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New Zealand Waste Data Framework: Review of International Waste Data Practice

In Partial Fulfilment of Milestone Two of the National Waste Data Framework Project

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Contents

1 Introduction

This report has been prepared in partial fulfilment of Milestone Two of the National Waste Data Framework Project. The project is being undertaken by Waste Management Institute New Zealand (WasteMINZ) and is supported by the Waste Minimisation Fund, which is managed by the Ministry for the Environment. The project consultants are Eunomia Research & Consulting Ltd and Waste Not Consulting Ltd.

It has long been recognised, across central government, local government, and the waste industry, that the lack of good quality, consistent waste data prevents the public and private sectors in New Zealand from effectively planning, monitoring, and reporting on waste issues and developing and prioritising appropriate solutions.

The 2010 *New Zealand Waste Strategy - Reducing Harm, Improving Efficiency* recognises that "the lack of data about waste hampers our ability to plan appropriate activities to improve waste management and minimisation".

In July 2013, WasteMINZ applied to the Waste Minimisation Fund for funding to develop a national waste data framework. Funding approval for the project was received in April 2014. The aim of the project is to develop a "flat pack" implementation plan containing all the elements required to establish a national waste data framework. The implementation plan will establish the definitions, protocols, and responsibilities required to make the framework operative, and is being developed in conjunction with key stakeholders from the solid waste and resource recovery sector.

Key stakeholders in the project are considered to be those responsible for generating and reporting waste data, those responsible for compiling and managing the information, and the parties that will use the data. Those identified as being key stakeholders include:

- Ministry for the Environment
- Statistics New Zealand
- regional authorities
- territorial and unitary authorities
- waste industry and community operators
- research and consulting organisations.

In the Project Plan for the National Waste Data Framework, Milestone Two is the "Development of Draft National Waste Data Framework". Two of the activities associated with Milestone Two in the Project Plan are:

- to research and analyse international data practice, definitions, protocols, and roles
- to scope existing definitions in use in New Zealand, and those used internationally, and develop draft definitions.

This report contains an overview of waste data frameworks in eleven jurisdictions. These jurisdictions have been chosen to provide a global overview of waste data practices, with this report including examples of waste data frameworks from Asia, Africa, Europe, and North America.

All of the information contained in this report was gathered through internet research. The range of jurisdictions that are included has been constrained by the requirement that an adequate amount of information be available, in English.

For each of the jurisdictions that have been included, the following information has been included:

- a brief summary of the roles and protocols that form the structure of the framework
- the primary sources from which the information was obtained.[1]
- a description of the legislative measures, if any, that form the basis of the framework
- a brief description of the waste classifications that are used within the framework
- a selection of important waste-related definitions
- noteworthy features that are considered to be of particular relevance to the New Zealand context.

Section 2 presents a summary of the findings of the research into international waste data practices. These findings illustrate the commonalities and differences between the different frameworks and provide a high-level perspective from which to assess the development of a New Zealand waste data framework.

The waste data practices of the eleven jurisdictions researched for this report are presented in tabular format in Section 3.

[1] It is acknowledged that most of the information has been adapted directly from these sources and direct quotes are not, as such, thoroughly referenced.

2 Summary of findings

The findings, based on the studies in Section 3, illustrate the commonalities and differences between the different frameworks and provide a high-level perspective from which to assess the development of a New Zealand waste data framework.

1) There is no global, internationally-adopted system of definitions and data-gathering and reporting protocols relating to solid waste. One major grouping of nations, the European Union, requires member nations to report solid waste data in a standardised format, but does not prescribe specifically how the data is to be collected.

2) There is no consistency as to whether waste data frameworks are structured at a national or regional level. In United States of America, for instance, some state governments collect and report waste data and others do not. Those states that do collect waste data use independent, stand-alone systems. On the other hand, some Australian states collect solid waste data using a standardised system of classification developed for the currently-dormant Australian Waste Database. By comparison, national level waste data is collected and reported by the federal government through Statistics Canada and the individual provinces do not have a role in the framework.

3) National or regional-level waste data is obtained through a limited number of mechanisms. The national frameworks that have been studied rely on: data from surveys of waste businesses, online reporting by the waste industry, administrative sources, or combinations of several mechanisms.

4) All of the frameworks that have been studied are based, to a large degree, on mandatory reporting. No systems that rely totally on voluntary reporting have been identified.

5) At least two of the systems studied, in South Africa and Queensland, have moved from voluntary reporting to mandatory reporting in order to improve the quality of the data.

6) Some of the frameworks studied focus entirely on solid waste disposed of to landfill. Others include alternative methods of waste management, such as composting and recycling.

7) Most, but not all, of the systems studied collect and report data on the 'source' of the data, based on the activity that produced the waste. While there are similarities between the different systems for classifying the 'source' of waste, there is not a universally-used system. Some of the differences arise from the varying levels of waste-collection activity undertaken by local government and private enterprise.

8) Waste classification systems tend to have started from either a ‘top-down’ or ‘bottom-up’ perspective. The top-down systems appear to originate from a theoretical or academic viewpoint, with complex taxonomies for waste that bear limited relationship to the experiences of those in the waste industry. The bottom-up systems appear to have more of an empirical basis, and are not as complex as the top-down systems.

9) The complexity of a national waste classification system appears to be related to the purpose of the legislative framework in which the system originated. A legislative framework that includes financial incentives and disincentives for waste reduction tends to result in a more complex waste classification system and stricter protocols.

10) For the most part, data-collecting frameworks concentrate on ‘municipal solid waste’ and exclude waste streams that are difficult to monitor, such as on-site disposal and non-municipal landfills, such as cleanfills and monofills.

3 International waste data practice

3.1 California

SUMMARY OF CALIFORNIA'S WASTE DATA FRAMEWORK	
	Each jurisdiction in California must adopt a Source Reduction and Recycling Element showing how it will meet diversion goals set out in the Public Resources Code. To determine if it has met the goals, a jurisdiction needs to calculate how much solid waste it has disposed. CalRecycle's online Disposal Reporting System assigns accountability for disposed solid waste to the jurisdiction from which it came. Counties receive disposal information from each permitted disposal facility within their boundaries. Counties then send quarterly disposal reports to CalRecycle and each jurisdiction that disposed waste in that county. Each jurisdiction must use CalRecycle's summary of tonnages from these county disposal reports to estimate its annual per capita disposal.
PRIMARY SOURCES OF INFORMATION	
	http://www.calrecycle.ca.gov/LGCentral/Basics/DispRept.htm
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	Revised Disposal Reporting System regulations became effective on January 1, 2006. The regulations are found in Title 14, California Code of Regulations (CCR), Sections 18800-18814.11.
CLASSIFICATIONS USED	
	The Disposal Reporting System only gathers data on the tonnage of waste disposed of to permitted facilities, the geographic source of the waste, tonnes of waste imported to or exported from California, and tons of alternative daily cover used by the landfills. No other data is gathered or reported as part of the system.
DEFINITIONS OF INTEREST	
	Although the Disposal Reporting System gathers only a limited range of information, California regulations define a wide range of waste-related concepts. **Recycling** "Recycle" or "recycling" means the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace. **Solid waste** "Solid waste" means all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include any of the following wastes: • Hazardous waste • Radioactive waste

SUMMARY OF CALIFORNIA'S WASTE DATA FRAMEWORK	
	• Medical waste **Hazardous waste** "Hazardous waste" means a waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics, may do either of the following: • Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness. • Pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, or disposed of, or otherwise managed. **Residential solid waste** "Residential Solid Waste" means all solid waste originating from single-family and multi-family dwellings, including self-haul wastes from residential sources. **Commercial solid waste** "Commercial solid waste" means solid waste originating from stores, business offices, commercial warehouses, hospitals, educational, health care, military, and correctional institutions, non-profit research organizations, and government offices. **Construction and demolition waste** "Construction and demolition waste" includes solid wastes, such as building materials; and packaging and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures. **Industrial solid waste** "Industrial solid waste" means solid waste originating from mechanized manufacturing facilities, factories, refineries, construction and demolition projects, and publicly operated treatment works, and/or solid wastes placed in debris boxes. **Municipal solid waste** "Municipal solid waste" means all solid wastes generated by residential, commercial, and industrial sources, and all solid waste generated at construction and demolition sites, at food-processing facilities, and at treatment works for water and waste water, which are collected and transported under the authorization of a jurisdiction or are self-hauled. Municipal solid waste does not include agricultural crop residues, animal manures, mining waste and fuel extraction waste, forestry wastes, and ash from industrial boilers, furnaces and incinerators. **Yard waste** "Yard waste" means any wastes generated from the maintenance or alteration of public, commercial or residential landscapes including, but not limited to, yard clippings, leaves, tree trimmings, prunings, brush, and weeds.
NOTEWORTHY FEATURES	
	Regulations require that waste haulers provide training on the disposal reporting system to each vehicle driver, dispatcher, and disposal report preparers. A disposal facility operator must provide training on the disposal reporting system to each gatehouse attendant and disposal report preparer. If solid waste in a load is from more than one jurisdiction, haulers must estimate the weight or percentage of waste from each based on a reasonable method which may include adjustments for documented waste density differences, if applicable. The methods that a hauler may use to make this estimate include, but are not limited to: • the number of bins emptied in each jurisdiction, • the total capacity of bins emptied in each jurisdiction, or • the actual waste tonnes collected in each jurisdiction.

3.2 Canada

SUMMARY OF CANADA'S WASTE DATA FRAMEWORK	
	Statistics Canada prepares a biennial report that presents the results of surveys of the business and government sectors of the waste management industry. These surveys gather information on the financial characteristics and waste management activities undertaken by companies, local governments, and other public waste management bodies. For the 2010 survey, questionnaires were mailed to a total of 1,353 businesses and local governments. Respondents were asked to report the following information: • specific types of waste management activities conducted by the respondent; • total quantities of non-hazardous waste managed in disposal facilities, recycled, composted, exported, and imported; • sources of waste and recyclable and compostable material; • total revenues realized from the sale of waste management services; • total operating and capital expenditures; and • total employment.
PRIMARY SOURCES OF INFORMATION	
	Statistics Canada (2013), Waste Management Industry Survey: Business and Government Sectors, Ministry of Industry 2013 at http://www.statcan.gc.ca/eng/survey/participant04
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	Participation in business surveys released by Statistics Canada is mandatory under the Statistics Act. Because most business surveys feed directly or indirectly into legally-mandated programs, mandatory response is required to ensure an adequate response rate and, therefore, reliable results.
CLASSIFICATIONS USED	
	Reporting focuses on municipal solid non-hazardous waste. Hazardous waste data is collected but not reported. Non-hazardous waste is broken down by type - residential and non-residential waste. Non-residential waste is further broken down into two classifications based on generating activities – industrial, commercial, and institutional and construction, renovation, and demolition.
DEFINITIONS OF INTEREST	
	Construction, renovation, and demolition waste CR&D waste, also referred to as DLC (demolition, land clearing and construction waste), refers to waste generated by construction, renovation and demolition activities. It generally includes materials such as brick, painted wood, drywall, metal, cardboard, doors, windows, wiring, etc. It excludes materials from land clearing on areas not previously developed. CR&D waste can come from residential sources such as house renovations or from non-residential sources for example the construction or demolition of office buildings. **Hazardous waste** Includes materials or substances that, given their corrosive, inflammable, infectious, reactive and/or toxic characteristics, may present a real or potential harm to human health or the environment. **Industrial, commercial and institutional waste** Industrial, commercial, and institutional (IC&I) waste is the waste generated by all non-

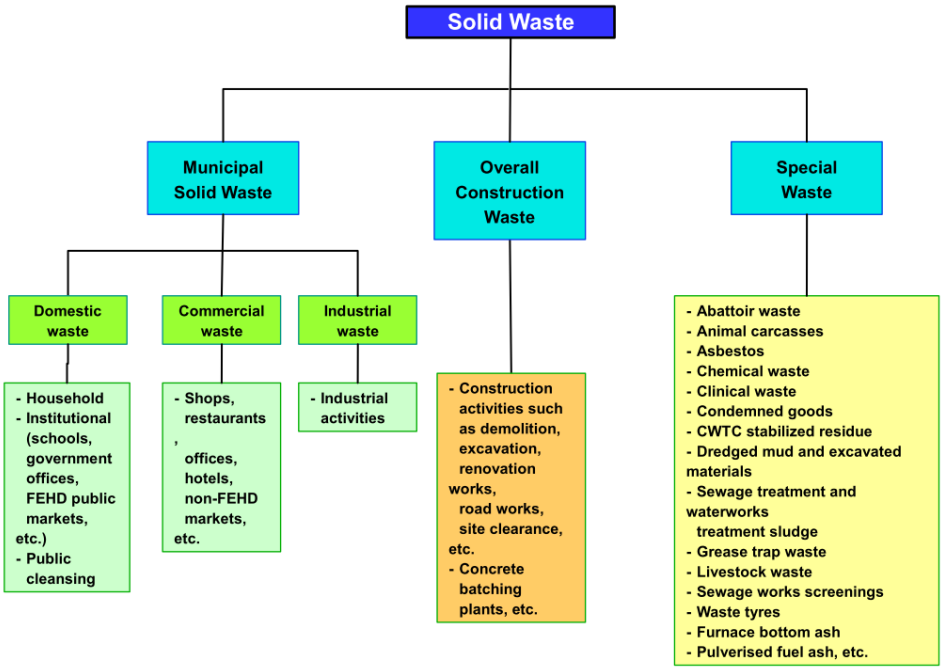
SUMMARY OF CANADA'S WASTE DATA FRAMEWORK	
	residential sources in a municipality, and is excluded from the residential waste stream. This includes: • Industrial waste, which is generated by manufacturing, primary and secondary industries, and is managed off-site from the manufacturing operation, and is generally picked up under contract by the private sector; • Commercial waste is generated by commercial operations such as shopping centres, restaurants, offices, etc. Some commercial waste (from small street-front stores, etc.) may be picked up by the municipal collection system along with residential waste; • Institutional waste is generated by institutional facilities such as schools, hospitals, government facilities, seniors homes, universities, etc. This waste is generally picked up under contract with the private sector. **Residential waste** Residential waste refers to waste from primary and seasonal dwellings, which includes all single family, multi-family, high-rise, and low-rise residences. It includes: • The waste picked up by the municipality, (either using its own staff, or through contracted companies), and • The waste from residential sources which is self-hauled to depots, transfer stations, and landfills.
NOTEWORTHY FEATURES	
	The estimates that are published by Statistics Canada refer only to waste that is processed by firms or local governments that are part of the 'waste management industry', as classified by the North American Industry Classification System (NAICS). Waste that bypasses the waste management industry is not included in the survey coverage. For example, estimates do not include waste managed on-site by companies or households. While the majority of residential waste is handled by municipalities or private businesses, a significant quantity of non-residential waste is managed on-site by industrial generators or is transported directly to secondary processors such as pulp and paper mills. The estimates also do not include materials that were processed for reuse and resale (for example, wholesaling of scrap metal or used clothing) or materials that were collected through deposit-return systems (for example, food and beverage containers and tires). Agricultural waste is not covered by these surveys. This waste is typically managed on-farm or by specialized firms that are not classified as part of the waste management industry under NAICS.

3.3 European Union Waste Statistics Regulations

SUMMARY OF EUROPEAN UNION'S WASTE DATA FRAMEWORK	
	Eurostat collects data from national governments in the European Union to produce waste statistics for the whole of the EU. The Waste Statistics Regulation lists four methods which Member States can use to collect the necessary data: • surveys • administrative or other sources • statistical estimation procedures • a combination of the above methods.
PRIMARY SOURCES OF INFORMATION	
	Eurostat *'Manual on Waste Statistics' A handbook for data collection on waste generation and treatment* 2013 edition
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	The reporting requirements and methods are set out in the Waste Statistics Regulations (Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002) on waste statistics. Different member states use different methods to produce the reporting data. Several countries have established in their national waste laws the general obligation for waste management facilities to submit regular reports to the competent authority summarising the information on the treated waste and the treatment methods carried out. The Waste Framework Directive (Directive 2008/98/EC) requires all establishments which carry out waste treatment to obtain a permit. Article 35 of Directive 2008/98/EC on waste stipulates that waste treatment facilities must keep records of their activities. The records must, among other things, provide information on the 'quantity, nature, origin, and treatment method' of the treated waste. The information must be made available to the competent authority on request.
CLASSIFICATIONS USED	
	Reporting by national governments involves the delivery of three different data sets. **Dataset 1** – Generation by: • 19 waste-producing activities – 18 economic sectors plus households • 51 waste categories (21 hazardous and 30 non-hazardous) **Dataset 2** – Waste treatment by: • 6 treatment types (incineration, energy recovery, recycling, backfilling, landfilling, other forms of disposal) • 51 waste categories **Dataset 3** – Infrastructure in terms of: • number and capacity of recovery and disposal operations and coverage of collections schemes • percentage of population covered by a collection scheme for household and similar waste.
DEFINITIONS OF INTEREST	
	Municipal waste 'Waste' is defined by EU legislation in the Waste Framework Directive as any substance or object which the holder discards or intends to or is required to discard. For Eurostat data reporting purposes, six exclusions have been made to the scope of the Waste Framework

SUMMARY OF EUROPEAN UNION'S WASTE DATA FRAMEWORK	
	Directive: • Gaseous effluent emitted into the atmosphere • Land (in situ) including unexcavated contaminated soil and buildings permanently connected with land • Uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated • Radioactive waste • Decommissioned explosive • Faecal matter, straw and other natural non-hazardous agricultural or forestry material used in farming, forestry or for the production of energy from such biomass through processes or methods which do not harm the environment or endanger human health.

3.4 Hong Kong, China

SUMMARY OF HONG KONG'S WASTE DATA FRAMEWORK	
	An annual report is released by the Environmental Protection Department. Data is collected from various sources throughout the year, including: • Waste intake records taken at waste management facilities • Results of annual survey on waste composition conducted at landfills and RTS • Results of waste recovery surveys conducted • Statistics provided by relevant groups in the Environmental Protection Department • Statistics provided by other government departments
PRIMARY SOURCES OF INFORMATION	
	Hong Kong Environmental Protection Department (2014) *Monitoring of Solid Waste in Hong Kong Waste Statistics for 2012*
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	No legislative drivers for the annual reporting have been identified as part of the background research. As all of the waste disposal facilities in Hong Kong are state-owned, no legislative interventions are required for the necessary data to be collected.
CLASSIFICATIONS USED	
	Solid waste is classified into three main types that make reference to the sources of waste and the institutional arrangements for waste collection and disposal. These three types of solid waste are municipal solid waste, overall construction waste, and special waste. Municipal solid waste is further broken down into domestic waste, commercial waste, and industrial waste.  The composition of waste is analysed and reported in the following classifications: • Glass • Paper • Putrescibles • Wood/rattan • Others • Metals • Plastic • Textiles • Household hazardous wastes

SUMMARY OF HONG KONG'S WASTE DATA FRAMEWORK	
DEFINITIONS OF INTEREST	
	Municipal solid waste Municipal solid waste includes domestic waste, commercial waste and industrial waste. Municipal solid waste contains a small portion of bulky items like furniture and domestic appliances which cannot be handled by conventional compactor type refuse collection vehicles. These items are regarded as bulky waste and are usually collected separately. **Domestic waste** Domestic waste refers to household waste, waste generated from daily activities in institutional premises, and refuse collected from public cleansing services. Public cleansing waste includes dirt and litter collected by the Food and Environmental Hygiene Department (FEHD), marine refuse collected by the Marine Department, and waste from country parks collected by the Agriculture, Fisheries and Conservation Department. **Commercial waste** Commercial waste is waste arising from commercial activities taking place in shops, restaurants, hotels, offices, markets in private housing estates, etc. It is collected mainly by private waste collectors. **Industrial waste** Industrial waste is waste arising from industrial activities and does not include construction waste and chemical waste. It is usually collected by private waste collectors. However, some industries may deliver their industrial waste directly to landfills for disposal. **Overall construction waste** Overall construction waste is a mixture of waste or surplus materials arising from construction activities such as site clearance, excavation, refurbishment, renovation, demolition and road works. It also includes waste concrete that is generated from concrete batching plants and cement plaster/mortar manufacturing plants not set up inside construction sites. Overall construction waste may comprise a fraction of inert materials such as debris, rubble, earth and concrete, which, after proper sorting, can be recycled for use in site formation, land reclamation and construction. **Special waste** Special waste is waste that requires special disposal arrangement. It includes abattoir waste, animal carcasses, asbestos, chemical waste, clinical waste, condemned goods, CWTC stabilized residue, dredged mud and excavated materials, sewage treatment and waterworks treatment sludge, grease trap waste, livestock waste, sewage works screenings, waste tyres, furnace bottom ash, pulverised fuel ash, etc. **Chemical waste** Chemical waste can be any substance arising from any process or trade activity which contains chemical in such form, quantity or concentration that can cause pollution to the environment or become a risk to health.
NOTEWORTHY FEATURES	
	The geographical distribution of solid waste arisings is estimated based upon waste intake records taken at waste management facilities. It is noted that this information should be regarded as an indicative reference only.

3.5 Republic of Ireland

SUMMARY OF IRELAND'S WASTE DATA FRAMEWORK	
	The Irish Environmental Protection Agency (EPA) is responsible for producing national statistics on waste generation and management in the Republic of Ireland, including information on waste exports and imports. This responsibility is fulfilled by publishing the annual National Waste Report. The system is designed around a series of annual surveys and questionnaires that are submitted electronically. Surveys are developed on a sector-specific basis. The number of surveys and questionnaires issued for the National Waste Report varies significantly according to the reporting year but it is generally more than 450 surveys.
PRIMARY SOURCES OF INFORMATION	
	Analysis of the Republic of Ireland's Survey System for National Waste Reporting – SKM report for the Australian Government or the Minister for Sustainability, Environment, Water, Population and Communities.
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	Survey respondents are required to: • submit a complete, valid and timely report to the National Waste Report project team. Failure to do so by EPA waste-licensed companies, local authority permitted facilities, and EPA IPPC-licensed industrial facilities may result in enforcement action as it is a condition of all licenses and permits to submit reports to governing agencies as and when requested • maintain readily auditable records so that the EPA and the project contractor can visit the site and reproduce the submitted data In the Republic of Ireland each local authority is responsible for issuing waste facility permits. One of the conditions attached to granting a waste facility permit is that an annual environmental report (AER) is submitted to the issuing local authority each year. Local authorities are also responsible for issuing waste collection permits. One local authority within each region is designated as the 'nominated' authority and is responsible for issuing all waste collection permits on behalf of that region to companies collecting waste within the boundaries of the regional grouping. The nominated authority is also responsible for ensuring waste collection permit holders submit valid annual environmental reports. They then circulate the submitted data to the secondary authorities within the regional grouping. A second system is also in operation whereby 10 nominated authorities nationwide may grant multi-region permits. Companies may then request to collect waste across multiple regional groupings under one waste collection permit rather than apply for several individual regional waste collection permits. Individual local authorities are also responsible for maintaining accurate and auditable records on 'bring banks', civic amenity sites, and any other collection receptacles within their area.
CLASSIFICATIONS USED	
	The main waste streams covered in each report vary but are generally one or more of the following waste streams: • municipal waste (household, commercial and local authority cleansing waste) • packaging waste • biodegradable municipal waste • industrial and hazardous waste • construction and demolition waste • waste electrical and electronic waste

SUMMARY OF IRELAND'S WASTE DATA FRAMEWORK	
	• waste batteries.
NOTEWORTHY FEATURES	
	A number of site visits to selected organisations are conducted each year for data verification purposes. A number of audits are also conducted on local authorities each year. These audits are used to verify the data submitted to local authorities by waste facility permit holders and waste collection permit holders in addition to the information held by authorities on bring banks, civic amenity sites, home composting, and their own collections of household waste. Costs of preparing and publishing the annual National Waste Report include: • contractor costs: The project duration is approximately nine months during which time a dedicated team (made up of a project manager, project director and, depending on the reporting year, approximately three to six team members) works on the project full-time and without interruption. • direct agency costs: A dedicated project team within the EPA also works full-time on collating the National Waste Report, particularly at and following the stage datasets are handed over. • training costs: Since 2004 the EPA has conducted training courses with waste management facilities and local authorities on completing National Waste Report surveys. A dedicated National Waste Report helpline and helpdesk is also available. • miscellaneous costs: These include publishing the report and organising media and press releases at the time of publishing. The Industrial Dataset is collated from IPPC data (submitted via the EPA's Pollutant Release and Transfer Register system) and non-IPPC Industry Survey returns. Responses to the Non-IPPC Industry Survey are generally poor. This is primarily because this is a voluntary survey which, unlike the other National Waste Report Surveys, the EPA does not hold jurisdiction to enforce.

3.6 Netherlands

SUMMARY OF NETHERLANDS WASTE DATA FRAMEWORK	
	The Municipal Waste survey is carried out annually by central government to gather data about waste collected by or on behalf of municipalities. The survey questionnaire is sent to all Dutch municipalities, or in some cases to inter-municipal organisations and private municipal waste collection companies.
PRIMARY SOURCES OF INFORMATION	
	http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLEN&PA=7467eng&D1=0-25,76-86&D2=0&D3=a&HD=100215-1537&LA=EN&HDR=G1,G2&STB=T http://www.cbs.nl/en-GB/menu/themas/natuur-milieu/methoden/dataverzameling/korte-onderzoeksbeschrijvingen/gemeentelijk-afval-hoeveelheden.htm
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	The Statistics Netherlands Act authorises the Director General of Statistics the powers to acquire data from local authorities and companies.
CLASSIFICATIONS USED	
	The Netherlands' environmental accounts quantify the origin and destination of: chemical waste, metallic waste, non-metallic waste, discarded materials, animal and vegetable waste, mixed waste, sludge, and mineral waste.
DEFINITIONS OF INTEREST	
	Municipal waste Waste collected by or on behalf of the municipalities. Textiles and paper and cardboard collected by charities, schools and clubs are also included. **Household waste** Waste from households collected by or on behalf of municipalities. Waste from small shops, etc. is sometimes collected simultaneously with household waste, hence a (small) part of household waste does not originate from households. **Cleansing waste** Waste collected by municipal cleansing services, e.g. litter and refuse collected in public gardens and parks. **Other waste** Waste from shops and industrial waste collected separately by the municipal authorities.

3.7 Queensland, Australia

SUMMARY OF QUEENSLAND'S WASTE DATA FRAMEWORK	
	From 2000 to 2010, Queensland's Department of Environment and Resource Management conducted an annual State of Waste survey, which was compulsory for councils and voluntary for the private sector. The State of Waste survey looked at aggregate tonnage data by local council area or private organisation only. The variable response rate and the quality of detail provided made it difficult to accurately compare yearly figures and determine trends. Differing interpretations of survey questions, use of different means to calculate tonnages, and lack of knowledge about onsite waste processes all contributed to uncertainty and debate about the accuracy of the figures. To improve the quality of data needed to implement its *Waste Avoidance and Resource Productivity Strategy (2014–2024)*, the Queensland Government invested in improving waste data collection with upgrades to the Queensland Waste Data System (QWDS)—previously the Queensland Waste Online System (QWOLS). QWDS is a web-based system for operators to report on their waste data returns. The system was enhanced to allow for the expanded capture of information about waste disposal and resource recovery. At a system level, QWDS provides the Department of Environment and Heritage Protection with a secure web-based system, enabling the collection data from a variety of entities in the waste sector including waste generators, landfill operators and recyclers. It provides for both accurate and timely reporting alongside the ability to interrogate and analyse waste sector data.
PRIMARY SOURCES OF INFORMATION	
	State of Queensland (Department of Environment and Resource Management) 2011 *Waste Site Characterisation Study* http://www.finnz.com/better-data-for-a-better-future.html http://www.ehp.qld.gov.au/waste/qwols.html http://www.ehp.qld.gov.au/waste/pdf/state-of-waste-recycling-report2013.pdf
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	Section 52 of the Waste Reduction and Recycling Act 2011 requires that: *(2) The operator of the waste disposal site must, on or before the day prescribed under a regulation, give the chief executive a return in the approved form (a waste data return) for the period prescribed under a regulation (a reporting period).* *(3) Without limiting subsection (2), information that an approved form of waste data return may require includes information about—* *(a) the types and amount of waste—* *(i) delivered to the site; or* *(ii) disposed of to landfill at the site; or* *(iii) moved from the site to a place outside the site*
CLASSIFICATIONS USED	
	The "headline" sources of waste that are used in the QWDS are used throughout Australia – municipal waste, commercial & industrial waste, and construction & demolition waste. The 2013 *State of Waste and Recycling in Queensland*, which was based on industry surveys, also included data on other waste streams such as clean fill, contaminated soils, biosolids, manure, agricultural, and forestry wastes, ash, and other regulated wastes.

SUMMARY OF QUEENSLAND'S WASTE DATA FRAMEWORK	
NOTEWORTHY FEATURES	
	The 2013 *State of Waste and Recycling in Queensland* distinguishes between wastes delivered in the normal course of business, and wastes that arise as a result of storms, floods and other disasters. Data limitations identified by the 2013 report include: • gaseous wastes and many liquid wastes are outside of the scope of the data collection • farm and mining wastes managed on site are also outside of the scope of the report • the department has not collected data on commercial and industrial waste landfilled on mine sites • the department has not surveyed every waste and recycling company operating in Queensland • some companies processing waste ceased business operations during the reporting period and did not supply data • the data supplied by responding entities is of variable quality and has been calculated using different methodologies. While many responses were based on accurate measurements, some responses were informed estimates. • there still remains the possibility of double-counting materials transferred between reporting entities • it is not always possible to match source streams with material recovery

3.8 Scotland, UK

SUMMARY OF SCOTLAND'S WASTE DATA FRAMEWORK	
	The Scottish Environmental Protection Agency releases waste data tables based on a range of data sources. The most detailed tables have been released on household waste, but tables for all types of waste are being developed. Data sources that are used for the waste data tables include: • Scottish licensed/permitted site returns • household wastes managed by Scottish local authorities • wastes managed by exempt activities in Scotland • Scottish accredited packaging waste reprocessors • UK packaging waste arisings • hazardous waste interrogator. There are three main sources of waste in the Scottish system: households, commerce, and industry (including construction and demolition). Scottish local authorities report data on waste collected from households and commercial and industrial waste collected on or on behalf of the local authority using the online "Waste Data Flow" system. Data is gathered on the large proportion of waste in Scotland that passes through 1,100 licensed or permitted waste management sites that are regulated by the Scottish Environmental Protection Agency. Waste generated by businesses is currently estimated by carrying out national surveys. The quantity of commercial and industrial waste treated and/or disposed of is derived from the statutory returns described above. Some commercial and industrial waste arisings, such as those from the agriculture, fishing and forestry sectors, are estimated using data models.
PRIMARY SOURCES OF INFORMATION	
	Briefing 11/47 August 2011 '*A Waste Data Strategy for Scotland*' Environmental Protection Act 1990
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	The Waste Management Licensing (Scotland) Regulations 2011 require the licensing of any establishment or undertaking which carries out the recovery or disposal of controlled waste, or which produces special waste, collects or transports such waste on a professional basis or acts as a broker of or dealer in such waste. Licensed sites must: • keep a chronological record of the quantity, nature, origin and, where relevant, the destination, frequency of collection, mode of transport and treatment method of the waste; and • make that information available, on request, to the waste regulation authority.
CLASSIFICATIONS USED	
	The SEPA waste data tables present summary tonnage information on waste arisings, which is broken down into recycled, recovered, and disposed of tonnages. Composition data is reporting in 33 classifications (including soil). Data are reported on specific waste types of controlled waste such as local authority collected municipal waste, hazardous, commercial, and industrial wastes and by waste management method. Different coding systems are used throughout the SEPA Waste Data for classifying waste types, business types, and waste management methods: • European Waste Catalogue List of Waste

SUMMARY OF SCOTLAND'S WASTE DATA FRAMEWORK	
	• European Waste Catalogue for Statistics • UK Standard Industrial Classification • Recovery and Disposal Codes
DEFINITIONS OF INTEREST	
	Controlled waste "Controlled waste" means household, industrial and commercial waste or any such waste. **Household waste** "Household waste" means waste from: • domestic property, that is to say, a building or self-contained part of a building which is used wholly for the purposes of living accommodation; • a caravan which usually and for the time being is situated on a caravan site ; • a residential home; • premises forming part of a university or school or other educational establishment; • premises forming part of a hospital or nursing home. **Industrial waste** "Industrial waste" means waste from any of the following premises: • any factory; • any premises used for the purposes of, or in connection with, the provision to the public of transport services by land, water or air; • any premises used for the purposes of, or in connection with, the supply to the public of gas, water or electricity or the provision of sewerage services; • any premises used for the purposes of, or in connection with, the provision to the public of postal or telecommunications services; or • any mine or quarry or any premises used for agriculture. **Commercial waste** "Commercial waste" means waste from premises used wholly or mainly for the purposes of a trade or business or the purposes of sport, recreation or entertainment excluding: • household waste; • industrial waste; • waste of any other description prescribed by regulations.
NOTEWORTHY FEATURES	
	The licensed waste management sites largely submit paper-based statutory returns but do not currently provide adequate information on the economic origin of the waste. Statutory returns from licensed or permitted sites do not contain information on the waste that is transferred on site to a final product. This makes the identification of waste recycled difficult. A number of licensed/permitted sites are allowed to carry out more than one waste management activity, causing difficulty when reporting data on the amount of waste handled by each activity. Waste may also be used in some industrial processes that are not classed as waste management sites or may be handled on sites undertaking activity that is exempt from Waste Management Licensing. Currently the reporting on household waste arisings and management include waste originating from households and waste from other commercial premises, but in the future household waste will mean "waste from households" only. Alongside the waste data tables, SEPA publishes a waste data quality report, which describes the methodologies used to produce the summary waste data. The *Waste Data Strategy for Scotland 2011* was published in June 2011, in support of Scotland's Zero Waste Plan. The purpose of the waste data strategy is to improve the

SUMMARY OF SCOTLAND'S WASTE DATA FRAMEWORK	
	information available on waste and deliver the following benefits: • Give an improved understanding of what waste is produced and how it is managed. • Provide information to support the development of new business opportunities including the development of new waste management infrastructure. • Allow businesses and local authorities to benchmark their waste management performance. • Aid policy development and support the successful implementation of Scotland's Zero Waste Plan. • Monitor the progress towards domestic and European targets. • Raise public awareness of waste management issues. The strategy focuses upon collecting data where there is a clearly defined requirement, ensuring that the administration burden is both minimised and proportionate to the amount and nature of the waste produced. Waste data requirements over the period until 2025 are identified in the Strategy, which also aims to track how resources flow through society and in particular what happens to those resources once they are disposed of. The ultimate objective is to be able to produce a mass balance and hence know where, when and how all of the waste produced is managed and transformed back into a natural resource. Data on waste prevention is not currently reported but will be in the future in order to monitor the Government's Waste Prevention Programme.

3.9 South Africa

SUMMARY OF SOUTH AFRICA'S WASTE DATA FRAMEWORK	
	The aim of South African Waste Information System is to create a single national repository of accurate and reliable tonnages of general and hazardous waste recycled, treated and landfilled, as well as tonnages of waste exported out of South Africa. Initially a voluntary system, regulations that came into effect in 2013 require that those involved in the recovery or recycling of waste, the treatment of waste, the disposal of waste, and/or the generation or export of hazardous waste must register with the South African Waste Information System. Those who are registered must provide the information required by the regulations to the provincial waste information system on a quarterly basis.
PRIMARY SOURCES OF INFORMATION	
	Department Environmental Affairs and Tourism, National Waste Management Strategy Implementation South Africa, Waste information System Guideline on Technical Implementation, DEAT Report Number:12/9/6 South African Waste Information Centre at http://sawic.environment.gov.za/?menu=13 Department of Environmental Affairs (2012). National Waste Information Baseline Report. Department of Environmental Affairs. Pretoria, South Africa.
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	The reporting framework is established by the National Environmental Management: Waste Act 2008 National Waste Information Regulations. Reporting became mandatory for waste generators, handlers, recyclers, and disposers in January 2013 under section 69(1)(y) of the National Environmental Management Waste Act.
CLASSIFICATIONS USED	
	Waste is classified into two main categories – general and hazardous waste. For reporting purposes, required information includes the category of waste, the source of the waste, and the quantity of waste. Major waste types (for non-hazardous wastes) include: municipal waste, commercial and industrial waste, organic waste, construction and demolition waste, paper, plastic, glass, metals, tyres, and other.
DEFINITIONS OF INTEREST	
	General waste Waste which does not pose an immediate threat to people or the environment, i.e. household waste, builder's rubble, garden waste, dry industrial and commercial waste. It may, however, with decomposition and infiltration by water, produce leachate with an unacceptable potential to pollute the environment. **Hazardous waste** Any waste which may, by the circumstances of its use or because of its quality, concentration, physical or infectious characteristics, cause or be likely to cause, danger to health or to the environment, whether by itself or when in contact with other waste (DWAF 1998).
NOTEWORTHY FEATURES	
	The 2012 *National Waste Information Baseline Report* notes that "until the South African Waste Information System moves from voluntary reporting to enforced reporting under the new regulations, the system is as yet unable to provide annual reports on the state of waste."

3.10 Tasmania, Australia

SUMMARY OF TASMANIA'S WASTE DATA FRAMEWORK	
	State and Local Government have agreed to jointly pursue the collection and reporting of waste data on a consistent basis across the State. Waste data is collected by the Environmental Protection Authority (EPA) each year from each of Tasmania's Level 2 landfills. This information is collated and published in the EPA's Annual Report. Data from Waste Transfer Stations (WTS) is vital to the development of a state-wide waste database. WTS are key facilities for resource recovery and WTS can 'see' information about waste (such as its source) which is invisible following consolidation and transport of that waste. As such, collection of waste data from WTSs is vital to furthering the EPA's objectives. To assist local government, a model contract clause has also been provided for inclusion in WTS contracts.
PRIMARY SOURCES OF INFORMATION	
	http://epa.tas.gov.au/regulation/measuring-waste-disposal-and-recovery www.environment.gov.au/.../australian-waste-definitions.docx
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	In April 2006, the Department of Tourism, Arts and the Environment issued Environment Protection Notices (EPN) imposing waste data reporting obligations upon operators of municipal landfills. Under these EPNs, landfill operators must report waste data for each financial year in accordance with the Tasmanian Solid Waste Classification System, which has been jointly adopted by State and Local Government. The classification system is supported by an agreed set of definitions.
CLASSIFICATIONS USED	
	The waste classification system used in Tasmania is based on the Australian system.

Tasmanian Solid Waste Classification System
(Based on the Australian Waste Database)

Processing Route	Primary Source	Secondary Source	Transport Mode	Material Composition
1 Recycling 2 Composting 3 Incineration 4 Landfill 5 On-site	A Municipal B Commercial & industrial C Construction & Demolition	1 Domestic Waste 2 Other Domestic 3 Other Council X Waste Processing Facility 0 Unknown X Waste Processing Facility 0 Unknown 2 Other Domestic 3 Other Council X Waste Processing Facility	0 WEIGHBRIGE 1 LIGHT VEHICLES Boot Load < 1m³ 1 - 2 m³ 2 3 m³ > 3m³ 2 TRUCKS GVM 3t - 7t GVM 7t - 12t GVM >12t single axle GVM >12t dual axle Dual Axle trailers 3 SKIP/BIN Up to 4 m³ 4 - 8 m³ 8 - 12m³ 12-15m³ 15 - 20m³ 20 - 25m³ 25-30m³ > 30m³ 4 COMPACTOR UP TO 7m³ 7 - 15m³ (Half Full) 7 - 15m³ (Full) >15m³ (Half Full) > 15m³ (Full)	0 Mixed 1 Paper/Cardboard 2 Food/Kitchen 3 Green Organics 4.1 Wood 4.2 Trees > 150mm diameter 4.3 Sawdust 5.1 Tyres - Car 5.2 Tyres 4WD 5.3 Tyres - Trucks 5.4 Tyres - Other 6 Glasses 7 Plastic 8.1 Ferrous - other 8.2 Ferrous - cars 9.1 Controlled Waste - Other 9.2 Sewage sludge 9.4 Putrescible/Organic 9.5 Asbestos 9.6 Clinical & Pharmaceutical 9.7 Low level contaminated soil 9.8 Contaminated soil 10 Clean fill - mixed 10.1 Bricks, concrete, rubble 10.6 Non - ferrous - other 10.8 Clean Excavated Material

SUMMARY OF TASMANIA'S WASTE DATA FRAMEWORK	
DEFINITIONS OF INTEREST	
	Municipal solid waste Municipal solid waste is primarily waste collected from households and councils, such as through kerbside waste and recycling collections. It includes biodegradable material, recyclable materials such as bottles, paper, cardboard and aluminium cans, and a wide range of non-degradable material including paint, appliances, old furniture and household lighting. **Commercial and industrial** Commercial and industrial waste is waste that is produced by institutions and businesses; includes waste from schools, restaurants, offices, retail and wholesale businesses, and industries including manufacturing. **Construction and demolition** Construction and demolition waste refers to waste produced by demolition and building activities, including road and rail construction and maintenance and excavation of land associated with construction activities. The C&D waste stream usually covers only some of the generation, disposal and recycling of C&D wastes, as these materials can also be found in the MSW and C&I streams, or as hazardous wastes.

3.11 UK

SUMMARY OF UK'S WASTE DATA FRAMEWORK	
	Waste Data Flow (WDF) is the UK's web-based data collection system. WDF only collects information on and related to local authority collected municipal waste. It does not include commercial and industrial (C&I) wastes or construction and demolition wastes which are not collected by local authorities. Data about C&I waste is collected through a completely separate survey of business, which was last carried out in 2010. The WDF survey provides a total of 63 questions, of which 40 are common to all four countries (England, Wales, Northern Ireland and Scotland). Data is collected on a quarterly basis.
PRIMARY SOURCES OF INFORMATION	
	SKM (2010) *Summary of the history and development of Waste Data Flow* –Report for the Australian Government or the Minister for Sustainability, Environment, Water, Population and Communities. DEFRA (2010) *Survey of Commercial and Industrial Waste Arisings 2010* – Final Results
LEGISLATIVE SUPPORT FOR FRAMEWORK	
	The WDF system was developed to replace a number of the traditional municipal waste management surveys, providing a single comprehensive data return and more frequent monitoring of progress against Article 5 of the EU Landfill Directive.
CLASSIFICATIONS USED	
	The questions in WDF are split into four main categories: • general infrastructure - for example, number of premises receiving a regular waste collection service, and number of households by dry recyclables collection method • recycling waste - for example, tonnes by material collected through kerbside schemes from household sources, and tonnes by material collected from commercial, industrial or other non-household sources by the local authority or its contractors • residual waste - for example, tonnes of waste disposed of in non-hazardous landfill, tonnes of waste disposed of by incineration with energy recovery, and tonnes of waste disposed of by advanced thermal treatment such as pyrolysis and gasification • waste costs - for example, the net cost of household waste collection. Within these categories there is a division between questions based on waste collection and others based on waste treatment/disposal. All treatment/disposal sites must be licensed and the WDF maintains a list, updated quarterly, of all licensed facilities in the UK. Some of the questions ask for the tonnage recorded to be split out by material type. There are 62 material types listed in WDF, ranging from different types of glass (green, brown, clear and mixed) to paint, textiles, and footwear.
NOTEWORTHY FEATURES	
	From 2004 to 2009 the outsourced services for: project management, telephone and email helpdesk support to all users, data validation services (England only), guidance, documentation, user training (England) and survey development, has been in the range of £200,000 to £350,000 per annum (NZ $400,000 to $700,000). The cost has depended on the extent of survey modification and system improvements needed each year.

4 Addendum – Comparison with Draft National Waste Data Framework Definitions and Protocols

The review of international waste data practice described in this document was undertaken to inform the development of a New Zealand Waste Data Framework (refer Section 1). The purpose of the review was both to find examples of best practice that could be emulated and to identify shortcomings that could be avoided.

The release of this document coincides with the release of the draft Definitions and Protocols (both provided to the project Steering Group in February 2015). Using the summary of findings in Section 3 as a starting point, the draft New Zealand National Waste Data Framework (NZ framework) is assessed against international practice in the table below.

SUMMARY OF INTERNATIONAL PRACTICE	DRAFT NZ FRAMEWORK
There is no global, internationally-adopted system of definitions and data-gathering and reporting protocols relating to solid waste.	In the absence of a widely-used system of definitions and protocols, a NZ-specific system has been developed that is largely compatible, if not directly comparable with, other systems.
There is no consistency as to whether waste data frameworks are structured at a national or regional level. In United States of America, for instance, some state governments collect and report waste data and others do not. Those states that do collect waste data use independent, stand-alone systems. On the other hand, some Australian states collect solid waste data using a standardised system of classification developed for the currently-dormant Australian Waste Database. By comparison, national level waste data is collected and reported by the federal government through Statistics Canada and the individual provinces do not have a role in the framework.	As is the case internationally, the NZ framework has been designed by taking into account the legislative environment in which the framework will function. In New Zealand, the territorial authority has been identified as the most suitable basic structural unit for data gathering and reporting. If territorial authorities produce compatible data, national-level data can be collated.
National or regional-level waste data is obtained through a limited number of mechanisms. The national frameworks that have been studied rely on: data from surveys of waste businesses, online reporting by the waste industry, administrative sources, or combinations of several mechanisms.	In the absence of any agency driving a centrally-run online reporting system, the NZ framework largely relies on reporting to TAs by waste industry members and disposal points. It is not anticipated that this will involve online reporting in many areas. The NZ framework system of combining data from waste collectors with disposal point data on General Users may be unique.
All of the frameworks that have been studied are based, to a large degree, on mandatory	The NZ framework relies on the collection and reporting of data by TAs

SUMMARY OF INTERNATIONAL PRACTICE	DRAFT NZ FRAMEWORK
reporting. No systems that rely totally on voluntary reporting have been identified.	as a function of their mandatory preparation of waste assessments. It is possible that reporting according to the protocols of the framework will be incentivised through the MfE's updating of guidance on the preparation of waste assessments. As the territorial authority is the major participant in the waste industry in many areas, some of the problems relating to mandatory vs. voluntary reporting will not occur. TAs have the option of making reporting by the waste industry mandatory by introducing waste bylaws that include licensing of waste operators and reporting requirements.
At least two of the systems studied, in South Africa and Queensland, have moved from voluntary reporting to mandatory reporting in order to improve the quality of the data.	The NZ framework is based on the only current mandatory driver for reporting waste data – the TA waste assessment. TAs can make reporting by waste operators mandatory through a solid waste bylaw.
Some of the frameworks studied focus entirely on solid waste disposed of to landfill. Others include alternative methods of waste management, such as composting and recycling.	Only data on waste to 'disposal facilities' (as defined by WMA) is included in the first stage of the NZ framework. It is intended that subsequent stages be developed to account for diverted material and material to non-levied sites
Most, but not all, of the systems studied collect and report data on the 'source' of the data, based on the activity that produced the waste. While there are similarities between the different systems for classifying the 'source' of waste, there is not a universally-used system. Some of the differences arise from the varying levels of waste-collection activity undertaken by local government and private enterprise.	The NZ framework includes a system of classifications for the Activity Source of waste. This system is of moderate complexity, compared to other systems, but a very similar system is currently in use in the MfE's Online Waste Data System (on which the draft protocol is based).
Waste classification systems tend to have started from either a 'top-down' or 'bottom-up' perspective. The top-down systems appear to originate from a theoretical or academic viewpoint, with complex taxonomies for waste that bear limited relationship to the experiences of those in the waste industry. The bottom-up systems appear to have more of an empirical basis, and are not as complex	In an effort to keep the NZ framework as simple and practical as possible as possible, a 'bottom-up' perspective has been used as a design principle. It has been recognised that the framework must be usable by those at the 'front lines' of the waste industry, such as weighbridge attendants and truck drivers, for it to be acceptable.

SUMMARY OF INTERNATIONAL PRACTICE	DRAFT NZ FRAMEWORK
as the top-down systems.	
The complexity of a national waste classification system appears to be related to the purpose of the legislative framework in which the system originated. A legislative framework that includes financial incentives and disincentives for waste reduction tends to result in a more complex waste classification system and stricter protocols.	In the absence of a regulatory regime that involves financial incentives and disincentives, the NZ framework has been kept as simple as possible and precise boundaries and definitions have not been considered necessary, at this point in time.
For the most part, data-collecting frameworks concentrate on 'municipal solid waste' and exclude waste streams that are difficult to monitor, such as on-site disposal and non-municipal landfills, such as cleanfills and monofills.	Only data on waste to 'disposal facilities' (as defined by WMA) is included in the first stage of the NZ framework.