



“Waste management options for greenhouse gases emissions control”

LIFE 09 ENV GR 294 / WASTE-C-CONTROL

**Action 5 - Description of Implementation of
Local Action Plan in REMTH**

Komotini, Autumn-Winter 2013

Description of Act 5 -

Implementation of the Local Action Plan REMTH

In the current document the implementation of measures and actions (short, medium and long term) of Local Action Plan (LAP) is described. Emphasis is given on short-term actions as they were the most direct and feasible for implementation. Nonetheless, the document presents the measures taken for preparation and implementation of medium and long term actions of the LAP in REMTH.

In summary, the classification of actions, as referred to the LAP, are as follows:

- Short-term (till end of 2013). Maximum utilization of Transfer Stations (TS) and enhancement of waste packaging recycling.
- Medium-term (till 2015). Increasing levels of waste packaging recycling, covering the entire area of REMTH with the use of the "blue bin" in most of municipalities in REMTH as possible. Also, an examination of implementing actions for the treatment of the organic fraction of municipal solid waste (composting) and ensuring and enhancing sanitary landfill, e.g. by better management of biogas from landfills.
- Long-term (till 2017-2020): The creation and operation of the Integrated Waste Management Unit (IWMU) for the mechanical and biological treatment of mixed municipal solid waste in the Waste Processing Unit (WPU).

Note that these procedures are completed step by step due to financial difficulties and the minimum staff working in DIAAMATH. The individual and more specific actions for each category level (short, medium, long-term) as presented indicatively in the LAP were the following:

Short-term actions (till 30/9/2013):

- B1- Production of practical guidelines for waste - transfer stations.
- B2- Information and Public awareness of REMTH's citizens.
- B3- Supply of recycling equipment.
- B4- Sitting of recycling bins in the West Sector of REMTh (cities of Drama and Xanthi).

- B5- Pilot monitoring of three (3) waste streams of municipal solid waste produced at household level (organic putrescibles to home composting, recyclable material to package recycling, other garbage to final disposal).
- B6- Improving the management of landfill gas.

Mid-term actions (till 2015):

- ME1-Operation of Drama Material Recycling Facility (MRF) and Xanthi MRF .
- ME2- Sanitary Landfill extension in Komotini, Xanthi, Kavala.
- ME3- Supply of solid waste pretreatment and composting equipment of MSW.

Long-term actions (till 2017-2020):

- MA1- Construction of Integrated Waste Management Unit (IWMU) of Eastern Sector of REMTH (Alexandroupolis).
- MA2- Construction of IWMU of Western Sector of REMTH (Chrysoypolis - Kavala).

In the following, the implementation of the aforementioned actions by DIAAMATH is briefly described. Note that all the material organized, produced and used by DIAAMATH along with pictures and photos of the actions and accompanying measures are given attached in their respective folders.

SHORT-TERM ACTIONS

B1- Production of practical guidelines for waste - transfer stations.

In REMTH there are Transfer Stations (TS) constructed and operated through program contracts between DIAAMATH and Municipalities. Operators of TS (workers, drivers) should follow some basic rules so that their work would be effective and safe for them and their work equipment.

In this action, when the required material had been collected, a guide on best practices was designed and written that contained briefly rules for efficient and safe operation, and instructions for proper response to emergency situations and emergency management in TS. This guide was printed in 30 color brochures for the workers in TS (mobile waste transfer station driver and TS operator) and in 15 color posters with a size of A3 for placement at every TS. Picture 1 shows the poster of the guide and the brochure.

The guide was sent by letter (31/07/2013-attached file) to Municipalities that were operating TS and specifically to the municipalities of Komotini, Drama, K. Nevrokopi, Alexandroupoli, Samothraki, Thassos and Paggaios.

Note that with better function of TS greater fuel savings can be achieved and the associated greenhouse gases emissions will be fewer.

Picture 1. Poster (left) and brochure (right) of the guide on waste transfer for action B1.



B2- Information and Public awareness of REMTh's citizens.

The second short-term action was about informing and educating residents on issues of recycling and climate change. For this reason, the following specific actions and activities were organized and implemented:

1. **Recycling corner.** In DIAAMATH's premises a recycling corner was created with information material available to the public on recycling, climate change and the project of Waste-C-Control.
2. **Recycling guide.** A guide for packaging recycling was designed and issued in the form of brochure and Poster. The poster posted in the office of DIAAMATH and the brochure printed on 400 color copies and distributed either through recycling corner or in awareness events, as presented below.

3. **Awareness events.** Awareness events took place about waste management on which DIAAMATH either organized or participated with presentations as follows:
- i. In cooperation with Rodopi's Scouts in May 2013 (18/05/2013) an all-day event was organized and held in DIAAMATH's premises, where DIAAMATH informed scouts, children and residents about the importance of recycling through participation in theatrical play and interactive games.
 - ii. DIAAMATH participated, along with other institutions in Komotini, in information days for students and teachers in high schools for the importance of recycling and in everyday life. The schools were the Musical high school of Komotini (10/04/13), the 4th high school of Komotini (15/04/13) and the Minority High school of Komotini (25/04/13). Photographs of these events can be found in the corresponding folder (B2_info_aware).
 - iii. DIAAMATH participated with a paper presentation on "Waste Management in municipality of Komotini" in the event of the Greek Association for the Protection of the Marine Environment (HELMEPA) under the framework of "Campaigns for the marine environment and science" in Komotini on 18/02/2013.
4. **Informative articles (web posts).** Six articles were written with useful information on the importance of better waste management to reduce the greenhouse gas emissions. The articles were posted on the website of DIAAMATH (www.diaamath.gr). The language of the article was simple and their issues were as follows:
- i. Making an improvised recycling bin (29/3/2013),
 - ii. Guide for proper packaging recycling (1/5/2013),
 - iii. Information event in cooperation with Scouts (18/5/2013 & 13/6/2013),
 - iv. Importance of house composting (22/6/2013),
 - v. Importance of printed paper recycling (31/7/2013),
 - vi. Importance of transshipment of waste (23/9/2013).

All the web posts are attached to the relevant file.

Picture 2. Indicative photos of recycling corner in DIAAMATH and of the all-day event in collaboration with Rodopi's Scouts (18/05/2013) for Action B2.



Picture 3. Participation in information days in schools (10/4, 15/4, 25/4) and in the HELMEPA event (18/2/2013) for action B2.





B3- Supply of recycling equipment.

For the third short-term action, regarding the supply of necessary collection equipment of packaging recycling operation, a Program Contract for cooperation between DIAAMATH and REMTH was concluded in November 2011 (attached file August 2012 as amended Programmatiki_Symvash_DIAAMATH_PAMTH.pdf). Goal of the program contract was the undertake of tender for the supply of necessary equipment for the municipal solid waste management by the Department of Technical Services of REMTH. The tender consisted of two subprojects. The first sub-project was about 4.000 plastic blue bins with volume 1.100lt, 35 refuse compression collector vehicles with a capacity of 16m³ and 4 bag openers. Executives of DIAAMATH participated as members of the evaluation committees of the tender along with members and executives of REMTH. The tender started on 10/10/2012 and ended in August 2012 with the award of the result by a decision of the Economic Committee of REMTH. It is noted that the long time interval was due to the procedure that should be followed after an objection was made against the contest. All records of the assessment from the start of the tender, the technical and financial offers (Record I, Record II, Record III) together with the decisions of Economic Committee of REMTH proclaiming the final contractors are presented as attachments to the corresponding folder (**B3_recycle equip**). The signed contracts with the final contractors are expected in early 2014.

Picture 4. Recycling plastic blue bin of 1.100lt and refuse compression collector vehicle for packaging recycling.

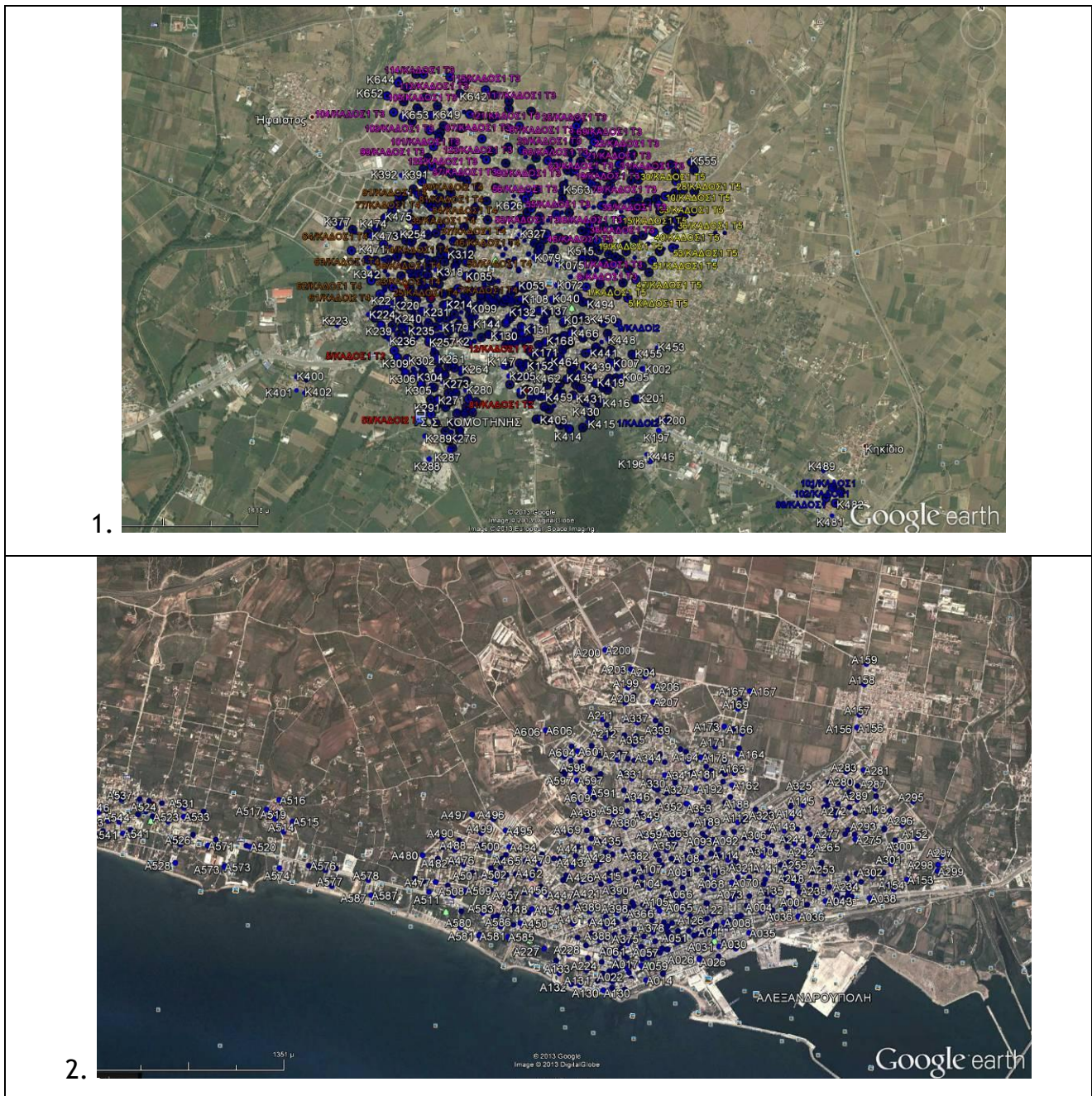


B4- Sitting of recycling bins in the West Sector of REMTh (cities of Drama and Xanthi).

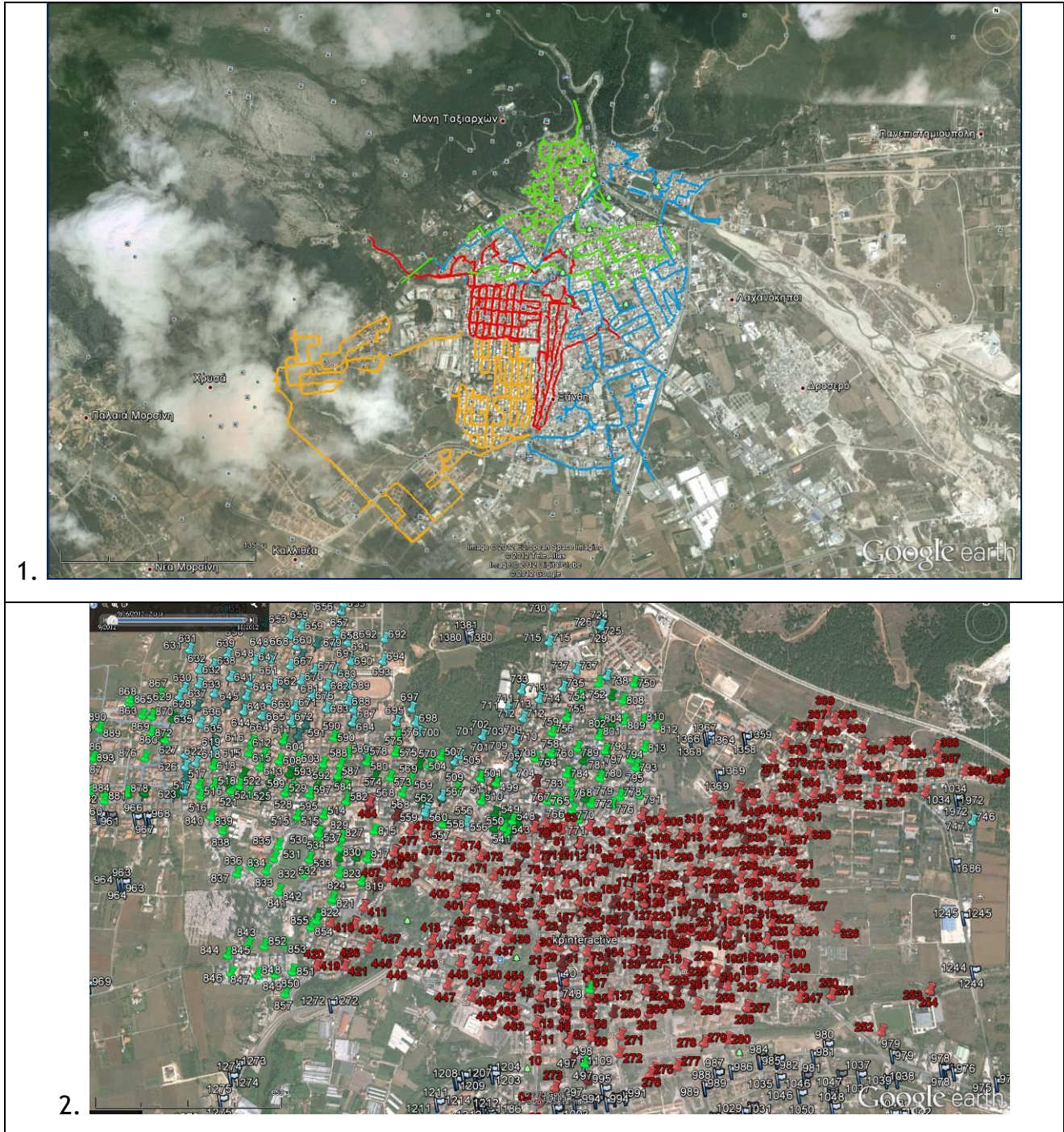
The fourth short-term action, which is related to the packaging recycling, is about the location of blue bins. For the implementation of this action a GPS (GARMIN - GPSMAP 62 series) device was purchased and recorded the positions of the blue bins in cities of Komotini and Alexandroupolis, in November 2011, where they have been placed by the municipal cleaning service. Based on these recordings, some useful statistics were obtained about the weight of recyclable materials per blue bin and the collection capability of collector vehicles. These data can be used to estimate the quantities of recyclable materials expected from the development of the blue bin in other areas of REMTH such as Drama and Xanthi.

Also, in fall of 2012 and winter of 2013 the solid waste bins recording with GPS in Xanthi and Drama was carried out and created kmz files. Based on these files is possible to support the municipal cleaning service of the respective municipalities and design the location of blue bins for packaging wastes.

Picture 5. Screenshot from the recording on map (Google Maps & Google Earth) of blue bins in the city of Komotini (first screenshot) and Alexandroupolis (second screenshot).



Picture 6. Screenshot from the recording on map (Google Maps & Google Earth) of waste solid bins in the city of Xanthi (first screenshot) and Drama (second screenshot).



Also, in a second stage, there will be planning development of the location of the remaining municipalities in REMTH, e.g. Kavala. Ultimately, it will be required a

cooperation with the cleaning services of Municipalities for the final location of bins, for which was prepared a short text with good practices in Municipal Solid Waste collection.

B5 - Pilot monitoring of three (3) waste streams of municipal solid waste produced at household level (organic putrescibles to home composting, recyclable material to package recycling, other garbage to final disposal)

For the fifth short-term action, a pilot monitoring program for the production of solid waste at the household level was planned and implemented. Three (3) different waste streams were monitored and recorded from households in Komotini, for a period of five (5) months, from April to August 2013. The systematic recording concerned the quantities of i) recyclable packaging, ii) organic putrescibles, and iii) other garbage, by using electronic scales and appropriate bins. Also, appropriate equipment (bins of 2 and 30 liter, kitchen scales, etc) was purchased and distributed as well proper documentation of participation was prepared. The proper documentation included folder with information material (welcoming/introduction message, participation guidelines, calendar for keeping records and waste-c-control leaflet). For the implementation of this action there was collaboration with the Ecological Group of Rodopi as an external assistance for:

- the selection of households and the distribution of specialized equipment and proper documentation (folder with information material),
- data monitoring, personal interviews with participants, data processing of the quantities of recyclable waste, organic putrescibles, garbage per household and data entry into a digital database,
- a technical report on the conclusions from the implementation of this program. The technical report included the following chapters: Introduction, Methods, Results, Conclusions, Bibliography and Appendix.

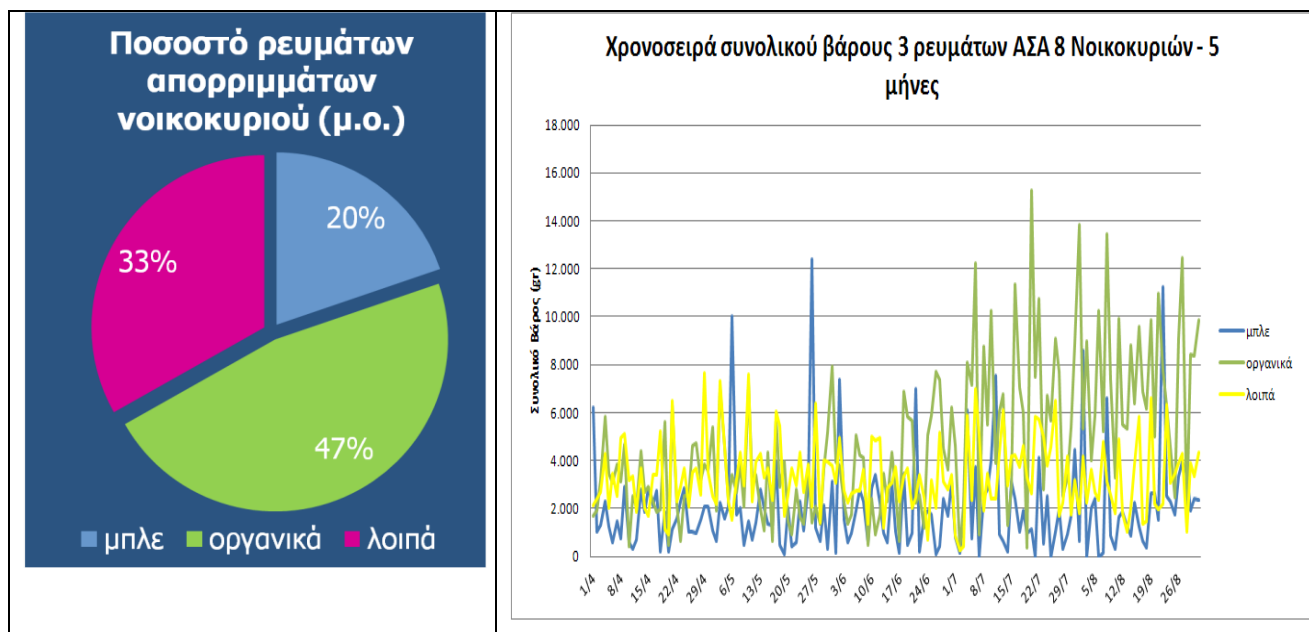
Picture 7. Photos from the pilot monitoring waste streams at the household level for action B5.



Based on the results of this action, the 67% of household waste can be recycled or composted. The pie chart is characteristic, in which the percent rates are average values of the pilot program. It appears that on average only 33% of waste by weight can not be recycled at source and is directed to garbage for final disposal.

Also, another one graph is showing the time series of the total weight of three waste streams for 8 households during 5 months. It's apparent the weight gain of the organics over the period of summer (June onwards).

Picture 8: Results of pilot action B5.



The results of this pilot action are encouraging and show the double benefit that may occur from the contribution of citizens and households in sustainable waste management, since waste that goes to sanitary landfill can be reduced together with greenhouse gases emissions.

B6 - Improving the management of landfill gas.

For the 6th short-term action, entitled improving the management of landfill gas, there was a monthly recording of biogas in sanitary landfill in Kavala for 6 months. There was preparation and monitoring of biogas by utilizing DIAAMATH's portable gas analyzer. In the start, there was a visit in the sanitary landfill and recording with the GPS device the geographical locations of 26 wells for passive relief of landfill gas. Then, the % concentration of landfill gas was recorded in the 26 wells as following:

- Methane (CH_4),
- Carbon dioxide (CO_2),
- Oxygen (O_2),
- Ammonia (NH_3),
- Hydrogen sulfide (H_2S),
- Carbon monoxide (CO) and

- BALANCE (nitrogen) (BAL-N₂).

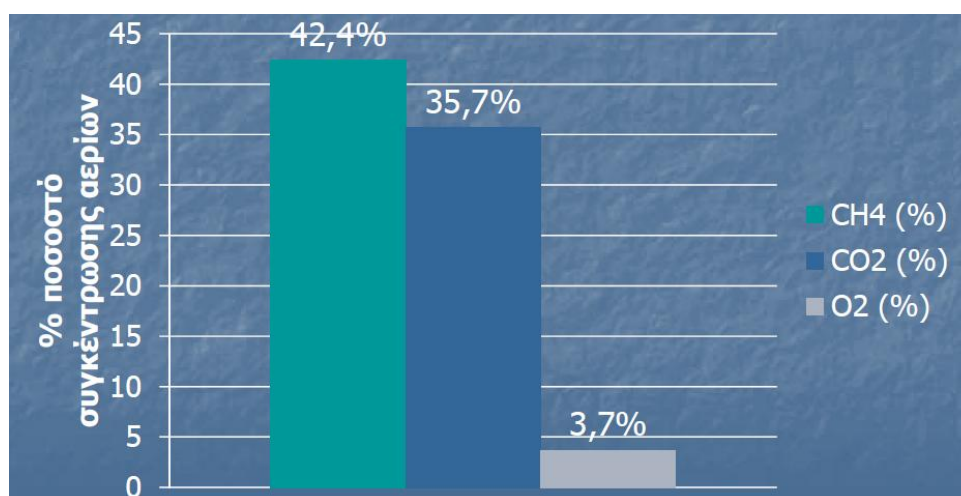
The monthly record was held for six months and particular in days: 01/02/2013, 01/03/2013, 12/04/2013, 24/05/2013, 28/06/2013 and 27/07/2013.

Picture 9: Photos of landfill gas recording in sanitary landfill in Kavala.



The next picture shows the graph of the percentages of landfill gas in a typical well of passive relief in Kavala's sanitary landfill. It appears that methane is more than 40%, and carbon dioxide is about 36%. Also, the next picture gives the graph of all the values recorded from the 26 wells concerning the three main component gases of landfill gas: methane, carbon dioxide and oxygen.

Picture 10: Typical graph of biogas in a well of landfill gas passive relief.



Finally, based on the data of solid waste quantities and the use of LANDGEM software in sanitary landfills in Kavala, Komotini and Xanthi, the emitted biogas quantity from sanitary landfills was estimated as shown in the attached file report.doc.

A good practice would be at least the burning of methane with the use of a flare so that there is less burden on the environment. In the design of the extensions of three sanitary landfills (Komotini, Kavala and Xanthi) the existence of flares is provided and this is a positive fact.

By using flares, methane may be combusted to carbon dioxide thereby reducing the impact on the greenhouse effect, since methane has a 20 times stronger weight as an agent of greenhouse gas compared to carbon dioxide.

MID-TERM and LONG-TERM ACTIONS

As noted, short-term actions were the most feasible for immediate implementation, since their time horizon was until the end of 2013. On the other hand, the mid and long term actions had longer time horizons due to the complexity of their implementation. Nevertheless, medium and long term implementation actions were already undertaken, as summarized below. Also it is noted that there are constantly developments related to their implementation.

MID-TERM ACTIONS

ME1- Operation of Drama Material Recycling Facility (MRF) & Xanthi MRF.

Up to October 2013, for initiating the operation of Material Recycling Facilities (MRF) in Drama and Xanthi, the following actions took place:

- An agreement on cooperation signed between DIAAMATH and Hellenic Recovery Recycling Corporation (HERRCO) on 24/7/2012, a company who organizes the collective recycling system in Greece, for packaging recycling in REMTH (attached file ME1_2012_07_24_symvash_EEAA_DIAAMATH.pdf).
- The documentation of a tender was prepared and the tender was held on 15/02/2013 for the selection of a contractor to operate the Drama MRF (Attachments: ME1_2013_02_15_Prokirixi_KDAY_Dramas.pdf, ME1_2013_02_15_Perilhpsh_Diagwnismos_Leitorygias_KDAYDramas.pdf).

- A cooperation agreement between the Municipality of Drama, DIAAMATH and HERRCO was prepared and signed on 22.03.2013 to start packaging recycling to the Municipality of Drama (attachment ME1_2013_03_22_EEAA_DIAAMATH_Dramas.pdf).
- Two cooperation agreements were signed between DIAAMATH and HERRCO on 02.10.2013 as amending the contract of 24.07.2012 regulating the operation of the MRF's or REMTH (Drama MRF, Xanthi MRF, Komotini MRF and Didymoteicho MRF).
- The operating permits of Drama MRF (03/09/2013) and Xanthi MRF (28/06/2013) were obtained by the respective Development Services of the Regional Units of Drama and Xanthi (attachments ME1_2013_09_03_adeia_leitourgias_KDAY_Dramas.pdf and ME1_2013_06_28_adeia_leitoyrgias_KDAY_Xanthis.pdf).

ME2- Sanitary Landfill extension in Komotini, Xanthi, Kavala.

Until the construction of the two IWMU there is a requirement for adequate sanitary landfill space for the disposal of MSW. So the extension of the existing three sanitary landfills (Komotini, Xanthi and Kavala) is necessary. First, the completion of environmental and technical studies is necessary and then the construction of the extensions follows. For the sanitary landfills of Xanthi and Kavala the completion of studies is underway while the extension of sanitary landfill of Komotini is being constructed. More specifically, for the extension of the Komotini sanitary landfill the environmental permitting was on May 2010 and April 2012 and subsequently its inclusion in Public Investment Program for funding was approved. An open tender was held and on March 2011 a contractor was appointment. On 15/02/2013 a contract was signed with the construction contractor. The contractual completion time is 12 months.

It is noted that the operation of sanitary landfills (Komotini, Xanthi and Kavala) until September 2013 is conducted by the municipalities of Komotini and Kavala and SDANX. A consultation process, for the operation of the sanitary landfills by DIAAMATH as provided by legislation, is underway between DIAAMATH and these operators. The relative letters of DIAAMATH can be found as attached files

(ME2_2013_05_26_letter_landfill_SDANX_DTopeirou.pdf, ME2_2013_06_25_letter_landfill_DKavalas.pdf , ME2_2013_06_25_letter_landfill_DKomotinis.pdf)

ME3- Supply of solid waste pretreatment & composting equipment of MSW

The third medium-term action was on the supply of equipment for pretreatment and composting of solid waste. The installation of the equipment is scheduled to be on the extensions of the three sanitary landfills and on three suitable locations in Drama and Evros. The equipment is: shredders, separators (Rotary sieve), System of aerobic treatment (composting) and baling systems. To this end a Program Contract was concluded between DIAAMATH and REMTH in November 2011 (attached file in August 2012 as amended Programmatiki_Symvash_DIAAMATH_PAMTH.pdf). The goal of the program contract was the undertake of tender for the supply of necessary materials for the management of municipal solid waste from the Department of Technical Services of REMTH. The tender consisted of two subprojects. The second subproject specifically concerned tendering for waste pretreatment and composting equipment (six shredders of bulky items, six waste separators, six aerobic treatment systems, six shreds for green wastes, six separators of treated waste and six wheeled loaders with bucket, three balers, three wheeled loaders with special provision for transferring bales).

The tender was held on 07/11/2012 and is ongoing (attachment ME3_Periplhpsh_DiakhryxhsEE_Ypoergo2.pdf). Executives from DIAAMATH are members of the evaluation committees of the tender along with members and executives from REMTH.

LONG-TERM ACTIONS

Long-term actions and activities include the construction and operation of the two Integrated Waste Management Units (IWMU) as provided in the Regional Waste Management Plan. The first IWMU is located in the Eastern Division of REMTH while the second IWMU is located in the Western Division of REMTH. Each IWMU includes a Waste Treatment Unit (WTU), and sanitary landfill of treatment residues (SLR). For long-term actions the following milestones and actions taken may be noted:

MA1- Construction of Integrated Waste Management Unit (IWMU) of Eastern Sector of REMTH (Alexandroupolis).

For the construction of the Integrated Waste Management Unit (IWMU) of Eastern Division of REMTH the following milestones and actions taken may be noted (until September 2013):

- The environmental impact study was approved by the decision (ref No 196552-1/3/12) of the ministry of the Environment, Energy and Climate Change (attached file - MA1_2012_03_01_AEPO_OEDA_An_Tomea.pdf).
- Draft program contracts between DIAAMATH and Municipality of Alexandroupolis for the WTU and SLR were prepared and approved by the Board of Directors of DIAAMATH (26.10.12) and the Board of the Municipality of Alexandroupolis. An audit by the Court of Auditors was followed on 20/12/12.

WTU of Eastern Division of REMTH:

- A program contract concluded between DIAAMATH and the Municipality of Alexandroupolis on 8.1.13 for the construction of WTU of Eastern Division of REMTH (attached file - MA1_2013_01_08_Programmatikh_symbash_DAlexpolis_MEA_SDIT.pdf).
- On January 18, 2013 an application for request of the WTU to enter the list of Public-Private Partnerships (PPP) projects was filed (attached file - MA1_2013_01_18_Aithsh_DAlexpolis_Ypagwghs_MEA_se_SDIT.pdf).
- Until September 2013 the acceptance of the application by the Special Secretariat of PPPs was pending.

SLR of Eastern Division of REMTH:

- A program contract concluded between DIAAMATH and the Municipality of Alexandroupolis on 8.1.13 for the construction of the SLR of Eastern Division of REMTH (attached file - MA1_2013_01_08_Programmatikh_symbash_DAlexpolis_XYTY.pdf).
- An application for funding request and a technical factsheet were filed to the

Intermediate Managing Authority (IMA) of REMTH (April 2013).

- The mode of tendering for the construction of the sanitary landfill of residues was approved. The mode was the one with the bidding system that includes design and build and it was approved by the Ref. No. D17g/69/5/FN440-30/8/13 decision of the General Secretariat of Public Works (attached file - MA1_2013_08_30_egkrish_tropou_Dhmoprathshs_XYTY.pdf).

MA2- Construction of IWMU of Western Sector of REMTH (Chrysoupolis - Kavala).

For the construction of the Integrated Waste Management Unit (IWMU) of Western Division of REMTH the following can be noted (until September 2013):

- The environmental impact study was approved by the decision (ref No 198028-4/5/12) of the ministry of the Environment, Energy and Climate Change (attached file - MA2_2012_05_02_AEPO_OEDA_Dyt_Tomea.pdf).
- On 23.1.2013 a letter was sent to the Municipality of Nestos together with a draft Program Agreement for the implementation of the IWMU of the Western Sector of REMTH through Public-Private Partnerships (PPP) (MA2_2013_01_24_letter_DNestou.pdf / attached file).
- On 12.2.2013 a letter was sent by the Municipality of Nestos which raised and highlighted the issue of contributory benefits for the Municipality of Nestos, which was answered by DIAAMATH with a letter dated 20.03.2013. (attached files: MA2_2013_01_24_letter_DNestou.pdf and MA2_2013_02_12_letter_DNestou_ofelh.pdf)
- On 1/7/2013 the Municipality of Nestos and residents of the Municipality of Nestos filled two requests for cancelling the approval decision (ref No 198028-4/5/12) of the ministry of the Environment, Energy and Climate Change by which the environmental impact study of the IWMU of Western Sector of REMTH was approved. The hearing requests to the CoS was set for September 18, 2013 and currently the decision of the Council of the State is pending.