SUPPORT ON ENVIRONMENTAL MANAGEMENT INFORMATION AND ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEMS

FOR

SMALL AND MEDIUM ENTERPRISES IN THE ELECTRICAL / ELECTRONIC AND CONSTRUCTION SECTORS IN HONG KONG

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Environmental Protection Department
HKSAR Government

REVIEW REPORT

SUPPLY CHAIN PRESSURES FOR ENVIRONMENTAL MANAGEMENT AND EMS IN THE ELECTRICAL / ELECTRONIC SECTOR

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LIST OF ABBREVIATIONS

APCO	*Air Pollution Control Ordinance*
ASIP	*Annual Survey of Industrial Production*
BEC	*Business Environment Council*
C&SD	*Census and Statistics Department*
CP	*Cleaner Production*
EIA	*Environmental Impact Assessment*
EIAO	*Environmental Impact Assessment Ordinance*
E&E	*Electrical & Electronic Sector*
EM&A	*Environmental Monitoring and Auditing*
EMS	*Environmental Management System*
EMSD	*Electrical and Mechanical Services Department*
EPD	*Environmental Protection Department*
ETWB	*Environment, Transport and Works Bureau*
EU	*European Union*
HKEIA	*Hong Kong Electrical Industry Association*
HKIE	*Hong Kong Institution of Engineers*
HKPC	*Hong Kong Productivity Council*
HKUST	*Hong Kong University of Science & Technology*
HSIC	*Hong Kong Standard Industrial Classification*
IAQ	*Indoor Air Quality*
ISO	*International Organization for Standardization*
MIGs	*Major Industry Groups*
NCO	*Noise Control Ordinance*
NGO	*Non-Government Organization*
OLPO	*Ozone Layer Protection Ordinance*
PBBs	*Polybrominated Biphenyls*
PBDEs	*Polybrominated Diphenyl Ethers*
PNAP	*Practice Note for Authorized Persons & Registered Structural Engineers*
PolyU	*Hong Kong Polytechnic University*
PRD	*Pearl River Delta*
ProPECC	*Practice Notes for Professional Persons*
PVC	*Polyvinyl Chloride*
ROHS	*Restriction of Hazardous Substances*
SCP	*Supply Chain Pressure*
SMEs	*Small and Medium Enterprises*
SUCCESS	*Support and Consultation Centre for SMEs (TID)*
TCs	*Technical Circulars*
TID	*Trade and Industry Department*
UHK	*University of Hong Kong*
WDO	*Waste Disposal Ordinance*
WEEE	*Waste Electrical and Electronic Equipment*
WPCO	*Water Pollution Control Ordinance*

EXECUTIVE SUMMARY

BACKGROUND

SMEs in Hong Kong's electrical and electronic sector are collectively a major part of the economy ranking high in terms of number of establishments, contribution to gross domestic product, and size of employment. Electrical and electronic sector SMEs however also account for substantial environmental concerns (such as air, water and noise pollution, energy consumption, waste generation and chemical waste) and face increasing supply chain pressures for improved environmental management.

This *Review Report* has been compiled through internet research, literature reviews and consultations with stakeholder organizations to identify:

- the number and composition by industry type of SMEs in the electrical and electronic sector with operations in Hong Kong and Shenzhen (broken down to three-digit Hong Kong Standard Industrial Classification, HSIC, codes);
- the Major Industry Groups (MIGs) appropriate for the basis of *Practical Examples* illustrating the step-by-step process of EMS development for an SME;
- current trends in supply chain pressure for environmental management and EMS, focusing on the requirements of large multinational client corporations in the electrical and electronic sector;
- the latest and upcoming international requirements to be imposed on the sector, focusing on developments in Europe, Japan and the United States of America; and
- professional and academic institutions in Hong Kong and the Pearl River Delta (PRD) region that can provide tailored support to local electrical and electronic sector SMEs.

Findings are summarised as follows.

THE SIZE AND COMPOSITION OF THE ELECTRICAL AND ELECTRONIC SECTOR

According to the figures (January 2004) from the Census and Statistics Department (C&SD) and Hong Kong Electrical Industry Association (HKEIA) the total number of establishments of SMEs in the electrical and electronic sector with operations in Hong Kong and Shenzhen was 2,772 and 2,942 respectively. As shown below the majority (66%) of establishments in Hong Kong were associated with just one MIG (Machinery, Equipment, Apparatus, Parts & Components, n.e.c., MIG 386-387), whilst SMEs located in Shenzhen were more evenly distributed.

	HK (Total 2772)		**SZ (Total 2942)**	
Activity (I/D and MIG code)	**Number**	**Percentage**	**Number**	**Percentage**
Electroplating I/D 381802	38	1.4%	3	0.1%
OAC Machinery MIG 382	301	10.9%	275	9.4%
Radio/Communication MIG 383	65	2.3%	528	18.0%
Electronic Components MIG 384	100	3.6%	820	27.9%
Electrical Appliances MIG 385	58	2.1%	274	9.3%
Machinery & Parts MIG 386 - 387	1830	66.0%	580	19.5%
PSMC & PO Goods MIG 389	380	13.7%	462	15.7%

MIGS APPROPRIATE FOR USE AS PRACTICAL EXAMPLES OF ISO14001 IMPLEMENTATION

The major industry groups chosen to provide the basis for the *Practical Examples* included in the support package, reflecting "real-life" activities and processes undertaken by real SMEs in the electrical and electronic sector, have been selected by consideration of:

- The number of electrical and electronic sector SMEs in each MIG with operations in Hong Kong and Shenzhen;
- The significance of the environmental impacts arising from the manufacturing activities of SMEs in the different MIGs; and
- The degree of supply chain pressures (for example, local or international legislation, client requirements, etc) experienced by SMEs in the different MIGs.

As shown below, the top three MIGs were the same for SMEs with operations both in Hong Kong and Shenzhen: Electronic Parts and Components (MIG 384); Office, Accounting & Computing Machinery (MIG 382); and Electroplating (I/D 381802). *Practical Examples* have been provided as part of the support programme based on these three groups.

Activity (I/D and MIG code)	Hong Kong Ranking	Shenzhen Ranking
Electronic Components MIG 384	1	1
OAC Machinery MIG 382	2	3
Electroplating I/D 381802	3	2
Machinery & Parts MIG 386 - 387	4	5
Radio/Communication MIG 383	5	4
PSMC & PO Goods MIG 389	6	7
Electrical Appliances MIG 385	7	6

CURRENT TRENDS IN SUPPLY CHAIN PRESSURE FOR ENVIRONMENTAL PROTECTION

Multinational corporations reviewed during the research have included Sony Corporation, Matsushita Electric Group (Panasonic), Toshiba Corporation, LG Electronics, Samsung Electronics, General Motors, HP (Hewlett Packard), Intel Corporation, Whirlpool, Electrolux Group, Nokia and others. Requirements stipulated by these leading clients have been varied and far-reaching, but can be categorized into six key areas:

1. Compliance with local and international legislation (with compliance with legislation in advance of its promulgation in some areas)
2. EMS and ISO 14001 certification (preference often given to ISO certified suppliers, certification mandated in some cases and even extending to second tier suppliers)
3. Eco-Design or "Design for Environment" to reduce the impacts of a product throughout its whole life cycle
4. Cleaner Production to minimise the impacts of the product during its production
5. Other client-specific requirements (e.g. environmental audit, questionnaires, education program and benchmarking exercises)
6. Wider-reaching requirements (going beyond the environment, e.g. labour, safety and health, sustainability compliance, workers rights, etc)

Those corporations reviewed are considered to be at the forefront of such initiatives, further reinforcing the need for Hong Kong SMEs to be prepared for future requirements for improved environmental performance.

LATEST AND UPCOMING INTERNATIONAL REQUIREMENTS

The review of latest and upcoming international requirements to be imposed on the electrical and electronic sector focused on developments in Europe, Japan and the United States of America. In each case the key environmental legislation and labeling schemes have been highlighted. Of particular concern are two recent European Union (EU) Directives on the Restriction of Hazardous Substances (ROHS) and Waste Electrical and Electronic Equipment (WEEE). Both have been introduced to restrict the types of hazardous substances in electrical and electronic equipment and require manufacturers to be responsible for the collection, recovery and recycling of used products, respectively.

The ROHS will ban the sale in the EU of certain categories of electrical and electronic equipment containing or manufactured using six banned substances (lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers) from the 1st July 2006. The ban on lead in solders will have the greatest impact on electrical equipment manufacturers in terms of the work and investment in new equipment.

The WEEE is designed to tackle the fast increasing waste stream of electrical and electronic equipment and complements EU measures on landfill and incineration of waste. Producers will be responsible for taking back and recycling electrical and electronic equipment, with consumers able to return their equipment free of charge. This will provide incentives to design electrical and electronic equipment in an environmentally more efficient way, which takes waste management aspects fully into account.

SOURCES OF ENVIRONMENTAL SUPPORT

The study identified more than twenty support centres in Hong Kong and the Pearl River Delta for the electrical and electronic sector. The services and supports offered by these organizations are diverse and include the provision of general information, ISO 14001 mentorship, Eco-design, “Design for Environment” to environmental technologies support and others. Given the trends of supply chain environmental pressures and requirements affecting local electrical and electronic manufacturers being driven by overseas national environmental legislations, directives and initiatives, contact details of some overseas sector-specific environmental information centres have also been provided. In addition, over 80 local consultancies provide construction related services in areas including environmental auditing, pollution control, impact assessments, analytical and laboratory services, training and strategy, and ISO14001 EMS development.

1. INTRODUCTION

1.1 BACKGROUND TO THE SUPPORT PROGRAMME

Companies worldwide are facing increasing pressure to provide their goods and services in an environmentally responsible manner. The risks of not doing so include loss of business and market share through damage to company image, the inability to comply with legislation in local or export markets, and falling behind customer or buyer requirements. To effectively control the environmental impacts resulted from the operation of a company, the introduction of environmental management is a frequently used tool. Environmental management also brings a range of potential benefits including cost savings through increased process efficiency, legal compliance and reduced waste, improved staff quality, and improved company reputation.

Small and medium enterprises (SMEs) face the same potential risks and benefits. In 2001 the Environmental Protection Department (EPD) has completed extensive research into environmental management system (EMS) adoption by SMEs[1] to:

1. identify the market threats and opportunities to local SMEs resulting from international trends in the adoption of ISO14001 EMS, and investigate the status of ISO14001 adoption by SMEs in Hong Kong;
2. prioritise the *Major Industry Groups* (MIGs) of local SMEs (in both the service and manufacturing sectors) which are most at risk or have most to gain from these trends, taking into account social, economic and environmental factors; and
3. examine the barriers to EMS through detailed case studies in the priority industries, and hence design a support programme to help local SMEs in the selected sectors.

The research revealed growing trends in the introduction of environmental requirements into the supply chain across many sectors. These included national and international legislation, and policy and procurement requirements from buyer and client organizations, both of which would in time exclude suppliers that did not comply. Despite this, fewer than 20% of local SMEs recognised the need to or benefits of implementing an EMS, or perceived any potential opportunity loss from not embracing ISO14001.

The electrical / electronic sector (from manufacturing industry) and the construction sector (from the service industry) were identified as the high priority SME sectors. This is because collectively they ranked highest in terms of the number of establishments, contribution to gross domestic product, size of employment, and environmental problems (energy consumption, waste generation, complaints and convictions, etc) in Hong Kong. They also faced the greatest supply chain pressures for environmental protection.

As a follow-up of these findings, the Business Environment Council (BEC) was commissioned by the EPD in October 2003 to provide support on *Environmental Management Information and ISO14001 EMS* for Hong Kong SMEs in (A) the electrical and electronic sector and (B) the construction sector.

1.2 OBJECTIVES OF THE SUPPORT PROGRAMME

This review report forms part of the support programme for **Hong Kong SMEs in the electrical and electronic sector**. A separate review report has also been produced for

[1] *Study on Small & Medium Enterprises (SMEs) in ISO14001 Environmental Management System (EMS) Implementation*, led by the Business Environment Council

SMEs in the construction sector (*Supply Chain Pressures for Environmental Management and EMS in the Construction Sector*, September 2004).

The key objectives of the support programme is to help SMEs in the local electrical and electronic sector to (i) prepare for future supply chain pressures towards ISO14001 EMS, (ii) improve their environmental performance, and (iii) stay competitive in an increasingly environmentally-conscious business marketplace. The support is being provided through three elements, all of which are provided in English and Chinese:

1. An update on the *supply chain pressures for environmental management and EMS in the electrical and electronic sector* ("*Task 1A*", presented in this report);

2. Easy to use *Generic ISO 14001 EMS Templates*, *User Manual* and *Practical Examples* ("*Task 2A*"), which an SME can use to develop its own ISO14001 Environmental Management System; and

3. An *Environmental Management Information and ISO14001 EMS Support* website for electrical and electronic sector SMEs ("*Task 3A*"), from which the Generic ISO 14001 EMS Templates, user manual, practical examples and contents of this report can be obtained.

This *Review Report* presents the findings from research into the supply chain pressures for environmental management and EMS facing Hong Kong SMEs in the electrical and electronic sector (*Task 1A*).

1.3 THE STRUCTURE OF THIS REVIEW REPORT

The remainder of this *Review Report* is structured as follows:

Section 2 provides an update on the number and composition by industry type of SMEs in the electrical and electronic sector with operations in Hong Kong and Shenzhen, and identifies the Major Industry Groups (MIGs) to form the basis of *Practical Examples* illustrating the step-by-step process of EMS development for an SME.

Section 3 presents current trends in supply chain pressure for environmental management and EMS in the local electrical and electronic sector, focusing on the requirements of large multinational client corporations.

Section 4 describes the latest and upcoming international requirements to be imposed on the electrical and electronic sector, focusing on developments in Europe, Japan and the United States of America.

Section 5 identifies the contact details of professional and academic institutions in Hong Kong and the Pearl River Delta (PRD) region that can offer tailor-made expert advice and technical assistance to electrical and electronic sector SMEs on local and international environmental requirements, ISO14001 EMS, and pollution control measures to suit the specific needs of individual enterprises.

Information in this report has been gathered through extensive web-based and literature research, including reviews of corporate environmental reports, trade publications and international circulars, plus consultations with relevant trade associations and interviews with major client companies. Information sources are provided throughout the report and compiled in *Appendix A*.

2. THE ELECTRICAL & ELECTRONIC SECTOR IN HONG KONG

This section presents an overview of Hong Kong SMEs in the electrical and electronic sector in terms of their number, industrial composition, and location of facilities and activities (either in Hong Kong and/or Shenzhen). The selection of appropriate Major Industry Groups (MIGs) upon which the *Practical Examples* illustrating the step-by-step approach to ISO14001 EMS implementation are based is also described.

2.1 MAJOR INDUSTRY GROUPS (MIGS) IN THE ELECTRICAL AND ELECTRONIC SECTOR

Different industries of Hong Kong's manufacturing sector, including electrical and electronic related manufacturing, are classified using the *Hong Kong Standard Industrial Classification*[2] (HSIC) system by the Census and Statistics Department of the Hong Kong SAR Government. Classifications consist of *Major Industry Groups* (MIGs), each with a three-digit code (for example, Electrical Appliances with HSIC code 385). Further sub-codes are applied within many MIGs to allow their more detailed sub-classification (for example, Electrical Fans with HSIC code 385101).

MIGs in the electrical and electronic sector consist of:

- Office, Accounting and Computing Machinery (OAC machinery) – *HSIC MIG Code 382*
- Radio, Television, Communication Equipment & Apparatus (Radio / Communication) – *HSIC Code 383*
- Electronic Parts and Components – *HSIC Code 384*
- Electrical Appliances & Houseware and Electronic Toys (Electrical Appliances) – *HSIC Code 385*
- Machinery, Equipments, Apparatus, Parts, Components, N.E.C Machinery & Parts – *HSIC Code 386-387*
- Professional / Scientific, Measuring / Control, N.E.C. / Photographic / Optical Equipment – *HSIC Code 389*

Table 2.1a presents these MIGs and also identifies the sub-classifications within each MIG that have been selected as relevant to this study for the purposes of quantifying the size and composition of the sector. It should be noted that Electroplating (Code 381802) has also been included to ensure appropriate representation, even though its MIG (code 381) is not as a whole relevant to the study.

Table 2.1a Manufacturing Industries and the HSIC Classifications

Description of the Manufacturing Activities	MIG Code
Electroplating (excluding plastic electroplating)	**381802** [3]
Office, Accounting and Computing Machinery (OAC Machinery)	**382**
Office machinery and equipment, except computing and accounting machinery	3821
Office machinery and equipment, except computing and accounting machinery	382100
Computing machinery and equipment	3822
Computing machinery and equipment	382200
Radio, Television, Communication Eq't & Apparatus (Radio & Communication)	**383**

2 Hong Kong Standard Industrial Classification (HSIC) Volume One, Hong Kong SAR Government Census and Statistics Department

3 According to the HSIC classification the 4th level of classification is a 6-digit code representing a specific Industry or Trade (I/D).

Description of the Manufacturing Activities	MIG Code
Transistorized radios	3831
Transistorized radios	383100
Television receivers and communication equipment	3832
Television receivers and video equipment	383201
Telephone and communication equipment	383202
Sound reproducing & recording equipment and apparatus	3833
Sound reproducing & recording equipment and apparatus	383300
Records and magnetic taps	3834
Gramophone records	383401
Magnetic taps	383402
Electronic Parts and Components	**384**
Electronic Parts and Components	3840
Electronic parts and components for computer and telecommunications equipment, manufacturing	384001
Electronic parts and components, n.e.c., manufacturing	384099
Electrical Appliances & Houseware and Electronic Toys (Electrical Appliances)	**385**
Electrical appliance and houseware	3851
Electric fans	385101
Electrical appliance and houseware	385199
Electronic toys	3852
Electronic toys	385200
Machinery, Equipments, Apparatus, Parts, Components, N.E.C	**386-387**
Engines and turbines	3861
Engines and turbines	386100
Agricultural machinery and equipment	3862
Agricultural machinery and equipment	386200
Metal and wood working machinery	3863
Metal and wood working machinery	386300
Special industrial machinery and equipment except metal and wood working machinery	3864
Special industrial machinery and equipment except metal and wood working machinery	386400
Industrial machinery and apparatus for the generation of electricity	3865
Industrial machinery and apparatus for the generation of electricity	386500
Dry batteries (excluding lead accumulators)	3866
Dry batteries (excluding lead accumulators)	386600
Electric and torch bulbs & tubes	3867
Electric and torch bulbs & tubers (excl. electric lamps)	386701
Fluorescent tubes	386702
Electronic industrial apparatus	3868
Electronic industrial apparatus	386800
Machinery and equipment except electrical, n.e.c	3871
Refrigerators and freezers, non-domestic	387101
Air-conditioning machines, non-domestic	387102
Moulds	387103
Machinery and equipment except electrical, n.e.c.	387199
Electrical products and accessories, n.e.c.	3872
Batteries	387201
Carbon Brushes	387202
Electric ballast	387203
Fuse cartridge, block or clip	387204
Carbon and graphite electrodes for dry batteries	387205
Electrical products and accessories, n.e.c.	387299

Description of the Manufacturing Activities	MIG Code
Electronic products, n.e.c	3873
Electronic products, n.e.c	387300
Professional/Scientific/Measuring/Control/N.E.C./Photographic/Optical Eq't	**389**
Photographic and optical goods	3891
Cameras	389101
Spectacles	389102
Photographic and optical goods, n.e.c.	389199
Watches and clocks, mechanical	3892
Clocks, mechanical	389201
Watches, mechanical	389202
Clock movements, mechanical	389203
Watch movements, mechanical	389204
Watches and clocks, electronic	3893
Clocks, electronic	389301
Watches, electronic	389302
Clock movements, electronic	389303
Watch movements, electronic	389304
Cases and parts for watches and clocks, n.e.c.	3894
Cases for watches and clocks	389401
Parts for watches and clocks, n.e.c.	389402
Professional & scientific, and measuring & controlling, n.e.c	3899
Professional & scientific, and measuring & controlling, n.e.c	389900

2.2 SIZE AND COMPOSITION OF THE ELECTRICAL & ELECTRONIC SECTOR IN HONG KONG

2.2.1 SMEs with Manufacturing Facilities and Activities in Hong Kong

The current number of Hong Kong electrical and electronic sector SMEs with facilities and activities solely in Hong Kong has been obtained from numerous C&SD publications[4], including its annual publication the *2001 Annual Survey of Industrial Production* (ASIP), with more up to date figures acquired where necessary through telephone enquiries. *Table 11* of ASIP (*Principal Statistics for All Manufacturing Establishments*, 2001) gives data on the number of establishments and persons engaged in each MIG. Establishments with less than 100 employees are counted as SMEs as defined by the Trade and Industry Department (TID) for manufacturing enterprises (ASIP in fact groups establishments into six sizes according to their number of employees: 1 to 9; 10 to 19; 20 to 49; 50 to 99; 100 to 199; and 200 to 499)[5]. As shown in *Table 2.2a*, the total number of Hong Kong electrical and electronic establishments is 2,828, 98% of which (2772) are classed as SMEs.

Table 2.2a Electrical and Electronic SMEs with Facilities in Hong Kong

Activity (I/D and MIG code)	Number of Employees in Hong Kong						SMEs
	1-9	10-19	20-49	50-99	>100	Total	
Electroplating I/D 381802 (note 4)	----	----	----	----	1	39	38
OAC Machinery MIG 382	269	15	14	3	7	308	301
Radio/Communication MIG 383	33	8	19	5	2	67	65

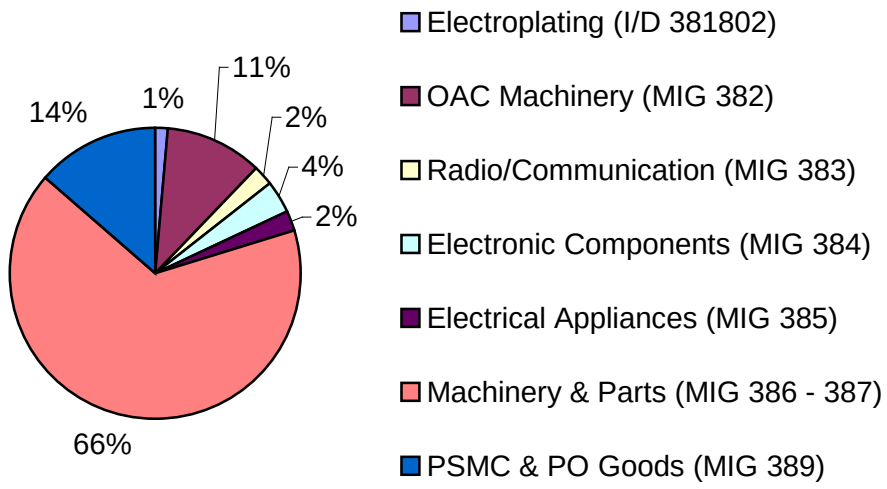
4 Hong Kong Standard Industrial Classification (Volume One), Hong Kong Annual Digest of Statistics (2002), Hong Kong Monthly Digest of Statistics (July 2003), 2001 Annual Survey of Industrial Production (ASIP 2001)

5 ASIP provides employment size data for all enterprises within an MIG but gives no breakdown for their sub-classifications. Employment data for Electroplating (I/D 381802) has therefore been sourced from the 2002-2003 Directory of Hong Kong Industries (DHKI), published by Hong Kong Productivity Council

Electronic Components MIG 384	56	16	14	14	24	124	100
Electrical Appliances MIG 385	47	4	7	0	0	58	58
Machinery & Parts MIG 386 - 387	1669	70	73	18	16	1846	1830
PSMC & PO Goods MIG 389	302	43	20	15	6	386	380
						2828	**2772**

The composition of SMEs across the surveyed industry groups is shown in *Figure 2.2a*. Clearly Machinery and Parts MIGs (HSIC codes 386 – 387) dominate in their number, distantly followed by Professional, Scientific, Measuring, Control, N.E.C., Photographic and Optical Equipment (MIG 389) and Office, Accounting and Computing Machinery (MIG 382).

Fig. 2.2a Composition of Electrical & Electronic SMEs with Hong Kong Operations



The HSIC definition for manufacturing covers all establishments mainly with operations in Hong Kong. Data in ASIP 2001 covers exclusively companies that have manufacturing facilities or activities in Hong Kong. Therefore, the ASIP 2001 data is considered a good estimation on the current number of establishments of Hong Kong based SMEs in E&E sector which have manufacturing facilities and activities in Hong Kong[6].

2.2.2 Hong Kong SMEs with Manufacturing Facilities and Activities in Shenzhen

The current number of Hong Kong based SMEs in the electrical and electronic sector with manufacturing facilities and activities in Shenzhen has been quantified mainly through information compiled by the Hong Kong Electronic Industries Association (HKEIA)[7].

The *2003-2004 Annual Directory of Hong Kong Electronic Industry* (DHKEI) and the HKEIA member database provided the necessary data. These records covered both member and non-member companies with operations ranging from electronic & electrical parts trading, consumer electronic product manufacturing, through to industrial electronic and electrical equipment manufacturing and export. The database also provided valuable information including company name, contact details, total number of staff in Hong Kong, location of

[6] However some discrepancies were found between the C&SD data and that of the DHKI (used to identify the size of SMEs in terms of number of employees in each MIG), particularly in the total number of SMEs based on TID's definition. To avoid confusion, the data set of DHKI was not included in this estimation process, except where needed for I/D 381802.

[7] C&SD publications and the DHKI of HKPC did not provide the necessary detail on the location of manufacturing facilities. No such information was also found on the websites of Shenzhen Statistics Department (深圳市统计局) http://www.sztj.com or Shenzhen Electronic Chamber of Commerce (深圳市电子商会) http://www.seccw.com.

manufacturing facilities (including Shenzhen, Guangzhou, Dongguan, Zhongshan. Shanghi or even overseas), business nature and product type[8].

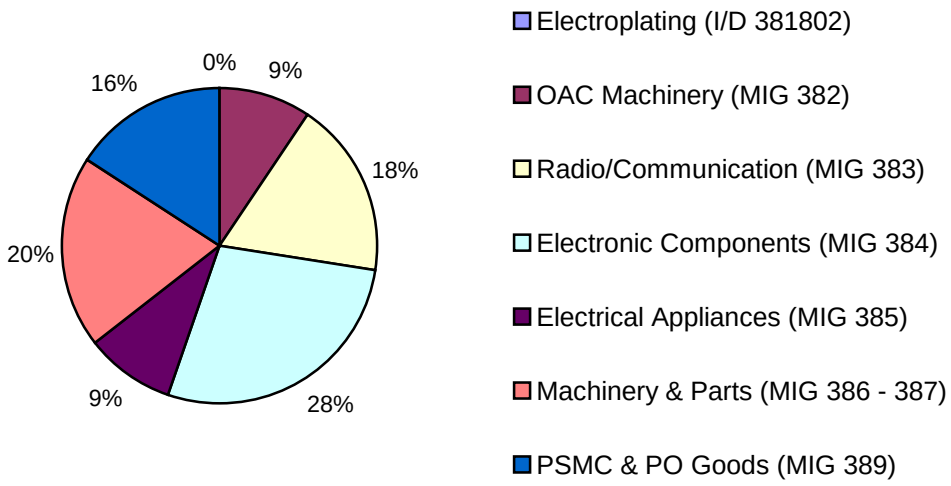
The breakdown of the number of Hong Kong SME establishments with manufacturing facilities and activities in Shenzhen in each selected MIGs in 2001 is shown in *Table 2.2b*.

Table 2.2b Electrical and Electronic SMEs with Facilities in Shenzhen

Activity (I/D and MIG code)	SMEs
Electroplating I/D 381802 (note 4)	3
OAC Machinery MIG 382	275
Radio/Communication MIG 383	528
Electronic Parts and Components MIG 384	820
Electrical Appliances MIG 385	274
Machinery & Parts MIG 386 - 387	580
PSMC Equipment & PO Goods MIG 389	462
	2942

The composition of SMEs across the surveyed industry groups is shown in *Figure 2.2b*. Unlike those SMEs with facilities in Hong Kong, the distribution of SMEs across the different industry groups is more even. Electronic Parts and Components (MIG 384) predominates, followed by Radio and Communication (MIG 383), Machinery and Parts (MIG 386 – 387) and Professional, Scientific, Measuring, Control, N.E.C., Photographic and Optical Equipment (MIG 389).

Fig. 2.2b Composition of Electrical & Electronic SMEs with Shenzhen Operations



2.3 IDENTIFYING APPROPRIATE MIGS FOR THE ISO14001 EMS PRACTICAL EXAMPLES

As mentioned in *Section 1*, an important element of this support package is the provision of easy to use *Generic ISO 14001 EMS Templates* and *User Manual* that an SME can use to develop its own ISO14001 Environmental Management System. Various *Practical Examples*, which reflect as far as possible on "real-life" activities and processes undertaken by real SMEs in the electrical and electronic sector, are provided to demonstrate clearly the step-by-step approach to EMS implementation.

[8] It was necessary to re-classify the HKEIA data using professional judgement into the appropriate major industry groups for consistency with the industrial classifications (MIG codes) of the HSIC (HKEI data is classified using 223 different product types)

The major industry groups chosen to provide the basis for these *Practical Examples*[9] have been selected by consideration of:

- The number of electrical and electronic sector SMEs in each MIG with operations in Hong Kong and Shenzhen (discussed in *Sections 2.2.1* and *2.2.2* respectively);
- The significance of the environmental impacts arising from the manufacturing activities of SMEs in the different MIGs; and
- The degree of supply chain pressures (for example, local or international legislation, client requirements, etc) experienced by SMEs in the different MIGs.

The remainder of this section describes the criteria used in the selection process and identifies with explanations the MIGs that have been selected.

2.3.1 The Environmental Impacts of SMEs in Different MIGs

The significance of the environmental impacts arising from the manufacturing activities associated with each MIG has been evaluated by consideration of seven areas of key concern consisting of 29 environmental factors:

1. *Resource Use*: natural resources (e.g. water, electricity, fuels, etc), process chemicals, organic solvents, hazardous substances, use of other chemicals for general purposes, etc;
2. *Air Emissions*: dust/smoke emissions, toxic gas emissions, green house gases emissions, odours, indoor air quality (IAQ), etc;
3. *Wastewater*: discharges of toxic substances, oil and grease, other industrial discharges, etc;
4. *Noise Nuisance*: noise from machinery, ventilation, maintenance, etc
5. *Waste Management*: packaging waste, reject products, scrap tools & parts, industrial wastes, etc;
6. *Chemical Waste*: locally / internationally regulated liquid and solid chemical wastes;
7. *Potential Emergencies*: leakage / spillage of chemicals/chemical wastes, wastewater, air pollutants, risk of fire and explosion, etc.

The selected MIGs have been evaluated in each area according to their severity of environmental impact, with verification by a technical advisor from a leading Hong Kong certification body, using the following scoring system:

Classification	Interpretation	Score
N/A	Not applicable to the MIG	0
Insignificant	Not a typical environmental aspect in the MIG	1
Normal	A typical environmental aspect in the MIG	2
Significant	A typical significant environmental aspect in the MIG	3

Detailed results for the evaluation are presented in *Appendix B* and summarised in *Table 2.3a* below. The top two ranked MIGs creating the most significant environmental

[9] Although based on selected MIGs, the *Practical Examples* are designed to be of assistance to SMEs in other electrical and electronic industries in illustrating how the *Generic Templates* can be used as the basis of an effective ISO14001 EMS.

concerns are found to be Electronic Parts & Components (MIG 384) and Electroplating (I/D 381802), whilst Professional, Scientific, Measuring, Control, N.E.C., Photographic and Optical Equipment (MIG 389) created the least.

Table 2.3a The Significance of Environmental Impacts of the Different MIGs

Activity (I/D and MIG code)	Environmental Impact Score
Electroplating I/D 381802	63.00
OAC Machinery MIG 382	43.50
Radio/Communication MIG 383	37.63
Electronic Parts and Components MIG 384	68.00
Electrical Appliances MIG 385	33.75
Machinery & Parts MIG 386 - 387	35.59
PSMC Equipment & PO Goods MIG 389	26.00
Maximum Possible Score	**87**

Due to the similarity in the nature of operations between Hong Kong based and Shenzhen based establishments in each MIG, their environmental impacts are considered to be sufficiently comparable for the purpose of identifying appropriate *Practical Examples*.

2.3.2 Global Supply Chain Pressure Trends Facing SMEs in Different MIGs

Global trends on supply chain pressures environmental management have been investigated by considering the six typical supply chain environmental requirements faced by the MIG:

1. Compliance to local and international statutory requirements;
2. Implementation of an EMS or certification to ISO 14001 EMS;
3. Adoption and consideration of eco-design or “Design for Environment”;
4. Adoption and consideration of cleaner production or means to minimize the generation of pollution;
5. Other environmental requirements such as client audit, review, evaluation, environmental reporting, propagation of environmental awareness to next level of the supply chain and education;
6. Other non-environmental requirements such as the consideration of corporate social responsibility, sustainable development, safety and health.

More detailed explanations and examples of these pressures are given in *Section 3*.

The selected MIGs have been evaluated in each area according to the severity of existing and forthcoming supply chain environmental pressures, again with verification by a technical advisor from a leading Hong Kong certification body, using the following scoring system:

Classification	Interpretation	Score
Low-priority	Stable Trend	1
Medium-priority	Slow growing trend	2
High-priority	Rapid Growing trend	3

The results for the evaluation are presented in *Appendix C* and summarised in *Table 2.3b*. The top two ranked MIGs facing the most significant environmental supply chain pressures are found to be Electroplating (I/D 381802) and Electronic Parts & Components (MIG 384), with Machinery and Parts (MIG 386 – 387) facing the least.

Table 2.3b Degree of Supply Chain Pressures Facing the Different MIGs

Activity (I/D and MIG code)	Supply Chain Pressure Score
Electroplating I/D 381802	15
OAC Machinery MIG 382	10.5
Radio/Communication MIG 383	8
Electronic Parts and Components MIG 384	14
Electrical Appliances MIG 385	10
Machinery & Parts MIG 386 - 387	7
PSMC Equipment & PO Goods MIG 389	7.5
Maximum Possible Score	**18**

As with the significance of environmental impacts, the high similarity in the operating nature of Hong Kong and Shenzhen based operations inferred supply chain environmental pressures sufficiently comparable for the purpose of identifying appropriate *Practical Examples*.

2.3.3 Selection of Practical Examples for SMEs with Operations in Hong Kong

In selecting the MIGs to form the basis of the *Practical Examples* to illustrate the EMS development process for establishments in Hong Kong, consideration has been given to:

- The MIGs with the greatest number of SMEs (presented in *Table 2.2a* for the SMEs with operations in Hong Kong);
- The MIGs with the most significant environmental impacts (in *Table 2.3a*); and
- The MIGs with the greatest degree of supply chain pressure for environmental management (presented in *Table 2.3b*).

The selection has been made by simple addition of the ranking of each MIG for each of these criteria, shown in the following table.

Table 2.3c Selection of Practical Examples with Operations in Hong Kong

	Ranking			Total Score	Final Ranking
MIG	Number of Establishments	Environmental Impact	Supply chain pressures		
MIG 384	4	7	6	17	1 (top)
MIG 382	5	5	5	15	2
I/D 381802	1	6	7	14	3
MIG 386 - 387	7	3	1	11	4
MIG 383	3	4	3	10	5
MIG 389	6	1	2	9	6
MIG 385	2	2	4	8	7 (least)

The top three business areas have therefore been selected as Electronic Parts & Components manufacturing (MIG 384), Office, Accounting & Computing Machinery (MIG 382) and Electroplating (I/D 381802). These three MIGs have therefore been used as the basis for developing the Practical Examples for SMEs in the electrical and electronic sector with activities and facilities in Hong Kong.

2.3.4 Selection of Practical Examples for SMEs with Operations in Shenzhen

Similarly, in selecting the MIGs to form the basis of the *Practical Examples* to illustrate the EMS development process for establishments in Shenzhen, balanced consideration has been given to:

- The MIGs with the greatest number of SMEs (presented in *Table 2.2b* for the SMEs with operations in Shenzhen);
- The MIGs with the most significant environmental impacts (in *Table 2.3a*); and
- The MIGs with the greatest degree of supply chain pressure for environmental management (presented in *Table 2.3b*).

The selection has been made by simple addition of the ranking of each MIG for each of these criteria, shown in the following table.

Table 2.3d Selection of Practical Examples with Operations in Shenzhen

	Ranking			Total Score	Final Ranking
MIG	Number of Establishments	Environmental Impacts	Supply chain pressure		
MIG 384	7	7	6	20	1 (top)
I/D 381802	1	6	7	14	2
MIG 382	3	5	5	13	3
MIG 383	5	4	3	12	4
MIG 386 - 387	6	3	1	10	5
MIG 385	2	2	4	8	6
MIG 389	4	1	2	7	7 (least)

The top three business areas have therefore been selected as Electronic Parts & Components manufacturing (MIG 384), Electroplating (I/D 381802) and Office, Accounting & Computing Machinery (MIG 382). These three MIGs have therefore been used as the basis for developing the Practical Examples for SMEs in the electrical and electronic sector with activities and facilities in Hong Kong.

3. SUPPLY CHAIN PRESSURES FOR ENVIRONMENTAL PROTECTION

This section presents the latest trends towards supply chain pressure and requirements for environmental protection. Information has been collected by extensive literature reviews and internet research (with information sources listed in *Appendix A*), plus consultations with relevant trade associations and interviews with major client companies[10].

Global electrical and electronic clients on the whole have a diverse product spectrum with suppliers originating from various trades. *Table 3.1a* below presents a matrix of the global clients included in the review and the MIGs with which they have extensive interfaces.

Table 3.1a Supply Chain Interfaces Between Major Global Clients and MIGs

	Major Industry Group (MIG) or Industry/Trade (I/D)						
Organizations	**381802**	**382**	**383**	**384**	**385**	**386/7**	**389**
Sony Corporation	x	x	x	x	x	x	x
Matsushita Electric (Panasonic)	x		x	x	x	x	x
Toshiba Corporation	x	x	x	x	x	x	x
LG Electronics	x		x	x	x	x	x
Samsung Electronics	x		x	x	x	x	x
General Motors	x			x			
HP (Hewlett Packard)	x	x		x	x	x	
Intel Corporation	x	x		x			
Whirlpool	x			x	x		
Electrolux Group	x			x	x		
Nokia	x		x	x		x	

Details of the requirements made by these organisations are given in *Appendix D*. These are found to fall broadly into six categories, each further discussed separately in the remainder of this section:

- Compliance with legal requirements
- EMS and ISO 14001 certification related requirements
- Cleaner production requirements
- Eco-Design or “Design for Environment” (DfE) requirements
- Other client-specific environmental requirements
- Other “corporate responsibility requirements (social accountability, health & safety, etc)

3.1 COMPLIANCE WITH LEGISLATION

Clearly a key supply chain pressure facing in all electrical and electronic related companies no matter their size is compliance with legislative and regulatory environmental

[10] Hong Kong Electronic Industries Association, Freescale Semiconductors HK Ltd, Philips Electronic Hong Kong Ltd

requirements. Companies have financial reasons for avoiding environmental convictions. A list of current ordinances and regulations is provided in *Appendix E*[11]. These consist of:

- *environmental ordinances and regulations* – the *Air Pollution Control Ordinance* (APCO), *Ozone Layer Protection Ordinance* (OLPO), *Noise Control Ordinance* (NCO), *Water Pollution Control Ordinance* (WPCO), *Waste Disposal Ordinance* (WDO), *Environmental Impact Assessment Ordinance* (EIAO); and

- *environmentally-related ordinances and regulations* – the *Factories and Industrial Undertakings Ordinance*, *Occupational Safety and Health Ordinance*, *Dangerous Goods Ordinance*, *Antiquities and Monuments Ordinance*, *Public Health and Municipal Services Ordinance*, and others.

Compliance with environmental legislation within the region in which the manufacturing facility is located has been the foundation of doing business in the electrical and electronic sector. However, more and more environmental legislation now addresses not only the pollution generated from manufacturing processes, but also the potential impacts from the rest of the product life cycle (e.g. during operation or disposal). The environmental requirements and legislations from the user country have become more important to the products and linked closely with its manufacturing processes.

Most companies require compliance with both local and global environmental legislation. Companies like Philips, Sony, Toshiba require suppliers to make earlier response to the new trend of legislation and initiatives that extend across borders, such as the EC directives on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (ROHS) and Waste Electrical and Electronic Equipment (WEEE), both discussed further in *Section 4*.

Requirements vary from client to client. Some, like Philips, require suppliers to take steps in changing their existing design and production methodologies in order to cater for future needs in the mass production of lead-free "Green" products. Others (e.g. Nokia) even require suppliers to supply evidence of compliance with such regulations. Some well-established global manufacturers of electronic & electrical consumer product (such as Philips & Electrolux) realize and accept their responsibility to ensure recycling or proper disposal of their products at the end of their life. They are working closely with their component suppliers to seek competitive advantages through design-for-recycling programs and investments in efficient handling systems for waste appliances.

3.2 EMS AND ISO 14001 CERTIFICATION

Derived from the growing trend of global environmental legislation, a common way for manufacturers to demonstrate their commitment to environmental protection, fulfilment of legislations and good environmental performance has been the implementation of EMS or certification to ISO14001. Certification helps manufacturers gain recognition and provide assurance of good environmental performance. Most of these "environmentally-conscious" electrical and electronic sector manufacturers gain direct benefits from the adoption of ISO 14001 EMS and seek to propagate the requirements to their whole supply chain.

Amongst the corporations with environmental requirements for suppliers reviewed, all but one (Electrolux) require the implementation of an EMS to some degree. Three corporations (Philips, Matsushita/Panasonic and GM) make ISO 14001 certification a must (for direct product suppliers only) whilst one other (Toshiba) gives explicit priority to

[11] Each of these requirements is described on the *Environmental Information and EMS Support Website* and in the *Register of Legal and Other Requirements Register* for the *Practical ISO14001 Example for the Construction Sector*. Hence in the interest of brevity their descriptions are not included in this review report.

suppliers with certification. Others require or "expect" suppliers to implement an EMS or some EMS elements (such as environmental policy) but without explicit requirements for formal certification (e.g. Philips, Sony, Toshiba, HP, Nokia).

Some companies also introduce solid time-frame to their supplier in achieving ISO 14001 certification for their major production facilities as one of the critical criteria in developing long-term partnerships. In the extreme (e.g. Philips), these time-frame linked requirements have also been extended to reach tier-two suppliers (the suppliers of the first tier supplier). Sony also explicitly requires suppliers to control the environmental performance (often implemented through EMS development & certification) of their own suppliers through implementing "upstream management".

3.3 ECO-DESIGN OR "DESIGN FOR ENVIRONMENT"

Eco-design or Design for Environment (DfE) is an engineering perspective of the design process focusing on pollution prevention and resource conservation. DfE is closely linked to life cycle analysis and involves design procedures that minimise material and energy use whilst maximizing reuse and recycling. DfE seeks to discover product innovations that will meet cost and performance objectives while reducing pollution and waste throughout the life cycle. DfE is also considered an umbrella term describing techniques used to incorporate an environmental component into products and services before they enter the production phase. In the electrical and electronic sector, eco-design or DfE requirements most frequently address (i) the control or non-use hazardous substances, (ii) reusability, recyclability, durability and ease of disposal, and (iii) energy efficiency.

Virtually all companies with eco-design requirements require control or non-use of hazardous chemical substances. Most of these (e.g. Sony, Philips, Matsushita, GM) have lists of restricted substances (mostly those listed in the EU Restriction of Hazardous Substances, with lead soldering being of much concern) and require disclosure of levels of these substances in the products supplied.

Resource efficiency and waste disposal are required by companies including Nokia, HP, Matsushita, Toshiba and GM, with conditions for reusability, recyclability, durability or recycled content. Suppliers are also required to supply relevant information including recommendations for end-of-life treatment. HP sets out requirements for product labelling for recycling and disposal, which may be derived from legislation or HP's own requirement. Though some companies such as Toshiba only states to "give priority" to items that meet their eco-design criteria (mostly concerned with control or non-use of hazardous substances), related information should be disclosed to prove the items' eco-design merit. Similarly, Nokia does not specify its lists of restricted substances but may require suppliers to declare the raw material contents of their supplies.

Some suppliers (e.g. Sony and Nokia) even have higher expectation in their suppliers' eco-design capacity. Sony requires its Green Partners (i.e. Sony's certified suppliers) to have the technological skills needed to create the new technologies and parts that Sony requires (which probably include eco-design); Nokia requires all supplies to consider design-for-environment in all phases of product development and make all reasonable attempts to eliminate hazardous constituents and pursue the use of recyclable materials.

3.4 CLEANER PRODUCTION

Cleaner Production (CP) is the continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment. CP can be applied to the processes used in any industry. For typical production processes, cleaner production results from one or a combination of conserving raw materials, water and energy; eliminating toxic and

dangerous raw materials; and reducing the quantity and toxicity of all emissions and wastes at source during the production process. The CP concept has been accepted and implemented by most developed countries such as US, UK and Germany and particularly in the chemical and chemical related manufacturing sectors. However, due to the increasing awareness of manufacturers, the growth of green consumerism and the demand of green products, CP has spread to the electrical and electronic and automobile sectors, propagating to various tiers of the supply chain. DfE is different from CP in that CP focuses only on the manufacturing processes, while DfE focuses on product design to reduce environmental impacts during both manufacturing and operation phases.

CP is a preventive strategy to minimize the impact of production and products on the environment by applying cleaner technologies and organizational measures. It reduces the impact of industrial plants on their environment by tracking their waste and emissions to their respective sources in the processes and defining measures to eliminate the problems there. Most companies (e.g. Philips, Sony, GM, HP, Nokia) require suppliers to manage pollutions from their manufacturing processes and substitute the raw and auxiliary materials by less harmful ones or ones that can be used more efficiently or recycled.

GM requires its tier 1 suppliers to provide information about materials input and process emissions (an "input/output inventory") of their manufacturing process; whilst the others restrict the use of certain hazardous substances such as (cadmium, lead and other heavy metals) in the manufacturing process. Philips and Nokia also encourage the suppliers to minimize the use of packaging materials and implementation of the supplier "take-back" system to enable cyclic use of the packaging materials. Companies like GM and Philips have made great strides in reducing the toxicity of their products and processes. Some have pledged to eliminate polyvinyl chloride (PVC) in some products with the cooperation of suppliers. Other CP requirements include: good housekeeping; training of employees, better logistics; data availability and communication; production and process modifications to minimize waste and emissions; and introduction of waste into recycling networks, etc.

3.5 OTHER ENVIRONMENTAL REQUIREMENTS

Most of the "environmentally-conscious" companies impose specific and unique environmental and other requirements to their suppliers, with examples including:

- Require their suppliers to submit environmental performance data (e.g. Philips, Matsushita, Toshiba, HP) or an environmental report (e.g. Sony);
- Require their suppliers to carry out environmental audit by themselves or third party for verification (e.g. Philips, Nokia);
- Require suppliers to evaluate their suppliers (second tier) environmental performance and set environmental improvement targets (e.g. Nokia);
- Require suppliers to complete environmental performance questionnaires (e.g. HP);
- Encourage suppliers to participate their environmental trainings, workshops or seminars and other education programs (e.g. Philips, Sony and HP);
- Demonstrate environmental performance through participation in local / global benchmarking or competition program (e.g. Philips, GM, Nokia); and
- Conduct environmental audit to their suppliers and technical visit to suppliers' manufacturing facilities (e.g. Philips, Sony and HP).

3.6 OTHER NON-ENVIRONMENTAL REQUIREMENTS

Some leading corporates (e.g. Philips, General Motors, and Electrolux) have recently begun to incorporate requirements extra to the environment (e.g. health & safety, social accountability and sustainable consumption), towards sustainable development as an

overall mission to their major suppliers. Sustainable development in a short is to meet the needs of the future by balancing social, economic, and environmental objectives, needs and consideration while business is making decisions today. These newly developed sustainable development requirements applicable to the E&E sector include:

- Require suppliers to achieve sustainability compliance including social accountability elements (e.g. Philips);
- Require suppliers to comply strictly with laws (labour, safety and health), regulations and social standards (e.g. Sony, Electrolux, Samsung & HP);
- Require suppliers to follow the customers' code of conduct, which covers occupational health and safety considerations (e.g. Electrolux);
- Conducts safety inspections on to suppliers and their manufacturing facilities;
- Require suppliers to complete occupational health and safety performance review questionnaire (e.g. HP)

4. INTERNATIONAL ENVIRONMENTAL REQUIREMENTS

This section presents the latest and upcoming international requirements to be imposed on the electrical and electronic sector, focusing on developments in Europe, Japan and the United States of America[12].

4.1 ENVIRONMENTAL REQUIREMENTS IN EUROPE

Environmental regulatory requirements for electrical and electronic products exist at both the European Union (EU) and national levels. For EU directives, they include (i) those adopted to implement EU-wide environmental management strategies, requiring member states to develop their own product-related legislation and strategies in order to fulfil the overall EU direction; and (ii) those primarily for harmonising practices between the Member States, allowing only products complying with the directive requirements to be placed in the EU. Directives applicable to the electrical and electronic sector include:

- Waste Electrical and Electronic Equipment (WEEE) Directive 2002 (Directive 2002/96/EC)
- Restriction of Hazardous Substances Directive 2002 (ROHS) (Directive 2002/95/EC)
- Directive 2000/55/EC on energy efficiency requirements for ballast for fluorescent lighting 2000 - The purpose of the directive is to achieve cost-effective energy savings in fluorescent lighting, which would not otherwise be achieved with other measures. This directive covers only newly produced ballasts, which are responsible for high energy consumption and offer considerable potential for energy savings.
- Directive 96/57/EC on energy efficiency requirements for household electric refrigerators, freezers and combination 1996 – The purpose of the directive is to lay down minimum energy efficiency standards for household refrigeration appliances sold in the European Union.
- Packaging Directive 1994 (Directive 94/62/EC) - The Directive aims to harmonise national measures concerning the management of packaging and packaging waste in order to provide a high level of environmental protection and to ensure the functioning of the internal market.
- Nickel Directive 1994 (Directive 94/27/EC) – The directive limit the use of Nickel in item intended to come into contact with BROKEN skin or to come into close and prolonged contact with skin.
- Energy Labelling Directive 1992 (Directive 92/75/EEC) – The directive is to introduce the energy labelling scheme for household electric refrigerators, freezers and their combinations
- Batteries Directive 1991 (Directives 91/157/ECC and 98/101/EC) and Battery Marking Directive 1993 (Directive 93/86/EEC) - The directive is to approximate the laws of the Member States on the recovery and controlled disposal of those spent batteries and accumulators containing dangerous substances in accordance with Annex I of the Directive
- Directive 86/594/ECC on airborne noise emitted by household appliances 1986 - This directive is to establish general principles on the publication of information on noise emitted by household appliances, the measuring methods for determining the noise and the arrangements for monitoring the levels of noise emitted by household appliances.

[12] More information can be obtained from the Trade Development Council publication, "Getting Green - Growing Demand in Overseas Markets", 2004 (researched and written by the Business Environment Council)

Internet resources of the Directives are given as *Appendix F*.

Two of the most pressing Directives, on Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances Directive (ROHS), are further elaborated below.

4.1.1 The ROHS and WEEE EU Directives

The Restriction of Hazardous Substances (ROHS) and Waste Electrical and Electronic Equipment (WEEE) Directives have been introduced to restrict the types of hazardous substances in electrical and electronic equipment and require manufacturers to be responsible for the collection, recovery and recycling of used products, respectively.

The ROHS will ban the sale in the EU of certain categories of electrical and electronic equipment containing (or manufactured using) certain banned substances from the 1st July 2006[13]. The ban applies to six substances; lead, cadmium, mercury, hexavalent chromium and two flame retardants; polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE). There are some limited exemptions but the ban on lead in solders will have the greatest impact on electrical equipment manufacturers in terms of the work and investment in new equipment required to switch to alternative lead-free materials.

The WEEE is designed to tackle the fast increasing waste stream of electrical and electronic equipment and complements EU measures on landfill and incineration of waste. Increased recycling of electrical and electronic equipment will limit the total quantity of waste going to final disposal. Producers will be responsible for taking back and recycling electrical and electronic equipment. This will provide incentives to design electrical and electronic equipment in an environmentally more efficient way, which takes waste management aspects fully into account. Consumers will be able to return their equipment free of charge[14].

Both Directives were published on 13 February 2003. All Member States of the EU have to transpose the Directive into national legislation by 13 August 2004. Details of these Directives are provided in *Appendix G* and summarized in *Table 4.1a* and *4.1b*.

Table 4.1a Outline of the WEEE Directive 2002/96/EC

Aims	• reduce the waste arising from electrical and electronic equipment; and • improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment.
Highlights	• private householders will be able to return their WEEE to collection facilities free of charge; and producers (manufacturers, sellers, distributors) will be responsible for financing the collection, treatment, recovery and disposal of WEEE from private households deposited at these collection facilities; • producers will be responsible for financing the collection, treatment, recovery and disposal of WEEE from users rather than private householders; • The separate collection symbol for electrical and electronic equipment: Large and small household appliance; IT and telecommunication equipment; consumer equipment; lighting equipment; electrical and electronic tools; medical equipment systems; monitoring and control instruments; and automatic dispensers; • Producers will also be responsible for financing the management of WEEE from products placed on the market. However, it may be possible for all or part of these costs to be recovered from users other than private householders; and

[13] The use of these chemicals in certain products is exempted. The EU recognises that feasibility of the phase-out time table depend on if alternative technologies are available.

[14] Information from Europa (http://europa.eu)

	• producers will be required to achieve a series of demanding recycling and recovery targets for different categories of appliance.
Key milestones	From 13 August 2005 • Member States are to minimise the disposal of waste electrical and electronic equipment (WEEE) as unsorted municipal waste and are to set up separate collection systems for WEEE. • financing is to be covered by producers in the case of waste from holders other than private households and placed on the market after that date By 31 December 2006 at the latest • a rate of separate collection of at least 4 kg on average per inhabitant per year of waste electrical and electronic equipment from private households must be achieved.

Table 4.1b Outline of the ROHS Directive (2002/95/EC)

Aims	• protect human health and the environment by restricting the use of certain hazardous substances in new equipment; • complement the WEEE Directive
Highlights	• New electrical and electronic equipment will not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; • Certain applications are exempt from the requirements of the Directive including mercury in certain types of fluorescent lamps, lead in the glass of cathode ray tubes, electronic components and fluorescent tubes, lead in electronic ceramic parts and hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators. The exemptions will be reviewed every four years; • Information about hazardous substances in and the proper disposal methods of the electrical and electronic products; and • Before 13 February 2005 the European Commission will review the terms of the Directive to take into account any new scientific evidence.
Key milestones	By 13 February 2005 • the Commission will review the provisions of the Directive, in particular as regards the feasibility of widening its scope and adapting the list of substances it covers so as to take account of new scientific facts From 1 July 2006 • lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in electrical and electronic equipment must be replaced by other substances.

4.1.2 Related Environmental Labeling Schemes in the European Market

Electrical and electronic sector related environmental labeling schemes in the European Market are identified in *Table 4.1c* below.

Table 4.1c Related Environmental Labeling Schemes in the European Market

E&E Product categories	Applicable environmental labels
Household appliances (e.g. white goods, air conditioners, cookers; except lighting equipment	➢ EU Eco-label ➢ Blue Angel ➢ Nordic Swan ➢ Energy
Household/consumer electronic equipment (e.g. TV sets, stereos, VCR, mobile phone)	➢ EU Eco-label ➢ Blue Angel

	➢ TCO (mobile phone only) ➢ Nordic Swan ➢ AENOR Medio Ambiente ➢ GEEA Energy Efficiency Label
Computers and peripherals (e.g. personal/portable computers, system units, printers, display units)	➢ EU Eco-label ➢ Blue Angel ➢ TCO ➢ Nordic Swan ➢ AENOR Medio Ambiente ➢ EU Energy Star ➢ GEEA Energy Efficiency Label
Lighting equipment (e.g. light bulbs, electronic ballasts for fluorescent lamps)	➢ EU Eco-label ➢ Blue Angel
Batteries (e.g. primary batteries, rechargeable batteries)	➢ Blue Angel ➢ Nordic Swan

4.2 ENVIRONMENTAL REQUIREMENTS IN JAPAN

4.2.1 Environmental Legislation

Japanese legislation concerning environmental performance of electrical and electronic products does not set down mandatory requirements but serves to provide guiding principles for manufacturers to design their products or products with environmental features. Voluntary measures among domestic manufacturers, although not imposed on imported products, nonetheless shape the electrical and electronic product profile in the Japanese as well as the global market (e.g. Japan is the world's leader in phasing out lead solders in electrical and electronic equipment). Examples include:

- Revised Recycling Law 1995 (Formally known as the Law for Promotion of Effective Utilization of Resources) – The Law is to promote product designs that facilitate waste reduction, recycling, and reuse. In 2001, the law was revised to address personal computers.
- Containers and Packaging Recycling Law 1997 (Formally known as Law for Promotion of Sorted Collection and Recycling of Containers and Packaging) – The Law is to make glass containers and plastic, or "PET" (polyethylene terephthalate), bottles "designated containers/packaging" for recycling. Collection and recycling became obligatory in April 1997 (including home appliances).
- Home Appliance Recycling Law 1998 (Formally known as the Law for Recycling of Specified Kinds of Home Appliances) – The Law is to make Manufacturers and sellers of home appliances are obligated to take back used home appliances and to recycle retrieved used home appliances.
- Energy Conservation Law 1998 (Formally known as the Law Concerning the Rational Use of Energy) – The Law is to contribute to the sound development of the national economy through implementing necessary measures for the rational use of energy in factories, buildings, and machinery and equipment, and other necessary measures to promote comprehensively the rational use of energy in order to ensure the effective use of fuel resources.

Internet resources of the Directives are given as *Appendix F*.

4.2.2 Related Environmental Labeling Schemes in the Japanese Market

Electrical and electronic sector related environmental labeling schemes in the Japanese market are identified in *Table 4.2a* below.

Table 4.2a Related Environmental Labeling Schemes in the Japanese Market

Consumer electrical and electronic equipment	Applicable Labels
Computers and peripherals (Personal computers, notebook computers, printers, displays, scanners)	➢ Eco Mark ➢ Energy Star ➢ PC Green Label ➢ EcoLeaf
Household/consumer electronic equipment (TV sets, cameras)	➢ Energy Saving Label ➢ EcoLeaf
Communications equipment (Fax machines and multi-functional devices)	➢ Energy Star ➢ EcoLeaf
Household electrical appliances (Air conditioners, refrigerators, freezers	➢ Energy Saving Label
Lighting equipment (Fluorescent lamps)	➢ Energy Saving Label

4.3 ENVIRONMENTAL REQUIREMENTS IN THE UNITED STATES OF AMERICA

4.3.1 Environmental Legislation

Electrical and electronic products environmental requirements in the US are from federal and state legislation, green claims guidelines and environmental labeling schemes. In the US, E&E related environmental legislation prescribes the environmental standards and/or the way of disclosing environmental performance information for specific types of products. To import the affected products, foreign manufacturers must ensure these requirements are fulfilled. Examples of these US environmental legislation and requirements are given below include:

- Battery Act 1996 (formally known as Mercury-Containing Rechargeable Battery Management Act) – The Law is to phase out the use of mercury in batteries and provide for the efficient and cost-effective collection and recycling or proper disposal of used nickel cadmium batteries, small sealed lead-acid batteries, and certain other batteries, and for other purposes.
- Federal Energy Efficiency Law 1995 – The Law is to provide drive for energy efficiency in the design and manufacturing of refrigerators, refrigerator-freezers, water heaters, clothes washers, furnaces, room air conditioners, central air conditioners, heat pumps, fluorescent lamps ballasts, fluorescent lamps and incandescent lamps.
- State electronic waste legislation and mandatory electronic take back programme[15] - different laws and regulation to set up systems for take-back and disposal of used electronic products (e.g. computers, peripherals, cathode ray electronics), or paying an upfront recovery fee.

Internet resources of the Directives are given as *Appendix F*.

[15] More details can be obtained from http://www.ncel.net/index.cgim

4.3.2 Related Environmental Labeling Schemes in the US Market

Electrical and electronic sector related environmental labeling schemes in the US market are identified in *Table 4.3a* below.

Table 4.3a Related Environmental Labeling Schemes in the US Market

E&E Product categories	Applicable environmental labels
Electrical appliances (e.g. Clothes washers, refrigerators, dehumidifiers, dishwashers)	➢ Energy Star
Home electronic (e.g. Audio-visual equipment, cordless phones)	➢ Energy Star ➢ Single Attribute Claims Certification
Air conditioning systems (e.g. residential central air-conditioning systems and heat pumps, room air conditioning units, fans, furnaces)	➢ Green Seal ➢ Energy Star
Compact fluorescent lamps	➢ Green Seal ➢ Energy star
Occupancy sensors	➢ Green Seal

5. SOURCES OF ENVIRONMENTAL SUPPORT

This section presents the professional and academic institutions in Hong Kong that can offer expert advice and technical assistance, tailored to the specific needs of individual electrical and electronic sector SMEs, on environmental requirements, ISO14001 EMS, and pollution control measures. Over twenty such organisations have been identified, consisting of trade associations, academic institutions, and Government and non-government organizations (NGOs):

Group 1: Academic Institution - Hong Kong

- Centre for Electronic Packaging and Assemblies, Failure Analysis and Reliability Engineering (EPA Centre) of CityUHK
- Industrial and Systems Engineering Department, HKPU
- Mechanical Engineering Department of HKUST
- The Centre of Urban Planning and Environmental Management, HKU

Group 2: Trade-specific Association/ Professional Bodies - Hong Kong

- Hong Kong Electronic Industries Association
- Hong Kong Electronic Packaging and Manufacturing Services Association (HKEPMSA)
- Electrical Division of The Hong Kong Institution of Engineers
- Electronic Division of The Hong Kong Institution of Engineers

Group 3: NGO - Hong Kong & Government Initiatives

- Business Environment Council
- Hong Kong Productivity Council
- Trade and Industry Department - Support and Consultation Centre for SMEs (SUCCESS)

Due to differences in the nature, size and mission of these organizations, the support that they offer is diverse. However, their services can be classified into four main groups:

Type 1: ISO 14001 EMS related services

- Cat 1 - ISO 14001 EMS trainings
- Cat 2 - ISO 14001 EMS consultation
- Cat 3 - ISO 14001 EMS free advisory services
- Cat 4 - ISO 14001 mentoring service

Type 2: Design and Manufacturing Processes Improvement

- Cat 6 - Eco-design & Design for Environment
- Cat 7 - Life Cycle Assessment and Life Cycle Costing
- Cat 8 - Cleaner Production
- Cat 9 - Pollution control technologies

Type 3: Environmental Information

- Cat 10 - Environmental Legislations & Other requirements
- Cat 11 - Environmental Information Centre

Type 4: Others

- Cat 5 - SME support (e.g. financial services, business advisory and supports)

To demonstrate the diversification of services and service providers, a list of local support centres for E&E industry with their scopes of services, contact details and website address are prepared and given as *Appendix H*.

It was also observed that the existing trend of supply chain environmental pressures and requirements affecting local E&E manufacturers was mainly governed by the development of overseas national environmental legislations, directives and initiatives such as the EU Directive on WEEE and ROHS. To acquire very up-to-date information about these legislations and initiatives and the trend, stakeholders may require frequent access the global E&E sector-specific environmental information centres. To address the needs, the contact details of some overseas E&E sector-specific environmental information centres was also given together with the local support centres as *Appendix H*.

In addition to these organisations, over 80 local environmental consultancies in Hong Kong regularly provide services to the construction sector, addressing areas such as pollution control (air, water, noise, waste, etc), impact assessments and auditing, analytical and laboratory services, training and strategy, and ISO14001 EMS development and implementation. Contact details of 87 such consultancies, and a summary of their core services, are provided in *Appendix I* (from the EPD *Directory of Environmental Consultants*, July 2004).

6. CONCLUSIONS

SMEs in Hong Kong's electrical and electronic sector are collectively a major part of the economy ranking high in terms of number of establishments, contribution to gross domestic product, and size of employment. Electrical and electronic sector SMEs however also account for substantial environmental concerns (such as air, water and noise pollution, energy consumption, waste generation and chemical waste) and face increasing supply chain pressures for improved environmental management.

This *Review Report* has been compiled through internet research, literature reviews and consultations with stakeholder organizations to identify:

- the number and composition by industry type of SMEs in the electrical and electronic sector with operations in Hong Kong and Shenzhen (broken down to three-digit Hong Kong Standard Industrial Classification, HSIC, codes);
- the Major Industry Groups (MIGs) appropriate for the basis of *Practical Examples* illustrating the step-by-step process of EMS development for an SME;
- current trends in supply chain pressure for environmental management and EMS, focusing on the requirements of large multinational client corporations in the electrical and electronic sector;
- the latest and upcoming international requirements to be imposed on the sector, focusing on developments in Europe, Japan and the United States of America; and
- professional and academic institutions in Hong Kong and the Pearl River Delta (PRD) region that can provide tailored support to local electrical and electronic sector SMEs.

Findings are summarised as follows.

6.1 THE SIZE AND COMPOSITION OF THE ELECTRICAL AND ELECTRONIC SECTOR

According to the most updated figures from the Census and Statistics Department (C&SD) and Hong Kong Electrical Industry Association (HKEIA) the total number of establishments of SMEs in the electrical and electronic sector with operations in Hong Kong and Shenzhen was 2,772 and 2942 respectively. As shown in *Table 6.1a* below, the vast majority (66%) of establishments in Hong Kong were associated with just one MIG (Machinery, Equipment, Apparatus, Parts & Components, n.e.c., MIG 386-387), whilst SMEs located in Shenzhen were more evenly distributed.

Table 6.1a Electrical & Electronic SMEs with Facilities in Hong Kong and Shenzhen

	HK (Total 2772)		SZ (Total 2942)	
Activity (I/D and MIG code)	**Number**	**Percentage**	**Number**	**Percentage**
Electroplating I/D 381802	38	1.4%	3	0.1%
OAC Machinery MIG 382	301	10.9%	275	9.4%
Radio/Communication MIG 383	65	2.3%	528	18.0%
Electronic Components MIG 384	100	3.6%	820	27.9%
Electrical Appliances MIG 385	58	2.1%	274	9.3%
Machinery & Parts MIG 386 - 387	1830	66.0%	580	19.5%
PSMC & PO Goods MIG 389	380	13.7%	462	15.7%

6.2 MIGS APPROPRIATE FOR USE AS *PRACTICAL EXAMPLES* OF ISO14001

The major industry groups chosen to provide the basis for the *Practical Examples* included in the support package, reflecting "real-life" activities and processes undertaken by real SMEs in the electrical and electronic sector, have been selected by consideration of:

- The number of electrical and electronic sector SMEs in each MIG with operations in Hong Kong and Shenzhen;
- The significance of the environmental impacts arising from the manufacturing activities of SMEs in the different MIGs; and
- The degree of supply chain pressures (for example, local or international legislation, client requirements, etc) experienced by SMEs in the different MIGs.

Table 6.2a Ranking of SMEs with Facilities in Hong Kong and Shenzhen

Activity (I/D and MIG code)	Hong Kong Ranking	Shenzhen Ranking
Electronic Components MIG 384	1	1
OAC Machinery MIG 382	2	3
Electroplating I/D 381802	3	2
Machinery & Parts MIG 386 - 387	4	5
Radio/Communication MIG 383	5	4
PSMC & PO Goods MIG 389	6	7
Electrical Appliances MIG 385	7	6

As shown in *Table 6.2a* below, the top three MIGs were the same for SMEs with operations both in Hong Kong and Shenzhen: Electronic Parts and Components (MIG 384); Office, Accounting & Computing Machinery (MIG 382); and Electroplating (I/D 381802). *Practical Examples* have therefore been provided as part of the support programme for based on hypothetical companies in these three industry groups.

6.3 CURRENT TRENDS IN SUPPLY CHAIN PRESSURE FOR ENVIRONMENTAL PROTECTION

Multinational corporations reviewed during the research have included Sony Corporation, Matsushita Electric Group (Panasonic), Toshiba Corporation, LG Electronics, Samsung Electronics, General Motors, HP (Hewlett Packard), Intel Corporation, Whirlpool, Electrolux Group, Nokia and others. Requirements stipulated by these leading clients have been varied and far-reaching, but can be categorized into six key areas:

- Compliance with local and international legislation (with compliance with legislation in advance of its promulgation in some areas)
- EMS and ISO 14001 certification (preference often given to ISO certified suppliers, certification mandated in some cases and even extending to second tier suppliers)
- Eco-Design or "Design for Environment" to reduce the impacts of a product throughout its whole life cycle
- Cleaner Production to minimise the impacts of the product during its production
- Other client-specific requirements (e.g. environmental audit, questionnaires, education program and benchmarking exercises)
- Wider-reaching requirements (going beyond the environment, e.g. labour, safety and health, sustainability compliance, workers rights, etc)

Those corporations reviewed are considered to be at the forefront of such initiatives, further reinforcing the need for Hong Kong SMEs to be prepared for future requirements for improved environmental performance.

6.4 LATEST AND UPCOMING INTERNATIONAL REQUIREMENTS

The review of latest and upcoming international requirements to be imposed on the electrical and electronic sector focused on developments in Europe, Japan and the United States of America. In each case the key environmental legislation and labeling schemes have been highlighted. Of particular concern are two recent European Union (EU) Directives on the Restriction of Hazardous Substances (ROHS) and Waste Electrical and Electronic Equipment (WEEE). Both have been introduced to restrict the types of hazardous substances in electrical and electronic equipment and require manufacturers to be responsible for the collection, recovery and recycling of used products, respectively.

The ROHS will ban the sale in the EU of certain categories of electrical and electronic equipment containing or manufactured using six banned substances (lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers) from the 1st July 2006. The ban on lead in solders will have the greatest impact on electrical equipment manufacturers in terms of the work and investment in new equipment.

The WEEE is designed to tackle the fast increasing waste stream of electrical and electronic equipment and complements EU measures on landfill and incineration of waste. Producers will be responsible for taking back and recycling electrical and electronic equipment, with consumers able to return their equipment free of charge. This will provide incentives to design electrical and electronic equipment in an environmentally more efficient way, which takes waste management aspects fully into account.

6.5 SOURCES OF ENVIRONMENTAL SUPPORT

The study identified more than twenty support centres in Hong Kong and the Pearl River Delta for the electrical and electronic sector. The services and supports offered by these organizations are diverse and include the provision of general information, ISO 14001 mentorship, Eco-design, “Design for Environment” to environmental technologies support and others. Given the trends of supply chain environmental pressures and requirements affecting local electrical and electronic manufacturers being driven by overseas national environmental legislations, directives and initiatives, contact details of some overseas sector-specific environmental information centres have also been provided. In addition, over 80 local consultancies provide construction related services in areas including environmental auditing, pollution control, impact assessments, analytical and laboratory services, training and strategy, and ISO14001 EMS development.

APPENDIX A – INFORMATION SOURCES USED IN COMPILING THIS REVIEW REPORT

Statistics on SMEs

Hong Kong Standard Industrial Classification (Volume One) – Census & Statistics Department, HKSARG

Hong Kong Annual Digest of Statistics (2002 Edition) – Census & Statistics Department, HKSARG

Hong Kong Monthly Digest of Statistics (July 2003) – Census & Statistics Department, HKSARG

Report on 2001 Annual Survey of Industrial Production (ASIP 2001) – Census & Statistics Department, HKSARG

Directory of Hong Kong Industries (DHKI), 2002/2003 – Hong Kong Productivity Council (HKPC)

2002-2003 Directory of Hong Kong Industrial Suppliers – HKPC

Website Reviews

Electrolux Group - www.electrolux.com

Hewlett-Packard (HP) - www.hp.com

Intel Corporation - www.intel.com

LG Electronic - www.lge.com

Matsushita Electric Group (Panasonic) – panasonic.co.jp

Nokia - www.nokia.com

Philips Semiconductors & Philips Electronic - www.philips.com

Samsung Electronic - www.samsung.com

Sony Corporation - www.sony.com/index.php

Toshiba Corporation - www.toshiba.com

Whirlpool Corporation - www.whirlpool.com

General Motors - www.gm.com

European Environment Agency (for international environmental requirements) - www.eea.eu.int

USA Environmental Protection Agency (for international environmental requirements) - www.epa.gov

Ministry of the Environment of Japan (for international environmental requirements) - www.env.go.jp/en

Local Organization Website Reviews

Environmental Protection Department, HKSAR

The City University of Hong Kong

The Hong Kong Polytechnic University

Hong Kong University of Science and Technology

The Chinese University of Hong Kong.

The University if Hong Kong

The Baptist University of Hong Kong

Hong Kong Electronic Industries Association

Hong Kong Electronic Packaging and Manufacturing Services Association (HKEPMSA)

The Hong Kong Institute of Engineers

The Electrical Division of The Hong Kong Institution of Engineers

The Electronic Division of The Hong Kong Institution of Engineers

Business Environment Council

Hong Kong Productivity Council

Trade and Industry Department - Support and Consultation Centre for SMEs (SUCCESS)

Literature Review

Corporate Responsibility & Sustainability Report 2000-2002
CSR Report 2003 Sony and the Global Environment
CSR Report 2003 Sony and the People
Eco-Labelling and Green Procurement Schemes for IT-Products: The Japanese Approach
Electrolux Group Workplace Code of Conduct
Electrolux Restricted Materials List
Electrolux Restricted Materials List Statement
Electronic Industry Environmental Roadmap 1995
Electronic Industry Environmental Roadmap 1996
Emerging Trends and Practices in Supply Chain Environmental Management
Enhancing Supply Chain Performance with Environmental Cost Information: Examples from Commonwealth Edison, Andersen Corporation, and Ashland Chemical
Environmental and Social Report 2002
Environmental Management Systems (EMS) Policy and Strategy Working Group Major Country Research Report
Environmental Report of Nokia Corporation 2002
Environmental, Health and Safety Report 2002
GM-FIAT Worldwide Purchasing
Going Green Upstream: The Promise of Supplier Environmental Management
Green Procurement Standards
Guidelines for Standardization of Material Declaration
High Density Packaging User Group Environmental Roadmap
HP General Specifications for the Environment (GSE)
HP Supplier Code of Conduct
HP Supplier Code of Conduct Questionnaire
HP Supplier Environmental Performance Review Questionnaire
HP Supplier Occupational Health and Safety Performance Review Questionnaire
Management Regulations for the Environment-Related Substances to be controlled which are included in parts and materials
Matsushita Electric (Panasonic): Sustainability Report 2003
Matsushita Electric Group: Green Procurement Standards
Measuring the Environmental Performance of Industry (MEPI) Final Report
Measuring the Environmental Performance of Industry (MEPI) Final Report – Appendices, Part I
New Paths to Business Value: Strategic Sourcing - Environment, Health and Safety
Nokia Suppliers and the Environment
Project Sigma: Supply Chain Strategy and Evaluation Case Studies
Project Sigma: Supply Chain Strategy and Evaluation First Report
Promoting Environmental Supply Chain Partnerships
Samsung Electronic EHS Report 2001
Standardizing Excellence: Working with Smaller Businesses to Implement Environmental Management Systems
Stimulating Sustainable Trade Phase 2 Overview Report
Strengthening Implementation of Corporate Social Responsibility in Global Supply Chains
Strengthening Implementation of Corporate Social Responsibility in Global Supply Chains
Suppliers' Perspectives on Greening the Supply Chain
Supply Chain Environmental Management
Supply Chain Environmental Management - a global study of the environmental work in the electronic industry
Supply Chain Environmental Management - Lessons From Leaders in the Electronic Industry
Survey on Green Purchasing Activities in Asian Countries Republic of China
The Energing Role of Associations As Mentors
The Green Business Letter
The ISO Survey of ISO 9000 and ISO 14000 Certificates Tenth cycle: up to and including 31 December 2000
The ISO Survey of ISO 9000 and ISO 14000 Certificates Twelfth cycle: up to and including 31 December 2002
The Mentoring Handbook: A Guide to Environmental Mentoring for Companies, Nonprofits, and Regulators
TOSHIBA Environmental Report

APPENDIX B – SIGNIFICANCE OF ENVIRONMENTAL ASPECTS OF THE MIGS

						Resource Use						Air Emission					Wastewater Discharge			Noise Nuisance			Waste Management				Chemical Wastes (C.W.)				Emergency Situation			
MIGs			Total	MIG Average	Score obtained	Use of natural resources	Use of process chemicals	Use of organic solvent	Use of hazardous Substances	Use of Fuels & Energy	Use of other chemicals	Dust/Smoke Emission	Toxic Gas Emission	Green House Gases Emission	Odour Emission	IAQ	Discharge of toxic substances	Discharge of O&G	Other industrial discharge	Noise from machinery	Noise from ventilation	Noise from maintenance	Packaging wastes	Rejected products	Scrap tools & parts	Industrial wastes	Local regulated liquid C.W.	Local regulated solid C.W.	Global regulated liquid C.W.	Global regulated solid C.W.	L&S of Chemicals/Chemical Wastes	Leakage & Spillage of wastewater	Leakage & Spillage of air pollutants	Fire & Explosion
381802	381802	Electroplating	63.5	63.00	6	2	3	3	3	2	3	1	3	1	1.5	3	3	2	2	1	2	1	1	2	2	2	3	3	3	3	3	3	1	1
382	3821	Office machinery & equipment	43	43.50	5	1	1	1	1	2	2.5	0	1	1	1	2.5	1	1	1	1	2	1	3	2	1	2	2	2.5	2	2.5	2	1	1	1
	3822	Computing machinery & equipment	44			1	1.5	1	1.5	1	3	0	1	1	1	2.5	1	1	1	1	2	1	3	1.5	1	2	2	3	2	3	2	1	1	1
383	3831	Transitorized radios	41	37.63	4	1	2	2	2	1	2	0	1	1	1	1	1	1	1	1	2	1	3	2	1	2	2	2	2	2	1	1	1	1
	3832	TV receivers & communication equipments	36			1	1	1	2	1	1	0	1	1	1	1	0	0.5	1	1	2	1	3	1.5	1	2	2	2	2	2	1	1	1	1
	3833	Sound reproducing & recording equipment & Apparatus	37			1	1	1	2	1	1	0	1	1	1	1	0	1	1	1	2	1	3	2	1	2	2	2	2	2	1	1	1	1
	3834	Records & magnetic tapes	36.5			1	1	1	2	1	1	0	1	1	1	1	0	1	1	1	2	1	2.5	2	1	2	2	2	2	2	1	1	1	1
384	3840	Electronic parts & components	68	68.00	7	1	3	3	3	2	3	2	3	1	2	3	2	2	2	2	2	2	2	3	2	2	3	3	3	3	3	2	2	2
385	3851	Electrical appliances & houseware	33.5	33.75	2	1	2	1	1	1	1	0	1	1	1	2	0	1	1	1	2	1	1.5	1	1	2	1	1	2	2	1	1	1	1
	3852	Electronic toys	34			1	2	1.5	1.5	1	1	0	1	1	1	2	0	1	1	1	1.5	1	1.5	1	1	2	1	1	2	2	1	1	1	1
386 -387	3861	Enginers & Turbines	33.5	35.59	3	1	2	1	1	1.5	1	0.5	1	1	1	2	0	1	1	1.5	2	1	1	1	1	1	1	1.5	1.5	2	1	1	1	1
	3862	Agriculture machinery & equipment	33.5			1	2	1	1	1.5	1	0.5	1	1	1	2	0	1	1	1.5	2	1	1	1	1	1	1	1.5	1.5	2	1	1	1	1
	3863	Metal & wood working machinery	34			1	2	1	1	1.5	1	0.5	1	1	1	2	0	1	1	1.5	2	1	1	1	1	1	1	1.5	2	2	1	1	1	1
	3864	Spical industrial machinery & equipment	34			1	2	1	1	1.5	1	0.5	1	1	1	2	0	1	1	1.5	2	1	1	1	1	1	1	1.5	2	2	1	1	1	1
	3865	Industrial machinery & apparatus for generation of electricity	33.5			1	2	1	1	1	1	0	1	1	1	2	0	1	1	1	2	1	1	1	1	2	1	1.5	2	2	1	1	1	1

						Resource Use						Air Emission					Wastewater Discharge			Noise Nuisance			Waste Management				Chemical Wastes (C.W.)				Emergency Situation			
	MIGs		Total	MIG Average	Score obtained	Use of natural resources	Use of process chemicals	Use of organic solvent	Use of hazardous Substances	Use of Fuels & Energy	Use of other chemicals	Dust/Smoke Emission	Toxic Gas Emission	Green House Gases Emission	Odour Emission	IAQ	Discharge of toxic substances	Discharge of O&G	Other industrial discharge	Noise from machinery	Noise from ventilation	Noise from maintenance	Packaging wastes	Rejected products	Scrap tools & parts	Industrial wastes	Local regulated liquid C.W.	Local regulated solid C.W.	Global regulated liquid C.W.	Global regulated solid C.W.	L&S of Chemicals/Chemical Wastes	Leakage & Spillage of wastewater	Leakage & Spillage of air pollutants	Fire & Explosion
	3866	Dry batteries	40.5			1.5	3	2	2.5	1	1.5	0	0.5	1	1	1.5	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1
	3867	Electric & torch bulbs & tubes	45			1.5	2	1	2	2.5	2	1	1	1	1	2	2	1	1	2	2	1	2	2	2	2	1	2	1	2	2	1	1	1
	3868	Electronic industrial apparatus	34.5			1	1.5	2	1.5	1	1.5	0.5	0.5	1	1	1	0.5	0.5	1	1	1	1.5	2	1	0.5	1	2	1.5	1.5	2	2	1	1	1
	3871	Machinery & equipment	34			1	2	1.5	1	1.5	1	1	1	2	1	1.5	0	1	1	1.5	1.5	1	1	1	1	1	1	1.5	1	1.5	1	1	1.5	1
	3872	Electrical products & accessories	31			1.5	1.5	2	1	1	1	0	0	1	1	1	0	1	1	1	1	1	2	2	1	2	1	1	1	1	1	1	1	1
	3873	Electronic products	38			1	2	1.5	2	1	2	1	1	1	1	2	1	1	1	2	1	1	2	2	1	2	1	1	1.5	1	1	1	1	1
389	3891	Photographic & optical goods	24	26.00	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	1	1	1	2	2	1	1	1	1	0	0	1	1	1	1
	3892	Watches & clocks, mechanical	20			1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	3	1	1	1	0	0	0	0	1	1	1	1
	3893	Watches & Clocks, electronic	20			1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	3	1	1	1	0	0	0	0	1	1	1	1
	3894	Cases & parts for watches & clocks	38.5			1.5	2	2	2	1	2	1	1	1	1	2	1	1	2	2	1	1	2.5	1.5	1	1	1	1	1	1	1	1	1	1
	3899	Professional & scientific, and measuring & controlling equipment	27.5			1	1	1	2	1	1	0	1	0	0	0.5	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Scoring

0 N/A - Not applicable

1 Insignificant - not a typical environmental aspect in the industry

2 Normal - typical an environmental aspect in the industry

3 Significant - typical a significant environmental aspect in the industry

APPENDIX C – DEGREE OF SUPPLY CHAIN PRESSURE OF THE MIGS

MIGs	Degree of Supply Chain Pressure* Faced						Degree		Score Obtained
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	Total	%	
381802	3	3	1	3	3	2	15	83.3%	7
382	2	2	2	1.5	1.5	1.5	10.5	58.3%	5
383	2	1	1.5	1.5	1	1	8	44.4%	3
384	2	3	3	2	2	2	14	77.8%	6
385	2	2	2	2	1	1	10	55.6%	4
386 -387	2	1	1	1	1	1	7	38.9%	1
389	1	1	2	1.5	1	1	7.5	41.7%	2

Scoring

1	Low-priority	Stable Trend
2	Medium-priority	Slow growing trend
3	High-priority	Rapid Growing trend

* types of supply chain pressure - please refer to explanation and examples (Appendix D)

APPENDIX D – SUPPLY CHAIN REQUIREMENTS OF MULTINATIONAL CORPORATIONS

Oragnizations	Type of Supply Chain Pressures						Sources of Information
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	
Sony Corporation	Compliance with environmental-related laws and regulations	"Suppliers must have an active environmental management programme"	"is seeking the cooperation of its suppliers" to use lead-free soldering	Implementation of "Upstream Management", which means the effective management of materials and processes. Lead-free soldering, LCA, chemical substances in products, vegetable based plastic, product recycling.	Suppliers are subject to periodic audits	"must … comply strictly with laws, regulations and social standards"	Sony Corporation Website - www.sony.com/index.php
		"expects its suppliers to introduce EMSs"	Green Partners have to meet all technical standards in the "Management Regulations for the Environment-related Substances to be Controlled which are included in Parts and Materials".			compliance with labour laws,	
		No explicit requirement for ISO 14001 certification	"must have the technological skills to needed to create the new technologies and parts that Sony requires" è *implies suppliers must have eco-design, cleaner production capabilities?*				

Oragnizations	Type of Supply Chain Pressures						Sources of Information
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	
Matsushita Electric Group (Panasonic)	(no explicit requirements)	ISO 14001 certification required	Require disclosure of information on hazardous chemical substances (according to the "Chemical Substances Management Rank Guidelines", level 1 substances requires "Non-use Warranty" and level 2 requires "Chemical Substance Content Survey Sheet") Priority given to materials and parts that (i) enables reuse, recycling and energy efficiency, (ii) that contain no prohibited substances, (iii) contain reduced amount of chemical substances, (iv) with packaging material designed for resource conservation and with less hazardous substances.	Priority given to materials and parts that (i) create less noise, vibration, or offensive odor in the manufacturing process	Suppliers have to periodically conduct a self-evaluation of environmental improvement programmes and submit results to Matsushita.	(no explicit requirements)	Matsushita Electric Group (Panasonic) Website – panasonic.co.jp
Toshiba Corporation		Priorities given to suppliers with ISO 14001 certification. (credits are given to individual ISO 14001 elements.)	Priorities given to items that meet eco-design criteria such as resource saving, reusable, recyclable,	(not explicit requirement	Credits are given in the evaluation process to suppliers exercising green procurement		Toshiba Corporation Website- www.toshiba.com

Oragnizations	Type of Supply Chain Pressures						Sources of Information
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	
			use of recycled materials, ease of disposal, control or non-use of hazardous substances, energy saving, and durability.		Annual surveys on environmental activities and environmental performance assessment of items, by completing forms provided by Toshiba.		
LG Electronics	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	LG Electronics Website- www.lge.com
Samsung Electronics	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	Samsung conducts environmental and safety inspections on our suppliers at least twice a year. *(Not sure such inspections are limited to suppliers in Korea.)*	Samsung conducts environmental and safety inspections on our suppliers at least twice a year. *(Not sure such inspections are limited to suppliers in Korea.)*	Samsung Electronics Website - www.samsung.com
General Motors	All suppliers are expected to comply with environmental regulations	"The fundamentals of an EMS should be part of the suppliers' existing procedure to satisfy applicable legal requirements"	Suppliers have to provide information relevant to GM's specifications on the recyclability, recoverability and restricted substances, which are developed in response to EU's End of Life Vehicle Directive.	Tier 1 suppliers must provide an "input/output" inventory of their manufacturing process detailing process material flows (e.g. usage of materials, water and process emissions to air, water, etc) upon request by GM.		All suppliers are expected to comply with health and safety regulations	General Motors Website - www.gm.com
		All direct product suppliers must demonstrate conformance to ISO 14001. A "proof of compliance to ISO 14001" is required. (è i.e. "certification"?)	100% chemical content disclosure when required by GM.				

Oragnizations	Type of Supply Chain Pressures						Sources of Information
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	
HP	requires compliance with environmental legislation	Expects suppliers to maintain EMS.	HP's General Specification for Environment (GSE) specifies substances to be prohibited or restricted (requirements may be from legislation or from HP)	Suppliers are expected to manage pollution from their operations.	Suppliers need to complete environmental performance review questionnaire	requires compliance with worker health and safety, labour legislation.	Hewlett-Packard (HP) - www.hp.com
		Suppliers must have environmental policies that cover: energy efficiency, hazardous materials, information and labelling, cleaner manufacturing, packaging, and product recycling and reuse.	HP's GSE specifies requirements for product labelling for recycling and disposal (requirements may be from legislation or from HP)	The GSE also prohibits and restrict the use of certain hazardous substances in the manufacturing process.	HP also conducts supplier audits and site visits (and "are evaluating the use of 3rd-party auditors for independent verification").	Suppliers are expected to provide OHS training, observe industrial hygiene, and workplace ergonomics, machine safeguarding and sound injury and illness reporting and management.	
						Expects suppliers to have management systems of OHS	
						Suppliers need to complete OHS performance review questionnaire	
Intel Corporation	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	Intel evaluates the safety performance and programmes during initial selection and hiring phase.	Intel Corporation Website - www.intel.com
Whirlpool	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	(Not mentioned)	Supplies must pass a Supply Quality Audit,	Whirlpool Corporation Website - www.whirlpool.com

Oragnizations	Type of Supply Chain Pressures						Sources of Information
	Compliance	EMS	Eco-design	Cleaner production	Other environmental	Other non-environmental	
Electrolux Group	Suppliers have to follow Electrolux' code of conduct, which covers (among others) environmental compliance.		Mandatory compliance with the "Restricted Materials Lists"			Suppliers have to follow Electrolux' code of conduct, which covers (among others) OHS.	Electrolux Group Website - www.electrolux.com
Nokia	Suppliers must meet applicable environmental legislation and provide evidence of compliance with such regulations	Suppliers shall have a properly documented EMS and/or a plan for its implementation.	Suppliers "shall upon request, declare the raw material contents of its products delivered to Nokia".	Suppliers needs to "take due consideration of environmental issues during … manufacturing process design and production".	Suppliers need to evaluate their suppliers environmental performance and set environmental improvement targets as necessary.		Nokia Website - www.nokia.com
		The EMS should comply with ISO 14001 or other internationally recognised standard. At the very least, it should contain elements of such standards.	Suppliers "shall upon request, provide end of life treatment recommendations for their products".	Suppliers shall implement continous improvement programes for pollution control and waste reduction and waste management, and shall be able to provide supporting evidence.	Nokia expects its suppliers to conduct audits, initiate correction actions and monitor progress.		
			Supplier shall consider DfE in all phases of product development. All reasonable attempts should be made to reduce or eliminate hazardous constituents from the products and pursue the use of recyclable materials.				

APPENDIX E – LEGISLATION, REGULATIONS AND INDUSTRY STANDARDS

Details of the following ordinances and regulations can be found in the "Bilingual Laws Information System" website of the Department of Justice at http://www.doj.gov.hk.
For details of the codes of practice, technical memoranda, guidelines, and technical circulars, please visit the websites of the corresponding authorities

Air Pollution Control – Ordinances and Regulations
• *Air Pollution Control Ordinance* (Cap. 311) • *Air Pollution Control (Asbestos) (Administration) Regulation* • *Air Pollution Control (Construction Dust) Regulation* • *Air Pollution Control (Dust and Grit Emission) Regulations* • *Air Pollution Control (Fuel Restriction) Regulations* • *Air Pollution Control (Furnaces, Oven and Chimneys) Installation and Alteration) Regulations* • *Air Pollution Control (Motor Vehicle Fuel) Regulation* • *Air Pollution Control (Open Burning) Regulation* • *Air Pollution Control (Smoke) Regulation*
• *Ozone Layer Protection Ordinance* (Cap. 403) • *Ozone Layer Protection (Controlled Refrigerants) Regulation* • *Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation*
• *Road Traffic Ordinance* (Cap. 374) • *Road Traffic (Construction and Maintenance of Vehicles) Regulations* • *Shipping and Port Control Ordinance* (Cap. 313)

Air Pollution – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars
• *Code of Practice on Asbestos Control – Preparation of Asbestos Investigation Report, Asbestos Management Plan and Asbestos Abatement Plan* [Source: EPD] • *Code of Practice on Asbestos Control – Asbestos Work Using Full Containment or Mini Containment Method* [Source: EPD] • *Code of Practice for the Prevention of Legionnaires' Disease in Hong Kong* [Source: EMSD]
• *TM Issuing Air Pollution Abatement Notices to Control Air Pollution from Stationary Process* [Source: EPD] • *Guidance notes for management of Indoor Air Quality in office and public places* [Source: EPD]
• ProPECC PN 1/92 *Impingement of Plumes from Boiler Chimneys on Adjacent Buildings* [Source: EPD] • ProPECC PN 4/94 *Air Conditioning Refrigerants – A Time for Change* [Source: EPD] • ProPECC PN 2/96 *Control of Air Pollution in Car Parks* [Source: EPD] • ProPECC PN 2/97 *Handling of Asbestos Containing Materials in Buildings* [Source: EPD] • ProPECC PN 1/98 *Control of Air Pollution in Semi-Confined Public Transport Interchanges* [Source: EPD] • ProPECC PN 1/99 *Control of Radon Concentration in New Buildings* [Source: EPD]
• PNAP 144 *Control of Environmental Nuisance from Construction Sites* [Source: BD] • PNAP 114 *Asbestos* [Source: BD]
• ETWB TC 18/99 *Particular Specification Clause for Vehicles Carrying Dusty Materials* [Source: ETWB]

Noise Control – Ordinances and Regulations
• *Noise Control Ordinance* (Cap. 400); • *Noise Control (General) Regulations* • *Noise Control (Construction Work) Regulation*; • *Noise Control (Construction Work Designated Areas) Notice;* • *Noise Control (Hand Held Percussive Breakers) Regulations* • *Noise Control (Air Compressors) Regulations* • *Noise Control (Motor Vehicles) Regulation*
• *Road Traffic (Construction and Maintenance of Vehicles) Regulation*
• *Factories and Industrial Undertakings Ordinance (Cap. 59)* • *Factories and Industrial Undertakings (Noise at Work) Regulations* • *Occupational Safety and Health Ordinance (Cap. 509)*

Noise Pollution – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars
• *Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites* [Source: EPD] • *Technical Memorandum on Noise from Construction Work Other Than Percussive Piling* [Source: EPD] • *Technical Memorandum on Noise from Construction Work in Designated Areas* [Source: EPD] • *Technical Memorandum on Noise from Percussive Piling* [Source: EPD]
• ProPECC PN 1/93 *Noise from Construction Activities – Statutory* [Source: EPD] • ProPECC PN 2/93 *Noise from Construction Activities – Non-statutory* [Source: EPD] • ProPECC PN 4/93 *Planning and Design Noise Sensitive Developments* [Source: EPD] • ProPECC PN 1/96 *Use of Quieter Construction Equipment for Road Opening Works during Non-Sociable Hours* [Source: EPD] • ProPECC PN 1/97 *Streamline Planning of Residential Developments Against Road Traffic Noise* [Source: EPD]
• PNAP 144 *Control of Environmental Nuisance from Construction Sites* [Source: BD] • PNAP 228 *Noise Annoyance Prevention Design of Pump Room and Ventilation System* [Source: BD]
• ETWB TC No. 11/2002 *Control of Site Crushers* [Source: ETWB] • ETWB TC No. 6/97 *Prohibition of the Use of Diesel Hammers for Percussive Piling for Government Projects* [Source: ETWB]

Water Pollution Control – Ordinances and Regulations
• *Water Pollution Control Ordinance* (Cap. 358) • *Water Pollution Control (General) Regulations* • *Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (Cap 358AK)*

- *Shipping and Port Control Ordinance* (Cap. 313)
- *Sewage Services Ordinance (Cap. 463)*
- *Waterworks Ordinance* (Cap.102)
- *Buildings (Demolition Works) Regulations*
- Buildings Ordinance (Cap. 123)
- *Waste Disposal Ordinance* (Cap. 354)
- *Dumping at Sea Ordinance* (Cap. 466)
- *Foreshores and Sea Bed (Reclamations) Ordinance* (Cap. 127)
- *Merchant Shipping (Prevention and Control of Pollution) Ordinance* (Cap. 413)
- *Merchant Shipping (Prevention of Oil Pollution) Regulations*
- *Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulations*
- *Radiation Ordinance* (Cap. 303)
- *Fisheries Protection Ordinance* (Cap. 171)

Water Pollution – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- ProPECC PN 1/94 *Construction Site Drainage* [Source: EPD]
- ProPECC PN 3/97 *A Revised Streamlined Approach for vetting of Drainage Plans Referred to EPD for Comments* [Source: EPD]
- PNAP 144 *Control of Environmental Nuisance from Construction Sites* [Source: BD]
- ETWB TC 14/2004 *Maintenance of Stormwater Drainage Systems and Natural Watercourses* [Source: ETWB]
- ETWB TC 32/2003 *Protection of the Harbour* [Source: ETWB]
- ETWB TC 9/2001 *Procedures for Gazetting under the Foreshore and Sea-bed (Reclamations) Ordinance (Chapter 127)* [Source: ETWB]
- ETWB TC 18/1995 *Drainage Impact Assessment Process for Public Sector Project* [Source: ETWB]
- ETWB TC 3/1995 *Control of Wave Reflection in Victoria Harbour* [Source: ETWB]
- ETWB TC 3/1992 *Abatement of Sanitary Nuisance from Defective Drains and Sewers in Private Streets and Service Lanes* [Source: ETWB]

Waste Management – Ordinances and Regulations

- *Waste Disposal Ordinance* (Cap. 354)
- *Waste Disposal (Chemical Waste) (General) Regulation*
- *Waste Disposal (Charges for Disposal of Chemical Waste) Regulation*
- *Waste Disposal (Charges for Disposal of Waste) Regulation*
- *Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap. 413)*
- *Merchant Shipping (Prevention of Oil Pollution) Regulations*
- *Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulations*
- *Foreshores and Sea Bed (Reclamations) Ordinance* (Cap. 127)
- *Buildings Ordinance* (Cap. 123)
- *Pesticides Ordinance* (Cap. 133)
- *Town Planning Ordinance* (Cap. 131)
- *Land (Miscellaneous Provisions) Ordinance* (Cap. 28)
- *Radiation Ordinance* (Cap. 303)
- *Dumping At Sea Ordinance* (Cap. 466)
- *Shipping and Port Control Ordinance* (Cap. 313)

Waste – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- *Code of Practices on the Packaging, Labelling and Storage of Chemical Wastes* [Source: EPD]
- *Code of Practices on the Handling, Transport and Disposal of Asbestos Waste* [Source: EPD]

- *A Guide to the Chemical Waste Control Scheme* [Source: EPD]
- *A Guide to the Registration of Chemical Waste Producers* [Source: EPD]
- ProPECC PN 3/94 *Contaminated Land Assessment and Remediation* [Source: EPD]

- PNAP 144 *Control of Environmental Nuisance from Construction Sites* [Source: BD]
- PNAP 155 *Marine Disposal of Dredged Mud* [Source: BD]
- PNAP 243 *Construction and Demolition Waste* [Source: BD]
- PNAP 252 *Management Framework for Disposal of Dredged/Excavated Sediment* [Source: BD]
- PNAP 275 *Use of Recycled Aggregated in Concrete* [Source: BD]
- PNAP 268 *Resident Supervision and Debris Management System for Demolition Works* [Source: BD]

- ETWB TC 15/2003 *Waste Management on Construction Sites* [Source: ETWB]
- ETWB TC 34/2002 *Management of Dredged/Excavated Sediment* [Source: ETWB]
- ETWB TC 33/2002 *Management of Construction and Demolition Material Including Rock* [Source: ETWB]
- ETWB TC 21/2002 *Trip-ticket System for Disposal of Construction and Demolition Material* [Source: ETWB]
- ETWB TC 6/2002A *Enhanced Specification for Site Cleanliness and Tidiness* [Source: ETWB]
- ETWB TC 12/2000 *Fill Management* [Source: ETWB]
- ETWB TC 3/2000 *Management of Dredged/Excavated Sediment* [Source: ETWB]
- ETWB TC 25/1999 *Incorporation of Information on Construction and Demolition Material* [Source: ETWB]
- *Management in Public Works Subcommittee Papers* [Source: ETWB]
- ETWB TC 4/1998 *Use of Public Fill in Reclamation and Earth Filling Projects* [Source: ETWB]
- ETWB TC 16/1996 *Wet Soil in Public Dumps* [Source: ETWB]
- ETWB TC 2/1993 *Public Dumps* [Source: ETWB]
- ETWB TC 10/1992 *Provision of Refuse Containment Booms in Reclamation Contracts Involving Public Dumping* [Source: ETWB]

Dangerous Goods Management – Ordinances and Regulations

- *Dangerous Goods Ordinance* (Cap. 295)
- *Dangerous Goods (Application & Exemption) Regulations*
- *Dangerous Goods (General) Regulations)*

- *Radiation Ordinance (Cap. 303)*
- Fire Protection Notice No.4 *Dangerous Goods General* [Source: Fire Services Department]

Dangerous Goods Management - Ordinances and Regulations: Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- ProPECC Practice Note PN 2/94 Potentially Hazardous Installations [Source: EPD]

Environmental Impact Assessment (EIA) – Ordinances and Regulations

- *Environmental Impact Assessment Ordinance* (Cap. 499)

EIA – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- EIAO Guidance Notes (GN1/2002): *EIA Principles* [Source: EPD]
- EIAO Guidance Notes (GN2/2002): *Environmental Study Management Group* [Source: EPD]
- EIAO Guidance Notes (GN3/2002): *Mitigation Measures* [Source: EPD]
- EIAO Guidance Notes (GN4/2002): *Independent Environmental Checker* [Source: EPD]
- EIAO Guidance Notes (GN5/2002): *Implementation Schedule* [Source: EPD]
- EIAO Guidance Notes (GN6/2002): *Ecological Assessment* [Source: EPD]
- EIAO Guidance Notes (GN7/2002): *Ecological Baseline Survey* [Source: EPD]
- EIAO Guidance Notes (GN8/2002): *Landscape and Visual Impact Assessment* [Source: EPD]

- *Technical Memorandum on Environmental Impact Assessment Process* [Source: EPD]

- ETWB TC 13/2003 *Guidelines and Procedures for EIA of Government Projects and Proposals* [Source: ETWB]
- ETWB TC 27/1999 *Environmental Impact Assessment Ordinance Particular Specification Clause* [Source: ETWB]

Resources Use – Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- *Code of Practice for Energy Efficiency of Lift and Escalator Installations* [Source: EMSD]
- *Code of Practice for Energy Efficiency of Electrical Installations* [Source: EMSD]
- *Code of Practice for Energy Efficiency of Air Conditioning Installations* [Source: EMSD]
- *Code of Practice for Energy Efficiency of Lighting Installations* [Source: EMSD]

- PNAP 153 *Tropical Hardwood Timber* [Source: BD]

- ETWB TC 12/2002 *Specifications Facilitating the Use of Recycled Aggregates* [Source: ETWB]
- ETWB TC 19/2001 *Metallic Site Hoardings and Signboards* [Source: ETWB]
- ETWB TC 4/98A *Use of Public Fill in Reclamation and Earth Filling Projects* [Source: ETWB]
- ETWB TC 2/97 *Use of PFA in Concrete Pile Caps and Substructures* [Source: ETWB]
- ETWB TC 14/94 *Use of PFA as General Fill in Reclamations* [Source: ETWB]
- ETWB TC 32/92 *The Use of Tropical Hardwood on Construction Sites* [Source: ETWB]
- ETWB TC 14/90 *The Use of PFA in Structural Concrete* [Source: ETWB]

Other Ordinances and Regulations

- *Country Parks Ordinance* (Cap. 208)
- *Country Parks and Special Areas Regulations*
- *Marine Parks Ordinance* (Cap. 476)
- *Marine Parks and Marine Reserves Regulations*
- *Antiquities and Monuments Ordinance* (Cap. 53)
- *Public Health and Municipal Services Ordinance* (Cap. 132)
- *Summary Offences Ordinance* (Cap. 228)
- *Fixed Penalty (Public Cleanliness Offences) Ordinance (Cap.570)*

Other Codes of Practice, Technical Memoranda, Guidelines, Technical Circulars

- PNAP 267 *Felling, Trimming or Replanting of Trees* [Source: BD]

- LAO PN 8/2002 *Application for Tree Felling or Transplanting for private projects* [Source: Lands Department]

- ETWB TC 08/2004 *Tender Evaluation of Works Contracts* [Source: ETWB]
- ETWB TC 34/2003 *Community Involvement in Greening Works* [Source: ETWB]
- ETWB TC 22/2003 *Additional Measures to Improve Site Cleanliness and Control Mosquito Breeding on Construction Sites* [Source: ETWB]
- ETWB TC 14/2003 *Role of Departmental Safety & Environmental Advisor on HSE Protection* [Source: ETWB]
- ETWB TC 02/2003 *Regulating Action where a Serious Incident has or Site Safety or Environmental Offences have occurred on a Construction Site* [Source: ETWB]
- ETWB TC 47/2002 *Management of Sub-Contractors by Contractors* [Source: ETWB]
- ETWB TC 24/2002 *Contractors' Performance Index System* [Source: ETWB]
- ETWB TC 14/2002 *Management and Maintenance of Natural Vegetation and Landscape Works, and Tree Preservation* [Source: ETWB]
- ETWB TC 07/2002 *Tree Planting in Public Works* [Source: ETWB]
- ETWB TC 4/97 *Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures* [Source: ETWB]
- ETWB TC 25/1993 *Control of Visual Impact of Slopes* [Source: ETWB]
- ETWB TC 28/1992 *Damage of Crops and Property on Agricultural Lands* [Source: ETWB]
- ETWB TC 25/1992 *Allocation of Space for Urban Street Trees* [Source: ETWB]

APPENDIX F – INTERNET RESOURCES FOR ENVIRONMENTAL REQUIREMENTS IN EUROPE, JAPAN AND USA

Environmental Requirements in Europe	Internet Resources
Waste Electrical and Electronic Equipment (WEEE) Directive 2002 (Directive 2002/96/EC)	http://europa.eu.int/comm/environment/waste/weee_index.htm
Restriction of Hazardous Substances Directive 2002 (ROHS) (Directive 2002/95/EC)	http://europa.eu.int/comm/environment/waste/weee_index.htm
Directive 2000/55/EC on energy efficiency requirements for ballast for fluorescent lighting 2000	http://europa.eu.int/scadplus/leg/en/lvb/l27032.htm
Directive 96/57/EC on energy efficiency requirements for household electric refrigerators, freezers and combination 1996	http://europa.eu.int/scadplus/leg/en/lvb/l21016.htm
Packaging Directive 1994 (Directive 94/62/EC)	http://europa.eu.int/scadplus/leg/en/lvb/l21207.htm
Nickel Directive 1994 (Directive 94/27/EC)	http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=1994&nu_doc=27
Energy Labelling Directive 1992 (Directive 92/75/EEC)	http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=1992&nu_doc=75
Batteries Directive 1991 (Directives 91/157/ECC and 98/101/EC) and Battery Marking Directive 1993 (Directive 93/86/EEC)	http://www.grc.cf.ac.uk/lrn/resources/waste/classification/controlled/hazardous/batteries.php
Directive 86/594/ECC on airborne noise emitted by household appliances 1986	http://ec.europa.eu/enterprise/newapproach/standardization/harmstds/reflist/airnoise.html
Environmental Requirements in Japan	**Internet Resources**
Revised Recycling Law 1995 (Formally known as the Law for Promotion of Effective Utilization of Resources)	http://www.env.go.jp/en/laws/recycle/06.pdf
Containers and Packaging Recycling Law 1997 (Formally known as Law for Promotion of Sorted Collection and Recycling of Containers and Packaging)	http://www.env.go.jp/en/laws/recycle/07.pdf
Home Appliance Recycling Law 1998 (Formally known as the Law for Recycling of Specified Kinds of Home Appliances)	http://www.env.go.jp/en/laws/recycle/08.pdf
Energy Conservation Law 1998 (Formally known as the Law Concerning the Rational Use of Energy)	http://www.eccj.or.jp/index_e.html
Environmental Requirements in United States of America	**Internet Resources**

Battery Act 1996 (formally known as Mercury-Containing Rechargeable Battery Management Act)	http://www.epa.gov/compliance/civil/ba/index.html
Federal Energy Efficiency Law 1995	http://www1.eere.energy.gov/femp/about/legislation.html
State Electronic Waste Legislation and Mandatory Electronics take back Programme	http://www.eiae.org/

APPENDIX G – KEY ELEMENTS OF THE EU WEEE AND ROHS DIRECTIVES

1) OBJECTIVE

To prevent the generation of electrical and electronic waste and to promote reuse, recycling and other forms of recovery in order to reduce the quantity of such waste to be eliminated, whilst also improving the environmental performance of economic operators involved in its treatment.

To approximate the laws of the EU member states on restricting the use of hazardous substances in electrical and electronic equipment in order to contribute to the recovery and elimination of equipment waste and the protection of human health.

2) ACT

Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment [Official Journal L 37, 13.2.2003].

Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment [Official Journal L 37, 13.2.2003].

3) SUMMARY

Directive on waste electrical and electronic equipment

1. Scope
This Directive applies to the following categories of electrical and electronic equipment:
- large and small household appliances;
- IT and telecommunications equipment;
- consumer equipment;
- lighting equipment;
- electrical and electronic tools (with the exception of large-scale stationary industrial tools);
- toys, leisure and sports equipment;
- medical devices (with the exception of implanted and infected products);
- monitoring and control instruments;
- automatic dispensers.

2. Product design
EU member states are to encourage the design and production of electrical and electronic equipment which take into account and facilitate dismantling and recovery, in particular the reuse and recycling of waste electrical and electronic equipment.

3. Separate collection
EU member states are to minimise the disposal of waste electrical and electronic equipment (WEEE) as unsorted municipal waste and are to set up separate collection systems for WEEE. In the case of electrical and electronic waste, EU member states are to ensure that, as from 13 August 2005:
- final holders and distributors can return such waste free of charge;
- distributors of new products ensure that waste of the same type of equipment can be returned to them free of charge on a one-to-one basis;
- producers are allowed to set up and operate individual or collective take-back systems;
- the return of contaminated waste presenting a risk to the health and safety of personnel may be refused.

Producers must make provision for the collection of waste which is not from private households. EU member states must ensure that all waste electrical and electronic equipment is transported to authorised treatment facilities.

4. By 31 December 2006 at the latest, a rate of separate collection of at least 4 kg on average per inhabitant per year of waste electrical and electronic equipment from private households must be achieved. A new target rate to be set at a later date is to be achieved by 31 December 2008.

5. Treatment
Producers of electrical and electronic equipment must apply the best available treatment, recovery and recycling techniques. Such treatment is to include the removal of fluids and selective treatment in accordance with Annex II to the Directive. Waste treatment and storage must be in conformity with Annex III to the Directive.

6. Establishments responsible for treatment operations must obtain a permit from the competent authorities. They are encouraged to participate in the Community eco-management and audit scheme (EMAS).

7. Treatment operations may also be undertaken outside the EU member state concerned, or even outside the Community, subject to compliance with Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community. Treatment outside the Community only count for the fulfilment of the targets of the Directive if the exporter can prove that treatment operations took place under conditions that are equivalent to the requirements of this Directive.

8. Recovery
Producers must set up systems for the recovery of waste electrical and electronic equipment collected separately.

9. By 31 December 2006, the rate of recovery by an average weight per appliance must be at least 80% in the case of large domestic appliances and automatic dispensers, 70% in the case of small domestic appliances, lighting equipment, electrical and electronic tools, toys, leisure and sports equipment and monitoring and control instruments, and 75% in the case of IT and telecommunications equipment and consumer equipment. By the same date, the rate of component, material and substance reuse and recycling by an average weight per appliance must be at least 80% in the case of discharge lamps, 75% in the case of large domestic appliances and automatic dispensers, 50% in the case of small domestic appliances, lighting equipment, electrical and electronic tools, toys, leisure and sports equipment and monitoring and control equipment, and 65% in the case of IT and telecommunications equipment and consumer equipment.

10. By 13 August 2004, the Commission is to lay down the rules on compliance with the rates specified above. Producers must state the weight of the electrical and electronic waste entering and leaving treatment and recovery or recycling facilities. By 31 December 2008, the European Parliament and the Council are to set new targets for recovery, recycling and reuse.

11. Financing
By 13 August 2005, producers must provide for the financing of the collection, treatment, recovery and environmentally sound disposal of waste electrical and electronic equipment. In the case of products placed on the market later than 13 August 2005, each producer is responsible for providing financing in respect of his own products. When a producer places a product on the market, he must furnish a guarantee concerning the financing of the management of his waste. Such a guarantee may take the form of participation by the producer in financing schemes, a recycling insurance or a blocked bank account. In the case of products placed on the market before 13 August 2005 ('historical waste'), financing is to be provided by the producers existing on the market, who are, for instance, to contribute proportionately to their share of the market.

12. By 13 August 2005, financing is to be covered by producers in the case of waste from holders other than private households and placed on the market after that date. In the case of waste from products placed on the market before 13 August 2005, management costs are to be borne by producers. However, EU member states may provide that users be made responsible, partly or totally, for this financing.

13. Information
Users of electrical and electronic equipment in private households must have access to the necessary information on the requirement not to mix this type of waste with unsorted municipal waste and to

ensure separate collection, collection and take-back systems, their role in the recovery of waste, the effects of such waste on the environment and health, and the meaning of the symbol which must appear on the packaging of such equipment (a crossed-out wheeled bin).

14. Producers must mark electrical and electronic equipment placed on the market after 13 August 2005 with the above-mentioned symbol.

15. For each new type of electrical or electronic equipment, producers must provide, within one year after it is placed on the market, information on its reuse and treatment. Such information is to identify the components and materials present in the equipment and the location of dangerous substances and preparations. Such information must be communicated to reuse centres and treatment and recycling facilities. Producers of electrical and electronic equipment placed on the market as from 13 August 2005 will be identifiable by a mark on each appliance.

16. Reporting and penalties
EU member states are to draw up a register of producers and keep information on the quantities and categories of electrical and electronic equipment placed on the market, collected, recycled and recovered in their territory. Every three years, they must also send a report to the Commission on the implementation of this Directive. The first such report will cover the 2004-2006 period. The Commission is then to publish a report on the same subject within nine months after receiving the reports from the EU member states.

17. EU member states are to determine the penalties applicable to breaches of this Directive.

Directive on the use of certain hazardous substances

18. This Directive covers the same scope as the Directive on waste electrical and electronic equipment (except for medical devices and monitoring and control instruments). It also applies to electric light bulbs and luminaires in households.

19. From 1 July 2006, lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in electrical and electronic equipment must be replaced by other substances. Certain exceptions are specified in the annex to the Directive.

20. By 13 February 2005, the Commission will review the provisions of the Directive, in particular as regards the feasibility of widening its scope and adapting the list of substances it covers so as to take account of new scientific facts.

21. EU member states are to determine the penalties applicable to breaches of this Directive.

Act	Date of entry into force	Final date for implementation in the EU member states
Directive 2002/96/EC	13.2.2003	13.8.2004
Directive 2002/95/EC	13.2.2003	13.8.2004

Source: European Union - http://europa.eu/

APPENDIX H – ORGANISATIONS OFFERING SUPPORT TO ELECTRICAL / ELECTRONIC SMES

		Type of Supports to be Provided to the SME of the S&E Sector*										
Organization	Website Address	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5	Cat 6	Cat 7	Cat 8	Cat 9	Cat 10	Cat 11
Academic Institution - Hong Kong												
Centre for Electronic Packaging and Assemblies, Failure Analysis and Reliablitity Engineering (EPA Centre) of CityUHK	http://www.ee.cityu.edu.hk/~epa/home.htm						1	1				1
Industrial and Systems Engineering Department, HK Polytechnical University	http://www.ise.polyu.edu.hk/						1		1			
Mechanical Engineering Department of HKUST	http://www.me.ust.hk/						1		1			
The Centre of Urban Planning and Environmental Management, HKU	http://www.hku.hk/cupem/home/index.html		1									1
Trade-specific Association/ Professional Bodies - Hong Kong												
Hong Kong Electronic Industries Association	http://www.hkeia.org/						1	1	1	1	1	1
Hong Kong Electronic Packaging and Manufacturing Services Association (HKEPMSA)	http://www.hkepmsa.org/about.htm						1	1	1			1
Electrical Division of The Hong Kong Institution of Engineers	http://www.hkie-electrical.com/						1	1	1			
Electronics Division of The Hong Kong Institution of Engineers	http://asic.ee.cuhk.edu.hk/en-division/						1	1				
Hong Kong Green Manufacturing Alliance	http://www.gma.org.hk/					1			1	1		1
NGO - Hong Kong												
Business Environment Council	http://www.bec.org.hk	1	1	1	1	1					1	1
Hong Kong Productivity Council	http://www.hkpc.org	1	1				1		1	1	1	1
Academic Institution - Mainland & Overseas												
Huazhong University of Science & Technology	http://www.hust.edu.cn/						1	1	1			
Shanghai Jiao Tong University	http://www.sjtu.edu.cn/						1	1	1			
The Computer Aided Life Cycle Engineering (CALCE) Electronic Products and Systems Center, University of Maryland	http://www.calce.umd.edu/						1	1	1	1		

		Type of Supports to be Provided to the SME of the S&E Sector*										
Organization	Website Address	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5	Cat 6	Cat 7	Cat 8	Cat 9	Cat 10	Cat 11
Electronic Production of Chalmers University of Technology	http://www.chalmers.se/en/sections/research/professors/interwievs/interview-with-professor7328						1	1	1			
Trade-specific Association - Mainland & Overseas												
Electronics Manufacturing Technology China	http://www.nepconchina.com/						1	1	1			1
Institute of Electrical and Electronics Engineers, Inc	http://www.ieee.org						1	1	1			
IEEE Reliability Society	http://www.ieee.org/portal/site/relsoc/menuitem.112d36a56667b078fb2275875bac26c8/index.jsp?&pName=relsoc_home						1	1				
Electronic Industries Alliance	http://www.eia.org/						1	1	1		1	1
IEEE Components, Packaging, and Manufacturing Technology (CPMT) Society	http://www.cpmt.org/						1	1	1			
The Fraunhofer Institute for Reliability and Microintegration (IZM)	http://www.izm.fraunhofer.de/EN/About/index.jsp						1	1	1			
The Electronic Components, Assemblies, & Materials Association	http://www.ec-central.org/abouteca/index.htm						1	1				
Consumer Electronics Association (CEA)	http://www.ce.org						1	1				
Government Electronics & Information Technology Association	http://www.geia.org/						1	1	1			1
Government & Government-related Bodies - Mainland												
廣東省環保產業協會	http://www.gdepi.com.cn								1	1	1	1
廣東省環境保護局	http://www.gdepb.gov.cn/								1	1	1	1
廣東省環境保護宣傳與教育	http://www.gdepb.gov.cn/xcyjy/index.html								1	1	1	1
深圳市環境保護局	http://www.szepb.gov.cn/								1	1	1	1
深圳市環境工程諮詢服務中心	http://www.szeecsc.com/								1	1	1	1
國家環境保護總局	http://www.zhb.gov.cn/								1	1	1	1
ISO14000 國家示範區	http://www.sepa.gov.cn/tech/ISO14000/								1	1	1	1

		Type of Supports to be Provided to the SME of the S&E Sector*										
Organization	Website Address	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5	Cat 6	Cat 7	Cat 8	Cat 9	Cat 10	Cat 11
深圳市環境監測中心站	http://www.szems.gov.cn/								1	1	1	1
中國環保網	http://www.ep.net.cn/								1	1	1	1
中國合格評定國家認可委員會	http://www.cnas.org.cn/			1					1	1	1	1
中國環境影響評價網	http://www.china-eia.com/								1	1	1	1
國家環境保護環境認證中心	http://www.sepacec.com/			1					1	1	1	1
NGO -Overseas												
National Science and Technology Education Partnership - US	http://www.nationalstep.org						1	1	1		1	1
The SIGMA project - UK	http://www.projectsigma.co.uk/										1	1
Environmental Management Accounting Network	http://www.eman-eu.net/										1	1

Cat 1	ISO 14001 EMS Training
Cat 2	ISO 14001 EMS Consultation
Cat 3	ISO 14001 EMS free advisory services
Cat 4	ISO 14001 EMS mentoring service
Cat 5	SME support
Cat 6	Eco-design & DFE
Cat 7	LCA/LCC
Cat 8	Cleaner Production
Cat 9	Pollution control technologies
Cat 10	Environmental Legislations & Other requirements
Cat 11	Environmental Information Centre

APPENDIX I – EPD DIRECTORY OF ENVIRONMENTAL CONSULTANTS (FULL LIST)

Please visit EPD website at:

http://www.epd.gov.hk/epd/english/business_job/business_opp/files/full_list.pdf