on eligible manufacturing and processing activities are subject to lower tax rates, as are qualifying small businesses.

In addition to discussing these tax deductions and rates, this paper will also briefly describe all the important federal tax provisions, such as the resource allowance, the manufacturing and processing tax credit, and the loss carry-forward and loss carry-backward provisions.

1. Metals

1.1 Background

Recycling is an important element of a metals industry built on sustainable practices. Metal production from secondary or recycled material entails many potential environmental benefits, including energy savings and reduced emissions and/or effluents. An indirect benefit is a reduction in the waste stream, taking pressure away from municipal landfills and other waste management resources.

Metals recycling is the oldest and most highly developed of all recycling activities. Previously produced metal is contained in capital goods, machinery, consumer durables, artistic and ornamental works, and various other durable forms. As technology advances and ageing contributes to increasing maintenance costs or declining performance in relative and/or absolute terms, many of these objects are scrapped, thus creating a flow of recyclable material.

Metal-bearing objects differ in the lengths of their useful economic lives and are recycled to differing degrees. An immediate low-cost source of recyclable scrap is the unusable metal left on the shop floor in manufacturing plants after the desired components have been produced from sheet metal or other standard forms. Next are to be found short-lived products, such as aluminum beverage cans which are recycled after a single use. Steel support for buildings, bridges and other structures may remain in place for many decades or even centuries. In the extreme case of art objects such as bronze sculptures, the value of the contained metal is dwarfed by its value as art, and the object may never be scrapped. In general, a metal-bearing object will be scrapped only when there is a more attractive option available to its owner.

Canada has a well-established metal recycling industry. It comprises over 1,000 companies and provides direct employment to some 20,000 persons. Recycling companies in Canada handle in excess of 11 megatonnes of metals annually, valued at more than $3 billion. After being sorted and graded, much of this material is processed, not by recycling operations dedicated wholly to secondary metals, but by smelting operations which also process concentrates produced by the mining industry.

In addition to recyclable scrap from domestic sources, Canada's metal recycling industry relies on imported material to a significant degree. For example, Canada imported nearly 1.8 megatonnes of ferrous scrap in 1994, or 75% of the total recyclable import volume of 2.35 megatonnes.

The decision to use secondary versus primary material is typically a matter of availability, quality and price, since a considerable degree of substitutability between the two is possible in smelter operations. All sources, foreign and domestic, primary and secondary, are considered by cost-conscious metal producers. Secondary material which can be obtained at competitive rates will be used where available. Technology is also a factor in the demand for scrap. In the case of steel production, integrated mills must use some scrap, while electric arc furnaces use mainly scrap, with some being close to 100% dependent on recycled material.

Canada's metals recycling effort has been expanding in recent years. The aluminum can recycling rate grew from 60% to 80% during the period 1991-1993, reaching the second highest level among reporting OECD countries. It has been estimated by NRCan that Canada's recycling rate for lead-acid batteries was 94% in 1991. In 1994, Canada produced 97,800 tonnes of secondary lead, or roughly 40% of its total lead production. Close to half of the steel produced in Canada is from secondary material.

1.2 Economic and Regulatory Considerations

The availability of recyclable metal scrap depends on a number of economic and regulatory factors. While virgin material must be produced where it is found, metals recycling derives its raw material from the principal centres of metals consumption, usually in major population centres. High collection costs for small volumes of scrap, and high transportation costs, can act as a barrier to sourcing supplies of recyclable scrap in more remote areas. This greatly affects the geographic scope of the recycling effort.

Short run cyclical influences may affect the supply of secondary material since the key decisions relating to the replacement of capital equipment may easily be advanced or postponed (and these decisions have historically been very sensitive to the business cycle). As the price of recyclable scrap increases, material is collected and processed whereas at a lower price, this material would have been recycled at a later date or been destined for the waste stream.

Recycling increasingly responds to the regulatory environment, though not all regulations may work to increase recycling rates. For example, regulations intended to ensure safe transportation of materials may add significantly to transportation costs, and increase the volume of recyclable material diverted to the waste stream. On the other hand, increasing waste management and processing charges may make recycling a relatively more attractive option.

How much of the flow of scrap metal is in fact recycled depends on the costs of recycling. An important factor in this regard is product design, since it determines handling costs, i.e. the ease with which the valuable materials contained in metal-bearing products may be recovered for metallurgical processing. In recent years, life cycle approaches have resulted in product designs that are more favourable to recycling.

Unlike recycling, which purchases its feedstock in the marketplace, the mining industry must incur exploration and development costs before a flow of primary material from a new mine is possible.

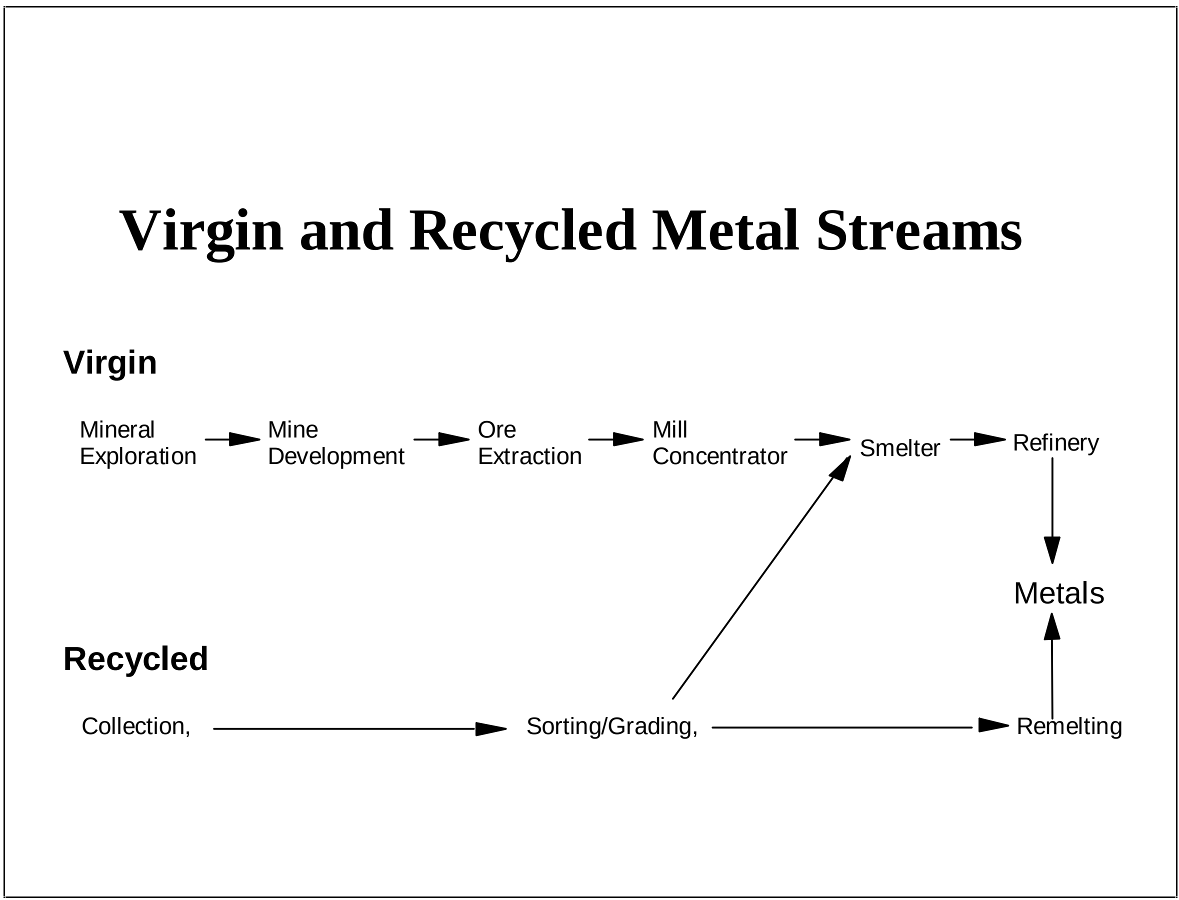
The business cycle is an important influence on the level of mine production, with commodity prices acting as an important signal to producers. In general, as metal concentrate prices increase, mine production will increase as lower grade ores, or more remote deposits, may be mined at a profit with current technologies and costs.

As with recycling, the regulatory environment also influences investment in mining, and thus the level of mine production of metals. For example, the recent trend towards regulations which internalize all environmental costs of mining, by imposing strict limits on mine effluents or by requiring project sponsors to make financial provision for site reclamation, has meant that only those projects which can support these costs will be developed.

1.3 Taxation

The virgin and recycled streams of production are both subject to taxation by various levels of government. The next sections describe the main elements of the federal income tax as it applies to the two streams in the metals industry. In particular, they provide information on how various costs incurred by the virgin and recycled streams are treated under the *Income Tax Act* (ITA), as well as on the tax rates that are applied to income generated from these activities. To facilitate the interpretation of these sections, a schematic summarizing the activities undertaken in each of the streams is provided in Figure I.

Figure I



1.4 Income Tax Treatment of Virgin Materials Stream

Table I presents the main tax deductions available to an integrated mining company under Canada's *Income Tax Act*.

Table I: Principal Tax Deductions in the Virgin Materials Stream

Expenditure Item	Tax Treatment
Exploration Costs	100% write-off; can be flowed through with new equity or carried forward indefinitely
Mine Investment: Pre-Production Development Costs	100% write-off; can be flowed through with new equity or carried forward indefinitely
Mine Investment: Post-Production Development Costs	30% declining balance*; indefinite carry forward
Mine Investment: Mining and Milling Equipment	25% declining balance* + Accelerated CCA (for new mine, major expansion, or if above 5% of gross revenue)
Capital Investment: Smelting/Refining Equipment	25% declining balance* + Accelerated CCA* (if part of a vertically integrated mine operation)
Capital Investment: Metal Fabrication Equipment	30% declining balance*
Carry-Forward of Operating Losses	7 years
Carry-Backward of Operating Losses	3 years

* Subject to "half-year" rule and "available-for-use" rule.

The activities and write-offs described in the upper panel of Table I have no counterpart in the recycling industry, but they are similar in some respects to activities and write-offs in other sectors of the economy. For example, expenditures on mineral exploration display strong similarities with the levels of risk and tax treatment of expenditures on scientific R&D.

Capital cost allowances are subject to the "half-year" and "available-for-use" rules. Under the "half-year rule", a company may claim only 50% of the prescribed CCA in the year a depreciable asset is acquired. Under the "available-for-use" rule, CCA claims on depreciable assets are deferred until the assets are available for the purpose of producing income from the business, with a maximum deferral of two years.

A brief description of each item follows.

Exploration Costs

Mineral exploration is widely recognized as a high risk activity. A large proportion of the mining industry's exploration expenditures results in no economic benefit. Another portion may lead to an economic benefit, but perhaps only after a delay of many years. The ITA allows an immediate 100% write-off for exploration expenditures. Exploration is described as *any* expense incurred to determine the existence, location, extent or quality of a mineral resource.[1]

Mine Investment: Pre-Production Development Costs

Pre-production development costs in mining represent investments made in excavations that provide access to the ore. For open pit mines or strip mines, overburden removal ("stripping") may be necessary. For underground mines, it is typically necessary to sink a shaft to provide access for workers and equipment and to allow the ore to be raised to the surface. In both cases, these expenditures must be incurred before production can begin and they may represent a significant proportion of the project's total costs.

Important features of these expenditures are that they are site-specific and do not result in the creation of tangible assets which may be sold in the event of financial difficulties. If, due to a decline in commodity prices, errors in estimating ore reserves, or other factors, the mine is forced to close, these expenditures cannot be recovered. The ITA allows this component of mine investment to be written off at the same rate; that is, at 100%.

Mine Investment: Post-Production Development Costs

Not all site-preparation work is carried out in the pre-production phase. For example, after a period of mining ore situated close to the surface, operations at an open pit mine may enter a phase of underground mining to extract deeper ore. This may require site preparation, including the sinking of one or more shafts. Similarly, an underground mine might, after a period of operation, move into a new ore zone, again requiring a new round of development.

These decisions are taken in an incremental fashion after the mine has established a cash flow, and generally after initial costs have been recovered entirely or substantially reduced. Even though they share many features with pre-production development costs, they are considered to entail smaller investment risks. These costs may be deducted using a 30% declining balance approach.

Mine Investment: Mining and Milling Equipment

After exploration and development costs, the remaining mine investment expenditures result in the acquisition of depreciable assets and are, on this account, more closely comparable to investments in manufacturing or materials processing.

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1 Provincial corporate tax rules generally follow the federal income tax rules. In the case of corporations incurring qualified exploration expenses within Quebec, however, amounts of up to 175% can be deducted when computing *provincial* taxable income.

At the mine site, the extraction process involves highly specialized equipment to drill, blast, gather and transport ore. After ore has been extracted and crushed, the valuable minerals are separated from waste material. The costs of the equipment used at this stage of the mining cycle may be written off over time on a 25% declining balance basis, subject to the "half-year" rule and "available-for-use" rule.

In addition, for new mines and major expansions (that is, expansions of at least 25% of the existing mill capacity), these investments are allowed an accelerated capital cost allowance (ACCA) where project incomes are sufficient. Large capital expenditures in excess of 5% of gross revenue from the mine for the year also qualify for the ACCA. If the project has taxable income, after all "standard" deductions have been taken (including 25% of the amount remaining in the mining equipment asset pool), then the ACCA may be applied against this income to reduce taxes payable. The ACCA may not be used to create a loss for income tax purposes.

An important restriction is that the ACCA for depreciable assets relating to a given project may only be applied against income from that project. This *"ring fencing"* approach ensures that mining income may not be shielded indefinitely from taxation by keeping a continuous stream of new projects in development and applying CCA from later projects against income from more mature projects. The *"ring fencing"* is accomplished using a separate CCA class for each new mines.

Capital Investment: Smelting/Refining Equipment

Mineral concentrates are typically smelted and/or refined to extract metal and refine it to a purity suitable to the needs of the end user. Like mining and milling equipment, smelting and refining equipment may be depreciated at 25%, with an additional ACCA where revenues allow this which is again subject to the "*ring fencing*" restriction. The ACCA is only available for integrated mine/mill/smelter operations. It cannot be claimed by stand-alone smelter/refiners.

Capital Investment: Metal Fabrication Equipment

Metal fabrication equipment qualifies for a CCA at a rate of 30% of undepreciated expenditures.

Carry-Forward of Operating Losses

Losses in a given year may be carried forward and used to reduce future tax liability for a period of up to seven years.

Carry-Backward of Operating Losses

Losses in a given year may be carried backward and used to reduce tax liability in the preceding three years.

Investment Tax Credits

Mining and manufacturing activities in the Atlantic and Gaspé regions may be entitled to investment tax credits of 10% on eligible equipment. This includes smelting and refining but not services.

1.4.1 Flow-Through Shares

So-called "junior" or non-producing mining companies that specialize in mineral exploration have, by definition, no revenues against which to apply the deductions allowed under the ITA and may, under certain circumstances, "flow through" the deductions to their individual investors. This option is also available to senior companies but they generally do not use flow-through shares, preferring to claim the deductions against operating income. The flow-through provisions of the ITA are intended to ensure that junior and senior companies compete for risk capital on more equal terms.

Although the ITA allows companies to "flow-through" both exploration and development costs to individual investors, in practice the flow-through provisions are used primarily to finance exploration expenditures.

1.4.2 Tax Rates

The statutory rate of taxation on corporate income in Canada is 28% after the 10% abatement for provincial income tax. Mining companies are granted a *resource allowance* which reduces this rate by 25%.[2] The *resource allowance* is provided *in lieu* of a deduction for mining taxes and royalties paid to the province (see next subsection). After the federal surtax of 4% has been added, income from mining operations is taxed at an effective rate of 21.84%.

1.4.3 Provincial Mining Taxes

Virtually all of the mineral production in Canada occurs within provinces which levy mining income taxes or other mining charges. These levies are not deductible in computing federal income taxes. In lieu of this deduction, a surrogate deduction entitled the "resource allowance" is provided. This deduction is computed at 25% of net operating income after deducting CCA. For an individual corporate taxpayer, the resource allowance may be less than or exceed disallowed Crown charges. In aggregate, the mining sector resource allowance has consistently exceeded disallowed royalties and mining taxes. One explanation for this is the policy decision to deny manufacturing and processing (M&P) tax treatment to smelting and refining activity. The resource allowance is effectively providing an equivalent value for the M&P credit that would be earned on these activities.

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[2] The resource allowance is a deduction when computing *federal* corporate income taxes. Some provinces have their own special mechanisms whereby royalties or mining taxes are made deductible in the determination of *provincial* income taxes. These mechanisms vary among provinces in both their design and impact.

1.4.4 Mine Reclamation Trust Funds

In addition to the deductions described above, the 1994 federal budget introduced an immediate deduction under the ITA for payments made by mining companies into a government-mandated mine reclamation trust fund. A deduction is thus received at the time financial provision is being made for reclamation rather than when the funds are being disbursed at the end of a mine's life. This measure was designed to be revenue neutral.

1.5 Income Tax Treatment of Recycled Materials Stream

Table II presents the main tax deductions available to an integrated recycling company under Canada's *Income Tax Act*.

Table II: Principal Recycling Write-Offs

Item	Recycled Materials
Investment in Equipment and Structures for collection, sorting, shredding, etc. of recyclable material	30% declining balance*
Capital Investment: Melting/Remelting Equipment	30% declining balance*
Capital Investment: Metal Fabrication Equipment	30% declining balance*
Carry-Forward of Operating Losses	7 years
Carry-Backward of Operating Losses	3 years

* Subject to "half-year" rule and "available-for-use" rule.

The activities and write-offs described in the upper panel of Table II have no counterpart in the mining industry. A brief description of each item follows.

Recycling Investment: Collection, Sorting, Shredding, etc. of Recyclable Material

Feedstock for the recycling stream of the industry is obtained by purchasing metal-bearing material in the marketplace which may be profitably recycled. This material is collected, sorted, shredded, graded, etc. to produce a standardized input to the metals processing stage.

Investments in the recycled materials stream at the collection and sorting stage typically result in the acquisition of depreciable assets. These include vehicles needed to transport recyclable scrap to a central location, shredders, compactors, and other specialized equipment used in efficiently handling recyclable scrap which is channelled to the recycler.

Capital Investment: Melting/Remelting Equipment

Melting and remelting equipment qualifies for a CCA at a rate of 30% of undepreciated expenditures. In the steel industry, for example, this tax treatment is available to "mini-mills" which use mainly recyclable scrap as feedstock.

Capital Investment: Metal Fabrication Equipment

Metal fabrication equipment qualifies for a CCA at a rate of 30% of undepreciated expenditures.

Carry-Forward of Operating Losses

Losses in a given year may be carried forward and used to reduce future tax liability for a period of up to seven years.

Carry-Backward of Operating Losses

Losses in a given year may be carried backward and used to reduce tax liability in the preceding three years.

1.5.1 Tax Rates

The statutory rate of taxation on corporate income in Canada is 28%, after the 10% abatement for provincial income tax. After the 4% federal surtax has been added, this rate is increased to 29.12%. The 7% manufacturing and processing tax credit is then applied, bringing the effective tax rate on income from recycling to 22.12%. The 7% M&P tax credit may be claimed by any corporation deriving 10% or more of its gross revenue from M&P activities. It does not apply to income which already benefits from the low rate applicable to small business. Small businesses operating as Canadian Controlled Private Corporations (CCPCs) are subject to a tax rate of 12% on the first $200,000 of income, if the corporate capital does not exceed $10 million.

The lower M&P tax rate is available to activities involving the manufacturing and processing of goods for sale. In this context, "manufacturing" involves the creation of something (such as making or assembling) or the shaping, stamping, or forming of an object out of something. "Processing" refers to the techniques of preparing, handling, or other activities designed to effect physical or chemical change in an article or substance, other than by natural growth. Whether any particular activity falls under "manufacturing and processing of goods for sale" is a question of fact depending on the particular case and period. An activity may be more in the nature of a service activity if there is no "significant" manufacturing and processing of goods for sale.[3]

1.6 Comparison of Tax Treatment

Table III provides a comparison of the main ITA write-offs as well as the tax rates which apply to both streams in the metals industry.

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[3] For further explanation, see IT-145R, *Canadian Manufacturing and Processing Profits – Reduced Rate of Tax.*

Table III reveals that where similar assets are used in the virgin and recyclable streams of activity in the metals industry, such assets receive similar tax treatment. Categories of expenditure which are found only in mining, such as exploration and development, receive tax treatment which has more in common with scientific R&D than with metals processing or recycling. The income tax rates applied to income earned in each of these streams of activity are almost identical. Virgin materials are, however, taxed more heavily at the provincial level in the form of royalties/mining income taxes which reflect provincial ownership returns on the extraction of the non-renewable resource.

Table III: Federal Income Tax Deductions and Rates
Comparison of Virgin vs. Recycled Material

Item	Virgin Materials	Recycled Materials
Exploration Costs	100% write-off	n/a
Mine Investment: Pre-Production Development Costs	100% write-off	n/a
Mine Investment: Post-Production Development Costs	30% declining balance	n/a
Mine Investment: Mining and Milling Equipment	25% declining balance + Accelerated CCA	n/a
Investment in Equipment and Structures for collection, sorting, shredding, etc. of recyclable material	n/a	30% declining balance
Capital Investment: Smelting/Refining Equipment	25% declining balance + Accelerated CCA	n/a
Capital Investment: Melting/Remelting Equipment	n/a	30% declining balance
Capital Investment: Metal Fabrication Equipment	30% declining balance	30% declining balance
Carry-Forward of Operating Losses	7 years	7 years
Carry-Backward of Operating Losses	3 years	3 years
Tax Rate	21.84%	22.12%

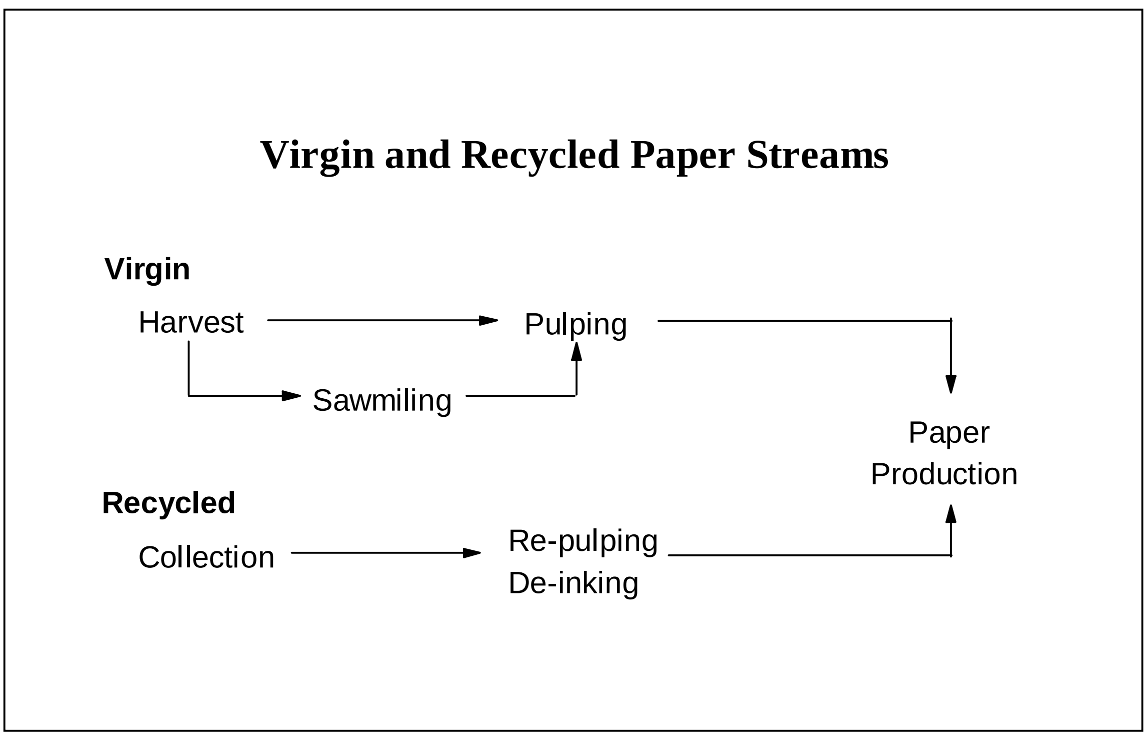
2. Paper Recycling

2.1 Background

The forest is a renewable resource that can be harvested in perpetuity if it is managed properly. The Canadian Council of Forest Ministers has committed Canada to managing its forest resources using sustainable management principles. This means that Canada will maintain and enhance the long-term health of its ecosystems, for the benefit of all living things both nationally and globally, while providing environmental, economic, social and cultural opportunities for the benefit of present and future generations.

The pulp and paper industry includes integrated establishments that can use primary (virgin) fibre or secondary (recycled) fibre. Thus, for the most part, the production of pulp and paper products using virgin fibre or recycled fibre cannot be considered as representing distinct industries (see Figure II). The only difference lies in the production of the fibre itself. Virgin fibre is derived directly from the logging industry in the form of pulpwood, or from the sawmilling industry in the form of chip and sawdust by-products. Recycled fibre derives from the wastepaper collection and processing industry. De-inking and re-pulping is usually undertaken by pulp and paper companies that also use virgin fibre. Wastepaper can be recycled seven to twelve times before the wood fibre becomes unusable, so there will always be a need for virgin fibre.

Figure II



2.2 Economic Considerations

The production of pulp and paper is a capital and energy intensive business, and non-fibre costs dominate total production costs. For newsprint, which accounts for about one-half of Canadian paper and paperboard production, the cost of fibre represents approximately 30% of the total cost of production, with a small (15-20%) but growing share of the cost of fibre accounted for by recycled fibre.

In the past, the decision to use virgin or recycled fibre depended on their relative availability and cost. For most paper grades, the quality of paper is the same whatever the type of fibre used. Therefore, paper producers would choose the type of fibre on a cost efficiency basis. More recently, consumer environmental awareness and limits to landfill capacity have resulted in a growing demand for paper with recycled content. In the cases of newsprint and directory paper, many U.S. states and publishers, representing more than 75% of U.S. newsprint consumption, have adopted minimum recycled-content regulations reinforcing the use of recycled fibre. Given Canadian reliance on the United States market for paper products (almost 60% of Canadian total shipments of paper products and 75% of newsprint shipments are exported to the U.S.), Canadian paper producers have adapted to this new reality by more than doubling their capacity to de-ink waste paper. Between 1990 and 1995, the consumption of recyclable paper by Canadian paper and board producers increased from 1.8 to 4.1 million tonnes, an increase of 122%.

At present, for most types of recycled paper (newsprint, paperboard, office waste) there is more than sufficient re-pulping/de-inking capacity installed to handle the amounts collected domestically. Last year, 47% of the 4.1 million tonnes of recycled paper used in Canada had to be imported, mainly from the United States. Given the location of major sources of wastepaper in the United States in relation to the location of Canadian mills, this reliance on imported wastepaper can add significant transportation costs to the basic wastepaper cost. About 75% of Canadian paper product shipments are exported, so that even if all Canadian municipalities collected wastepaper, our recycled-content paper industry would still need to import sizeable quantities of wastepaper.

The importance of imported wastepaper can be seen by considering the domestic paper recovery rate. This rate shows the amount of recyclable paper diverted from the solid waste stream and used to make paper and board. In 1995, Canada consumed 6.6 million tonnes of paper and paperboard, of which 2.7 million tonnes of paper were recovered, for an overall recovery rate of 41% (0.5 million tonnes of this were exported). Feasible maximum recovery rates vary by type of paper and paperboard product, but a recovery rate of 100% is impossible to achieve since a certain percentage of papers and boards consumed are non-recoverable. These include all sanitary papers, some food packaging papers and boards, a proportion of book and business papers, and boxes employed for permanent storage. Countries which are much more densely populated, such as Japan and Switzerland, have achieved overall recovery rates as high as 50-55%, but this level of recovery would still be insufficient to satisfy fully the current domestic demand for wastepaper.

2.3 Environmental Considerations

From an environmental perspective, a number of factors need to be kept in mind when comparing the use of virgin and recycled material in the production of paper products. Foremost is the fact that much of the production of paper using virgin fibre relies on by-products rather than harvested pulpwood. About 67% of the virgin fibre used by Canadian pulp mills comes from sawmill wastes.

Another consideration is the issue of waste generation. The disposal of waste paper in landfills imposes social costs. The de-inking process also generates wastes in the form of wet sludge which must be landfilled, although it occupies significantly less space than the original wastepaper. However, the reliance on imported wastepaper means that sludge is, in essence, imported. Last year, for example, the large amount of imported wastepaper used in the industry required disposal of approximately 750,000 tonnes of wet sludge in Canada.

2.4 Federal Corporate Income Tax Treatment

The effective corporate tax rate paid on activities related to paper production varies according to whether or not an activity is considered to be manufacturing and processing. Production of sawmill residues, pulping, de-inking, re-pulping and paper and paperboard production all benefit from the manufacturing and processing tax credit. This lowers the effective federal corporate tax rate on income from these activities by 7 percentage points to 22.12%. As logging is not a manufacturing or processing activity, it does not benefit from this tax credit and faces an effective corporate tax rate of 29.12% except where a company can use the federal logging tax credit. This deduction is equal to the lesser of two-thirds of the logging tax levied in British Columbia and Quebec or 6⅔% of logging income earned in those provinces. No other province levies a logging tax. Both British Columbia and Quebec also provide logging tax credits, with the net effect that provincial logging taxes should be largely offset. Other provincial charges, such as stumpage fees, are generally deductible.

Other basic provisions of the federal corporate income tax system, such as those governing loss carry-forward and small business deductions, apply equally to the tax treatment of income from activities related to the production of virgin fibre paper and recycled-content paper. There are also no differences in the application of capital cost allowances (CCAs) to similar types of capital used by the two processes. However, there are some differences in the types of capital employed. CCAs for various stages in fibre, pulp and paper production are shown in Table IV.

The treatment of CCAs related to timber used for industrial purposes depends on whether the forest property is classified as a timber resource property or a timber limit. Timber resource properties are defined as extendable or renewable rights to cut timber where the right was originally obtained after May 6, 1974. These properties account for the largest portion of the industrial roundwood harvest, except in British Columbia, and benefit from a 15% declining balance rate. CCAs for timber limits, which include freehold timber properties, tenures that are not renewable, and renewable tenures originally obtained prior to May 7, 1974, are based on either the undepreciated capital cost of the timber limit or the quantity of timber cut, plus allowance for survey and cruise expenses.

With respect to fibre production, the machinery, equipment and structures used in logging, sawmilling and chipping generally are all subject to a 30% declining balance rate. Machinery, equipment and structures used in collection and sorting of recycled fibre benefit from the same CCAs. For logging equipment used for cutting and removing timber from timber limits, taxpayers can claim a favourable variable CCA for property described in Class 15, if they wish. This CCA varies according to the harvest in the taxation year or the undepreciated cost of the equipment.

With respect to pulp production and paper production, the CCAs provide equal tax treatment for capital investment in machinery, equipment and structures used in production based on either virgin fibre or recycled fibre. As well, there is no difference in the CCAs for pollution control equipment used in the two activities.

In summary, similar types of activities related to the production of virgin-fibre paper and recycled-content paper are treated in the same way in the federal corporate income tax system. One difference between the two is logging activity, which does not benefit from the manufacturing and processing tax credit, but which does benefit from both special CCAs applied to forest resources, and the logging tax credit, where available.

Table IV: Capital Cost Allowances for Pulp and Paper Production[1]

Expenditure Item	Virgin Fibre		Recycled Fibre	
Capital Investment: Fibre Production				
Timber resource property[2]	15%	(Class 33)		n/a
Timber limit[2]		see Note 2		n/a
Logging mechanical equipment[3]	30%	(Class 10)		n/a
Sawmilling machinery and equipment[4]	30%	(Class 43)		n/a
Chipping machinery and equipment[4]	30%	(Class 43)		n/a
Machinery and equipment for collection and sorting recyclable material[4]		n/a	30%	(Class 43)
Buildings and other structures	4%	(Class 1)	4%	(Class 1)
Capital Investment: Pulp Production				
Machinery and equipment for production of pulp[4,5]	30%	(Class 43)	30%	(Class 43)
Machinery and equipment for de-inking and re-pulping[4]		n/a	30%	(Class 43)
Air and pollution control equipment[6]	30% 20%	(Class 43) or (Class 8)	30% 20%	(Class 43) or (Class 8)
Buildings and other structures	4%	(Class 1)	4%	(Class 1)
Capital Investment: Paper Production				
Machinery and equipment for production of paper[4,5]	30%	(Class 43)	30%	(Class 43)
Air and pollution control equipment[6]	30% 20%	(Class 43) or (Class 8)	30% 20%	(Class 43) or (Class 8)
Buildings and other structures	4%	(Class 1)	4%	(Class 1)

1 All capital cost allowances are declining rate subject to the half-year and available for use rules, except as noted.

2 Timber resource properties are those for which the holder has a right or licence to cut timber, which is renewable or extendable, and which was originally granted after May 6, 1974. Where the right was granted earlier than that, or where the right to cut exists in perpetuity or is not extendable or renewable, the CCA for timber limits applies. This is calculated as defined in Schedule VI of the Income Tax Regulations, and is based on either the undepreciated cost of the timber limit or the quantity of timber cut, plus allowance for survey and cruise expenses.

3 CCAs for equipment for cutting and removing timber from timber limits are calculated as defined in Class 15 and Schedule V of the Regulations, and vary according to the undepreciated capital cost of the equipment or the harvest. See note 2. The half-year rule does not apply to Class 15.

4 Class 43 applies to machinery and equipment purchased after February 26, 1992. For purchases between January 1, 1988 and February 25, 1992, Class 39 applies with a basic declining balance of 25% and a transitional phase-down from 40%. For purchases prior to 1988, the machinery and equipment could be written off with a 3-year 25%, 50%, 25% straightline balance under Class 29. The half-year rule does not apply to Class 29.

5 For pulp mills and integrated pulp and paper mills built prior to 1962, a 10% declining balance applies under CCA class 10.

6 The CCA rate for pollution abatement equipment may be greater than 30% in some circumstances. Class 43 refers to machinery and equipment while Class 8 refers to structures that are manufacturing machinery and equipment or structures such as vats and tanks. Property that is new and utilised in operations that have been continuously carried on and started before 1974, can use an accelerated 3-year CCA of 25%, 50%, 25% straightline balance under Class 24 (water pollution) or Class 27 (air pollution). The half-year rule does not apply, and additions to these classes will be eliminated after 1998. Assets within classes 24 and 27 used in the province of Ontario may also qualify for the Ontario Current Cost Adjustment (OCCA). This adjustment will reduce taxable income for *provincial* corporate income tax purposes.

3. Plastics

3.1 Background

Synthetic resins and the resulting plastic products contribute significant added value to important Canadian raw materials – oil and gas. The integrated plastics sector encompasses producers of synthetic resins, machinery and mould makers, compounders, plastics processors, and recyclers. In total, plastics continue to be a high-growth sector due to the ever-growing demand for plastic products, and the related strong demand for resins, machinery and moulds. In 1995, the overall industry produced $17.3 billion of output, employed 87,000 people, and had exports of $8 billion. Plastics processing also occurs as a secondary or in-house activity in many other industries. When estimates from these companies are included, overall output rises to $25 billion and total employment rises to 123,000. The industry is becoming more export-oriented, with overall exports growing by 33% in both 1994 and 1995.

All petrochemical products, including plastics or synthetic resins, are derived from petroleum and natural gas. About 2% of all oil and gas ultimately gets used to produce plastic products. Another 8% is used to make other petrochemical and chemical products, while the remaining 90% is used as energy.

The creation of synthetic resins involves several steps. First, crude oil or natural gas is processed to separate usable components (naphtha from oil and ethane, propane and butane from natural gas). Through chemical reactions, sometimes involving other substances, these feedstocks are turned into primary petrochemicals, which are the building blocks for many products, including plastics.

Plastic products can be manufactured to meet wide-ranging performance demands. Polystyrene foam insulation, vinyl siding, automotive components, flexible packaging and beverage bottles are but a few of the many plastic products available.

There are two types of resin streams. Virgin resins are produced directly from petrochemical feedstocks, while recycled resins are produced from post-consumer or post-industrial scrap plastic products.

3.2 Virgin Resins

The processes for making all types of virgin resin are basically the same, although the chemical inputs change. In each case, the petrochemical monomer is polymerized in a chemical reactor to yield the resin which is normally sold in pellet or powder form. For example, ethylene (a gas) is reacted under heat and pressure, in the presence of a catalyst, to form polyethylene (a solid), the most widely used resin in the world. The process through which its molecular structure is changed is called polymerization. Similarly, polypropylene is made from the feedstock propylene, and polyvinyl chloride is made from vinyl chloride monomer.

In some cases resin is sold directly from the resin producer to the plastics processor. In other cases, the resin first passes through a compounder that blends functional additives into the resin, using extrusion equipment, before it is sold to a processor. Advances in reducing the amount of plastic used, such as reducing the thickness of plastic film used in packaging, are usually achieved with the use of virgin rather than recycled resins.

3.3 Recycled Resins

Recycled resin is derived from scrap plastics and sub-standard virgin materials. Post-industrial scrap is created during the manufacture of plastic products. In many cases, this is recycled internally. In other cases, recyclers collect and process this material for re-use. This stream is relatively easy to handle because the scrap plastics are largely segregated by type and they are reasonably clean. Post-consumer scrap collected through, for example, curbside recycling programs, is more difficult to handle. This waste stream is made up of many different kinds of plastics, and is often contaminated.

While a few processes do not require pre-sorting, these are in the minority. In most plastics recycling operations, plastics are first separated by resin type. The sorted streams are then ground into chips. The chips are cleaned, dried and re-extruded. The resulting recycled resin pellets are then sold to a plastics processor for re-incorporation into another plastic article. Some processors use 100% recycled resin, but most blend recycled resin with virgin resin in order to get the desired end-use properties.

3.4 Economic Considerations

The virgin petrochemical feedstocks used to make plastic products are manufactured by large internationally competitive plants primarily located in Alberta, Ontario and Quebec. Prices for these feedstocks are set internationally. There are also internationally agreed performance specifications for synthetic resins. Consequently, lower performing resins, including recycled resins, usually command lower prices. There is, however, considerable price volatility. This is because demand for resins is cyclical, giving rise to fluctuating prices for both virgin and recycled resins. Indeed, there have been times when the prices of recycled and virgin resin have been similar.

Recycling poses significant challenges to producers of synthetic resins. Since recycled plastics must be collected, sorted, cleaned, washed, dried and ground before they can be reused, it is often uneconomical to compete with plastic products derived from virgin materials. Efforts by some users of plastics, such as Mercedes, to reduce or simplify the variety of plastics used in their cars will facilitate recycling. However, because recyclers operate on relatively lower margins, and because their prices for both feedstock (scrap) and output can shift suddenly, many recycling companies have come and gone. Only a few have remained viable through these cycles.

Some recycling is nevertheless economical. For example, a higher valued-added form of recycling is possible with some resins such as polyethylene terephthalate (PET), which can be depolymerized back to petrochemicals and then repolymerized to virgin resin once again. Via this route, PET can be reused in food contact applications, whereas if it is simply ground into chips, it must be used in lower value-added applications such as carpet fibre. Nylon is another plastic that can be recycled in this way – most others are not chemically suitable.

In summary, high margins are not driving growth in the use of recycled resins. The main driver behind the use of recycled resin has been green corporate marketing strategies to use recycled materials in a product and, from time to time, very high prices for virgin resin.

3.5 Environmental Considerations

Plastic products are a small but very visible element of the waste stream. Unless specifically formulated to do so, they do not quickly biodegrade or photodegrade. Neither do they release toxics into the environment. Because post-consumer recycling is not very economical, the question is how to reduce the volume of plastics being land filled through reduction, reuse, post-industrial recycling and energy recovery. These consultations focus on government policy barriers to post-industrial recycling.

3.6 Federal Corporate Income Tax Treatment

The production of plastic products from virgin resins is a capital intensive manufacturing process, while the production of recycled resins is much less so. From a federal corporate income tax perspective, however, there are no appreciable differences in the tax regimes facing resin producers. The same loss carry forward and back provisions and tax rates apply. Similarly, for capital equipment, both processes are eligible for the same Capital Cost Allowances (Class 43 – 30% on a declining balance).

4. Rubber

4.1 Background

In 1995, the rubber products industry generated shipments of $3.8 billion, had imports of $2.8 billion and exports of $2.2 billion, and employed 25,000 people. The industry can be divided into two components of roughly equal size – automotive tires and industrial rubber products. Even within the industrial rubber products, approximately 70% of output goes to the automotive sector, highlighting the strong dependence between the rubber industry and the automotive industry.

4.2 Virgin Rubber

The primary raw materials for manufacturing rubber products are natural and synthetic rubbers. Canada produces some synthetic rubbers while all natural rubber consumed in Canada is imported.

The process for manufacturing synthetic rubber is essentially the same as the process for making synthetic resins used in the plastics industry, and will not be repeated here.

4.3 Recycled Rubber

The process for recycling rubber is very different from the one for recycling plastic. While recycled plastics can be reheated and reformed into new articles, this is not possible with recycled rubber. When a rubber product is made, the rubber undergoes a process known as vulcanization, which chemically crosslinks the structure together and yields its characteristic elasticity. This vulcanization process is not easily reversed.

Used tires are the dominant feedstock for producing recycled rubber. Unless the tires are to be incinerated, recyclers prefer to deal with tires which have not been stockpiled because they are much cleaner. Tires are first cut into pieces or shredded to reduce them to a more manageable size. There are two main routes for processing the tires beyond this point – ambient and cryogenic.

In ambient processes, the rubber is shredded and granulated at room temperature until the particle sizes are reduced to the desired size range. Non-rubber components are separated: steel using magnetic separators, and reinforcing fibres and fabrics using screens. Secondary markets exist for the separated steel and recovered fibres.

In the cryogenic process, the chunks of rubber are frozen, using liquid nitrogen to render the rubber brittle. The rubber is then pulverized to yield crumb. Non-rubber materials are separated as in the ambient process.

There are three main uses for crumb rubber. The first is to produce other rubber products. The crumb is either blended in with virgin resin, where it acts like a filler, or a binder is used to hold the particles of crumb together to form a shape. Products made using rubber crumb tend to be lower-performance products like mud flaps and floor mats. In higher-performance products like tires, belts, and hoses, small quantities of recycled rubber may be blended into virgin rubber.

The second use is as an additive in road or roofing asphalt. The crumb serves as a partial replacement for gravel or sand. The resulting rubberized asphalt may offer superior performance to unmodified asphalt.

The final use of crumb rubber is as a fuel in incinerators or cement kilns. Tires have been used in pilot tests in cement kilns, boilers for pulp and paper plants, and municipal incinerators. These practices are much more prevalent in the United States than in Canada.

4.4 Economic Considerations

Because rubber cannot be recycled back into synthetic resins, the recycling industry does not compete directly with resins derived from virgin materials. Consequently, the sector does not face the cyclicality and price volatility that characterizes plastics recycling. Cost pressures are further reduced because rubber recyclers do not pay for their used tire supply – to avoid tipping fees at land fills, recyclers are paid to collect used tires. Other sources of revenue include: collecting provincial tire deposit revenues; selling recovered steel and fibres; and selling crumb rubber.

The demand for recycled rubber is growing as more companies seek ways to green their products. For example, Rubbermaid makes extensive use of recycled rubber (and plastic) in their products.

4.5 Environmental Considerations

Because rubber products are vulcanized, they do not degrade or damage the environment. Nevertheless, events such as Hagersville and St. Basil le Grand are a reminder that they present a potential environmental risk. Unfortunately, tires stockpiled in such facilities are contaminated and are not as easily recycled, presenting a technological challenge to recyclers. Incineration is, at present, the most viable option for these tires.

4.6 Federal Corporate Income Tax Treatment

The production of rubber products from virgin resins is a capital intensive manufacturing process. The production of crumb rubber is much less so. From a federal corporate income tax perspective, however, there are no appreciable differences in the tax regimes facing resin producers. The same loss carry forward provisions and tax rates apply. Similarly, for capital equipment, both processes are eligible for the same Capital Cost Allowances (Class 43 – 30% on a declining balance).

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