

## 8 Socio - economic impact assessment of the proposed regulations

### 8.1 Theoretical approach to the impact assessment model

The socio-economic impact assessment model reflects the impact of the proposed regulations on the current industries relevant to vest type carrier bags, as well as industries that could possibly be affected in future. There are two main factors that drive all the impacts with regard to the proposed plastic bag regulations.

The first factor is that **products** will change based on the 30 micron or 80 micron criteria and that these product changes create a number of impacts. This product change will then create significant shifts in the market that will fundamentally affect **demand** for VCB type bags and subsequently create a number of upstream and downstream impacts. The demand change is however not only a function of product change since there are demand boundary constraints such as maximum affordable cost. Therefore, product change will also depend on demand changes. How these two factors combine determines what the nature of the impacts will be.

A number of scenario's, based on different products and varying levels of demand, is therefore created to illustrate the potential impact of the regulations. For each scenario the impact variables such as impact on investment, the changes in labour requirements, the price of the product, etc. is calculated, based on the product and demand assumptions

### 8.2 Product assumptions

Since the nature of the proposed regulations is such that it could result in a change of product, it is necessary to base the impact assessment on the product sets that come into play, individually or in combination, For each of the scenario's it is therefore necessary to make fundamental assumptions regarding the product, as follows:

- **The type of material.** The product will be constructed from a thicker plastic film and therefore will use more polymer on a per bag basis than the current product, or from a different type of material altogether. The research established that cloth bags cannot realistically be considered as an alternative product. The impact assessment therefore considers plastic and paper as the alternative types of material.
- **The dimensions of the product.** The fact that the type of material has different properties means that the bag is likely to be larger and be able to carry more goods. This means that fewer but larger bags will be required to carry the same amount of goods – it is a different product. The product (current and potentially adjusted) dimensions used in the scenarios are based on information provided by converters.

- **The raw material requirements.** In the case of plastics for example, the fact that the film is thicker means that there is a good probability that there will be changes in the type of polymer used in the product and in their relative proportions. The polymer mix will not remain the same and this will impact on the upstream segment, and specific assumptions need to be made on which to calculate impact on raw material requirements.

### 8.3 Demand assumptions

The most pertinent question, since it fundamentally determines the impact on the sector is “What is the size and composition of the new VCB market”. This is not quantifiable and therefore a number of scenarios need to be developed which place upper and lower bounds on the size of the market. Therefore, on the demand side the assumptions made relate to specific demand boundaries and scenarios within the demand boundaries, as follows:

- The one demand boundary assumes that demand for VCB's will not increase. The upper demand boundary is therefore the current demand for VCB's (i.e. the number of bags consumed stays the same)
- The other demand boundary is based on the assumption that supply of bags will be limited by the amount of money that retailers are prepared to spend on bags. The lower demand level is therefore a function of current retailer spend on bags
- The upper demand boundary is unrealistic since demand for bags will change due to a number of factors. Three primary factors are considered in determining a more realistic demand.
  - Increased re-use of bags will reduce demand.
  - Product optimisation (changes in bags dimensions and material) will take place and reduce the demand for bags.
  - Packaging practices of retailers will change due to an increase in the cost of bags, and reduce the demand for bags.

### 8.4 Impact assessment scenario's

The impact assessment is done for four scenarios, which are based on the combined product and demand assumptions as stated. These scenarios were chosen specifically to reflect first of all the boundaries of the impact of the regulations (current demand scenario and limited retailer spend scenario), to reflect what could the realistic impact be (adjusted demand scenario), and lastly to reflect a worst-case scenario which should be avoided.

The order in which the scenarios are presented reflects a specific logic.

- The first scenario reflects the impact on the value chain if the proposed regulations have no impact on demand for bags. This **current demand scenario** is the upper-boundary limit, and

although an unlikely scenario, will provide insight into one of two maximum impact situations based on current consumption levels. It assumes there are no limits to retailer spend, that products stay the same, and substitute products are ignored. This scenario is unrealistic because it assumes no change in current bag demand, and no role for substitute products.

- The second scenario, the **adjusted demand scenario**, is more realistic in that it considers that the regulations will achieve a reduction in demand for bags and that market forces will introduce substitute products such as paper bags. The change in demand is realistically estimated considering three factors
  - Changes to the current VCB product characteristics, such as carrying volume and weight capacity, reduce the demand for bags.
  - Provision is also made for efficiency gains on the retailer side, since it can be safely assumed that more expensive bags would result in more efficient application of the product.
  - Re-use of the bags will increase and reduce demand.
- The third scenario reflects what the situation will be if no additional cost to the retailer (and therefore consumer) is to be incurred. This is the **current retailer spend scenario**. Retailer spend as a percentage of revenue stay the same, with adjustments for increased usage of paper bags as a substitute product. This can be seen as the other demand boundary. The need for adjustment for substitute products is driven by the change in the difference between the cost of plastic and paper bags due to the regulations. It assumes the bag characteristics remain unchanged.
- The scenarios conclude with a brief description of what could be a **worst-case scenario**. The worst-case scenario, which is where the total VCB manufacturing industry ceases to exist, could happen for two reasons. The first would be if converters were unable or unwilling to recapitalise their equipment to manufacture at the proposed minimum thickness, and exit the industry. The domestic supply would become zero. The second would be if the cost of bags increases to a point where retailers and consumers are unable to, or unwilling to buy bags. The demand for bags therefore ceases to exist. The impact is the same, and assessed in this scenario.

The first scenario is described in detail, highlighting the rationale and assumptions behind all calculations. The other three scenarios had the same rationale and assumptions as underpinning, but do not repeat all the calculations and assumptions in detail.

The calculation of the optimum scenario is beyond the scope of this research, as this would include thorough research into the consumer market to determine price elasticity of demand, potential changes in consumer behaviour, consumer spending patterns, and a host of other factors.

## 8.5 Scenario A: Current demand

This is the upper-boundary limit and not a realistic scenario since the demand for units of bags stays the same. This is highly unlikely based on the significant price increases for the product. It provides insight into the potential impact of the regulations but needs to be recognised that this is a highly unrealistic scenario and is therefore of theoretical value only.

### 8.5.1 Assumptions and product data

The scenario is based on the following assumptions:

- The demand, in terms of units stays at current levels (8.024 billion bags)
- There are no limits to retailer spending (currently R 571 million per annum)
- The bag dimensions do not change
- There are no efficiency gains at the retailer (or consumer) side, i.e. the retailer (or consumer) makes no attempt to use less bags
- No substitute products are considered.

The product data is as follows:

	Current VCB	30 ì bag	80 ì bag
<b>Bag dimensions</b>	Current	No change	520 x (420+70)
<b>Product mix</b>	Current	No change	One type
<b>Weighted average thickness</b>	14.24	30	80
<b>Mass of bag (avg weighted)</b>	5.87g	12.36g	34.4
<b>Demand (units)</b>	8.024 billion	8.024 billion	8.024 billion
<b>HDPE proportion</b>	85%	75%	0
<b>LLDPE proportion</b>	10%	20%	20
<b>LDPE proportion</b>	0%	0%	75
<b>Masterbatch proportion</b>	5%	5%	5
<b>Cost/1000 bags</b>	71.56	167.87	467.30

The impact assessment is done by firstly illustrating how the supply and demand balance will change for this specific scenario. The impact on the value chain is then assessed, based on the supply-and demand balance changes.

## 8.5.2 The supply-and-demand balance

### 30i bag

Retailer category	Bags consumed (billion)	Average weight per bag (g)	Required spending <sup>28</sup> on bags R million	Conversion, exports and imports (units and tonnage)	Polymer usage tonnes	
Large retailer groups	2.552	12.36	428	Domestic 99 176 t (8 024 m bags)	HD-PE	74382
Smaller retailers Printed bags	2.314	12.36	388	Exports <sup>29</sup> 0	LLD-PE LD-PE	19835 0
Smaller retailers Unprinted	3.158	12.36	530	Imports <sup>30</sup> 0	Masterbatch	4958
Total	8.024		1347			99175

### 80i bag

Retailer category	Bags consumed (billion)	Average weight per bag (g)	Required spending on bags R million	Conversion, exports and imports (units and tonnage)	Polymer usage tonnes	
Large retailer groups	2.552	34.4	1229	Domestic 276 025 t (8 024 m bags)	HD-PE	0
Smaller retailers Printed bags	2.314	34.4	1114	Exports 0	LLD-PE LD-PE	55205 207019
Smaller retailers Unprinted	3.158	34.4	1529	Imports 0	Masterbatch	13801
Total	8.024		3872			276025

The key changes on the supply and demand balance is shown to be:

- Significant increased in the required retailer spending from current level of R 571 million per annum to R 1 347 million and R 3 872 million respectively
- Significant increase on raw material usage (and therefore required manufacturing capacity) from 42 000 tonnes per annum to 99 000 and 276 000 tonnes respectively.

<sup>28</sup> It is assumed that the average cost per ton stays the same, namely R 13 581, except for 80i bags where the 10% price difference between HD and LD is included. Efficiency gains for whatever reasons is not passed on to the retailer (consumer)

<sup>29</sup> It is assumed that exports will discontinue in favour of using the capacity to supply the more profitable domestic market

### 8.5.3 Impact on the upstream sector

The changes in polymer demand based on the upper and lower boundaries

The upstream impacts are determined almost exclusively by the changes in demand within the domestic market.

The table below makes the flawed assumption that the total country's needs will be able to be produced domestically and that all converters will invest to expand capacity or modify capacity accordingly. It is nevertheless illustrative of the potential upstream impact. Many converters have indicated that they will not invest at the 80-micron scenario and therefore most bags will be imported and all the polymer currently going into VCB manufacture will have to be diverted into export markets.

	<b>Current Situation</b> Actual demand	<b>30 micron scenario</b> Changes in demand	<b>80 micron scenario</b> Changes in demand
<b>HDPE Demand</b>	37,000	+37,382	-37,000
<b>LLDPE Demand</b>	4,760	+15,075	+50,445
<b>LDPE Demand</b>	0	0	+207,019
<b>Masterbatch</b>	1,740	+3,218	+12,061

In summary the implications for each situation are:

#### 30-micron scenario:

- Demand for all polymers increases with the increase in demand for HDPE being particularly significant

#### 80-micron scenario:

- Demand for HDPE changes significantly with HDPE no longer being used for bag manufacture
- Demand for LLDPE and LDPE increases significantly with the increase for LDPE being huge would necessitate the establishment of a world scale plant in order to be able to provide the required volumes in the domestic market.

### 8.5.4 Analysis of the impact on the upstream sector

The polymer manufacturing sector is currently ethylene constrained and polymer capacity constrained, with available ethylene being the major constraint. Polymer capacity cannot be expanded without ethylene capacity first being increased.

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<sup>30</sup> Although imports of bags could continue, the calculations assume that no imports will take place, for two reasons. It is firstly impossible to estimate the quantity of imports, and secondly the calculations reflect the maximum impact on the VCB industry.

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## Impact on HDPE

The 30 micron scenario shows HDPE demand changing to an increase in demand for 37,382 tons per annum. The first 10,000 tons will be able to be supplied from the current HDPE capacity surplus of 10,000 tons. This will have a positive impact on the profitability of DOW Chemicals since the production will be sold into the domestic market as opposed to exported.

The remaining 27,382 tons will have to be imported will all the associated negative impacts of importing polymer such as:

- Negative impact on trade balances
- Negative impact on exchange rate due to increased dollar demand
- Negative impact on trade balance
- Negative impact on balance of payments
- Increase in converter costs since they will have to hold greater stocks of polymer to guarantee supply with increasing uncertainty of on –time delivery and increased lead-times due to having to import the required polymer
- Increasing port delays due to increased volumes on a port infrastructure that is already under strain

The nature of polymer manufacture is one where the firms run their plants typically at full capacity in order to maximise economies of scale and then sell as much product as possible into the domestic market where margins are typically better and then sell the balance into the export market. In the case of the 80 micron scenario we would see all the 37,000 tons currently being sold to the VCB market having to be sold into the international market at significantly lower margins than is current. This will have a significant impact on the profitability of DOW Plastics as well as on the investor confidence of an international firm which has made significant investments in South Africa. The impact is the same for HDPE regardless of whether or not the converters make the required investments to be able to produce 80 micron bags.

The exhibit below depicts the impact, on a per ton basis of shifting polymer sales from the domestic market to the export market and vice versa. This applies to all scenarios as a general rule.

<p>Import parity price =</p> <p>Ruling FOB polymer price in country of origin</p> <p>+ Freight (depending on region)</p> <p>+ Duty at 10%</p> <p>+ Landing/ wharfage</p> <p>+ Coastal transport</p> <p>+ Insurance, forward cover, stock provision of 3%</p> <p>Rule of thumb for the additional factors is an increase of 25%.</p> <p>e.g.</p> <p>FOB price of \$600 per ton implies a import parity price of \$750 per ton. This is the revenue line to the domestic polymer producer</p>	<p>Export price =</p> <p>Ruling FOB polymer price in country of destination</p> <ul style="list-style-type: none"> <li>- Transport to coast</li> <li>- Wharfage and port fees</li> <li>- Freight to country of destination</li> </ul> <p>Note: Freight is cheaper out of South Africa than into South Africa</p> <p>e.g. (assuming no in-going duties)</p> <p>FOB price of \$600 per ton less \$35 per ton "to port" less 4% less 3% agent commission provides a revenue line of \$527</p>
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The above exhibit shows that the nett revenue line loss to a polymer producer of having to divert polymer from the domestic market to the export market is \$223 per ton or R1895 per ton. This nett revenue line loss will directly affect the profit line. We will use this figure as illustrative of the market shift for all polymers.

The worst case impact for the 80 micron scenario is a reduction in profit to DOW Plastics of R70m per annum and a loss of taxes to the government of R21m per annum (assuming an average tax rate of 30%)

In the 30 micron scenario depending on the market size, the likely impact on DOW Plastics is increased profits of R18.95m.

### Impact on LLDPE

For both the 30 micron and the 80 micron scenario, there is an increase in demand for LLDPE ranging from +15,075 to +50,445 tons per. There is currently a shortage of locally produced LLDPE in South Africa and all of the increased demand will have to be imported. The impacts fall into the same categories as above for imported product. Clearly if the converters do not make the required investments then demand for LLDPE will decline. The impact will not be high since there is currently a shortage of LLDPE and polymer is being imported to meet domestic demand.

## Impact on LDPE

There is only an increase in LDPE demand in the 80 micron scenario. The increase in demand is 207,019 tons per annum. There is currently a shortage of locally produced LDPE in South Africa and all of the increased demand will have to be imported. The impacts fall into the same categories as above for imported product

The next question we need to ask is what is the likelihood of the above increases in demand for polymer having an impact on the investment and expansion plans of the monomer and polymer producers. In order to assess this we need to understand the investment planning approaches and cycles of such organisations ( the following discussion applies to all scenarios).

### 8.5.5 Nature of Upstream Investments

There are a number of possible investments in the upstream segment. These can be assessed in two main categories:

- Greenfields development of a cracker and associated downstream polymer plants
- Brownfields expansion and enhancement of existing infrastructure to increase capacity

In the current South African scenario only the second option really holds true. A feasibility study to develop a cracker on the coast using imported feedstock was developed in the mid-1990's and subsequently discarded. All current expansion plans are based on brownfields models.

It is furthermore important to note that large organisations of the nature of DOW Plastics and Sasol Polymers typically develop long term capital expenditure plans based on forecasts of market demand (among other factors) and that the time from decision until capacity comes on stream can be of the order of 5 or more years. The impact timeframe of the proposed legislation would be far shorter than the above.

The table below provides some idea of world scale with respect to plants of this nature. This shows the type of market increments that would be required in order to justify an investment of this nature.

Investment	Capacity
Monomer plant (cracker)	500,000 – 1,000,000
Polymer plant	200,000 – 400,000

In the case of LLDPE, the scenario indicates an increase in demand from +15,075 to +50,445 tons per annum. The upper figure would clearly have an influence on any investment decision. In the case of LDPE demand in the 80 micron scenario there is increased demand of 207,019 tons per annum. A world scale plant would be required to supply this demand domestically and the notion of a dedicated

plant to supply the polymer required to produce “give-away” plastic bags is somewhat ludicrous. Furthermore an investment on hundreds of millions will be required to establish such a plant not taking into account the required monomer expansions that will also be required. This investment would require certainty that the converters will invest in new plant in order to be able to produce the 80 micron bags. With this an unlikely scenario, the demand uncertainty created would not positively impact on any such investment.

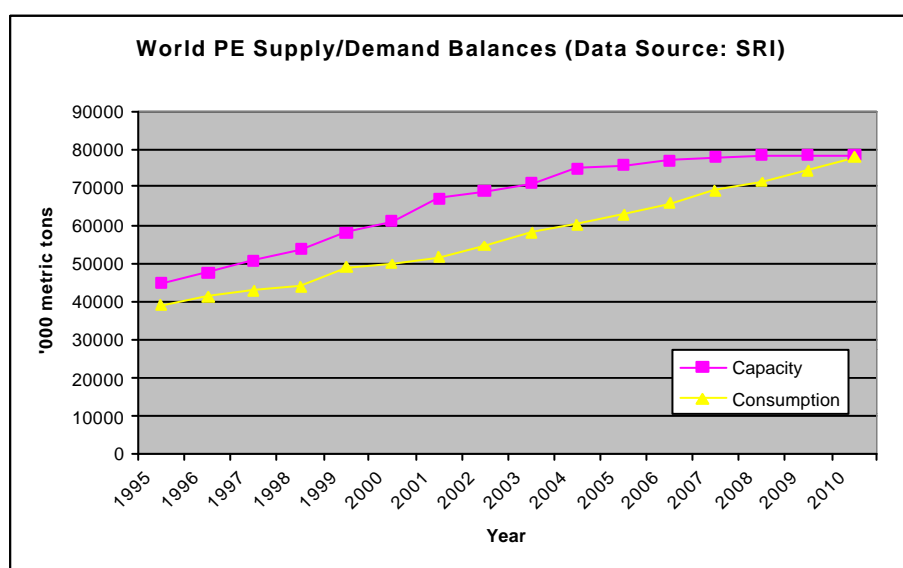
With the assumed figures above it is unlikely that demand figures of that nature with the uncertainty created in the market by the proposed regulations and the uncertainty around the propensity of the converters to make the required investments that the increased demand will in any way influence Sasol Polymers to accelerate its investment plans.

Any investment scenario needs to be informed by international supply/demand developments since these impact on ones ability to sell product into the international market at reasonable prices and also has impact on international prices for polymer. The current situation in this regard for ethylene based polymers is discussed below.

#### 8.5.6 International ethylene based polymer position

Demand for olefins and polyolefins, globally is expected to be moderate to high over the next few years with polypropylene exhibiting significantly higher growth rates globally than the polyethylenes. According to SRI, global polypropylene demand is expected to grow at approximately 7% per annum to 2010 and polyethylene demand at 4.5% per annum. European growth rates are expected to be lower.

The world polyethylene supply / demand balance is a prime driver for upstream investment in crackers. The SRI supply/ demand balance forecast is depicted in the figure below.



The supply/ demand balance will be significantly affected by new ethylene investments in feedstock rich regions. The regions which currently have low cost ethanes or condensates are primarily the Middle East and in particular Iran. The availability of significant quantities of low cost feedstock make it an ideal investment area for gas-based chemicals and in particular ethylene crackers. Due to the complexities and costs associated with transporting ethylene (e.g. under pressure) it is expected that derivative capacity will be associated with these new ethylene plants. In contrast, Europe has very high feedstock cost (compared to most regions although the USA and Asia are also at a feedstock cost disadvantage to the Middle East) which have recently been exacerbated by higher crude oil prices. With the possibility of further instability in the Middle East, feedstock prices could be further adversely affected. These prices significantly affect the feedstock cost in Europe which as a high dependency on naphtha as a feedstock. The forecast supply/demand balance of SRI depicted above shows that the PE market will not start to recover until after 2004 when a narrowing of capacity and consumption is expected to commence (unless further plant rationalisation occurs). SRI forecasts that ten new crackers will be built between 2000 and 2005 in the Middle East with five of these crackers being in Iran.

Middle East market share of petrochemicals has grown significantly over the past 25 years and this market share growth is expected to continue to expand over the next decade

Capacity expansions are expected in Europe and are likely to come online in a more orderly fashion than in the past with capacity increments being spread over time. Ethylene capacity in Europe is expected to grow from approximately 21.5mt in 1999 to about 23.3mt in 2004. Forecast loading rates are expected to stay above 91% until 2004 with demand growth for ethylene expected to be about 2.3% per annum in line with GDP growth. Capacity creep and expansions are expected an average annual growth rate of 2.1%. Europe is expected to require additional ethylene supply to fulfil the need for ethylene derivatives. This is likely to be met by imports since the decision to build a new cracker is hard to take in a fragmented market which is providing unsatisfactory ROI.

As far as derivative products are concerned the Middle East will enjoy a significant cost advantage in LDPE, LLDPE, HDPE and ethylene glycol. This will place significant pressure on high cost producers who will either have to exit the market or invest either in new technologies or in new markets/ regions.

The above scenario indicates that international capacity for polyethylenes will exceed demand until at least 2010 with the gap only starting to narrow after 2004. This means that the global outlook for a South African based investment in expanding monomer and polymer capacity is poor. Furthermore, the low cost plants being built in the Middle East are unlikely to be able to be emulated in South Africa which means domestic market considerations are paramount in the establishment of any plant.

### 8.5.7 Impact on the VCB conversion industry

#### Production, capacity and technology

The following factors should be considered under the 30 ì scenario:

- **Production process remains the same.** It is technically possible to manufacture a 30 ì VCB, and the production process will not change in terms of the primary activities of extrusion, printing and bag making.
- **The raw material mix and volume requirements will change.** Converters are of the opinion that it would not be necessary to manufacture a 30 ì VCB primarily from LLD or LD. The product will still be a HD product, but the raw material mix ratio's will change as earlier specified, and almost double in terms of volume.
- **Conversion of current technology is possible.** Converters indicated that it would be possible to modify existing extrusion and bag making equipment to produce bags at 30ì. The cost implications are dealt with in the next section of the report. Printing machines can operate at any thickness, and no modifications are required.

The following factors should be considered under a 80 ì scenario:

- **The production process changes.** It is technically not possible to manufacture a 80 ì VCB. The thickness at the gussets (320 ì) compared to thickness of the rest of the bottom of the bag (160 ì) is too great to allow for effective sealing. The implication is a change in bag type, typically to a bottom-seal bag, with either a separately attached handle, or "banana" cut out handle.
- **The raw material mix and volume requirements will change.** The bag will change from being primarily a HD bag to being purely LD bag, and the raw material mix ratio's will change as earlier specified.
- **Conversion of current technology is not possible.** Converters indicated that it is not possible to convert existing equipment to manufacture at 80ì's. This was confirmed with equipment manufacturers who indicated that totally new equipment is required.

A critical issue for both the 30ì and 80ì situation is the domestic capacity available to meet changed demand. The maximum available capacity is determined as follows:

<b>Available capacity</b>	<b>Current VCB</b>		
Current capacity for local market	38 000 t		
Current capacity for international markets	6 000 t		
Maximum additional capacity due to under-utilizes plant	2 000 t		
Maximum additional capacity if all companies produce maximum hours	2 000 t		
<b>Total available</b>	48 000 t		
		<b>30 ì</b>	<b>80 ì</b>
<b>Required capacity</b>		99 175 t	276 025
<b>Capacity shortfall/excess</b>		<b>51 175 t</b>	<b>228 025</b>

From the above it can be concluded that even if no exports are pursued, and available capacity maximised through optimisation, less than 50% of demand will be met under the 30ì scenario, and less than 25% of demand under the 80 ì situation

The above is based on the assumption that throughput per annum will remain constant. This is however not true. Total throughput per annum is constrained within every manufacturing plant by the extrusion, printing and bag making throughput, whichever is lower. Under both the 30 and 80ì scenario machine throughput will be negatively affected. The bag making process will be slower (cycle reduction) due to the longer seal time per bag, and the extrusion throughput will be lower due to thicker film being extruded. Companies indicated that throughput will reduce by 40-50% of current.

This figure was correlated with equipment manufacturers who provided more detail on how throughput of equipment is affected by producing at 30 and 80 microns.

	<b>Current</b>	<b>30 ì</b>	<b>80 ì</b>
Extrusion	100 m/minute	60 m/minute	35 m/minute
Bag making	220 cycles/minute	140 cycles/minute	Can not be converted

The implication is that capital investments required to meet increased capacity will have to consider both the cost of upgrading existing equipment, as well as the cost of investing in additional equipment in order to reach the required throughput per annum

### Capital investment

The manufacturers of VCB have provided the following information regarding the capital investment required to meet demand under higher thickness. The capital investment reflects both the need to upgrade existing equipment (30i situation only), as well as the need to buy additional equipment to meet throughput requirements.

Company	A	B	C	D	E	F	G	H	I	Total
Current capacity (t)	24000	2380	3400	1592	1326	240	630	840	120	34528
30i Investment requirement ( R mil)	55	5.9	7	6	7.9	2	3	5	3	94.8
80 i investment requirement ( R mil)	260	25	35	20	16	?	?	10	?	366

It is not possible to statistically analyse or extrapolate the above data in a great deal of detail due to a number of reasons, including for example the type of equipment used, the age of equipment, etc. This estimates provided by the converters however corresponds accurately with data provided by equipment manufacturers, who indicated the following:

- If either entry level new equipment, or second hand high quality equipment is purchased, the cost would be approximately R 400 000 for 350 t/annum on the extrusion side, which translates to approximately R 65 million for 50 000 tonnes capacity
- If either entry level new equipment, or second hand high quality equipment is purchased, the cost would be approximately R 270 000 for 350 t/annum on the bag making side, which translates to approximately R 35 million to convert 50 000 tonnes of film into 17i bags

The following can therefore be concluded:

- The capital investment required by the VCB industry to adapt to a 30 i situation and meet the existing demand would exceed R 150 million (R 35 million to compensate in reduction in throughput speed, R 100 million to increase capacity because of increased demand and R 15 million for modifications)
- The capital investment required by the VCB industry to adapt to an 80 i situation and meet the existing demand, would be approximately R 526 million. (R 61 million to compensate in reduction in throughput speed and R 465 million to replace and increase capacity because of increased demand)

### Likelihood of re-capitalisation of the industry taking place under the proposed regulations

The majority of large and small companies indicated that they would invest under the 30 i scenario, depending on their ability to raise finance. Examples were provided where access to capital (hire

purchase finance) was refused to manufacturers due to the uncertainty regarding proposed regulations.

The 80i scenario is somewhat different. It must be realised that VCB manufacturing is a commodity industry with low margins. The 80i situation essentially means the creation of a completely new industry, rather than an adaptation of an existing industry. Large companies who have access to finance indicated that they would rather exit the industry altogether, than invest in a new industry that produce low returns. The smaller companies indicated that they simply do not have access to such large amounts of capital, and will have no choice but not to invest in re-capitalisation. The consequences of re-capitalisation not taking place are severe, and dealt with extensively in the “worst case” scenario later on in the report

**It is worthwhile pointing out that no capital investments would be required if a minimum thickness of 22 - 24i is specified<sup>31</sup>. There is agreement within industry that 24 microns is the maximum thickness at which manufacturing can take place, without any throughput capacity being lost, or any modifications to equipment is required.**

**A detailed analysis of the impact of regulations specifying a thickness of 22-24i was outside the scope of the study, but some indication thereof is provided in the section that concludes the report.**

### 8.5.8 Impact on the retail industry and the consumer

The total cost of bags under the proposed regulations, assuming current demand, is summarised below.

Retailer category	Current consumption (bag units, billions)	Current spending (R million)	Future required spending - 30 i		Future required spending - 80 i	
			(R million)	% change	(R million)	% change
Large retailer groups	2.552	202	428	212	1192	591
Smaller retailers Printed bags	2.314	181.09	388	201	1081	574
Smaller retailers Unprinted	3.158	188.45	530	293	1475	815
Total	8.024	571.54	1347		3748	

The impact on the retailers would be more than a 200% increase under a 30i scenario, and more than 500% under the 80i scenario, on VCB spending. With the retail industry being a low margin industry, it can be readily concluded that retailers will not be able to absorb increased costs of this magnitude. It

<sup>31</sup> This information was provided by the VCB converters, and confirmed with equipment manufacturers.

is worth noting that the smaller retailers will be affected more negatively than the larger retailers. It will inevitably end up in a situation where the additional cost of either R 776 million or R 3,27 billion be passed onto the consumer, who can ill-afford it.

### 8.5.9 Impact on the waste management industry, including recycling

It is known that currently only approximately 1% of VCB's are recycled after consumption. A key driver for increasing the thickness of VCB's is to stimulate recycling of VCB's. The fundamental premise is that a thicker bag has inherently more value than a thin bag, and collection and recycling becomes economically viable. There are a number of issues that need to be addressed in order to answer the question about whether VCB's will be collected and recycled after consumption. (Note that for this scenario demand for bags are not affected by re-use.)

The issues relate to the supply and demand balance, and the constraints associated with VCB recycling, and how such constraints can be overcome.

Supply side – Post consumer collection	Demand side – market for recycled polymer
Currently less than 1% of post consumption VCB's collected for recycle	Market limited currently limited to refuse bags and some types of piping
Constraints to supply: <ul style="list-style-type: none"> <li>• Limited market</li> <li>• Printing on bags</li> <li>• Weight to volume ratio</li> <li>• Contamination</li> <li>• Lack of central collection points other than dumpsites</li> </ul>	Limits to demand: <ul style="list-style-type: none"> <li>• Uneconomical collection</li> <li>• Specifications to products, e.g. some municipalities specify refuse bags to be made from virgin material, bags used in the food industry must be made from virgin material</li> <li>• Imported "plain" carrier bags</li> </ul>

From the above it can be seen that should the bags be specified to be of a minimum thickness, it will not necessarily result in increased recycling. Although many of the constraints on the supply side will be reduced, and recyclers indicated that this would be the case, recycling will not take place unless corresponding markets are created.

### 30i situation

The total potential market for post consumption VCB's under the proposed 30i regulations, for this specific scenario, is estimated as follows:

- It is unlikely that post consumer recycled HD will ever be used for the manufacture of bags for the food retail industry.

- Post consumer recycled HD can be used for the manufacture of “plain” carrier bags for the non-food retail industry. Therefore, under the 30i regulation, the maximum market for that could be served by post consumer recycled HD, would be approximately 20 000<sup>32</sup> tonnes.
- If it is assumed that all refuse bags are specified to be manufactured from recycled material, it will represent an additional market of 5000 tonnes per annum.<sup>33</sup>

The net-effect of the proposed regulations at 30i's could be an maximum increase of VCB recycling from the current 1% to a maximum of approximately 25%, assuming all plain bags are made from recycled material, additional demand is created by specifying recycled material for all refuse bags, and assuming not importation of “plain” carriers bags. If imports stay at current levels, and the situation regarding refuse bags do not change, the increase will be limited to 15% of VCB's manufactured.

It must also be considered that even if 25% recycling is achieved, the volume of polymer that will end up as either litter or disposed in landfills, will increase from 42 000 tonnes to 74 000 tonnes per annum. The cost associated with disposal in landfill is estimated to be R 220/tonne<sup>34</sup>, and therefore total additional cost of R 7 million per annum.

### 80 i Situation

Under a 80i regulation the additional polymer (LD-PE) that will be released into the waste stream would be 236 000 tonnes. Since the present demand for recycled LD is being met, it can be concluded that unless additional markets for recycled LD is created; the only additional demand would be the VCB industry. It can therefore be estimated that a maximum of 20% of VCB's will be recycled The potential additional cost of landfill disposal would be in excess of R 40 million per annum.

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<sup>32</sup>30% of 100 000 tonnes, and less 10% that will be served by in-process waste

<sup>33</sup> Estimate supplied by industry

<sup>34</sup> Research report: “The potential of using fiscal instruments to promote the recycling of plastic waste in South Africa”, Deloitte & Touche, 1995

### 8.5.10 Impact on labour

#### The Social Impact Associated with the Scenarios

The primary social impact associated with the scenarios outlined is the potential change in employment linked to the quality of these jobs. Flowing from this is the larger number of people affected as a result of job losses (or gains) given the high dependency ratios on wage earners in South Africa.

The four scenarios calculate estimated changes in employment and this can be linked to the approximate quality of jobs (with reference to the High and Low Productivity Segments of the VCB industry as a benchmark along with a third, lower, category approximating to informal employment), and the estimated number of dependants.

The estimated impact on employment is calculated for each scenario and summarised in tabular form. This is followed by a tabular summary of the socio-economic impact of these employment changes taking into account the quality of jobs involved and the estimated number of dependants affected.

Some of the qualitative dimensions of possible employment changes and the resulting socio-economic impact are discussed below.

#### The impact of employment or unemployment on the income of VCB workers and their dependants

Using evidence from the interviews with shop stewards in the VCB industry the following impact on wage earners and their dependants can be projected per job lost or created in the formal sector.

Job category	Average take home income (per month)	Average number of dependants	Average income of dependants with wage income (includes other sources)	Average income of dependants without wage income
High Productivity Segment of VCB industry. (Also upstream and paper bag manufacturing industries).	R2,552	7.4	R428	R114
Low Productivity Segment of VCB industry. (Also formal recycling and retail packing jobs.)	R1,454	5.3	R332	R79

### **Comparison with international poverty levels**

The measurement of poverty (the inability to maintain a minimum standard of living) is difficult. The most common internationally used benchmark is US\$1 per day<sup>35</sup> (or approximately R260 per month).

On this basis the loss of employment would result in workers and their dependants falling to income levels dramatically below this international poverty line. Conversely, job creation would reverse this situation.

### **The impact of job losses on women**

While women constitute a minority of workers in the VCB industry they appeared to be concentrated in lower-skilled jobs where prospects or re-employment are lowest.

Although packing jobs in the retail industry were not researched in this project, this low-skilled occupation also appears to be dominated by women.

While evidence on the situation of women as workers was not collected during the study (all in-depth interviews being with male shop stewards) it is likely that where women workers are the sole breadwinner these represent some of the most vulnerable households in society.

### **The impact on job losses for migrant workers and their dependants**

The evidence indicates that many workers in the VCB industry are migrant workers. Any loss of income experienced by them as a result of job losses will be felt not only in the immediate vicinity of the workplace but will be spread, through reduced remittances, to other locations. Given the motivation for migrant labour it is likely that these locations will be in some of the most economically depressed regions of the country.

### **Un-quantifiable Costs Associated with Employment**

While the income associated with job losses or gains can be calculated other less quantifiable factors also have to be considered. These include:

- Increase crime linked to unemployment.
- Stress on families due to unemployment and poverty.

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<sup>35</sup> May, Julian *et al.* 2000. The Nature and Measurement of Poverty and Inequality. In May, Julian. *Poverty and Inequality in South Africa: Meeting the Challenge*. David Phillip. Cape Town.

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- Psychological damage to individuals as a result of prolonged unemployment.
  - The impact on the ability of families to secure education for children in families with limited income.

### **The Impact on Taxation**

Another, significant socio-economic implication is the loss or gain in tax revenue in the form of workers pay-as-you-earn contributions. This is primarily a feature of jobs in or similar to the High Productivity Segment of the VCB industry. Other workers are generally below the tax threshold.

### **The Impact on UIF**

All workers in the formal sector pay UIF contributions. In the event of job creation there will be increased revenue into the fund. In the event of job losses there will be a drain on the fund for the duration of payments to retrenched workers and a loss of future income to the fund.

### **Calculating Changes in Employment Under the Four Scenarios**

A number of assumptions have had to be made to reach estimations of the effect on employment of the proposed regulations in the four scenarios at 30 and at 80 microns. This section outlines these assumptions in the following notes.

#### **Note 1: The Upstream Industry**

Based on interviews with representatives from the upstream industry, it is assumed that where total VCB polymer demand increases by 100,000 tonnes or more there will be the upgrading of upstream production by 200,000 tonnes. It is estimated that this will result in the creation of between 20 and 100 jobs.

In the event of a decrease in domestic polymer usage it is assumed, on the basis of upstream interviews, that any reduction in domestic use will be exported. In this case there will be no change in employment.

#### **Note 2: Re-capitalisation of the VCB Industry at 80 microns?**

At 80 microns the cost of necessary re-capitalisation of the VCB industry is regarded as prohibitive (as previously discussed in this document). However, where the 80-micron scenarios indicate an increase in VCB polymer usage a range of employment implications are calculated assuming industry re-capitalisation. This is to provide a full development of the scenario and does not imply that this will necessarily happen.

**Note 3: Spare capacity in the VCB Industry**

As earlier calculated, approximately 4,000 tonnes of spare capacity exists in the VCB industry. Bringing this capacity on stream, which involve running machines - notably in the Low Productivity Segment of the industry – 24-hours a day, seven days a week, 11 months of the year. This will involve increased use of labour. In the short term this is likely to be met by increased overtime and the use of casual and temporary workers. In the longer run using this capacity is likely to involve the employment of additional shifts given the limits on overtime and casual work i.e. additional employment will be created.

The estimation of potential job creation in the event of increased polymer conversion is based on this long-term understanding of employment creation. Given this, it is assumed that bringing this spare capacity on stream will have similar job implications to the installation of new capacity.

Thus, the base line from which any increase or decrease in employment in the VCB industry is calculated is 44,000 tonnes.

**Note 4: Retrenchment and re-employment of employees in the VCB industry**

From section it is estimated that 76.6 percent of employees in the High Productivity Segment of the VCB industry and 84.6 percent of employees in the Low Productivity Segment of the VCB industry would not find re-employment if retrenched. Where scenarios involve job losses in this industry these figures are used; i.e. total unemployment created in this sector and not actual retrenchments.

**Note 5: Re-employment of retail bag packers**

It is assumed no bag packers will find alternative employment should they be retrenched.

**Note 6: VCB Efficiency Gains and Employment Gains in the Event of New Capacity**

In the event of increased VCB polymer usage and the installation of new capacity it is likely that there will be efficiency gains and resulting higher productivity per employee. The extent of these gains is difficult to predict.

**30 Micron Scenarios**

In the 30-micron scenarios that anticipate increased conversion of polymer a range of employment implications is calculated.

The upper end of this range, in terms of job creation, assumes that both the High and Low Productivity Segments of the industry expand proportionally to their current share of conversion and that their current productivity rate (tonnes converted per employee) remains constant. That is, the industry becomes bigger but otherwise remains the same. This is based on the relative ease of conversion of machinery to 30 microns reported by employers. This implies that new capacity could be a mixture of new machines and newly installed second-hand machines.

Job increases at this upper range are, therefore, calculated on the basis of 72.2% of new tonnage being converted by an expanded High Productivity Segment at 41.5 tonnes per employee and 27.8% of new tonnage being converted by an expanded Low Productivity Segment at 12.7 tonnes per employee.

The lower limit of this range, in terms of job creation, is based on *all* new capacity being installed at the current highest recorded level of any VCB manufacturing site in South Africa - 46.7 tonnes per employee. This reflects a situation in which employers decide to only invest in high productivity machinery to meet increased demand.

### 80 Micron Scenarios

At the 80-micron level, on the basis that the industry does re-capitalise, it is assumed that this would be on the basis of high productivity plants given the expense involved. That is, the Low Productivity Segment of the industry would cease to exist and all production would take place at the current highest recorded level of any VCB manufacturing site in South Africa - 46.7 tonnes per employee.

## **Note 7: VCB Employment Losses in the Event of Decreased Demand**

### 30 Microns

In the event of decreased polymer conversion it is likely that both segments of the industry will contract on a proportional basis, as their respective markets are likely to be equally affected.

With a major decrease in the size of the industry some increase in productivity might be expected as less efficient machines are scrapped and less profitable companies close down. However, if any decrease is relatively small then this effect is also likely to be limited.

It is therefore assumed in the relevant scenarios that output will be decreased on a proportional basis to the existing division of the VCB industry between the High and Low Productivity Segments. It is further assumed that these industry segments will continue to operate at their current average levels of productivity.

### 80 Microns

In the event of decreased polymer conversion under 80 micron conditions it is assumed that the reduction in capacity will be taken up first by the Low Productivity Segment and then by the High Productivity Segment of the industry.

## **Note 8: Domestic Production of Thicker VCBs**

It is assumed that the production of thicker VCBs will be domestically based, other than in the worst case scenario where no bags are produced domestically.

**Note 9: Possible Job Creation in the Paper Bag Industry**

Only limited data was collected to allow the estimation of job creation from an increased share of the market by paper bags.

In order to make this calculation data was used from one large manufacturer of both VCBs and paper bags. Total VCB employment cost per employees in this company (approximately R90,000) was used with the percentage labour cost (approximately 20%) in the production of paper bags in this company to calculate the number of jobs that would be created for a given value of any created paper bag market.

Given the limited nature of the data used in calculating possible job creation in the paper bag industry, the employment estimated need to be treated with caution.

**Note 10: Possible Job Creation in the Plastic Recycling Industry**

Increased polymer use presents opportunities in the plastic recycling industry.

From limited evidence collected is estimated at an employment rate of 7 tonnes of collected recycled per collector and 84 tonnes of recycled material per recycling operator at dedicated recycling plants. This information is linked to estimated amounts of polymer available for recycling in the different scenarios.

Employment created as a result of collecting material is considered to be informal in nature. Employment created in the recycling plants is considered to be formal and similar in conditions to the Low Productivity Segment of the VCB industry.

Given the limited nature of the data used, the employment estimations need to be treated with caution.

Furthermore, given that it is not known whether this extra polymer in the form of VCBs will in fact be recycled, the estimate of possible job creation is ranged from no recycling of the extra material to complete recycling of the estimated available material.

**Note 11: Possible Job Creation in the Paper Recycling Industry**

The increase use of paper bags presents opportunities in the paper recycling industry, primarily in the demand for recycled material as an input into paper bags rather than in the recycling of bags. The employment implications of this are not known and are not included in the scenario calculations.

**Note 12: Impact of 30 and 80-micron bags on retail packing jobs**

Retailers were not asked for the impact of 30-micron bags on the employment of packers. It is assumed that there will be no employment effects as bags will continue to be used in the retail sector.

Responses from small and medium retailers indicated that at the 80 micron level a number of outlets would require customers to use their own bags and that, consequently, the jobs of their packers would become redundant.

This (but not other reasons given for retrenchments of packers, such as use of paper bags) is extrapolated to the whole of the small and medium retail sector. The figure of 5,228 retail packing job losses is used in the appropriate scenarios.

Evidence from large retailers indicated that there would be no impact on the employment of packers in this sector.

In the event of consumers shifting to their own bags (e.g. 'bags for life') it is assumed that all packing jobs in retail will be lost. On limited data this is estimated to be approximately 70,000 jobs. More detailed research may well alter this figure and also provide a detailed breakdown in terms of employment contracts. However, the magnitude of the figure is not implausible given that the Wholesale and Retail Sector SETA's sector profile estimates that there are 163,000 elementary occupations (sales and service) workers in the sector, a figure that does not include checkout cashiers<sup>36</sup>. Consequently, this figure is used in the relevant scenario.

### **Note 13: Quality of jobs gained or lost and number of dependant affected**

The four scenarios calculate estimated changes in employment and this can be linked to the approximate quality of jobs (with reference to the High and Low Productivity Segments of the VCB industry as a benchmark along with a third, lower, category approximating to informal employment), and the estimated number of dependants.

- It is assumed that jobs in the upstream industry, and paper bag manufacturing are similar in characteristics to those in the High Productivity Segment of the VCB industry. The number of dependants (including the wage earner) is calculated from the interviews with worker representatives in this segment at 7.4 people.
- It is assumed that jobs in plastic recycling companies and retail packing jobs are similar to the Low Productivity Segment of the VCB industry. The number of dependants (including the wage earner) is calculated from the interviews with worker representatives in this segment at 5.3 people.
- It is assumed that jobs in plastic recycling collection are a form of informal employment. Data was not collected on this form of employment. It is assumed that workers in this occupation have incomes at or below poverty levels. For the purpose of estimating the socio-economic impact it is assumed that they have a smaller number of dependants to the Low Productivity Segment of the VCB industry. For the purposes of calculations this is assumed at three including the informal worker.

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<sup>36</sup> Wholesale and Retail Sector Skills Plan. 2000.

The impact on labour, based on the above assumptions, and for the current scenario is summarised in the tables of the following pages.

<b>Scenario A, 30 Microns: No change in the number of VCBs demanded</b>	
Change in polymer conversion	New tonnage of polymer converted: 99,175 tonnes. Increase in polymer conversion: 55,175 tonnes
Employment area	<b>Bases for calculation of change in employment</b>
Upstream (Note 1)	Increase in polymer conversion < 100,000 tonnes. Therefore no change in employment.
VCB manufacturing	<p><b>Increase in employment</b></p> <p><b>Upper limit to job creation</b> (Notes 3 and 6) New jobs in the High Productivity VCB companies: 72.2% of 55,175 tonnes at productivity of 41.5 tonnes per employee = 960 new jobs. New jobs in the Low Productivity VCB companies: 27.8% of 55,175 tonnes at productivity of 12.7 tonnes per employee = 1,208 new jobs Total new jobs = <b>2,168</b></p> <p><b>Lower limit to job creation</b> (Notes 3 and 6) 100% of 55,175 tonnes at productivity of 46.7 tonnes per employee = 1,181 new jobs Total new jobs = <b>1,181</b></p>
Paper bag manufacturing	Not applicable
Plastic recycling (Note 10)	<p>Estimated range of plastic recycling: 0 – 20,000 tonnes</p> <p><b>Higher limit to job creation:</b> Jobs in recycling plants: 20,000 tonnes at 84 tonnes per employee = 238 new jobs Jobs in collecting plastic: 20,000 tonnes at 7 tonnes per worker = 2,857 Total higher estimate of job creation = <b>3,095</b></p> <p><b>Lower limit to job creation = 0</b> (non of available extra polymer is recycled)</p>
Retail (Note 12)	No change

**Total impact on employment of Scenario A, 30 microns**

Industry	Lower Limit to Employment Change	Higher Limit to Employment Change
Upstream	0	0
High Productivity VCB industry	+1,181	+960
Low Productivity VCB industry	0	+1,208
Paper bag manufacturing	0	0
Plastic Recycling (plants)	0	+238
Plastic Recycling (collectors)	0	+2,857
Retail	0	0
<b>Total</b>	<b>+1,181</b>	<b>+5,263</b>

**Direct Socio-economic Impact of Scenario A, 30 microns**

Change in Employment	Number of Workers (from previous table)		Number of people effected by change in income (note 13)	
	Lower Estimate	Higher Estimate	Lower Estimate	Higher Estimate
High Productivity Segment of VCB industry. (Also upstream and paper bag manufacturing industries). (Note 13)	+1,181	+960	8,739	7,104
Low Productivity Segment of VCB industry. (Also recycling jobs in plants and retail packing jobs.) (Note 13)	0	+1,446	0	7,664
Informal jobs in collecting plastic for recycling. (Note 13)	0	+2,857	0	8,571
<b>Total</b>	<b>+1,181</b>	<b>+5,263</b>	<b>8,739</b>	<b>23,339</b>

<b>Scenario A, 80 Microns: No change in number of VCBs demanded</b>	
<b>Change in polymer conversion</b>	New tonnage of polymer converted: 276,025 tonnes (Note 2). Increase in polymer conversion: 232,025 tonnes
<b>Employment area</b>	<b>Bases for calculation of change in employment</b>
<b>Upstream</b>	Increase in polymer conversion > 100,000 tonnes. Therefore, increased capacity with between <b>20</b> and <b>100</b> jobs created (Note 1).
<b>VCB manufacturing</b>	<p><b>Increase in employment</b></p> <p><b>Upper limit to job creation</b> (Notes 2 and 6)</p> <p>Jobs in the High Productivity VCB companies producing at 46.7 tonnes per employee: 276,025 tones at 46.7 tonnes per employee = 5,799</p> <p>Minus existing jobs in the High Productivity Segment (766) = 5,033</p> <p>Minus existing jobs in the Low Productivity Segment (1,700) = 3,333</p> <p>Total new jobs = <b>3,333</b></p> <p><b>Lower limit to job creation</b> (Notes 2 and 6)</p> <p>Jobs in the High Productivity VCB companies producing at 46.7 tonnes per employee: 276,025 tones at 46.7 tonnes per employee = 5,799</p> <p>Minus existing jobs in the High Productivity Segment (766) = 5,033</p> <p>Minus existing jobs in the Low Productivity Segment (2,000) = 3,033</p> <p>Total new jobs = <b>3,033</b></p>
<b>Paper bag manufacturing</b>	Not applicable
<b>Plastic recycling (Note 10)</b>	<p>Estimated range of plastic recycling: 0 – 50,000 tonnes</p> <p><b>Higher limit to job creation:</b></p> <p>Jobs in recycling plants: 50,000 tonnes at 84 tonnes per employee = 595 new jobs</p> <p>Jobs in collecting plastic: 50,000 tonnes at 7 tonnes per worker = 7,143</p> <p>Total higher estimate of job creation = <b>7,738</b></p> <p><b>Lower limit to job creation = 0</b> (non of available extra polymer is recycled)</p>
<b>Retail</b>	At 80 microns returns from retail questionnaire indicated an estimated 5,223 packers would loose their jobs in the small and medium retail section (Note 12). However, this contradicts the assumptions on this scenario in which VCB demand is not reduced. To maintain the integrity of the scenario it is, therefore, assumed that there is not impact on retail jobs.

**Total impact on employment of Scenario A, 80 microns**

Industry	Lower Limit to Employment Change	Higher Limit to Employment Change
Upstream	+20	+100
High Productivity VCB industry	+5,033	+5,033
Low Productivity VCB industry	-2,000	-1,700
Paper bag manufacturing	0	0
Plastic Recycling (plants)	0	+595
Plastic Recycling (collectors)	0	+7,143
Retail	Assume 0	Assume 0
<b>Total</b>	<b>+3,053</b>	<b>+11,171</b>

**Direct Socio-economic Impact of Scenario A, 80 microns**

Change in Employment	Number of Workers (from previous table)		Number of people effected by change in income (note 13)	
	Lower Estimate	Higher Estimate	Lower Estimate	Higher Estimate
High Productivity Segment of VCB industry. (Also upstream and paper bag manufacturing industries). (Note 13)	+5,053	+5,133	37,392	37,984
Low Productivity Segment of VCB industry. (Also recycling jobs in plants and retail packing jobs.) (Note 13)	-2,000	-1,105	(10,600)	(5,857)
Informal jobs in collecting plastic for recycling. (Note 13)	0	+7,143	0	21,429
<b>Total</b>	<b>+3,053</b>	<b>+11,171</b>	<b>26,792</b>	<b>53,556</b>

## 8.6 Scenario B: Adjusted demand scenario

The previous scenario cannot be considered to be realistic as it assumes current demand levels. The following scenario is more realistic since it considers the expected change in demand due to the regulations, and also considers substitute products such as paper bags.

### 8.6.1 Assumptions and product data

The scenario is based on the following assumptions:

- Paper, as a substitute product becomes a factor. Under a 30 ì situation the share of paper bags in the VCB industry increases from 1% to 5% and under a 80 ì scenario it is estimated that 35% of market share will shift from plastic to paper, as previously explained

The net effect is therefore a reduction of 35 and 50% on the demand for plastic VCB's, respectively, and an increase in 5 and 35% respectively for paper bags.

- The demand for bags change as follows:
  - Under a 30 ì situation there is a 20% reduction in total demand for units of bags due to a more efficient bag being introduced, and increased re-use taking place. The bag dimensions are changed, i.e. it is a larger bag with a 70% volume increase. The carry capacity in terms of weight increases, but it must be remembered that there are limitations to the weight that one person can comfortably accommodate. Issues related to how products are packed, for example "rat poison and bread in one bag", must also be considered.
  - There is also 10% decrease in the demand for bags due to improved packaging practices at retail outlets, for example double packaging is limited. This of for both the 30 and 80ì scenario.
  - Under an 80 ì situation the change in demand due to the bag being larger is limited to 5%. This is because the 80ì plastic bag is smaller than the optimized 30ì plastic bag, and the bag cost to functionality ratio have already been optimized. The paper bag is similar is size to the current VCB's in use, is not re-usable and there is therefore no reduction in demand due to the paper bag.
- Retailer spending is not limited.