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LitusGo Manual
Module 8
**Waste Management/
Recycling/Compost**



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Preface to the LitusGo Education Manual

The LitusGo Manual is part of the LitusGo educational package which is included in the LitusGo portal: www.litusgo.eu. LitusGo aims at the training and capacity building of Local Authorities and local stakeholders in Integrated Coastal Zone Management issues and the reaction to the impacts of climate change.

This Manual consists of 20 autonomous, self-contained and inter-related modules. The modules are available in four languages, Greek, English, Maltese and Turkish and in three different forms: the dedicated wiki application in the LitusGo portal, the dvd and the hard copy version. This hard copy version of the LitusGo Manual consists of 20 self-contained booklets, one for each module, kept in a hard collective case.

List of modules of the LitusGo Educational Manual

- Module 1: European legal framework
- Module 2: Stakeholder involvement/Public participation
- Module 3: Sustainable tourism-carrying capacity
- Module 4: Water resources management
- Module 5: Fisheries/fish farming
- Module 6: Coastal water quality
- Module 7: Ecosystems management (land and coastal ecosystems)
- Module 8: Waste management/recycling/compost
- Module 9: Air pollution
- Module 10: Land uses/urban planning/coastal over-development
- Module 11: Landscape and marine-scape management
- Module 12: Coastal erosion control
- Module 13: Community annoyance issues 1: noise pollution
- Module 14: Community annoyance issues 2: light and thermal pollution, odours
- Module 15: Archeological areas/historic sites/cultural heritage
- Module 16: Extreme conditions management: flood risks, coastal flooding and storm surge
- Module 17: Droughts
- Module 18: Desertification
- Module 19: Energy use, consumption and management
- Module 20: Green buildings

Credits

The LitusGo Education Manual has been developed by the LitusGo Educational Manual Working group:

Modules 1, 2, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19 have been prepared by the scientific team of the beneficiary/coordinators ISOTECH Ltd. Major authors: Michael I. Loizides, Chemical/Environmental Engineer and Xenia I. Loizidou, Civil/Coastal Engineer. Constantinos Georgiades (MSc in ICZM) is responsible for the overall editing. The hard copy of the educational Manual is designed by Anastasia Georgiou.

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Dr Alan Pickaver on behalf of partner The Coastal & Marine Union (EUCC) was responsible for the quality control of the educational material.

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www.egaio.gr

ONISIS web development www.onisis.gr

Malta:

Municipality of Kirkop www.kirkop.gov.mt

The Netherlands:

EUCC – The Coastal & Marine Union www.eucc.net

Module 8

Waste Management/Recycling/Compost

1| Theoretical background

Waste is one of the most important problems of the modern world. In a series of successive legislations, the European Union (EU) has attempted to institutionalize management tools regarding waste, starting in 1994 and most recently with the Directive 2008/98/EC titled "Waste" [4]. The directive "establishes a legal framework for waste management in the Community". "The purpose is the protection of the environment and human health through the reduction of negative effects of production and waste management of the Community." [4].

One of the key principles promoted by the directive is "the polluter pays", which clearly attaches responsibility for any pollution to the person who created it [5]. Under this directive, waste is defined as "any substance or object which the holder discards or intends to discard or is required to dismiss" [4]. This Directive focuses on the best ways to manage specific types of waste listed as waste streams, including "the collection, transport, recovery and disposal ..." [4].

The general waste categories are solids, liquids, gases and radioactive materials - substances that can be managed by a large number of methods-technology-scientific disciplines [2]. Bibliographic reference [3] gives a more detailed list of the separated streams of the general waste.

This module focuses on urban solid waste which is of most concern to a local authority in order to give the opportunity to suggest specific and practical solutions.

The European Directive on Waste [4] clearly specifies that the responsibility for waste management lies with the producer. Each producer or holder of waste will either be responsible for the collection, processing and disposal of waste resulting from their activity, or will assign an authorized and licensed agency for this purpose. Regarding packaging, the collective management of such waste, such as Green Dot, allows importers to work together to manage their waste. For the remainder and larger part of household waste such as organic waste from the kitchen, garden prunings, etc., the provisions of this legislation, in fact give a significant responsibility for management to the local authorities. However, the small municipalities, especially suburban ones and those away from the central municipalities have a weakness in infrastructure and qualified personnel to enable them to manage innovative technological solutions, or even simpler technical solutions, different from the methods they already use. For this reason it is important to inform, educate and record the weaknesses along with the needed improvements in terms of the existing infrastructure of the local authorities to enable effective methods of municipal waste management.

The LitusGo programme makes an attempt to fill this lack of information and methodology on waste management (municipal waste) at local level, giving effective and workable suggestions to local authorities and other local partners.

3| Problem

Nowadays, over consumption is a major issue in all developed countries, whose main feature is a disproportionate, in relation to the population, production of large quantities of municipal waste. The management, treatment and disposal of waste are the biggest challenges faced by the local authorities. The lack of preparation within the majority of European local authorities for the integrated management of municipal waste has led to a very dangerous situation for both human health and the environment. Uncontrolled discharges, operation of illegal landfills, combustion with emission of toxic compounds, waste stream and leachate runoff into surface water and aquifers are part of the whole scene. A striking fact is that even in areas where integrated solid waste processing centres are operated, both the processing costs and the restrictions on permitted waste streams that can enter these centres, lead into a significant amount of waste (including hazardous and toxic) resulting out of the controlled areas and into uncontrolled dumps.

Therefore, despite the fact that the European Union provides guidelines and an institutional framework for the proper management of solid waste in the Member States, a significant number of those are still far away from achieving the controlled management of solid waste.

4| How to deal with the problem

First it should be understood that the EU provides the basic principles under which the local authorities of each member state, should deal with the issue of urban waste. This should not be confused with the need of applying specific techniques/technologies. On the contrary, it is important that each member state recognises the local particularities of each region with the cooperation of local authorities. Each region has to determine its priorities in terms of the treatment of each waste stream. Urban organic wastes in a northern country like England offer a good example. The already significant presence of organic substance concentrations in the soil allows the option of converting organic waste into energy. In contrast, in countries like Cyprus and Greece, where there is a foreseeable risk of desertification and reduction of organic soil, the selection of domestic and collective composting is presented as a priority.

For the aforementioned reasons, the following recommendations aim to broaden the horizons of choices for local authorities to flexibly manage the available solutions-technologies-techniques in an attempt to find the optimal solution for each waste stream that takes into account the local conditions, infrastructure and social sensitivities.

1. A **set of procedures** is given below which, according to the authors of this LitusGo module, are most likely to lead the local authorities and those involved, in choosing the best solution within the EU legislative framework:

- Recognition by the local authority, or adviser, of all the stakeholders in the process of waste generation, consumption, management and disposal within the area of administrative responsibility (importers, consumers, recyclers, researchers, consultants, etc.).
- Creation of a network with all the stakeholders and a team consisting of representatives from a larger number of groups (stakeholder team or Concerned Commission). Personal and telephone contact between the Mayor and those representatives, gives a seriousness to the intention of the formal authority for effective collaboration and adoption of views – decisions of this committee.
- The Local Authority, supported by the Concerned Commission, will supervise the development (most likely by a consultant) of a fully qualitative and quantitative study of identification, registration and quantification of each source of municipal solid waste generation operating within the municipality. The spatial distribution of information is vital and should be included in the study.
- With the completion of the above database with all the necessary information, a specific study of alternative management scenarios for the total household waste stream

can be prepared. These alternative scenarios should consider the following:

- Which are the main local needs in terms of the use of final products of each waste stream? For example, energy (methane, compost, biodiesel, etc) can be produced from organic wastes.
 - Preparation of techno-economic analysis of each proposed project for each waste stream, in the short, medium and long term.
 - Investigation of the presence of infrastructure and human resources that could technically support the operation-maintenance of any proposed project.
- The prevailing scenario solutions will be presented and discussed in the Concerned Committee. It is crucial that the final positions and recommendations of the Committee receive an influential weight in the final decisions of the Local Authority on how to manage this issue.
 - The results from the discussions - negotiations between the local authority and the Concerned Commission should be presented to the public at public consultation meetings. It is important that the proposals will come from a common front of Local Authorities and the Commission. This creates an atmosphere which has a positive effect on the potentially affected public.

It is advisable to continue the engagement of the Concerned

Commission in all the procedures to be followed by consultations. Specifically, it should be involved in the processes of the agreed strategic plan as to each individual process-task.

- In this way, local authorities will succeed: transparency, effective participation of key affected members in the final decision and as a result, the formation of the necessary confidence to achieve and maintain a project.

2. **Methods of waste management**, for relatively small, or remote from large urban areas, municipalities: a relatively simple approach is proposed below, which gives the chance to the local authority to maintain full control of all waste streams, without having to adopt complex management models of all existing waste streams:

Municipal waste could be divided into five main categories, regarding the purposes of separation methods, collection and temporary storage:

- **Packaging Materials:** Individual or group collection, separation, transport and recycling of packaging materials can be applied. The Green Dot is one of the most famous collecting recycling initiatives in Europe.
- The **composting** of a household's organic waste is estimated to reduce at least 40% of the waste weight. Prior to initiating the promotion of household composting in the municipality or community, local authorities should implement a pilot programme to test the success of this process, regarding both the selection of the most appropriate composter type, and the

preparation of the authority for the necessary inspections on hygiene, control odours, rodents, etc.

It has been demonstrated through the ten-year research of the author of this module, that the local peculiarities of each municipality (climate, culture, motives, provided technical support, support from the authorities, etc.), define the evolution and success of the pilot programme and also promote an easier acceptance from the public.

- **Pruning and other organic garden waste.** Under European legislation on sanitary landfills (landfill directive [6]), green waste is not allowed in the landfill. These materials, possibly in combination with organic waste of animal origin (manure), can produce a good quality compost. To achieve this, the creation of a central and regional composting facility is required.
- The fraction that remains in the household waste after removing packaging materials and a part of the organic fraction, is called **mixed household waste**. In the most common case where there is no system or separator/recycling unit for further absorption of other waste streams prior to mixed disposal, the mixed stream usually goes to landfill. Great scientific efforts are made to propose economically sustainable ways/technologies for further exploitation of the remaining energy load that such waste contains.

So far, the cost of these proposals is still prohibitive for small municipalities, prompting the cooperation of neighbouring municipalities in order to form a critical mass of waste that would allow the economic viability of a serious solution.

- **Other - Special categories of waste-streams.** It consists from bulky items, such as electric and electronic appliances, furniture, cars at the end of life, etc., to dangerous substances such as paints, used motor oils, etc. Where there are no recycling systems for each of the different streams in operation in the immediate or wider area of the municipality or community, the creation of a controlled temporary storage site is a good method for reducing uncontrolled dumping. These sites are usually called "Green Points". Depending on the size of the municipality/community more than one site can be created, so as to minimise distances from the centre-axis of each service area. If the green points are far from the community, the residents will find them less attractive and not use them in the desirable degree. After several discussions with the residents of rural Cyprus, the author of this thematic section considers that the distance from the centre-axis of a community should not exceed 2 km.

3. Involvement of residents in the actions of municipal waste management: One of the challenges faced by the local authorities regarding the separation and recycling of municipal waste, is to convince people to get involved with the whole system.

For this reason the following actions are proposed:

- Financial pressure on the residents through a system of "pay as you throw", where instead of a fixed price for all the houses in the municipality, citizens buy special trash bags, sold by the municipality (in cooperation with supermarkets, shops of the area), and through their purchase pay a garbage fee based on

the amount of waste that they produce. Cleaning workers only collect the special bags. Another method of "pay as you throw", is weighing each residence's waste and then charging on that basis. Even though this system has a high cost of applied technology-logistics-management, it has the advantage of actually implementing the "polluter pays" principle.

- Adoption of a technique that provides benefits to a person who delivers a used item to a licensed/designated recipient. Various techniques are available, for example the retailer of new electrical and electronic equipment should receive the old equipment and even provide a discount on purchase of the new device.

Encouragement of home composting by the municipality. This can be in the form of subsidization of compost bins, and/or involvement of private sponsors as part of their normal corporate responsibility, and/or through technical support of their efforts by properly trained officers or consultants of the municipality (for the early period of this measure).

- Provide motives in the form of lotteries or discount coupons to all who deliver specific waste streams to the green points.
- Provision of support by the municipality, in the form of free transport of bulky items from their houses to the green points (for the initial period of the implementation of this measure).

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