



ECO CANADA
Environmental Careers Organization



Solid Waste Management

LABOUR MARKET RESEARCH STUDY

2010

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2. EXECUTIVE SUMMARY

2.1 KEY FINDINGS

2.1.1 INDUSTRY SIZE

ECO Canada's national survey estimated that the current size of the solid waste management (SWM) industry is likely in excess of 70,000 employees. The survey concluded that there were approximately 59,869 private sector employees and 9,354 public sector employees. Between 2004 and 2006¹, the SWM industry grew 17% in terms of revenues but shrunk by 14% in terms of number of businesses, in part due to mergers and acquisitions.

Based on the employer survey, SWM employment over the next three years is expected to grow by an annual compound rate of 6%. Over 4,000 new SWM employees will be required, with the growth by job classification varying widely—80% of employers expect increases in the number of labourers (45%) and operators (35%), while only 14% of employers expect higher management positions to grow.

2.1.2 INDUSTRY SCOPE

For the purposes of this study, the SWM industry was defined as being comprised of the three (3) main categories of North American Industry Classification System (NAICS)² codes in which SWM activities were most likely to occur:

1. NAICS 562 – Waste Management and Remediation Services;
2. NAICS 91 – Government Sector; and
3. Other NAICS codes
 - Construction and Demolishing or Excavation Waste Management (part of NAICS 237 and 238);
 - Composting (NAICS 32531), except if Agricultural;
 - Wholesalers of Recyclable Materials (NAICS 4181);
 - Transportation of Waste without Waste Collection (part of NAICS 484);
 - Engineering Services concerning SWM (part of NAICS 54133); and
 - Waste Management Consultants (part of NAICS 54162).

New and emerging activities not yet covered by NAICS were also included: anaerobic digestion/biodigestion; landfill gas management; waste-to-energy (WtE).

Exclusions: The following areas were not included in the definition of the SWM industry for the purpose of this study:

- Agricultural organic waste composting;
- Industrial and agricultural hazardous waste management;
- Manufacturing of intermediate or finished products from recovered and recycled materials; and
- Waste water treatment.

2.1.3 INDUSTRY PROFILE

Most SWM organizations were small and staffed with men working in full-time, permanent positions. Labourer and operator positions dominated the workforce. Succession issues and potential loss of knowledge in the short and medium term may be an issue for higher management positions where staff tend to be older and have higher levels of seniority. The higher levels of education and the level of SWM knowledge gained from seniority make succession planning for these individuals critically important.

Most organizations (74%) had only one establishment and were located in Ontario (44%). Outside of seasonal peaks or shut down periods, most organizations (76%) reported having less than 50 employees in total, while half (56%) had less than 10 employees assigned to SWM.

The vast majority of positions in SWM were full-time (95%) or permanent (94%). Labourer and operator positions represent 78% of total SWM employment.

Men represent 77% of the SWM workforce. Women (23% of the total SWM labour force) were most likely to work in areas not related to SWM, primarily in general administration (42%). Women working in SWM-related positions were most likely to be labourers (12%) or post-secondary educated professionals (11%).

Higher management (both SWM and non-SWM) were more likely to be older, have more seniority and be more educated. Employees over the age of 50 (39%) and that had at least ten years of experience (39%) were most likely to be in higher management. Individuals in higher management positions also tended to be more educated, with over one-third having completed a bachelors (37%) or masters (40%) degree.

¹ Statistics Canada 2006 Bi-annual Waste Management Industry Survey

² NAICS is the acronym for the "North American Industry Classification System", a set of industry categories standardized between the U.S.A., Canada, and Mexico.

2.1.4 SWM INDUSTRY CHALLENGES

Regulations were the most important challenge stated by employers that can affect the growth of their organization—67% cited it as very important. Regulations, therefore, can have a significant impact on the SWM industry. Detailed survey results show that public employers (73%) and employers in waste treatment and disposal organizations (77%) were more likely to consider this issue very important.

Other important challenges mentioned were production and financing challenges. Key informants interviewed in the preliminary phase of the study also identified regulations and production issues as the main drivers of the industry.

2.1.5 EVOLUTION OF SOLID WASTE MANAGEMENT

The global trend in the industry is toward replacing traditional SWM with sustainable SWM practices and the use of waste as a resource. The cradle-to-cradle concept of solid waste management is based on diverting waste from disposal, which helps to conserve landfill space and preserve natural resources. The concept aims at preventing waste generation in the first place. Producers are made responsible for the entire lifecycle of products and packaging, which encourages sustainable practices at every stage, from virgin material extraction through to recycling and other forms of end-of-life management. Making producers responsible encourages innovation and increased eco-efficiency over time.

Although technological improvements are several years away from implementation, new technology is expected to drive a need for highly-skilled, specially-trained professionals, particularly for Extended Producer Responsibility (EPR) programs.

2.1.6 SWM INDUSTRY LABOUR MARKET

2.1.6.1 EMPLOYER PERSPECTIVE

Recruitment and Retention

Although most (59%) organizations did not currently experience difficulties in hiring qualified candidates, more than half (52%) of the employers surveyed expected to encounter hiring difficulties in the next five years. Current and future hiring difficulties were greatest for labourers and operators. In addition, over half of the respondents indicated that their staff turnover was greatest at the labourer level (53%), followed by operators (24%).

HR Challenges

Health and safety at work is by far the most important challenge in human resource management in the SWM sector (54% stated it was very important). Other key challenges were staff turnover (30%) and absenteeism/sick leave (30%).

HR Management Tools and Training

Most organizations used various human resource management practices, particularly job and task descriptions (82%) and training and development programs (77%).

Only a third (34%) of surveyed organizations offered incentive programs to attract and retain staff, mostly in the form of bonuses (49%). Among the HR management practices that employers currently did not use, the top three practices they would consider implementing for future HR development in their organization were:

- Non-monetary incentives/benefits package;
- Recruiting and selection process; and
- Training and development programs.

This finding creates an opportunity for employers to distinguish themselves from other organizations in recruiting and retaining employees. For example, although many employers (44%) found the recruitment and selection process very important, one-third (33%) currently did not have a process in place.

The majority of employers currently offered CPR or health and safety courses (60%). Many also offered in-house seminars (43%), further education/training (42%), and off-site workshops, seminars, and/or conferences (41%).

Most organizations' 2008 training budgets were \$10,000 or less (61%) and most 2009 budgets were similar in size to those in 2008 (68%). Over the next three years, 43% expected the number of employees trained to increase, while about one-third (36%) expected the number of hours to increase.



2.1.6.2 EMPLOYEE PERSPECTIVE

Career Development and Retention

Many participants indicated they did not originally intend to work in SWM. Most said that in looking for work, they relied on the Internet. Labourer/driver jobs were seen as easy to find, particularly with private establishments. Some participants mentioned a lack of opportunities for advancement within SWM. Specifically, participants with post-secondary education mentioned that this absence of advancement opportunities had the potential to influence a decision to leave their current job for a better paying position.

Job Satisfaction and Challenges

In general, job satisfaction was high, particularly with the following aspects of the work environment:

- Working schedules;
- The physical requirements of the work;
- General working conditions; and
- Relationships with colleagues.

Women tended to be more satisfied with the number of working hours, their working schedule, social benefits, relationships with colleagues and the physical environment of the workplace. Employees in public organizations were more satisfied with their working conditions, the social benefits offered by their employer, the relationships with their colleagues, their overtime pay, and the work-life balance environment.

On-the-job challenges mentioned by participants included dealing with customers, adapting to the changes in policies and regulations regarding SWM, and dealing with the slow pace of decision-making in government organizations.

Training

Most participants attended in-house training, particularly health and safety courses for labourers and supervisors. Several employees from public organizations mentioned that the budget for training has decreased due to the economic downturn. Employees with post-secondary education were particularly interested in participating in soft skill courses such as communications, human resources and project management.

2.2 KEY RECOMMENDATIONS

1. Improve the solid waste industry as an attractive career path for environmental workers in order to attract future employees with the right skill sets.

Most focus group participants had not originally intended to work in the SWM sector, and employers anticipated having difficulties recruiting employees in the next five years.

2. Develop better succession and knowledge transfer plans to ensure knowledge retention within the industry.

A number of key occupations, particularly higher management positions, have relatively high percentages of older workers with greater seniority. To retain their knowledge, tacit knowledge transfer from these senior employees to newer and younger SWM employees and students is critical for the successful management of the solid waste industry in the coming years.

3. Focus on ensuring effective future hiring and retention practices among lower skilled SWM workers.

Staffing and retaining labourers and operators will be a challenge over the next 3-5 years. Not only did employers anticipate the greatest staff increases to be with labourers and operators, they also expected the greatest difficulties in hiring for these positions. To compound this issue, staff turnover was greatest at the labourer level. Developing effective HR practices to meet these challenges will be key to meeting future staffing requirements in this area.

4. Investigate the preparedness of training programs for future skills requirements.

On-the-job training remains the rule in the SWM industry, with most of the training programs delivered in-house. Training through post-secondary institutions is limited to one or two SWM elective courses focusing on theory and process. Practical, operations-oriented training is expected to be provided in-house by employers. Key informants cited Solid Waste Association of North America (SWANA)³ as a key training source, but the organization was not mentioned by employers. SWANA delivers training to the entire solid waste industry across North America in key areas such as collection and transfer, landfill and landfill gas, planning, management and communication, and recycling and special waste. Further study is required to understand if appropriate training programs are in place to satisfy future skills requirements and if employers are adequately aware of training sources and are supportive of further training for future skill needs.

³ www.swana.org



To retain their knowledge, tacit knowledge transfer from senior employees to newer and younger SWM employees and students is critical for the successful management of the solid waste industry in the coming years.



5. Prepare for the expected increased need for highly skilled workers with the advent of new technology.

New highly skilled, specifically trained professionals will be required as new technology is introduced over time to the SWM sector. More in-depth investigation into the specific skill sets required will help prepare the sector for the employees required.

6. Further investigate expected government policy and regulation developments.

Public policy has the potential to greatly impact the development of the SWM industry as employers cited regulation as the most important challenge to potentially impact the growth of their organization. Employees also mentioned that adapting to changes in policies and regulations was a key challenge for them. A more detailed study of upcoming regulations and policies is warranted to understand the impact on labour requirements, particularly for skilled positions such as Extended Producer Responsibility (EPR) professionals.

7. Improve ECO Canada awareness among SWM workers.

Most focus group participants were not aware of ECO Canada or its job board. Raising awareness of the organization and its services will improve the ability to attract the right employees to the industry in the future.

3. NATIONAL STEERING COMMITTEE RECOMMENDATIONS

3.1 KEY FINDINGS

The National Steering Committee (NSC), made up of senior Solid Waste Management (SWM) industry members, provided feedback on the potential future developments and challenges in the SWM industry based on their experience as well as this study's findings.

The NSC outlined the following issues and trends that will impact the SWM labour market in the future:

- The global trend is moving toward sustainable SWM practices where waste is viewed as a resource and SWM is based on diverting waste from disposal. Corporate behaviour and well-designed regulations will help drive this trend in Canada.
- Waste will increasingly be seen as being composed of two streams – organic waste and waste from products, with both subject to the idea that the material will be reused. Each of these streams will require specific skill sets.
- New emerging technologies will be developed and implemented that will impact the industry over time, including:
 - Back-end technologies for improving the management of waste (e.g., anaerobic digestion, biomass, landfill gas collection, automated collection, recycling facility equipment).
 - Front-end solutions to reduce waste (e.g., the redesign of products to reduce packaging and facilitate recycling or reuse, more deconstruction centres, public education, product stewardship programs).
- Public opinion and perception will impact the evolution of SWM in the form of public support or opposition to proposed SWM initiatives.
- There is currently no consistent nomenclature for SWM occupation standards or certification of key SWM occupations.
- Skills training is mainly delivered in-house by SWM organizations themselves with employers having little understanding of the training available through such organizations as SWANA.
- Soft skills such as leadership and communication are currently in short supply.



Waste will increasingly be seen as being composed of two streams – organic waste and waste from products, with both subject to the idea that the material will be reused.



As a result of these issues and trends, skills training will become more important in the future and new skills and training will be required as the Canadian SWM industry evolves:

- There will be a shift in workers from disposal to diversion, as Canada moves away from a traditional waste collection toward a more sustainable model. This shift will result in the need for a different skill set, and the skills that will be required as diversion grows will need to be determined.
- Changes in technology will also impact the skill sets required in the industry. Automation and mechanization have reduced the need for some staff. However, different, higher-level skill sets will be required related to information technology.
- An in-depth understanding of the specific soft skills requirements is needed to effectively incorporate them into training programs.
- Effective training strategies need to be developed to attract and retain qualified employees and build these required skill sets. Consistent job descriptions and required skill sets are not the norm in the SWM industry today.



3.2 RECOMMENDATIONS

With these trends in mind, the NSC made the following recommendations based on their experience as well as the study's findings:

- Develop a consistent occupational nomenclature for the SWM industry that creates standards and competencies to support the successful future management of the sector. Standards for SWM occupations and functions would be developed similarly to those created for the Canadian Water/Wastewater Industry that results in documented National Occupational Standards (NOS). Given the changing nature and requirements of the SWM workforce, an NOS tool will map SWM occupations to standardized job descriptions and competency requirements. Labour shortages and education skill gaps within the sector will be better understood if SWM NOS are in place. These standards will support more effective communication of future labour market planning issues, leading to the creation of an efficient labour market.
- Put in place a body for certifying SWM personnel, which must be independent and distinct from those organizations offering SWM training in Canada. An independent body, such as ECO Canada, could be accredited to provide personnel certifications. Implementing this structure would ensure that the same body does not both train and certify, particularly given that, in the past five years, SWANA has separated training from its certification programs. Certification will add value to SWM jobs and to the certified training programs, and is vital to ensuring that qualified individuals are operating SWM facilities.
- In developing a certification model, the following challenges should be addressed:
 - Determine if certification is intended to address public safety (as in certification for waste water managers) and/or for career advancement;
 - Verify the voluntary or mandatory nature of the certification process;
 - Clarify and gain agreement on how certification and training will be funded;
 - Ensure criteria are relevant to a wide range of situations, ranging from rural municipalities to large cities; and
 - Ensure partnerships are created between the training institutions and the certifying body to ensure appropriate training programs are developed and implemented.

NOS and certification will establish standards to maintain a core competency level that supports the development of required skill sets for the continued evolution of the SWM industry.



4. INTRODUCTION

4.1 PROJECT OVERVIEW

4.1.1 STUDY CONTEXT

In 2009, ECO Canada, which is the national sector council for environmental professionals, commissioned Zins Beuchesne and Associates, a market research firm, to conduct a nationwide labour market investigation of the Solid Waste Management (SWM) sector. The study was aimed at profiling the occupational structure within this sector, focusing exclusively on environmental jobs, and determining the current and emerging labour market issues. The *Solid Waste Management Labour Market Study 2010* was undertaken by ECO Canada in response to requests from the SWM industry for insight into this critical and evolving area.

4.1.2 STUDY OBJECTIVES

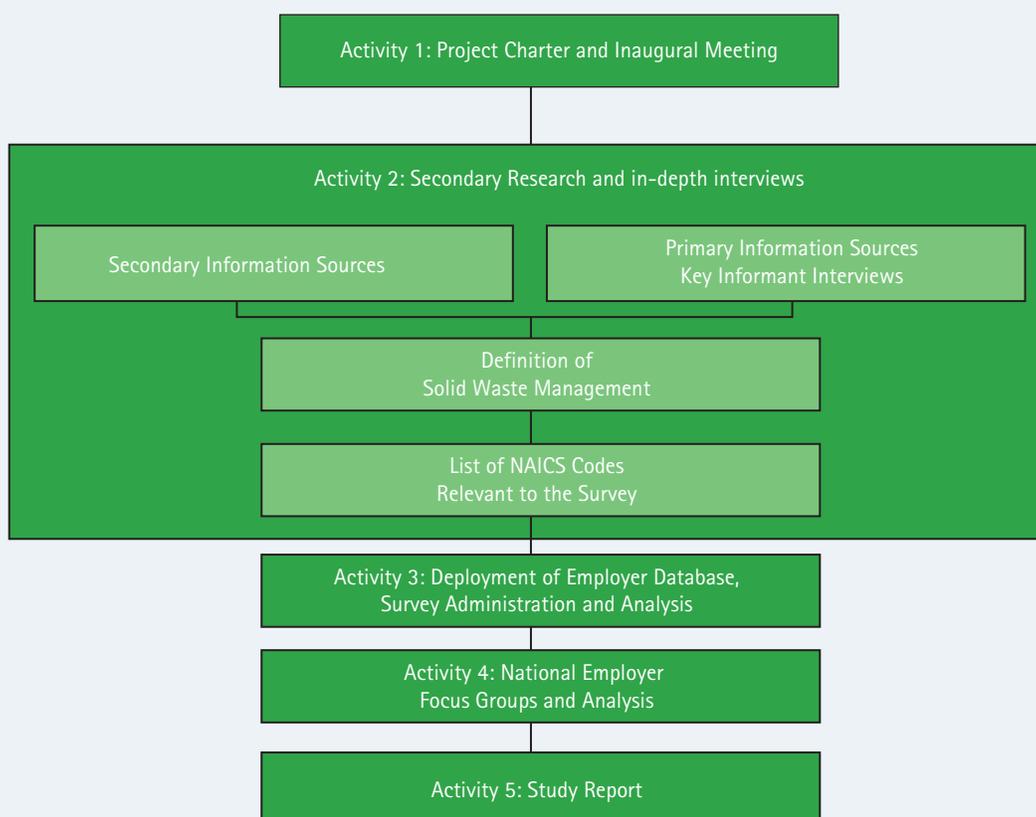
The study's objectives were to:

- Define the scope of environmental employment in Canada related to SWM;
- Determine the size of the SWM sector in Canada and profile employment within it; and
- Research the current and anticipated SWM labour market to identify critical and emerging human resources issues.

4.1.3 STUDY METHODOLOGY

The five-step methodology in the following flowchart was followed to ensure that the study objectives were met (Figure 1).

Figure 1
Methodology Flowchart



STEP 1:
Define the project charter.

STEP 2:
Secondary Research and In-depth Interviews.

To prepare for the administration of the employer survey and the employee focus groups, preliminary information was gathered from both secondary (literature review) and primary (expert interviews) sources. A clear definition of solid waste and the solid waste management sector was developed, and research was carried out to determine which North American Industry Classification System (NAICS) codes were relevant to the survey.

Telephone interviews with 11 key informants were conducted in May and June 2009 to gather preliminary information concerning general trends in the SWM industry. During the same period, telephone interviews were conducted with representatives of four post-secondary institutions offering SWM programs.

STEP 3:
Employer National Survey.

Zins Beuchesne and Associates (ZBA) conducted a quantitative survey with SWM employers between August 6th and October 14th, 2009. The main objective of the survey was to collect labour market information in the solid waste management sector particularly related to recruiting, human resource management practices, and staff development and training.

Interviews were completed with individuals responsible for human resources management in 853 organizations within the SWM industry. Interviews were conducted with 726 public and private organizations for which solid waste management was their primary activity (562 NAICS code) and 127 private organizations for which the primary activity was not related to this sector (NAICS code other than 562). In addition, a second questionnaire was sent by fax to obtain information regarding labour needs and employee characteristics. This questionnaire was completed by 200 employers (183 public and private organizations with NAICS code 562, and 19 non-562 establishments).

STEP 4:
Employee Focus Groups

ZBA also conducted five focus groups with a total of 40 employees with varying occupations in SWM. Focus groups were held in Calgary, Vancouver, Montreal, Halifax and Toronto between October 27th and November 9th, 2009. Discussions centred on employee perspectives regarding current job and career pathways, job satisfaction, employee retention and human resources.

STEP 5:
Final Report

ZBA produced a comprehensive final report that integrates the results of the secondary research, the two employer surveys and the employee focus groups. Preliminary documents were provided to ECO Canada representatives during the study as well as two "stand alone" documents presenting the detailed survey results as well as focus group session summaries.



The main objective of the survey was to collect labour market information in the solid waste management sector particularly related to recruiting, human resource management practices, and staff development and training.



4.2 SCOPE OF THE SWM INDUSTRY AND STUDY FRAME

4.2.1 UNDERSTANDING SOLID WASTE MANAGEMENT

Globally, the trend is moving toward replacing traditional SWM with sustainable SWM practices and the use of waste as a resource. While the definition of SWM is still evolving, some dramatic changes are apparent in the SWM industry in terms of new emerging technology and skills requirements.

The Old Cradle-to-Grave Concept

Although solid wastes are, for the most part, non-hazardous, their mismanagement can result in pollution of the atmosphere, soil, water supplies, homes, and the environment in general. Solid waste management practices have been based on the cradle-to-grave concept which encompasses established procedures that enable the lifespan of a waste to be safely managed (collected, transferred and transported) from its birth to final disposal, typically by land filling or burning to prevent environmental pollution. Recently, people have become conscious of public health and environmental issues that can arise from these disposal methods. Public awareness has put increased pressure upon governments and businesses to find better ways to manage solid waste. Furthermore, understanding has increased about the environmental burden from the upstream impact of producing goods from virgin materials, which can be reduced with DfE (Design for the Environment) and using recycled materials.

The New Cradle-To-Cradle Concept

The cradle-to-cradle concept of solid waste management is based on diverting waste from disposal, which helps to conserve landfill space and preserve natural resources. The concept aims at preventing waste generation in the first place. Products are designed for ease of dismantling and wherever possible to be made of easy-to-recycle materials. Producers are made responsible for the entire life cycle of products and packaging, which encourages sustainable practices at every stage, from virgin material extraction through to recycling and other forms of end-of-life management. Making producers responsible encourages innovation and increased eco-efficiency over time.



The cradle-to-cradle concept of solid waste management is based on diverting waste from disposal, which helps to conserve landfill space and preserve natural resources. The concept aims at preventing waste generation in the first place.



Cradle-to-cradle is an evolving idea, but currently includes:

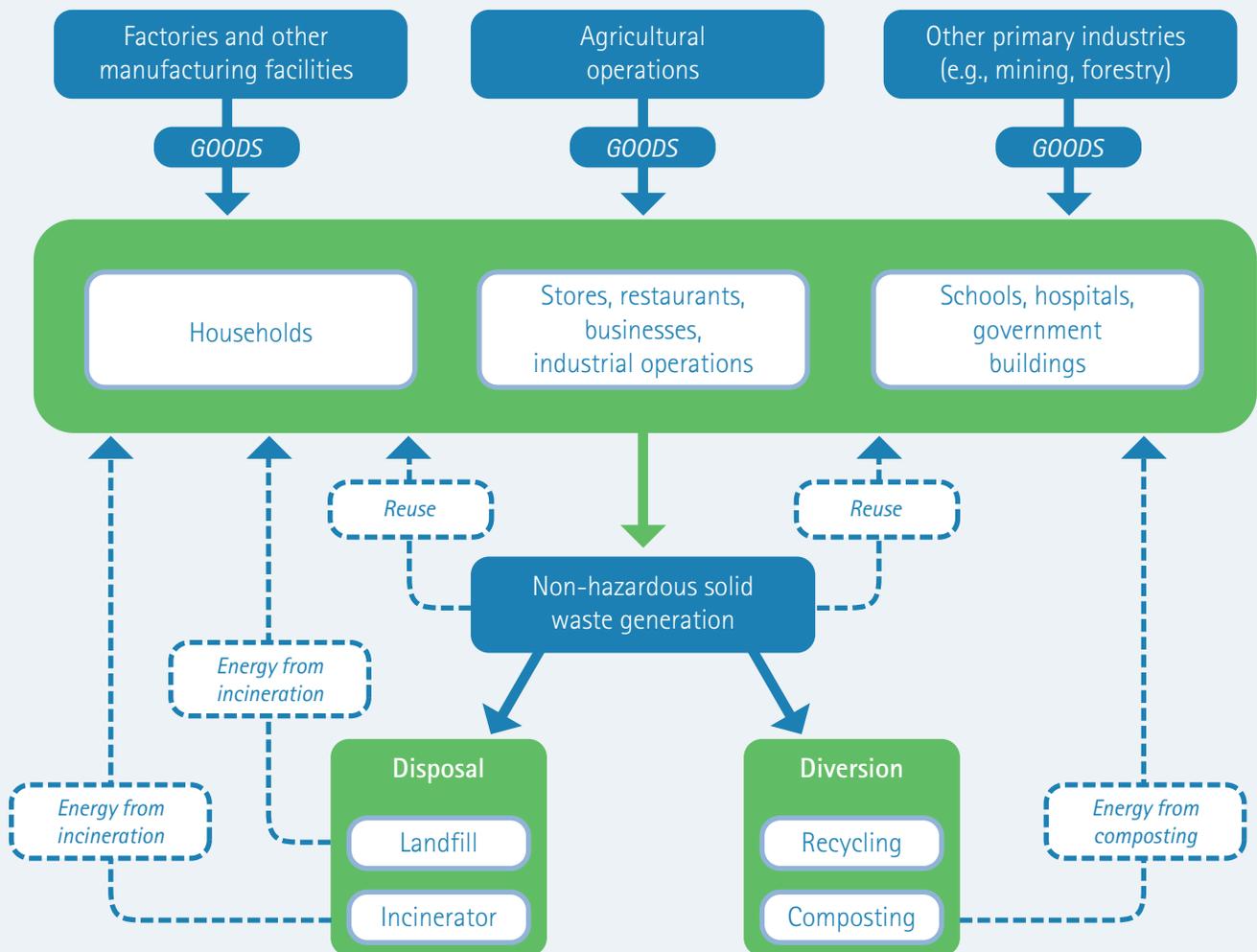
- Product and packaging redesign;
- Material substitution;
- New technologies in waste collection, transfer and transportation;
- Waste processing (e.g., separation of co-mingled wastes, before or after collection and transportation);
- Waste diversion (e.g., materials resource recovery or recycling, organics diversion [composting], waste-to-energy);
- Disposal of non-recyclable residual waste in high-tech landfills or via use of progressive disposal technologies (e.g., anaerobic digestion, or 'AD')

These new strategies for minimizing the creation of waste are being adapted globally to meet economic and environmental conditions and social needs. Although technological SWM variations are being marketed, the basic skill requirements, job types and titles are similar.

The Solid Waste Flow

The shift from one-directional flow (cradle-to-grave) to a cycle (cradle-to-cradle) in which solid waste is recycled or reused can be seen in Figure 2 below. The flow diagram identifies SWM activities and helps identify new and emerging activities, as it takes into account the industry's initiatives in waste reduction and waste being increasingly seen as a resource.

Figure 2
Solid Waste Flows



Source: Human Activity and the Environment, Annual Statistics 2005
Solid Waste in Canada, Statistics Canada, Catalogue no. 16-201-XIE

Sources of Solid Waste

Waste generation across the economy occurs during extraction, production, distribution, and consumption activities, with three sources of non-hazardous solid waste⁴:

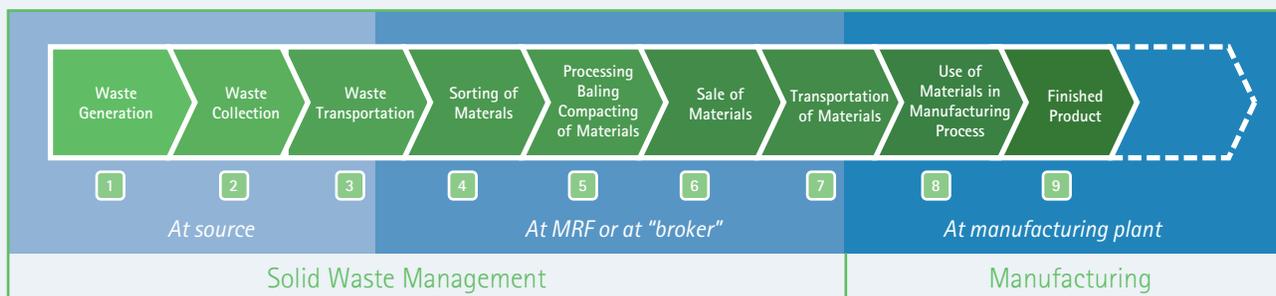
- **Residential Waste** – waste from primary and seasonal dwellings, including all single family, multi-family, high-rise and low-rise residences;
- **Construction, Renovation and Demolition Waste** – includes materials such as concrete, brick, painted wood, rubble, drywall, metal, cardboard, doors, windows and wiring. It excludes materials from land clearing on areas not previously developed; and
- **Industrial, Commercial and Institutional (ICI) Waste** – waste generated by materials discarded from industrial operations or derived from manufacturing processes; waste materials originating in commercial operations such as shopping centres, restaurants and offices; and institutional waste generated by schools, hospitals and government facilities.

Solid waste is dealt with in different ways depending on the source and the material involved. Waste produced from primary production (agriculture, forestry, fisheries, mining and quarrying) are normally managed by the industry itself, whereas industrial waste from production activities ranging from food processing to computer manufacturing may be managed on-site or through contracts with private waste firms. Finally, distribution and commercial activities produce wastes which are normally managed through private contracts, but occasionally these wastes pass through municipally-managed systems.

Recycling and Manufacturing Using Recycled Materials Overlaps

Some overlaps exist between the recycling component of SWM and manufacturing. However, the waste stream can be used to draw the lines between these two types of activities, as illustrated in Figure 3 below. In this diagram, the waste stream starts with waste generation at the source and ends with the manufacturing of products, using the materials recycled by a material recovery facility (MRF) or by a broker in recyclable materials. SWM covers chain links 1 through 7, but chain links 8 and 9 belong to the manufacturing chain⁵.

Figure 3
Solid Waste Management Stream



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⁴ Statistics Canada, 2004, Waste Management Industry Survey, 2002—Business and Government Sectors Survey Guide, www.statcan.ca/english/sdds/2009.htm

⁵ The line for the end of Solid Waste Management was drawn between link 7 and 8, because recycled materials, after having been processed the MRF, are actually shipped elsewhere to be integrated into a manufacturing process.

4.2.2 DEFINING THE PROJECT SCOPE OF THE SWM INDUSTRY

For the purposes of this study, the SWM industry scope was defined through the use of Statistics Canada NAICS codes (NAICS 2007). Since the SWM industry is cross-sectoral, an analysis of several NAICS codes was completed to ensure as inclusive a definition of the industry as possible. There were three (3) main categories of NAICS codes in which SWM activities were most likely to occur:

- NAICS 562 – Waste Management and Remediation Services;
- NAICS 91 – Government Sector; and
- Other NAICS codes.

New and emerging activities not yet covered by NAICS were also included.

SWM Activities in the NAICS 562 Business Sector

For the most part, SWM activities are found in NAICS code 562, Waste Management and Remediation Services, which is defined by Statistics Canada as follows: "This subsector comprises establishments primarily engaged in providing waste management services, such as waste collection, treatment and disposal services; environmental remediation services; and septic tank pumping services. Material recovery facilities are also included". The NAICS 562 business sector is mostly comprised of private firms and companies generally run for profit, although some of these organizations may be owned by government bodies, and therefore may be run as not-for-profit.

At a more detailed NAICS code level, Statistics Canada⁶ considers that the business sector of the waste management industry is comprised of businesses falling into the following four NAICS classifications:

- 56211 Waste Collection;
- 56221 Waste Treatment and Disposal;
- 56292 Material Recovery Facilities; and
- 56299 All Other Waste Management Services.

However, the current definition of NAICS 562 is not strictly limited to solid waste. In particular, it includes activities related to waste water treatment, which are not part of SWM. Unlike Statistics Canada, ECO Canada considers that Remediation Services (sub-code NAICS 56291), other than waste water treatment, are part of SWM⁷.

SWM Activities Included in Other NAICS Codes

The current definition (NAICS 2007) of NAICS 562 has not been revised for several years⁸, and it may be argued that it does not reflect the evolution of SWM over recent years. Statistics Canada, in its bi-annual survey of the waste management industry⁹, has acknowledged this evolution by including NAICS codes, or parts of NAICS codes, other than NAICS 562. Other SWM activities included, other than NAICS 562, were:

- NAICS 4181: Recyclable Material Wholesaler-Distributors;
- NAICS 32531: Fertilizer Manufacturing (which includes composting);
- NAICS 23891: Site Preparation Contractors;
- NAICS 48423: Specialized Freight (except Used Goods) Trucking, Long Distance (which includes hauling waste);
- NAICS 54162: Environmental Consulting Services (which includes SWM consulting); and
- NAICS 54133: Engineering Services concerning SWM.

According to Statistics Canada¹⁰, the current NAICS 562 definition covers only approximately 84% of the SWM business sector in terms of revenues.

SWM Activities in the NAICS 91 Government Sector

Separating government services and private services was difficult, due to the numerous combinations of government and private waste management services. The government sector of SWM includes 'public waste management bodies', 'service boards', or 'waste management commissions' that exist mostly at the provincial/territorial, or municipal/regional level of government, covered by NAICS code 91, Public Administration. Most are part of NAICS 912, Provincial and Territorial Public Administration, or NAICS 913 Local, Municipal and Regional Public Administration, but some may also be part of NAICS 911, Federal Government Public Administration. Throughout the text, 'public' should be interpreted as inclusive of the government sector but not limited to it.

⁶ "Waste Management Industry Survey: Business and Government Sectors 2006" (Catalogue no. 16F0023X)

⁷ Statistics Canada's definition of the waste management industry is based on that of the Canadian Council of Ministers of the Environment.

⁸ The revised NAICS will be available in 2012, and will be known as NAICS 2012.

⁹ "Waste Management Industry Survey: Business and Government Sectors - 2006". The survey refers to CANSIM table 153-0044, "Business sector characteristics of the waste management industry, Canada, provinces and territories", a bi-annual study last published in 2006.

¹⁰ According to key informants with in-depth knowledge of Statistics Canada's Bi-Annual Survey of the Waste Management Industry.

Other Relevant SWM Activities Not Yet Covered by NAICS

Interviews with key informants identified new and emerging SWM activities not yet captured in the 2007 NAICS but which should be part of the definition of SWM. According to key informants, activities related to anaerobic digestion/biodigestion, landfill gas management, and waste-to-energy (WtE) should be included as part of the definition of SWM¹¹.

4.2.3 STUDY FRAMEWORK

After the relevant NAICS codes were identified, the survey frame used to design the sample plan was established accordingly and is illustrated in Figure 4 below.

The sample plan was based primarily on businesses belonging to NAICS 562 and government organizations having SWM as their main activity. Although government organizations are not in NAICS 562, they were included in the survey because they are part of the SWM industry. Private businesses that do not have SWM as their primary activity (and so are not in NAICS 562) were integrated in a segment called 'non-562'. The new and emerging areas of SWM that were identified by key informant interviewees were also included as part of 'non-562'.

Figure 4
SWM Study Framework

	NAICS 562	Non-562 NAICS
Private businesses 75%	<ul style="list-style-type: none">• 56211 Waste collection• 56221 Waste treatment and disposal• 56292 Material recovery facilities• 56299 All other waste management services	<ul style="list-style-type: none">• Relevant NAICS codes other than 562
Public organizations 25%	<ul style="list-style-type: none">• Mainly NAICS codes 91 (with SWM as their main activity) and 562	<ul style="list-style-type: none">• Organizations not eligible for survey purposes

¹¹ A thorough check of the current Canadian NAICS database for the presence and application to SWM of other key words such as biogas, gasification, organic (as in "organic waste"), plasma, and pyrolysis did not produce results. This may be a sign that, even though some of the underlying technologies are far from new, they have not yet been introduced in SWM to any sizable extent.

For the purpose of this study, SWM includes the following:

Base

- Current NAICS 562: Waste Management and Remediation Services

Additions

Private Businesses—Non-562 NAICS

- Construction and demolishing or excavation waste management (part of NAICS 237 and 238);
- Composting (NAICS 32531), with the exception of agricultural;
- Wholesalers of recyclable materials (NAICS 4181);
- Transportation of waste without waste collection (part of NAICS 484);
- Engineering services concerning SWM (part of NAICS 54133);
- Waste management consultants (part of NAICS 54162);
- Anaerobic digestion / biodigestion (terms not used in any NAICS code);
- Landfill gas management (expression not used in any NAICS code); and
- Waste-to-energy (WtE) (expression not used in any NAICS code).

Public Organizations – Non-562 NAICS

- Public administration (part of NAICS 911, 912, and 913)

Exclusions

- Agricultural organic waste composting;
- Industrial and agricultural hazardous waste management;
- Manufacturing of intermediate or finished products from recovered and recycled materials; and
- Waste water treatment.

Defining the Project SWM Occupational Categories

There is no national taxonomy and structure appropriate for the analysis of SWM occupational data. Although HRSDC's National Occupational Classification (NOC) provides a list of codes and job titles that pertain to SWM occupations, occupations in the NOC are not specific to one industry and are found across many industries. NOC occupations could not be used to derive a structure of SWM occupations across Canada (in NAICS 562). Also, it was not possible to cross-tabulate NOC codes and NAICS codes to identify SWM occupations outside of NAICS code 562, Waste Management and Remediation Services.

Since this study was intended to cover the breadth of SWM occupations, for the purposes of the survey and with the help of solid waste experts, SWM occupations were categorized into the following six segments:

- Higher management specific to solid waste (e.g., VP Operations, Directors of Operations);
- Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts);
- Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators);
- Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers);
- Licensed/heavy equipment operators (e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers); and
- Labourers (e.g., helpers, handy men).



5. SWM INDUSTRY SIZE, PROFILE AND INDUSTRY CHALLENGES

5.1 SUMMARY

Industry Size

Between 2004 and 2006, the SWM industry grew 17% in terms of revenues, but shrunk by 14% in terms of number of businesses, in part due to mergers and acquisitions. This study concluded that the SWM industry currently has in excess of 70,000 employees.

Industry Profile

Most organizations (74%) had only one establishment and were located in Ontario (44%). Outside of seasonal peaks or shut down periods, most organizations (76%) reported having less than 50 employees in total while half (56%) had less than 10 employees assigned to SWM.

The vast majority of positions in SWM were full-time (96%), permanent (93%) and held by men (77%). Labourer and operator positions represent 78% of total SWM employment.

Women were most likely to work in areas not related to SWM duties, particularly general administration (42%). Of the SWM-related positions, women were most likely to be labourers (12%) or post-secondary educated professionals (11%).

Succession issues and potential loss of knowledge in the short and medium term may be an issue for higher management. Individuals in higher management (both SWM and non-SWM) were more likely to be older, have more seniority and be more educated. Employees over the age of 50 (39%) and that had at least ten years of experience (39%) were most likely to be in higher management. Individuals in higher management positions also tended to be more educated, with over one-third having completed a bachelors (37%) or masters (40%) degree.

SWM Industry Challenges

Employers indicated that regulations were perceived as the most important challenge that can affect the growth of their organizations (67% of employers cited it as very important). Regulations, therefore, can have a significant impact on the SWM industry. Detailed survey results show that public employers (73%) as well as employers in waste treatment and disposal organizations (77%) were more likely to judge this issue very important. Key informants interviewed in the preliminary phase of the study also identified regulations and production issues as the main drivers of the industry. They also predicted that more changes in regulations and technology are expected in the future.

5.2 INDUSTRY SIZE

5.2.1 INDUSTRY SIZE – NUMBER OF EMPLOYEES

Both Statistics Canada data as well as the findings of the Employer Survey from this study were used to calculate SWM industry size. A summary of the industry size calculations follows, with a detailed explanation outlined in Appendix C.

ECO Canada's national survey estimated that the SWM industry currently has in excess of 70,000 employees. Given the differences in the definition of SWM between Statistics Canada and ECO Canada, and considering that the Statistics Canada surveys do not cover all existing establishments, this figure is considered a conservative estimate.

1. Determining the Number of Organizations

Industry size calculations began with determining the number of organizations in the SWM industry, of both businesses and government sector establishments, using Statistics Canada data¹².

a. Number of businesses

Statistics Canada evaluated the number of businesses¹³ in the SWM business sector (Table 1).

These figures showed a decrease in the number of businesses over the 2-year period, which contrasted with the growth of operating revenues observed for the same period (see Section 4.2.2). However, according to Statistics Canada, even though some closures were observed, this decline mostly reflected mergers and acquisitions that took place over this two-year period.

Although the equivalent figure for the 2008 survey has not yet been published, Statistics Canada has indicated there has been a slight increase in the number of businesses¹⁴. Since not all businesses are covered by the Statistics Canada survey, the figure of 1,477 businesses can be considered a low estimation of the actual number of SWM businesses in Canada.

b. Number of government sector establishments

For the purpose of the same 2008 waste management industry survey, Statistics Canada has indicated that 862 government establishments were surveyed¹⁵. As with the business sector of SWM, since not all government establishments are covered by the Statistics Canada survey, the figure of 862 government establishments can be considered a low estimation of the actual number of SWM government establishments in Canada.

2. Determine the average number of employees per establishment

The next step calculated the number of employees in SWM per establishment, based on the employer survey data. Analysis was completed for organizations with only one establishment as well as those with more than one establishment. Estimates were calculated for a lower, center and upper bound.

Data from the employer survey indicated that 76% of businesses have one establishment and 24% have more than one. Of government entities, 75% were determined to have one establishment and 25% had more than one (Tables 2 & 3).

Table 1
The Number of Canadian SWM Businesses

	2004	2006	VARIATION	
	Number of Businesses	Number of Businesses	Number of Businesses	%
Business Sector	1,725	1,477	-248	-14

¹² "Waste Management Industry Survey: Business and Government Sectors - 2006", published June 2008.

¹³ Not all existing businesses are included in the Statistics Canada survey. The decision to include businesses or not is made by Statistics Canada using a threshold based on the level of workforce and revenue that varies by province or territory.

¹⁴ Information obtained from key informants with in-depth knowledge of the 2008 Statistics Canada waste management industry survey. (Data collection for this Statistics Canada survey was completed in October 2009, the same time as the ECO Canada survey).

¹⁵ Information obtained from key informants with in-depth knowledge of the 2008 Statistics Canada waste management industry survey. (Data collection for this Statistics Canada survey was completed in October 2009, i.e., at the same time as the ECO Canada survey).

Table 2
Average Estimated Number of Employees in SWM With One Establishment

AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	6.00	7.00	8.00
Government sector	5.00	5.50	6.00

(n=726)

^A Median

^B Trimean

^C Midhinge

Table 3
Average Estimated Number of Employees in SWM With More Than One Establishment

AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	25.00	29.00	33.00
Government sector	7.00	13.50	20.00

(n=726)

^A Median

^B Trimean

^C Midhinge

3. Estimate the number of SWM employees

The number of organizations was multiplied by the number of employees (for organizations having one establishment as well as those with more than one establishment) to arrive at the following estimation of SWM employment (Table 4).

Table 4
Total Estimated Number of Canadian SWM Employees

TOTAL NUMBER OF EMPLOYEES	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	42,600	59,869	80,009
Government sector	5,463	9,354	13,246
Total number of employees	48,063	69,223	93,255

^A Median

^B Trimean

^C Midhinge

Given the differences in the definition of SWM between Statistics Canada and ECO Canada, and considering that the Statistics Canada surveys do not cover all existing establishments, this figure is considered a conservative estimate. The definition used by Statistics Canada does not include NAICS 56291, Remediation Services', whereas that of ECO Canada does (with the exception of waste water treatment). The ECO Canada definition of SWM also includes emerging SWM activities not yet accounted for by Statistics Canada, such as anaerobic digestion/biogasification, and some new landfill gas management and waste-to-energy (WtE) activities. However, employment in these sectors cannot be quantified, for lack of appropriate statistical data.

5.2.2 INDUSTRY SIZE – OPERATING REVENUES

For survey years 2004 and 2006, Statistics Canada evaluated the operating revenues of the Canadian waste management industry (Table 5).

These figures showed a sizable growth of the waste management industry (overall growth of 17%) in terms of operating revenues over the 2-year period, and very stable proportions for the business and the government sectors.

Table 5
Operating Revenues of The Canadian Waste Management Industry

	2004		2006		VARIATION	
	\$ Millions	%	\$ Millions	%	\$ Millions	%
Business Sector	4,417	83	5,176	83	+760	+17
Government Sector	896	17	1,037	17	+141	+16
Total	5,313	100	6,213	100	+901	+17

5.3 INDUSTRY PROFILE

5.3.1 SUMMARY

The SWM industry profile was derived from the information obtained through the employer survey.

Most participating employers:

- Main activities were either in solid waste collection (40%) or as part of the government sector (23%) (Table 6);
- Stated they had only one establishment in Canada (74%);
- Were located in Ontario (44%) and in Quebec (23%) (Figure 5); and
- Did not have facilities in, or provide services in, aboriginal communities (70%).

Positions were mainly full-time (96%) and permanent (93%). The majority of all SWM positions were in unskilled or low skilled occupations, namely labourers (51%) and operators (27%). Higher level positions accounted for the remainder of occupations: higher management (10%), supervisors (6%), post-secondary educated professionals (4%), and technicians (3%) (Table 7).

The vast majority (77%) of positions were held by men. Women (representing 23% of the workforce) were most likely to work in areas not related to SWM duties, particularly general administration (42%). Of the SWM-related positions, women were most likely to be labourers (12%) or post-secondary educated professionals (11%) (Table 8).

Succession issues and potential loss of knowledge in the short and medium term may be an issue for higher management. Higher management (in both SWM and non-SWM related work) were most likely have 10 or more years of experience (39%) and be over the age of 50 (39%). Individuals in higher management positions also tended to be more educated, with at least one-third having completed a bachelors (37%) or masters (40%) degree (Tables 8 and 9).

In addition, over half (56%) of all employees were over 40 years of age (Tables 8 and 9).

On a year-round basis, the organizations surveyed employed an average of 83 employees in total, with an average of 36 employees considered to be working in SWM (Table 10). However, under normal circumstances (i.e., outside of seasonal peaks or shut down periods), most organizations (76%) reported less than 50 employees in total, while half (56%) had less than 10 employees assigned to SWM (Figures 6 and 7).

Detailed results showed the following differences among various organizations:

- Public organizations were more likely to have a higher number of employees in total than private organizations (50 or more employees: 27% vs. 17% respectively);
- Public organizations had a lower number of employees assigned to SWM than private firms (less than 10 employees: 71% vs. 52% respectively); and
- Remediation and other waste management services organizations had a greater number of SWM employees than other types of organizations (50 or more employees: 20% vs. 10% respectively).

5.3.2 SUPPORTING TABLES

Geographic Distribution

Figure 5
Geographic Distribution of Facilities, Plants and Offices

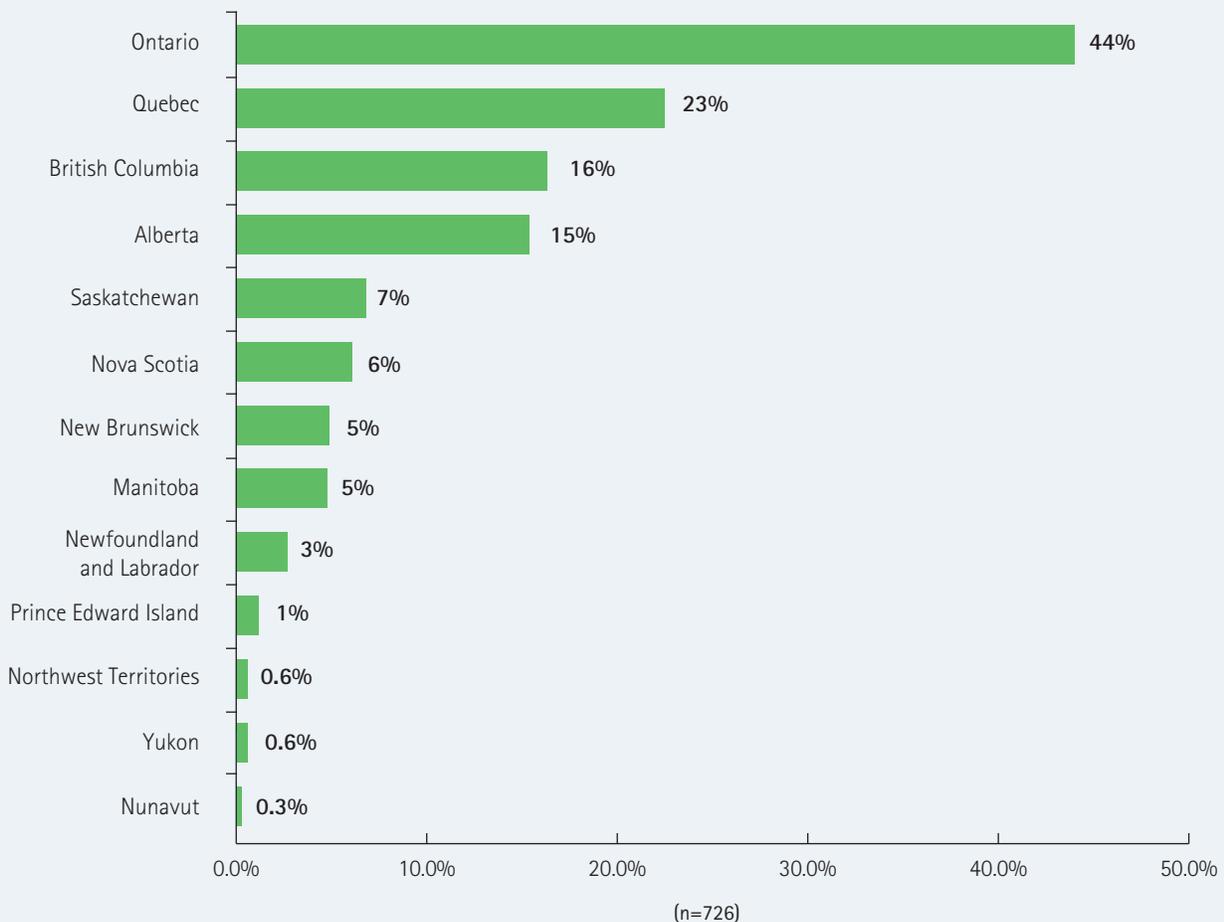


Table 6
Main Solid Waste Management Activity

(n=726)	
SOLID WASTE COLLECTION	40%
• Industrial, Commercial and Institutional (ICI) waste management (e.g., construction, renovation, demolishing (CRD) or excavation waste)	16%
• Municipal Solid Waste (MSW) management	14%
• Transportation of waste from a transfer station	6%
• Transfer station (bulking facility)	4%
GOVERNMENT	23%
• Local, municipal or regional government - Waste management agency or department	19%
• Provincial or territorial government - Waste management agency or department	3%
• Federal government - Waste management agency or department	0.7%
REMEDICATION AND OTHER WASTE MANAGEMENT SERVICES	17%
• Treatment and brokerage of recyclable materials	11%
• Material recovery facilities (MRFs)	4%
• Household hazardous waste management	1%
• SWM consulting services	0.7%
• Waste water treatment	0.2%
• Manufacturing of intermediate or finished products from recovered and recycled materials	0%
• Hazardous waste management that does NOT include residential hazardous waste (i.e., that includes ONLY industrial or agricultural hazardous waste)	0%
SOLID WASTE TREATMENT AND DISPOSAL	10%
• Landfilling	6%
• Residential, commercial and industrial organic waste composting facility	4%
• Waste-to-energy facility (e.g., gasification, digestion, pyrolysis)	0.6%
• Incinerators	0.2%
• Agricultural organic waste composting facility	0%
OTHER SWM ACTIVITIES	9%
• Does not know	0.7%

Occupation Type Distribution by Employment Status

Table 7
Employee Distribution of Occupation Type by Employment Status

(n=183)	Full-time						Part-time						Total	
	Total Permanent		Total Seasonal/ Contractual		Total Full-time		Total Permanent		Total Seasonal/ Contractual		Total Part-Time			
Related to SWM														
Labourers	1,811	51%	47	28%			87	64%	37	62%			1,982	51%
Licensed/heavy equipment operators	899	26%	113	68%			26	19%	12	20%			1,050	27%
Higher management	362	10%	3	2%			4	3%	2	3%			371	10%
Supervisors/ group leaders	199	6%	1	1%			16	12%	2	3%			218	6%
Post secondary-educated professionals	140	4%	1	1%			2	1%	4	7%			147	4%
Technicians/ Technologist	109	3%	1	1%			2	1%	3	5%			115	3%
Total SWM	3,520	100%	166	100%			137	100%	60	100%			3,883	100%
Not related to SWM														
General administration	1,352	47%	2	6%			12	32%	7	10%			1,373	45%
Higher management	253	9%	0	0%			2	5%	0	0%			255	8%
Others	1,300	45%	34	94%			23	62%	66	90%			1,423	47%
Total not related to SWM	2,905	100%	36	100%			37	100%	73	100%			3,051	100%
Total SWM and non-SWM	6,425	93%	202	3%	6,627	96%	173	2%	133	2%	306	4%	6,934	100%

Occupation Type Distribution by Gender and by Age

Table 8
Employee Distribution of Occupation Type by Gender and Age

(n=183)	Gender		Age				
	Women	Men	< 25 years old	25-30 years old	31-40 years old	41-50 years old	over 50 years old
Related to SWM							
Higher management specific to SWM (e.g., VP, Operations, Director, Operations)	9%	21%	3%	13%	17%	22%	22%
Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)	11%	7%	0%	14%	10%	8%	4%
Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)	4%	5%	2%	6%	10%	4%	2%
Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)	7%	11%	6%	9%	7%	12%	11%
Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers)	2%	22%	10%	14%	20%	20%	15%
Labourers (e.g., helpers, handy men)	12%	21%	63%	17%	15%	16%	16%
Not related to SWM							
Higher management (e.g., President, Divisional VP or GM)	9%	7%	4%	5%	4%	3%	17%
General administration (e.g., accounting and finance, marketing and sales, IT, HR)	42%	4%	7%	11%	14%	14%	11%
Other	4%	3%	5%	12%	3%	1%	2%
Total	23%	77%	7%	11%	25%	30%	26%

Occupation Type Distribution by Education and Seniority

Table 9
Employee Distribution of Occupation Type by Education and Seniority

(n=183)	Education level when hired (%)					Seniority (%)				
	Ph.D.	Master's	Bachelor	College/ technical training	High school	0-1 year	2 to 3 years	4 to 5 years	6 to 9 years	10 years and over
Related to SWM										
Higher management specific to SWM (e.g., VP, Operations, Director, Operations)	0%	26%	28%	20%	9%	3%	9%	9%	21%	28%
Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)	85%	34%	43%	15%	4%	14%	21%	21%	13%	14%
Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)	0%	5%	4%	8%	2%	7%	4%	5%	7%	2%
Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)	0%	4%	4%	11%	10%	4%	11%	8%	8%	9%
Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers)	0%	0%	2%	10%	27%	8%	16%	23%	20%	14%
Labourers (e.g., helpers, handy men)	0%	0%	2%	5%	33%	49%	20%	13%	12%	9%
Not related to SWM										
Higher management (e.g., President, Divisional VP or GM)	0%	14%	9%	8%	4%	2%	2%	6%	6%	11%
General administration (e.g., accounting and finance, marketing and sales, IT, HR)	0%	7%	8%	18%	8%	9%	11%	11%	12%	12%
Other	15%	9%	0%	4%	3%	3%	5%	4%	2%	2%
Total	0%	5%	19%	30%	45%	12%	23%	16%	14%	35%

Average Number of Employees

Table 10
Average Estimated Number of Employees in Canadian SWM Industry

(n=701-717)	Full time		Part time		Total
	Permanent	Seasonal/ contractual	Permanent	Seasonal/ contractual	
Average number of employees (total)	60	13.4	4.6	4.6	83
Average number of SWM employees	26	5.7	2.5	1.8	36

Number of Employees per Establishment

Figure 6
Total Number of Employees in Each Establishment

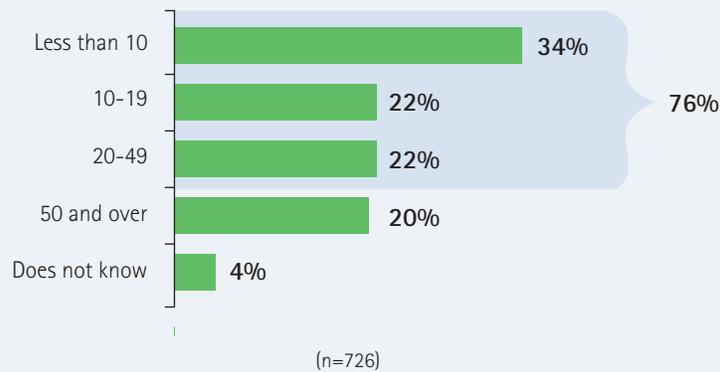
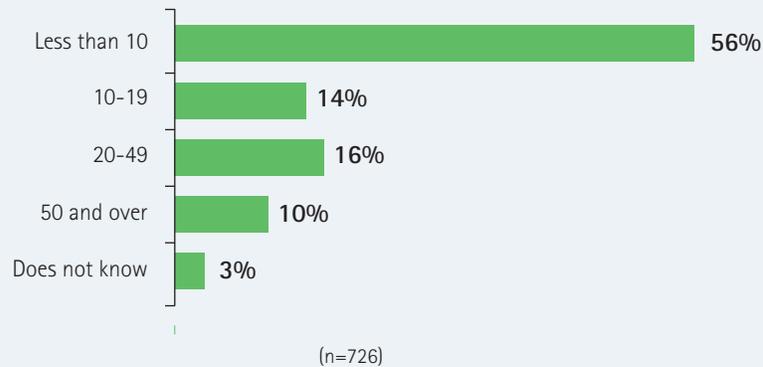


Figure 7
Number of Employees Assigned to SWM Work in Each Establishment



5.4 KEY INDUSTRY CHALLENGES

5.4.1 EMPLOYER PERSPECTIVE

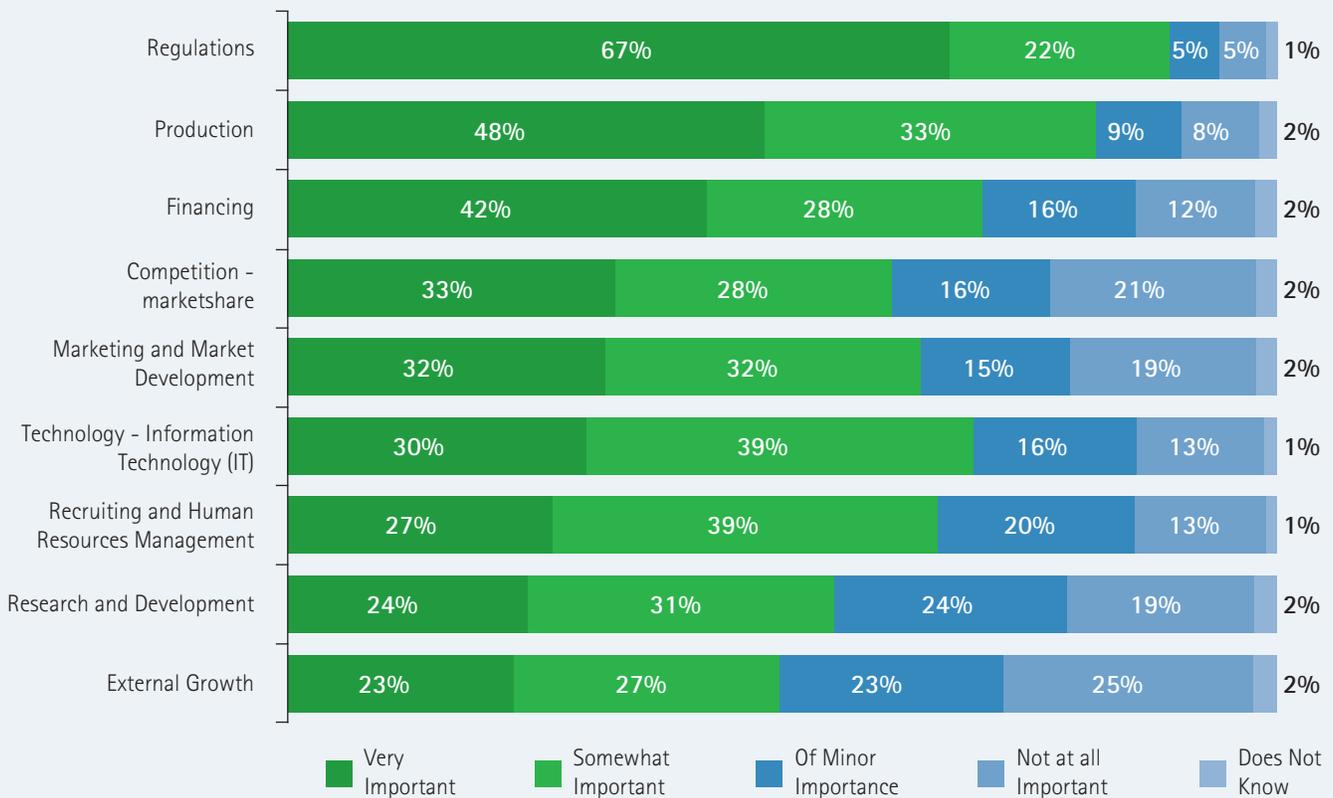
Employers stated that regulations were the most important challenge that can affect the growth of their organization--67% cited this as very important (Figure 8). Regulations, therefore, can have a significant impact on the SWM industry. Other very important challenges mentioned were in the areas of production and financing.

Employers in waste treatment and disposal organizations were more likely to judge regulations as very important (77%) when compared to all organizations (67%).

Detailed survey results showed that public employers were more likely than private organizations to cite the following issues as very important:

- Regulations (73% and 65% respectively); and
- Financing (50% vs. 40% respectively).
- Marketing and market development (36% and 18% respectively);
- Competition (41% and 6% respectively);
- External growth (27% and 8% respectively); and
- Production (53% and 32% respectively).

Figure 8
Importance of Potential Challenges that may Affect the Growth of SWM Organizations



(n=726)

5.4.2 KEY INFORMANT PERSPECTIVE

According to the key informants, regulations are expected to become more complex over time. Although regulations can vary greatly across provinces, territories, municipalities or regions, overall regulatory trends were cited as:

- Higher standards for landfills, particularly as regards capturing biogases and leachate;
- Higher standards for incinerators/waste-to-energy plants;
- More energy recovery laws to avoid GHG emissions;
- Increased pressure to harmonize legislation and regulations across provinces and regions; and
- More products/materials to be designated in product stewardship or Extended Producer Responsibility (EPR) programs.

Regulatory changes are expected to involve tightening of landfill standards, particularly to control leachate and greenhouse gas emissions, and more materials banned from landfills. There is a trend away from prescriptive regulations in some provinces towards results-based regulations. Diversion from disposal is now a top priority for most municipal and provincial governments, which is leading to higher and higher recycling targets for residences and businesses and the designation of more materials for handling via product stewardship programs and Extended Producer Responsibility (EPR), in which manufacturers are responsible for end-of-life management of products and packaging.

Recycling and material recovery facilities (MRFs) will grow, as landfill is increasingly being seen as a last resort solution. MRFs will be able to process a wider range of materials, including glass and textiles, possibly disposable diapers. More equipment is being installed, and is becoming more efficient. New manufacturing methods are being developed to use processed waste, such as a wider range of plastics. Therefore, there will be more new jobs in occupations at recycling and composting facilities to deal with construction and demolition recycling for SWM consultants, researchers and managers, and at municipalities (department people, educators).



Regulatory changes are expected to involve tightening of landfill standards, particularly to control leachate and greenhouse gas emissions, and more materials banned from landfills.



While there are many technological improvements under development to improve environmental and financial performance of the sector, most of these are still several years from implementation because many are still in demonstration mode and regulatory changes take time. Increased public awareness of the urgency to address environmental challenges may ease the introduction of new SWM technologies. Potential improvements are expected in areas such as waste-to-energy, automation of collection and sortation, and the ability to reuse and recycle more materials. These improvements mean there will be a need for mechanical, civil, electrical and chemical engineers with practical knowledge of the new SWM technologies and systems. The trend towards automation and waste diversion will likely reduce the need for certain unskilled positions, such as labourers, and increase the need for specially-trained engineers, consultants and designers in the growing areas of recycling, product stewardship and EPR. As companies adopt sustainable practices, such as 'Design for the Environment', or 'DfE', many products and packaging that previously showed up in the traditional waste stream will instead be managed in 'cradle-to-cradle' re-manufacturing systems. The people managing these systems aren't currently classified as waste management professionals, but a new category of trained EPR professional appears to be emerging.



6. SWM INDUSTRY LABOUR MARKET TRENDS

6.1 SUMMARY

Employer Perspective

The survey showed that SWM employment over the next three years will grow by an annual compound rate of 6% per year. Over 4,000 new SWM employees will be required in the next three years, with 80% of the new positions being comprised of labourers (45%) and operators (35%).

Although most (59%) organizations did not currently experience difficulties in hiring qualified candidates, more than half (52%) of the employers surveyed expected to encounter hiring difficulties in the next five years. Current and future hiring difficulties were greatest for labourers and operators. In addition, over half of respondents indicated that their staff turnover was greatest at the labourer level (53%), followed by operators (24%).

To recruit employees, almost half (50%) of the employers relied on ads in the media and another 27% used the Internet.

Health and safety at work is by far the most important challenge in human resource management in the SWM sector (54% stated it was very important). Other key challenges were staff turnover (30%) and absenteeism/sick leave (30%).

Most organizations used various human resource management practices, particularly job and task descriptions (82%) and training and development programs (77%). Only a third (34%) of surveyed organizations offered incentive programs to attract and retain staff, mostly in the form of bonuses (49%). Among the HR management practices that employers currently did not use, the top three practices they would consider implementing for future HR development in their organization were:

- Non-monetary incentives/benefits package;
- Recruiting and selection process; and
- Training and development programs.

The majority of employers currently offered CPR or health and safety courses (60%). Many also offered in-house seminars (43%), further education/training (42%) and off-site workshops, seminars or conferences (41%).

Most organizations' 2008 training budgets were \$10,000 or less (61%) and most 2009 budgets were similar to those in 2008 (68%). Over the next three years, 43% expected the number of employees trained to increase, while one-third (36%) expected the number of hours to increase.

Employee Perspective

The focus groups revealed that entry into the SWM industry is relatively undefined, as most participants did not originally intend to work in SWM. The job search method they relied on most was the Internet. The general view seemed to be that labourer/driver jobs were easy to find, but jobs in public organizations were harder to come by.

In general, job satisfaction is high, particularly with working schedules, the physical requirements of their work, general working conditions and relationships with colleagues. Women were more likely to be satisfied with the number of working hours, their working schedule, social benefits, and relationships with colleagues, as well as with the physical environment of the workplace. Employees in public organizations were more satisfied with their working conditions, the social benefits offered by their employer, the relationships with their colleagues, their overtime pay, and the work-life balance environment.

On-the-job challenges mentioned by participants included dealing with customers, adapting to the changes in policies and regulations regarding SWM, and dealing with the slow pace of decision-making in various levels of government organizations.

Most participants have attended in-house training, particularly health and safety courses for labourers and supervisors. Several employees from public organizations mentioned that the budget for training has decreased due to the economic downturn. Employees with post-secondary education were interested in participating in courses to develop soft skills such as communications, human resources and project management.

The absence of opportunities for advancement would motivate many participants, particularly those with post-secondary education, to leave their jobs, while others would change for better-paid jobs.

6.2 DETAILS OF EMPLOYER PERSPECTIVE

The findings presented below are representative of respondents who work in Waste Management and Remediation Services (NAICS 562). Out of 853 respondents, 726 were classified as NAICS 562, and 127 as Non-NAICS 562. Although the nature of the information obtained from both groups is comparable, it could not be established whether or not the second group was representative of non-NAICS 562 establishments, so their results were not included in the findings.

6.2.1 RECRUITING

Employment Trend – Last Three Years

According to employers, recruitment in some occupations has remained relatively more stable than others over the past three years. Labourers (30%) and operators (25%) were the most likely positions to experience an increase in the number of employees. However, recruitment of technicians/technologist remained most stable with two-thirds (66%) of employers stating the number of employees stayed the same while only 12% noted an increase in the number of employees (Figure 9).

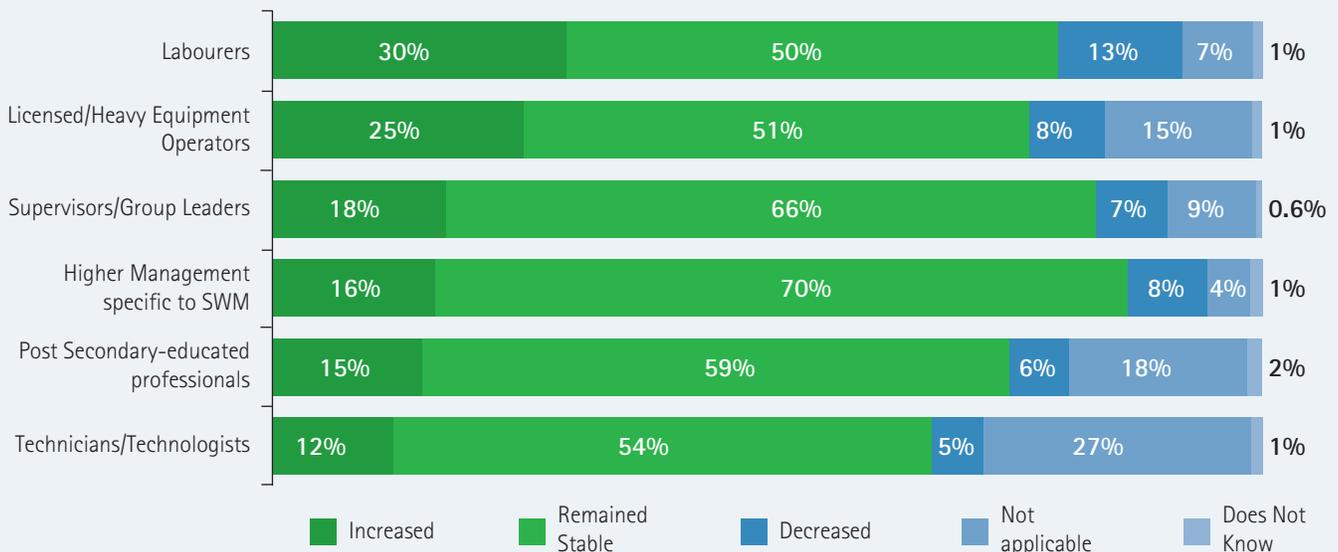
Those organizations with a higher number of employees (50+) were more likely to mention an increase in employment, regardless of the occupation, than smaller organizations (Table 11).

Employment Trend – Next Three Years

When asked to predict the change in the number of employees over the next three years, employers anticipated the most increases would be in labourer (43%) and operator (34%) positions. Employment was anticipated to be relatively stable for higher management (79%), post-secondary educated professionals (61%) and supervisors (64%) (Figure 10).

Again, the proportion of employers expecting a rise in employment was higher among larger organizations (50+ employees), regardless of the occupation, than smaller organizations (Table 11).

Figure 9
Change in Number of Employees Over Past Three Years by Occupation Type



(n=726)

Figure 10
Projected Change in Number of Employees Over Next Three Years by Occupation Type

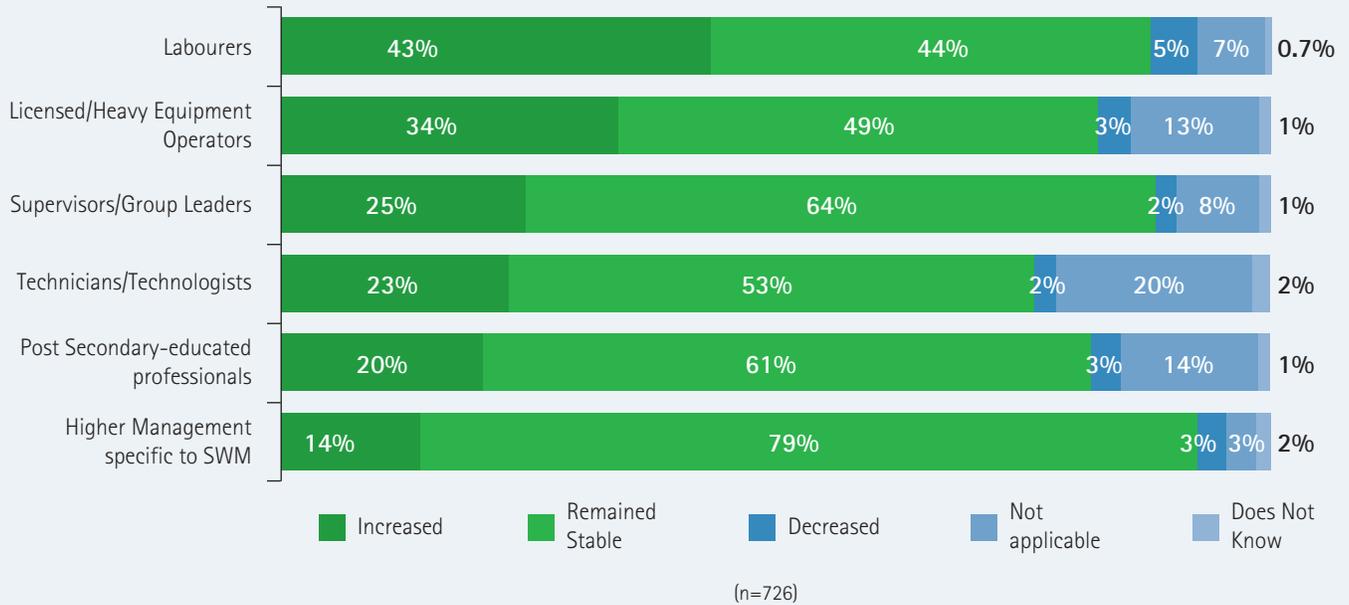


Table 11
Change in Number of Employees by Organization Type and Size
 (% STATING AN INCREASE IN EMPLOYEES)

(n=726)	Organization Size (%)				Organization Type (%)			
	Last 3 years		Next 3 years		Last 3 years		Next 3 years	
	50+ Employees	All Organizations	50+ Employees	All Organizations	Private	Public	Private	Public
Related to SWM								
Higher management specific to SWM (e.g., VP, Operations, Director, Operations)	33%	16%	33%	14%	16%	16%	15%	11%
Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)	39%	15%	49%	20%	15%	16%	21%	20%
Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)	36%	12%	51%	23%	12%	13%	23%	23%
Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)	46%	18%	54%	25%	19%	12%	28%	13%
Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers)	41%	25%	48%	34%	27%	20%	38%	22%
Labourers (e.g., helpers, handy men)	55%	30%	68%	43%	32%	30%	48%	28%

Projected Employment Growth – Next Three Years

Recruitment of projected new hires shows that, over the next three years, SWM employment is expected to grow by an annual compound rate of 6% per year, with 80% of the new positions being comprised of labourers (45%) and operators (35%).

The employers surveyed¹⁶ expected to hire 615 new positions by 2012 (Table 12). These same employers represent 3,520 full-time, permanent employees assigned to SWM (Table 7). From these two numbers, it was calculated that employers expect to increase the number of employees in SWM-related positions by 18% by 2012. This corresponds to a compound annual growth rate of SWM employment of 6% over the next three years¹⁷.

Most new positions will be for unskilled or low skill positions, mostly labourers (35%) and licensed/heavy equipment operators (45%). Fewer (20%) positions were expected with higher level positions (Table 12). However, key industry drivers ranked by employers indicated that policy changes, production and financing challenges could greatly affect the types of hires an organization will require in the future (Figure 8, section 4.4).

Table 12
Anticipated New Hires by 2010

(n=183) Related to SWM	NEW POSITIONS		EXISTING POSITIONS ¹⁸	
	Count	Percentage	Count	Percentage
Higher management	41	7%	21	5%
Post secondary-educated professionals	37	6%	10	3%
Technicians/Technologists	18	3%	28	6%
Supervisors/group leaders	23	4%	28	6%
Licensed/heavy equipment operators	218	35%	123	28%
Labourers	278	45%	229	52%
Total Number of Positions	615	100%	439	100%

Tools Used to Recruit Employees

Half (50%) of the employers surveyed relied on ads in the media to recruit employees, and another quarter (27%) relied on the Internet. To a lesser extent, employee referrals (19%) and job banks (12%) were also used. All other recruiting tools were used by less than 10% of employers (Figure 11).

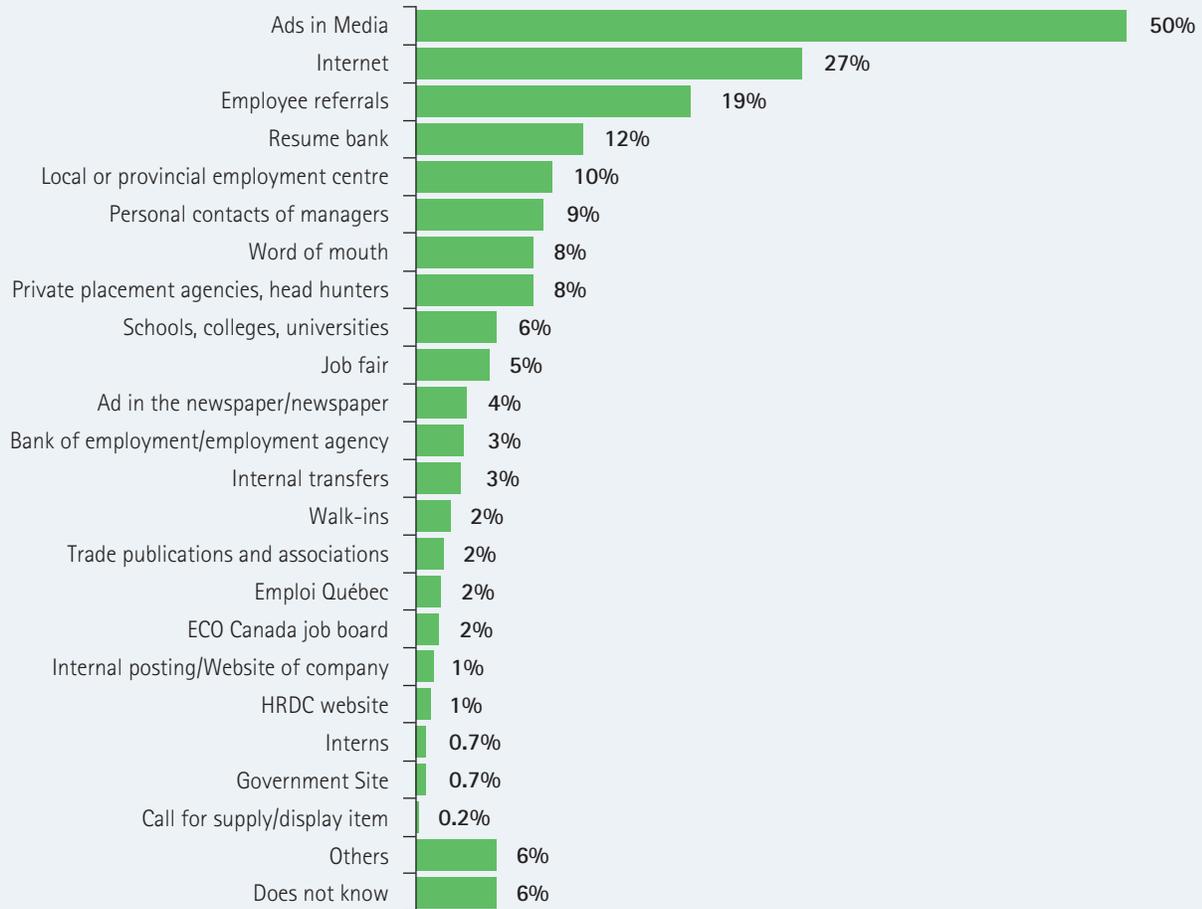
Use of media ads and the Internet was higher among public organizations (73% and 36%, respectively) and organizations with a total of 50 employees and over (60% and 45%, respectively).

¹⁶ Based on 183 respondents from the Employer Survey Questionnaire 2, Appendix D.

¹⁷ The margin of error associated with this figure is $\pm 6.8\%$, 19 times out of 20.

¹⁸ Corresponds to replacements, due to employees leaving their current employer or retiring.

Figure 11
Main Recruitment Tools in SWM



(n=726)

Difficulties in Hiring Candidates Today and in the Next Five Years

Although the majority (59%) of organizations did not currently experience difficulties in hiring qualified candidates, some had encountered difficulties hiring labourers (17%), operators (15%) and supervisors (13%) (Figure 12). Half (52%) of the surveyed employers expected to encounter hiring difficulties in the next five years (Figure 13). Difficulties were expected to be most prevalent for licensed/heavy equipment operators (22%) and labourers (21%), which were the types of employees that the employers said they will need to hire the most in the future.

“
Half of the surveyed employers expected to encounter hiring difficulties in the next five years.
”

Figure 12
Current Difficulty Hiring Qualified Candidates
by Occupation Type

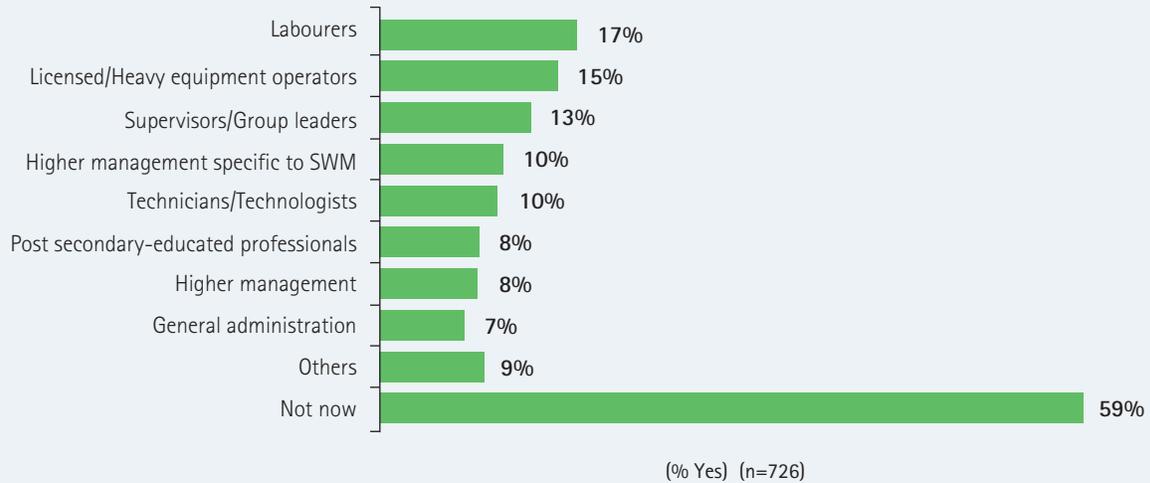
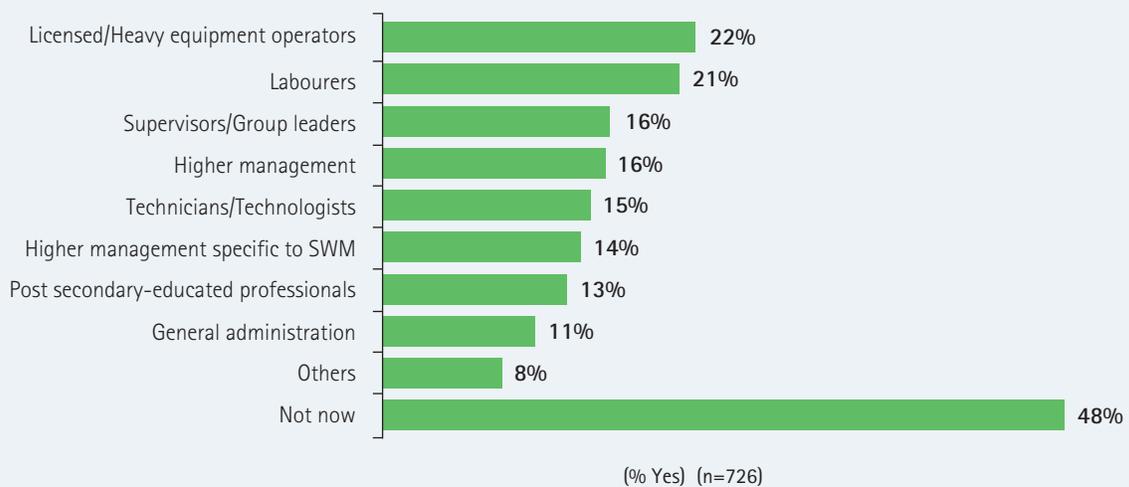


Figure 13
Anticipated Difficulty Hiring Qualified Candidates in Next
Five Years by Occupation Type



6.2.2 RETENTION

Staff Turnover

For over half the organizations surveyed, staff turnover was greatest at the labourer level (53%). Labourer staff turnover was highest among those organizations offering remediation and other waste management services (69%) and private organizations (55%) (Figure 14).

Employers in solid waste collection were more likely to indicate a high turnover rate for licensed/heavy equipment operators (32%).

Incentive Programs for Retaining Staff

A third (34%) of surveyed organizations offered incentive programs to attract and retain staff. Of those that offered incentives, the most prevalent types of programs were bonuses (49%) and better than average benefits (27%) (Figure 15).

In general, incentive programs were more likely to be offered in:

- Organizations in Alberta (49%);
- Larger organizations (50 employees and over; 47%);
- Organizations in remediation and other waste management services (41%); and
- Private organizations (36%).

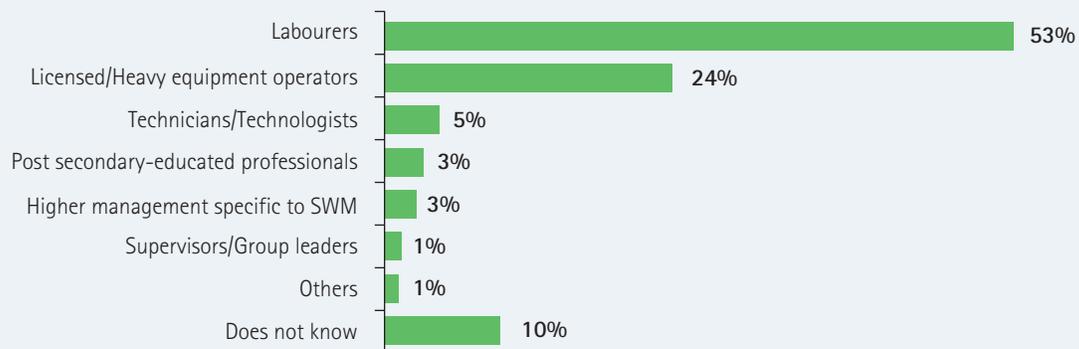
Detailed results showed that private organizations were more likely to offer bonuses (54%), while public organizations were more likely to rely on competitive salaries (33%), overtime pay (23%), and RRSP or pension plan contributions (21%).



For over half the organizations surveyed, staff turnover was greatest at the labourer level (53%).

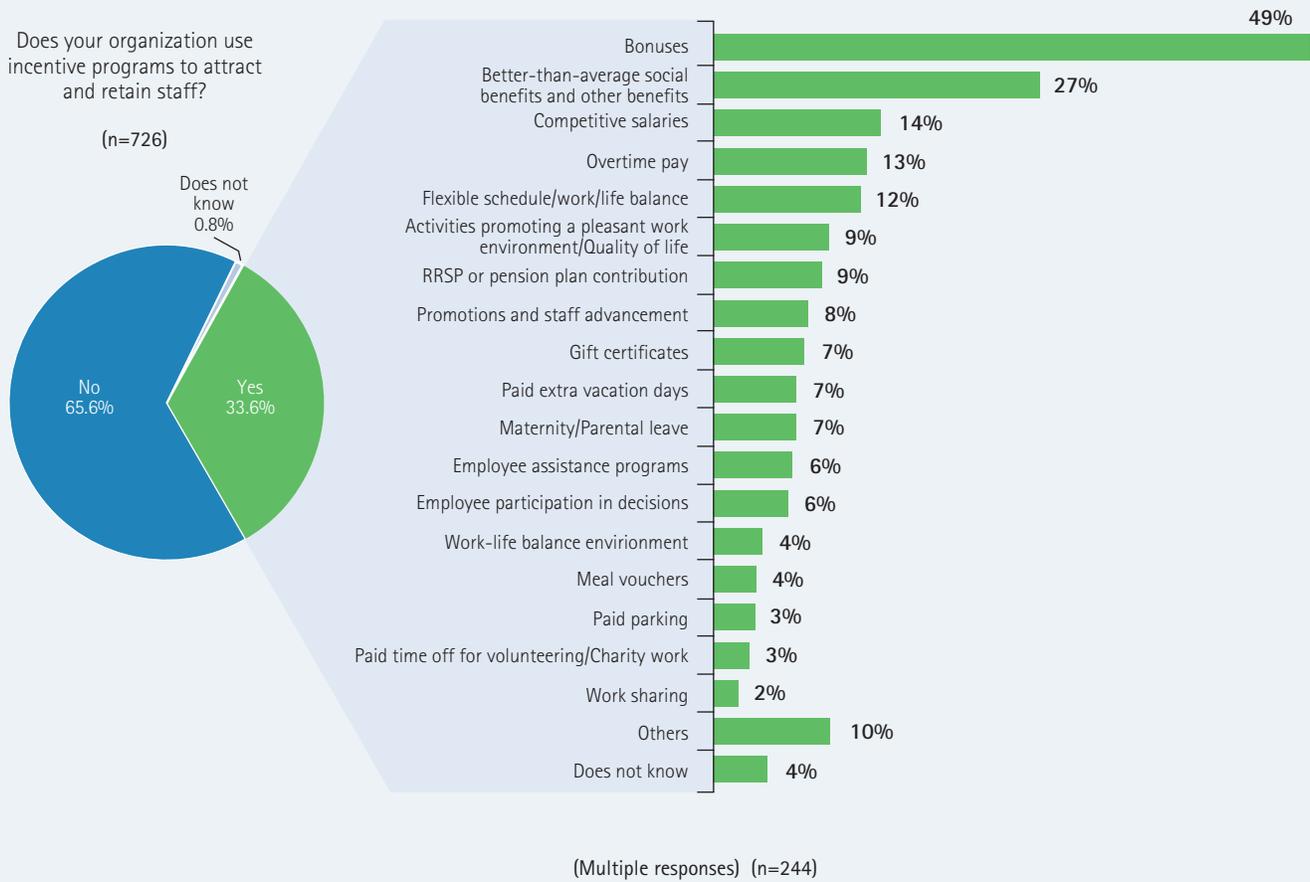


Figure 14
Greatest SWM Turnover by Occupation Type



(n=378)

Figure 15
Incentive Programs for Retaining Staff



6.2.3 HUMAN RESOURCE MANAGEMENT PRACTICES

Main HR Challenges

According to employers, health and safety at work was the most important challenge in human resource management in the SWM sector (54% stated it was very important). Other key challenges were staff turnover (30%) and absenteeism/sick leave (30%). Employers encountered at least some challenges in all of the categories listed in Figure 16.

Current HR Management Practices

Most organizations used many human resource management practices, particularly job and task descriptions (82%) and training and development programs (77%) (Figure 17). Larger (50 employees and over) and public organizations were most likely to use these human resource management practices (Table 13).

Future HR Management Practices

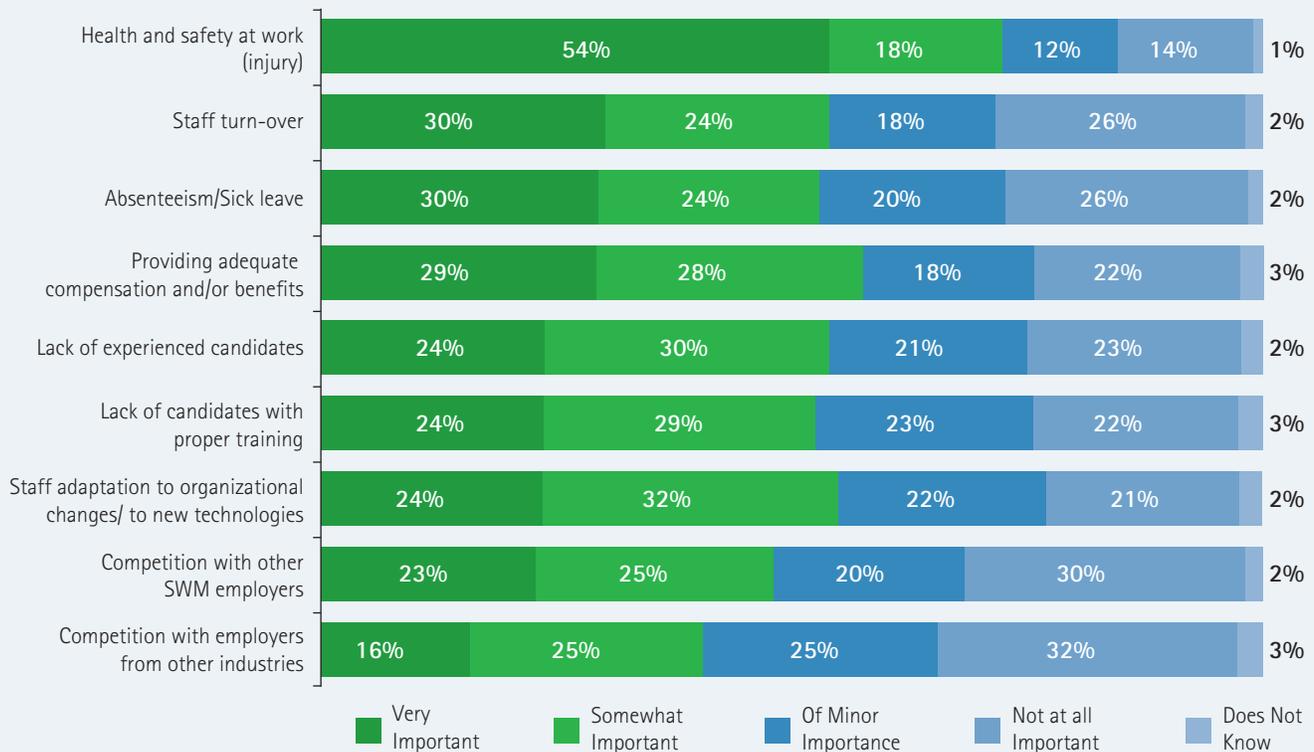
Among the HR management practices that employers did not currently use, the following were considered very important for future HR development in their organization (Figure 18):

- Non-monetary incentives/benefits packages;
- Recruiting and selection process;
- Training and development programs;
- New employee orientation programs;
- Work enrichment programs; and
- Job and task descriptions.

Public organizations were more likely than private organizations to consider formal performance evaluation and goal setting (56% vs. 36%), graduated retirement (47% vs. 32%) and career planning (43% vs. 30%) as being important.

Employers were not leveraging some of the key HR practices they deemed to be important. The recruitment and selection process was the second most important HR practice cited but was not currently being used by a third (33%) of the organizations. However, training and development programs, new employee orientation programs, and non-monetary incentives/benefits packages were ranked among the four most important practices in both cases (Figures 17 and 18).

Figure 16
Importance of Potential Human Resource Challenges That May Affect SWM Organizations



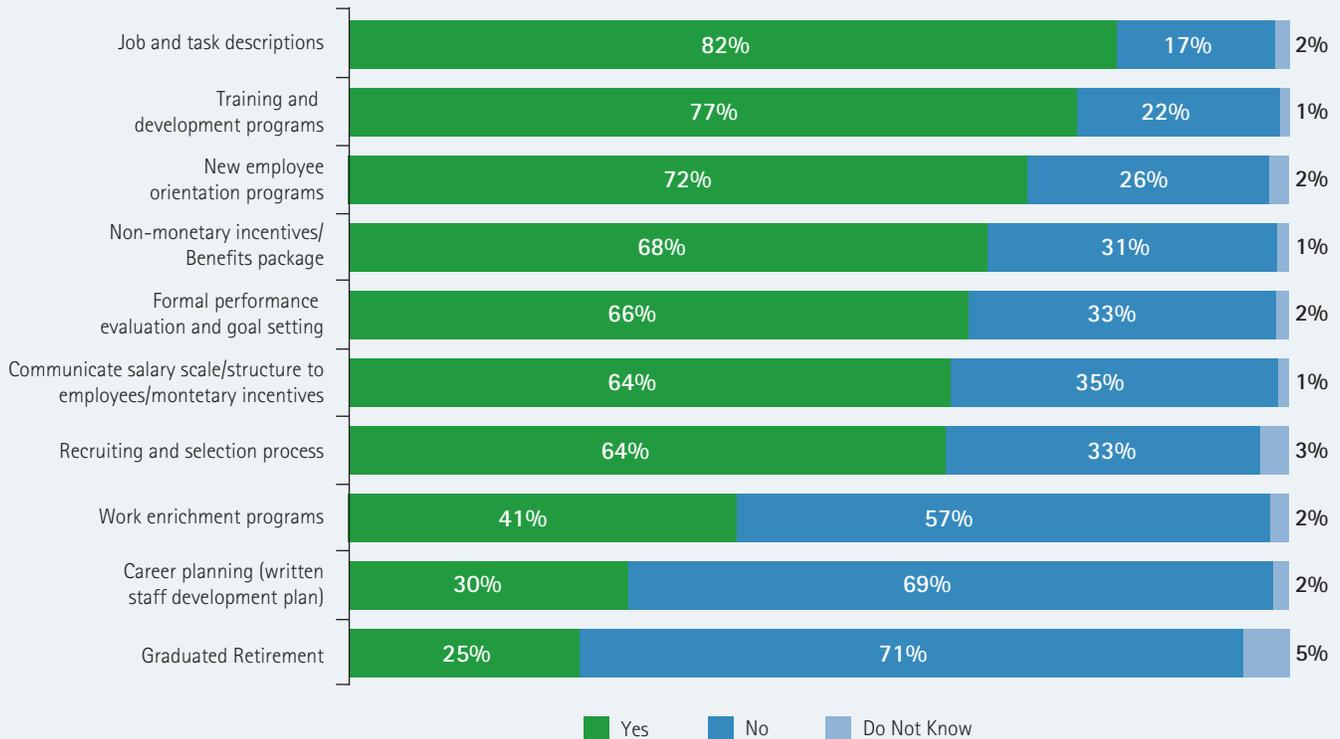
(n=726)

Table 13
Current HR Management Practices by Organization Type and Size

(% USING PRACTICE)

(n=726)	Organization Size (%)		Organization Type (%)	
	50+ Employees	All Organizations	Private	Public
Current HR management practices with SWM employees				
New employee orientation programs	96%	72%	69%	83%
Recruiting and selection process	78%	64%	59%	78%
Job and task descriptions	97%	82%	79%	92%
Work enrichment programs	64%	41%	41%	44%
Training and development programs	100%	77%	74%	90%
Career planning (written staff development plan)	47%	30%	26%	42%
Formal performance evaluation and goal setting	88%	66%	63%	76%
Communicate salary scale/structure to employees	77%	64%	63%	67%
Non-monetary incentives/benefits package	95%	68%	65%	78%
Graduated retirement	44%	25%	22%	35%

Figure 17
Human Resources Management Practices in SWM Organizations



(n=726) (Multiple Responses)

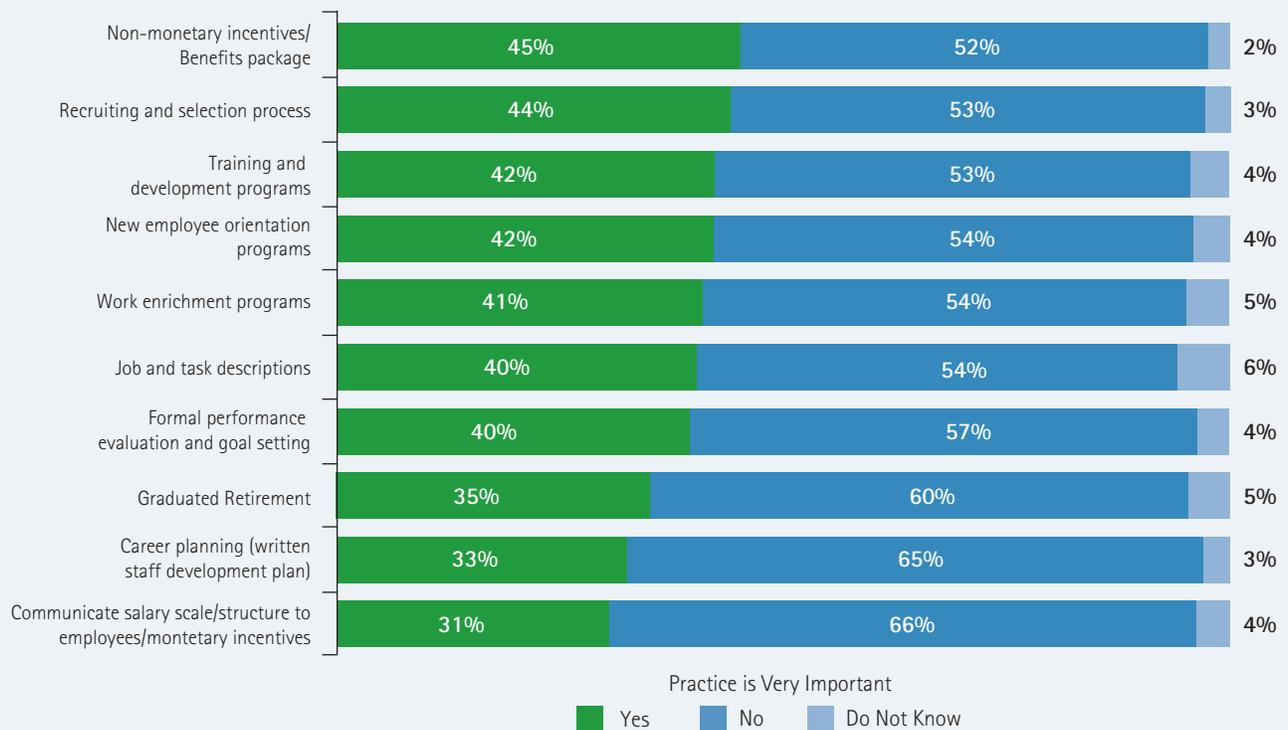
“

According to employers, health and safety at work was the most important challenge in human resource management in the SWM sector.

”



Figure 18
Importance of HR Practice for Future HR Development in SWM Organizations



(n= 164-548 Depending on the practice)*

* Among respondents who do not currently use this practice in their organization.

6.2.4 STAFF DEVELOPMENT AND TRAINING

Education Level Requirements for New Hires

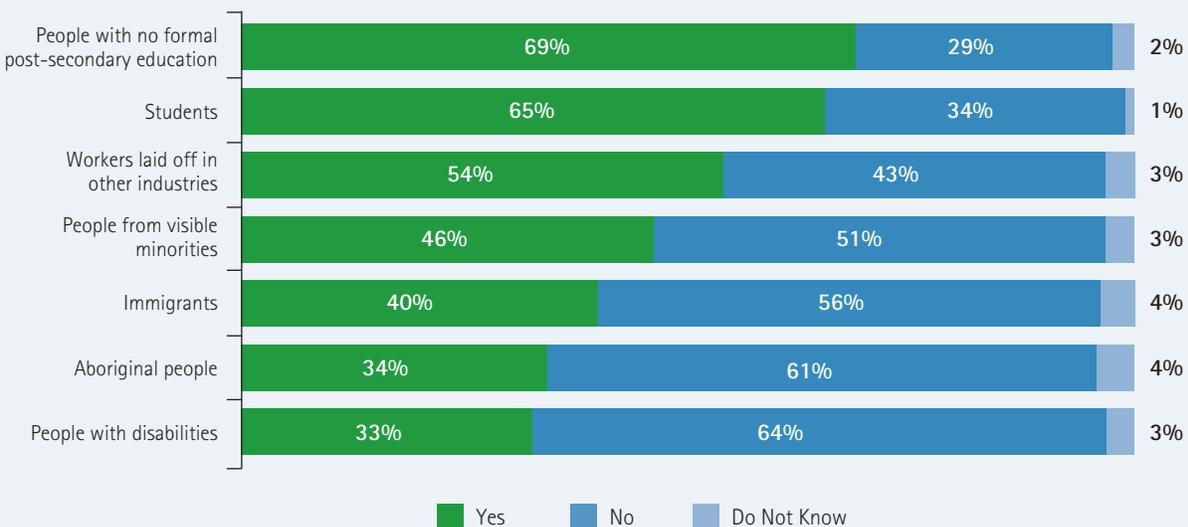
To fulfill their labour needs, over half of the employers surveyed were more likely to recruit people with no formal post-secondary education (69%), students (66%) and workers laid off in other industries (54%) rather than visible minorities (46%), immigrants (40%), Aboriginal people (34%) or people with disabilities (33%) (Figure 19).

The high percentage of employees without formal post-secondary education hired confirmed the results shown in Table 9, which indicated that most labourers and operators only had high school education when hired, as opposed to employees in more skilled occupations.

Detailed results show that larger organizations (50 employees and over) were more likely to hire people from all groups. Private organizations were more likely than public organizations to hire people with visible minorities, immigrants and workers laid off from other industries. Public organizations were more likely than private firms to hire students (Table 14).

“ Private organizations were more likely than public organizations to hire people with visible minorities, immigrants and workers laid off from other industries. Public organizations were more likely than private firms to hire students. ”

Figure 19
Type of Employee Recruited to Fulfill Labour Needs
(Currently and in the Past)



(n=726)

Table 14

**Type of Employee Recruited to Fulfill Labour Needs by Organization Type and Size
(% HIRING)**

(n=726) Current hiring practices with SWM employees	Organization Size (%)		Organization Type (%)	
	50+ Employees	All Organizations	Private	Public
People with no formal post-secondary education	86%	67%	70%	64%
Students	77%	65%	63%	74%
Workers laid off in other industries	69%	54%	56%	48%
People from visible minorities	74%	46%	49%	38%
Immigrants	78%	40%	44%	28%
Aboriginal people	55%	34%	34%	36%
People with disabilities	53%	33%	31%	37%



Employers stated that employee retention after training and knowledge transfer to job performance were the most challenging training issues they faced.



Current Staff Development and Training Tools

Most employers currently offered CPR or health and safety courses (60%) to meet their employees' development plans, as well as in-house seminars (43%), further education/ training (42%) and off-site workshops, seminars or conferences (41%) (Figure 20).

Detailed results show that larger organizations (50+ SWM employees) were more likely to use all the listed development and training tools. In general, public organizations were more likely than private firms to offer training tools (Table 15).

Future Staff Development and Training Tools

CPR or health and safety courses were rated as the most useful training tools for future human resource development (37%), followed by in-house seminars (32%) (Figure 21).

Larger organizations (50 employees and over) were most likely to find value in in-house seminars (56% for large firms vs. 32% for all organizations).

Public organizations were also more likely than private firms to consider the following training methods in the future:

- In-house seminars (41% vs. 30%);
- Online seminars (23% vs. 14%);
- Off-site seminars (38% vs. 24%); and
- Further education and training (42% vs. 26%).

Training Issues

Employers stated that employee retention after training (28%) and knowledge transfer to job performance (27%) were the most challenging training issues they faced. However, employers also faced several other issues, most notably, a lack of employee interest in training (17% a lot and 46% somewhat). Few employers viewed the availability of providers and instructors or training offers as a training issue (Figure 22).

Figure 20

Staff Development and Training Tools Used to Meet Employee Development Plans

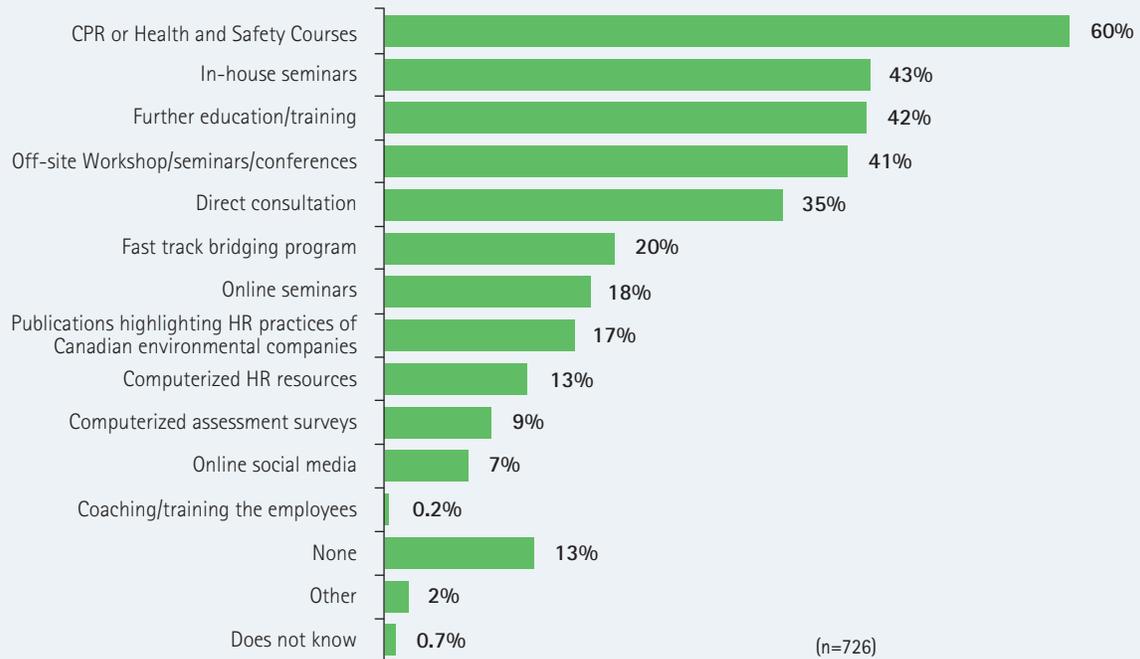


Table 15

Current Training Tools by Organization Type and Size

(% USING TOOL)

(n=726) Current training tools with SWM employees	Organization Size (%)		Organization Type (%)	
	50+ Employees	All Organizations	Private	Public
CPR or Health and Safety Courses	78%	60%	56%	74%
In-house seminars	76%	42%	39%	55%
Further education/training	68%	42%	36%	63%
Off-site workshops/seminars/conferences	68%	41%	35%	62%
Direct consultation	55%	35%	35%	36%
Fast track bridging program	40%	20%	21%	19%
On-line seminars	32%	18%	15%	30%
Publications highlighting PR practices	37%	17%	15%	21%
Computerized HR resources	27%	13%	11%	18%
Computerized assessment surveys	19%	9%	8%	12%
On-line social media	12%	7%	7%	9%

Figure 21
Staff Development and Training Tools of Most Use In Future to Meet Employee Development Plans

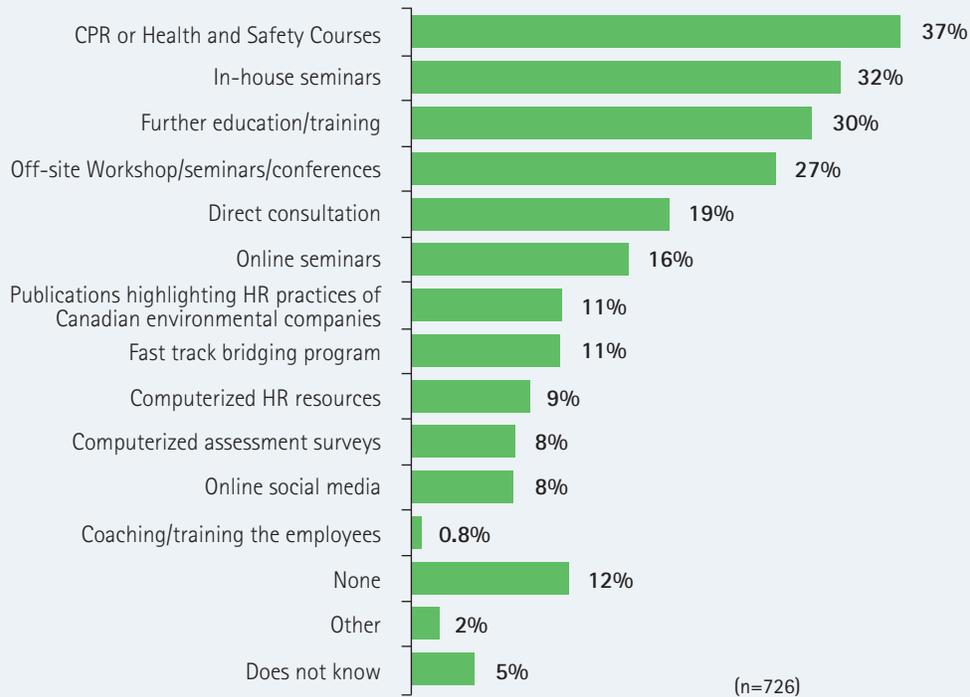
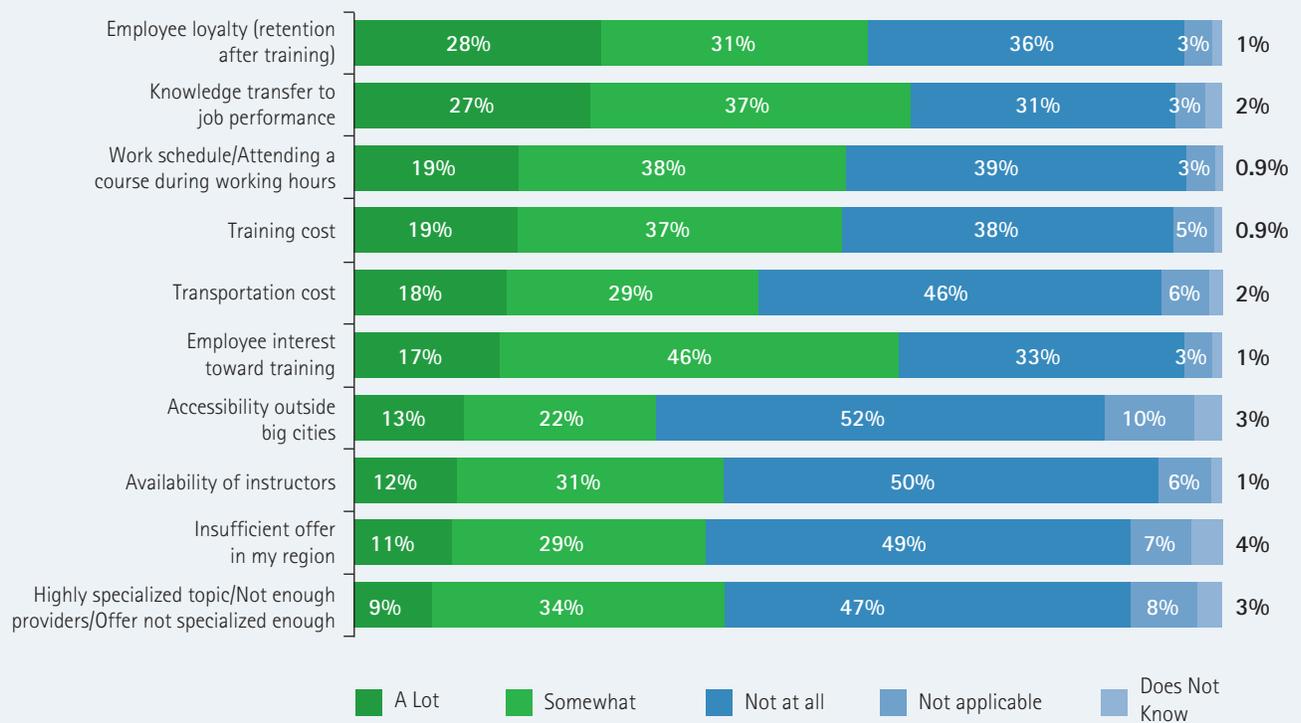


Figure 22
SWM Training Issues Faced by Employers



2008 Training Budget

In 2008, most (61%) organizations' budgets for training were equal to or less than \$10,000. Organizations with less than 10 employees were more likely to spend less money on training (61% spent less than \$5,000 in 2008 compared to 41% spending less than \$5,000 in 2009 for all organizations) (Figure 23).

2009 Training Budget

Most (68%) respondents said that compared to 2008, their training budgets for 2009 were similar. Fifteen percent said that their budgets had increased, while 10% experienced a decrease. Public organizations and organizations of 50 employees and over were more likely to indicate an increase (25% and 26%, respectively).

Training for the Next Three Years

Over the next three years, employers expect the amount of training to either remain stable or increase. Half (50%) of the surveyed employers predicted the number of employees who will be trained to remain stable, while 43% expected the number of employees trained to increase. Slightly more employers (57%) expected that the number of training hours per employee to remain stable, while one-third (36%) expect the hours to increase (Figures 24 and 25).

Private firms (46%) and larger organizations (50 SWM employees or more) (70%) were most likely to expect the number of employees trained to increase. Larger organizations (50 SWM employees or more) (55%) also anticipated an increase in the training hours per SWM employee.

Figure 23
Size of Last Year's SWM Training Budget (2008)

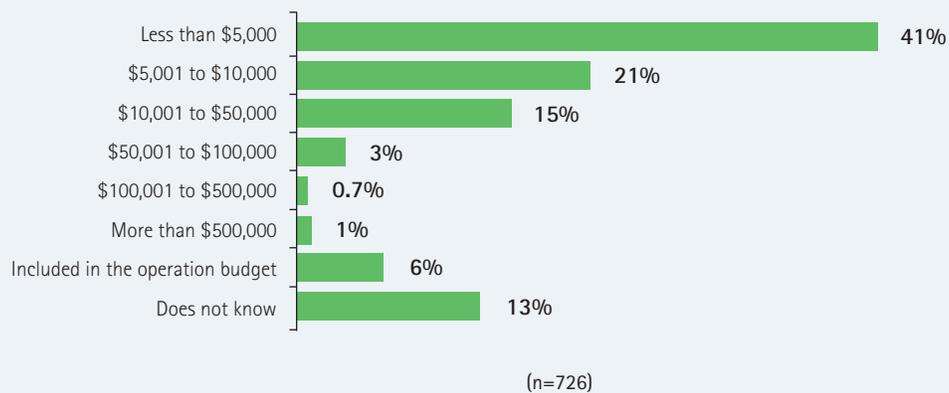


Figure 24
Change in Expected Number of Employees to be Trained Over Next Three Years

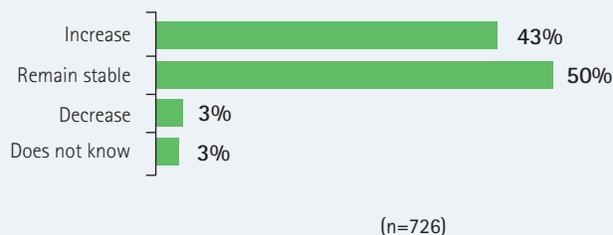
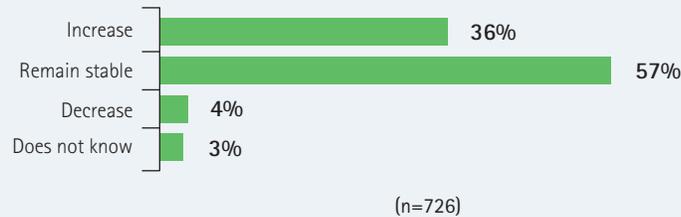


Figure 25
Change in Average Expected Number of Training Hours per SWM Employee Over Next Three Years



6.3 DETAILS OF EMPLOYEE PERSPECTIVE

To gather an employee perspective of the key labour issues covered by the study, five focus group meetings were conducted by Zins Beuchesne and Associates on behalf of ECO Canada. The focus groups were held between October 27th and November 9th, 2009 with employees from the SWM industry in Calgary, Vancouver, Montreal, Halifax and Toronto. The main objective of the focus groups was to research career pathways, job satisfaction, employee retention and human resource management practices, as well as the education, training and professional development needs of workers.

6.3.1 CAREER PATHWAY AND JOB SEARCH

Most participants said they had not intended to work in SWM. However, some employees in consulting or working for a public organization specifically planned to work in SWM, or at least in the environmental sector, and planned their education accordingly. A typical career path was not identified, especially for workers at lower levels.

According to participants, labourer/driver jobs were fairly easy to find, particularly due to high turnover rates. The opposite was observed in public organizations, where employees stayed longer and jobs specific to SWM were not as common.

Most people relied on the Internet when looking for a job. Some used a variety of online job posting vehicles including large cross-sectoral websites such as Monster, government or local municipality websites. A minority mentioned the ECO Canada job board. Some also used their network once they had gained experience. However, participants mentioned that driver and labourer jobs were mostly advertised in the newspapers.

Most participants did not know of ECO Canada before being contacted for the focus group. Several proposed that ECO Canada should be more visible on job websites. Services they suggested include a mentoring program, training and certification courses, as well as more job postings outside big cities. Some participants showed enthusiasm toward an online course finder.

6.3.2 JOB SATISFACTION

In general, participants expressed being highly satisfied with their job, particularly with the relationships with their colleagues, learning opportunities and the diversity of their tasks.

Participants were asked to complete an individual exercise regarding their satisfaction with different aspects of their job¹⁹. Table 16 shows that employees were more satisfied with...

- The physical requirements of their work;
- Their working schedule;
- Their working conditions in general;
- The work-life balance environment;
- Their relationships with their colleagues; and
- The geographical situation of their organization.

On the other hand, they were less satisfied with the opportunities for advancement, and the social benefits offered by their employer.

¹⁹ Results are based on the number of participants. Given the small sample size, results may not be extrapolated to the entire population.

Table 16
SWM Employee Satisfaction With Specific Aspects of Their Jobs

Number of Mentions by Employees (n=40)	VERY SATISFIED	SOMEWHAT SATISFIED	NOT VERY SATISFIED	NOT AT ALL SATISFIED	DO NOT KNOW/ NOT APPLICABLE	AVERAGE SCORE ON A SCALE OF 1 TO 4*
The physical requirements of your work	23	14	0	0	3	3.6
Your working schedule	23	13	1	1	2	3.5
Your working conditions in general	22	14	2	0	2	3.5
The work-life balance environment	20	14	5	0	1	3.4
Your relationships with your colleagues	19	18	2	0	1	3.4
The geographical situation of your organization	18	14	4	0	4	3.4
Your number of working hours	19	14	5	1	1	3.3
Your relationship with your direct manager	16	19	2	2	1	3.3
Your job tasks	15	22	2	0	1	3.3
The physical environment of your workplace (space, cleanliness, air conditioning, etc.)	16	17	5	1	1	3.2
Your salary	14	19	5	1	1	3.2
Overtime pay	11	7	6	0	16	3.2
The social benefits offered by your employer (e.g. bonuses, RRSP or pension plan contribution, vacation days)	15	14	8	1	2	3.1
The opportunities for advancement	7	22	7	2	2	2.9

Note: Results are based on the number of participants. Given the small sample size, results may not be extrapolated to the entire population.

** 1 = not at all satisfied, 2 = not very satisfied, 3 = somewhat satisfied, and 4 = very satisfied.*

When looking at the results by gender, women tended to be more satisfied than men with the following aspects of their job:

- Number of working hours;
- Working schedule;
- Social benefits;
- Relationships with colleagues; and
- The physical environment of the workplace.

In addition, employees in public organizations tended to be more satisfied with their working conditions and schedules, the social benefits offered by their employer, the relationships with their colleagues, their overtime pay, the work-life balance environment and job security. Furthermore, several employees holding a post-secondary degree were very motivated by the positive impact of their job on the environment.

Participants were asked what challenges they faced in performing their jobs. Dealing with customers and/or the public represented a challenge for many participants. Employees in private firms sometimes found it difficult to meet customers' expectations, while those in public organizations have to continually communicate the importance of preserving the environment.

Some participants found it challenging to adapt to the frequent changes in policies and regulations regarding SWM and to deal with the slow pace of decision-making in various levels of government organizations.

When asked about the main reason that would motivate them to leave their current job, many participants mentioned the loss of autonomy/freedom in their work schedule (i.e., fixed time schedule vs. flexible hours) or in the execution of their tasks. The absence of opportunities for advancement would cause many participants, especially those with post-secondary education, to leave their job. Others would change for a better-paid job offer.

6.3.3 DEVELOPMENT AND TRAINING

The majority of participants had attended in-house training, with labourers and supervisors receiving health and safety courses. Several employees in public organizations mentioned that the budget for training had decreased because of the economic downturn.

Many employees, particularly those with post-secondary education, were interested in participating in courses such as communications, human resources and project management. Some participants considered that internship programs for students were beneficial in providing hands-on experience.



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APPENDICES

APPENDIX A:
RESEARCH METHODOLOGY

APPENDIX A: DETAILED RESEARCH METHODOLOGY

The following five-step methodological approach was employed to acquire the information required to meet the study objectives.

1. ACTIVITY 1: PROJECT CHARTER AND CONTRACT, AND INAUGURAL MEETING

An inaugural meeting was held in Calgary with the research contractor, Zins Beaudesne and Associates (ZBA), and ECO Canada's project team management to validate the detailed objectives and scope, the proposed methodological approach, the deliverables and the production schedule. This meeting also enabled ECO Canada's project team to provide ZBA with all additional information necessary for a sound understanding of the project, as well as with all relevant available data.

2. ACTIVITY 2: SECONDARY RESEARCH AND IN-DEPTH INTERVIEWS

Preliminary research was conducted based on secondary sources (literature review) to define the industry and determine its scope. This research included:

- (i) An analysis of solid waste-based occupations;
- (ii) An analysis of public and private sector environmental SWM employers;
- (iii) A glossary of new and frequently used terms; and
- (iv) A description of key human resources issues and needs specific to environmental employers and employees.

The objective of this analysis was to prepare the administration of the employer nationwide labour market study and employee focus groups that were at the core of the study. Also, key informants and post-secondary institution representatives were selected for in-depth interviews to provide background on the size of the industry and its relevant issues, to be validated with the large-scale survey.

Key Informant Interviews

Key informants were selected jointly by ECO Canada and Zins Beaudesne and Associates to represent all regions of Canada, as well as both the business sector and the government sector of SWM. The geographical distribution of the 11 key informants interviewed was as follows: Maritime Provinces (3), Quebec and Central Canada (3), Western Canada (4), and the Territories (1).

Their insight into the scope of the SWM industry was gathered through the Key Informant Interview Guide which covered the following topics: scope/definition of SWM, legal framework/regulations/governance, technology, training, labour market and complementary information.

Post-Secondary Institution Interviews

Representatives of post-secondary institutions were selected from an ECO Canada list of colleges and universities that offer solid waste and solid waste related programs. Out of 10 institutions contacted, four provided input: Brock University (Ontario), Concordia University (Quebec), SIAST (Saskatchewan), and the University of New Brunswick.

3. ACTIVITY 3: EMPLOYER SURVEY

Zins Beaudesne and Associates conducted a telephone survey among 853 employers within the SWM sector in Canada using a five-step methodological approach, outlined below.

Step 1: Designing the survey questionnaire

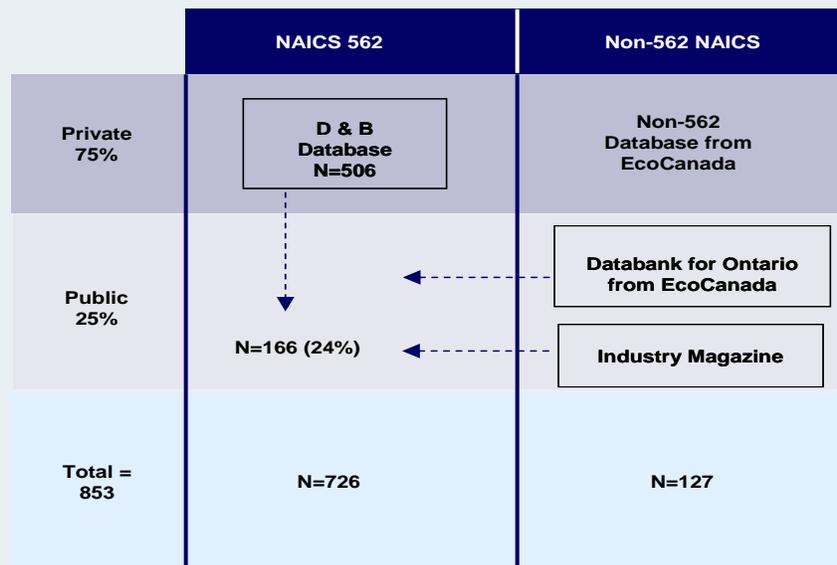
Questionnaire 1 (Appendix D) was a 20-minute telephone survey administered in both English and in French by ZBA to meet the research objectives. A follow-up survey, Questionnaire 2 (Appendix D), was sent by fax or e-mail to obtain more detailed information on labour needs and employee characteristics (such as full time/part time, permanent/seasonal, gender, age, education level, and seniority). ECO Canada reviewed and approved the scope of the surveys.

Step 2: Designing the sampling plan

Population under study

The population under study was mainly composed of organizations for which SWM is the primary activity, both private and public. Lists of potential respondents were obtained from Dun & Bradstreet for all private firms with the 562 NAICS code, while the sample for public organizations was obtained from lists provided by ECO Canada, such as a list from Solid Waste & Recycling Magazine and the Municipal Waste Integration Network (MWIN). A small proportion of the sample was also comprised of private firms for which SWM was the secondary activity (NAICS code different from 562) and organizations from new and emerging areas of SWM. This sample was also sourced from Dun & Bradstreet and lists provided by ECO Canada. The survey frame used is illustrated by the matrix in Figure A.

Figure A
SWM study framework



Sampling method

A disproportional stratified sampling technique was used to ensure a representative number of public organizations in the sample. A final sample of 853 employers was surveyed including 420 private businesses (NAICS code 562), 306 public organizations and 127 private organizations with NAICS codes other than 562.

A weighting procedure based on region and type of organization (public or private) was applied for the 726 organizations for which SWM was the primary activity. Table 1 shows the distribution of respondents by region and type of organization before and after weighting (i.e., the distribution of the final sample compared to Statistics Canada).

Table A
Distribution of respondents by region and type of organization

PROVINCE / TERRITORY	PRIVATE FIRMS WITH 562 NAICS CODE			PUBLIC ORGANIZATIONS		
	SAMPLE	POPULATION	WEIGHTED SAMPLE	SAMPLE	POPULATION	WEIGHTED SAMPLE
British Columbia	7.2%	9.5%	9.5%	3.6%	2.8%	2.8%
Alberta	7.0%	8.2%	8.2%	5.7%	3.9%	3.9%
Manitoba	1.2%	1.8%	1.8%	3.2%	0.7%	0.7%
Saskatchewan	1.9%	3.4%	3.4%	4.8%	0.9%	0.9%
Ontario	20.1%	30.7%	30.7%	12.8%	10.1%	10.1%
Quebec	14.2%	17.6%	17.6%	6.5%	2.3%	2.3%
New Brunswick	1.8%	2.0%	2.0%	0.7%	0.7%	0.7%
Nova Scotia	2.5%	2.6%	2.6%	1.9%	1.0%	1.0%
Newfoundland and Labrador / Prince Edward Island	0.8%	1.1%	1.1%	1.8%	0.4%	0.4%
Yukon/ Northwest Territories / Nunavut	1.1%	0.2%	0.2%	1.2%	0.01%	0.01%
Total Canada	57.9%	77.2%	77.2%	42.1%	22.8%	22.8%
Sample size (unweighted, weighted)	420		506	306		166

Step 3: Pre-testing the questionnaire

Pre-testing the questionnaire

A pre-test replicating exact survey conditions was conducted with 10 respondents in both official languages. The purpose of the pre-test was to ensure that all of the questions were well expressed and that respondents would understand the questions. Following the pre-test, modifications to the questionnaire were made to incorporate feedback received.

Step 4: Conducting the survey

The survey (Questionnaire 1) was conducted between August 6th and October 14th, 2009 with the person responsible for human resources management (e.g., HR Managers, Vice Presidents, Company Owners). A total of 853 organizations were surveyed including 726 organizations for which SWM was the primary activity (public and private 562 NAICS code), and 127 private organizations for which the primary activity was not related to this sector (NAICS code other than 562). Interviews averaged 20 minutes.

The margin of error for 853 respondents is $\pm 3.4\%$, 19 times out of 20, $\pm 3.6\%$, 19 times out of 20, for 726 respondents. The margin of error is $\pm 8.7\%$, 19 times out of 20, for 127 respondents.

From a total valid sample of 5,351 employers, 853 employers completed the survey, representing a response rate of 16%. Of these completions, 834 were completed by mail and 19 were completed on-line.

Response rate calculation

TOTAL SAMPLE	INELIGIBLE SAMPLE (NOT IN SERVICE/NOT AVAILABLE, ETC.)	VALID SAMPLE	NUMBER OF VALID COMPLETED SURVEYS	VALID RESPONSE RATE
9,233	3,882	5,351	853	15.9%

Questionnaire 2, sent by fax or email, was completed by 183 public and private NAICS code 562 organizations.

Step 5: Coding, data entry and processing

Questionnaire responses were automatically entered into a computer file, with the structure of the data file checked for inaccurate codes and alignment errors. Data was processed using the STAT-XP Software, producing frequency and cross-tabulation results to outline the characteristics of the various segments under study.

4. ACTIVITY 4: FOCUS GROUPS

Five focus groups were held in Calgary, Vancouver, Montreal, Halifax and Toronto with 40 employees in the SWM industry. The objective of the groups was to research career pathways, job satisfaction and education, training and professional development needs of workers. To meet this objective, ZBA used a three-step methodological approach, summarized below.

Step 1: Designing the focus group discussion guide

An outline of the discussion guide was designed by ZBA according to the research objectives and the scope of the study and approved by ECO Canada. The guide was developed around the following themes: current job and career pathway, job satisfaction, employee retention and human resource management practices, and staff development and training.

Step 2: Recruiting the participants

Recruitment began at least two weeks prior to the focus groups to maximize the number of participants, using a combination of convenience sampling method and judgement sampling method. Hence, potential participants were identified by employers who participated in the survey as well as by NSC members and key informants in the sector. They were contacted by phone and asked to respond to a brief questionnaire concerning their occupation, the type of organization they work for, the number of years of experience in SWM, number of years with their current employer, as well as socio-demographic characteristics.

Two days prior to the group meeting, a reminder call was made to each participant to confirm their participation. In case of a cancellation by a participant, they were replaced by another person with similar characteristics.

Step 3: Conducting the groups

The focus groups were held from 6pm to 8pm on October 27th in Calgary, October 28th in Vancouver, November 3rd in Montreal, November 5th in Halifax and November 9th in Toronto in a facility equipped with a one-way mirror and video recording.

5. ACTIVITY 5: FINAL REPORT

ZBA produced a comprehensive final report that integrates the results of the secondary research, the two employer surveys and the employee focus groups. Preliminary documents were provided to ECO Canada representatives during the study as well as two 'stand alone' documents presenting the detailed survey results as well as focus group session summaries.

6. LIMITATIONS AND CONSTRAINTS OF THE RESEARCH

Quantitative

The lack of reliable Canada-wide statistical data concerning private and public organizations involved in SWM posed some challenges.

One such challenge was the identification of a representative sample of SWM employers. As a consequence, contact information for SWM employers was sourced from a combination of Dun & Bradstreet market research sample, Solid Waste & Recycling Magazine subscribers, and ECO Canada's internal databases.

It should be noted that comprehensive listings of private SWM organizations for which the primary activity was not related to SWM sector (organizations classified outside of the 562 NAICS code) and organizations representing new and emerging areas of SWM not yet encompassed by the NAICS classification system were unavailable.

It should also be noted that this lack of comprehensive listings influenced the calculation of the overall size of the Canadian SWM industry. As a result, detailed calculations to derive the size of the industry were based on methods utilizing the statistical median, trimean, and midhinge. See Appendix C: Sizing of the SWM Industry for a detailed explanation of statistical terminology and metrics.

The multi-method data collection strategy for this project included telephone interviews, an online survey and the dissemination of a hard copy questionnaire via fax. In total, 853 organizations participated in the study. An overall response rate of 15.9% was achieved. While a 'true' margin of error statistic cannot be calculated due to the multi-modal data collection approach and composition of the sample, a margin of error of $\pm 3.4\%$, 19 times out of 20 is offered as a best estimate to aid in the interpretation of the findings.

Qualitative

Five focus groups sessions were held across Canada with SWM employees. While the information gathered through this process provided in-depth and insightful results, these focus group results are not statistically representative of all Canadian SWM employees. These focus group results should not be extrapolated to all Canadian SWM employees.

Overall

Taking into account these limitations, the information collected should be treated as a guide to discussions on the future direction of the SWM industry for employer and stakeholder engagement.

APPENDIX B:
GLOSSARY OF TERMS

APPENDIX B: GLOSSARY OF KEY TERMS

Selected terms relevant to this document are extracted from the following glossaries dedicated to SWM: World Bank glossary¹, EPA published glossary², Federation of Canadian Municipalities (FCM) glossary³, METAP (a sub-branch of the World Bank) glossary⁴ and Global Development Research Center glossary⁵.

Aerobic

A biochemical process or condition occurring in the presence of oxygen.

Anaerobic Digestion (AD)

A biological process using microbes to break down organic material in the absence of oxygen. Digestion takes place in an enclosed chamber, where critical environmental conditions can be controlled to maximize microbe generation, gas generation and waste decomposition rates.

Biogas

Gas formed by digestion of organic materials. Typically dominated by CH₄ (methane) and CO₂ (carbon dioxide) in a landfill.

Cell

1. A volume within a landfill occupied by a specific amount of waste. E.g., waste disposed during one day. The cell boundaries are then defined by a daily cover. A series of adjoining cells, all the same height, make up a lift.
2. A compartment within a landfill designed for a particular purpose. E.g., the treatment of organic wastes. The cell has defined boundaries which may be a low permeability base, a bund wall and low permeability cover.

Collection

The process of picking up waste, recyclables, or compostable material from a household or a business.

Commercial Waste

Waste materials originating in wholesale, retail, institutional or service establishments, such as office buildings, stores, markets, theatres, hotels and warehouses.

Composting

A biological process whereby organic matter is decomposed through microbial activity, in the presence of oxygen, to produce a peat-like humus.

Construction and Demolition Waste (CDW)

Municipal solid waste originated from or in the use of building materials, dredging materials, tree stumps, and rubble resulting from construction, re-modelling, repair, and demolition of homes, commercial buildings and other structures and pavements.

Diversion Rate

The percentage of waste materials diverted from disposal to productive use.

Domestic Waste

See Household Waste.

Dump

A site used to dispose of solid waste without management and/or environmental controls.

Energy Recovery

Obtaining energy from municipal solid waste (MSW) through a variety of processes (e.g., combustion).

¹ See http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTUSWM/0,contentMDK:20241717~menuPK:4153320~pagePK:210058~piPK:210062~theSitePK:463841_00.html.

² See EPA web site <http://www.epa.gov/>

³ See FCM web site <http://www.fcm.ca/>

⁴ See <http://www.metap-solidwaste.org/index.php?id=61>.

⁵ See <http://www.gdrc.org/uem/waste/swm-glossary.html>.

Garbage

Municipal solid wastes (MSW) which include animal and vegetable waste resulting from the handling, storage, sale, preparation, cooking, and serving of foods.

Hazardous Waste

Waste generated during production or other activities by society that can pose a substantial or potential hazard to human health or the environment when improperly managed.

Haul Distance

The distance over which wastes or landfill cover material must be transported either from a) the last pick-up point of the collection vehicles, or b) from the transfer station, to the landfill.

Hierarchy (for Waste) / The 4 R-D Hierarchy

A hierarchical method of SWM. The following practices are ranked in order of preference: source *Reduction*, *Reuse*, *Recycling*, energy and material *Recovery*, and landfill *Disposal*. A previous hierarchy called '3R Hierarchy' focused on *Reduction - Reuse - Recycling*.

Household Hazardous Waste

Products used in residences, such as paints and some cleaning compounds that are toxic to living organisms and/or the environment.

Household Waste

Municipal solid waste composed of garbage and rubbish, which is generated as the consequence of household activities. Domestic waste may contain a significant amount of hazardous waste.

Industrial Waste

Materials discarded from industrial operations or derived from manufacturing processes.

Institutional Waste

Waste materials originating in schools, hospitals, prisons, research institutions, and other public buildings.

Inorganic Waste

Waste composed of matter other than plant or animal (i.e., contains no carbon).

Landfill

Designed, controlled and managed disposal site for municipal solid waste spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day.

Landfill Gas

A mixture of primarily methane and carbon dioxide that is generated in landfills by the anaerobic decomposition of organic wastes.

Leachate

Wastewater that collects contaminants as it trickles through municipal solid waste disposed in a landfill. Leaching may result in hazardous substances entering surface water, ground water, or soil.

Liner

A relatively impermeable barrier designed to contain leachate within a landfill. Liner materials include plastic and dense clay. Plastic liners may be geosynthetic membranes, or 'geomembranes', usually made of synthetic polymers in sheets.

Material Recovery Facility (MRF)

A facility that separates and processes source-separated secondary materials (such as glass, metals, plastics, or paper) into marketable materials.

Municipal Solid Waste (MSW)

MSW means household waste, commercial solid waste, non-hazardous sludge; conditionally exempt small quantity hazardous waste, and industrial solid waste.

Municipal Wastewater (Sewage)

The spent or used water from a home, community, institution, farm, or industry that contains dissolved or suspended matter.

Organics

The organic fraction of the waste stream, consisting of material that is biodegradable—typically food, yard waste and paper.

Processing

Preparation of solid waste for sale to markets through activities such as hand sorting, magnetic and/or mechanical separation or shredding, composting or digestion.

Pyrolysis

Chemical decomposition of a substance by heat in the absence of oxygen, resulting in various hydrocarbon gases and carbon-like residue.

Recovery Rate

Percentage of useable recycled materials that have been removed from the total amount of municipal solid waste generated in a specific area or by a specific business.

Recycling

The process by which materials otherwise destined for disposal are collected, reprocessed, or remanufactured, and are reused.

Refuse-Derived Fuel (RDF)

Product of a mixed waste processing system in which certain recyclable and non-combustible materials are removed, with the remaining combustible material converted for use as fuel to create energy.

Residential Waste

Waste generated in single- and multiple-family homes.

Rubbish

A general term for solid waste. Sometimes used to exclude food wastes and ashes.

Site Remediation

Treatment of a contaminated site by removing contaminated solids or liquids or treating them on-site.

Sludge

A semi-liquid residue remaining from the treatment of municipal and industrial water and wastewater.

Solid Waste

Waste composed of solid matter from household, commercial, institutional and industrial sources.

Source Reduction

Reducing the amount of waste entering the municipal solid waste stream by redesigning products or patterns of production or consumption (e.g., using returnable beverage containers).

Transfer Point

A designated point, often at the edge of a neighbourhood, where small collection vehicles transfer waste to larger vehicles for transport to disposal sites.

Transfer Station

A permanent facility where waste materials are taken from smaller collection vehicles and placed in larger vehicles for transport, including truck trailers, railroad cars, or barges. Recycling and some processing may also take place at transfer stations.

Waste

1. Unwanted materials left over from any human activity.
2. Refuse from places of human or animal habitation.

Waste may be generically defined as a heterogeneous mixture of material which is discarded as superfluous and has no further use or value to its owner.

Waste Diversion

The redirection of generated wastes away from disposal through reuse, recycling, or recovery. It does not include source reduction.

Waste Reduction

Waste reduction is a broad term encompassing all waste management methods - source reduction, recycling, composting - that result in reduction of waste going to a combustion facility or landfill.

Waste Stream

The waste output of a community, region, or facility. Total waste can be categorized into different waste stream components (e.g., wet organic waste, construction waste, household hazardous waste, or white goods).

Waste-to-Energy (WtE) System

A method of converting municipal solid waste into a usable form of energy, usually through combustion.

Wastewater

Water that is generated, usually as a by-product of a process, and which cannot be released into the environment without treatment.

APPENDIX C:
INDUSTRY SIZING DETAILED CALCULATIONS

APPENDIX C: SIZING OF THE SWM INDUSTRY

1. BACKGROUND AND CONCEPTUAL FRAMEWORK

Two sub-sectors

The SWM industry is comprised of two sectors—the *business sector* and the *government sector*. Given available data on both these sub-sectors, sizing the SWM industry requires multiplying an estimate of the number of establishments in this sector by an estimate of the number of employees per establishment in this sector.

Number of businesses vs. number of establishments

Statistics Canada has provided a figure for the number of *establishments* in the government sector, and a figure for the number of *businesses* in the business sector. On the other hand, information from the employer survey conducted by ECO Canada was collected at the *establishment* level.

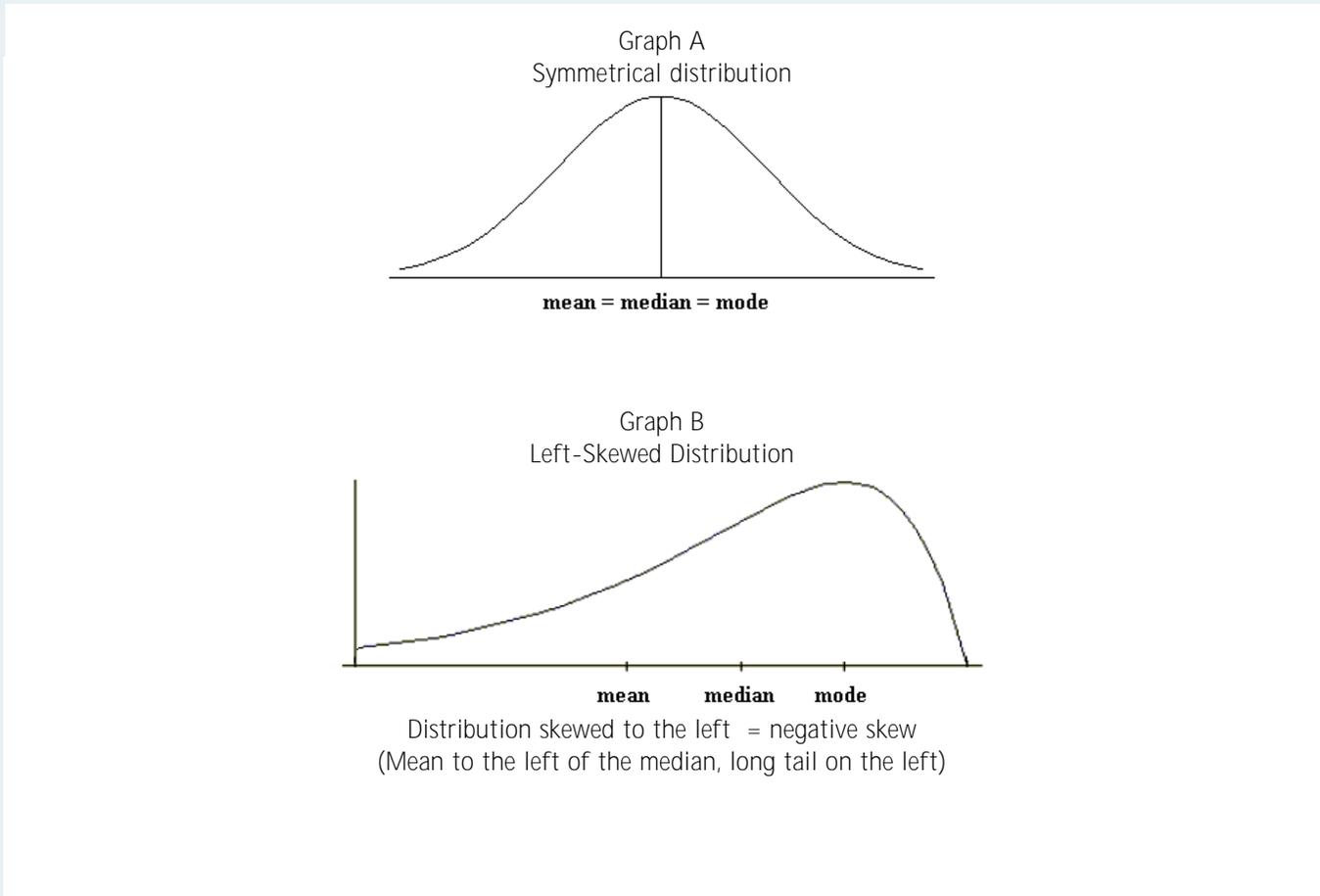
Metrics

Each parameter (number of establishments or number of employees) to be estimated from the employer survey data must generally be represented by a typical value characterizing its *central tendency*. The usual metrics to estimate a central tendency are either the *mean* or the *median*, depending on the data and/or one's purposes.

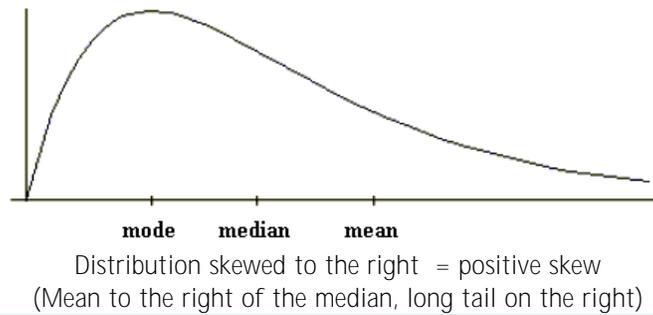
Means are most commonly used, under the provision that data distributions are symmetrical (e.g., bell curves), or only slightly asymmetrical (see Graph A below). However, *means* should not be used when distributions are very asymmetrical (skewed).

A strong skew in a distribution exists when there is a sizable difference between the value of the *mean* and the value of the *median* (see Graphs B and C below). In such cases, *medians* should be used instead of *means* to measure *central tendencies*.

Graphic illustration of symmetrical vs. skewed distributions

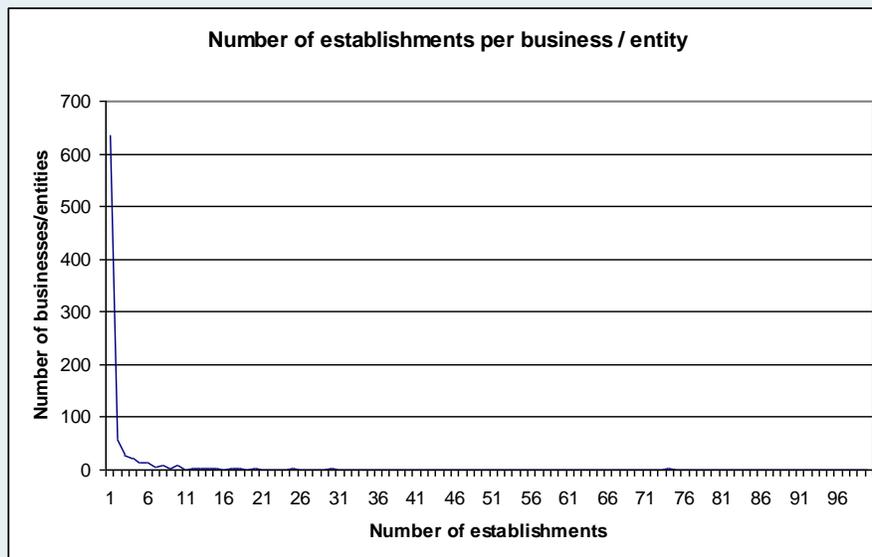


Graph C
Right-Skewed Distribution



Graphic illustration of the type of distributions used to size the SWM industry

For illustration purposes, the following curve shows the distribution of establishments per organization reported by the respondents of the employer survey. The distribution shows a very strong right skew, showing that most organizations have only one establishment. As shown by the data in Section 2.0 below, all data distributions used to estimate the size of the SWM industry present a very strong skew, which precludes the use of means to characterize their central tendency.



Metrics based on quartiles

Medians, unlike means, are not usually affected by extreme values and are thus used when the research emphasis is on *centre values*. However, when accounting for *extreme values* of a distribution are required, alternative metrics may be used, including (but not limited to) the *trimean* and the *midhinge*.

The *trimean* (TM) is defined as a weighted average of the distribution's *median* and its two *quartiles*: $TM = (Q1 + 2 Q2 + Q3)/4$. Its value is equal to the average of the *median* and the *midhinge* (the *midhinge* being the average of the first and third quartiles).

An advantage of the trimean as a measure of the centre of a distribution is that it combines the median's emphasis on centre values with the midhinge's attention to the extremes of the distribution and is thus useful when the data results show a strong skewed distribution.

2. SWM INDUSTRY SIZE DETAILED CALCULATIONS

Both Statistics Canada data as well as the findings of the Employer Survey from this study were used to calculate SWM industry size.

2.1 DETERMINE THE NUMBER OF ORGANIZATIONS

Industry size calculations began with determining the number of organizations in the SWM industry, for both businesses and government sector establishments, using Statistics Canada data⁶:

- Number of businesses in the business sector: 1,477 businesses; and
- Number of establishments in the government sector: 862 establishments.

2.1.1 Number of Businesses

Statistics Canada evaluated the number of businesses⁷ in the SWM business sector as follows:

Table 1:
The number of Canadian SWM businesses

	2004	2006	VARIATION	
	Number of Businesses	Number of Businesses	Number of Businesses	%
Business Sector	1,725	1,477	-248	-14

2.1.2 Number of Government Sector Establishments

For the purpose of the same 2008 waste management industry survey, Statistics Canada has indicated that 862 government establishments were surveyed⁸. As with the business sector of SWM, since not all government establishments are covered by the Statistics Canada survey, the figure of 862 government establishments can be considered a low estimation of the actual number of SWM government establishments in Canada.

2.2 DETERMINE THE AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT

2.2.1 Total SWM Industry – Overall Number of Employees per Establishment

TOTAL SWM INDUSTRY	OVERALL NUMBER OF EMPLOYEES PER ESTABLISHMENT
Mean	36.13
Median	7.00
First Quartile	3.00
Third Quartile	20.00
Trimean	9.25
Midhinge	11.50

⁶ "Waste Management Industry Survey: Business and Government Sectors - 2006", published June 2008.

⁷ Not all existing businesses are included in the Statistics Canada survey. The decision to include businesses or not is made by Statistics Canada using a threshold based on the level of workforce and of revenue that varies by province or territory.

⁸ Information obtained from key informants with in-depth knowledge of the 2008 Statistics Canada waste management industry survey. (Data collection for this Statistics Canada survey was completed in October 2009, i.e., at the same time as the ECO Canada survey.)

2.2.1.1 Business Sector

Business Sector - Distribution of the Number of Establishments

Data from the employer survey indicates that 75.7% of the businesses have only one establishment. For the remaining 24.3% of the businesses, the number of establishments varies between 2 and 100. Data distribution therefore dictates that two groups be formed:

- Group 1 – One establishment per business; and
- Group 2 – More than one establishment per business.

Business Sector - Number of Employees and Establishments

BUSINESS SECTOR	OVERALL NUMBER OF EMPLOYEES PER ESTABLISHMENT	NUMBER OF EMPLOYEES FOR BUSINESSES WITH ONE ESTABLISHMENT	NUMBER OF EMPLOYEES FOR BUSINESSES WITH MORE THAN ONE ESTABLISHMENT	NUMBER OF ESTABLISHMENTS IF MORE THAN ONE ESTABLISHMENT PER BUSINESS
Mean	30.17	12.26	87.61	9.65
Median	8.00	6.00	25.00	4.00
First Quartile	3.00	2.00	6.00	2.00
Third Quartile	21.00	14.00	60.00	10.00
Trimean	10.00	7.00	29.00	5.00
Midhinge	12.00	8.00	33.00	6.00

2.2.1.2 Government Sector

Government Sector - Distribution of the Number of Establishments

Data from the employer survey indicates that 74.8% of the government entities have only one establishment. For the remaining 25.2% of the government entities, the number of establishments varies between 2 and 73. Data distribution therefore commands that two groups be made:

- Group 1 - One establishment per government entity; and
- Group 2 - More than one establishment per government entity.

Government sector - Number of employees and establishments

GOVERNMENT SECTOR	OVERALL NUMBER OF EMPLOYEES PER ESTABLISHMENT	NUMBER OF EMPLOYEES FOR GOV'T ENTITIES WITH ONE ESTABLISHMENT	NUMBER OF EMPLOYEES FOR GOV'T ENTITIES WITH MORE THAN ONE ESTABLISHMENT	NUMBER OF ESTABLISHMENTS IF MORE THAN ONE ESTABLISHMENT PER GOV'T ENTITY
Mean	56.17 ⁹	12.13	197.13 ¹⁰	13.73
Median	5.00	5.00	7.00	6.00
First Quartile	3.00	2.00	4.00	3.00
Third Quartile	14.00	10.00	36.00	9.00
Trimean	6.75	5.50	13.50	6.00
Midhinge	8.50	6.00	20.00	6.00

⁹The value is only 16.09 when excluding 2 outliers.

¹⁰Including the 2 outliers mentioned in Footnote 9 (above).

2.3 ESTIMATE THE NUMBER OF SWM EMPLOYEES

This section summarizes the detailed calculations used to derive the size of the SWM industry in Canada based on methods utilizing the statistical median, trimean, and midhinge.

2.3.1 Number of Employees Based on the Median

Business sector

Estimation of total number of business employees:

# OF BUSINESSES	% WITH ONE ESTABLISHMENT	MEDIAN		# OF BUSINESSES	% WITH MORE THAN ONE ESTABLISHMENT	# OF ESTABLISHMENTS	MEDIAN		
(1,477 x	75.7% x	6.0)	+	(1,477 x	24.3% x	4 x	25)	=	
		# employees (one establishment)					# employees (more than one establishment)		total # of employees
		6,709	+				35,891	=	42,600

$((1,477 \times 75.7\% \times 6.0) + (1,477 \times 24.3\% \times 4 \times 25)) = 6,709 + 35,891 = 42,600$ employees.

Government sector

Estimation of the proportion of establishments owned by government entities with only one establishment:

% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	MEDIAN # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH ONE ESTABLISHMENT
(74.8% x	1)/	(74.8% x	1 +	25.2% x	6.00)	=	.748/	2.26 =	33.1%

Estimation of the proportion of establishments owned by government entities with more than one establishment:

% WITH MORE THAN ONE ESTABLISHMENT	MEDIAN # OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	MEDIAN # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH MORE THAN ONE ESTABLISHMENT
(25.2% x	6)/	(74.8% x	1 +	25.2% x	6.00)	=	1.512/	2.26 =	66.9%

Estimation of total number of government employees

# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	MEDIAN		# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	# OF ESTABLISHMENTS	MEDIAN		
(862 x	33.1% x	5)	+	(862 x	66.9% x		7)	=	
		# employees (one establishment)					# employees (more than one establishment)		total # of employees
		1,427	+				4,036	=	5,463

$((862 \times 33.1\% \times 5.0) + (862 \times 66.9\% \times 7)) = 1,427 + 4,036 = 5,463$ employees.

Total SWM employment (based on median)

TOTAL SWM EMPLOYMENT (MEDIAN)	OVERALL NUMBER OF EMPLOYEES
Business Sector	42,600
Government Sector	5,463
Total	48,063

42,600 + 5,463 = 48,063 employees.

2.3.2 Number of Employees Based on the Trimean

Business sector

Estimation of total number of business employees:

# of businesses	% with one establishment	trimean		# of businesses	% with more than one establishment	# of establishments	trimean		
(1,477 x	75.7% x	7.0)	+	(1,477 x	24.3% x	5 x	29)	=	
		# employees (one establishment)					# employees (more than one establishment)		total # of employees
		7,827	+				52,042	=	58,869

((1,477 x 75.7% x 7.0) + (1,477 x 24.3% x 5 x 29)) = 7,827 + 52,042 = 59,869 employees.

Government sector

Estimation of the proportion of establishments owned by government entities with only one establishment:

% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	TRIMEAN # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH ONE ESTABLISHMENT
(74.8% x	1)/	(74.8% x	1 +	25.2% x	6.00)	=	.748/	2.26 =	33.1%

Estimation of the proportion of establishments owned by government entities with more than one establishment:

% WITH MORE THAN ONE ESTABLISHMENT	MEDIAN # OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	TRIMEAN # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH MORE THAN ONE ESTABLISHMENT
(25.2% x	6)/	(74.8% x	1 +	25.2% x	6.00)	=	1.512/	2.26 =	66.9%

Estimation of total number of government employees:

# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	TRIMEAN		# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	TRIMEAN			
(862x	33.1% x	5.5)	+	(862 x	66.9% x	13.5)	=		
		# employees (one establishment)				# employees (more than one establishment)			total # of employees
		1,569	+			7,785	=		9,354

((862 x 33.1% x 5.5) + (862 x 66.9% x 13.5)) = 1,569 + 7,785 = 9,354 employees.

Total SWM employment (based on trimean)

TOTAL SWM EMPLOYMENT (TRIMEAN)	OVERALL NUMBER OF EMPLOYEES
Business Sector	59,869
Government Sector	9,354
Total	69,223

$59,869 + 9,354 = 69,223$ employees.

2.3.3 Number of Employees Based on the Midhinge

Business sector

Estimation of total number of business employees

# OF BUSINESSES	% WITH ONE ESTABLISHMENT	MIDHINGE		# OF BUSINESSES	% WITH MORE THAN ONE ESTABLISHMENT	# OF ESTABLISHMENTS	MIDHINGE		
(1,477 x	75.7% x	8.0)	+	(1,477 x	24.3% x	6 x	33)	=	
		# employees (one establishment)					# employees (more than one establishment)		total # of employees
		8,945	+				71,064	=	80,009

$((1,477 \times 75.7\% \times 8.0) + (1,477 \times 24.3\% \times 6 \times 33)) = 8,945 + 71,064 = 80,009$ employees.

Government sector

Estimation of the proportion of establishments owned by government entities with only one establishment:

% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	MIDHINGE # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH ONE ESTABLISHMENT
(74.8% x	1)/	(74.8% x	1 +	25.2% x	6.00)	=	.748/	2.26 =	33.1%

Estimation of the proportion of establishments owned by government entities with more than one establishment:

% WITH MORE THAN ONE ESTABLISHMENT	MEDIAN # OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	MIDHINGE # OF ESTABLISHMENTS IF MORE THAN ONE EST. PER GOV'T ENTITY				% OF ESTABLISHMENTS OWNED WITH MORE THAN ONE ESTABLISHMENT
(25.2% x	6)/	(74.8% x	1 +	25.2% x	6.00)	=	1.512/	2.26 =	66.9%

Estimation of total number of government employees:

# OF GOV'T ESTABLISHMENTS	% WITH ONE ESTABLISHMENT	MIDHINGE		# OF GOV'T ESTABLISHMENTS	% WITH MORE THAN ONE ESTABLISHMENT	MIDHINGE		
(862x	33.1% x	6.0)	+	(862 x	66.9% x	20.0)	=	
		# employees (one establishment)				# employees (more than one establishment)		total # of employees
		1,712	+			11,534	=	13,246

$((862 \times 33.1\% \times 6.0) + (862 \times 66.9\% \times 20.0)) = 1,712 + 11,534 = 13,246$ employees.

Total SWM employment (based on midhinge)

TOTAL SWM EMPLOYMENT (MIDHINGE)	overall number of employees
Business Sector	80,009
Government Sector	13,246
Total	93,255

80,009 + 13,246 = 93,255 employees.

3. CONCLUSIONS

Experts in statistics recommend that estimates, particularly those derived from a skewed distribution, be represented by a range rather than a single number.¹¹

Accordingly, the uncertainty surrounding the estimation of the size of the SWM industry is best accounted for by the provision of a range of values defined by the median as lower bound, the midhinge as higher bound, and the trimean as centre value.

The key figures provide the average number of employees per establishment as well as the total number of SWM employees and can be summarized as follows:

Average estimated number of employees in swm with one establishment

AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	6.00	7.00	8.00
Government sector	5.00	5.50	6.00
(n=726)	^A Median	^B Trimean	^C Midhinge

Average estimated number of employees in swm with more than one establishment

AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	25.00	29.00	33.00
Government sector	7.00	13.50	20.00
(n=726)	^A Median	^B Trimean	^C Midhinge

Total estimated number of Canadian swm employees

TOTAL NUMBER OF EMPLOYEES	LOWER BOUND ^A	CENTRE VALUE ^B	UPPER BOUND ^C
Business sector	42,600	59,869	80,009
Government sector	5,463	9,354	13,246
Total number of employees	48,063	69,223	93,255
	^A Median	^B Trimean	^C Midhinge

¹¹ For instance, see "Comparing Measures of Central Tendency", Version 2.3, July 11, 2003, available at <http://cnx.org/content/m11011/latest/>

APPENDIX D:
QUESTIONNAIRE

APPENDIX D: EMPLOYER QUESTIONNAIRE 1 (TELEPHONE)

1. INTRODUCTION

I'd like to speak to the person who is responsible for human resources management in your organization.

Hello, I am (name) from Zins Beauchesne and Associates and I'm calling you on behalf of ECO CANADA, the national sector council for the environmental professions.

ECO CANADA is conducting a nationwide labour market investigation of the Solid Waste Management (SWM) sector and we would like to ask you a few questions. This study has been commissioned by Human Resources and Skills Development Canada (HRSDC).

Your participation will be most appreciated, because this investigation will help to improve the understanding of the key human resource issues in Solid Waste Management, such as staff recruiting and retention, and adequate training and skills. We guarantee that your responses will remain strictly confidential.

Name: _____

Title: _____

Phone number: _____

- | | |
|----------------------------------|---|
| • CEO/President | 1 |
| • HR Manager / HR Vice-President | 2 |
| • Controller | 3 |
| • Facility Manager/Supervisor | 4 |
| • Other
(specify: _____) | 9 |

Organization: _____

Location (city and province): _____

Note the industry group of this organization (up to 6 digits).

<u>11</u> _____	Agriculture, Forestry, Fishing and Hunting	<u>53</u> _____	Real Estate and Rental and Leasing
<u>21</u> _____	Mining and Oil and Gas Extraction	<u>54</u> _____	Professional, Scientific and Technical Services
<u>22</u> _____	Utilities	<u>55</u> _____	Management of Companies and Enterprises
<u>23</u> _____	Construction	<u>56</u> _____	Administrative and Support, Waste Management and Remediation Services
<u>31</u> _____ - <u>33</u> _____	Manufacturing	<u>61</u> _____	Educational Services
<u>41</u> _____	Wholesale Trade	<u>62</u> _____	Health Care and Social Assistance
<u>44</u> _____ - <u>45</u> _____	Retail Trade	<u>71</u> _____	Arts, Entertainment and Recreation
<u>48</u> _____ - <u>49</u> _____	Transportation and Warehousing	<u>72</u> _____	Accommodation and Food Services
<u>51</u> _____	Information and Cultural Industries	<u>81</u> _____	Other Services (except Public Administration)
<u>52</u> _____	Finance and Insurance	<u>91</u> _____	Public Administration

2. SIZING, SCOPING AND GENERAL TRENDS

1. Within the Solid Waste Management activities of your organization (*enterprise or government agency*), how can you describe your main activity in Canada and what are your secondary activities (if any)? (*Read out the 5 main categories to respondent then subcategories if applicable, multiple answers possible.*)

	Main activity (One answer only)	Other activities (Multiple answers possible)
• GOVERNMENT		
• Federal government - Waste management agency or department	1	1
• Provincial or territorial government - Waste management agency or department	2	2
• Local, municipal or regional government - Waste management agency or department	3	3
• SOLID WASTE COLLECTION	4	4
• Municipal Solid Waste (MSW) management	5	5
• Industrial, Commercial & Institutional (ICI) waste management (e.g. construction, renovation, demolishing (CRD) or excavation waste)	6	6
• Transfer station (bulking facility)	7	7
• Transportation of waste from a transfer station	8	8
• SOLID WASTE TREATMENT AND DISPOSAL	9	9
• Landfilling	10	10
• Incinerators	11	11
• Residential, commercial & industrial organic waste composting facility	12	12
• Agricultural organic waste composting facility	13	13
• Waste-to-energy facility (e.g., gasification, digestion, pyrolysis)	14	14
• REMEDIATION AND OTHER WASTE MANAGEMENT SERVICES	15	15
• Material recovery facilities (MRFs)	16	16
• Treatment and brokerage of recyclable materials	17	17
• Manufacturing of intermediate or finished products from recovered and recycled materials	18	18
• Household hazardous waste management	19	19
• Hazardous waste management that does NOT include residential hazardous waste (i.e. ONLY industrial or agricultural hazardous waste)	20	20
• Waste water treatment	21	21
• SWM consulting services	22	22
• Other Solid Waste Management activities (Specify: _____)	99	99

IMPORTANT NOTE TO INTERVIEWER. The following activities are excluded from this study:

- Agricultural organic waste composting facility
- Hazardous waste management that does NOT include residential hazardous waste
- Manufacturing of intermediate or finished products from recovered and recycled materials
- Waste water treatment

Thus, if mentioned above as main activity, thank respondent and end.

2. Is your organization a public body, or is it a private firm?

- Public body 1
- Private firm 2

(Only if necessary: “public bodies” refer to local government bodies, waste management boards and waste management commissions whereas “private firms” generally are companies that are for profit, privately-owned and privately-run)

3. How many establishments (*i.e. facilities, plants, offices*) do you have in each province/territory?

- Alberta: _____
- British Columbia: _____
- Manitoba: _____
- New Brunswick: _____
- Newfoundland and Labrador: _____
- Northwest Territories: _____
- Nova Scotia: _____
- Nunavut: _____
- Ontario: _____
- Prince Edward Island: _____
- Quebec: _____
- Saskatchewan: _____
- Yukon: _____

4. Does your organization have facilities or provide service in aboriginal communities?

- Yes 1
- No 2
- DNK 9

5. I'm going to read you a list of potential challenges that may affect the growth of your organization in solid waste management in Canada. For each of them, I want you to tell me if this challenge is: Not at all important, Of minor importance, Somewhat important, or Very important.

	Not at all important	Of minor importance	Somewhat important	Very important
a. Marketing and market development	1	2	3	4
b. Competition – market share	1	2	3	4
c. Financing	1	2	3	4
d. External growth (<i>Mergers & Acquisitions</i>)	1	2	3	4
e. Research & Development (<i>R & D</i>)	1	2	3	4
f. Recruiting / Human Resources Management	1	2	3	4
g. Technology – Information Technology (<i>IT</i>)	1	2	3	4
h. Regulations	1	2	3	4
i. Production (<i>productivity, better equipment</i>)	1	2	3	4
j. Other (<i>specify: _____</i> <i>_____</i>)	1	2	3	4

3. RECRUITING

We'll now move on to issues related to recruiting in Solid Waste Management.

6. At each of the levels I read to you, tell me if the number of employees in your organization assigned to Solid Waste Management in Canada decreased, remained stable or increased over the past three years (*calendar years 2005 to 2008*)?

	Increased	Remained Stable	Decreased	Not applicable
• Higher management specific to SWM (<i>e.g., VP of Operations, Director of Operations</i>)	1	2	3	8
• Post secondary-educated professionals (<i>e.g., engineers, designers, consultants, program coordinators, regulatory experts</i>)	1	2	3	8
• Technicians/Technologists (<i>e.g., waste stream analysts, compliance inspectors, gas field operators</i>)	1	2	3	8
• Supervisors/Group leaders (<i>e.g., route managers, landfill managers, MRF managers, dispatchers</i>)	1	2	3	8
• Licensed/heavy equipment operators (<i>e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers</i>)	1	2	3	8
• Labourers (<i>e.g., helpers, handy men</i>)	1	2	3	8

7. At each of the levels I read to you, tell me if you think this number will decrease, remain stable, or increase over the next three years (*calendar years 2010 to 2013*)?

	Increase	Remain Stable	Decrease	Not applicable
• Higher management specific to SWM (<i>e.g., VP of Operations, Director of Operations</i>)	1	2	3	8
• Post secondary-educated professionals (<i>e.g., engineers, designers, consultants, program coordinators, regulatory experts</i>)	1	2	3	8
• Technicians/Technologists (<i>e.g., waste stream analysts, compliance inspectors, gas field operators</i>)	1	2	3	8
• Supervisors/Group leaders (<i>e.g., route managers, landfill managers, MRF managers, dispatchers</i>)	1	2	3	8
• Licensed/heavy equipment operators (<i>e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers</i>)	1	2	3	8
• Labourers (<i>e.g., helpers, handy men</i>)	1	2	3	8

8. Which tool(s) do you mainly use to recruit employees in Solid Waste Management? (*Read only if necessary, multiple answers possible.*)

• Resume bank	1
• Schools, colleges, universities	2
• Employee referrals	3
• Private placement agencies, head hunters	4
• Local or provincial employment centre	5
• Ads in media	6
• ECO CANADA job board	7
• Internet	8
• Job fair	9
• Personal contacts of managers	10
• Trade publications and associations	11
• Interns	12
• Internal transfers	13
• Other (<i>specify: _____</i>)	99

9. I'm going to read you a list of occupations for which difficulties to hire qualified candidates may be encountered. For each of these occupations, I want you to tell me if you are meeting such difficulties now, and if you expect to meet some in the next 5 years.

Occupations directly related to SWM	Now	5 years
• Higher management specific to SWM (e.g., VP of Operations, Director of Operations)	1	1
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)	2	2
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)	3	3
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)	4	4
• Licensed/heavy equipment operators (e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers)	5	5
• Labourers (e.g., helpers, handy men)	6	6
Occupations not directly related to SWM		
• Higher management (e.g., President, Divisional VP or GM)	7	7
• General administration (e.g., accounting & finance, marketing & sales, IT, HR)	8	8
• Other (specify: _____)	9	9
• None	98	98
• DNK/DNA	99	99

10. Under normal circumstances, how many employees in total work in your establishment and how many of them are assigned to Solid Waste Management?

	FULL TIME		PART TIME	
	PERMANENT	SEASONAL/ CONTRACTUAL	PERMANENT	SEASONAL/ CONTRACTUAL
Total number of employees?				
SWM employees?				

11. To fulfill your labour needs, have you in the past recruited, or are you currently recruiting... (multiple answers possible.)

	Yes	No
• People from visible minorities?	1	2
• Aboriginal people?	1	2
• Immigrants?	1	2
• Workers laid off in other industries?	1	2
• Students?	1	2
• People with no formal post-secondary education?	1	2
• People with disabilities?	1	2

4. HUMAN RESOURCE MANAGEMENT PRACTICES

12. I'm going to read you a list of potential challenges that may affect your organization in the area of Solid Waste Management human resources. For each of them, I want you to tell me if this challenge is: Not at all important, Of minor importance, Somewhat important, or Very important.

	Not at all important	Of minor importance	Somewhat important	Very important
• Staff turn-over	1	2	3	4
• Absenteeism / Sick leave	1	2	3	4
• Staff adaptation to new technologies / to organizational changes	1	2	3	4
• Lack of experienced candidates	1	2	3	4
• Lack of candidates with proper training	1	2	3	4
• Providing adequate compensation and/or benefits	1	2	3	4
• Competition with other Solid Waste Management employers	1	2	3	4
• Competition with employers from other industries (e.g. construction, transport, etc.)	1	2	3	4
• Health and safety at work (injury)	1	2	3	4
• Other (specify: _____)	1	2	3	4

13. If answer to Q.12 Staff turn-over is: Somewhat important or Very important, at what level is SWM turn-over the greatest?

• Higher management specific to SWM (e.g., VP of Operations, Director of Operations)	1
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)	2
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)	3
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)	4
• Licensed/heavy equipment operators (e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers)	5
• Labourers (e.g., helpers, handy men, recycling depot labourer)	6
• Other (specify: _____)	7
• DNK	9

14. Which of the following human resource management practices do you use in your organization? (respond yes or no)

	Yes	No	If no, would you consider it very important for future HR development in your organization?	
• New employee orientation programs	1	2	Yes	No
• Recruiting and selection process	1	2	Yes	No
• Job and task descriptions	1	2	Yes	No
• Work enrichment programs (<i>staff retreat, task rotation</i>)	1	2	Yes	No
• Training and development programs (<i>paid for by the organization</i>)	1	2	Yes	No
• Career planning (<i>written staff development plan</i>)	1	2	Yes	No
• Formal performance evaluation and goal setting	1	2	Yes	No
• Communicate salary scale/structure to employees/ monetary incentives (<i>bonus, dividend plan, etc.</i>)	1	2	Yes	No
• Non-monetary incentives / Benefits package	1	2	Yes	No
• Graduated Retirement	1	2	Yes	No
• Other (<i>specify: _____</i>)	1	2	Yes	No

15. Does your organization use incentive programs to attract and retain staff?

- Yes 1
- No 2

B. (If Q15=1) Which ones? (Multiple answers possible, read in rotation if necessary.)

• Competitive salaries	1
• Bonuses (<i>e.g. salary bonus, signing bonus</i>)	2
• Overtime pay	3
• Employee assistance programs (<i>e.g. financial</i>)	4
• RRSP or pension plan contribution	5
• Work-life balance environment	6
• Maternity/Parental leave (<i>in excess of legislated</i>)	7
• Work sharing	8
• Paid time off for volunteering/Charity work	9
• Telecommuting (<i>working from home</i>)	10
• Promotions and staff advancement (<i>professional growth</i>)	11
• Better-than-average social benefits and other benefits (<i>e.g. work environment, ergonomics, childcare in the workplace, free parking, health/wellness programs and benefits, on-site fitness centre, etc.</i>)	12
• Paid parking	13
• Employee participation in decisions	14
• Flexible schedule/work/life balance (<i>compensatory time in lieu of overtime, closing during Christmas, flex-time, vacation in excess of legal requirements, etc.</i>)	15
• Paid extra vacation days	16
• Meal vouchers	17
• Gift certificates	18
• Activities promoting a pleasant work environment/Quality of life	19
• Other (<i>specify: _____</i>)	99

5. STAFF DEVELOPMENT AND TRAINING

16. As an employer, which of the following tools do you currently use and which could be of MOST use in the future to meet your employees' development plan? (*multiple answers possible*)

	Current	Future
• In-house seminars	1	1
• Online seminars	2	2
• Off-site workshops/seminars/conferences	3	3
• Publications highlighting and HR practices of Canadian environmental companies/Studies comparing salaries and benefits of Canadian environmental companies (<i>Downloadable HR reference guides and materials</i>)	4	4
• Computerized assessment surveys (<i>staff satisfaction survey</i>)	5	5
• Computerized HR resources (<i>HR templates, metric calculators</i>)	6	6
• Online social media (<i>discussion forums, blogs</i>)	7	7
• Direct consultation	8	8
• Fast track bridging program (<i>new staff orientation, in house training</i>)	9	9
• CPR or Health and Safety Courses	10	10
• Further education/training (<i>e.g. professional courses, management training</i>)	11	11
• Other (<i>specify: _____</i>)		
• None	98	98
• Don't know	99	99

17. Compared to 2008, is the training budget for 2009 bigger, smaller or similar?

- Bigger
- Smaller
- Similar

18. Over the next three years (*calendar years 2010 to 2013*), do you expect the number of employees who will be trained to increase, remain stable or decrease compared to 2009?

- Increase 1
- Remain stable 2
- Decrease 3

19. Over the next three years (*calendar years 2010 to 2013*), do you expect the average number of training hours per SWM employee to increase, remain stable or decrease compared to 2009?

- Increase 1
- Remain stable 2
- Decrease 3

20. To what extent is your organization faced with each of the following SWM training issues? Is it....

	Not at all	Somewhat	A lot	Not applicable
• Employee interest toward training	1	2	3	8
• Employee loyalty (<i>retention after training</i>)	1	2	3	8
• Knowledge transfer to job performance	1	2	3	8
• Accessibility outside big cities	1	2	3	8
• Availability of instructors	1	2	3	8
• Training cost	1	2	3	8
• Transportation cost	1	2	3	8
• Work schedule / Attending a course during working hours	1	2	3	8
• Highly specialized topic / Not enough providers / Offer not specialized enough	1	2	3	8
• Insufficient offer in my region	1	2	3	8
• Other (<i>specify: _____</i>)	1	2	3	8

21. Last year, what was the size of your organization's budget for training?

• Less than \$5,000	01
• \$5,001 to \$10,000	02
• \$10,001 to \$50,000	03
• \$50,001 to \$100,000	04
• \$100,001 to \$500,000	05
• More than \$500,000	06
• *Included in the operation budget (<i>internal</i>)	98
• DKN/DNA	99

Thank you for taking the time to answer this questionnaire. We'd also like you to complete a short follow-up questionnaire concerning the education and characteristics of your employees. This questionnaire will be sent to you by fax or e-mail.

Those who complete this second questionnaire will be entered in a draw to win one of five Eco Gift Baskets, containing environmentally friendly products worth \$250. This draw will be held on October 1st 2009.

Would you prefer that we send you the questionnaire by fax or e-mail?

• Yes, by fax: _____	1
• Yes by e-mail: _____	2
• Not interested	3

THANKS YOU VERY MUCH FOR YOUR COOPERATION

APPENDIX D: EMPLOYER QUESTIONNAIRE (FAX OR EMAIL)

You recently participated in a study concerning the labour market issues in solid waste management in Canada and we thank you for your valuable cooperation. We kindly ask your participation once again to complete a short follow-up questionnaire. We guarantee that your responses are strictly confidential.

Those who complete this second questionnaire will be entered in a draw to win one of five Eco Gift Baskets, containing environmentally friendly products. This draw will be held on October 1st 2009.

Under normal circumstances, how many employees in total are assigned to Solid Waste Management in your establishment and how many are not?

	FULL TIME		PART TIME	
	PERMANENT	SEASONAL/ CONTRACTUAL	PERMANENT	SEASONAL/ CONTRACTUAL
Related to SWM				
• Higher management specific to SWM (e.g., VP, Operations, Director, Operations)				
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)				
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)				
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)				
• Licensed/heavy equipment operators (e.g. landfill gas technicians, boiler operators, compactor operators, truck drivers)				
• Labourers (e.g., helpers, handy men)				
Not related to SWM				
• Higher management (e.g., President, Divisional VP or GM)				
• General administration (e.g., accounting & finance, marketing & sales, IT, HR.)				
• Other (specify: _____)				

In the following table, which presents the different employment occupations that may be found in Solid Waste Management, can you:

- Indicate how your total number of employees is split by type of occupation?
- Assess, for each occupation, how many employees you consider hiring by 2012?
- Specify, for planned hires, the selection criteria (*degree, experience, etc.*)?

	Planned hires									
	New hires by 2012		Staff Reductions by 2012 (due to downsizing, retirements, etc.)	Degree (Multiple answers possible)					Min. years of experience	Other qualifications required
	New positions	Existing positions (Replacements)		High school	College/technical training	Bachelor's	Master's	Ph.D.		
Related to SWM										
• Higher management specific to SWM (e.g., VP, Operations, Director, Operations)										
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)										
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)										
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)										
• Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers)										
• Labourers (e.g., helpers, handy men)										
Not related to SWM										
• Higher management (e.g., President, Divisional VP or GM)										
• General administration (e.g., accounting & finance, marketing & sales, IT, HR.)										
• Other (specify: _____)										

For each applicable employment category, please indicate how your employees are split by gender and age group.

	Gender			Age					
	% Women	% Men	Total	% < 25 years old	% 25-30 years old	% 31-40 years old	% 41-50 years old	% over 50 years old	Total
Related to SWM									
• Higher management specific to SWM (e.g., VP, Operations, Director, Operations)			100%						100%
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)			100%						100%
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)			100%						100%
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)			100%						100%
• Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers)			100%						100%
• Labourers (e.g., helpers, handy men)			100%						100%
Not related to SWM									
• Higher management (e.g., President, Divisional VP or GM)			100%						100%
• General administration (e.g., accounting & finance, marketing & sales, IT, HR.)			100%						100%
• Other (specify: _____)			100%						100%

For each applicable employment occupation, please indicate the distribution of your staff by education level when hired, and their seniority?

	Education level when hired (%)						Seniority (%)					
	Ph.D	Master's	Bachelor	College/ technical training	High school	Total	0-1 year	2-3 years	4-5 years	6-9 years	> 10 years	Total
Related to SWM												
• Higher management specific to SWM (e.g., VP, Operations, Director, Operations)						100%						100%
• Post secondary-educated professionals (e.g., engineers, designers, consultants, program coordinators, regulatory experts)						100%						100%
• Technicians/Technologists (e.g., waste stream analysts, compliance inspectors, gas field operators)						100%						100%
• Supervisors/Group leaders (e.g., route managers, landfill managers, MRF managers, dispatchers)						100%						100%
• Licensed/heavy equipment operators (e.g., landfill gas technicians, boiler operators, compactor operators, truck drivers))						100%						100%
• Labourers (e.g., helpers, handy men)						100%						100%
Not related to SWM						100%						100%
• Higher management (e.g., President, Divisional VP or GM)						100%						100%
• Business administration (e.g., finance, marketing, IT, HR, etc.)						100%						100%
• General administration (e.g., accounting & finance, marketing & sales, IT, HR.)						100%						100%
• Other (specify: _____)						100%						100%

THANK YOU VERY MUCH FOR YOUR COOPERATION. PLEASE FAX THE COMPLETED QUESTIONNAIRE TO
514-861-0881



ECO CANADA

Environmental Careers Organization

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ECO Canada (2010).

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Labour Market Research.

Environmental Careers Organization of Canada.



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