

Appendix B Detailed waste analysis

In this Appendix we discuss the largest direct and total waste multipliers for each of the 14 waste types. We have chosen to make note of only the largest ten multipliers, as the associated sectors could be a good place for the implementation of specifically targeted waste prevention and recycling strategies. Furthermore, the inclusion of the ten largest direct and total waste multipliers per waste type gives a chance to compare the different multipliers of waste generated (tonnes) per million dollars spent. We then discuss which of the aggregated sectors have the largest direct and total multipliers. We included this as we believe these aggregated multipliers are a fair indication of where waste prevention and recycling strategies could be generally implemented. Please refer to Appendix A for a full list of all sectors and waste types direct and total multipliers.

Food waste

The ten sectors with the largest direct food waste multipliers were 72 Phosphate rock (3.33 tonnes per millions of dollars (tpm\$)), 28 Natural rubber (3.12), 31 Cotton seed (0.90), 110 Wool scouring (0.90), 30 Ginned cotton (0.87), 74 Meat products (0.81), 89 Flour mill products (0.69), 14 Eggs (0.69), 94 Pasta (0.69), and 258 Hotels, clubs, restaurants and cafes (0.69).

The ten sectors with the largest total food waste multipliers were 72 Phosphate rock (7.92), 28 Natural rubber (7.16), 20 Horses (1.53), 88 Fodder and feed (1.49), 14 Eggs (1.35), 107 Spirits (1.32), 104 Animal food (1.31), 22 Animal breeding (1.28), and 74 Meat products (1.28).

Agricultural sectors dominated the largest direct and total food waste multipliers, with 258 Hotels, clubs, restaurants and cafes being a notable exception. This result indicates that different waste prevention and recycling strategies should be formulated for the agriculture and services sectors.

Green waste

The ten sectors with the largest direct green waste multipliers were 72 Phosphate rock (0.97 tpm\$), 28 Natural rubber (0.91), 26 Grass seed (0.67), 11 Dairy cattle (0.53), 33 Aerial agriculture (0.51), 25 Hops (0.44), 9 Beef cattle (0.40), 246 Non-residential building repair and maintenance (0.35), 2 Shorn wool (0.32), and 17 Plant nurseries (0.31).

The ten sectors with the largest total green waste multipliers were 72 Phosphate rock (2.40), 28 Natural rubber (2.17), 26 Grass seed (1.72), 246 Non-residential building repair and maintenance (0.75), 11 Dairy cattle (0.70), 33 Aerial agriculture (0.64), 25 Hops (0.56), 9 Beef cattle (0.50), 156 Rubber products (0.46), and 110 Wool scouring (0.40).

Agricultural sectors dominated the largest direct and total green waste multipliers, with 246 Non-residential building repair and maintenance being the main exception. It is also interesting to note that animal sectors such as 11 Dairy cattle, 9 Beef cattle, are listed among the larger multipliers, as composition of green waste from these sectors is likely to differ from municipal sources.

Timber waste

The ten sectors with the largest direct timber waste multipliers were 72 Phosphate rock (1.49 tpm\$), 28 Natural rubber (1.40), 124 Undressed resawn timber (0.96), 125 Hardwood woodchips (0.75), 234 Wooden furniture (0.67), 266 Transport services (0.40), 121 Sawmill products (0.37), 122 Undressed sawn timber (0.29), 34 Forest products (0.27) and 126 Pulp, paper and paperboard (0.26).

The ten sectors with the largest total timber waste multipliers were 72 Phosphate rock (2.40), 28 Natural rubber (2.17), 26 Grass seed (1.72), 246 Non-residential building repair and maintenance (0.75), 11 Dairy cattle (0.70), 33 Aerial agriculture (0.64), 25 Hops (0.56), 9 Beef cattle (0.50), 156 Rubber products (0.46), and 110 Wool scouring (0.40).

Unsurprisingly, wood manufacturing sectors had the largest direct and total timber waste multipliers. We assume that the timber waste in 266 Transport services is comprised of pallet and packaging waste, while the other sectors have waste resulting from the manufacturing of timber goods. Different waste reduction strategies could be employed to reduce timber waste in these sectors with diverse timber waste composition.

Textiles and clothing waste

The ten sectors with the largest direct textile and clothing waste multipliers were 246 Non-residential building repair and maintenance (1.31 tpm\$), 247 Roads and bridges (1.06), 248 Non-building construction (0.91), 245 Non-residential building construction (0.87), 244 Residential building construction (0.72), 218 Construction machinery (0.63), 253 Industrial machinery repairs (0.62), 232 Prefabricated buildings (0.60), 254 Business machines and equipment repairing and services (0.60) and 255 Wholesale repair and servicing (0.59).

The ten sectors with the largest total textile and clothing waste multipliers were 246 Non-residential building repair and maintenance (2.48), 247 Roads and bridges (1.25), 248 Non-building construction (1.10), 243 Residential building repair and maintenance (1.08), 245 Non-residential building construction (1.02), 72 Phosphate rock (0.94), 244 Residential building construction (0.92), 28 Natural rubber (0.83), 249 Non-building repair (0.83), and 253 Industrial machinery repairs (0.75).

The above results indicate construction sectors dominated the largest direct and total textile waste generation multipliers. Retail and non-construction related service industries (though also generating relatively substantial volumes of textile waste) did not produce equivalently large multipliers, the minimisation of construction sector waste should be in preference to these other sectors.

Paper, printing, and cardboard waste

The ten sectors with the largest direct paper, printing, and cardboard waste multipliers were 72 Phosphate rock (2.28 tpm\$), 28 Natural rubber (2.14), 320 Education (0.29), 247 Roads and bridges (0.27), 246 Non-residential building repair and maintenance (0.25), 248 Non-building construction (0.24), 245 Non-residential building construction (0.23), 330 Creative arts (0.22), 133 Recorded media and publishing (0.21), and 314 Business services (0.21).

The ten sectors with the largest total paper, printing, and cardboard waste multipliers were 72 Phosphate rock (5.57 tpm\$), 28 Natural rubber (5.04), 246 Non-residential building repair and maintenance (0.71), 156 Rubber products (0.68), 330 Creative arts (0.51), 158 Retreading strips

(0.44), 248 Non-building construction (0.41), 247 Roads and bridges (0.41), 245 Non-residential building construction (0.41), and 133 Recorded media and publishing (0.39).

It is interesting that large paper waste producing sectors do not have the largest multipliers, with the small and medium paper waste producing sectors having the larger multipliers. The results have identified sectors that have large total paper, printing, and cardboard waste multipliers — but are not traditionally identified as large paper waste producing sectors (i.e. 33 Creative arts, 158 Retreading strip, 156 Rubber products, etc.). Action can now be taken to reduce these sectors' waste generation through focussing on the waste generation of the sectors' that are with-in these supply chains. Future research could carry out a structural decomposition analysis to identify the biggest of these waste producers within the supply chain.

Plastics waste

The ten sectors with the largest direct plastic waste multipliers were 72 Phosphate rock (1.24 tpm\$), 28 Natural rubber (1.16), 32 Sheep shearing (0.46), 160 Superphosphate (0.43), 151 Chemical products (0.42), 159 Plastic products (0.37), 148 Pharmaceutical goods for human use (0.34), 145 Gases (0.34), 155 Glue (0.32), and 147 Pesticides, insecticides and medicinal goods (0.31).

The ten sectors with the largest total plastics waste multipliers were 72 Phosphate rock (3.54 tpm\$), 28 Natural rubber (3.18), 151 Chemical products (0.83), 160 Superphosphate (0.75), 156 Rubber products (0.71), 246 Non-residential building repair and maintenance (0.70), 148 Pharmaceutical goods for human use (0.63), 145 Gases (0.60), and 20 Horses (0.59).

Plastic waste is generated by all parts of the economy, with large contributions from construction, agriculture and manufacturing process, the most worthwhile interventions potentially occurring in manufacturing sectors.

Rubber waste

The ten sectors with the largest direct rubber waste multipliers were 319 Defence (0.04 tpm\$), 157 Tyres (0.02), 45 Brown coal (0.02), 195 Motor vehicle repairing (0.01), 341 Police (0.01), 343 Fire brigade (0.01), 316 Federal government (0.01), 192 Motor vehicle parts (0.01), 317 State government (0.01), and 318 Local government (0.01).

The ten sectors with the largest total rubber waste multipliers were 72.00 Phosphate rock (0.11), 28.00 Natural rubber (0.10), 319.00 Defence (0.04), 157.00 Tyres (0.02), 45.00 Brown coal (0.02), 192.00 Motor vehicle parts (0.02), 195.00 Motor vehicle repairing (0.02), 194.00 Trucks (0.02), 193.00 Finished cars (0.02), and 156.00 Rubber products (0.02).

The above results indicate that vehicle based (and related) industries are the dominate producers of rubber waste, with a mix of services, transport and manufacturing sectors represented in the largest direct and total rubber multipliers. This is not a surprising result as tyres are a primary feature of the rubber waste stream.

Glass waste

The ten sectors with the largest direct glass waste multipliers were 163 Glass products (0.14 tpm\$), 72 Phosphate rock (0.14), 28 Natural rubber (0.13), 253 Industrial machinery repairs (0.05), 108 Wine (0.04), 105 Soft drinks (0.03), 84 Fruit products (0.03), 83 Vegetable products (0.03), 246 Non-

residential building repair and maintenance (0.03), and 245 Non-residential building construction (0.03).

The ten sectors with the largest total glass waste multipliers were 72 Phosphate rock (0.33 tpm\$), 28 Natural rubber (0.30), 163 Glass products (0.17), 108 Wine (0.07), 253 Industrial machinery repairs (0.06), 246 Non-residential building repair and maintenance (0.06), 105 Soft drinks (0.05), 84 Fruit products (0.04), 83 Vegetable products (0.04), and 156 Rubber products (0.04).

The above results indicate that manufacturing is the dominant sector type represented in the direct and total glass multipliers. The presence of glass used for packaging in the waste stream can be observed through the presence of the 108 Wine, and 105 Soft drinks sectors in the direct and total glass multipliers.

Plaster board waste

The ten sectors with the largest direct plaster board waste multipliers were 246 Non-residential building repair and maintenance (0.23 tpm\$), 247 Roads and bridges (0.19), 248 Non-building construction (0.16), 244 Residential building construction (0.15), 245 Non-residential building construction (0.15), 170 Worked monumental or building stone (0.14), 253 Industrial machinery repairs (0.11), 232 Prefabricated buildings (0.11), 218 Construction machinery (0.11), and 243 Residential building repair and maintenance (0.11).

The ten sectors with the largest total plaster board waste multipliers were 246 Non-residential building repair and maintenance (0.43), 247 Roads and bridges (0.22), 243 Residential building repair and maintenance (0.20), 248 Non-building construction (0.19), 244 Residential building construction (0.19), 245 Non-residential building construction (0.18), 170 Worked monumental or building stone (0.15), 249 Non-building repair (0.15), 253 Industrial machinery repairs (0.13), and 218 Construction machinery (0.12).

Plasterboard waste is predominantly from the construction sector. The above direct and total multipliers confirm there is little produced outside the construction and building repair sectors. This primacy of construction is shown in the above results with the largest total plasterboard waste multiplier for 246 Non-residential building repair and maintenance being double that of the next largest total multiplier.

Construction and cement waste

The ten sectors with the largest direct construction and cement waste multipliers were 246 Non-residential building repair and maintenance (15.75 tpm\$), 247 Roads and bridges (12.10), 248 Non-building construction (10.31), 245 Non-residential building construction (9.81), 244 Residential building construction (8.20), 218 Construction machinery (6.96), 253 Industrial machinery repairs (6.82), 243 Residential building repair and maintenance (6.69), 232 Prefabricated buildings (6.59), and 254 Business machines and equipment repairing and services (6.54).

The ten sectors with the largest total construction and cement waste multipliers were 246 Non-residential building repair and maintenance (29.54 tpm\$), 247 Roads and bridges (14.25), 243 Residential building repair and maintenance (12.92), 248 Non-building construction (12.50), 245 Non-residential building construction (11.47), 244 Residential building construction (10.52), 249

Non-building repair (9.80), 253 Industrial machinery repairs (8.08), 218 Construction machinery (7.81), and 254 Business machines and equipment repairing and services (7.14).

As expected construction waste is produced primarily by the construction and repair sectors. The sheer volume of construction waste produced by each of these sectors has resulted in multipliers that are much larger than observed in other waste types.

Metal (ferrous) waste

The ten sectors with the largest direct Metal (ferrous) waste multipliers were 218 Construction machinery (0.59 tpm\$), 229 Agricultural tractors (0.49), 232 Prefabricated buildings (0.49), 200 Aircraft (0.48), 184 Reinforcing rods (0.47), 221 Mining or drilling machinery and parts (0.45), 219 Hoists, cranes, lifting and loading machinery (0.45), 198 Railway equipment (0.44), 183 Fabricated construction steel (0.44), and 223 Industrial machinery and equipment (0.44).

The ten sectors with the largest total Metal (ferrous) waste multipliers were 72 Phosphate rock (1.40), 28 Natural rubber (1.23), 218 Construction machinery (0.84), 246 Non-residential building repair and maintenance (0.81), 232 Prefabricated buildings (0.68), 198 Railway equipment (0.64), 182 Structural metal products (0.63), 221 Mining or drilling machinery and parts (0.63), 184 Reinforcing rods (0.63), and 200 Aircraft (0.63).

The above results indicate the largest direct and total Metal (ferrous) waste multipliers are found in manufacturing and service sectors related to machinery production and repair.

Metal (non-ferrous) waste

The ten sectors with the largest direct metal (non-ferrous) waste multipliers were 177 Aluminium (0.80 tpm\$), 174 Non-ferrous non-aluminium semi-manufactures (0.60), 180 Aluminium semi-manufactures (0.51), 217 Electrical equipment (0.45), 185 Aluminium doors (0.39), 204 Spectacles and sunglasses (0.37), 181 Aluminium foil (0.37), 186 Architectural aluminium (0.36), 188 Sheet metal products (0.35), and 239 Advertising signs (0.26).

The ten sectors with the largest total metal (non-ferrous) waste multipliers were 177 Aluminium (1.06), 180 Aluminium semi-manufactures (0.82), 217 Electrical equipment (0.81), 174 Non-ferrous non-aluminium semi-manufactures (0.70), 188 Sheet metal products (0.67), 185 Aluminium doors (0.62), 181 Aluminium foil (0.59), 186 Architectural aluminium (0.56), 72 Phosphate rock (0.48), and 204 Spectacles and sunglasses (0.48).

The above results indicate that (unlike the ferrous metal waste) the largest direct and total Metal (non-ferrous) waste multipliers are found in mining and manufacturing sectors related to Aluminium and other non-ferrous metal production.

Electronic waste

The ten sectors with the largest direct electronic waste multipliers were 314 Business services (0.15 tpm\$), 340 Interest groups and community organisations (0.12), 298 Research and meteorology services (0.09), 301 Technical services (0.09), 302 Data processing services (0.09), 311 Cleaning (0.09), 309 Security and investigation (0.08), 313 Collecting and credit reporting (0.08), 300 Surveying services (0.08), and 316 Federal government (0.08).

The ten sectors with the largest total electronic waste multipliers were 72 Phosphate rock (0.24 tpm\$), 28 Natural rubber (0.21), 314 Business services (0.17), 340 Interest groups and community organisations (0.13), 301 Technical services (0.13), 298 Research and meteorology services (0.13), 311 Cleaning (0.12), 302 Data processing services (0.11), 339 Community services and religious organisations (0.11), and 316 Federal government (0.11).

Electronic waste has relatively small multipliers when compared to other waste types. The largest of these multipliers are spread across the service sectors, with charity, business, research, government and technology based sectors all featuring in the direct and total top ten sectors.

Other waste

The ten sectors with the largest direct Other waste multipliers were 72 Phosphate rock (3.87 tpm\$), 28 Natural rubber (3.63), 324 Veterinary services (0.35), 247 Roads and bridges (0.34), 138 Petroleum and coal products (0.30), 248 Non-building construction (0.30), 245 Non-residential building construction (0.30), 246 Non-residential building repair and maintenance (0.30), 314 Business services (0.29), and 287 Public liability (0.27).

The ten sectors with the largest total Other waste multipliers were 72 Phosphate rock (8.97 tpm\$), 28 Natural rubber (8.13), 156 Rubber products (1.06), 246 Non-residential building repair and maintenance (0.90), 158 Retreading strips (0.70), 330 Creative arts (0.65), 138 Petroleum and coal products (0.55), 245 Non-residential building construction (0.54), 248 Non-building construction (0.54), and 247 Roads and bridges (0.53).

The above results indicate that Other waste is a mix of generating sectors — as can be expected from the ‘unclassifiable’ waste type. Construction sectors feature heavily, as do service sectors. Manufacturing sectors are absent from the largest direct and total multipliers of Other waste. This could be explained by manufacturing sectors producing predominantly classifiable waste from distinct production processes.