LOCAL GOVERNMENT DEPARTMENT
MINISTRY OF HOUSING AND LOCAL GOVERNMENT
MALAYSIA

NATIONAL STRATEGIC PLAN FOR SOLID WASTE MANAGEMENT

Executive Summary

AUGUST 2005

PREFACE

Municipal Solid Waste Management (SWM) is a basic sanitary service that is crucial for maintaining the health of urban and rural communities and protection of the environment. An Action Plan for a Beautiful and Clean Malaysia, the ABC Plan, was prepared in 1987, and since then no national plan for municipal SWM has been prepared.

Effective management of solid wastes is one of the prerequisites for Malaysia to achieve a developed country status. It is generally recognised that there is a strong relationship between effective management of solid wastes and a good quality of life and a healthy environment. The attractiveness of the country to foreign visitors and investments is very much influenced by a clean and healthy environment.

The time has come for many crucial decisions to be made on municipal SWM with respect to the impending SWM Act. These decisions include the finalisation of the SWM Concession Agreement for privatisation of SWM; enhancing waste reduction, re-use and recovery (the 3 Rs); and investments in new infrastructure facilities such as sanitary landfills, transfer stations and intermediate facilities.

The National Strategic Plan for Solid Waste Management (the Strategic Plan) that has been prepared is to serve as a guide in planning and allocating resources based on national priorities and consensus. The Strategic Plan is in line with the vision for Malaysia to achieve a fully developed country status by 2020.

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1. EXISTING CONDITIONS

1.1 Scope of the Strategic Plan

Municipal solid waste is the subject of this Strategic Plan, which covers Peninsular Malaysia. Wastes considered include those generated from household, institutional, commercial and industrial premises, as well as those generated from construction and public cleansing activities. Scheduled waste is not included. The planning period considered is up to the year 2020.

1.2 Institutional and Regulatory Framework

Under the Local Government Act 1976, Local Authorities (LAs) are responsible for providing SWM services within local authority areas. The services comprise mainly waste collection and transport to disposal sites as well as the operation of some recycling centres. LAs either provide the services directly or contract them out to private sector service providers. The State Governments oversee the LA activities and play a role in provision of land for disposal facilities.

At the Federal level, the Ministry of Housing and Local Government (MHLG), the Ministry of Health (MOH) and the Economic Planning Unit (EPU) are playing an increasingly important role in providing local authorities with technical and financial assistance to better manage their wastes.

1.3 SWM Service Scale

Currently, 17,000 tonnes of municipal solid wastes[1] are generated in Peninsular Malaysia daily. This is estimated to increase to more than 30,000 tonnes in the year 2020[2]. It is estimated that 75% of this waste is being collected while the remainder is disposed off by other, including illegal, means. Almost 95% of the collected wastes are taken to about 120 treatment disposal facilities that are distributed throughout the Peninsula. In a survey by MHLG in 2001, of 112 landfill facilities, only 6% have been classified as having some form of environmental control measures. The vast majority have minimal or no such measures, and invariably, have given rise to significant environmental concerns, which need to be addressed immediately. Intermediate waste treatment and recycling accounts for a meagre 3 – 4% of the wastes collected.

1.4 SWM Costs

The cost of waste management services presently provided has been estimated to be RM 360 million in 2001, or RM 70 per tonne of waste collected. Collection accounts for 83% of the cost, disposal at 16% and recycling at 1%. Share of the tax assessment for waste management is estimated to range between RM5 - RM10 per premise per month.

1.5 Interim Period

In 1995, the Government of Malaysia (GOM) decided to federalise and privatise SWM services. Three separate Concessionaires were appointed to take over the management of waste services within each of the three regions created in the Peninsula. Prior to the finalisation of the Concession Agreement and the new regulatory system under which federalisation and privatisation of SWM shall proceed, some local authorities have entered into interim agreements (renewed annually) with the Concessionaires to provide SWM services in their respective areas.

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[1] This amount does not cover construction wastes managed directly by the construction industry

[2] This amount is based on present waste generation trends and may be lowered as waste reduction initiatives recommended in this Strategic Plan take effect.

2. FEDERALISATION AND PRIVATISATION OF SWM

2.1 Background

The GOM in recent years has committed itself to two important objectives, which have direct impacts on the quality and scale of SWM services required for the country. In 1991, Vision 2020 set the target for the country to become a developed nation by 2020 and in 1992 the GOM signed the Rio Declaration committing to the principles of sustainable development. To achieve these objectives, various commitments had to be made, one of which is the need to significantly improve SWM services.

The Action Plan for A Beautiful and Clean Malaysia (the ABC Plan) prepared in 1988 produced a road map for the development of SWM under the local authorities. However, the ABC Plan was never authorised nor implemented in total, although MHLG initiated its first and second recycling programs in 1993 and 2000 respectively.

The weaknesses of LAs in SWM have become apparent to the GOM and it has been recognised that many local authorities would require assistance. Federalisation and privatisation of SWM was decided as an appropriate means to overcome this problem. The Federal Government determined to step in and assume overall responsibility for SWM.

Private sector participation and investment in SWM was seen as a means to improve the sector through the provision of cost efficient services. Letters of intent were issued to the three Concessionaires in 1995.[3] A draft bill for SWM identifying the role of the GOM in SWM and the roles of the other stakeholders has been in preparation since 1995.

2.2 Federalisation

The objectives of federalisation of SWM may be summarised as follows:

- Establish a national policy for SWM and ensure its implementation;
- Provide the basis for regional development of SWM facilities, such as intermediate treatment plants and sanitary landfills;
- Ensure that proposed technical systems to be adopted are consistent with the national policy and have been sufficiently studied; and
- Provide the required funding, either directly or through the privatisation program, to reduce the financial burden on the public at the outset.

2.3 Privatisation

Privatisation of SWM services initially reflected the GOM's intention for the private sector to invest in and manage solid wastes on a regional basis in order to speed up the desired improvements to the sector. However, due to the high cost of investment, it has become apparent that the GOM needed to shoulder a major portion of the investments in the initial stages to reduce the impacts of high cost recovery from the public. The private sector could still be involved in capital and operational investments for waste collection services, with the GOM responsible for development of treatment and disposal facilities.

[3] Concessionaires have since been operating under Interim Agreements while the Concessionaire Agreements are being drafted.

3. TARGETS FOR DEVELOPMENT OF SWM

3.1 The Waste Hierarchy

The trend in developed countries is to tackle the solid waste problem at its inception in order to minimise its production, and to deal with the generated waste as resources that may be processed into reusable materials. Intermediate treatment processes are also used to recover elements of the waste and significantly reduce the waste amount to be disposed off by sanitary landfill.

Basically, the waste hierarchy adopted under the Strategic Plan aims to:

- Reduce waste through the effective management of resources at the levels of raw materials utilisation, production, distribution, marketing and consumption;
- Re-use products and materials;
- Recover reusable elements of the waste such as paper, plastic, glass and metals through source separation and separate waste collection, and materials recovery at materials recovery facilities;
- Intermediate treatment of the waste in order to reduce the waste amount, and further recover the value of the waste through composting or waste to energy; and
- The disposal by sanitary landfill of the residual waste.

3.2 Established Targets

SWM service targets have been established to focus the improvement plans and to measure their efficiency as shown in the following table.

Level of Service	Present	2003 – '09	2010 – '14	2015 – '20
1) Extend collection service	75%	80%	85%	90%
2) Reduction & recovery	3 – 4%	10%	15%	17%
3) Closure of dump sites	112 sites	50%	70%	100%
4) Source separation[4]	None	20%	80%	100%

These targets are considered achievable within the timeframe up to 2020; however, they should be reviewed periodically during the planning period to ensure that they remain relevant with respect to the prevailing conditions at the time of review. Such revisions could include the ultimate vision of "Zero Waste" that is to be achieved within a timeframe that is to be established.

[4] Source separation shall be limited to the urban areas

4. STRATEGIES TO DEVELOP SWM

4.1 Determination of SWM Priorities

Traditional concerns with respect to poor SWM focused on health and safety issues, but today waste management is recognised as a significant environmental issue. *Sustainable SWM should balance between the need to conserve resources and the equally important responsibility to prevent pollution of the environment*. Within the recognised waste hierarchy, it is necessary to strike this balance, using the available resources wisely and addressing the immediate concerns.

There is serious concern posed by the legacy of improper management of waste disposal sites in the Peninsula. Poor site selection, the lack of environmental protection measures, the lack of knowledge of waste amounts and types disposed, and the absence of proper closure measures for disused landfills, make landfill sites points of environmental concern. Further, the practice of illegal waste dumping adds to this concern.

Modern treatment and disposal methods for managing solid wastes, in accordance with international protocols such as Agenda 21 and the Rio Summit Declaration, *requires the use of extensive and expensive measures to protect the environment*. This can only be cost-effective if significant quantities of waste are treated and disposed of at these facilities. This requires solid waste management to be coordinated on a national scale with large centralized facilities serving the main centres of population.

It is recognised that there is much to be done and accordingly a large amount of investment is required. Financial constraints may require initial investments to be focused on expanding collection services, dealing with existing disposal sites problems, and the construction of proper sanitary landfills. The introduction of more expensive facilities for processing and treatment of wastes would need to be gradual, so as not to burden the public in the initial stages, but sufficient to achieve realistic recycling targets and to decrease the amount of waste required for disposal.

It is also recognised that the changing nature of waste generation and characteristic requires periodic review of the National Strategy and modifications have to be made in tune with these developments. *The dynamic nature of the national strategy is to be emphasised*.

Strategy 1: The priorities for SWM shall be as follows:

Short-term: Waste Hierarchy suited to Malaysia's conditions

1. *Expand the service coverage to areas which do not have such services*
2. *Address problems associated with existing dump sites through upgrading and safe closure as deemed appropriate*
3. *Develop new sanitary landfill facilities.*
4. *Introduce some SWM facilities to encourage waste recycling and waste-to-energy recovery*

Long-term: Towards a more balanced waste hierarchy

4.2 Rapid and Comprehensive Development of the Regulatory Framework

1) Legal Concerns

There is currently no Federal or State legislation that deals comprehensively with all aspects of SWM. The Local Government Act (1976) and the Street, Drainage and Building Act (1974) lack sufficient depth and coverage for the efficient management of solid wastes.

Existing provisions of the Environmental Quality Act (1974) are generally adequate for matters relating to the prevention and control of environmental pollution. However, they are not specific to SWM and do not cover items such as discharges and emissions from landfills and other SWM facilities.

The long delay and continuing interim nature of the relationship between the Concessionaires and the Local Authorities have imposed severe constraints on planning and development of SWM services by the private sector.

2) Institutional Aspects

SWM is being managed at all three levels of Government: Federal, State and Local Government. There is a lack of capacity and focus in the management of solid waste system at all levels.

LAs are the authorities directly responsible to provide the SWM services. However, the complex and increasingly high cost involved has made it difficult for LAs to provide comprehensive SWM services, other than waste collection.

The framework for involvement of other stakeholders, which have important responsibilities and roles in SWM, is lacking. These stakeholders include administrative agencies, the public, manufacturers, retailers, private service providers as well as other third parties.

Strategy 2: The Rapid and Comprehensive Development of the Necessary Legal and Institutional Framework shall proceed as follows:

(1) Legal Development

1. *Enact the SWM Bill in 2003 as a comprehensive legislation related to SWM, with provision for federalisation of solid waste services and enabling provisions of subsidiary legislation*
2. *Formalise the Agreements for the Concessionaires and other service providers*
3. *Develop the environmental legislation to cover SWM aspects*
4. *Specify duties and responsibilities for all stakeholders*

(2) Institutional Development

1. *Establish a new institutional structure for SWM where all three levels of government have specific legally defined roles.*
2. *Establish the Solid Waste Management Department (SWMD) in 2003 within the Federal Government to develop policy, and undertake planning and management of solid waste expenditures*
3. *Establish a National Council for SWM at the Federal level and Standing Committee for SWM at State level to provide a forum for all stakeholders to participate in SWM.*
4. *Delegate powers to LAs to monitor and enforce the provisions of the SWM Act.*

4.3 Public Awareness and Technical Development

1) Public Awareness

Environmental awareness is low in Malaysia. Local Authorities often complain of lack of cooperation from the general public with respect to the provision of SWM services. Whilst the National Recycling Program undertaken by the Ministry of Housing and Local Government has contributed to a greater awareness of the need to preserve resources, public response, on the other hand, has been disappointing.

Essentially, the focus of public awareness campaigns needs to be broadened to provide the general public with a better understanding of the requirement for better SWM facilities and the costs associated with such improvements.

Whilst the Government may have the will and take the necessary action to change the way wastes are managed, it is unable to achieve change without the support and active participation of the people.

2) Technical Development

Professionalism in the solid waste industry is weak and poorly represented. Indeed, there is a need to improve skills and expand the dissemination of knowledge among practitioners in SWM at all levels.

Capacity development, both in terms of number of personnel and technical capabilities, is also lacking in the planning, design, construction and management of SWM facilities and services.

Strategy 3: Development of public participation and technical capabilities in SWM shall proceed as follows:

(1) Public Participation

1. *The SWMD will coordinate and engage in sustained public education and awareness campaigns.*
2. *Public participation will be enhanced through the proposed National Council for SWM and the Standing Committees for SWM in the States*
3. *The topic of solid waste will be introduced as part of the curriculum in schools, together with an environmental education program for children based on the program of ISO 14000s for Kids.*

(2) Technical Capability Development

1. *An Institute of Waste Management will be formed by 2004*
2. *A national program of research will be drawn up by the SWMD in collaboration with the Ministry of Education and other agencies*
3. *The Government will consider providing tax breaks to companies willing to fund or undertake research in accordance with the national program.*
4. *A SWM Research and Development Centre will be established in Malaysia to conduct research, especially to localise technology and practices relevant to Malaysia and the surrounding countries in the region.*
5. *A database, with collection and interpretation of relevant information will be set up by the SWMD for use in planning and management.*

4.4 Provision of Sustainable Technologies

Increasing waste generation and urbanisation together with the lack of landfill void capacity in proximity to urban conurbations and the environmental implications of open dumping are cause for concern. The lack of solid waste planning and financial investment in SWM in previous years has resulted in a legacy of inefficient and poorly operated facilities, which contribute to environmental pollution and are a hazard to public health. There is an urgent need to address these concerns and to provide new facilities.

Large intermediate treatment and disposal facilities benefit from economies of scale but require large budgets for capital expenditure and must be supported by efficient transfer haul facilities. The rapid rate of urbanisation and population and waste growth predicted for Malaysia over the period of this Strategic Plan provides the impetus for the development of regional waste treatment facilities at an early stage of the planning process. The Proximity Principle set against the cost/benefit of a regional approach is the basis for this Strategic Plan.

Thermal treatment of waste has a role to play in waste management in densely populated urban areas, but securing land for the development of sanitary landfills is an issue. Notwithstanding that, the construction of these capital-intensive facilities should be studied in relation to the regional strategy for SWM and the sustainability of such facilities. Recommended waste flows and facilities for various States in the Peninsula are shown in **Figures 4.1 to 4.11** (please refer to back page).

Strategy 4: Provision of sustainable technologies to manage solid waste shall proceed as follows:

(1) Facility types

The following technologies and infrastructure are to be adopted for the development of SWM in Peninsular Malaysia to 2020:

1. *Sanitary landfills*
2. *Transfer stations (with "bring" centres for recyclables)*
3. *Integrated material recovery facilities; and*
4. *Thermal treatment plants*

(2) Number of facilities required for the period 2004 - 2020

1. *Sanitary landfills: 22 sites*
2. *Transfer stations: 45 stations*
3. *Integrated MRFs: 7 facilities*
4. *Thermal treatment plants: Initially 6 plants[5] (with an additional two candidate plants in Johor and Selangor South to be evaluated in master plans and feasibility studies to be undertaken)*

(3) Detailed Planning and Feasibility Studies

1. *Master plans will be made to determine the suitability of the facilities proposed[6], specific sites, technologies and operational plans.*
2. *Feasibility studies addressing the financial viability of the projects shall be implemented.*
3. *Environmental Impact Assessment studies will be conducted.*
4. *These studies will be conducted during 2003 in order that construction can commence in 2004.*

[5] This number includes the existing three plants and the three new ones planned by GOM in KL South, Pulau Pinang and Cameron Highlands.

[6] Including the GOM proposed facilities for which studies have not been undertaken.

4.5 Develop the Waste Reduction, Re-use and Recovery Elements of SWM

The importance of waste reduction at the source of production cannot be overemphasised. Although some individual industries have adopted waste minimisation practices, these attempts are very limited and do not significantly affect waste quantities for disposal. Currently, there are no legal or fiscal instruments aimed at requiring waste generators to reduce the amount of waste they produce.

The concept of "Zero Waste" has been considered as a long-term commitment within the Strategic Plan. This concept will require fundamental changes in the way people think and act, and inevitably, will require large costs to put in place the necessary support infrastructure.

The Strategic Plan should not be bogged down by attempts to define recovery or recycling and the associated terms of recyclable materials, recovered materials and recycled materials. In principle, recycling shall refer to the return of certain materials as raw materials for production and accordingly reduction in the exploitation of virgin materials. However, it is recognised that as resource recovery takes root, more concrete definitions concerning contracts and legislations will be necessary.

Strategy 5: A comprehensive approach to develop waste reduction, re-use and recovery shall proceed as follows:

1. *SWMD will promote waste reduction in a coordinated manner, working with both the public and private sectors and will monitor the development of best environmental practice.*
2. *Waste reduction and recovery will be achieved by employing a combination of mandatory and voluntary instruments.*
3. *Regulatory authorities will require registered companies to report on their "Environmental Performance" on aspects of SWM.*
4. *In assessing new investments for industrial development, the Malaysian Industrial Development Authority (MIDA) will include in its checklist, items related to waste management and plans for waste reduction and recovery.*
5. *SWMD will develop fiscal incentives for the promotion of waste reduction and will employ a combination of statutory control and non-statutory (voluntary) measures to increase resource and energy recovery from waste.*
6. *SWMD will periodically assess public response to determine the feasibility of source separation and determine the appropriate time for its implementation*
7. *A detailed study on waste reduction, re-use and recovery will be undertaken during 2003/2004, upon which a master plan setting more relevant targets and defining methods to achieve these targets shall be prepared*
8. *Provisional overall waste reduction and recovery targets have been set at 17% by 2020. Recycling targets for specific waste streams are 30% for paper and board, 20% for plastic, 50% for glass and 75% for metals. SWM infrastructure has to be provided to support these targets.*

4.6 Develop A Socially Acceptable SWM System

The total construction and basic operation costs of the facilities proposed in the Strategic Plan are estimated to be RM15.6 billion and RM14.4 billion respectively[7].

The present rate charged to waste generating premises, as a portion of the assessment tax, is estimated to be between RM5 – RM10/premise/month. With the implementation of the proposed facilities and to ensure that the tariff regime will be adequate to recover the costs associated with the proposed facilities, the following long-term monthly average tariff levels will be required per premise[8].

Tariff Levels to Achieve Full Cost Recovery

Premise type (RM/premise/month)	Collection/ transport	Transfer/ treatment/disposal	Total SWM
Residential-Urban	7.80	14.20	22.00
Residential-Rural	5.50	9.90	15.40
Commercial-Urban	27.70	50.40	78.10
Commercial-Rural	19.40	35.30	54.70

A financial strategy has been proposed to achieve full cost recovery from the beneficiaries by the year 2020 based on government intervention and partial subsidy of the system in the initial phases of the Strategic Plan. Full costs for collection will be recovered from the beneficiaries at the initial. For residential areas, it is anticipated that there will be no increase to present tariff levels levied. In the case of transfer, treatment and disposal, cost recovery will be by a gradual increase in tariff levels for both residential and commercial premises as shown in the following table.

Share of Transfer, Treatment and Disposal Costs by Premise Type

Premise type	2004 – 2008	2009 - 2013	2014 - 2018	2019 - 2020
Residential	0%	30%	65%	100%
Commercial	50%	100%	100%	100%

Strategy 6: A Socially Acceptable SWM System shall proceed as follows:

1. *During the initial years of privatisation, payment for collection and transport services will be recovered from charges to waste generators the annual assessment.*
2. *Government intervention in construction and operation of transfer stations, treatment plants and sanitary landfills will be required to reduce the financial burden on the public in the initial stages, with full cost recovery to be implemented gradually.*
3. *The long-term strategy is for full privatisation of all SWM functions.*
4. *Operation and maintenance of SWM facilities to be constructed by GOM will be privatised.*
5. *Third party investors are to be encouraged if proposals for development of SWM facilities are consistent with development plans and such projects are made on a competitive basis.*

[7] CAPEX and OPEX which include provision of an additional two thermal treatment plants at Johor and Selangor South are estimated at RM 17.8 billion and RM 14.5 billion, respectively.

[8] Tariff levels determined based on Government intervention in construction and operation of SWM facilities and private sector provision of the collection services.

5. ACTION PLAN

An Action Plan has been developed to provide a road map for the implementation of the Strategic Plan. The Action Plan is divided into three parts: the first establishes the regulatory framework for SWM and the planning of the required technical services; the second sets the programme for implementation and operation of the SWM facilities and services; and the third develops the supporting infrastructure required for the SWM system to function in a sustainable manner. The categories in each part are as follows:

Part 1 – Regulatory Framework

1. Strategy Development and Approval
2. Legislation Development
3. Institutional Development
4. SWM Master Plans (M/P)

Part 2 – Service Operation

5. Privatisation of collection services
6. Development of SWM Facilities

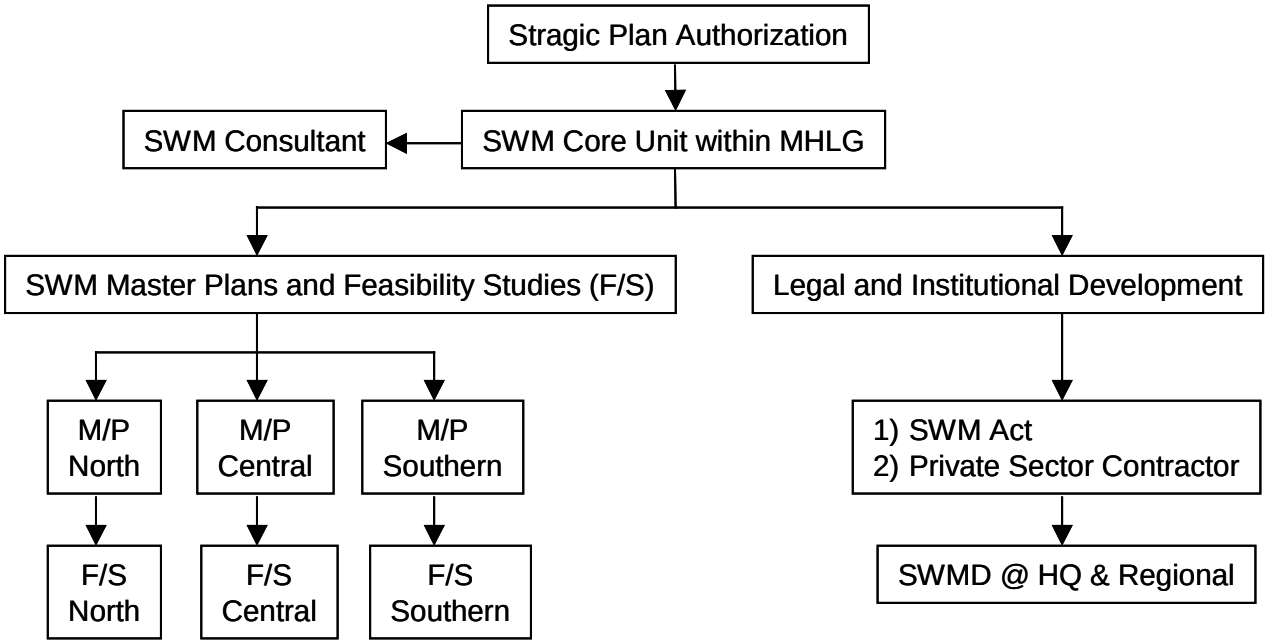
Part 3 – Supporting Infrastructure

7. Public Awareness & Education
8. Waste Reduction, Re-use and Recovery
9. Technical Training and Professional Development
10. Finance
11. Waste Database

Detailed descriptions of the activities required in each part and the time schedules for implementation have also been identified.

Part 1 comprises the immediate Action Plan, which should be implemented (within the first 10 months) as shown in the following **Figure 5.1**.

FIGURE 5.1: IMMEDIATE ACTION PLAN



6. RECOMMENDATIONS

The following is a summary of recommendations of the Strategic Plan and actions that need to be undertaken.

1) Set up the Core Unit within MHLG to launch the new SWM system	
The SP identifies the duties of the Core Unit in 2003 to be: (a) Prepare the SWM Act (b) Prepare the terms of reference for the Master Plan Studies	GOM needs to: (a) Set-up the Unit with clear objectives and a timeframe (b) Arrange the necessary budget for the Unit and the Master Plans
2) Finalize the SWM Act	
The SP proposes: (a) The required SWM institutional framework (b) Main responsibilities for SWM stakeholders (c) A set of related laws to support waste reduction and recycling and set environmental standards	GOM needs to: (a) Finalize the SWM Act (b) Study and develop forums for discussions on related laws to support waste reduction and recycling and environmental standards
3) Establish the Federal Government Agency responsible for SWM	
The SP: (a) Studied the two options of Department and Commission and opted for Department (b) Proposed the Department organisation and duties	GOM needs to: (a) Reach a final decision on the Department v/s Commission debate by considering duties outlined for the new agency (b) Prepare technically and administratively able government officers for this new agency
4) Develop the Master Plans for SWM	
The SP identified: (a) Waste generation amounts (b) SWM improvement targets (c) Technical principles and options (d) Facilities generic locations and scales (e) Contents of the required Master Plans	The GOM needs to develop the master plans that will include: (a) Alternatives for the SWM facilities (b) Facilities locations (c) Construction and O&M plans and costs studies (d) Prepare initial environmental studies
5) Resolve the most suitable form for SWM privatisation	
The SP: (a) Adopted GOM's decision to fully privatise collection services while subsidising SWM facilities (b) Set a target for complete privatisation of SWM and gradual application of polluter-pay-principle to be fully applicable by 2020 at the latest (c) Identified policy issues relevant to the roles of existing private haulers, companies involved in construction/ operation of various SWM facilities, and the mechanism for their interaction with the concessionaires and GOM under the concepts of "concession region" and "full privatisation"	GOM needs to make decisions on: (a) Finalise service contracts with collection concessionaires that allow for periodic evaluation of performance and hiring of other private haulers to ensure privatisation produces more cost efficient and better service level. (b) Allow private haulers to operate in some areas in order to avoid monopolies. (c) Encourage private companies to set up SWM facilities under BOT and BOO schemes provided proposed facilities are in line with Strategic Plan, M/P and tariff levels are reasonable (d) Develop the system for interaction between the different private operators

6) Prepare the GOM Intervention Budget	
The SP: (a) Estimated basic costs for SWM up to 2020 (b) Projected costs of Government intervention for CAPEX and OPEX of SWM facilities (c) Proposed a tariff strategy (d) Identified policy issues requiring GOM decisions such as adoption of flat rates, cross-subsidy by waste type, by region (by actual cost), and tipping fees	GOM needs to: (a) Prepare the required intervention budget (b) Carefully consider the tariffs proposed by the private sector in comparison with the basic costs estimated in the Strategic Plan (c) Guide interested private investors on SWM facilities in the desired direction (d) Take decisions to gradually adjust tax assessments to achieve full polluter-pay-principle by 2020 at the latest.
7) Improve Waste Generators' Awareness on SWM	
The SP: (a) Identified the messages that need to be incorporated in SWM public awareness campaigns ▪ Waste reduction and recycling, including source separation ▪ Costs associated with SWM ▪ Acceptance of SWM facilities requirements ▪ Acceptance of tariff levels (b) Proposed that education begin with school children and introduced "ISO 14000s for Kids" program	GOM needs to: (a) Intensify the message of the present public awareness campaigns (b) Develop various SWM competitions at different levels with support by the highest government levels (c) Involve communities, NGO's, schools and societies in these activities (d) Encourage the introduction of zero waste system based on ISO 14000 by manufacturers, and commercial and business establishments
8) Develop the waste database	
The SP: (a) Implemented a comprehensive questionnaire survey to state and local authorities with mixed results (b) Identified most of the available studies and reports on solid waste in Malaysia in the last few years (c) Prepared a GIS database which when built up may provide relevant information required by GOM officials (d) Proposed to submit annual operation records by all private service operators including concessionaires	GOM needs to: (a) Instruct State and Local authorities on standard formats to collect and arrange the waste information (b) Ensure that future SWM facilities are equipped to collect and analyse waste data (c) Operate and manage the GIS system
9) Technical Research & Development in SWM	
The SP: (a) Identified the extent of this activity in Malaysia at present (b) Raised some proposals on how to enhance R & D in Malaysia (c) Proposed areas where Malaysia may develop technologies and export them to other countries	GOM needs to: (a) Identify areas for R & D, such as Zero Waste, environmental standards related to SWM activities and local SWM plant and equipment production industry (b) Provide funding and research facilities (c) Cooperate with related academic circles

10) Safe Closure of Disposal Sites	
The SP has developed a plausible time frame for the safe closure of tentatively identified disposal sites.	GOM needs to implement the programme for safe closure of disposal sites in accordance with the guidelines to be developed in the ongoing JICA Study.
11) No more time to waste	
SP set the Action Plan	GOM needs to implement the Action Plan