Comparative study of solid waste management in Macedonia and Sweden

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Comparative study of solid waste (SW) management in Macedonia and Sweden - Revised draft report

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PROJECT BACKGROUND

Environmental protection has traditionally not been considered as a priority policy area in the Republic of Macedonia. Further considerable efforts are needed in order to comply with the EU acquis communitaire, for example within the filed of waste management. The state of the environment is lagging far behind EU standards.

The Swedish Environmental Protection Agency (Swedish EPA) has carried out a feasibility study on the development of bilateral environmental cooperation between Swedish EPA and the Republic of Macedonia /March 2007). Based on the information and assessments received during the feasibility study it was recommended that swedish EPA enter into cooperation with the Ministry of Environmental and Physical Planning, Republic of Macedonia (MoEPP).

A cooperation project was decided “Improved system for collection of municipal waste in Macedonia”. The outlines of the project was developed during the project developing phase (MA 711 MK). The design of the project is based on the outcome of the missions and background materials.

The project objective is improved conditions for developing a well functioning system for collection of municipal waste in Macedonia. The project will mainly focus on administrative issues concerning collection of municipal waste such as fees, organization, local regulations, planning, contracting, information etc. Key results are that the MoEPP and municipalities have clarified/better understanding and tools how to exercise their respective roles and initiated implementation of reforms towards EU standards.

This study is a part of that project, with the purpose to analyze and make recommendations on how the municipalities can improve their collection of municipal waste.

SUMMARY

Existing conditions

Solid waste management in Gostivar is governed by the the municipal waste company in Gostivar, PE Komunalec. The main activity of the Komunalec is to collect and transport the waste from houses and public areas in municipality and to dispose it at the disposal site in the municipality. No private waste enterprises are involved in waste management in Gostivar.

In total the company has around 18 000 customer, divided in approximately 16 000 houses and flats (30 % houses and 70 % flats) and 200 commercials and institutions. The total amount of household waste collected in Gostivar during 2007 was estimated to 47 450 m^3.

The SWM shall in principle be self financed without municipal subsidies. The municipality decides the fee, not the company. The fees are collected monthly directly from each household by ten collectors (also collecting water fees). Only about 50 % of the users pay the fees for waste. Budget in 2007 was 1,2 million Euros for both water supply and solid waste management, approximately 50% on each sector. During 2007 the cost for solid waste management was 900 000 Euros, but only 750 000 Euros came in as fees.

The solid waste is collected from the city area, the city settlements, suburbs and part of the nearby villages. 7-8 villages are not serviced due to lack of collection vehicles and limited ability to pay fees in these villages. Approx. 70 % of the total population of 81 000 in the municipality is serviced. Solid waste from schools is collected 2 times/week, and medical waste from the hospital daily.

Medical waste and infectious waste is not separated, all goes to landfill. The company provides different colour plastic bags to the hospital, but they don’t use them, and no separate collection is provided. This may be an institutional, financial or educational issue.

Komunalec has ten trucks for collecting solid waste. Five of these are operational, and the rest are broken-down and in too bad condition for repair. Two of the trucks in operation are from 2006, the other three are 20 – 30 years old and in great need of repair and maintenance. Normally only three trucks are in daily operation. In total 6-7 persons work with maintaining trucks and vehicles. The workshop facility appears inadequate both in equipment and in operation.

There is no separation or collecting of hazardous waste. Today all types of waste is mixed in the same bin or container. Some informal separation is probably taking place. Furthermore there are no facilities for treating hazardous waste in the region or country. Medical waste is mixed with other waste from the hospital and taken separately to the dumpsite and buried.

The special PET containers are collected by a private company and to some part by the municipality and are transported to the dumpsite where there is a bailing machine. Currently the collection of plastic bottles is 800 – 1000 kg per day.

Other than the PET plastic bottles there is no organized collection of sorted waste or material fractions. There is, however a fairly extensive informal sector operating within recycling. Scavengers collect paper, cardboard, metals, electric waste etc along the streets and sell to scrap yards or private companies.

All waste collected by Komunalec, except sorted plastic bottles, is transported to a dumpsite about 3 km from the city. At the dumpsite there is a bulldozer for spreading the waste, and a press- and baling machine for plastic bottles. No other treatment exists today. A newer site, Russino, is located approximately 5 km further away in a location where they used to collect clay. Today, only waste from a nearby municipality, Tetovar, is transported to the Russino site. As it seems there is no fee at this landfill for the other municipality. The Russino site has been proposed as one of the regional landfills in the national SWM plan.

As a part of the local SWM improvement, it is crucial to as soon as possible carry out the municipal solid waste master plan (required in the national SW plan) according to the requirements arising from the ongoing project.

The national SW planning process is supposed to include development of the Russino site, and Komunalec should secure that the planning of this site is addressing the local needs. If the national planning of sites is delayed, a local planning initiative related to the site are relevant.

Main recommendations

- Improve the environmental legislation and regulations through continuation of the ongoing efforts. Initially, requirements appropriate for Macedonian conditions should be considered, in light of the limited current financial, technical and institutional capacity.
- Implement the national SW master plan and execute all the local SWM master plans.
- Initiated and encourage intermunicipal/regional cooperation within SWM.
- Investigate if an organized separation and collection of the financially most feasible fractions could be introduced. Investigated, develop and encouraged domestic processing capacity. Financial support to recycling should be introduced through subsidies or environmental taxes on optional landfilling.
- Initiatives for treatment of hazardous waste should be investigated and encouraged.
- Identify and develop regional landfill sites up to an appropriate and environmentally acceptable level as soon as possible. In Gostivar it is most important to upgrade the Russino site. Site preparation, road repair and upgrade are crucial for the landfill operation. Together with this the existing dumpsite should be covered and close down.
- Manual door to door system for collecting fees should be phased out. More strict enforcement must be developed.
- Maintenance and service of the vehicles must be organized and be a part of the investment plan for the SWM in Gostivar.

1 BACKGROUND

1.1 Population and demographic structure

The current population in Macedonia is approx. 2,1 mill. With approx. 564 000 households, the average household consists of 3,7 people.

Approx. 58% of the population lives in urban areas in 37 cities.

There are a total of 84 municipalities, of which 22 are urban with more than 10 000 inhabitants.

Gostivar is a municipality located 50 km southwest of Skopje, with 81 000 inhabitants, divided in approx. 30 % flats and 70 % private houses.

In comparison, Sweden has a population of approx. 9,1 mill. in approx. 4,4 mill. households, averaging to 2,1 people/household. There are in total 290 municipalities.

In Borlänge there are 47 000 inhabitants, divided in approx 10 000 one family households, 14 000 households in apartments and 1000 summer houses.

1.2 Physical conditions

Macedonia is approx. 25 700 km2. The annual rainfall is between 500 and 750 mm, and average temperature is between 10 and 15 ˚C.

In comparison, Sweden has an area of approx. 450 000 km2, and colder and more humid climate, in average the rainfall is about 500 - 800 mm a year, and between 1000 – 1200 mm a year in the northwest mountains and the southwest parts of the country.

1.3 Infrastructure

The following picture shows the main infrastructure in Macedonia.

Figure 1 The main infrastructure in Macedonia

1.4 Economic conditions

According to official UN statistics from 2007, the specific GDP (Gross Domestic Production) figure was approx. 3 700 USD/capita, compared to approx. 49 900 USD/capita for Sweden. However, when using the country listing from 2007 from the World Bank the corresponding figures are 8500 usd/capita for Macedonia compared to 36400 USD/capita for Sweden. The reason for this substantial difference has not been investigated.

The unemployment figure is approx. 35%, which is relatively high. In Sweden it is approx. 6%.

The economic growth in Macedonia has been in the range of 4% per year the last years, in Sweden between 2 and 4 % annually.

1.5 Projections

The no. of inhabitants has increased modestly at approx. 0,4% pr. year the recent years. This trend is supposed to continue.

To estimate a future economic increase is difficult in the current situation; but 2-3% increase could be a realistic figure the first years.

In Sweden the inhabitants is increasing with less than 0,1 % per year and during the last 5 years the increase of the economy has been approx. 2 - 4 % annually.

These figures were estimated before the financial crises, and will most probably be affected by the ongoing crisis for a period ahead.

2 FACTS ON WASTE

2.1 Waste quantities

2.1.1 In Macedonia

According to Macedonian sources, in 2007 approx. 713.564,298 tons/year of municipal solid waste (MSW) was generated in Macedonia. This includes all the solid waste being generated in a municipality being natural for a municipal entity to collect, treat and dispose. As an average this gives 349 kg/capita annually. A portion of this was generated in rural areas with inadequate or no collection.

It is estimated that between 350 and 400 000 tons/year is being generated in more urban areas, requiring a collection, treatment and end disposal system at an initial stage. This results in an average

2.1.2 In Sweden and in the EU region

According to international statistics, the SWM generation pr. capita in 2005 was 574 kg/capita and year in average for 15 old EU- members and EFTA and 334 kg/capita and year in average for 12 new EU- members in eastern Europe.

The following figure illustrates the municipal solid waste generation in and treatment methods measured in kg/capita and year for most of the EU countries.

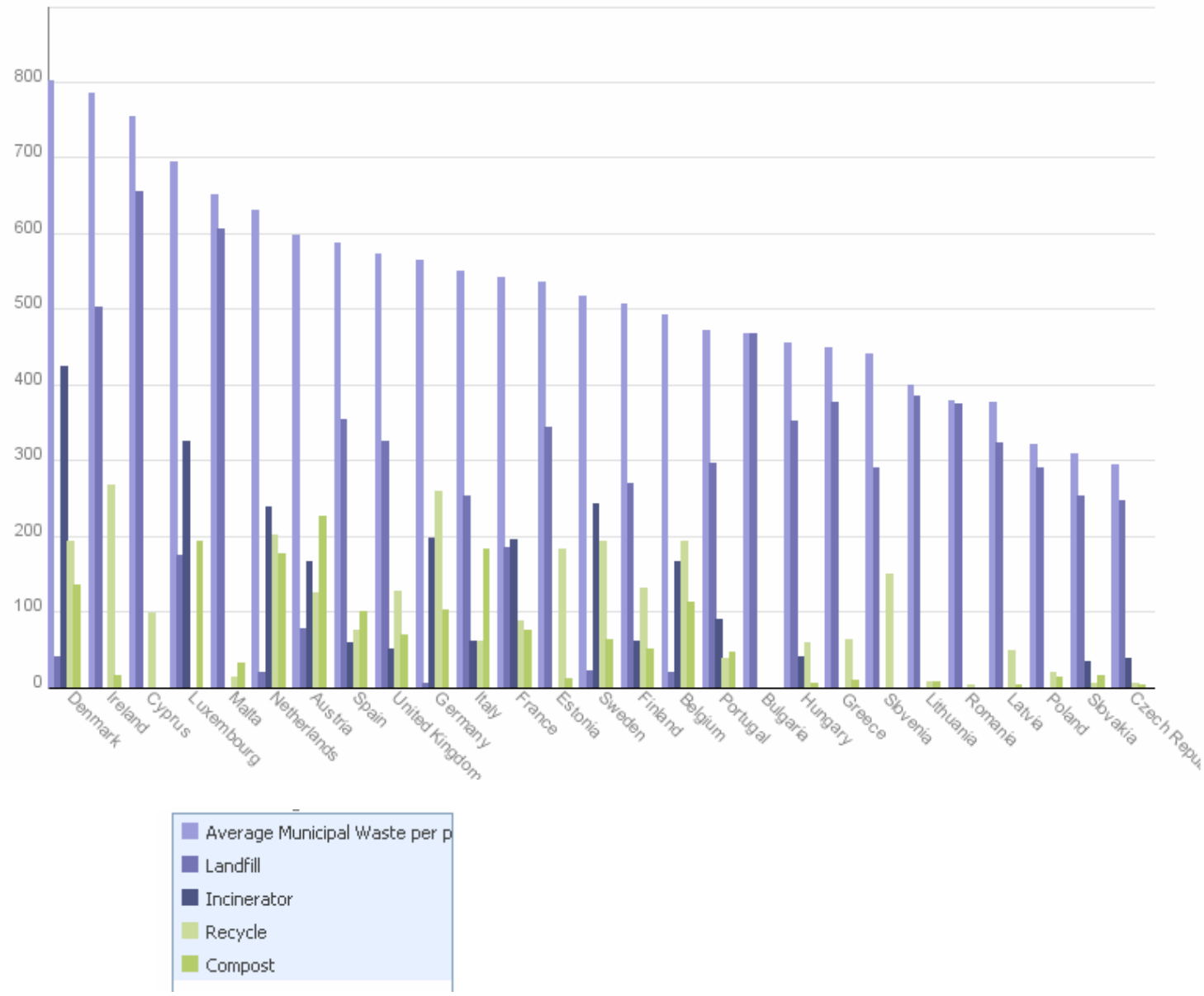

Figure 2 Municipal solid waste generation in and treatment methods measured in kg/capita and year for most of the EU countries

The estimated MSW generation of Macedonia above is well in accordance with the pattern in these figures.

In Sweden, a total of approx. 4,7 mill. tons of household waste was generated in 2007, which gives 514 kg/capita. This includes waste similar to household waste arising from institutions, shops, etc..

2.2 SW types

Municipal solid waste (MSW) is complex, both in terms of sources and the quality/composition. The figure below shows a breakdown, according to source and type, of the major waste streams included in MSW. In addition to the waste types indicated, also most waste sources generate some hazardous waste.

Municipal solid waste

- Household waste (HHW)
  - Large objects/bulky waste
  - Yard waste
  - Daily collected waste
- Commercial waste
  - Light waste (similar to HHW)
  - Food waste (from markets, etc)
  - Packaging waste
- Industrial waste
  - Light waste (similar to HHW)
  - Heavy/bulky waste
  - Industry-specific waste
- Institutional waste
  - Light waste (similar to HHW)
  - Medical waste
  - Infectious waste
- Hotel and restaurant waste
  - Light waste (similar to HHW)
  - Food waste
- Construction and demolition waste
  - Light waste (similar to HHW)
  - Wood waste
  - Inert materials
- Ship, harbor and airport waste
  - Light waste (similar to HHW)
  - Special waste (from customs etc)
  - Cargo spills
- Agricultural waste
  - Light waste (similar to HHW)
  - Organic waste
- Street waste and municipal cleansing waste
  - Street sweeping
  - Park waste
  - Gully and drainage cleaning
  - Manholes and fat trap sludge

Figure 3: Breakdown of the major waste types in MSW

(The waste types in dotted frames only partly enter the municipal waste stream.)

2.3 Waste characterisation

2.3.1 Macedonia

In general
The composition of municipal solid waste in general in Macedonia is approximately as follows, an as shown in figure 2. The waste from households can also be divided in fractions, as shown in figure 3. The figures vary depending on source.

Solid waste normally includes household waste, institutional waste, restaurant/hotel waste, office/commercial waste and some lighter fractions of waste from industries and enterprises. Approx 50-70 % of the waste quantities origins from households and the rest from commercial and other waste.

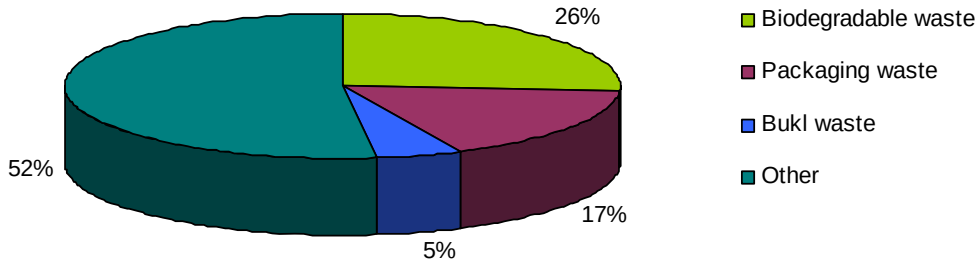

Figure 4
Composition of solid waste in Macedonia

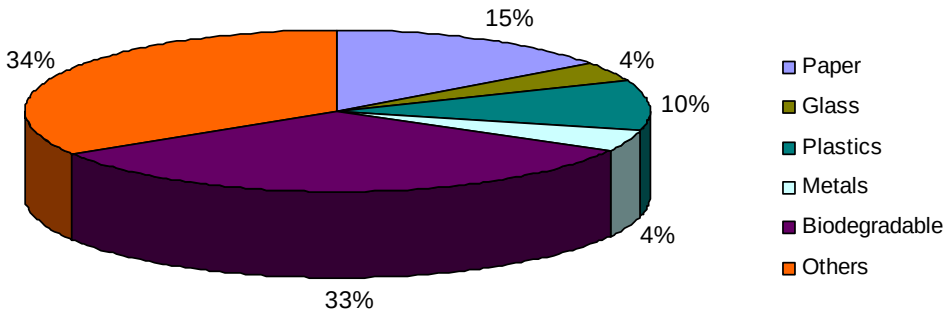

Figure 5
Composition of household waste in general in Macedonia

In Gostivar
According to information from Komunalec (the municipal waste company in Gostivar), the total amount of household waste collected in Gostivar during last year was estimated to 47 450 m3. The figures are an estimation based on approximately how many trucks are in use. The type and amount of waste collected in Gostivar shows below. There is no separate collection of all different kinds of waste shown below, consequently this is an estimation based on Komunalecs' experience.

Metal	470	m^3
Package waste	450	m^3
Glass	940	m^3
Plastic	4 770	m^3
Paper	2 375	m^3
Packaging paper	2 375	m^3
Cartridge	230	m^3
Agriculture waste [1)]	24 000	m^3
Construction waste	1 720	m^3
Electric waste	480	m^3
Chemicals, oil, colours	470	m^3
Medical waste	940	m^3
Animal waste	90	m^3
Garden waste (parks)	230	m^3
Waste from forests (wood)	230	m^3
Industrial mine waste	3 650	m^3
Sludge, ashes	4 030	m^3
Total - Municipal waste	47 450	m^3

1) The figure for agricultural waste is in real the same as biodegradable waste from households.

2.3.2 Sweden

Waste from regular waste collection (called "bagged waste" in Sweden) make up around half the quantity of household waste. The composition of this waste has altered substantially since the advent of sorting at source and recycling. Random analyses suggest that around 70 % of this mixed rest waste is biodegradable.

Household waste includes paper, cardboard, kitchen waste, packaging, glass, textiles, metal, wooden and plastic objects, electronic waste, garden waste, bulk waste, hazardous waste, latrine, sludge from septic tanks. However, latrine and sewage sludge are not included in the statistics, since they are normally sent to sewage treatment plants.

The following figure indicates the composition of household waste in general in Sweden.

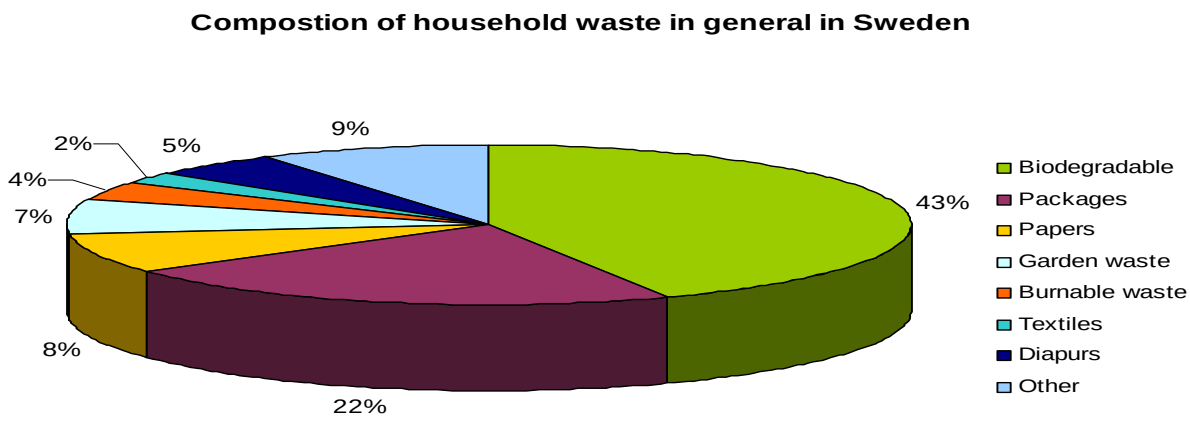

Figure 6

The system for collecting, transporting and recycling of material fractions paper, cardboard, glass, metals, plastics and wood is operated by branch organisations. The system is financed through deposit fees on new products. These organisations are also responsible for the import and production in general of the same fractions. The system includes material fractions in use for packaging only.

Borlänge
Waste managed by Borlänge Energi, year 2003 – 2007, is shown in figure 5.

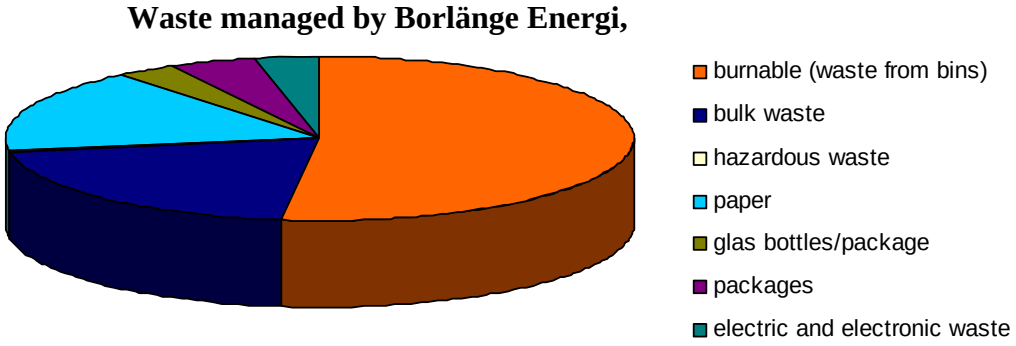

Figure 7

2.4 Projections

The MSW quantities to be handled will normally increase due to the following:

- increase in the population
- increase in the areas serviced by organised municipal collection and treatment
- increase in the specific MSW generation due to change in consumers practices and/or increase in economic status (GDP/capita)

Changes in consumption will generally effect specific waste streams/MSW generation, and surveys and statistics have indicated a clear connection/correlation between GDP/capita and MSW generation pr. capita. This particularly applies to the lower medium and medium income countries. The connection is rather linear; typically an increase in 500 % for a low GDP/capita may only result in some 70 % increase in MSW generation/capita.

The following figure indicates the connection some years ago:

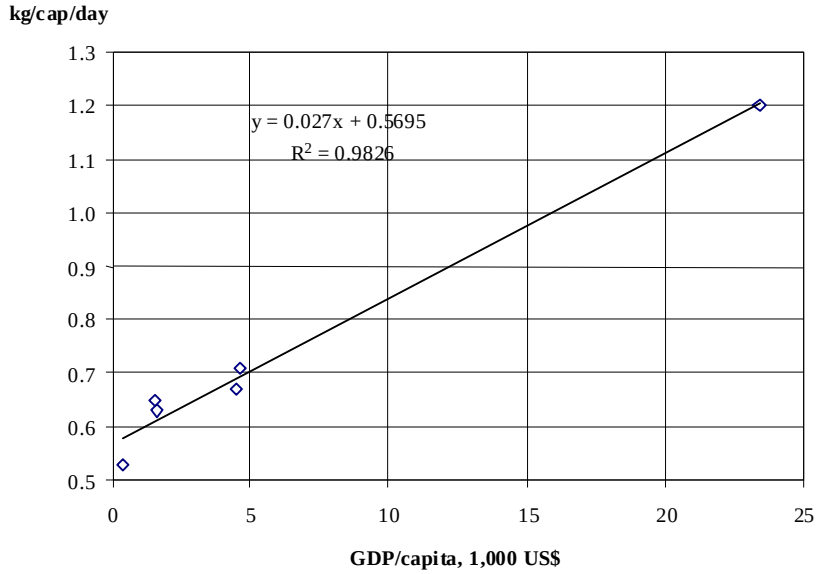

Figure 8 Connection/correlation between GDP and MSW generation (per capita)

The projections has been estimated for 2015 (short term) and 2030 (long term). The following has been estimated:

	2007	2015	2030
Population	2,1 mill.	2,2 mill.	2,3 mill.
Population to be served by municipal services (in urban areas)	1,6 mill (77%)	1,43 mill. (65%)	1,50 (75%)
GDP/capita in USD	3100	4400	7900
MSW generation in kg/capita and year - national average	260	310	390
MSW generation in kg/capita and year - in urban areas	300	360	480

GDP/capita is taken from UN statistic.

table 1 MSW projections for 2015 (short term) and 2030 (long term)

2.5 Existing MSW management in general

2.5.1 Macedonia

Collection
A wide range of systems are in use, from sophisticated compacting trucks combined with mechanical loading of specially designed modern SW bins to more simple systems using open trucks being loaded manually from open bins or bags/sacks along the street side.

Apparently, the most sophisticated systems with new equipment are financed through soft loan or grant packages from abroad.

Recycling
Recycling of materials is still in an initial phase in Macedonia. Most of the recycling is managed through local scrap yards, of which 135 are registered countrywide. There are approximately 100 unregistered scrap yards.

All of these recycle a selection of good quality paper, cardboard, metals and plastics. They also receive electrical and electronic waste for repair (and reselling) or metal recycling. The hazardous waste from these is not properly treated.

It is established a private system for car batteries, a factory in the east part of the country is handling 3200 tons/year.

Used oil is being processed and reused in a factory in Stip.

There is one large facility for processing and recycling of paper and cardboard in Skopje, which probably could handle at least a part of the potential quantities if improved schemes are introduced.

At several places PET-bottles are collected and recycled, via a program introduced and partly financed from abroad. This does currently only serve selected areas in the country. The collected PET-bottles are exported for further processing, melting and reuse.

There is one facility for processing and recycling of PE-plastics in Skopje, but in general, limited public collection schemes for plastic are in operation. Some plastic is collected at the scrap yards.

There is a deposit system in place for many types of glass bottles for washing and reuse. Currently there is no factory for processing, melting and recycling of glass.

In Skopje there is one small facility for composting garden waste from the municipality.

Treatment and disposal
Except for the recycling initiatives mentioned there are no treatment facilities for incineration or biological treatment (composting etc.) in the country.

The main treatment or more likely disposal is landfilling on dumpsites (uncontrolled location, preparation and operation) or uncontrolled or partly controlled landfills. 58 active municipal disposal sites exists; 4 with extremely high risk, 16 with high risk, 16 with middle risk and 19 with low risk. Only one Drisla is close to a controlled sanitary landfill standards. Up till now limited planning has been carried out for location for these sites. In addition there are 28 disposal sites for industrial waste within the generator's premises.

One incineration facility is located at the Drisla landfill. It is mainly for incinerating medical waste and is not suitable for incinerating other waste. There are problems with the operation and when it is out of order, medical waste is deposited at the landfill and covered. A new incinerator is going to be built, but the tendering process is delayed. In total in the country there are (much more than 4 in the medical institutions) autoclaves. It is not clear if they are in use and how much waste they treat.

Currently there are limited systems for centralised heat distribution in Macedonia, except for one in Skopje. Consequently, solid waste incineration must include cost for an additional heat distribution system. In Skopje there are some system with pipes and connections but no incineration plant connected.

Main problems with existing disposal facilities are:

- The landfills/dumpsites do not comply with the EU standards, even for Drisla
- Incinerator needs gas cleaning and upgrading
- Composting technologies applied are only suitable for garden waste and have inadequate treatment capacity

2.5.2 Sweden

Collection
Household waste that is not included in material fractions subject to producer responsibility is collected by municipalities themselves or by their contractors. Bulky household waste, electrical and electronic waste, and hazardous waste is often taken to municipal recycling stations. Other types of waste, such as packaging, newspapers, glass, metal, plastics and batteries, are collected from recycling stations or smaller collection points in residential areas. This collection is organised by the producers. Municipalities increasingly arrange separate collection of food waste from the households.

Hazardous waste collection methods vary municipality to another. Most common is collection via so-called environmental stations, located at e.g. petrol stations. Hazardous waste is also collected at recycling centres and from boxes left at the gate (property close collection). Producers and municipalities assume joint responsibility for end-of-life electrical and electronic products (WEEE), which must be taken to

municipal recycling centres or in some cases, shops selling electrical goods collect such waste voluntarily.

Household hazardous waste must be taken to this special collection stations, spent batteries can be placed in one of numerous collection boxes or in shops.

Treatment and disposal of household waste

About 50 % of the household waste is recycled (material recovery and biological treatment) and approx. 45 % goes to incineration with energy recovery. Consequently, around 95 % of the household waste is recycled in some way, and less than 5 % of the waste goes to landfill (This is probably a realistic minimum, given the current composition and treatment technology). Less then 1 % is hazardous waste which requires special treatment.

The amount of recovered waste has increased considerably during the last 10 – 15 years. Incineration and material recycling in particular as well as biological treatment have increased sharply in recent years (see fig. 7). Biological treatment still accounts for a small proportion, but is expected to increase. Waste to landfill has more than halved between 1994 and 2004. Industrial waste is now the predominant kind of waste in the landfills.

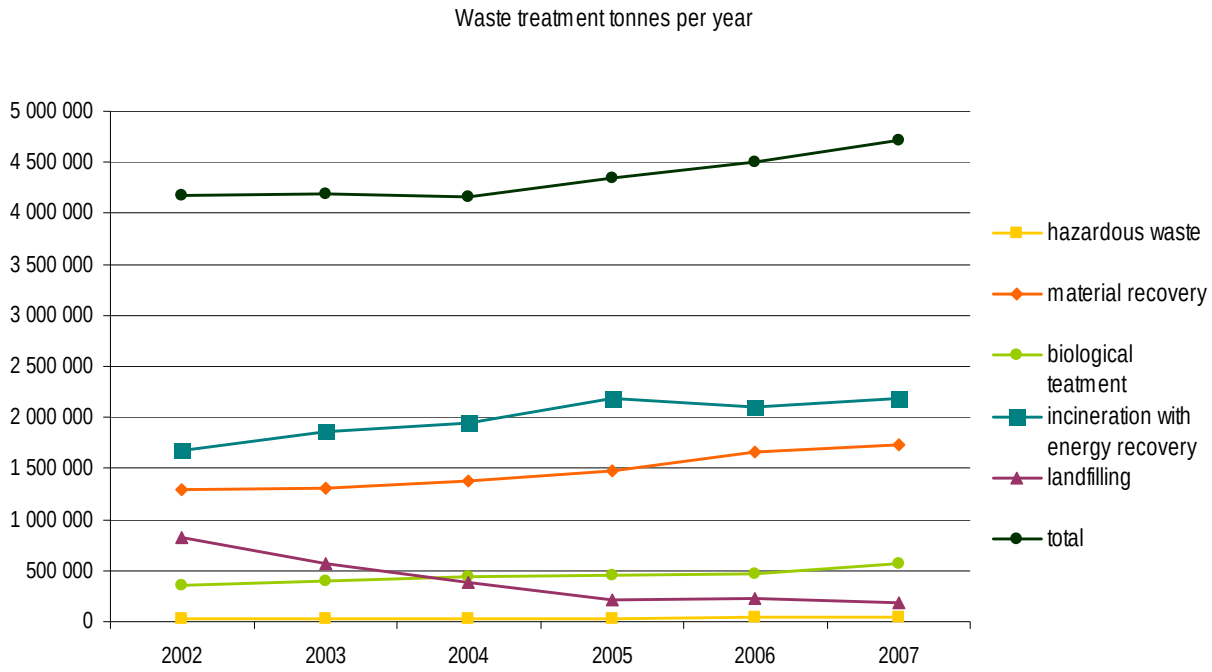

Figure 9 Treatment of household waste in Sweden 2002-2007

2.6 Hazardous waste management

Some of the characteristics that distinguish hazardous waste are that they may be toxic, carcinogenic, corrosive, harmful to foetuses, ecotoxic, infectious or inflammable. The hazardous substances may exist in very small amounts in different products, but together they can cause tremendous damage if they are wrongly disposed of. It is therefore important that hazardous waste is sorted out and handed over in the right way.

2.6.1 Macedonia

Except for car batteries, no organised secure separation or collection of chemical hazardous waste currently exists in the municipalities. In general all hazardous waste from households goes to landfills, some informal separation is probably carried out.

Today about 1000 tonnes of hazardous medical waste is generated per year.

Medical waste should go to incineration at Drisla, but the process is frequently not working at the moment, so medical waste is being disposed (buried down) in the landfill. The incinerator used to take care of about 350 – 400 tonnes per year of hazardous medical, and about 600 tones per year were disposed on the municipal landfills.

In the future one possibility could be to use cement factory for incineration of suitable types of hazardous and medical waste. Normally, this mainly requires a separate feeding system into the kiln, with limited or no revisions of the kiln itself.

A tender is out for a national incinerator for infectious waste (and for old medicines) located on Drisla. Capacity will be 500 kg/hour and planned combustion temperature is 1500 ^{o}C. The tender process is currently delayed.

In some places electrical and electronic waste is collected by companies, who separate the plastic and sell it. In the new regulation there will be some sort of fee on new electrical and electronic goods.

2.6.2 Sweden

In 2007, 40 000 tonnes of hazardous waste was collected from households, an average of 4.5 kg per person. Included in this amount are lead batteries, small batteries and impregnated wood, a fraction of hazardous waste that has increased noticeably in recent years.

Households are required to sort out their hazardous waste from other household waste. Municipalities are responsible for collection, transportation and treatment of hazardous waste from households. The responsibility is regulated by the Swedish Environmental Code, (SFS 1998:808), the Waste Ordinance (SFS), the Waste directive and the Municipal refuse collection directives.

Hazardous waste that is deposited at storage or treatment facilities must often be pre-treated in order to simplify the subsequent treatment. Since hazardous waste may contain substances that are to be phased out of circulation, the treatment often involves destroying these substances. The substances that cannot be rendered harmlessly or reused are landfilled at designated landfills. It is important that the waste is chemically and physically stable so that hazardous substances do not leak into the surrounding area.

New technology and legislation is expected to reduce the amount of hazardous waste further and increase the proportion that is utilised for material recycling. Incineration and secure landfill continue to be the most common treatment methods for hazardous waste.

2.7 Formal planning status and requirements

2.7.1 Macedonia

Overall situation

The MoEPP has the main responsibility for preparing and adopting all legal instruments to complete full transposition and implementation of the waste management directives. The transposition of the Waste Framework Directive is under way and not yet fully achieved.

For the first time, general waste management policy in the Republic of Macedonia was defined with the adoption of the National Environmental Action Plan (NEAP) in 1996, which included the detailed analysis of the status of waste management. Since than, for the purpose of implementing the general waste management policy, several planning documents have been developed, and others are being drafted.

A Strategy for waste management was adopted in 2008 and National Waste Management Plan (NWMP) was prepared in 2008, too, although this has not been adopted and still remains unpublished. The plan has been prepared by Hydro Engineering from Slovenia. The NWMP includes plans for new regional landfills and closure/rehabilitation plans for the existing dumpsites.

All municipalities are requested to prepare local solid waste master plans within approx. 1 year from 2008, but no standardised structure or content for local solid waste master plans has been provided. Currently, MoEPP is preparing a guiding manual for such master plans, assisted by the Swedish EPA.

All municipalities are to follow the national law, sub laws and regulations, and local SWM regulations currently do not exists.

National solid waste management plan (SWMP)

In the national strategy a network of 5-7 regional landfills is being planned. The plan is to implement this in 2009-2010. No sites have currently been formally selected, consequently the implementation may be delayed.
Of the proposed/identified sites, 2 were in old clay mines, 2 were extension of existing sites and 2 were potential problem sites due to unfavourable site conditions.

1 of the identified sites in clay mines is in Gostivar.

The SWMP includes cost estimates for establishing new landfill sites and closing down and rehabilitation of the former dumpsites. The investments for the regional landfills are to be covered by the government.

Responsibilities within SWMP

The Waste Management Strategy reflects the national policy in waste management and represents the basis for preparation and implementation of an integrated and cost-effective waste management system. The national SWMP defines the fundamental directions in waste management for the coming twelve year period (2008-2020).

According to this plan:

"All members of a society shall take corresponding responsibility of waste because they appear as holders and producers of waste in three contradictory roles:

- *taking care of the quality of the environment, health and quality of life particularly for the coming generations on both a global and local level,*
- *generating waste and polluting the environment in daily activities and*
- *consuming of goods and services."*

2.7.2 Sweden

EU decisions set the framework for Swedish waste management. The Parliament's environmental objectives provide the overall, governing objectives for the environmental aspect of waste management.

The national environmental objectives
Waste management has a bearing on many of the environmental objectives, although *A Good Built Environment, Reduced Climate Impact* and *A Non- Toxic Environment* are of most importance. There are a number of interim targets under the Good Built Environment objective. These mainly address waste as a resource conservation issue, and require resources to be returned to natural cycles.

National solid waste management plan (SWMP)
The aims of Swedish waste management are that:

"The total quantity of waste should not increase, and the maximum possible use should be made of the resource that waste represents, while at the same time minimising the impact on, and risk to, health and environment."

Although progress has been made over the last ten years, there is still plenty of scope for improvement. According to the SWMP, the following areas must be given priority if the overall goals for waste management are to be achieved.

- Implement the regulations and use the instruments decided on, and monitor progress to ensure they achieve the desired effect
- Place greater emphasis on reducing the quantity of waste and the hazard it poses
- Improve knowledge about pollutants
- It must be easy for households to sort their waste
- Develop Swedish participation in EU work in the waste management field

Municipal solid waste management planning
Since 1991 all municipalities have to have a waste plan covering all types of waste, specifying the measures needed to deal with it in a sustainable, resource-efficient way. Waste plans often include targets and strategies for various waste flows, although they usually focus on household waste, since this is the type of waste they are formally responsible for.

Waste planning means that municipalities have assumed wide-ranging responsibility for improving management of household and hazardous waste. For example, many municipalities have developed comprehensive systems for source separation and recycling of various types of waste. Continued municipal waste planning is important to support local waste management, efforts to achieve the national environmental objectives and to complement national and regional waste planning. The municipalities are normally responsible for the updating of the plans at certain intervals, with the support of the Swedish EPA through guidelines.

3 EXISTING MANAGEMENT STRUCTURE AND ORGANISATION

3.1 Macedonia

In principle, the municipality has monopoly on collection and treatment of household waste, while enterprises and institutions are free to select their own SW collector. Public-private cooperation is being encouraged within SWM.

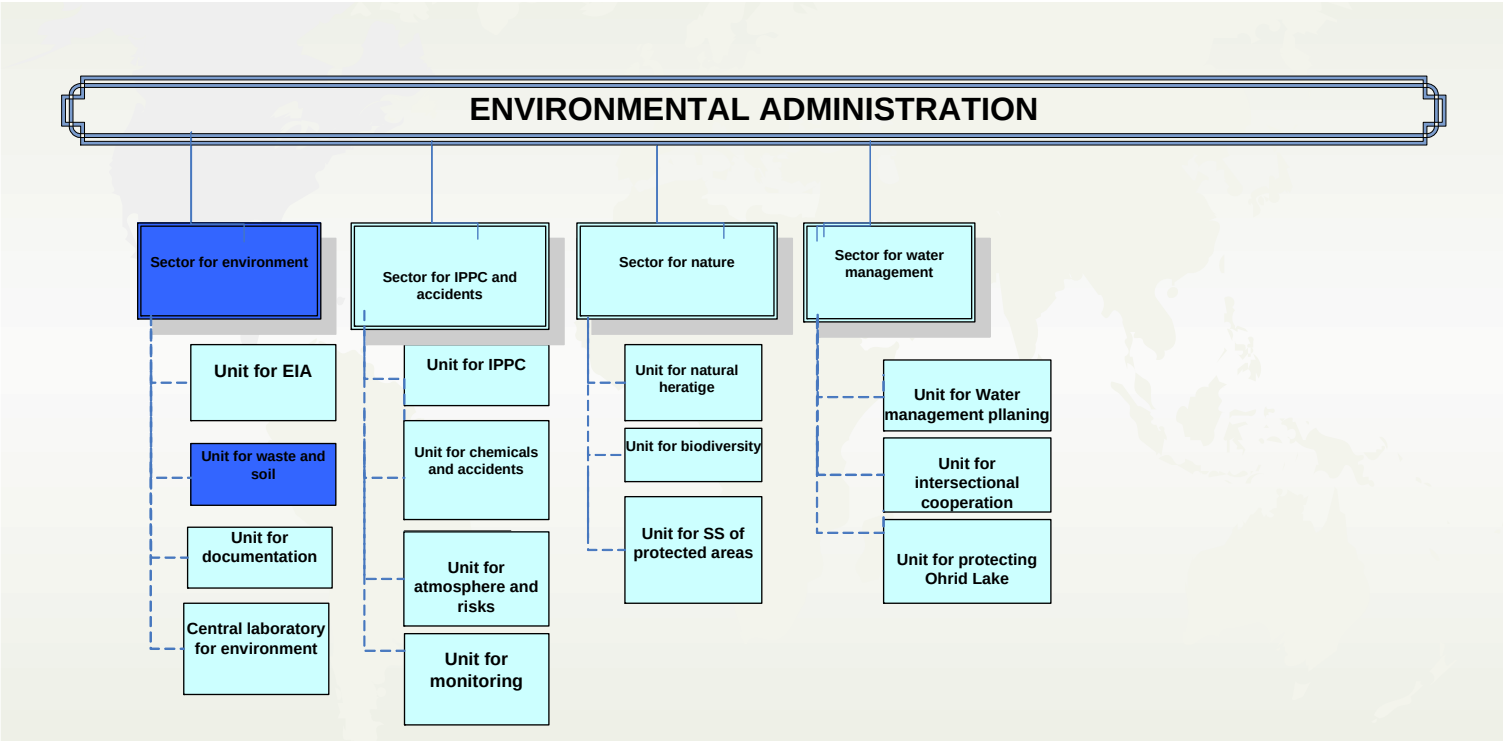

Figure 10 Organisational scheme of waste management at the department of environment MoEPP in Macedonia.

Each municipality shall in principle have a minimum of three positions within environmental management (including waste management) according to national requirements.

There is a large informal sector within SWM through scrap yards, street side collectors, scavengers at landfills etc..

3.2 Sweden

The responsibility for Swedish waste management can be divided into the following categories of players.

Waste owners
Anyone generating waste is responsible for ensuring that it is dealt with in accordance with current regulations. This applies both to private individuals and to commercial operators.

Anyone generating household waste or waste of similar characteristics is obliged to sort their waste according to the instructions of the municipality and deliver each type of waste and fraction to the designated collection points.

Generators of commercial and industrial waste are free to select a contractor to collect and treat their waste, but must secure that the waste is managed according to national waste requirements and regulations.

Producers
Sweden has producer responsibility for end-of-life packaging, cars (ELV), tyres, recycled paper and electrical and electronic products (WEEE) and batteries. Anyone manufacturing or importing such products is responsible for that it is collected, processed and recycled. The aim is to give producers an incentive to reduce waste quantities and ensure that "their" waste is less hazardous and easier to recycle.

Voluntary commitments have also been made by the office paper, construction waste and agricultural plastics sectors.

Municipalities
Sweden's 290 municipalities are responsible for collecting and disposing of household waste, except for the product categories (material fractions) covered by producer responsibility. Swedish municipalities have an additional responsibility to draw up municipal public cleansing procedures and a waste plan. Municipal waste management is financed by fees paid by individual property owners, not via municipal tax. The municipalities also exercise regulatory control in most cases, except for certain large scale facilities, which are regulated by the county administrative boards.

The municipalities may decide themselves how they wish to organise their waste management. The right to municipal autonomy exists in the Swedish local government act.

County administrative boards
The 21 county administrative boards are the permit-issuing authorities for the majority of operations. A limited number of large facilities are granted permits by the environmental courts. Alongside a certain amount of regulatory activities, the boards also guide municipalities on regulatory issues. Moreover, county administrative boards are responsible for regional waste planning, which includes monitoring available capacity.

Swedish EPA
The Swedish Environmental Protection Agency is the central environmental authority, acting as a driving force and coordinator in environmental policy and protection. The agency produces regulations, general guidelines and other guidance, including regulatory guidance. It is also a stakeholder with an environmental agenda in conjunction with permit applications under the Environmental Code. Additionally, the agency supports the Government in EU environmental policy and protection.

The environmental courts and the Environmental Court of Appeal
The environmental courts issue permits for a number of large industrial facilities and hear appeals of decisions made by other authorities. There are five environmental courts at various locations in Sweden.

3.3 Organisation and responsibilities for public/political management of municipalities

3.3.1 Gostivar

Solid waste management in Gostivar is governed by the PE Komunalec and is organised by the Board, the director of the Komunalec and the manager of the Komunalec.

The total number of employees in the company is 78 persons. From this about 59 persons is involved in collecting the waste, four at the workshop/depot, one at the dumpsite, four to five in administrations and around ten persons collecting municipal fees.

The main activity of the Komunalec is to collect and transport the waste from houses and public areas in municipality and to dispose it at the disposal site in the municipality..

No private waste enterprises are involved in waste management in Gostivar.

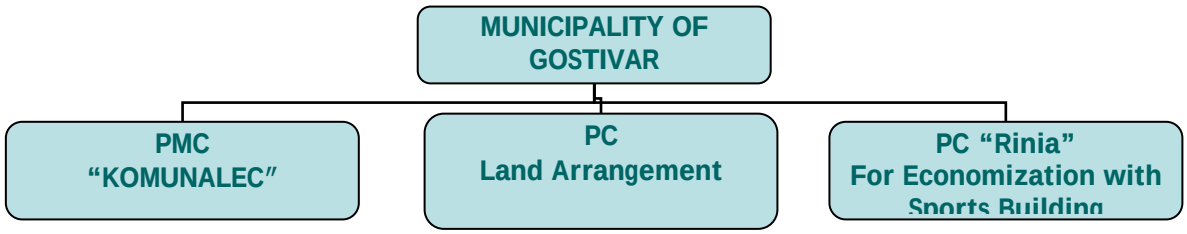

Figure 11 Organisation scheme for the waste management in Gostivar, where the Komunalec is the waste company.

3.3.2 Borlänge

In principle, the organisation of SWM in Borlänge is quite similar to Gostivar. In Borlänge the SWM is organised by Borlänge Energi, a company owned by the municipality. The board of the company consists of politicians from the municipality.

There is a director of the company and a manager of the SWM part. Toady there is 220 employees in total. Apart from waste management Borlänge Energi is also responsible for sewage, energy production, parks, heating etc. Around 25 persons are working with solid waste management
Borlänge Energi provides the waste collection and transportation from the households. They also provide management and operation of the landfills and the regional incineration facility.

Dala specialavfall is owned by both a private waste company and 13 municipalities in Dalarna. The company deals with hazardous waste, by providing collection stations and service and also treatment and transportation to other facilities for hazardous waste.

There is an organisation for all the municipalities in Dalarna region, Dala Avfall, which aim is to provide cooperation within some SWM sectors between the municipalities and to make basic guidelines for SWM plans that can be used in every municipality.

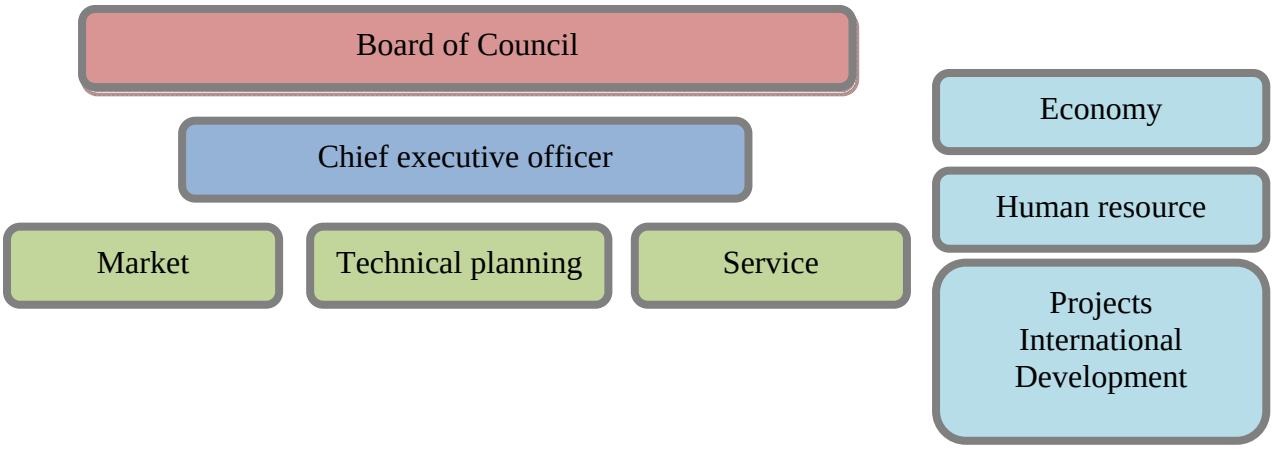

Figure 12 ***Organizational scheme from Borlänge***

Incentives of the Municipality
The municipality can use different incentives to bring the waste management in right direction:

- Solid waste management plan (SWMP) with information about the all the waste in the municipality, both from household and others. The SWMP shall also report aims and measures for collection and treatment and information about how hazardous waste can be reduces in both quantities and toxic.
- Local regulations, this is where the municipality can point out special regulation to the waste generators, rules fort household composting, type of bins that must be used etc.
- Waste fee. The municipality can use this as an economic incentive to achieve the aims in the SWMP.
- Information plays an important role in the work of the municipality to achieve awareness from the inhabitants. Good information, motivation and promotion

is a key to good sorting of the waste, which is necessary for a system with different kinds of treatment and recycling.

4 COSTS, FEES AND TAXES

4.1 Gostivar

Fee level and structure is decided by the municipalities. The SWM shall in principle be self financed without municipal subsidies. The municipality decides the fee, not the company.

Fee levels for households and enterprises depend on size of house and yard, not on no. of members in the household or no. of employees. Currently, the fees are as follow:

- 4 euro/month for small flats
- Up to 10 euro/month for large individual houses.
- Different fee level for commercial enterprises
- Fees for commercial enterprises are based on area of the building/premises served.

In total the company has around 18 000 customer, divided in approximately 16 000 houses and flats (30 % houses and 70 % flats) and 200 commercials and institutions.

The fees are collected monthly directly from each household by ten collectors (also collecting water fees).

There is no diversion in fees according to service level only related to the size of the house. Households with individual curbside collection pay the same as households using communal containers.

There are separate bills for water and waste. Only about 50 % of the users pay the fees for waste, the same with the water bills. Low willingness to pay among the citizens and inadequate enforcement actions are the main reasons. This makes it hard for the Komunalec to recover the costs for waste collection and treatment, not to mention information and waste planning. The company are working with remainders and warnings, it can be connecting the payment of solid waste bills to getting municipal permits for example for construction, ultimately the company can use the court

Budget in 2007 was 1,2 million Euros for both water supply and solid waste management, approximately 50% on each sector. Of this around 100 000 Euros was subsidies from the municipality. During 2007 the cost for solid waste management was 900 000 Euros, but only 750 000 Euros came in as fees. Remaining 150 000 Euros were cross-subsidised from the water sector. Together with this the company also pays large sums for old loans, which makes a tough financial situation.

4.2 Borlänge

In Sweden municipal waste management is financed by fees paid by individual property owners and not by taxes. It is the municipality council that decides the waste fee. The fee must include the costs for administration, waste management planning, custom service, future funds, information, service at the recycling stations, etc. This is usually covered by the so called basic fee, everyone pays the same. A part of the fee is depending on how much waste that is produced, that part shall cover the costs for collecting and treating the waste. The system must be financially in balance without profits or annual losses.

The cost for the producer's responsibility is paid by the buyers of the products. The producers decide the fee and then it is enclosed in the total price of the product.

In general a household in Sweden pays 1940 SEK (179 EUR) per year as an average waste fee (2007).

Different treatment has different costs as shown below. (1 EUR = 10,82 SEK)

EUR/tonnes	2003	2004	2005	2006	2007
Landfill	65-111	65-111	65-111	65-111	65-111
Incineration	38-46	38-55	38-55	46-92	46-92
Biological treatment	37-92	37-92	37-55	37-65	37-74

table 2 Treatment and disposal costs in Sweden

In Borlänge the average fee for a one family household is for normal service 1750 SEK (162 EUR) a year. The municipality will provide two bins, one 190 l bin for combustible waste and one 130 l bin for biological waste. Normally the bins are collected every second week.

If the household decides to have their own compost for the biological waste, the municipality only collects the bin for burnable waste and the fee is reduced to 1342 SEK (124 EUR) a year.

Even if a household don't produce any waste there is a basic fee, of 625 SEK (58 EUR) a year.

5 EXISTING COLLECTION, RECYCLING, TREATMENT AND DISPOSAL OF MSW

5.1 Gostivar

5.1.1 Collection

The solid waste is collected from the city area, the city settlements, suburbs and part of the nearby villages. 7-8 villages are not serviced due to lack of collection vehicles and limited ability to pay fees in these villages. Approx. 70 % of the total population of 81 000 in the municipality is serviced.

The responsibility is divided in three zones.

- First zone: the central area, waste is collected seven days a week. For collection containers of 5 m3 and 1.1 m3 is used.
- Second zone: the wider city area, waste is collected four days a week. For collection containers of 5 m3 and 1,1 m3 is used.
- Third zone: the suburbs, waste is collected twice a week. No special bins are provided from the municipality.

The Komunalec provides the bins for household waste collection in public places, normally 1,1 m^3 and 5 m^3 containers, both plastic and metal in fairly good condition. There are some problems with fires in the plastic containers, consequently the company currently preferred metal containers. In addition a large number of smaller bins (25-120 l) are in use, mostly for commercial enterprises, but also for single houses. Smaller containers for single houses are more costly to collect than larger public containers.

They also provide the containers for the plastic bottles. In total there are containers in 7 locations for collecting plastic bottles.

Bins and containers used for solid waste in Gostivar:

Containers 5 m3	10	pieces
Containers 1,1 m3	170	pieces
Eco-containers	15	pieces
Bins 25 l	1 200	pieces
Bins 50 l	1 100	pieces
Bins 60 l	4 500	pieces
Bins 80 l	8 240	pieces
Bins 120 l	1 800	pieces
Plastic bags	10 000	pieces
Other equipment	1 500	pieces

Individual houses may have curbside collection outside the house, but must provide their own bins/receptacles or leave their waste outside on collection time in bags etc..

Solid waste from schools is collected 2 times/week, and medical waste from the hospital daily.

Medical waste and infectious waste is not separated, all goes to landfill. The company provides different coloured plastic bags to the hospital, but they don't use it, and no separate collection is provided. This may be an institutional, financial or educational issue.

Komunalec has ten trucks for collecting solid waste. Five of these are working, and the rest of them are broken down and in too bad condition for repair. Two of the trucks are from 2006, the other three are 20 – 30 years old and in great need of repair and maintenance. Normally only three trucks are in daily operation. All the trucks are compacting trucks with loading equipment for containers. With every truck come 3 – 4 persons collecting the bins.
The tough workload on the operative trucks leaves limited time for maintenance. The Komunalec has two simple workshop bays, also serving other municipal vehicles like fire trucks, water vehicles etc. In total 6-7 persons work with maintaining trucks and vehicles. The workshop facility appears inadequate both in equipment and in operation.

5.1.2 Hazardous waste

There is no separation or collecting of hazardous waste. Today all types of waste is mixed in the same bin or container. Some informal separation is probably taking place. Furthermore there are no facilities for treating hazardous waste in the region or country.

The disposal of hazardous waste from the activity of the scrap yards is uncertain.

In Gostivar there are no large industries generating hazardous waste.

Medical waste is mixed with other waste from the hospital and taken separately to the dumpsite and buried, according to Komunalec.

5.1.3 Recycling

The special PET containers are collected by a private company and to some part by the municipality and are transported to the dumpsite where there is a bailing machine. The plastic material is then sold to private companies for recycling. Currently the collection of plastic bottles is 800 – 1000 kg per day.

Other than the PET plastic bottles there is no organised collection of sorted waste or material fractions. There is, however a fairly extensive informal sector operating within recycling. Scavengers collect paper, cardboard, metals, electric waste etc along the streets and sell to scrap yards or private companies. Several scrap yards is receiving many different fractions of solid waste for recycling. If it is possible objects, like electronic products, are being repaired, and if beyond reparation usable materials

and components are sorted out. Also cars are normally recycled at the scrap yards. Engine, oil, tyres, metals etc are sorted out and recycled.

5.1.4 Disposal

All waste collected by Komunalec, except sorted plastic bottles, is transported to a dumpsite about 3 km from the city.

At the dumpsite there is a bulldozer for spreading the waste, and a press- and bailing machine for plastic bottles. No other treatment exists today.

The capacity of the dumpsite is around 750 000 m3. A scavenger community exists at the dumpsite.
The location is in a limestone valley some 50 - 100 m above the city. There is no geological barrier or system for drainage and leaching water and no infrastructure or organised compacting/cover operation exist at the dumpsite. Consequently the ground and ground water are being polluted and since it is close to the city there are periods with smell problems. Continuous burning of waste occurs at the dumpsite.

The old landfill, beside the one that is in use today, is poorly covered and with slopes so steep that light material is often washed out or blown away. The slopes also make a proper capping difficult.

A newer site, Russino, is located approximately 5 km further away in a location where they used to collect clay. This site is more suitable for landfill because of bottom clay layer, adequate topography and isolated location. Currently large potential volumes are available at the new site. One problem is the road, which is partly in bad condition with some steep sections. However, these sections are limited. The main reason for Komunalec not using the newer site is concern of the time and wear and tear, when the limited available trucks are going up there.

Today, only waste from a nearby municipality, Tetovar, is transported to the Russino site. As it seems there is no fee at this landfill for the other municipality.

The Russino site has been proposed as one of the regional landfills in the national SWM plan.

5.2 Borlänge

All the households in Borlänge have two different bins; one 190 L bin for combustible waste and one 130 L bin for biological/organic waste. In general the bins are collected every second week. If the household ask for it, the collection can be more often or more seldom, the latter do require that the household is doing their own composting. I general Borlänge Eneryg collects 5 000 bins a day, taking care of combustible and organic waste from the households. In the same way waste is also collected from all the municipality facilities like schools, etc.

Hazardous waste is together with bulky waste, electrical and electronic waste, sorted out by the households and then brought to the recycling centres. Normally, there is one recycling centre in each municipality. Hazardous waste can be collected by BE at the doorstep if the household ask for it.

Package waste, paper, glass are sorted out by the households and brought to approx. 30 small recycling stations/points throughout the municipalities. The producers are responsible for collection and treatment of these fractions.

6 PROCUREMENT AND TENDERING - CONDITIONS

6.1 Existing conditions in Macedonia

A very detailed and extensive law on public procurement has been implemented. The law has been prepared with a key focus on harmonization with the relevant European Union laws. If this law is fully and in all details adapted to EU legislation on the same matters has not been clarified.

For small contracts below 20 000 Euros, simplified competitive procedures are adequate. Public service contracts above 20 000 Euros are subject to more strict requirements, but may be carried out domestically. National regulations require international publishing and tendering when contract values are estimated to be more than 0,5 mill. Euros for supply and services and 2,0 mill. Euros for works.

Consequently, in principle tenders shall be carried out for collection and treatment, but no national regulation nor guidelines have been proposed or encouraged on the durance of contracts and size of tender area.

Contracts where funds from international organisations or third countries are provided are exempted from this requirement. The same apply to contracts as a part of international agreements in joint implementation.

6.2 Existing conditions in Sweden

The Swedish system is fully in accordance with EU requirements. The EU competition rules apply as Swedish law in parallel to Swedish competition legislation. If a restriction on competition has effects on trade within Sweden, the Swedish Competition Act is applicable.

EU regulations require international publishing and tendering when contract values are estimated to be more than 0,2 mill. Euros for services and 5,0 mill. Euros for works.

For smaller contracts, under 0,2 mill Euros it is possible to use an informal procedure which could be a direct award without prior contract notice.

A common kind of contract used by municipalities is framework agreement, which can be used for smaller contracts.

Agreements between undertakings operating only on the Swedish market can also be examined under the EU competition rules if they e.g. hinder imports.

EU cases are handled and decided on by the European Commission. Decisions can be appealed to the Court of First Instance. The European Court of Justice is the final court of appeal.

6.3 Future system

It is recommended that the existing system is followed initially and gradually adapted to EU requirements when conditions are suitable.

7 SOLID WASTE CHALLENGES

7.1 Macedonia

7.1.1 In general

In the current situation, Macedonia has solid waste challenges being very common for countries in a transition period from one level of development to higher levels. The main problems are divided in some key sectors:

- Lack of adequate financing of upgraded SWM, mainly due to limited ability to pay fees in the society, both in the households and in the national and local authorities and entities. However, the potentials for achieving maximum payments through an optimal fee structure may not be fully utilized.
- Lack of adequate legal instruments at local, regional and national level.
- Lack of institutional capability and capacity at local, regional and national level to develop and support an modern and cost-effective SWM
- Lack of awareness in the society and in the system of the potential problems with inadequate SWM.
- Ineffective collection system, partly due to inadequate financing, but also due to lack of organized planning.
- Lack of sufficient enforcement possibilities, resources and instruments.
- Lack of adequate treatment and disposal system for environmentally safe handling of municipal and hazardous waste

In the following sections, some specific challenges related to various SWM areas have been listed.

7.1.2 Fees and financing

- Financial difficulties for many stakeholders to fulfill the task given by the law.
- Inadequate financing of a modern SWM system, particularly of larger investments (like a landfill and trucks)
- No or very low treatment/disposal fees
- No environmental taxes to finance activities within SWM

7.1.3 Legal and institutional conditions, including enforcement

- Currently, the national SW strategy has not been implemented
- The national authorities and agencies do not have sufficient institutional capacity
- Many municipalities do not have institutional capacity and capability to properly plan and organize the SWM
- It appears to be limited or no SW authorities and initiatives at a regional/intermunicipal level.
- There is limited enforcement of existing environmental legislation.
- Lack of communication between state authorities and municipalities and other stakeholders and also between municipalities.
- No guidelines for the municipalities in SWMP

7.1.4 Recycling

- It is a problem that Macedonia as a relatively small and not heavily industrialized country to a large extent the country is lacking the downstream processing facilities for recycled materials.
- To export many materials is a challenge, as the international market is fluctuating in demand and prices. (Currently, one normally will have to pay to deliver the material)
- Very limited separation and recycling systems is in operation for the households.
- No centralized sorting facility for suitable fractions is in operation.

7.1.5 Collection and transport

- collection systems are lacking modern equipment and adequate O&M schemes (preventive maintenance are not widespread)
- lack of planning of collection routes and frequency

7.1.6 Treatment and disposal

- There are currently no sanitary landfills in full accordance with EU requirements in operation.

- There is close to none treatment facilities like incinerators or composting plants.
- There is limited or no regional cooperation, enabling larger and more cost-effective facilities

7.1.7 Hazardous waste

- Except for used oil, no facility for chemical hazardous waste treatment is in operation.
- Until the new incinerator is in operation, few and small adequate treatment facilities for medical waste are in operation
- .No system for collection and transport is in operation

7.1.8 In Gostivar

Collection is difficult and inadequate because there are few collections trucks working.

The lack of O&M facilities, schemes and routines causes a very high down-time for the few operating vehicles. Inadequate workshop facility, equipment and operation. Scheduled, preventive maintenance is not carried out.

Few vehicles gives few possibilities to plan adequate collection schemes and routes.

The location and operation of the local disposal site is insufficient and environmentally unacceptable.

There is an inadequate financing of the SWM due to limited ability and willingness to pay fees within the population combined with limited enforcement of payments.

7.2 Sweden

7.2.1 In general

In the national SWMP for Sweden five major areas for action are pointed out. These goals should be given priority f the overall goals for waste management are to be achieved.

1. Implement the regulations and use the instruments decided on
2. Put greater emphasis on reducing the quantity of waste and the hazard it poses.
3. Improve knowledge about pollutants
4. It must be easy for households to sort their waste
5. Develop Swedish participation in EU work in the waste management field

Many of these goals will be relevant also for Macedonia, either on short (goal 1, 2, 3 and 4) or on longer term (goal 5).

7.2.2 In Borlänge

During the work with the current solid waste management plan in Borlänge, the company together with Dala avfall have listed a number of future challenges, example as follows:

- Increase the interest and awareness of environment and solid waste among the inhabitants.
- The connection between national – regional – municipal environmental aims
- The connection environmental aims – inhabitants
- Attitude of the consumers
- Responsibilities Municipality – producers – inhabitants
- Hazardous waste
- Transportation
- Future waste incineration
- Quality of the biological treatment
- Rehabilitation of Closed landfills

8 IMPORTANT SWM COMPONENTS TO BE ADRESSED

8.1 Planning of SWM activities and investments

8.1.1 In general

It is important that the SWM activities to be implemented is based on initial overall planning, addressing the need for harmonisation and coordination between sectors, regions and municipalities.

The initial national SWM plan must be formally accepted as soon as possible, so the new activities are set in an overall framework. The landfill network must be suitable to efficiently cover the whole country. Connected to the plan, the financing of initial actions and investments must be identified and clarified.

These aspects are covered in the recommendations at the end of the report.

8.1.2 In Gostivar

As a part of the local SWM improvement, it is crucial to as soon as possible carry out the municipal solid waste master plan (required in the national SW plan) according to the requirements arising from the ongoing project.

The national SW planning process is supposed to include development of the Rusino site, and Komunalec should secure that the planning of this site is addressing the local needs. If the national planning of sites is delayed, a local planning initiative related to the site are relevant.

The new site must be prepared for upgraded operation immediately, and closing and cover plans for the existing dumpsite must be prepared.

These aspects are also covered in the recommendations at the end of the report.

8.2 Monitoring, evaluation and revision

In modern solid waste management systems for frequent monitoring of service and operational performance and environmental compliance are normal. The results are normally reported to national or regional authorities or agencies for statistics and further processing and analysis.

The results from monitoring may be used for frequent evaluation of status and addressing further development and improvement. The results may also be used for improving performances and for enforcement of environmental violations.

Based on data collected and reported, regular updates and revisions of SWM plans like master plans should be carried out in regular intervals (e.g. every 4. year).

9 REGIONAL COOPERATION

In modern solid waste management regional cooperation is beneficial and to a large extent required, in particular when the municipalities are limited in size and institutional capacity. Many solid waste facilities have a clear economy-of-scale, resulting in substantially lower costs pr. ton for larger plant size. Regional cooperation also makes harmonisation and coordination of solutions and schemes in a larger area possible. Regional cooperation is also important for an effective common use of skilled and competent personnel and of professional information systems etc. In Macedonia, some areas are of particularly suitable for such cooperation:

- cooperation between the local municipalities on regional landfill development and operation and access road repair and upgrading
- common, regional workshops
- harmonise recycling initiatives
- Knowledge and information centre
- regional, more advanced treatment facility (sorting plant, composting plant, incinerator)

10 ANALYSIS AND CONCLUSIONS

10.1 Introduction

The following tables aim to organise in items the information of the current conditions, status and constraints in the Swedish and Macedonian SWM. For each item, an assessment and if applicable an analysis has been carried out as summarised in the next column, and the conclusions and recommendations for changes/actions has been outlined in the last column .

10.2 Overall solid waste management

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Existing laws and strategies	SWM strategy established - National master plan prepared, but not implemented	All laws and strategies in accordance with EU requirements	Currently, full compliance with EU requirements is not required on short term, with Macedonia not being a member. Before becoming a member, Macedonia must have a full compliance of the EU legislation approved and introduced (not fulfilled).	It must be implemented on medium or long term, depending on the time for application for EU-membership.
Existing sub-laws and regulations	Sub-laws in accordance with EU requirements under preparation	All sub-laws and regulations in accordance with EU requirements	In the current situation, full compliance with EU is not required, but they should be prepared based on adequate and appropriate requirements. Before becoming a member, Macedonia must have a full compliance of the EU regulations approved and introduced (not fulfilled).	Initially, ongoing work on sub-laws and regulations must be finalised, as a minimum at an adjusted, appropriate EU-standard.. Full compliance must be implemented on medium or long term, depending on the time for application for EU-membership.
Recycling of materials and packaging	Private initiatives No incentives No subsidies	Each branch responsible for system for their materials System financed through product fees paid at purchase	The branch/producer responsibility is currently probably not appropriate for Macedonia. However, it should be encouraged in medium term. Nearly all recycling schemes in the western world are supported, subsidised or financed through national taxes, fees, support programs, regulations etc.. Pure commercial schemes are difficult to establish and maintain. Consequently, domestic initiatives and incentives must be introduced and encouraged in Macedonia.	Initially, national, local and regional initiatives within recycling from the environmental authorities and municipal entities must be encouraged and supported. The branch/producer responsibility should be introduced and supported in medium term.
Recycling of WEEE	Private initiatives only No incentives No subsidies	Producer responsibility for certain products System financed through product fees paid at purchase Shops selling EEE often receive WEEE	Producer responsibility is currently probably not appropriate for WEEE recycling in Macedonia, and pure commercial schemes without subsidies or incentives are difficult to establish and maintain. Consequently, domestic initiatives and incentives must be introduced and encouraged in Macedonia.	Short-term: Introduce incentives and subsidies for WEEE recycling. Medium term: Establish branch responsibility and systems financed through product fees

Regional cooperation	Very limited cooperation	Very extensive cooperation. Most municipal SWM is organised through regional inter-municipal companies	Regional solutions is crucial for many components within modern SWM(see chapter 10) . Consequently, it is important to introduce and support regional cooperation. With the rather small average size of municipalities in Macedonia, this is of particular relevance.	Introduce and support regional cooperation within treatment, disposal, knowledge transfer etc.
Recording, reporting and statistics	No scaling No organised and standardised reporting	All SW scaled and reported annually Annual statistics	Proper and organised scaling and reporting is important for monitoring, statistics, accounting and fair fees in a modern SWM system.	Introduce scaling in the SWM system Establish reporting and statistics based on tons

10.3 Municipal solid waste management responsibilities

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Local SWM responsibility	Household waste: The municipality is responsible, but the monopoly is uncertain. Other waste: The waste producer free to select operator of the SWM.	Household and all similar waste: The municipality has monopoly Remaining waste: The waste producer free to select	The existing arrangement is widespread and well functioning in the EU, and probably should be kept. However, the monopoly for the responsibility of the municipality (not the execution - it may be contracted out) must be established and verified.	Monopoly of the responsibility of the municipality for collecting and treating household waste must be verified and fully implemented. (either within own organisation or through managed contractors).
Connection between SWM agency and political system	The top management of the municipal agencies are connected with the political system and may be replaced after election.	In principle: No connection, the municipal agencies are outside the political system in the daily operation, although the budgets and major investments and system changes must be approved by the local politicians	The close connection between the organisation of utility providers and the political system has many disadvantages, for instance politically motivated (unpopular) decisions in the municipal agency may lead to unnecessary replacement of management. Replacement to allow politically loyal civil servants is also a risk. This connection must be separated, allowing the public agencies/enterprises to operate independent from the political system, although the municipal board may give directions for SWM through local regulations and budget approvals.	Allowing the public agencies/enterprises to operate independent from the political system. The politicians may give directions for SWM through the municipal board, providing local regulations and budget approvals at certain intervals.

Financing	Most through fees, but also subsidies from municipality. Limited funds available for investments.	100 % financed through fees, according to EU requirements. Investments financed through municipal loans.	Currently, municipalities may not have financial resources for substantial investments . National interventions can help temporary. Gradually, a self financing system must be established, also covering investments	
Normal activities of the municipalities ' SWM agency	Collection and transport Disposal	Collection Transfer and transport treatment and disposal Hazardous waste from households	When regional systems and facilities is being introduced, transfer and haulage will be municipal responsibility (contracted out). Hazardous waste from households and small enterprises should also eventually be a municipal responsibility, since the municipal agency will have the facilities and systems for handling this waste..	Extending the responsibility to SW treatment and regional SWM activities like transfer and transport when applicable. Responsibility for collection and declaration of hazardous waste from households and small enterprises
Recycling	Limited collection and recycling (PE plastics)	Local recycling stations Municipal Recycling centres	The municipalities must be involved in recycling from households. Focus must be on the fractions that are feasible. It is less costly to operate recycling schemes where the public bring the fractions to collection points. When the SWM situation develops, more advanced systems like door-to-door collection of material fractions should be introduced.	Initially, small recycling stations may be established and when applicable: introduce larger municipal centres (for bulky waste etc.) gradually. If conditions become favourable, the municipalities should implement and carry out recycling of feasible materials from the households based on door-to-door collection
Population served	In general, only urban areas are served. Rural areas have not been included in the initial SWM plans.	Practically all households and even holiday cabins have a collection service. Rural areas often have larger communal containers in some distance from the house.	In general, only urban areas is served, due to lack of financial and technical capacity. Current planning do not cover rural settlements. Low-cost systems for rural population are widespread in many countries, for instance large containers (3-10 m3) in the villages. In principle the whole country should have SWM services at some level.	Provide SW collection service at a minimum level for all households in the urban areas. Introduce and develop appropriate low-cost collection (larger communal bins or containers) in the villages for the rural population.

10.4 Recycling

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Markets for recycled materials and products	Problematic, due to limited domestic processing and use and very fluctuating demand and prices in the international market for the common fractions.	For most fractions: mature markets, and Sweden has an extensive industrial base.	In the current situation it is necessary to develop available markets domestically (or in the adjacent region) for the major part of the main material fractions. The current international markets do not provide financial support to a domestic recycling. However, export of selected high quality fractions is still a to some extent a profitable possibility, and national initiatives for this should be investigated and introduced.	Develop domestic markets (or in the adjacent region) for the major part of the main material fractions. Investigate export of selected high quality fractions. Closely follow market fluctuations, allowing increased export when applicable.
Domestic processing	Processing of cardboard/paper and some PE-plastics only, but limited capacity	Several processing facilities but also export to China, Poland, Germany etc.	Since the international markets are problematic, it is important to encourage and support increased local processing. From current experience it may be difficult to sell products from recycled materials in the international market. To further support local recycling, the authorities should encourage buying locally recycled materials and products.	Encourage and support increased local processing industry Encourage buying locally recycled materials and products within the public sector
Sorting out fractions	Only source separation of household waste. No post-collection separation Informal sorting at streets and scrap yards Scavenging at disposal sites	Source separation in households etc. Many private (mechanical and manual in combination) central sorting facilities, primarily for post-collection separation and for non-household waste	Although being common in many similar countries, many of the informal sorting activities are unacceptable of health and social reasons. Scavenging at landfills has a rather low recycling result (quantities and quality) and causes serious health problems. Uncontrolled sorting at scrap yards etc. also causes health and environmental hazards. Thus it is important to regulate informal sorting and ban scavenging.	Regulate informal sorting at scrap yards etc. Ban scavenging along the streets and at the landfills/dumpsites.

10.5 Collection and transport of solid waste

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Bins and containers	Several types in use, of which many suitable for mechanical/ automatic loading Normally only public/communal containers	Similar types in use, but general in good condition Single houses have plastic bins or use large plastic or paper bags.	The best of the existing systems are adequate. The standard must be more consistently at an adequate level. Upgrading and extension to a maximum number of households must be encouraged. Communal containers are cost-effective and should be the main system for standard households. The collection frequency is very important for the utilisation of trucks and the cost of SW collection. Daily collection must be discouraged and replaced with collection once or twice a week. The system/service for medium/high income families could be developed, allowing single household to purchase private bins and have doorstep collection for a high fee compared to communal containers.	Communal containers on wheels suitable for mechanical/automatic loading should be the main system for standard households. Improved door-to-door service for medium/high income families could be encouraged, but for a relatively high fee.
Trucks	Many types in use, but many in bad condition Compacting units are not reused	Most vehicles in good condition. Compacting unit may be used at 2 chassis.	Apparently, the collection vehicles in many municipalities are inadequate and in poor condition, partly due to inadequate financing. Trucks in good conditions with mechanical/automatic loading have a much higher performance compared to old trucks in poor condition. To utilise the trucks to a maximum it is also normal in many countries to carry out optimised route planning for the SW collection. Maintenance and replacement systems, enabling use of Compacting units to last 2 chassises is normal in many western countries. The compacting unit is more expensive, but also more durable than the chassis.	Improved vehicle fleet with mechanical/automatic loading must be encouraged. Systems enabling use of Compacting units to last 2 chassises should be encouraged. Carry out optimised route planning for the SW collection.
Transfer	Not established, since no regional sites	Many transfer stations of various types, combined with transport on trucks and trailers or on semi-trailers.	The need for more cost effective long transport and transfer facilities to support efficient haulage is normally being introduced when the distance to treatment facilities increase. Typically, a transfer and haulage may be profitable at 30-50 km one way. This also leaves the collection trucks to do what they are designed for; collection and short transports. When applicable and appropriate more effective and cheaper transport long transport must be introduced. The national and regional authorities and entities must when applicable introduce and develop transfer facilities to support efficient haulage to regional facilities. .	Carry out transport analysis connected to the proposed landfill network. When found suitable/profitable: introduce and develop transfer facilities and haulage vehicles to regional facilities..

Transport	Mostly by collection trucks and smaller trucks	Shorter distances collection trucks Medium/long distances large haulage trucks (semitrailers and truck and trailers)	When the distance to treatment facilities increases, larger haulage trucks (semitrailers or truck and trailers) should be used, with compaction containers or open (covered) containers. Often, the possibility of transporting other goods the opposite way is utilised. This could be based on a tender process, utilising locally available haulage trucks.	Based on transport analysis: introduce larger haulage trucks when applicable/profitable. When relevant: introduce tenders for haulage and if applicable for transfer.
Operation & Main-tenance	Inadequate workshop facilities and O&M schemes	Good O&M schemes Preventive maintenance Both private and public workshops are used	The workshops and O&M schemes are important elements in a modern SWM. The municipalities must improve O&M schemes and when required cooperate with private workshops. It is normally not necessary to have a full workshop capacity and capability within the municipal agency.	Introduce improved O&M schemes for trucks and equipment. Improve workshop facilities. Utilise private workshops, particularly for heavier maintenance.

10.6 Treatment of solid waste

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
General treatment	Local/municipal dumpsites or landfills without initial location process and basic infrastructure and environmental measures	Range of treatment methods, depending on the type of waste Normally regional facilities	There is a range of available treatment methods with specific suitability for certain waste types. Incineration is suitable for many waste types, but not for wet organic waste and inorganic waste including metals. Biological treatment (aerobic or anaerobic) is suitable for wet and dry organic waste. It is also possible to carry out central sorting of mixed waste (MBT-Mechanical/Biological/Treatment). In most of the western countries there is a mix of treatment facilities available in a region, complementing each other. However, many treatment methods are expensive, like incineration and anaerobic biological treatment. It is vital to assess the waste streams, frame conditions, markets and treatment cost to find a suitable selection of methods for the domestic situation. In Macedonia, only the more inexpensive methods are currently judged to be appropriate and affordable. There is a clear economy-of-scale in most methods, supporting larger facilities.	Gradually introduce mixed treatment, focusing on appropriate and low-cost methods Regional cooperation to find resources for higher standard and more cost-efficient treatment facilities.

Biological treatment	Approx. not existing	Many composting plants and some biogas plants	Simple (open-air) aerobic treatment is clearly the cheapest option. The composing process is most easy to handle and causes less process and neighbour problems when used on garden waste. Composting of organic household waste normally requires initial source separation of this fraction. Anaerobic biological treatment is very costly, but produces biogas that can be utilised. The compost is an excellent soil conditioner. It is also very important to develop markets/customers for compost , normally focusing on the public and agricultural sector.	Initial composting initiatives with garden waste, then gradually use source separated organic household waste. Focus on low-tech composting. Simultaneously develop markets for sale of compost in the public and agricultural sector.
Incineration	Not existing and almost no infrastructure for heat/energy distribution	Widespread and main treatment method Very extensive heat/energy utilisation (required)	Incineration of Municipal SW can be carried out based on several techniques. It can be a robust technology providing heat energy for utilisation. In large facilities this heat energy can be used for production of electricity. The most appropriate solution for Macedonia is low-cost incineration of wood waste and pre-treated refined waste fuel. Incineration of mixed MSW is very costly and normally require a connected heat distribution system to a large area, optional an industrial customer with a substantial heat energy need.	Initially, incineration of wood waste should be investigated and introduced, preferably connected with an existing possibility for heat delivery. In a long-term perspective, incineration of mixed MSW could be introduced, connected with an possibility for heat delivery.
Sorting and combined treatment (MBT)	Not existing	Uncommon	This is a method being used in several North-European countries (MBT-Mechanical/Biological/Treatment). It separates organic waste and some material fractions from mixed waste, avoiding extensive source separation. However, it is an expensive and rather advanced technology and is assessed as not appropriate for Macedonia in short or medium term.	Assess MBT when the SW situation improves.

10.7 Landfilling - end disposal

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Siting/ location	Existing sites located on convenient and suitable sites adjacent to nearby urban centres.	Based on multi-criteria identification and siting process	The future landfill sites must be located on adequate locations only. A site identification and implementation process may take up to 10-15 years. Consequently, it may be rational to start a location process with existing sites, investigating how suitable they are. Some of the sites are probably not suitable, and optional sites should than be identified.	Verify that the selected regional sites are according to up-to-date and widespread location requirements, causing a little environmental, health and social impacts as possible. ASAP: start preparation/upgrading of the suitable selected sites. If applicable: solve problems with selected sites with problems, and if possible find replacement for these.
Environ-mental measures	No or limited	Extensive and in accordance with EU requirements	Typically, a modern landfill will require a membrane to prevent leakage, a leachate collection and treatment system, a landfill gas extraction system, stormwater cutoffs etc. EU currently has very strict requirements for landfill installations, but many landfills in countries in southern and eastern Europe do not comply with these. The recommended infrastructure and measures can be developed gradually, starting at an appropriate level and gradually improving the standard.	Initially, all disqualified smaller landfills/dumpsites must be closed down properly. The remaining landfills should be improved to appropriate level, close to EU-requirements (e.g. 1 membrane instead of 2). Gradually the landfills should be improved to EU standard.
Operational conditions	Inadequate equipment and routines	Adequate routines and equipment in accordance with EU requirements	Typically, a modern landfill will require extensive operational routines and equipment. Heavy, specialised compactors must be used. The landfills must be constructed in sections or cells. The surface must be regularly and properly covered. Measures must be taken to avoid smell, rodents, littering, smoke, dust etc.	Initially, the operation of all remaining landfills must improved to appropriate level with good operational routines and the use of a compactor. Gradually, operation of the landfills should be improved to EU standard.
Size and number	58 active legal landfills and about 1000 illegal dumpsites. 5-7 regional landfills are planned for in Macedonia.	Approx. 100 landfills, most of them regional.	It is essential that the network of remaining landfills is well distributed regarding where the bulk of the SW is being generated. This requires an adequate and planned site structure reflecting the main points of SW and transport distances. With the large number of municipalities in Macedonia, this will require a regional cooperation, but also a coordinated national planning.	Verify that the selected sizes, locations and numbers are in accordance with appropriate selection and location requirements. Start regional cooperation on site preparation and operation.

10.8 Fees and financing in solid waste management

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Household fee level and structure	Gostivar 4 -10 euro/month for various houses depending on the property size (flats/individual) (up to 120 Euros/year)	In average 180 Euros pr. household and year.	It is normal to have a clear connection between fee level and collection service and SW quantities generated (reflected through bin size). It is also normal and required in Europe to have a fee level enabling a 100% user- financing of all SWM in the municipalities. In most countries waste reduction is being encouraged through the fees. In order to achieve affordable fees, it is important that the municipalities have a cost-efficient SWM. The difference between the top fee level in Macedonia and Sweden is not substantial, and this indicate that some potentials for rationalisation exist.	Review the current fee structure. Review the current cost level and operational arrangements. Improve the fee structure.
Treatment and disposal fees	None or very low	landfill 65-110 euro/ton (icl. env. taxes) Incineration 50-90 euro/ton Biological tr. 40-75 euro/ton	In most European countries, treatment fees at the facility gate are implemented. These fees normally are reflecting the treatment costs. In Macedonia with limited affordability to pay in the households it is particularly important to collect fees from enterprises bringing waste to the municipal SW facility.	Introduce and implement treatment fees reflecting the costs. Increase fees when treatment costs increase.
Payment compliance and collection	50% pay Inefficient/costly fee collection (monthly door to door)	Approx. 100 %. Strong enforcement and general payment compliance	Existing fee collection system is not efficient, but is labour-intensive in an area with high unemployment. Currently, very limited initiatives within incentives, motivation, information and enforcement are being implemented. One major constraint is limited affordability to pay even low fees in many households. However, if informed of properly, international experience shows that even in poor countries, a high level of payment compliance can be achieved with an appropriate fee structure and level and good information and motivation.	Initiatives within incentives, motivation, information and enforcement. Coordinate with improved fee structure.
Financing sources	Mostly by the users and waste producers. Some municipal subsidies	100 % financed by the users, either through consumers, users or treatment/disposal fees	In EU it is required that 100 % of the SWM costs shall be financed by the users (polluter pay principle). Many poor countries still have some governmental or municipal subsidies of the SWM. Gradually, Macedonia will have to adapt to the EU requirement.	Gradually transfer all financing to the users through fees.

Incentives and subsidies	Currently no	Environmental taxes on landfilling promote and support optional treatment and recycling. Lower household fees promote and awards waste reduction.	In most western countries incentives and subsidies are important instruments to introduce, operate and expand recycling and waste reduction activities and schemes. This will also apply for Macedonia when aiming at the same goals. This can be achieved through negative incentives like environmental tax on landfilling, supporting optional treatment/recycling or positive incentives like lower fees for selection of smaller bins.	Introduce incentives. Assess environmental taxes versus subsidies.

10.9 Monitoring and enforcement

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Enforce-ment of environ-mental violations	In principle enforcement, realistically limited	Strong enforcement and reactions when appropriate	From experience, enforcement is a vital element in any modern SWM system, and is often the key difference between a functional system in a developed country to a not or only partly functioning systems in poorer countries. Enforcement complements incentives and is required.	Improved enforcement at national and local level. Institutional strengthening to enable enforcement.
Enforce-ment of payments	Currently limited possibilities for enforcement, due to difficult financial situation of many households	Strong enforcement through standardised routines similar to other fees and taxes	When appropriate structures and levels for fees has been publicly accepted and adopted, international experience shows that enforcement must supplement information and motivation. Connection to other basic infrastructure bills (water or electricity) is one way. Using other legal instruments is one option. A study on the most appropriate enforcement should be carried out.	Study on the most appropriate enforcement. Improved enforcement introduced
Environ-mental monitoring and reporting	There are prescribed monitoring in the Law of waste management which include some obligations and responsibilities for the major of municipalities to report on central level . There is limited monitoring in the municipalities	Extensive monitoring and reporting through standardised routines	For all SWM planning, improvement and enforcement good statistics and background information is essential. Monitoring schemes of operational conditions and performance, environmental impacts etc. is normally established at local (municipal), regional and national level. The records and results from this monitoring must be adequately reported to relevant local and national authorities as a basis for statistics, enforcement of violations etc. This is normally an important component of an institutional strengthening program.	Institutional strengthening within national and local agencies and authorities Assess regional monitoring entity Establish a system for operational and environmental monitoring and reporting within SW and HW Management. Enforcement of policy and lows regarding the obligation of reporting in local and central level.

10.10 Hazardous waste (HW) management

Item/issue	Conditions/situation in Macedonia	Conditions/situation in Sweden	Assessment/Analysis	Conclusions - changes and actions needed in Macedonia
Infectious medical waste and medicines	4 small autoclaves 1 old incinerator at Drisla Limited separation schemes at hospitals	Consequent separation at hospitals and clinics. All inf. waste is treated in incinerators or autoclaves Pharmacies must collect medicines	Some of the waste coming from hospitals is infectious and must be collected, transported and treated separately. Normally, coloured bags and boxes are provided and handled separately. This waste must be incinerated, go to a sterilising autoclave or as a minimum being dug down controlled at landfills.	Implement separation schemes at hospitals and clinics Construct 1 new incinerator Assess need for further treatment facilities When applicable, establish secures routines at landfills
Organic Chemical waste	Almost no collection nor treatment. Some collection, processing and reuse of used oils.	Separate collection, transport and treatment (domestic and export)	The organic chemical waste can normally be burned but may cause hazardous air emissions. Therefore this incineration must be done in specially designed and operated HW incinerators, using very expensive technology. One very relevant option is utilising cement kilns. These are robust, have a very long combustion zone and time at very high temperatures. Normally this will neutralise and break down most of the hazardous components. This is being practised in many European countries. Macedonia has a suitable cement kiln which most probably can be adapted to HW reception and treatment with small investments in reception, storage, feeding and monitoring systems. An initial survey of types and quantities of such HW must be carried out to select treatment. A separate collection and transport system must be introduced, bringing the HW to the designated facilities. To process used oil for reuse is a widespread and accepted method in many parts of Europe.	Initial survey of types and quantities Introduce and develop separate collection and transport system The use of the cement kiln Increased utilisation of used oil must be encouraged and supported.
Other hazardous waste	Almost no collection nor treatment	Separate collection, transport and treatment (domestic and export)	An initial survey of types and quantities of such HW must be carried out to select treatment. Treatment can be in secure landfills or in advanced processing facilities. Often several countries cooperate on a common facility, for instance is a major portion of inorganic HW in Sweden and Norway treated in Denmark.	Survey of types and quantities A separate collection and transport system must be introduced, bringing the HW to the designated facilities. Establish one or several national secure landfills for inorganic HW.

HW system	No HW system or organisation in operation	Designated and separate system for collection, transport, storage and treatment is well established , managed by a national, designated public HW agency	The HW system will normally be different than the SW system. Most appropriate and widespread is a separate national system for this, cooperating with the municipalities and with private actors. The system is normally operated by a national public agency, either via own equipment and schemes or through contractors selected in tenders.	Establish a public HW agency, responsible for manageing the HW collection, transport, storage and treatment system. Establish a separate national system for this, cooperating with the municipalities and with private actors.

11 SUMMARY - RECOMMENDATIONS

11.1 At national level

11.1.1 Short-term activities – 0 - 3 years

Legislation and over all SWM

The environmental legislation and regulations must be improved through continuation of the ongoing efforts. Initially, requirements appropriate for Macedonian conditions should be considered, in light of the limited current financial, technical and institutional capacity. However, the requirements must be gradually improved, reaching EU requirements within medium term horizon.

The ongoing improvement of SWM planning must continue, focusing on implementing the national SW master plan and executing all the local SWM master plans.

Municipal SWM

Intermunicipal/regional cooperation within SWM must be initiated and encouraged, especially for the landfill operation.

The connection between public enterprises and the political system must be separated, allowing the public agencies/enterprises to operate independently. The elected municipal board may give directions for SWM through local regulations.

Recycling

It should be investigated if an organized separation and collection of the financially most feasible fractions could be introduced. Domestic processing capacity must be investigated and development encouraged. In the existing market situation, financial support to recycling should be introduced through subsidies or environmental taxes on optional landfilling. National, local and regional initiatives within recycling from the environmental authorities and municipal entities must be encouraged and supported.

Treatment of SW

Initiatives for treatment of hazardous waste should be investigated and encouraged. The use of cement kiln for high temperature incineration is normally a suitable and appropriate solution.

Landfill and disposal

The regional landfill sites must be identified and developed up to an appropriate and adequate and environmentally acceptable level as soon as possible. This could still be somewhat below EU requirements initially.

All local inadequate dumpsites and landfills must similarly be closed down and initially completely covered.

Fees

The system for collecting fees including securing compliance with payments should be investigated and improvements identified and implemented. Manual door to door system should be phased out. More strict enforcement must be developed.

11.1.2 Medium term – 4 - 9 years

Over all SWM

- Establish national system with branch responsibility for recycling of WEEE and selected material fractions
- Follow-up and updating of national and local SWM plans
- Identification of large energy consumers (heat utilisation)
- Improved legislation and regulations to EU requirements

Municipal SWM

- Further develop Intermunicipal/regional cooperation within SWM

Recycling

- Further develop domestic processing capacity for recycling
- Continue subsidies or env. taxes to support recycling

Collection and transportation

- Implement regular organized separation and collection of the most feasible material fractions

Treatment of SW

- Introduce low-tech composting facilities
- Additional treatment facilities like composting plants should be introduced.
- If sufficient customers of heat energy can be identified, incinerators could be introduced in some municipalities.

Landfill and disposal

- On medium term, the regional landfill sites must be further developed to EU standard.
- Improved cover of all old dumpsites

11.1.3 Long term - 10 - 20 years

- Implementation of network of incinerators for wood and RDF connected to identified heat consumers and distribution network
- Implement ban on landfilling of organic waste
- If applicable: introduce incinerators for mixed SW connected to identified heat consumers and distribution network

11.2 At local level in Gostivar

11.2.1 Short-term activities - 0 - 3 years

Landfill and disposal

Most important is to upgrade the Russino site and develop it to a minimum level as soon as possible, including the access road. Site preparation and road repair and upgrade are crucial for the landfill operation. Together with this the existing dumpsite should be covered and close down. For the operation of the landfill intermunicipal and regional cooperation must be initiated and encouraged. Further more costs for operating and maintaining the landfill must be distributed equally per ton delivered on each municipality using it. On medium term, the Russino site must be further developed to EU standard.

Recycling

Sorting out and recycling of cardboard and high quality paper exists, but only in the informal sector. The municipality should investigate if an organized separation and collection of the financially most feasible fractions could be introduced.

Collections and transportation

The whole system for waste treatment depends on transportations. Therefore it is most important that all vehicles for waste treatment is working well. Service and Maintenance and service must be organized and be a part of the investment plan.

Hazardous waste

Local initiatives and possibilities for treatment of hazardous waste should be encouraged. The municipality and the waste company, preferable together with private enterprises should work with a plan to introduce municipal system for selected, feasible and suitable hazardous waste, especially oil.

Further initiatives and activities

- Improved O&M schemes (preventive) and contract workshop services when required
- Assess reuse of compactor units on trucks
- Disposal fees from neighbour municipalities and private operators
- Improved fee structure and collection including enforcement
- Initiative to Intermunicipal/regional cooperation
- Prepare for solid waste management plan for Gostivar

11.2.2 Medium term - 4-9 years

Landfill and disposal

Also in medium terms upgrading and developing the Russino landfill will be an important part of the solid waste management in Gostivar. Continue to improve the site to EU-standards and investigate possibilities to collect landfill gas.

Further activities and initiatives

- Implement organized separation and collection of the financially most feasible material fractions
- Develop local system for collection and local disposal or shipment of hazardous waste
- Establish local regulations within MSW
- Establish low-tech composting facility
- Establish small, local incinerator for wood, paper or RDF connected to existing heat distribution system

11.2.3 Long term - 10-20 years

If applicable: medium size incinerator for mixed MSW may be established, connected to identified heat consumers or/and heat distribution network