Whiteware Sector

Product Stewardship Study

Prepared for the Ministry for the Environment and Sector Group Representatives

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Prepared by Product Ecology Pty Ltd in association with
Responsible Resource Recovery Ltd

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Preamble

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Contents

Preamble 2

Executive Summary 5

1 Introduction 7
- 1.1 Background 7
- 1.2 Purpose and scope of the study 7
- 1.3 Project objectives and terms of reference 8
- 1.4 Project methodology 8
- 1.5 New Zealand policy context 8

2 Overview of the Whiteware Sector in New Zealand 10
- 2.1 About the product category – whiteware 10
- 2.2 Scale of the market 11
- 2.3 The geography of production – local manufacture and imports 12
- 2.4 Brand owners – the competitive landscape 12
- 2.5 Local authorities 14
- 2.6 Recyclers 14
- 2.7 Summary of observations 14

3 Environmental Issues Related to Whiteware 16
- 3.1 Environmental issues and impacts 16
- 3.2 Overseas responses 18
- 3.4 Best practice in whiteware product stewardship (collection and processing focus) 19
- 3.5 Summary of observations 20

4 Current Whiteware Product Stewardship in New Zealand 21
- 4.1 Product stewardship at Fisher & Paykel Appliances Ltd 21
- 4.2 Product stewardship at Electrolux (NZ) Ltd 24
- 4.3 The role of design for environment in product stewardship 27

5. Performance Against Current Government Policy Objectives 29
- 5.1 Assessment against the New Zealand Waste Strategy 30
- 5.2 Assessment against the Product Stewardship Discussion Document objectives 31
- 5.3 Assessment against the policy objectives – study brief 34
- 5.4 Stability of schemes 37
- 5.5 Overall environmental and economic benefits of current schemes 39

6. The Role of Regulation and Other Interventions 40
- 6.1 Non-regulatory interventions, funding support and incentives 40
- 6.2 Evaluation of potential regulatory and non-regulatory options 42

7 Lessons Learned and Key Recommendations 48

References 50

Appendix 1: Whiteware Collection and Processing Flow: Fisher & Paykel 51

Figures

Figure 1.	Material composition of whiteware	10
Figure 2.	Country of origin for New Zealand imports of whiteware	12
Figure 3.	Lifecycle of an item of whiteware	18
Figure 4.	LCA results showing environmental impact (CO_2 emissions) of a refrigerator and air conditioner showing the majority of impact during use phase	19

Tables

Table 1.	Core goals of the New Zealand Waste Strategy	30
Table 2.	Criteria for prioritising action	31
Table 3.	Product Stewardship Discussion Document objectives: Fisher & Paykel Appliances Ltd	32
Table 4.	Product Stewardship Discussion Document objectives: Electrolux Home Products	32
Table 5.	Product Stewardship Discussion Document objectives: Other whiteware producers/suppliers	33
Table 6.	Policy objectives – Fisher & Paykel Appliances Ltd	34
Table 7.	Policy objectives (study brief) – Electrolux Home Products – a division of Electrolux NZ Ltd	36
Table 8.	Environmental and economic benefits: Fisher & Paykel Appliances	39
Table 9.	Environmental and economic benefits: Electrolux Home Products	39
Table 10.	Option 1 – Status quo (industry-driven and voluntary schemes) – whiteware focus	42
Table 11.	Option 2 – Industry-led schemes with free-rider regulation – whiteware focus	43
Table 12.	Option 3 – Mandatory approach to product stewardship schemes – whiteware focus	44
Table 13.	Option 4 – voluntary and regulatory mix of approaches – whiteware focus	45
Table 14.	Option 5 – Mandatory refund system – whiteware focus	46

Abbreviations

ABS	Acrylonitrile butadiene styrene
CfC	Chlorofluorocarbon
DfD	Design for Disassembly
DfE	Design for Environment (also known as EcoDesign)
DfR	Design for Recycling
EDA	Exclusive Dealer Arrangement
EHP	Electrolux Home Products (a division of Electrolux New Zealand Ltd)
EPHC	Environment Protection and Heritage Council (Australia & New Zealand)
EPR	Extended Producer Responsibility
EPS	Expanded Polystyrene
EU	European Union
F&P	Fisher & Paykel Appliances
HCFC	Hydrochlorofluorocarbon
KPI	Key Performance Indicators
LCA	Life Cycle Assessment
MfE	Ministry for the Environment (New Zealand)
RoHS	EU Directive on Restriction of Hazardous Substances
SPR	Shared Product Responsibility
VOCs	Volatile Organic Compounds
WEEE	EU Directive of Waste Electrical and Electronic Equipment

Executive Summary

The need to effectively and efficiently address end-of-life waste arising from electrical and electronic products is acknowledged as an important priority in need of industry, government and community action. Evidence and activity worldwide is highlighting the need to develop sustainable solutions that can significantly reduce the life-cycle environmental impacts associated with production and consumption. This imperative has been acknowledged through the Ministry for the Environment's discussion document on product stewardship and water efficiency labelling.

It is understood this project may contribute to the Ministry's policy development process with a view to developing a coherent product stewardship policy for various product categories and waste streams in New Zealand, including whiteware. The project objectives and terms of reference as outlined in the project brief were extensive and challenging. In particular, the project aimed to: "*Study the issues associated with the environmental impact of the whiteware sector, case study any existing product stewardship schemes to address this and establish what assistance a national product stewardship policy could offer.*"

Within the context of life-cycle thinking and the need to pursue sustainable production and consumption, the widely accepted definition of 'product stewardship' provided the guiding concept for the project ie *"Product Stewardship is the term used to describe an approach whereby producers, importers, brand owners, retailers, consumers and other parties involved in the life cycle of a product accept a responsibility for the environmental impacts of the products through their life cycle."*

Whiteware is made predominantly of steel. The steel component varies according to the appliance type, ranging from 90% for clothes dryers and cookers to less than 60% for dishwashers. The presence of metal is a major factor in the economic viability of whiteware recycling. Steel yields a relatively small price (less than NZ$200/tonne) while non-ferrous metals have significant monetary value.

An estimated 600,000 whiteware units are sold in New Zealand every year.[1] More than half of the whiteware sold in New Zealand is imported. In 2005, approximately 330,000 units were imported into New Zealand, representing 55% of the total market. The New Zealand whiteware market is characterised by a single, dominant domestic manufacturer and distributor (Fisher & Paykel Appliances Ltd) whose products represent as much as 50% of the total whiteware market. Overseas studies have found that whiteware represents approximately 60–70% of the e-waste stream by weight.[2] This indicates that whiteware could represent between 48,000 and 56,000 tonnes of waste every year in New Zealand.

In relation to municipal activity, local authorities have responsibility for managing domestic waste and recycling in their geographical areas. Some councils divert resalable whiteware through stores at their recycling centres. Others simply collect quantities of whitegoods at their collection sites and a scrap metal dealer will visit, crush the appliances with a mobile crusher, and pay the council a price according to the market rate for scrap.

The re-use and/or recycling of whiteware is considered environmentally preferable compared to landfilling for several reasons. Landfilling results in the loss of valuable materials including ferrous and non-ferrous metals. To extract from landfill, process, assemble and transport these materials involves enormous amounts of resources. In addition, whiteware can contain some hazardous substances. Major appliances contain fewer hazardous substances than other electronic and electrical equipment. Nevertheless, appliances (particularly older products) do contain various toxic and hazardous substances. These substances include lead, cadmium, hexavalent chromium, CFCs, HCFCs, brominated flame retardants, as well as oils and greases from refrigerators and other major appliances.[3]

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1 Market research information, provided by Fisher & Paykel Ltd.

2 Data average from: Network Recycling (2003) *CA Site WEEE Capacity in the UK: An Assessment of the Capacity of Civic Amenity Sites in the United Kingdom to Separately Collect Waste Electrical and Electronic Equipment*; and Industry Council for Electronic Equipment Recycling (2005) *Interim Status Report on WEEE in the UK*; January 2005.

3 Environment Australia (2001) *Major Appliances Materials Project*.

Most whiteware in New Zealand is not ending up in landfill. There is no reliable data on the quantities that are ending up in landfill, however, the opinion of the waste and recycling industry and local authorities is that up to 95% of whiteware waste is being recycled in New Zealand, at present. Overall, the environmental impacts of whiteware disposal in New Zealand appear to be relatively low because there is currently a high rate of diversion of product for recycling. The resulting shredder floc has the potential to be an environmental concern, however publicly available evidence is currently lacking in New Zealand.

It is widely acknowledged that Design for Environment (DfE) has a key role to play in maximising overall environmental performance. More specifically a DfE strategy that follows the waste management hierarchy has the potential to reduce end-of-life whiteware waste, including shredder floc. While there is evidence of DfE related environmental improvements in imported whiteware, there does not seem to be any information about end-of-life collection and recycling schemes operating in New Zealand.

This report describes the two noteworthy whiteware product stewardship schemes currently underway in New Zealand ie Fisher & Paykel and Electrolux. A range of views, concerns and perspectives is also presented. Beyond the activities of these two companies there is no compelling evidence or widely promoted information that any other whiteware importers or suppliers are proactively pursuing a product stewardship approach to the life-cycle management of the products they supply in New Zealand.

The environmental and economic benefits resulting from whiteware product stewardship in New Zealand are not insignificant, particularly in relation to Fisher & Paykel's scheme.

- The take-back scheme contributes to materials recycling and resource conservation by diverting end-of-life from landfill. Approximately 32,000 whiteware units diverted from landfill were recovered and recycled during 2004.
- DfE contributes to waste avoidance, materials efficiency and reduced use of hazardous substances.
- The take-back scheme helps to safely recover and control hazardous and toxic substances that might otherwise lead to human health or ecosystem impacts.
- Recovery of materials back into the economy eg reuse and/or recycling of metals and plastics.
- Cost reduction related to Fisher & Paykel's waste management activities for post-industrial waste.
- Costs savings of materials efficiency improvements in product development and manufacturing.
- Costs savings to whiteware retailers through participation in Fisher & Paykel scheme.
- Broader economic benefits of facilitating the removal of inefficient whiteware from the energy grid.

While regulatory interventions are potentially valid and necessary in some cases, there is scope for environmental change and improvement through other, non-regulatory means. The success of non-regulatory measures would depend significantly on the level of voluntary commitment, foresight and resourcing from the sector, the Government and other relevant stakeholders. In relation to regulatory and non-regulatory interventions and incentives, a diverse range of options was canvassed in regard to:

- DfE;
- consumer education and information;
- market development for recovered materials;
- end-of-life management – collection and processing.

Government policy, together with a proactive whiteware sector, could drive and support a range of very specific measures that would target different aspects of the whiteware life cycle with a view to maximising waste avoidance and resources recovery in a cost-effective manner. Several options were considered in concept form and provide a sense of what may be relevant and possible within New Zealand:

- Option 1 – Status quo: industry driven and voluntary schemes (not recommended by the consultants)
- Option 2 – Industry-led schemes with free-rider regulation (recommended by the consultants)
- Option 3 – Mandatory approach to product stewardship (not recommended by the consultants)
- Option 4 – Voluntary and regulatory mix of approaches (strongly recommended by the consultants)
- Option 5 – Mandatory refund system (strongly recommended by the consultants).

Several specific issues emerged from the project including *lessons learned* that should inform ongoing product stewardship policy formulation in New Zealand. These observations and conclusions are accompanied by specific recommendations aimed at real-world solutions and action.

1 Introduction

1.1 Background

The need to effectively and efficiently address end-of-life waste arising from electrical and electronic products is acknowledged as a significant imperative in need of industry, government and community action.

Evidence and activity worldwide is clearly indicating the need to develop sustainable solutions that can substantially reduce the life-cycle environmental impacts associated with the production and consumption of electrical and electronic products. This has been acknowledged through the Ministry for the Environment's discussion document on Product Stewardship and Water Efficiency Labelling.

It is expected that this project will contribute to the Ministry's policy development process with a view to developing a coherent, effective and enduring product stewardship policy for various product categories and waste streams in New Zealand, including the whiteware sector.

Product Ecology Pty Ltd (in association with Responsible Resource Recovery Ltd) was commissioned by the Ministry for the Environment to undertake the study.

1.2 Purpose and scope of the study

Based on the project brief:

> *"The Ministry for the Environment wants to reduce the amount of waste both generated and disposed of in New Zealand (refer The New Zealand Waste Strategy, 2002). Amongst other tools, it has recommended "product stewardship" to aid this, whereby producers, retailers and consumers take more responsibility for the amount of waste generated in a product's lifetime. The approach to date has been to encourage voluntary, industry-led product stewardship schemes.*
>
> *In August 2005, the Ministry released a discussion paper to investigate modifications to this approach to assist the effectiveness, stability and uptake of these and future schemes. Before making recommendations to the Government on the adoption of a product stewardship policy, the Ministry wants to better understand the implications of the proposals for existing and potential schemes."*

The project brief also clarifies the overall scope including key definitions:

> *"Priority for this case study is working through the performance and policy issues, rather than quantifying the problem or exact costs and benefits. "Whiteware" is defined as: (domestic) refrigerators/freezers, clothes dryers, washing machines, dishwashers, ovens, stoves, rangehoods, waste disposers, air conditioners/heat pumps, dehumidifiers and microwaves. Potential improvements should focus on the environmental consequences of the product's life in New Zealand, and design, manufacture, distribution, use and disposal options for which New Zealand industry or Government can reasonably influence.*
>
> *This report will not address issues concerned with the energy or water efficiency policy. This report should highlight areas where refrigerant recovery requirements will potentially have an influence. The potential, approach or costs of any proposed scheme or scheme changes suggested by the report will not be binding for the sector or the Government."*

1.3 Project objectives and terms of reference

The project objectives and terms of reference as outlined in the project brief are extensive and provided a very challenging set of activities given the timeline and resources. In particular, the project aimed to:

- under guidance of a sector group, study the issues associated with the environmental impact of the whiteware sector, case study any existing product stewardship schemes to address this and establish what assistance a national product stewardship policy could offer;
- formulate a process that results in a policy well matched to the needs of industry and assists industry groups in understanding what the implications are, if any, of that policy proposal for existing schemes.

Guided and informed by the sector group, the project was to address the following terms of reference:

- description and quantification of the environmental impact of the whiteware sector and the stakeholders involved;
- description of any current product stewardship schemes to address this problem;
- evaluation of how the current schemes perform (against policy objectives listed below) and their long-term stability (in the current policy environment);
- estimation of the potential performance and stability of the schemes (in the current policy environment) and the environmental and economic benefits (or costs) from achieving this potential;
- assessment, design and cost of the tools needed to achieve this potential;
- assessment of whether the availability of regulatory tools could further increase the potential performance and stability of the schemes and the environmental and economic benefits (or costs) from achieving this potential;
- if the potential improvement justifies it, the cost, timing and enforcement of any regulatory intervention.

1.4 Project methodology

The methodology adopted reflects a consultative approach. It aimed to facilitate the whiteware sector group to identify, discuss and analyse key policy issues affecting the development of product stewardship schemes and programmes for whiteware in New Zealand. The key elements of are:

- desktop review of literature and data;
- face-to-face interviews/meetings;
- focused follow-up;
- synthesis and analysis;
- draft report development including sector group feedback;
- final report preparation.

1.5 New Zealand policy context

The policy context for the conduct of the project is informed by three key Ministry for the Environment documents.

i) The New Zealand Waste Strategy, 2002.

ii) Product Stewardship and Water Efficiency Labelling, Discussion Document, 2005.

iii) Project Brief: Whiteware Sector Product Stewardship Study, 2006.

Collectively, these three documents provide the policy context within which the project has been undertaken. The Strategy provides the overarching rationale and goals as well as critical information and criteria in relation to prioritising action on waste avoidance and resource recovery.

The discussion document further explores the options and possibilities with a particular emphasis on the relevance, role and potential for applied product stewardship.

Most importantly, the discussion document provides a guiding definition for product stewardship as well as generic options for potential intervention.

The project brief outlines specific study objectives underpinned by the terms of reference, which provide further direction for the study's conduct and focus.

The elaboration of the term 'product stewardship' as per the discussion document represents a critical and guiding definition, which directly informed the study and served to focus the study process and content:

> *"Product stewardship is the term used to describe an approach whereby producers, importers, brand owners, retailers, consumers and other parties involved in the life cycle of a product accept a responsibility for the environmental impacts of the products through their life cycle. This can include upstream impacts from the choice of materials and the manufacturing process, through to downstream impacts from the use and disposal of products.*
>
> *Product stewardship aims to encourage producers and other parties to internalise a substantial proportion of the environmental costs arising from the final disposal of their products. Internalising involves creating schemes that help to shift the costs of managing wastes from ratepayers and taxpayers to the producers and consumers. This ensures the costs of wastes get considered when purchase and production decisions are made. Product stewardship schemes can contribute to reduction in waste and to the recovery of materials from the waste stream."*

2 Overview of the Whiteware Sector in New Zealand

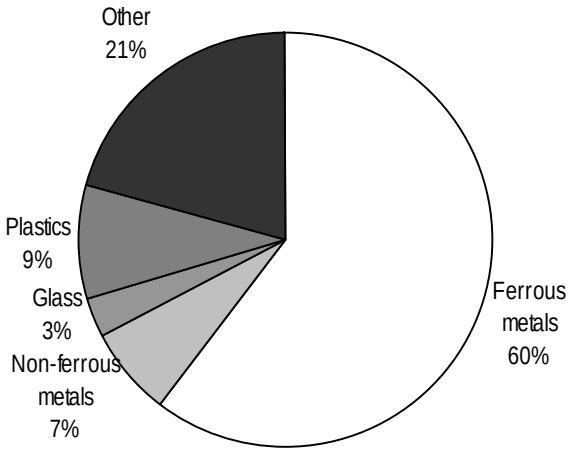
2.1 About the product category – whiteware

For the purposes of this study whiteware is defined as domestic versions of:

- refrigerators and freezers;
- clothes dryers;
- washing machines;
- dishwashers;
- ovens, stoves and rangehoods;
- waste disposers;
- air conditioners/heat pumps;
- dehumidifiers;
- microwave ovens.

Whiteware is made predominantly of steel, as can be seen in Figure 1, below. This steel component varies according to appliance, ranging from 90% for clothes driers and cookers to under 60% for dishwashers. The presence of metal is a major factor in the economic viability of whiteware recycling. Steel yields a relatively small price (less than NZ$200/tonne) while non-ferrous metals have significant monetary value. Copper, one of the common non-ferrous metals in whiteware, has a current market price in excess of NZ$5,000/tonne and is continuing to become more expensive due to a global shortage in supply.[4]

Figure 1. Material composition of whiteware



Source: ICER, 2000.[5]

[4] See for example: *Copper, Zinc Climb to Records in London Amid Supply Concern*, from www.bloomberg.com 10 April 2006.

[5] Industry Council for Electronic Equipment Recycling (ICER) (2000) UK Status Report on WEEE; London.

The material composition of whiteware shown in Figure 1 is for equipment at the point of disposal. The data therefore represents the composition of older products. There has been a trend towards greater use of plastics in whiteware for many years and it is, therefore, likely the levels of plastic in end-of-life whiteware will change considerably in future years. For example, it is approximately 40 years since plastic liners replaced porcelain enamel liners in refrigerators. In fact, the trend towards greater use of plastic has probably slowed down significantly in the last five to ten years. The industry reports this move towards greater use of plastic has just about run its course because there is a technical limit to the quantities of plastic that can be used in items of whiteware. The percentage level of metals in products has remained approximately the same apparently, indicating that it is other materials that have been substituted with plastic eg glass shelves in refrigerators being replaced by plastic shelves in many designs, although glass is making a resurgence in current models. Electrolux has moved from wire-coated shelves in refrigerators to glass shelves. The primary reason, according to Electrolux, relates to consumer benefits in food safety. The use of glass may reduce the overall plastics content and introduces another recyclable material. Electrolux noted that anecdotal evidence suggests plastic shelves can become brittle and are prone to cracking, necessitating replacement.

In relation to overall product life span and average age of whiteware an Australian study on major appliances (Environment Australia, 2001: iv) outlined a range of estimates:

Appliance	Average life span
Refrigerators	10–25 years
Freezers	20+ years
Dishwashers	10–20 years
Washing machines	5–15 years
Clothes dryers	15+ years
Electric stoves/cookers	15–20 years
Microwave ovens	5–15 years
Hot water heaters	5–30 years
Air conditioners	20 years

The Australian Major Appliances Materials Project noted that:

> *"These are estimates of the age of appliances when discarded. There is no information on the age of appliances that are recycled or landfilled. However, anecdotal evidence suggests that many appliances that are discarded have reached the end of their useful life and cannot be reused. The life spans quoted do not take into account 'storage' time; it is estimated that between 5% and 33% of broken of replaced appliances are stored for a round two years for use as a 'spare' or merely because people do not know what else to do with them."*

2.2 Scale of the market

An estimated 600,000 whiteware units are sold in New Zealand every year.[6] Sales of whiteware have grown significantly over the last five years. Total sales have risen from 400,000 units in 2001, representing a 50% growth. This sales growth has been due to population growth, a new housing boom and the strong economic conditions in New Zealand over the period.

It should also be noted that the market is not saturated in some categories eg dehumidifiers, heat pumps, air conditioners and, probably, range hoods. Note that range hoods are made in New Zealand by Robinson Industries (Robinhood) and possibly other manufacturers also.

Approximately eight million items of whiteware are now owned by New Zealand households.[7]

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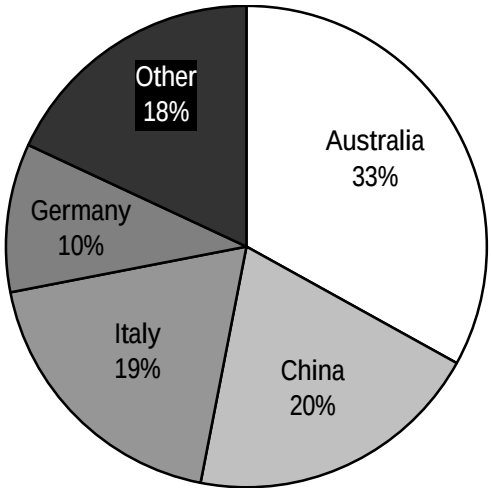
6 Market research information, provided by Fisher & Paykel Ltd.

7 Statistics New Zealand, Household Economic Survey 2003–2004.

2.3 The geography of production – local manufacture and imports

More than half of the whiteware sold in New Zealand is imported. In 2005, approximately 330,000 units were imported into New Zealand, representing 55% of the total market.

Figure 2. Country of origin for New Zealand imports of whiteware



One-third of whiteware imported into New Zealand came from Australia; 20% from China; 19% from Italy, and the remainder from elsewhere in the world.

2.4 Brand owners – the competitive landscape

The New Zealand whiteware market is characterised by a single, dominant domestic manufacturer and distributor (Fisher & Paykel Appliances Ltd) whose products represent as much as 50% of the total whiteware market. Fisher & Paykel also imports and distributes Whirlpool appliances and some appliances from other manufacturers that are re-branded Fisher & Paykel.

Many other brands represent the other 50% of the market, including (but not limited to):

> *AEG, Ariston, Asko, Atlas, Baumatic, BSH/Bosch, Carrier, Daikin, DeLonghi, Electrolux, Fujiair, Fujitsu, Haier, Ilve, Jennaire, Lemair, LG, Liebherr, Maytag, Miele, Mitsubishi Electric, Panasonic, Rangemaster, Samsung, Sharp, Simpson, Smeg, Teba, Telmann, Vestfrost, Viking, Westinghouse.*

Electrolux (and the other brands it owns) have a physical company representation in New Zealand, although all whiteware is imported. All other brands are imported and distributed by third party companies, or appliance import groups. A more recent trend in the market has been retailers direct importing, relabelling appliances and selling under a brand name they own.

There are four different models for appliances entering the market in New Zealand.

i. Fisher & Paykel exclusive dealership agreements

Fisher & Paykel represents as much as 50% of the domestic whiteware market. Fisher & Paykel holds exclusive dealership agreements (EDAs) with approximately half of all appliance retailers in New Zealand. Under these agreements, retailers are restricted to only selling Fisher & Paykel and Whirlpool-brand washers, dryers, dishwashers and refrigerators.

This is a unique arrangement and gives Fisher & Paykel significant leverage over the retailing of its products. In Auckland, Fisher & Paykel delivers appliances directly from its plant in East Tamaki to consumers that have purchased appliances through EDA retailers. This provides an excellent opportunity for Fisher & Paykel to reduce logistics costs and enables easy return of their customers' end-of-life equipment.

ii. Manufacturer import and distribution of own brands

Some manufacturers have a presence in New Zealand, but do not manufacture here. Companies in this category include Electrolux, Bosch and Haier. These companies import their own brands of whiteware and distribute them to retailers. Currently, Electrolux's primary method of distribution is through the retailer network, however, the home delivery service is offered in Auckland with a view to expanding it through other major centres. This reduces handling costs and provides an opportunity for the company to easily return its customers' end-of-life equipment.

iii. Appliance importer and distributor

The majority of the rest of the whiteware brands are imported and distributed by third parties. These are specialised importers or buyers groups that act on behalf of a group of retailers. For example, the Applico Group imports, while Appliance Connexion is a retailer buying group (not an importer of whiteware). Other examples of such groups include Monaco (Mitsubishi), Rankins (LG) and Southfort (Miele).

iv. Retailer direct import

Some retailers, including supermarkets, have begun importing whiteware directly to their stores. The Warehouse, for example, now imports a small number of its own-branded whitegoods (Telmann). Other examples of retailers importing whiteware directly include K-mart (Mistral and other brands), Mitre 10 (Nouveau, and Countdown).

The actual market share of companies in the whiteware sector varies according to the different appliances. Overall market rankings for products to market are estimated by industry sources as:

1. Fisher & Paykel;
2. Electrolux NZ (includes Westinghouse, Simpson, and AEG);
3. Applico Group (SMEG, Baumatic, Classique, St George, Viking);
4. Bosch;
5. other producers and suppliers.

There is no official market data to confirm these rankings, however, it is estimated that:

- Fisher & Paykel Appliances holds approximately 45% of the market in New Zealand;
- Electrolux New Zealand holds approximately 20% of the market in New Zealand;
- the remaining producers, suppliers and brand owners collectively represent approximately 35% of the market in New Zealand.

While these figures may be slightly elastic, the proportions indicate a sense of how the market is divided. Importantly, it could be concluded that approximately 35% of the market in terms of producers, suppliers and brand owners, do not have any recovery and recycling-related product stewardship activities in place. This represents a significant figure in terms of non-activity among producers in the New Zealand whiteware sector and thus offers considerable scope for improvement and change.

2.5 Local authorities

Local authorities have responsibility for managing domestic waste and recycling in their geographical areas. There are two ways in which local authorities collect whiteware from households:

- separation at recycling centres/refuse transfer stations/landfills;
- collection at annual kerbside inorganic waste events.

Some councils divert resalable whiteware through stores at their recycling centres. A particular example is the SuperShed operated by Christchurch City Council. Others simply collect quantities of whitegoods at their collection sites and a scrap metal dealer will visit, crush the appliances with a mobile crusher, and pay the council a price according to the market rate for scrap. The collection of scrap metal, including whiteware, often brings in revenue for councils, although this depends on geographical location. After they have collected and crushed the whitegoods, scrap metal dealers will sell the material to Sims Pacific Metals Ltd for shredding.

In many council areas an annual, or biannual, inorganic kerbside collection is run by the council. Inorganic collections provide an opportunity for scavenging of whiteware by the community, either for reuse or for scrap metal value. Any whiteware remaining when the council collects is diverted for recycling as with the whiteware collected at recycling centres.

There is no data available on the number of councils that collect whiteware for recycling, or on the total quantities collected.

2.6 Recyclers

There are only two shredders in New Zealand capable of processing scrap whiteware. Both of these shredders are owned by Sims Pacific Metals Ltd – the largest metal recycling business in New Zealand. Because whiteware uses a relatively light grade of steel, it is mixed with heavier grade items such as whole car bodies and processed through the shredders. Ferrous and non-ferrous metals are separated for recycling. The remaining material is known as "fluff" or "floc" and is made up of non-metal materials, such as plastics, wood, glass and rubber. It is estimated that 28–30% of the total material entering the shredders is floc, which is subsequently landfilled. Given current processing infrastructure and material values, this co-mingled and sometimes contaminated residual waste is not being recycled. While the constituent material types (eg glass, plastics, wood) might be technically recyclable, their co-mingled nature does not allow cost-effective recycling.

Sims Pacific Metals estimates 70% of whiteware entering its shredders comes from local authority collection programmes.[8] The remainder comes from producers' take-back systems. Sims Pacific Metals does not have data on the quantities of whiteware processed through its shredders. This is because whiteware usually arrives mixed with other metal waste.

2.7 Summary of observations

There are some key differences in the way that brands are distributed in New Zealand that may influence the way product stewardship for whiteware is established. Fisher & Paykel manufactures domestically and, in the Auckland region, delivers directly to households. This direct delivery allows the company to easily return equipment to its plant for recycling. Electrolux also uses a home delivery model throughout New Zealand, providing the same opportunity to collect old equipment from its customers.

There are also significant differences in how brands are retailed. The unique conditions of the Fisher & Paykel exclusive dealership agreements give the company an opportunity to collaborate with retailers on how products are handled and associated logistics issues concerning collection of end-of-life whiteware.

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8 Charlie Carlyon, Sims Pacific Metal Ltd, personal communication.

It appears that the single most significant avenue for collecting whiteware at present is through local authority initiatives. It is estimated that as much as 70% of recycled whiteware is collected through local authorities.

There is no data available on the total quantities of whiteware collected in New Zealand. However, all industry sectors and local authorities believe that as much as 95% of all whiteware is being recycled in New Zealand. This is a relatively high recovery rate and compares favourably even with mature sectors – such as cardboard and paper – for recovery purposes. The key factor determining this high rate is the market value of metals in whiteware. It should also be noted that these percentages may look very different should sub categories of whiteware be further investigated. For example, it is unknown whether the recovery rate for microwave ovens or domestic air conditioners would be as high.

It is also highly likely that second-hand dealers and whiteware service and repair businesses feature along the whiteware life cycle, and that they also provide a source of end-of-life product for recovery and metal recycling. However, data about volumes being processed through such routes is not currently available.

3 Environmental Issues Related to Whiteware

3.1 Environmental issues and impacts

Up to 80,000 tonnes per annum (and growing) of e-waste is potentially disposed of yearly to landfill in New Zealand.[9] This figure is not further broken down to describe what proportion is represented by end-of-life whiteware.

Overseas studies have found whiteware represents approximately 60-70% of the e-waste stream by weight.[10] Based on an estimated total potential e-waste arisings of 80,000 tonnes per annum, this indicates that whiteware could represent between 48,000 and 56,000 tonnes of waste every year in New Zealand. The reliability of this estimate is untested. There are other models for calculating arisings that suggest whiteware may be as low as 24,000 tonnes. There is no definitive data on the quantities of e-waste arising in New Zealand.

The reuse and recycling of whiteware is considered environmentally preferable to landfilling because landfilling:

- results in the loss of valuable materials including ferrous and non-ferrous metals. To extract from landfill, process, assemble and transport these materials involves enormous amounts of resources;
- places pressure on landfill space. Landfilled whiteware uses up land area;
- can contain some hazardous substances. Major appliances contain fewer hazardous substances than other electronic and electrical equipment. Nevertheless, appliances (particularly older products) do contain various toxic and hazardous substances. These substances include:[11]
  - lead and lead compounds are found in solder, notably in printed circuit boards;
  - cadmium has been used as a stabiliser in plastics and is found in some pigments/paints, and formerly in some plating, brazing alloys and bearing metals;
  - hexavalent chromium is widely used as a passivator (corrosion inhibitor) on most galvanised steel (including all corrugated iron roofing);
  - chlorofluorocarbons (CFCs were the refrigerant and the gas in the cells of the insulation in refrigerators and freezers pre-1995);
  - hydrochloroflurocarbons (HCFCs are the refrigerants used in air conditioners which are only being phased out now);
  - brominated or halogenated flame retardants are used in plastic enclosures serving as a fire safety measure for electrical equipment inside appliances;
  - oils and greases from refrigerators and other appliances.

  There is the risk that these substances may leach into surrounding aquatic and terrestrial ecosystems, causing both health and environmental problems. Fires at landfill sites can also result in the emission of toxic dioxins and fumes into the atmosphere from flame-retarded plastics. The presence of toxic materials also presents problems for the future remediation of landfill sites.

Most whiteware in New Zealand is not ending up in landfill. There is no reliable data on the quantities that are ending up in landfill but the opinion of the waste and recycling industry and local authorities is that up to 95% of whiteware waste is currently being recycled in New Zealand. This means that only 5% (10% to 15% at worst), and a further 30% as shredder floc, is being disposed of to landfill.

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9 MfE (2005) *Product Stewardship & Water Efficiency Labelling – New Tools to Reduce Waste. Discussion Document*. July 2005.

10 Data average from: Network Recycling (2003) *CA Site WEEE Capacity in the UK: An Assessment of the Capacity of Civic Amenity Sites in the United Kingdom to Separately Collect Waste Electrical and Electronic Equipment*; and Industry Council for Electronic Equipment Recycling (2005) *Interim Status Report on WEEE in the UK*; January 2005.

11 Environment Australia (2001) *Major Appliances Materials Project*.

Shredder floc

Shredder floc is typically comprised of plastics, rubber, wood, paper, textiles, glass, composites, automotive fluids, refrigerants, sand, dirt, stones, ferrous and non-ferrous metals. One of the issues or concerns with floc is its heavy metal content and the potential to be mobilised through leachate in landfills. Some UK research from the late 1980s and 1990s (Warren Spring Laboratory, 1992: 28) concluded *"that the levels were comparable to those from domestic refuse and hence should not cause problems at properly managed sites".* The same study also reported on material studies conducted in the USA with a view to using the plastics-rich floc in polymer concrete. Although the trials showed technical promise, commercialisation was unlikely.

It is also worth noting that the current landfilling of floc fails to effectively recover a range of high-priced materials, some of which have high levels of embodied energy. There is a view among some researchers and policy makers that this loss of material and embodied energy – in addition to the cost of landfilling, the inevitable tightening of regulations, long-term viability concerns and shrinking landfill space – demands new solutions or alternatives for better managing floc.[12]

The potential recoverability of shredder floc is currently low due to the presence of a wide mix of plastics, including flame-retarded plastics. The equipment necessary to separate materials in shredder floc is being developed elsewhere in the world,[13] but is unlikely to be economically viable in New Zealand due to the relatively low throughput of material and immature markets for recycled plastic.

It is widely acknowledged that DfE has a key role to play in maximising overall environmental performance. More specifically, a DfE strategy that follows (where practicable) the waste management hierarchy and embeds relevant waste avoidance and resource recovery features in the product has the potential to reduce end-of-life whiteware waste, including shredder floc. Design for Disassembly (DfD) and Design for Recycling (DfR) features in consumer durables are well advanced among many of the appliance, computer and consumer electronics producers. Computer modelling and specific DfD and DfR software has been commercialised to support and review product development decisions that have end-of-life implications such as floc.

In simplistic terms, if the appliance design process was chiefly driven by floc reduction then the outcome would be environmentally beneficial. However, a multitude of other drivers and design considerations dictate appliance priorities ie functionality, energy and water efficiency, cost, price and aesthetics. In other words, while DfE can help optimise what is possible and realistic, the critical phase, given current processing methods and technologies, remains the disassembly stage. Many DfE features are unable to deliver environmental gains unless the product is actually subjected to an end-of-life process, be it disassembly or otherwise.

The current scenario in New Zealand, and that for the near future, indicates the most effective way of significantly reducing floc from the whiteware shredding process is to undertake some form of initial disassembly and materials recovery pre-shredding. This would enable some of the major floc-contributing materials to be removed early in the process with a view to accumulating larger quantities of uncontaminated plastics, which, in turn, would be more appealing to plastics recyclers. The initial whiteware disassembly process underway at Fisher & Paykel's Auckland site reflects this approach.

Lifespan

A noteworthy aspect raised by Electrolux New Zealand is the issue of shortened product life span and the negative solid waste impacts associated with the non-repair of whiteware. According to Electrolux, the premature disposal of whiteware is an unnecessary outcome that can be directly attributed to business practices that lack any product stewardship objectives. While Electrolux and Fisher & Paykel use authorised service centres to repair products, there is a view that some whiteware importers are simply swapping products rather than repairing and extending product life. This is a concern to Electrolux as the service network (including spare parts availability) is offered as a *"significant and necessary support for the consumer and ensures appliances are not disposed of after a short life"*.

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[12] Pacific NW Pollution Prevention Resource Centre. http://www.pprc.org/pprc/rpd/fedfund/doe/doe_oit/automobi.html

[13] Environmental Science & Technology Online (2006) Expanding automotive recycling to include plastics; 22 March 2006. http://pubs.acs.org/journals/esthag/index.html

This particular concern raises an important product stewardship-related issue in terms of how service and repair centres can play a positive role in extending product life and deferring the potential generation of solid waste arising from end-of-life whiteware.

3.2 Overseas responses

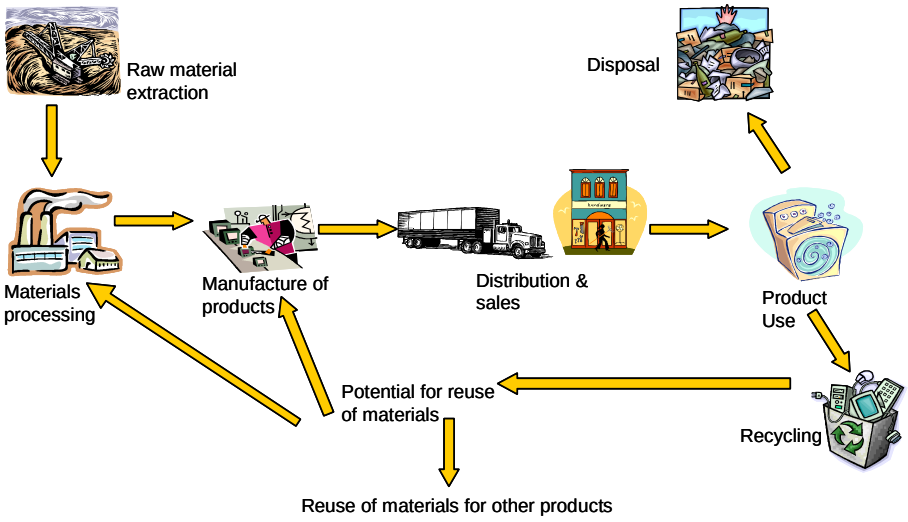
The hazardous substances in whiteware are rapidly decreasing as a result of international legislation. The European Directive on the Restriction of Hazardous Substances (RoHS) in electronic and electrical equipment is having a global effect on the reduction of hazardous substances. Mirror legislation is under development in China and is being considered for Australia. Fisher & Paykel manufactures in New Zealand for international markets where such legislation is being introduced. The company has been working on this issue for many years and is phasing out the use of lead, hexavalent chromium, brominated flame retardants, and cadmium for those markets. It can be expected that these changes will flow though to all Fisher & Paykel production, irrespective of market although this has not been finally decided and will depend on the market. Imported whiteware is coming predominantly from Australia, China and Italy. Germany represents a further 10% of imported product.

Production facilities overseas are increasingly manufacturing for international markets, including the EU market, and may not create separate production lines or models to meet the requirements of each country or jurisdiction. However, there is a real and significant risk that some suppliers will dump older (non-EU RoHS compliant) product into New Zealand and Australia should there be an absence of any local regulatory requirements in harmony with the RoHS Directive. Therefore, while the logic might suggest that most producers will manufacture to the most stringent regulatory requirements (eg EU RoHS), it can not be assumed that RoHS compliance in the EU automatically translates to improved product in other countries or jurisdictions where environmental legislation and/or regulations are weaker or in development.

3.3 Relevance of energy efficiency and ozone-depleting substances

The lifecycle of an item of whiteware describes the complete path of that product's existence, from cradle to grave. The major stages of the lifecycle of a whiteware product are shown in Figure 3, below.

Figure 3. Lifecycle of an item of whiteware

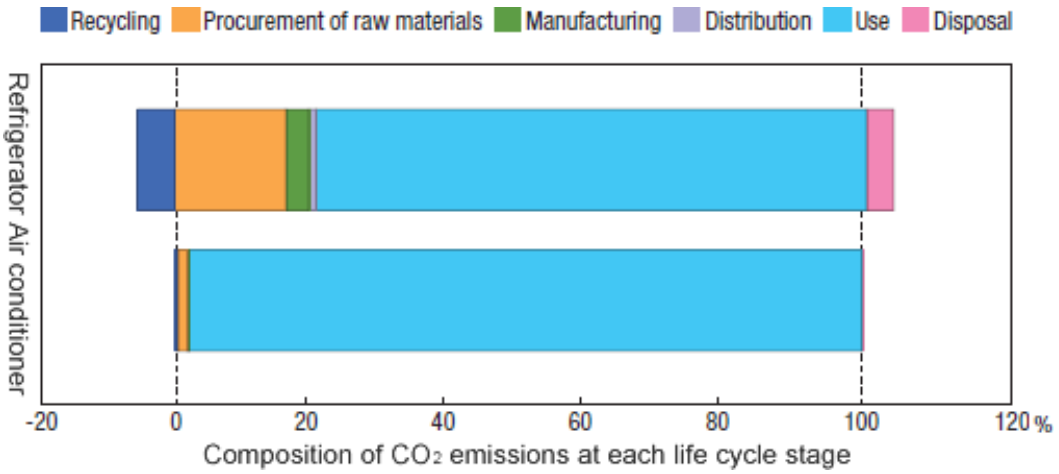


Source: Adapted from Environment Australia, 2001.[14]

[14] Environment Australia (2001) op cit.

When considering the lifecycle of a product that uses significant amounts of energy in its lifetime, such as a washing machine or clothes drier, the environmental impacts of the use phase often outweigh other stages. Life Cycle Assessment (LCA) is a tool developed over the last 15 years to analyse the lifecycle environmental impacts of a product. LCAs of whiteware have shown that most items have their most significant impact on the environment while people are using them rather than when they dispose of them.[15] This means that consumers have the greatest ability to change the environmental impact of whiteware by choosing energy efficient products and by using settings such as warm or, where appropriate, cold water instead of hot.

Figure 4. LCA results showing environmental impact (CO_2 emissions) of a refrigerator and air conditioner showing the majority of impact during use phase



Source: Toshiba – www.toshiba.co.jp.

The environmental impact of refrigerators is further complicated by the presence of ozone-depleting substances which can cause significant damage if released from refrigerators in an uncontrolled way. Refrigerators collected for recycling in New Zealand are legally required to have the gas removed for safe destruction before they can be processed. This degassing is usually done at council facilities or by dealers who take back refrigerators from their customers. It could be concluded that these old refrigerators are often being replaced because they have already lost their gas charge and so stopped working. Refrigerators put out for kerbside collection are almost always stripped of their non-ferrous metals (including their copper and aluminium pipe work) before they are collected. In these cases, the refrigerant is always lost to the atmosphere. Such scavenging may also 'deprive' some local councils of revenues and possibly makes their return on remaining "carcasses" less economic.

3.4 Best practice in whiteware product stewardship (collection and processing focus)

Best practice in whiteware product stewardship has the potential to be misread and misrepresented. Best practice can vary depending on numerous factors and what might be described as best practice in one region or country due to available infrastructure might be unachievable in another region where market size, industry capabilities and consumer awareness and action is low.

The information presented below is adapted from the Major Appliances Materials Project (Environment Australia 2001: 59) and reflects a strong commitment to the waste hierarchy as well as specifically dealing with hazardous and toxic substances. It serves as a guide to what the ideal 'wish list' might look like and is relatively consistent with similar studies and assessments from Europe and North America.

[15] Deni Greene Consulting Services (1992), *Life Cycle Analysis. A view of the environmental impact of Consumer Products using clothes washing machines as an example*. Australian Consumers' Association.

1. Collection systems that:
   - ensure separation of appliances from other waste streams to maximise the potential for reuse and recycling (it is noted that in areas with a low population base it may be more appropriate to ensure the amalgamation of appliances with other appropriate waste streams to maximise the economies of scale and facilitate recycling);
   - are paid for by the producer/user, in order to remove the cost burden from local government and ratepayers. While local government can be service providers for appliance collection, they should not bear the financial burden;
   - ensure sufficient volumes to make reuse and recycling viable;
   - are convenient for consumers, to avoid illegal dumping.
2. Appliance degassing for refrigerators, freezers and air conditioners.
3. Sorting of collected appliances into three categories:
   - those that are economically feasible to reuse, with or without repair;
   - those that can be cannibalised or dismantled for the recovery of reuseable parts;
   - those that are only suitable for materials recovery.

   Appliances falling into the first two categories are transferred to appropriate reuse and recovery organisations (including producers, second-hand dealers, charities and organisations such as Revolve). Materials remaining after cannibalisation are passed onto material recyclers.

   Appliances in the third category are transferred directly to material recyclers.
4. Capturing and appropriate treatment of toxic and hazardous substances, such as polychlorinated biphenyls (PCB), mercury, lead and ozone-depleting substances (ODS) in insulation material, before recycling. It is noted that there are currently very few facilities around the world for capturing ODSs form insulation material. The process entails having the shredder enclosed and extracting all the air and released gases through an activated carbon filter bank. It may also entail the different treatment of cabinets with CFCs (HCFCs) in the insulation from those without.
5. Separation of materials before recycling, to maximise materials recovery and reduce the amount of shredder floc going to landfill.
6. The adoption of quality and/or environmental management systems at recycling facilities, to minimise the environmental impact of appliance recycling.
7. A feedback loop to manufacturers and importers regarding problems associated with the repair, reuse and recycling of major appliances.
8. The landfilling of only materials that cannot be reused or recycled.

3.5 Summary of observations

The environmental impacts of whiteware disposal in New Zealand are relatively low because there is currently a high rate of diversion of equipment for recycling. The resulting shredder floc has the potential to be an environmental concern, however, some evidence and testing-based facts are currently lacking in New Zealand.

Approximately 30%, by weight, of processed material is shredder floc and is landfilled by scrap metal operators. This residual floc material is made up of mixed plastics, glass and other materials for which there are limited markets and low value. The majority of environmental impacts from whiteware occur during the consumer use phase, primarily due to the energy demands of these products during their lifetime. This also underscores the importance of not extending product life under the guise of waste minimisation if newer products demonstrate higher levels of energy and water efficiency. While durability and product longevity holds great appeal in a generic sense, the environmental impact of not retiring older, inefficient whiteware has the potential to be higher as shown in LCA results.

The ideal scenario is where the product core features high levels of durability and where the electronics or information-intensive aspects, components and 'software' can be upgraded to allow reprogramming for evolving levels of energy and water efficiency.

4 Current Whiteware Product Stewardship in New Zealand

This section describes the two noteworthy whiteware product stewardship schemes currently underway in New Zealand ie Fisher & Paykel's and Electrolux's. A range of views, opinions, concerns, expectations and perspectives are also presented. These are based on meetings and phone discussions with the whiteware sector group established by the Ministry for the Environment as part of the conduct of the study. Relevant content from publicly available literature published by Fisher & Paykel and Electrolux is also covered.

Whiteware product stewardship activities currently underway in New Zealand are primarily limited to the activities of Fisher & Paykel. This is to be expected given the company's national significance as a manufacturer and exporter of whiteware. At a much smaller scale but potentially expanding, Electrolux Home Products (a division of Electrolux NZ Ltd) appears to be providing some consumers with a disposal and recycling service as part of its home-delivery process.

Beyond the activities of these two companies, there is no significant or compelling evidence or widely promoted information that any other whiteware importers or suppliers are proactively pursuing a product stewardship approach to the life-cycle management of the products they supply in New Zealand. Some retailers are involved in whiteware collection and recycling as part of the Fisher & Paykel scheme, while other non-Fisher & Paykel aligned retailers also offer consumers disposal and recycling of old whiteware as a result of a new product purchase. This is an observation (of the current situation) offered by the consultants and should not necessarily be viewed as an implicit criticism of importers and retailers not operating schemes similar to Fisher & Paykel or Electrolux.

While there is evidence of DfE related environmental improvements in imported whiteware, as well as environmental management systems in their off-shore production facilities, there does not seem to be any information about any end-of-life waste avoidance and resource recovery schemes operating in New Zealand. In short, Fisher & Paykel characterises how product stewardship principles and approaches are being implemented in New Zealand.

4.1 Product stewardship at Fisher & Paykel Appliances Ltd

> *"Commitment to energy efficiency and preservation of the environment as corporate guidelines and an integral part of the culture of Fisher & Paykel Appliances."* (Fisher & Paykel website: www.fp.co.nz)

The meaning and application of product stewardship at Fisher & Paykel permeates all operations of the business and features across the complete product life cycle. Consistent with the definition of product stewardship outlined in the Ministry for the Environment discussion document, Fisher & Paykel has embraced life-cycle thinking and understands the environmental, economic and social value of being a responsible corporate citizen.

Fisher & Paykel's view of product stewardship is in harmony with the theory and conceptual origins of product stewardship ie life-cycle focus, collaboration and cooperation with other stakeholders, balancing environmental responsibility and protection with sensible economic management, and so on. The company is beyond more simplistic product stewardship responses, which limit themselves to solely upstream DfE objectives or predominantly end-of-life recycling activities. While the term product stewardship might not be always used at Fisher & Paykel, the meaning and concept are given life in reality.

The single most significant distinguishing factor which helps to describe product stewardship at Fisher & Paykel is the geography of ownership and production. Fisher & Paykel is a New Zealand-owned company with substantial production facilities in Auckland/East Tamaki and Dunedin. The company also has manufacturing sites in Australia and the USA. It is the only company manufacturing domestic whiteware in New Zealand. These factors mark a major point of difference between Fisher & Paykel and all other suppliers in the New Zealand whiteware market.

What are the practical realities of product stewardship at Fisher & Paykel in relation to New Zealand?

Product design and materials selection

A diverse range of DfE measures have been implemented at Fisher & Paykel, including new methods that are being trialled and evaluated. A sample DfE and materials-related initiatives includes:

- avoiding the use of scarce resources in products wherever possible;
- setting goals to eliminate brominated flame retardants;
- changing grades of ABS (a type of engineering plastic) to reduce styrene monomers during processing;
- trialling lead-free soldering of printed circuit boards;
- apart from one minor component, previously eliminating PVC injection mouldings;
- effectively eliminating cadmium several years ago;
- working towards the phase out of hexavalent chromium systems in pre-treatment processes;
- where practicable, avoiding construction techniques that combine incompatible materials that make end-of-life disassembly and recycling difficult;
- marking of plastic components to enable easier identification, sorting and recycling at end-of-life.

Manufacturing technologies and cleaner production

Cleaner production techniques combined with leading manufacturing methods and equipment enables Fisher & Paykel to maximise efficiencies and outputs while also reducing emissions, waste and costs. Some of the cleaner production achievements in recent years include:

- eliminated production paint shops which inefficiently painted large empty white boxes with high solvent wet paint. This involved a transition to powder coating, which eliminated solvents, and then to prepainted galvanised steel which is produced in a dedicated facility equipped to deal with volatile organic compounds;
- all factories operate 'on-line' manufacturing which results in reduced waste and less inventory;
- the electronics facility is working to eliminate hot air levelling of solder after the soldering process with a view to reducing energy consumption;
- Fisher & Paykel recycling personnel are actively engaged in investigating the waste stream from the Auckland facilities and diverting all materials that can be recycled. This has resulted in a 40% reduction of material going to landfill;
- most injection moulding rejects and sprues are recycled in-house with the rest being recycled through Astron;
- circuit board assembly process has eliminated the use of CFCs in cleaning (and avoided the use of HCFCs).

Packaging

At Fisher & Paykel, the waste hierarchy is applied in a pragmatic manner with a view to maximising product protection while also facilitating relatively high levels of reuse and resource recovery. For example:

- all packaging is either returned or reused where freight distances make this viable (New Zealand only);
- packaging comprises cardboard which largely uses renewable resources from plantation forests;
- the Auckland recycling centre takes back expanded polystyrene (EPS) for recycling by a local EPS component recycler ie all EPS is diverted from landfill.

Energy and water efficiency

Fisher & Paykel acknowledges the need to maximise energy efficiency during the use phase of the whiteware life cycle as a key imperative in whiteware design and development worldwide. By designing and producing energy efficient products, the company is helping to reduce greenhouse gas emissions associated with energy production and the associated consumer demand. A sample of product-based achievements and outcomes include:

- Fisher & Paykel has a fundamental commitment to design intelligent appliances that can react to usage patterns thus saving energy and ultimately money;
- all key product platforms – Active Smart Refrigeration, Smart Drive Washing Machines and DishDrawer Dishwashers – are intelligent appliances ie if the power is not needed, it is not used;
- the Active Smart Refrigeration System, which saves 40% of the power of previous refrigeration models, is on all refrigerator/freezers above 300 litres, and accounts for 67% of the Australian market;
- an average household does eight full washes per week; using an Intuitive Eco instead of a traditional top loader will save the household approximately 500 kWh of electricity consumption per annum;
- Fisher & Paykel continues to be actively involved with numerous regulatory bodies in an effort to raise the profile of energy efficient appliances, and also assist in the setting of testing standards;
- the Fisher & Paykel autowasher (Eco Smart / Intuitive Eco) is the highest-rated top loader energy efficient washer in the USA;
- Smart Drive won the Rutherford Award in New Zealand for minimised environmental impact, the 2001 Galaxy Star Award for commitment to energy efficiency and the environment and the 2006 highly commended EECA award for meeting the new tight MEPS levels for refrigerators and freezers without increasing prices. This was with an average reduction of 156 kWh a year or to less than three quarters of the previous levels.

Waste reduction and end-of-life whiteware recycling

Fisher & Paykel's work on recovering and recycling end-of-life whiteware represents a pioneering approach to product stewardship and producer responsibility in the Southern Hemisphere, if not globally. The company's take-back and recycling scheme demonstrates what can be achieved on a voluntary basis under the right circumstances. The following description explains some of the specifics behind the Fisher & Paykel recycling scheme. (Also refer to Appendix 1 for a schematic overview.)

- Fisher & Paykel commenced taking back end-of-life whiteware from retailers in 1993 as a pilot project.
- Several Fisher & Paykel personnel are currently employed in the recycling centre and deal with approximately 30,000 end-of-life whiteware units per year. Other personnel are involved nationwide through Fisher & Paykel's use of contractors and specialised service providers.
- The majority of whiteware recycled each year is the result of retailers trading in an old appliance for a new one.
- The recycling service goes beyond the appliance itself, with packaging also being returned to Fisher & Paykel for reuse and/or recycling if the customer has no need for it. If the packaging is in good condition it is reused for packing another new product. Slightly damaged cartons are sold onto the second-hand carton market while the most damaged cartons are recycled for pulp.

The parameters of Fisher & Paykel's whiteware recycling activities are relatively clear and very much connected to arrangements with retailers. The trade-in and replacement process covers the following aspects.

- Fisher & Paykel encourages its service centres across New Zealand as well as its dealer organisations to make end-of-life whiteware available for collection.
- In the greater Auckland area (representing about a quarter of the population of New Zealand), these are then collected for fisher & Paykel and returned to the Auckland/East Tamaki Recycling Centre (for other parts of New Zealand this whiteware is collected and processed as below).
- Fisher & Paykel offers a service to its retailers for the collection of returned whiteware. Fisher & Paykel charges the retailer a small fee for this service. Almost all of the EDA retailers use this service.

- The delivery and installation service available for new whiteware purchases provides the consumer with a free collection service for unwanted and/or end-of-life products (also available through inorganic kerbside collections).
- Free drop-off of end-of-life and/or unwanted whiteware is available to the general public at the East Tamaki site and this information is available through the local council.

While the Fisher & Paykel scheme is most advanced in the North Island and the Greater Auckland area, Fisher & Paykel also coordinates a more streamlined collection and recycling service in major South Island centres in collaboration with Sims Pacific Metals – its steel recycling partner. Other than the Greater Auckland region, the appliances are collected by contractor trucks on four routes for the North Island (Northland, Coromandel – Bay of Plenty – Waikato – West Coat, East Coast) and taken directly to Sims collection points. In the South Island, take back is done in Christchurch and Dunedin where there are Sims collection points. Fisher & Paykel has expressed interest in extending the service to Nelson and Invercargill, however freight costs are very high at this point in time.

The physical presence of Fisher & Paykel's main production facility in Auckland is a major factor in substantially underpinning the overall success of the recycling centre and the recycling service for end-of-life whiteware.

The proximity of the production facility enables Fisher & Paykel to combine revenues from production waste as well as materials recovered from end-of-life whiteware. The pivotal role of the Fisher & Paykel's factories being in the country and on the North Island should not be under-estimated. The cost savings associated with landfill diversion possible through efficient and effective post-industrial (ie factory off-cuts and scrap) recycling at Fisher & Paykel's Auckland facility may be the single most critical factor in what is currently making end-of-life whiteware recycling possible and viable.

4.2 Product stewardship at Electrolux (NZ) Ltd

> *"Consumers are concerned about a resource-stressed planet. Through our products we aim to raise quality of life while addressing those concerns.*" (Electrolux Sustainability Report 2004: 11)

Electrolux New Zealand Ltd is part of the Electrolux Group, "*the world's largest producer of powered appliances for kitchen, cleaning and outdoor use".* The company's presence in New Zealand is purely distribution and retail and does not involve any local manufacturing. Whiteware is sourced from Electrolux's Australian production facilities and other overseas locations.

At a global level, the Electrolux Group demonstrates an advanced level of knowledge, understanding and action on environmental matters. Indeed, like many global corporates, the Electrolux Group is increasingly describing its environmental activities under the broader context of 'sustainability' thus encompassing social, environmental, cultural and economic considerations in a more holistic and integrated manner. This is a worldwide trend among global companies as well as smaller more progressive enterprises, be they manufacturers, service providers or primary industries.

The 2004 Electrolux Sustainability Report presents a comprehensive picture of what the company is doing on environmental sustainability from product design and innovation, through to manufacturing, environmental management systems, producer responsibility, public reporting and socially responsible investment. The systems, programmes, standards and internal guidance manuals represent a substantial and impressive collection of tools and approaches underpinned by considerable environmental commitment.

What are the practical realities of product stewardship at Electrolux (NZ) in relation to New Zealand?

Design and innovation

The Electrolux Group has developed EcoDesign handbooks to guide the development of most product lines: "*These are used during our Integrated Product Development Process as tools to assure that the right concerns are addressed and the appropriate factors considered during each step of the product development process".* Electrolux also use LCA methodologies to assist in the product development process and identify priority environmental impacts and design improvement opportunities. These types of approaches enable Electrolux to design products that address relevant product stewardship aspects related to design for disassembly and recyclability.

EcoDesign guidelines have also contributed to the development of products with a strong focus on sustainability, several of which are featured in the 2004 Sustainability Report. These include attention to energy efficiency, cadmium and PVC-free products, biodegradable materials, recyclability and the elimination of hazardous and toxic substances. Attention to waste reduction in packaging design is also described. The Electrolux Group is also a participant in the Future-Proofed Building™ initiative which aims to educate the market on the importance of buildings to accommodate the demands of tomorrow's lifestyles as well as today's, thus promoting improved building practices and environmental management. In particular, Electrolux's support for Future-Proofed Building™ aims to encourage a change in thinking from cost-based purchases to one that considers wider environmental factors covered by the initiative: energy efficiency, space management, sound control, quality control, life-cycle costing, health and safety, security and automation and resource responsibility. Of these, aspects such as resource responsibility, life-cycle costing, quality assurance and energy efficiency, directly and indirectly relate to product stewardship.

Sustainable application of materials

While Electrolux is undertaking numerous materials-related initiatives to improve environmental performance, the company has clearly noted that the EU's Directive on Restriction of Hazardous Substances (RoHS) is one of most significant, sustainability related issues facing the company. In response to the RoHS Directive, Electrolux is modifying virtually all its products to ensure the elimination of lead, mercury, cadmium, hexavalent chromium and brominated flame retardants. The company is also working towards ensuring effective compliance in similar regulations emerging in China, Japan and the USA.

Electrolux has also developed a Restricted Materials List which serves to define which substances and chemicals are banned and/or restricted from use in Electrolux manufacturing facilities as well as the overall supply chain. It is assumed that some of the design decisions concerning restricted materials may flow on to product entering New Zealand, however regulatory compliance is likely to be a key driver.

Manufacturing

As with most global manufacturing companies, the Electrolux Group has an environmental management system in place for most of its production facilities. By the end of 2004, 92% of the Group's total manufacturing area was ISO140001-certified (this corresponds to 71 production units or 90% of the total number of units requiring certification). All Electrolux Group production facilities pursue the generic targets including the reduction of energy and water consumption, high use rates for materials and components, minimizing waste and managing hazardous materials.

Energy and water efficiency

The Electrolux Group acknowledges that maximising energy and water efficiency in products during their use stage is one of the company's highest environmental priorities. Its own work on LCA, as well as that from other companies and producers worldwide, clearly recognises the greatest environmental impact occurs during the operation or use stage of the whiteware product life cycle. At a global level and in many individual countries, the Electrolux Group has developed and launched numerous highly energy efficient products including refrigerators and freezers.

Electrolux recently released the new Westinghouse ovens, which are 'best in class' in terms of capacity, cooking result and energy efficiency. In the absence of energy star rating in Australasia for cooking products, Electrolux applied the European Standard Energy test to these ovens, achieving the highest rating for the category. The new oven technology is to be progressively rolled out to all Electrolux, Westinghouse and Simpson ovens manufactured in Australia.

The forthcoming release of the Electrolux-branded front-load washing machine also demonstrates the company's commitment to water efficiency and resource use efficiency. This range of washers is all 5A rated under the water efficiency labelling scheme.

Many of these whiteware products have been recognised with awards, ecolabels and commendations. These products are the result of voluntary efforts by the company as well as the need to ensure regulatory and labelling compliance.

Waste reduction and end-of-life whiteware recycling

At a global level, the Electrolux Group position on minimising end-of-life waste from whiteware is clear and impressive. The company is explicit about its commitment to producers playing a greater role in managing the total product life cycle:

> *"Electrolux is an early advocate of producer responsibility. We were among the first in our industry to identify the business case for recycling and lobby actively for individual responsibility."*

In its annual 2004 Sustainability Report, the company notes its engagement with the EU's WEEE (waste electrical and electronic equipment) Directive and the need to find appropriate solutions. It appears that a key element in how the Electrolux Group effectively addresses end-of-life whiteware (in the EU at least) will depend on its collaboration with Sony, Hewlett Packard and Braun, as part of the European Recycling Platform. This collective approach by Electrolux represents a potential solution to how each of the participating producers will manage end-of-life products, be they whiteware, small appliances or IT equipment.

It is worth noting that as an exporter of whiteware to the EU, Fisher & Paykel also complies with relevant directives, legislation and regulations and is a member of REPIC and WEEE Ireland (producer responsibility type organisations who manage end-of-life recovery and processing of whiteware on behalf of Fisher & Paykel).

There is a major difference between how Electrolux deals with EU requirements on electrical and electronic waste equipment versus what the company does in New Zealand with end-of-life whiteware. With the exception of Electrolux New Zealand's nascent home delivery service offering disposal and recycling options, there is limited information or data about product stewardship or producer responsibility activities being offered by Electrolux New Zealand. Clearly there are major differences between the two regions (and jurisdictions) ie producers in the EU are required to comply with mandatory laws compared to no regulation whatsoever in New Zealand.

Electrolux New Zealand reports that Global CEO Hans Straberg was recently in New Zealand and stated, that in terms of recycling and product stewardship, "Electrolux New Zealand should leverage off the techniques and processes established in Europe and use this to enhance Electrolux's position as a market leader". Straberg identified care for the environment to be a core responsibility of the company.

The current Electrolux New Zealand collection and recycling service covers the following:

- all materials returned to Electrolux through the home delivery service are recycled ie cardboard, polystyrene, plastic shrink-wrap, strapping and the appliance. This allows for direct delivery to customer, removal of all packaging and old appliances;
- Electrolux is expanding the home delivery service to a nationwide service over the next year;
- end-of-life appliances collected during the home delivery service are delivered to Sims Metal Recycling to reclaim metal. The Warehouse has also indicated the possibility of such a service;
- refrigerators with R12 and R134A collected through the trade-in process are degassed. Data collection on how degassing is actually performed is not available;
- the Electrolux home delivery service is being rolled out through main centres at this time.

Electrolux New Zealand notes that the main drivers for its collection and recycling activities relate to customer benefit and the convenience of having Electrolux dispose of the old appliance: *"... if customers know we can take away old product they are more likely to buy one of our products".*

4.3 The role of design for environment in product stewardship

Worldwide research and applied commercial activity on DfE recognises the critical importance of DfE in helping improve the life-cycle environmental performance of whiteware, and manufactured goods in general. The body of knowledge on DfE, EcoDesign and Sustainable Product Development is extensive, comprehensive and constantly being updated. It is generally underpinned by the use of life-cycle thinking and the use of LCA software and methodologies.

Much of this work is being done by research institutions as well as producers such as Electrolux, Fisher & Paykel, HP, Sony, Philips and much of the automotive sector including the BMW Group, Toyota, and Daimler Chrysler. Noteworthy outcomes associated with DfE include:

- design to eliminate or reduce hazardous and/or toxic substances eg EU RoHS Directive;
- design to improve energy and water efficiency eg compliance and labelling requirements and bonus schemes worldwide;
- design for durability and extended product life eg contributes to materials efficiency and waste avoidance;
- design for reuse, refurbishment and remanufacturing eg Fuji Xerox leasing model for copiers, Herman Miller model for commercial furniture initiatives;
- design for disassembly and recyclability eg contributes to cost-effective and more viable materials identification, sorting and processing.

Both Electrolux and Fisher & Paykel, to varying degrees, have adopted what can be described as pragmatic DfE strategies. Both companies also highlight the role of design innovation as a way of identifying and implanting product-based environmental improvements. Electrolux pursues a 'best in class' approach and aims to ensure each new product release is an improvement on the previous model.

While DfE is an essential strategy for any producer selling product worldwide, the role of mandatory requirements and compliance is a key driver. With regard to waste-related product stewardship objectives, the EU directives on WEEE and RoHS have the potential to effectively become the default drivers globally. In addition to the EU, other countries and regions are also strengthening (and mandating) their environmental laws on restricted materials. In particular China, Japan and various US states are moving forward on EU RoHS-type requirements. These countries represent significant global markets and thus compliance becomes an essential part of doing business in order to operate.

In other words, any sector-wide attempt to stimulate and increase measurable DfE-type initiatives (such as RoHS) for whiteware in New Zealand is very unlikely to be successful or enduring within a voluntary framework. While it can be argued that, over time, most whiteware imported into New Zealand will be RoHS-compliant in some way, this cannot be guaranteed or automatically assumed. It could also be realistically argued that New Zealand could become a dumping ground for pre-RoHS (ie non-compliant) whiteware stock or designs that continue to be manufactured. Similarly, these arguments could apply to New Zealand-based producers.

It should be noted that Electrolux's commitment to RoHS compliance extends to product entering New Zealand. Electrolux reports that it will not allow non-RoHS compliant product to be shipped to New Zealand.

It is the consultants' view that any type of non-mandatory DfE-type requirements in New Zealand will fail to engage overseas producers and provide an effective signal. This view is comprehensively substantiated by the worldwide stampede by producers, brand owners and component suppliers to ensure effective compliance with each stage of the EU RoHS Directive dealing with lead, mercury, cadmium, hexavalent chromium and brominated flame retardants. There may, however, be exceptions. For example, The Warehouse is confident that, if not currently in all cases, it could readily ensure its whiteware sourcing practices comply with either a regulatory or voluntary DfE code. The Warehouse also indicated that its source factories also manufacture international brands to EU RoHS, thus its compliance standards could be readily aligned to a regulatory framework which was harmonised with emerging international norms.

An obvious New Zealand policy response includes the development of legislation and regulations that mirror the RoHS Directive. This would serve to both eliminate inappropriate dumping of non-EU RoHS-compliant product on the New Zealand market as well as directly improving the environmental performance of New Zealand manufacturers. The economic impact on New Zealand industry of such worldwide policy harmonisation would need to be very carefully assessed.

5. Performance Against Current Government Policy Objectives

In a policy context where whiteware product stewardship has developed and evolved in a voluntary atmosphere with no official or formal target setting, data collection or monitoring and little overall transparency, the process of a performance review and assessment is a difficult and challenging task. The ability, however, to identify and review some key outcomes across the spectrum of activity is possible, especially given the presence of nationally significant (industry-driven) work on whiteware collection recycling.

The methodology adopted for this study draws on the stated goals and objectives outlined in key government documents and involves three levels of assessment and observation.

Firstly, the New Zealand Waste Strategy specifies three core goals, which provide a valuable high-level framework for any analysis and assessment relating to policy goals for waste reduction, resource efficiency, resource recovery and waste management.

- Lowering the social costs and risks of waste.
- Reducing the damage to the environment from waste generation and disposal.
- Increasing economic benefit by more efficient use of materials.

Secondly, the Product Stewardship Discussion Document outlines five specific objectives for product stewardship in New Zealand.

- Use resources more efficiently.
- Reduce the volume of waste produced.
- Increase the resources recovered.
- Include the costs of waste management into the price of products.
- Enhance product design.

Thirdly and finally, the brief for this study outlines additional and more specific objectives that can be used for assessing existing or proposed whiteware product stewardship schemes and programmes.

- Schemes should lead to environmental gains.
- Schemes should use a product stewardship approach.
- Schemes should be effective and efficient.
- Schemes should contain publicly reported, challenging performance measures, quantifiable where possible.
- The benefits of any regulatory aspects should exceed their costs.
- Schemes should be transparent.
- Schemes should not reduce market competition.
- Schemes should set safe standards for the collection and handling of recovered material.
- Schemes should provide a forum for communication and to address any issues.
- Schemes should include public information and education components.

It was also considered important by a sector group representative – Fisher & Paykel – that schemes should not simply be a cost shifting exercise from the ratepayer to the appliance purchaser, if that cost shifting resulted in a less efficient and/or more expensive process.

Based on information from the whiteware sector, Government and other parties, this section provides an assessment of the main whiteware product stewardship activities in New Zealand, including a review of how they perform against the goals and objectives outlined above.

5.1 Assessment against the New Zealand Waste Strategy

As a sector where current product stewardship and waste reduction activities are voluntary and driven by individual whiteware companies, it is important to consider the sector's significance and relevance within the context of The New Zealand Waste Strategy. It is particularly important to attempt to establish the extent to which the whiteware sector is a priority for action and policy attention in relation to the Strategy's core goals as well as the criteria used for prioritising action.

Table 1. Core goals of the New Zealand Waste Strategy

Core goals	Whiteware
Lowering the social costs and risks of waste	• There is no Government or industry data and information in New Zealand indicating that the current disposal practices for end-of-life whiteware and any associated disposal and processing activities pose a threat or risk to human health or society more broadly.
Reducing the damage to the environment from waste generation and disposal	• There is no Government or industry data or information in New Zealand indicating that end-of-life whiteware and any associated disposal and processing activities pose an environmental threat, risk or impact, either from the volume of waste generated or from its disposal, processing and/or treatment. • A situation of 'no impact data or information' should not be interpreted that no damage is being caused or that additional impact reduction options are not appropriate or available. The precautionary principle should apply in such a case. • The issue of shredder floc or residues from the steel recycling process going to landfill has been raised as an issue by parts of the whiteware sector as well as Government. However, no study or research has been conducted to establish its impact. • The issue of shredder floc from the steel recycling process is acknowledged as a potential concern in Australia and other countries, especially due to the presence of heavy metals and other toxic and/or hazardous substances ending up in landfill leachate.
Increasing economic benefit by more efficient use of materials	• Resource recovery associated with the collection, partial disassembly and recycling of end-of-life whiteware contributes to increased economic benefit as evidenced by the viability of the Fisher & Paykel recycling operation. • Electrolux Home Products is also offering end-of-life whiteware disposal and recycling as part of its overall home delivery service indicating that some degree of economic and consumer benefits accrue from increased resource recovery enabled through whiteware recycling. • Local councils, together with other steel and scrap merchants/dealers, are also likely to benefit economically from the collection, component reuse and recycling of end-of-life whiteware.

Current waste avoidance and resource recovery activity focused on whiteware appears to contribute towards addressing the Waste Strategy's three core goals. While not all such activity can be described as consistent with a product stewardship approach, the combined efforts of local councils, Fisher & Paykel and other more minor parties is effectively diverting end-of-life whiteware from landfill and helping ensure relatively high levels of resource recovery, especially in relation to metal recycling.

The extent to which responsibilities and action on waste avoidance and resource recovery in the New Zealand whiteware sector is balanced and equitable remains an outstanding question. Despite the work of local councils, Fisher & Paykel and, to a lesser degree, Electrolux Home Products, there seems to be no coordinated approach. Such an approach could serve to:

- further improve and maximise the environmental performance of the whiteware sector;
- identify improvement opportunities;
- remove barriers and address collection and processing infrastructure concerns;
- increase consumer and community awareness;
- generally operationalise the policy rhetoric of product stewardship value and approaches.

In relation to prioritising action, it is the consultants' view that end-of-life whiteware does not qualify given the criteria and available research, data or information. However, this observation would change should new data emerge (eg negative findings about shredder floc or problems created by an upsurge in non-RoHS compliant imports) or the criteria expand to include specific attention to product stewardship principles being applied and the need for sector-wide responsibilities to be taken by producers and retailers.

Table 2. Criteria for prioritising action

Criteria	End-of-life whiteware
Volume and harm	• Based on available New Zealand data from Government and/or industry, the volume of end-of-life whiteware going to landfill appears to be negligible. The metal component in whiteware and its economic value enables an effective market-based solution to diverting whiteware from landfills. • Shredder floc from the metal recycling process is sent to landfill. However, there is no evidence at this time to indicate that floc poses any environmental harm. • It should be noted that whiteware is not the sole contributor to shredder floc; end-of-life vehicles and other products going through the metal recycling process generate shredder floc that ends up in landfill.
Achievability	• Some whiteware product stewardship activities (eg Fisher & Paykel's Greater Auckland recycling operation) are demonstrating viable and realistic approaches and outcomes, however, any additional or new product stewardship schemes or activities will require further investigation and assessment.
Public concern	• Within the context of environmental concerns that are waste related (solid, hazardous, toxic), there is little or no evidence of whiteware being a public concern in New Zealand (excluding concerns about ozone-depleting substances, energy efficiency and water consumption). • While there is growing media attention on the issue of electronic waste broadly (ie IT equipment, televisions and cell phones) this does not apply to whiteware.
Cost-effectiveness	• Current whiteware product stewardship activities (eg Fisher & Paykel's Greater Auckland recycling operation and Electrolux's recycling service) are privately-run company activities and appear to be cost effective as evidenced by their ongoing existence.

As part of any prioritisation process, it is particularly important to acknowledge differences between seemingly similar product categories and waste streams. In other words, it is important to recognise the differences between electronic wastes generally (eg IT equipment, consumer electronics, cell phones), and the characteristics of whiteware. In relation to *volume and harm,* many of the toxicity issues associated with e-waste are not generally present in whiteware. Where they may exist in older whiteware products, their effective diversion from landfill is helping to ensure problematic substances, materials and components are being captured and processed in an environmentally sound manner.

Nonetheless, data or evidence to the contrary has the potential to shift how whiteware might be assessed in terms of action priorities. For example, should research on the composition and toxicity of shredder floc (comprising in part whiteware-generated residues) show reason for environmental or human health concern, then the issue of *volume and harm* may change in favour of escalating the priority. Similarly, this may also apply to the status of *public concern* should greater awareness of a potential environmental or human health concern gain greater public attention and interest.

It is the consultants' view that additional research and environmental assessment may be required in order to more robustly identify, assess and verify the priority level for end-of-life whiteware in New Zealand. Such research is especially important in any environment or industry policy development process that may result in significant sector-wide and social measures and consequences, such as regulation and related legal instruments.

5.2 Assessment against the Product Stewardship Discussion Document objectives

Moving from high-level Waste Strategy goals down to more specific product stewardship objectives enables a tighter focus on individual schemes and activities dedicated to whiteware. The evaluation is based on available information from companies, authorities and other parties. The particular value of these assessments is the ability to examine where and how the whiteware sector is itself integrating product stewardship principles into its commercial and environmental activities.

Table 3. Product Stewardship Discussion Document objectives: Fisher & Paykel Appliances Ltd

Discussion Document objectives	Fisher & Paykel Appliances Ltd
Use resources more efficiently and reduce the volume of waste produced	• DfE combined with 'on-line manufacturing' and cleaner production techniques contribute to waste avoidance and overall resource use efficiency at Fisher & Paykel production facilities. Cost reduction related to materials efficiency is also an important driver.
Increase the resources recovered	• Fisher & Paykel implements various activities related to DfE and Cleaner Production. • Recovery and recycling of 32,000 end-of-life whiteware units during 2004 represents a significant programme of resource recovery and associated environmental gains.
Include the costs of waste management into the price of products	• Based on information from Fisher & Paykel, the costs (and benefits) associated with waste management are implicitly included in the price of products. These costs and benefits flow 'to or from the bottom line'. This is the result of savings primarily achieved through the work of the Fisher & Paykel Recycling Centre
Enhance product design	• Fisher & Paykel is explicit about its commitment to environmentally oriented design including strategies to phase out restricted substances, DfD and DfR. • Fisher & Paykel's recycling operation has provided a direct information feedback-loop to the company's product research and development group.
Provide product stewardship that is effective and efficient	• From data collected to date and meetings with Fisher & Paykel personnel, the scheme appears to be effective and efficient. However, opportunities for improvement have also been identified by Fisher & Paykel personnel. • The scheme appears to be economically viable at this point in time.

Table 4. Product Stewardship Discussion Document objectives: Electrolux Home Products

Discussion Document objectives	Electrolux Home Products – a division of Electrolux NZ Ltd
Use resources more efficiently and reduce the volume of waste produced	• All Electrolux Group production facilities share three general targets that inherently represent resource-use efficiency approach developing whiteware: i) achieve high-use rates for materials and components; ii) minimise waste and manage hazardous materials; and iii) reduce energy and water consumption. • These targets, combined with Electrolux's commitment to EcoDesign tools and strategies, underscore the company's approach to, and outcomes related to, resource use efficiency and waste avoidance.
Increase the resources recovered	• Electrolux is recycling all materials returned to it through the home delivery system. This allows for direct delivery to customer, removal of packaging and old whiteware units. These are delivered to Sims Metal Recycling for steel recovery. Data on volumes collected and recycled is not available and there are no plans for its future release.
Include the costs of waste management into the price of products	• The costs of recycling and product stewardship activities are, in general, implicitly included in the price of a product. The Electrolux position is that these costs should be managed at the bottom line.
Enhance product design	• Electrolux is proactive on the issue of environmentally oriented product development. 'EcoDesign handbooks have been developed for most product lines. These are used during the company's Integrated Product Development Process as tools to assure that the right concerns are addressed ...'
Provide product stewardship that is effective and efficient	• The Electrolux service is a relatively new offering so data to enable external evaluation is not yet available. However, by using the home delivery service to help manage end-of-life whiteware Electrolux is seeking to maximise freight/logistics efficiencies. • Electrolux believes it should be seen to be doing more in relation to product stewardship and plans to increase its activity over the next 12 to 24 months.

Table 5. Product Stewardship Discussion Document objectives: Other whiteware producers/suppliers

Discussion Document objectives	Other whiteware producers/suppliers
Use resources more efficiently and reduce the volume of waste produced	• At a global level, the majority of established whiteware producers are increasing resource use efficiency with the overall objective of minimizing production and transport costs. While the reasons for resource use efficiency might be environmentally driven with some companies, the imperative of cost reduction across the product life cycle and supply chain is likely to be the predominant factor. • Production methods among established whiteware producers generally reflect a range of measures, techniques and programmes aimed at effective environmental management. These would include cleaner production techniques, waste avoidance through DfE, in-factory waste reduction and post-industrial materials recycling. • Collectively, such tools and approaches result in using resources more efficiently with the potential for reducing the volume produced during production and also at end-of-life. • DfE focused on light-weighting and other material efficiency strategies are evident in global annual environment and sustainability reports released by established whiteware producers.
Increase the resources recovered	• There is no evidence that 'other whiteware suppliers' and/or brands being imported into New Zealand are increasing (proactively or otherwise) the volume of resources being recovered from end-of-life whiteware. • While some suppliers may offer to dispose of old whiteware as a result of a trade-in or home delivery, there is no information to support that this is widespread, publicly promoted or environmentally noteworthy from a resource recovery perspective.
Include the costs of waste management into the price of products	• There is no evidence that 'other whiteware suppliers' and/or brands being imported into New Zealand are including the costs of whiteware collection and processing into the price of new products. • The current situation in New Zealand does not require 'other suppliers' to cover the costs of whiteware collection and recycling, thus no costs are incurred with no need to internalize such expenditure upstream in the product life cycle.
Enhance product design	• At a global level, the majority of established whiteware producers are implementing DfE consideration during product development. Such DfE considerations include the phasing out or reduction of restricted substances such as those specified in the RoHS Directive. • Producers also make claims about increased attention to design for disassembly and recyclability and associated materials identification to facilitate more viable sorting, segregation and processing. • While such design-based measures contribute to a producer's overall product stewardship programme, the ultimate fulfilment of such product features depends substantially on having end-of-life take-back programmes or schemes in place for specific locations and countries. • The extent to which individual brands of whiteware imported into New Zealand embody such DfE features would require a focused product audit – company by company as well as product category by product category. • At a general level, it would be accurate to conclude that established producers such as Whirlpool, Miele, Bosch, Asko, Samsung and LG Electronics, demonstrate varying levels of commitment to, and action on, DfE.
Provide product stewardship that is effective and efficient	• Effective and efficient product stewardship requires attention across the product life cycle; not just at the design and/or production stages. • Excluding Fisher & Paykel and Electrolux Home Products, there is no evidence to suggest 'effective and efficient' product stewardship activity among other suppliers. • The lack of any other company offering a whiteware collection recycling service represents a significant gap in any product stewardship scheme or programme.

5.3 Assessment against the policy objectives – study brief

Table 6. Policy objectives – Fisher & Paykel Appliances Ltd

Policy objectives (study brief)	Fisher & Paykel Appliances Ltd
Schemes should lead to environmental gains	• Fisher & Paykel implements various activities related to DfE, elimination or improved management and specification of restricted substances, cleaner production as well as lean manufacturing. • Recovery and recycling of approximately 32,000 end-of-life whiteware units during 2004 represents a significant programme of resource recovery and associated environmental gains. • The company's efforts to recover, partially disassemble and recycle end-of-life whiteware and associated packaging is in harmony with the principles and practice of product stewardship. • While not applicable to all end-of-life whiteware recovered through the Fisher & Paykel scheme, all product collected from the Greater Auckland area is partially disassembled to recover and recycle various polymers and glass. • The polymers are sold onto Astron Plastics while all metals go to Sims Metal Recycling. • The disassembly and recycling of some plastics helps to reduce the volume of shredder floc that can be attributed to end-of-life whiteware being recycled out of Fisher & Paykel's Greater Auckland operation. • An important element of the company's Auckland recycling operation is proactive reuse and recycling of cardboard packaging. • As an exporter of whiteware from New Zealand to the EU, Fisher & Paykel is also ensuring for that market compliance with the RoHS Directive and is moving towards a similar position for products supplied to all markets.
Schemes should use a product stewardship approach	• As a manufacturer and supplier of whiteware in New Zealand, the Fisher & Paykel scheme demonstrates a relatively pro-active product stewardship approach across the product life cycle, from product design and innovation through to materials selection, production, packaging, distribution and end-of-life recovery and recycling. • In the company's own words: *'Commitment to energy efficiency and preservation of the environment are corporate guidelines and an integral part of the culture of Fisher & Paykel Appliances.'* • The company's philosophy on environmental matters (including product stewardship) appears to be characterised by an unassuming approach where commitment and action to practical implementation remains paramount. • There is also the view that Fisher & Paykel is not an open market seller and its holistic approach to production distribution and recovery is a source of market advantage.
Schemes should be effective and efficient	• From information and data collected to date and meetings with Fisher & Paykel personnel, the scheme appears to be effective and efficient. • The company has refined its methods and recycling techniques while also intelligently exploiting the synergies possible through combining its management of post-industrial waste with the recycling of end-of-life whiteware. • Careful attention to logistics and maximising the efficient and decentralised use of freight also seems to be operating efficiently and effectively in many parts of New Zealand, particularly the main cities and centres. • Fisher & Paykel personnel have also identified opportunities for further improvement and enhancement with regard to logistics, disassembly, recycling and overall market development for recovered materials.
Schemes should contain publicly reported, challenging performance measures, quantifiable where possible	• Fisher & Paykel collects data and monitors the scheme's overall performance and outcomes. Some data is publicly released and features widely as case study material (eg The New Zealand Waste Strategy) and how New Zealand companies are effectively dealing with waste reduction and recycling in a commercially oriented environment. • The extent to which the scheme is widely and openly reported, inclusive of challenging performance measures, is an area that could be explored further by Fisher & Paykel. • As a voluntary company operation, it should be noted there is no requirement for the company to report more than it currently does. General and specific information about Fisher & Paykel environmental activities, including product stewardship related measures, is presented on the company web site: www.fp.co.nz

Policy objectives (study brief)	Fisher & Paykel Appliances Ltd
Schemes should be transparent	• Some information about the scheme is freely available and Fisher & Paykel appears to respond to information requests and case study content freely and enthusiastically. • Cost data that may be commercially sensitive is not generally publicly available. The company openly showcases its recycling operations to relevant interested parties and conducts tours and site visits. • Queries from external parties are answered wherever possible and practicable and not commercially sensitive. Fisher & Paykel's participation in this study also demonstrates a willingness to engage with the policy development process and therefore a commitment to scheme transparency.
The benefits of any regulatory aspects should exceed their costs	• The Fisher & Paykel scheme is not regulated; it is a voluntary, company-initiated product stewardship scheme.
Schemes should not reduce market competition	• There is no evidence to date that the Fisher & Paykel scheme reduces market competition. Integral to the Fisher & Paykel recycling scheme is that the company will collect and recycle end-of-life whiteware regardless of brand or producer when a consumer purchases a new Fisher & Paykel whiteware product. • It could be argued that the Fisher & Paykel recycling scheme adds value and provides consumers with a convenient disposal and recycling service for end-of-life whiteware. • Conversely, it could be argued that Fisher & Paykel's proactive approach to product stewardship and end-of-life take-back and recycling, is a cost which some other whiteware suppliers in New Zealand are avoiding, thus providing a cost advantage to non-recycling whiteware suppliers.
Schemes should set safe standards for the collection and handling of recovered material	• Fisher & Paykel has a proactive programme to ensure that all relevant compliance requirements in their recycling centre are tracked and addressed. • It is assumed that the company's recovery and recycling partners would comply with all relevant laws, regulations, standards and codes of practice to ensure the safe collection and handling of recovered materials.
Schemes should provide a forum for communication & to address any issues	• As the scheme is centred on Fisher & Paykel, any 'forum for communication' is primarily internal. The company's participation in this study highlights its broader sectoral engagement on product stewardship and opportunities to evolve, collaborate, communicate and improve where/if required. • Fisher & Paykel appears to be committed to realistic measures (including the possibility of regulation and associated public forums) that can help further improve product stewardship in the whiteware sector in New Zealand.
Schemes should include public information and education components	• Fisher & Paykel provides some public information via the company website and through various trade, industry and government publications. • The extent to which such information could be described as detailed public information or community education needs requires further analysis, mindful of the overall communication objectives. • It should be noted that 'education' about whiteware product stewardship (and recycling in particular) requires expertise in community education and outreach. • Fisher & Paykel seems to be eager to explore the possibilities of how its scheme might be enhanced or bolstered by public information and education. • The Fisher & Paykel website features an environment section with public information about DfE, cleaner production, materials selection and whiteware recycling: www.fp.co.nz

Table 7. Policy objectives (study brief) – Electrolux Home Products – a division of Electrolux NZ Ltd

Policy objectives (study brief)	Electrolux Home Products
Schemes should lead to environmental gains	• Electrolux is recycling all materials returned to them through its home delivery system regardless of brand or producer; this allows for direct delivery to customer, removal of packaging and old whiteware units. These are delivered to Sims Metal Recycling. • Data on volumes collected and recycled is not publicly available at the time of preparing this report. The absence of any data on units collected and recycled makes any assessment about resource recovery and environmental gains problematic. • At a global level, Electrolux has noted three particular environment and sustainability issues facing their business: global warming, the RoHS Directive and socially responsible investments. • The RoHS Directive has implications for specific whiteware products imported into New Zealand and the degree to which such products are, by default, RoHS-compliant or not.
Schemes should use a product stewardship approach	• The Electrolux service reflects some product stewardship principles and is driven, in part, by offering customers a convenient way of managing the old product when they purchase a new one. This service is being rolled out through main centres. • The extent to which the New Zealand home delivery service is being communicated or promoted as a product stewardship or environmental initiative is unclear, however, the company's global position on producer responsibility, EcoDesign, greening the supply chain and restricted materials is explicitly in favour of proactive environmental management: *"Electrolux is an early advocate of producer responsibility. We were among the first in our industry to identify the business case for recycling and lobby actively for individual responsibility."*
Schemes should be effective and efficient	• The Electrolux service is a relatively new offering thus data to enable external evaluation is not yet available. However, by using the home delivery service to help manage end-of-life whiteware, Electrolux is seeking to maximise freight/logistics efficiencies.
Schemes should contain publicly reported, challenging performance measures, quantifiable where possible	• At a global level, Electrolux demonstrates a comprehensive and sophisticated approach to public reporting and information dissemination on environmental matters and sustainability in general. • The extent to which the scheme is widely and openly reported, inclusive of challenging performance measures is an area in need of more company attention. • Electrolux does recognise the importance of improving the perceived value of collection and recycling activities among consumers. As a voluntary company operation, there is no requirement for Electrolux to report more than it currently does. • For more information on Electrolux 's environmental activities and outcomes including end-of-life whiteware recycling and producer responsibility, refer to the annual Sustainability Report 2004: www.electrolux.com
Schemes should be transparent	• The extent to which the Electrolux scheme is transparent from a consumers' perspective is limited at this time. • There is no evidence of publicly available information or materials about how, when or where end-of-life whiteware is recovered and recycled when a new Electrolux product is delivered to a consumer. • At a global level, Electrolux demonstrates a high degree of transparency via its annual sustainability reporting process. • The company is subject to various sustainability indexes and socially responsible investment assessments such as Dow Jones pan-European Sustainability Index and the FTSE4Good Series, both of which require a substantial commitment to making data available and open public reporting.
The benefits of any regulatory aspects should exceed their costs	• The Electrolux disposal/recycling service is not regulated; it is a voluntary, company-initiated activity in its infancy.
Schemes should not reduce market competition	• There is no evidence to date that the Electrolux service reduces market competition. Integral to the Electrolux home delivery service is that the company will collect and recycle end-of-life whiteware regardless of brand or producer, when a consumer purchases a new Electrolux whiteware product. It could be argued that Electrolux recycling scheme adds value and provides consumers with a convenient disposal and recycling service for end-of-life whiteware.

Policy objectives (study brief)	Electrolux Home Products
Schemes should set safe standards for the collection and handling of recovered material	• As part of the global Electrolux approach to restricted materials and hazardous substances, the company is '... concerned with the health, safety and environmental consequences of the different material choices we make'. • Electrolux promotes a four-pronged approach to the use of materials and their environmentally sound management. Electrolux literature highlights the use of a Restricted Materials List (RML), which guides and defines which chemicals are banned and restricted from use in production and across the supply chain. • Consistent with Electrolux's statement in its annual Sustainability Report, it is assumed that Electrolux, together with its recovery and recycling partners, comply with all relevant laws, regulations, standards and/or codes of practice. • Electrolux also highlights its position to 'remain one step ahead of legislation such as EU's RoHS and similar laws ...'. This is especially the case with mercury, cadmium, hexavalent chromium and brominated flame retardants.
Schemes should provide a forum for communication and to address any issues	• As the home delivery service is centred on Electrolux product, any 'forum for communication' is primarily internal. • The company 's participation in this study highlights its broader sectoral engagement on product stewardship and opportunities to evolve, collaborate, communicate and improve where/if required. • While not currently applicable to product stewardship activities in New Zealand, it should be noted that Electrolux together with Sony, Hewlett Packard and Braun is part of a pan-European platform for managing end-of-life whiteware and other electrical and electronic products. • For more information about ERP refer to: www.erp-recycling.org
Schemes should include public information and education components	• While the annual Electrolux Sustainability Report 2004 covers a diverse and comprehensive range of information, data and performance outcomes, this does not extend to any significant information about the company's product stewardship activities in New Zealand. • At this point, there is no evidence of publicly available information or materials about how, when or where end-of-life whiteware is recovered and recycled when a new Electrolux product is delivered in New Zealand. • There is no information available via www.electrolux.co.nz • The company's comprehensive annual Sustainability Report 2004 can be downloaded at www.electrolux.com

5.4 Stability of schemes

The Fisher & Paykel scheme represents a substantial achievement and evolution given from where the company commenced in 1994. The transition from a pilot project to a national initiative demonstrates considerable commitment in terms of funds, time and expertise.

Despite the scheme's enduring operation, the risks to its stability and ongoing existence are several and potentially significant. In particular, the voluntary nature of the scheme leaves it open to market volatility both in terms of product stewardship free riders as well as potential fluctuations in the price of secondary metals. While it appears that such factors have not negatively impacted on the scheme to date, there is a need to think and act more strategically from a government policy perspective to help bolster the scheme while also stimulating other suppliers and parties in the sector to develop and operate product stewardship schemes focused on managing end-of-life whiteware.

With the exception of the embryonic Electrolux home delivery and recycling service, the absence of any other importers/suppliers proactively offering retailers and consumers a whiteware collection and recycling service, further undermines the long-term stability and expansion of the Fisher & Paykel scheme. This situation may, to some degree, provide Fisher & Paykel with a market advantage (at present) but only while the cost structure and overall market situation is favourable.

In addition to supporting proactive company initiatives in New Zealand, there is clear role for the Government to provide a policy setting, which can maximise environmental outcomes that are economically sensible.

In terms of overall sector participation, whiteware product stewardship in New Zealand is very limited and unable to deliver the type of environmental outcomes and community support that would otherwise be possible through a more 'level playing field' and widespread producer and retailer involvement.

The importance of a level playing field and sector-wide participation in creating stability and certainty is manifold in that they will:

- help to support proactive company initiatives eg Fisher & Paykel scheme;
- maximise resource recovery and overall environmental benefits;
- help to reduces competitive disadvantage;
- demonstrate significant government commitment to effective and efficient policy interventions;
- help to build public confidence in a policy, scheme or programme that may otherwise attract cynicism if only isolated company initiatives exist;
- provide a more attractive scenario for market development and investment in e-waste recycling infrastructure and associated collection and processing service.

Whether the producer is manufacturing in New Zealand, China, Europe or the USA, the relevance of on-ground product stewardship is critical as is being demonstrated by mandatory instruments in the EU, Japan and a growing number of USA states. The argument often used by some importers – *that products are not manufactured in New Zealand, therefore, we are unable to take on collection and recycling responsibilities* – is unable to be justified given the nature of the global market and everyday compliance requirements faced by importers and exporters worldwide. Government support in terms of knowledge transfer, expertise and funding may be warranted in order to help ensure non-compliance is overcome and economic development is able to continue in an environmentally responsible way. Any environmental policy or regulation that results in substantial and/or widespread failure across manufacturing business in an entire sector does not reflect an effective or sensible approach to product stewardship and should be avoided as a priority.

Uniformity can provide stability without constraining or smothering individual company opportunities to innovate and implement efficient, effective and consumer-friendly collection and recycling services. The introduction of the EU Directive on WEEE has resulted in a diverse range of industry collectives, producer responsibility organisations and operational models, all of which aim to better manage end-of-life electrical and electronic products including whiteware. The involvement of the Electrolux Group in the European Recycling Platform together with Sony, HP and Braun, is a noteworthy example of such responses. Refer to www.erp-recycling.org for more information about the European Recycling Platform.

The price of, and demand for, metals are contributing factors within the context of whiteware recovery and recycling. Metal prices have, for many years, been the primary reason why end-of-life whiteware is recovered and recycled. Any dramatic downward fluctuation in metal prices may have a negative impact on the current stability of whiteware recycling, however, the ability of any product stewardship policy or scheme design to accommodate or address such structural economic factors is impossible.

It is the consultants' view that scheme stability and sector-wide participation are essentially dependent on each other if government policy is aiming to facilitate significantly higher levels of waste avoidance and resource recovery among producers, suppliers, retailers and consumers than is presently the case.

5.5 Overall environmental and economic benefits of current schemes

Table 8. Environmental and economic benefits: Fisher & Paykel Appliances

	Environmental benefits	Economic benefits
Fisher & Paykel	• Approximately 32,000 whiteware units diverted from landfill recovered and recycled during 2004. • DfE contributes to waste avoidance, resource-use efficiency and a reduction in the use of hazardous substances. • Take-back scheme contributes to materials recycling and resource conservation. • Materials recycling contributes to reducing energy consumption and emissions associated with processing/manufacturing virgin materials. • Take-back scheme helps to safely recover and control hazardous and toxic substances that might otherwise lead to human health or ecosystem impacts and contamination. • Take-back scheme diverts (and reduces) end-of-life related whiteware solid waste away from landfill.	• Recovery and reutilisation of materials back into the economy: – reuse of packaging for new appliances – recycling of ferrous and non-ferrous metals – recycling of plastics including EPS. • Cost reduction related to Fisher & Paykel's waste management activities, especially for post-industrial waste. • Employment opportunities and job creation at Fisher & Paykel through its recycling centre. • Costs savings associated with materials efficiency improvements in product development and manufacturing. • Costs savings to whiteware retailers through participation in Fisher & Paykel scheme. • Broader economic benefits of facilitating the removal of inefficient whiteware from the energy grid.

Table 9. Environmental and economic benefits: Electrolux Home Products

	Environmental benefits	Economic benefits
Electrolux NZ	• The embryonic stage of the Electrolux scheme and the lack of any data on units collected and volume of materials recycled makes any observations about environmental benefits premature at this time.	• The embryonic stage of the Electrolux scheme and the lack of any data on units collected and volume of materials recycled makes any observations about environmental benefits premature at this time.

6. The Role of Regulation and Other Interventions

This section aims to canvass a range of possibilities, ideas and policy options aimed at expanding and enhancing the role and outputs associated with product stewardship in the New Zealand whiteware sector.

As noted in the project brief and other relevant documents, the goal of the study has not focused on how to regulate the sector per se. While regulatory interventions are potentially valid and necessary in some cases, there is scope for environmental change and improvement through other, non-regulatory means. The success of non-regulatory measures would depend significantly on the level of voluntary commitment, foresight and resourcing from the sector, the Government and other relevant stakeholders.

The first part of this section outlines a series of non-regulatory and enabling propositions and measures, while the second part engages with the options discussed in the product stewardship discussion document as well as an additional option emanating from the whiteware sector group (and Fisher & Paykel in particular).

6.1 Non-regulatory interventions, funding support and incentives

Government policy, together with a proactive whiteware sector, could drive and resource a range of very specific measures that target different aspects of the whiteware life cycle with a view to maximising waste avoidance and resources recovery in a cost-effective manner. The list below represents such measures in concept form only and is by no means conclusive. It is indicative of the types of non-regulatory initiatives adopted for a broad range of product categories and waste streams in Australia, Europe and North America.

i) Sector-wide collaboration and support

- Assess how a national waste levy could be used to further expand and enhance the role and outputs associated with whiteware product stewardship across the entire sector. Through its role in the whiteware sector group, The Warehouse believes the potential of a national landfill levy to fund or subsidise further research and actual operating mechanisms for more robust product stewardship (where there is clear evidence of market failure and environmental harm) is worthy of urgent exploration. The Warehouse added that the *'... the design of any such levy ... be sized to meet projected waste minimisation and resource recovery demands based on a clearly defined policy matrix which would identify qualifying candidate programmes'.*
- Develop and implement a public reporting initiative to provide a more transparent view of how the whiteware sector is performing on product stewardship implementation and, in particular, DfE and materials efficiency improvements as well as resource recovery initiatives such as end-of-life take-back schemes, etc.
- Develop an agreed industry code of practice or accord specifically focused on whiteware and featuring targets for collection, processing/recycling, community awareness and action.
- Continue to fund industry collaborative research initiatives on sustainability such as that provided by the Foundation for Research Science & Technology.

ii) Design for environment

- Fund product development (potentially via a national waste levy) to support local producers to trial and implement specific DfE features that maximise cost effective disassembly and recycling.
- Harmonise with EU RoHS Directive to help ensure that non-RoHS compliant product does not enter the New Zealand market. In the first instance, such harmonisation could be attempted in the form of a voluntary code of practice.
- Government to initiate dialogue with all producers (New Zealand and off-shore manufacturers) requesting more specific detail on how DfE is being applied to products entering the New Zealand market.

iii) Consumer education and information

- Research consumer and community awareness and behaviours in order to inform and shape initiatives developed by the whiteware sector.
- Develop and promote reader-friendly (jargon-free) consumer information and education initiatives about whiteware recycling, for point of sale application and driven by retailers in collaboration with whiteware producers/suppliers.
- Assess the relevance and potential value of environmental labelling such as that possible through the Environmental Choice programme and the New Zealand Ecolabelling Trust.
- Develop sustainable whiteware purchasing guidelines for government departments (relevant to laundry equipment and cooking equipment in hospitals, schools and other relevant facilities).

iv) Market development for recovered materials

- Fund market development (potentially via a national waste levy) to target problematic materials not currently being processed and/or recycled from end-of-life whiteware in New Zealand (eg shredder floc from the metal recycling process, printed circuit boards and plastics).
- Undertake research to identify and assess potential synergies and collaboration between different product sectors (eg end-of-life vehicles and whiteware) with a view to maximising economies of scale for materials processing and securing end-markets.

v) End-of-life management – collection and processing

- Review national product and materials handling to assess how to streamline the refrigerant degassing process for end-of-life refrigerators, freezers and air conditioners with a view to maximising the overall, product recovery and recycling rate. In other words, what can be done to improve efficiencies so that ozone-depleting substances can be effectively managed while also increasing the collection, partial disassembly and recycling rate of end-of-life whiteware.
- Co-fund (whiteware sector, Government and recyclers) the establishment of a New Zealand e-waste recyclers association or consortium to develop and improve collection and recycling infrastructure.
- Develop a national scrap metal recycler code of practice. The Auckland Regional Council together with the Scrap Metal Association is developing a voluntary code of practice for scrap metal operators. This should be expanded to become a national initiative.
- Use funds from a national waste levy for the purpose of offering consumer rebates, bounties and other financial incentives to encourage responsible disposal and recycling of whiteware. Such incentives may be temporary and be designed to stimulate action rather than as a continuing measure.
- Assess the relevance and cost benefit of temporary or limited-term collection events for whiteware, especially for rural or more remote locations.
- Conduct a LCA to quantitatively establish the respective environmental impacts and priorities associated with different disposal options for whiteware eg landfilling versus metal recycling versus partial disassembly and some plastics recovery. This work could extend to assessing the specific impacts and issues resulting from shredder floc. This work could also be expanded to include life-cycle costing research.

6.2 Evaluation of potential regulatory and non-regulatory options

Table 10. Option 1 – Status quo (industry-driven and voluntary schemes) – whiteware focus

Key features	
• Entirely voluntary and industry driven. • Does not reflect sector-wide involvement or commitment. • Weak and unconnected expression of product stewardship principles as per the Discussion Document. • Landfill diversion and recycling of end-of-life whiteware primarily facilitated by local councils. • Funded by individual whiteware companies, retailers, collectives and/or participating retailers. • Builds competitive advantage for proactive producers and retailers. • Absence of any Government intervention. • Reflects a least-cost, producer responsibility or a shared product responsibility model.	
This option should:	**This option would not:**
• Enable a relatively low level of waste avoidance and/or resource recovery involving whiteware producers and retailers. • Give sector-wide flexibility. • Be attractive to whiteware companies generally regarded as environmentally proactive or pioneering. • Enable participating companies to develop, evolve, expand and improve their schemes over an indefinite timeframe. • Allow new schemes at any time without Government approval and intervention. • Benefit local whiteware producers. • Continue to rely heavily on local councils to divert end-of-life whiteware from landfill. • Allow non-EU RoHS compliant whiteware to be supplied to the New Zealand market.	• Encourage or facilitate whiteware suppliers currently not operating a product stewardship scheme. • Provide a scheme framework with set collection and recycling targets or key performance indicators. • Encourage whiteware suppliers to collect data and report publicly. • Achieve high levels of sector-wide whiteware collection and recycling. • Benefit smaller whiteware importers. • Encourage a stronger product stewardship model involving whiteware producers and suppliers. • Increase general community and consumer awareness about whiteware product stewardship. • Effectively address issues associated with existing or future orphaned whiteware. • Demonstrate any significant and long-term commitment and action from Government to address the issue of whiteware product stewardship.

It is the consultants' view that this option is highly unlikely to achieve sector-wide product stewardship schemes and activities. Whether partial or sector-wide, this option lacks any transparency and any means of accurately and consistently measuring environmental and economic performance. It is also vital that any data collection and reporting activities associated with high levels of transparency do not unnecessarily increase business costs without any overall economic and environmental benefit. Data collection, collation and reporting needs to be purposeful and productive given the scheme's broader goals.

In relation to the definition and principles of product stewardship, this option demonstrates a very weak expression of product stewardship. The fact that the vast majority of end-of-life whiteware in New Zealand is channelled through disposal pathways other than producers and suppliers highlights the general absence of a strong and measurable industry role.

In other words, the predominant role of local councils managing end-of-life whiteware does not constitute product stewardship, despite the legitimate role councils play at present. Whether or not this is a bad thing, if there is already a high rate of diversion from landfill, is a debatable issue. It is important to note that diversion and treatment of whiteware by local councils fails to address how shredder floc could be reduced in any significant way. This does not exclude a continuing role for local councils in any future sector-wide scheme(s), which may reflect greater participation and involvement of producers and retailers.

Generally, this option does not enable small volume whiteware importers to establish a collection and recycling scheme that is cost effective. In this case, several importers and/or suppliers could investigate setting up a collective product stewardship programme.

This option is not recommended if sector-wide action is considered desirable by industry and Government.

Table 11. Option 2 – Industry-led schemes with free-rider regulation – whiteware focus

Key features	
• Product stewardship agreements between industry, Government and other potential stakeholders eg retailers, local councils, recyclers, service and repair centres, second-hand market, NGOs. • Establishment of industry-led schemes under agreements complete with targets, KPIs and public reporting. • A balance of industry flexibility and minimal Government intervention. • Funded by individual whiteware companies, retailers, collectives and/or participating retailers. • Builds competitive advantage for proactive producers and retailers. • Increased scheme transparency over the status quo. • Legislation providing for the regulation of free-riders unwilling to participate. • Enables a relatively low-cost producer responsibility or a shared product responsibility model. • Potential inclusion of a phased landfill ban on unprocessed end-of-life whiteware as an incentive to participate. This would necessarily include a landfill ban on shredder floc.	
This option should:	**This option would not:**
• Ensure a relatively high level of waste avoidance and/or resource recovery involving whiteware producers and suppliers. • Provide an explicit agreement between parties as the basis for product stewardship schemes that establish specific responsibilities. • Provide incentives for potential free-riders to join schemes and possible regulation to ensure a 'level playing' field for all whiteware producers and suppliers within the sector. • Enable the establishment of schemes involving the entire whiteware sector. • Provide the means to effectively deal with orphaned and historical whiteware. • Result in increased consumer and community awareness and action on whiteware product stewardship, particularly on end-of-life collection and recycling. • Accommodate a diversity of schemes and approaches, both individual company schemes and collective initiatives.	• Force an unwilling whiteware producer or supplier into the establishment of product stewardship agreements. • Make the establishment of a whiteware scheme mandatory, or give the Government power to set scheme performance requirements such as design, collection, recycling or reporting targets. • Smother or constrain innovation in whiteware product stewardship. • Require all schemes to be similar or identical. • Be effective without adequate Government resourcing and commitment to enforcement of free-riders.

It is the consultants' view that this option has considerable merit and provides a relatively streamlined approach to maximising sector-wide participation in whiteware product stewardship. Greater clarity is required on the definition of a 'free-rider' and the extent to which it would or should include not only producers but disinterested retailers as well.

A key element in this option is to ensure that any free-rider regulation is simple yet effective to stimulate potential non-participants into practical and measurable action. In other words, any regulation needs to 'bite' early and provide little or no choice for producers and/or retailers but to adopt a responsible corporate position on whiteware product stewardship, either individually or as a collective.

This option is undermined by its failure to include non-regulatory incentives and interventions in the form of Government funding, infrastructure investment, market and product development support, or a consensus based sector-wide code of practice. There is clearly a role for specific non-regulatory instruments to help bolster a safety net or backstop type approach to regulating the sector.

This option is worthy of further investigation and assessment as a viable direction.

Table 12. Option 3 – Mandatory approach to product stewardship schemes – whiteware focus

Key features	
• Legislation requires whiteware product stewardship schemes. • A landfill ban on unprocessed end-of-life whiteware and shredder floc. • Prescribed targets for collection, recycling, community awareness, action and reporting. • DfE requirements, standards and/or guidelines dealing with RoHS-type requirements as well as DfD and DfR requirements (in guideline form). • Allows for specific tools to be implemented. • Sector-wide involvement of all whiteware producers, distributors, retailers and service companies active in the New Zealand market. • Government drives the process with less input from, and flexibility for, the whiteware sector. • Mirrors similar policy and legislative instruments being applied in the EU, Japan and some USA states eg Washington and California.	
This option should:	**This option would not:**
• Ensure a very high level of waste avoidance and/or resource recovery involving whiteware producers and suppliers. • Provide a 'level playing field' for all whiteware producers and reduce the risk of competitive disadvantage. • Provide certainty and stability for all stakeholders. • Provide clear performance expectations as well as firm goals and targets. • Give Government control over the performance of product stewardship activities being conducted by whiteware producers. • Require significant Government resources to ensure effective and efficient development, administration and enforcement of relevant legislation and regulations. • Provide a range of economic and other tools to back up schemes. • Provide a powerful instrument to address orphaned and historical whiteware. • Result in increased consumer and community awareness and action on whiteware product stewardship, particularly on end-of-life collection and recycling.	• Give the flexibility of industry-led approaches to whiteware product stewardship. • Provide significant market-based incentives for industry to reduce scheme costs through DfE features. • Smother or constrain innovation in whiteware product stewardship. • Require all schemes to be similar or identical. • Be effective without considerable Government resourcing and commitment to enforcement of free-riders.

It is the consultants' view that this option is a mismatch given the broader environmental, social and economic issues associated with whiteware in New Zealand. Mindful of the criteria for prioritising action on waste as outlined in the New Zealand Waste Strategy, the costs would significantly outweigh the benefits of developing, administering and enforcing a mandatory product stewardship scheme for whiteware.

Criteria related to volume and harm, achievability, public concern and cost-effectiveness do not elevate end-of-life whiteware to a priority status given the (limited) available data from Government, industry or other sources.

While the environmental outcomes of this option would be considerable and directly require a sector-wide approach, the implementation costs would be exorbitant for industry, and the costs of administration and enforcing the regulation would be excessive for Government.

The essential value of this option – should the 'volume and harm' criteria be established as significant – is the opportunity to ban whiteware and shredder floc from landfill, as well as being able to mandate targets for collection and recycling.

This option is not recommended.

Table 13. Option 4 – voluntary and regulatory mix of approaches – whiteware focus

Key features	
• Product stewardship agreements between the whiteware sector and Government. • Legislation can regulate whiteware companies unwilling to initiate, develop or participate in a product stewardship scheme. • As a backstop, regulation could require the whiteware sector to operate a product stewardship scheme, either collectively, company by company, or both. • Prescribed targets for design, collection, recycling, community awareness, action and reporting. • Potentially allows for specific tools to be implemented. • Sector-wide involvement of all whiteware producers active in the New Zealand market. • Potential inclusion of a phased landfill ban on unprocessed end-of-life whiteware.	
This option should:	**This option would not:**
• Ensure a relatively high level of waste avoidance and/or resource recovery involving whiteware producers and suppliers. • Enable a whiteware sector-led scheme(s). • Allow a range of economic and other tools to be used to back up a scheme(s). • Provide certainty, stability and a level playing field for whiteware producers, suppliers and retailers. • Give Government control over the performance outcomes of whiteware product stewardship activities if/where required. • Provide clear performance expectations as well as firm goals and targets. • Result in increased consumer and community awareness and action on whiteware product stewardship, particularly on end-of-life collection and recycling.	• Rely significantly on sector-led schemes for whiteware product stewardship. • Avoid regulation entirely; regulation may be needed for those whiteware producers and suppliers unwilling or indifferent to adopting a product stewardship approach for whiteware. • Smother or constrain innovation in whiteware product stewardship. • Require all schemes to be similar or identical. • Be effective without adequate Government resourcing and commitment to enforcement of free-riders.

It is the consultants' view that this option has the greatest merit and can accommodate and combine effective approaches, instruments and tools that are regulatory and/or non-regulatory. It is potentially more desirable that Option 2 due to its ability to enable more stringent levels of regulation compared to just free-rider regulation. This option allows the scenario of no regulation whatsoever should the whiteware sector demonstrate that is able to increase recovery and recycling rates (including floc reduction) on a voluntary basis.

This option provides the opportunity for proactive and forward-thinking companies to develop and implement their own schemes – either individually or collectively – and benefit from minimal Government intervention.

Also valuable as part of this option is the ability to set relevant targets and key performance indicators on aspects such as DfE, end-of-life whiteware collection, processing and materials recycling, consumer awareness and action, as well as transparent public reporting. As part of the mix of tools, the option of a phased landfill ban on unprocessed end-of-life whiteware could be used to accelerate the interest and participation of otherwise indifferent producers and retailers.

Importantly, this option also allows Government to demonstrate its commitment to the process and to helping achieve the desired outcomes. Such commitment could be in the form of funding and knowledge support or policies and programmes that remove barriers and stimulate and expand external investment.

Particularly critical is the need for Government, industry and other affected stakeholders to comprehensively identify and assess the impact of any potential regulation, its direct consequences and its side effects, as well as the long-term implications for national industry policy and competition.

This option – in its generic format – appears to have the in-principal support of Fisher & Paykel Appliances, Electrolux New Zealand and The Warehouse. It enables voluntary initiatives to take place where they perform effectively, yet it also provides the possibility to regulate free-riders as a way of explicitly involving producers, suppliers and retailers that might otherwise choose to avoid their product stewardship obligations.

Electrolux, for example, highlights the need for a mixed voluntary–regulatory approach, noting that some form of mandatory instrument is essential in dealing with free-riders and/or potential free-riders: *"... the regulatory approach must ensure that manufacturers, manufacturer importers and agencies are sharing the responsibility equally with regards to product design, packaging and end-of-life disposal".*

While Electrolux believes whiteware should not end up in landfill, the company is concerned about obligations for orphaned and historical products:

"Electrolux agrees that whole appliances should not end up in landfill, however end-of-life disposal will often fall to the company which sells the new product by default. Electrolux views this area with some concern, as Electrolux has limited control over what was manufactured in the past. Electrolux ensures it uses a high composition of reusable materials and its packaging is completely recyclable, therefore even with product disassembly and sorting of reusable components, Electrolux would view a ban on landfill for whiteware components to be onerous."

Electrolux would view a mixed approach favourably if it ensured that the administration costs of any scheme did not exceed the benefits. A similar view is held by Fisher & Paykel Appliances.

This option is strongly recommended for further investigation, development and assessment.

Table 14. Option 5 – Mandatory refund system – whiteware focus

Key features	
• Requires that a retailer must accept an approximately equivalent appliance (whether working or not) if the customer wants to trade it in and refund a set amount from a fixed scale (probably with levels set under the jurisdiction of MfE). • Includes a phased landfill ban on unprocessed end-of-life whiteware introduced on a regional basis. • Eliminates free-riders and effectively addresses issues associated with existing and future orphaned whiteware. • Includes an opportunity to retire older, energy and water in-efficient whiteware; a synergy that addresses multiple resource use efficiency objectives.	
This option should:	**This option would not:**
• Ensure a relatively high level of waste avoidance and/or resource recovery involving whiteware producers, suppliers and retailers. • Move significant volumes of whiteware away from local councils if they no longer want to collect/receive end-of-life whiteware. • Minimise the collection cost to both councils and the appliance industry. • Allow new schemes at any time without Government approval and intervention. • Eliminate illegal dumping of old appliances. • Have the potential to be self-regulating provided the scheme is promoted and non-compliance is reported. • Require no Government funding other than for administration/enforcement. • Have the potential to capture more refrigerant at end-of-life. • Encourage whatever scheme that makes the best economic sense to operate • Provide a level playing field for whiteware producers, suppliers and retailers. • Result in increased consumer and community awareness and action on whiteware product stewardship, particularly on end-of-life collection and recycling.	• Smother or constrain innovation in whiteware product stewardship. • Require all schemes to be similar or identical. • Be effective without some Government promotion and policing. • Completely eliminate curb-side recycling. • Give Government absolute control over every last scrapped appliance. • Intrinsically require reporting to Government of recycled numbers etc (though this could easily be added if it could in any way be justified). • Stop local councils from continuing whiteware collection and benefiting from metal recycling revenues.

In some respects this is a relatively simple option. It attributes value to end-of-life whiteware and (provided the economic value is sufficient) will 'pull' the majority of old units back to the retailer's collection point, thus also offering a potential logistics solution. This option also would minimise the illegal dumping of now valuable, old appliances.

This option also has the ability to encourage the timely retirement of older energy and water inefficient appliances, especially refrigerators and freezers. Testing shows that older appliances are significantly less water and energy efficient than their modern replacements. Old appliances (particularly refrigerators) are often kept running because their owners see no advantage in disposing of them. This option would push up the net price of whiteware for the customer who does not have (and can not find) an old unit to trade in, however, it should reduce total cost as it would have the tendency to use the final part of the delivery chain for recovering old appliances.

Retailers may choose to give the consumer a voucher or rebate (typically high-street retailer with shortage of access or the "cash & carry" retailer would be expected to select this option). A consumer could redeem (say, for $50) when the old appliance is returned to a suitably convenient and retailer-authorised collection centre. The collection centre could either pay the refund directly or "stamp the voucher" for the customer to take back to the retailer who would then pay the customer. Any cost or benefits for the recycling centre would be negotiated commercially outside the customer refund system. This option still enables local councils to remain involved in whiteware collection and establish or further expand an existing revenue stream from sale of end-of-life whiteware to metal recyclers.

This option is strongly recommended for further investigation, development and assessment.

7 Lessons Learned and Key Recommendations

The study has provided an opportunity to review product stewardship initiatives currently underway in the New Zealand whiteware sector. At the same time, several key issues have emerged as both challenges and opportunities. The associated recommendations draw on a range of activities undertaken during the course of the project, not excluding:

- interviews and meetings with sector group representatives;
- data and information collected and analysed by the authors;
- knowledge of related policy and industry initiatives worldwide;
- key aims, objectives and issues outlined in the New Zealand Waste Strategy and the product stewardship Discussion Document;
- public submissions related to the Ministry for the Environment product stewardship Discussion Document;
- dialogue and discussion with the Ministry for the Environment.

a) Anecdotal information and evidence indicates that, although the majority of end-of-life whiteware in New Zealand is recovered for metal recycling, significant volumes of shredder floc from the recycling process still end up in landfill, the environmental impacts of which have yet to be documented and/or publicly released.

Associated recommendation: The whiteware sector, together with Government, should establish and document accurate data on the level of whiteware collection and recycling currently underway, including figures on discards and recycling rates, as well volumes of shredder floc going to landfill.

b) DfE features and characteristics such as design for disassembly and recycling, materials efficiency and RoHS compliance, are well advanced among several of the major whiteware producers including Fisher & Paykel Appliances and Electrolux New Zealand.

Associated recommendation: Encourage producers and retailers to proactively communicate and promote (to consumers) the environmental, economic and consumer benefits resulting from DfE features and characteristics.

c) Detailed quantitative information about 'whiteware and the environment' (excluding energy and water efficiency) is significantly lacking in New Zealand. This includes limited accurate data and information about actual disposal pathways, recycling rates and the environmental impact of shredder floc going to landfill.

Associated recommendation: Undertake relevant and authoritative research that clearly identifies and documents the nature and scale of any identified environmental problems associated with current disposal and recycling activities in New Zealand.

d) The Fisher & Paykel scheme represents an exemplary initiative within the context of a voluntary response with no Government intervention or regulation.

Associated recommendation: Fisher & Paykel should, as a priority, develop and communicate high quality outreach information which effectively describes how its scheme operates including the overall environmental, economic and social benefits.

e) Driven chiefly by a desire to maximise consumer benefit, it appears that the embryonic Electrolux home delivery service (which includes product/packaging recycling) may expand to most major centres.

Associated recommendation: Government should, as a priority, encourage Electrolux New Zealand to further expand its product and packaging recycling activities currently being offered through the company's home delivery service. As its scheme develops, Electrolux should also document its activities and provide a higher level of public information and reporting.

f) There appears to be general in-principle support for a mix of voluntary and regulatory measures (where required) as a means of further expanding and enhancing the role and outputs of product stewardship in the New Zealand whiteware sector.

Associated recommendation: Government should consider this report with a view to further developing and refining a national policy position on product stewardship as it relates to the whiteware sector. The whiteware sector group should also be retained and substantially widened with a view to continuing a productive dialogue between Government and industry on the specifics of how regulatory and/or non-regulatory measures should be designed, assessed, implemented and administered and/or enforced.

g) There is a general view among members of the whiteware sector group that industry free-riders are a major barrier to greater investment in, and uptake of, whiteware product stewardship in New Zealand. Such free-riders include not only whiteware producers/importers, but also retailers who do not offer any form of systematic recovery and recycling service or programme to consumers.

Associated recommendation: The existing whiteware sector group should be widened to include more diverse representation including other producers, importers/agents, retailers, the waste management industry and local councils. The policy development process should be seen to be inclusive and open to other relevant stakeholders to participate.

h) There is a view that current requirements and procedures for degassing end-of-life refrigerators, freezers and air conditioners, present a barrier to some retailers being more active participants in whiteware recovery and recycling.

Associated recommendation: Government should work collaboratively with the whiteware sector group and the Recovery Trust, to identify specific barriers and opportunities, with a view to modifying current requirements (where legally possible) so that the management of ODS and end-of-life whiteware recycling can be effectively and efficiently undertaken.

i) There are competing views on whether or not a landfill ban covering whiteware would be acceptable to producers, importers and retailers, or not. While Fisher & Paykel Appliances has no immediate objection to the landfill ban concept, Electrolux New Zealand believes such a ban would be onerous.

Associated recommendation: The whiteware sector group should further discuss a landfill ban option with a view to comprehensively identifying and documenting the full range of advantages and disadvantages.

j) There is a relatively strong view that should any regulatory intervention be more seriously pursued, that its direct consequences and side effects be clearly identified, modelled and assessed with a view to ensuring that the envisaged benefits exceed the costs.

Associated recommendation: A comprehensive cost–benefit analysis should be conducted as part of a broader regulatory impact study on any proposed regulatory options.

k) There is a view among some stakeholders that great care should be taken to ensure any potential regulatory intervention does not negatively impact or destabilise existing schemes such as that being run by Fisher & Paykel. Similarly, there is a view that continued policy inaction could undermine the voluntary efforts of the Fisher & Paykel scheme and participating retailers/dealers.

Associated recommendation: Refer to recommendation j).

l) Finally, there is a relatively strong view across the whiteware sector group, that relative to other product categories and waste streams, the environmental impacts and issues associated with end-of-life whiteware are not worthy of any major industry upheaval or radical regulatory intervention.

Associated recommendation: Refer to recommendations a) and c).

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Appendix 1: Whiteware Collection and Processing Flow: Fisher & Paykel