

Maximising Waste Utilisation at a Flexible Packaging Company

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ABSTRACT

Afripack Consumer Flexibles: Labels DLC (ACF Labels) has been measuring key sustainability criteria and seeking ways to become more energy and water efficient since 1997. The current programme to drive the reduction of carbon footprint while maintaining production and environmental standards ensures that ACF Labels achieves its environmental goals. However, in addition they have forged partnerships with a variety of craft organisations to offer opportunities to upcycle waste into high quality, saleable goods and hence create employment and reduce poverty.

1. INTRODUCTION

ACF Labels is a producer of labels and flexible packaging, and has been operating from Pinetown, KwaZulu Natal since 1990. It was acquired by the Afripack group in 2009. It prints on mainly plastic film using the flexography, and which can go through several processes before dispatch to the customer, resulting in significant quantities of waste. The choice of packaging materials is normally decided by the brand owner, and often their recyclability is not taken into consideration. These materials have changed significantly over the years – eg, a leading soft drink manufacturer over the last 20 years has labeled their products' bottles first with PVC¹, then LDPE², then solid BOPP³, and now cavitated BOPP (at an ever-decreasing gauge). These changes affect the amount of landfill and the income from the sale of recyclables. The ideal situation is for the brand owner and manufacturer of the goods to be packaged to consult with the company producing the packaging at the onset of a new project, not at the end, when it is too late to make eco-friendly changes.

Facing up to the reality of rising energy and raw material costs, impending stricter legislation on waste, air emission controls, carbon taxes and water scarcity has become a cultural imperative. Therefore we need to use natural resources and energy conservatively, minimise waste generation, limit the amount of hazardous chemical substances and prevent pollution. This work ethic is entrenched in the Afripack Environmental Policy. Waste is streamed at source to ensure that the recyclable element is kept apart from landfill. ACF Labels, along with its waste management partners, has developed a waste management system which requires dealing with up to 75 tonnes of dry waste (the filmic material mentioned above, cardboard, cores, wood) and 18 tonnes of wet waste (used inks and solvent washings) a month. The standard waste hierarchy is followed (figure 1):

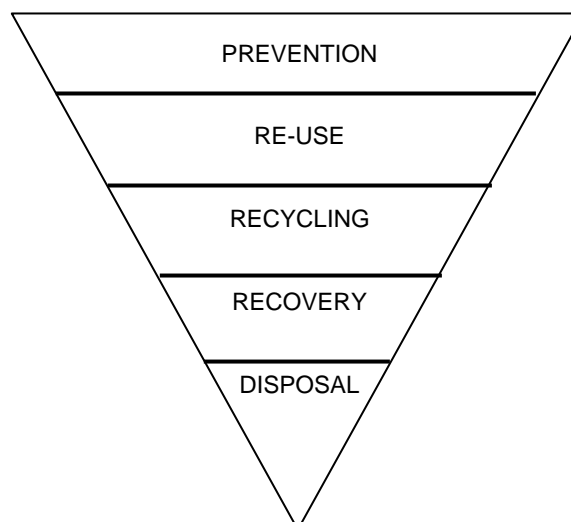


Figure 1: The waste hierarchy

In other countries, “recovery” generally refers to energy recovery from incineration, or the thermolytic processes of pyrolysis, gasification and hydrogenation (Brems et al, 2013). However these are in their infancy in South Africa and are not available currently for waste generated by the Pinetown plant. The types of waste can be classified as follows (figure 2):

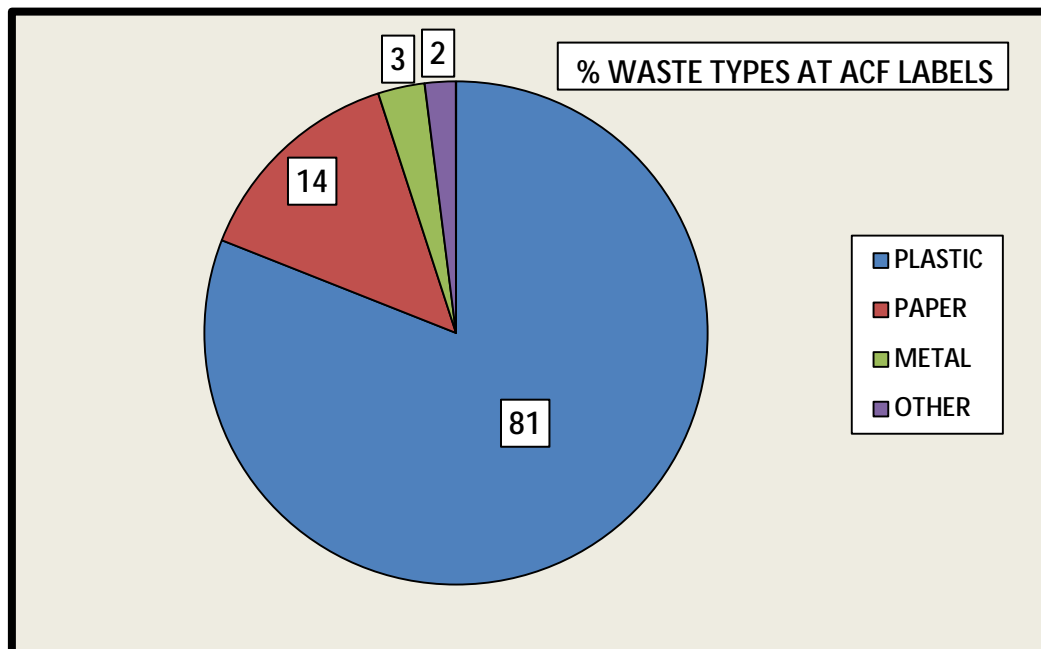


Figure 2. Percentages of the main wastes at ACF Labels

2. WASTE VOLUMES

The handling of this waste, both hazardous and non-hazardous, requires careful choice of waste service providers and recyclers. Recycling ratios have gradually improved, and in 2013 peaked at 74% of general waste diverted from landfill as shown in Table 1:

Table 1. General waste volumes and recycle ratios at ACF Labels 2010-2013

| GENERAL WASTE (tonnes/month) | 2010 | 2011 | 2012 | 2013 |
|---------------------------------|--------------|--------------|--------------|--------------|
| Polypropylene | 17.4 | 16.6 | 16.2 | 17.5 |
| Polyethylene | 4.1 | 8.8 | 8.6 | 9.8 |
| Paper-based products | 4.9 | 5.1 | 4.9 | 7.0 |
| Metal | 1.3 | 0.8 | 1.3 | 1.3 |
| Miscellaneous | 0.7 | 0.8 | 0.5 | 0.9 |
| TOTAL RECYCLED | 28.4 | 32.1 | 31.5 | 36.5 |
| LANDFILL | 13.4 | 13.6 | 11.9 | 13.0 |
| TOTAL GENERAL WASTE | 41.8 | 45.7 | 43.4 | 49.5 |
| % GENERAL WASTE RECYCLED | 67.9% | 70.2% | 72.6% | 73.7% |

Solvents and inks are redistilled off-site, with ACF Labels buying back the distillate for use in the processes (mainly cleaning) and paying for safe disposal of the sludge.

Table 2. Hazardous waste volumes and recycle ratios at ACF Labels 2010-2013

| HAZARDOUS WASTE(tonnes/month) | 2010 | 2011 | 2012 | 2013 |
|--------------------------------------|-------|-------|-------|-------|
| Rags, containers | 2.8 | 3.5 | 3.8 | 2.7 |
| Solvent-based inks, washings | 3.6 | 5.5 | 8.7 | 7.9 |
| TOTAL RECYCLED | 2.7 | 4.1 | 5.5 | 5.3 |
| TOTAL LANDFILL (inc. solvent sludge) | 3.7 | 4.9 | 7.0 | 5.3 |
| TOTAL HAZARDOUS WASTE | 5.4 | 10.0 | 12.5 | 10.6 |
| % HAZARDOUS WASTE RECYCLED | 50.0% | 41.0% | 44.0% | 50.0% |

Pallets are either reused as is, or if damaged or are the incorrect size, are given to a pallet recycler and the refurbished pallets are bought back.

The waste service provider supplies the company with a monthly summary of all the waste types, the ratio of waste to recyclables and the income gained from the sale of recyclables – which usually exceeds the cost of waste management and disposal. Figures are also given for the carbon footprint saved by recycling general waste rather than by disposal to landfill (table 3):

Table 3. Carbon Footprint saving at ACF Labels through recycling general waste

| | 2010 | 2011 | 2012 | 2013 |
|--|-------|-------|-------|-------|
| Quantity CO ₂ (tons/month) | 54.2 | 69.1 | 81.4 | 71.5 |
| % of Scope 2 footprint | 19.0% | 23.4% | 25.2% | 25.2% |

As can be seen, this is significant compared to the Scope 2 (purchased electricity) carbon footprint, although the figures can't be used to offset said footprint!

3. THE SUSTAINABILITY MANAGER AND THE GREEN TEAM

In 2011, a sustainability manager for the Afripack group was appointed. Knowing that help this person could not work alone, a 'green team' was set up to co-ordinate green initiatives on site, e.g. energy, water, raw material and waste savings, including carbon footprint measurement. This team of 3 was selected due to their interest in ensuring that the company has a 'tread lightly' approach to the environment. They do however have their own job functions, so they also have to be efficient at time management. The ethos of 'if you can't measure, you can't manage' has been applied so that any anomalies in the energy, waste and water data could be explained and rectified. Monthly results are collated and compared against both the target and previous results.

These teams are kept abreast of global green information by means of twice-weekly newsletters from, and regular meetings with, the Group Sustainability Manager. These newsletters cover relevant topics such as renewable energy, energy savings, waste initiatives, climate change and changes in environmental legislation.

4. WASTE BENEFICIATION

No matter how efficient the on-site waste management system is, there will always be a portion of waste that ends up in landfill rather than to be recycled. Plus the amount of money gleaned from recycling is between 90-95% less than the true cost of waste – production costs plus the price paid for virgin material. One also needs to consider the disposal of packaging that protects the raw materials – in many cases these are imported, and cannot be returned to the supplier. ACF Labels has been pursuing a solution to this problem since 1998 when they realized that waste has so much more potential than maximising the diversion to recyclers. A chance meeting with the Art Works Trust resulted in a donation of reels of various label and flexible packaging designs which were used to enrobe a 10m-high Christmas tree outside of Durban's City Hall (Fig. 3):



Figure 3. Art Works Trust Christmas Tree, 1998

This project introduced us to key players in the creative arts industry who realized that there was a rich source of materials for students and crafters alike from post-industrial waste. The various dry waste streams at DLC have been donated since 1998 to various craft and self-help groups. This waste has the advantage to the community of being clean (rather than scavenged post-consumer, which is often too dirty or damaged to be used), so they can be converted into high-end goods for sale. Items produced have been sold on the global market as well as locally. ACF Label's donation of clean industrial waste to the various craft groups has shown that in the right hands, work can be produced whose standard can exceed the norm and can generate income for people that previously were severely disadvantaged by unfortunate circumstances. The goods produced have shown that to simply recycle is a lost opportunity for job creation. Upcycling can result in income from saleable, functional art – clothes, mats, baskets, wall hangings and furniture.

This has resulted in tremendous positive response from suppliers and customers. Consequently organisations that can benefit from donations of clean, post-factory waste have been actively sourced. Staff based at Labels have taken the initiative by making their own items from this waste, and currently 10 separate NGOs working in the craft industry are being supported. Success stories have been as follows:

4.1 Waste trim

This has been crocheted and woven to give a variety of articles, as seen in the following figures:





Figure 4. Articles made with waste plastic trim



Figure 5. Fashionable clothes made with waste plastic trim



Figure 6. Hats, wall hangings and 'wastecoats' from trim

4.2 Plastic furniture and stationery holders

A wealth of sizes and shapes can be made by using square end plates that are used to support and protect some of the reels of plastic film used at Labels. These are cut and bolted together, along with struts used to chock the reels in place on a pallet, and covered with printed scrap material (figures 5):



Figure 7.: Chairs made using scrap plastic end plates and struts



Figure 8. Stationery holder made from end plates

4.3 Cardboard furniture

Most organisations produce vast quantities of cardboard and cartonboard, which are sold for a very low price to recyclers. However, if made correctly they can produce attractive lightweight, durable furniture that can suit even the most discerning home owner. The examples below were made (with cartonboard from the boxes supplied with the photopolymer used for making flexographic plates) that was first cut and then glued together, then covered with crocheted material and/or unrecyclable plastic laminate (figures 9-11):



Figure 9. Cardboard lounge and dining room chairs



Figure 10. Desk and side desk; legs made with cardboard cores

The waste materials even presented entertainment possibilities with the creation of a pool table, entirely made from waste or found materials. This was set up in the canteens of two Afripack sites and had to be dismantled after a year due to their popularity, and interference with work schedules (figure 11):



Figure 11. Pool table; sides covered with scrap PVC; legs and pockets made with cardboard cores; balls from painted golf balls

4.4 Dress made with non-recyclable laminate

One school we deal with has a very active art department. They made this award-winning dress using cut-outs of non-recyclable laminate (figure 12):



Figure 12. Dress made with non-recyclable laminate cut-outs

5. CONCLUSIONS

The focus on waste management at ACF Labels has given the company enormous benefits:

- There has been a greater focus on recycling rates of general waste;
- Diversion from landfill to waste beneficiation projects has uplifted the company profile;
- In turn this has presented income-generating opportunities to the greater Durban community;
- The project has saved the company from incurring waste transportation and landfill costs, as well as benefitting the Municipality by prolonging the life of the landfill site;
- More involvement of employees in sustainability – the 'Green teams'.

ACF Labels has shown that it is truly "Wired for Waste". Mutually beneficial partnerships with the various craft organisations to maximize the value of our waste are demonstrably successful, and are planned to continue for the foreseeable future .

ACKNOWLEDGEMENTS

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REFERENCE

Brems, A., Dewil, R., Baeyens, J. and Zhang, R. (2013). Gasification of plastic waste as waste-to-energy or waste-to-syngas recovery route, *Natural Science*, vol. 5, no. 6, 695-704.

ABBREVIATIONS USED

- 1 – PVC: polyvinyl chloride
- 2 – LDPE: low-density polyethylene
- 3 – BOPP: bi-axially orientated polyethylene