



LIST OF GHG EMISSIONS REDUCTION MEASURES – GREATER VOLOS AREA

GREENHOUSE GAS (GHG) EMISSION REDUCTION MEASURES	Local Government	Public sector	Private sector	Residents
A. BUILDINGS				
A.1. Roof insulation	✓	✓	✓	✓
A.2. External walls insulation	✓	✓	✓	✓
A.3. Green roofs				✓
A.4. Replacement of window/door frames & glazing	✓	✓	✓	✓
A.5. Replacement of low efficiency A/C units	✓	✓		✓
A.6. External shading	✓ (municipality buildings & schools)	✓	✓	
A.7. Ceiling fans	✓ (municipality buildings)	✓		✓
A.8. Replacement of low efficiency diesel boilers		✓	✓	✓
A.9. Regular maintenance of boilers				✓
A.10. Intelligent indoor temperature management system				✓
A.11. Solar collectors for space & water heating			✓	✓





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A.12. Increased penetration of natural gas use		✓	✓	✓
A.13. Solar collectors for water heating only		✓ (hospital)	✓	✓
A.14. Solar cooling	✓	✓	✓	
A.15. Photovoltaics	✓ (municipality buildings & schools)	✓	✓	✓
A.16. Energy efficient office and home electrical appliances	✓	✓	✓	✓
A.17. Replacement of low efficiency bulbs	✓	✓	✓	✓
A.18. Light control automation systems	✓ (municipality buildings & schools)	✓	✓	✓
A.19. Non-technical energy conservation measures	✓	✓	✓	✓
A.20. Co-generation		✓ (e.g. hospital, university)		
A.21. Installation of Building Management Systems (BMS) - new construction	✓ (new municipality buildings)	✓ (new buildings)		
A.22. Bioclimatic buildings - new construction	✓ (new municipality buildings, Mediterranean Village, new building areas)		✓	✓





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B. TRANSPORTATION				
B.1. Replacement of old municipal passenger cars with hybrid ones	✓			
B.2. Renewal of heavy duty vehicles fleet	✓			
B.3. Renewal of garbage truck fleet	✓			
B.4. Renewal of DEYAMV vehicle fleet		✓ (DEYAMV)		
B.5. Municipal bicycle rental system	✓			
B.6. Extension of bicycle lane network	✓			
B.7. Extension of the pedestrian walkways	✓			
B.8. New car parking stations	✓		✓	
B.9. Urban buses - new low emissions compact buses			✓	
B.10. Urban buses - redesign of bus lines	✓		✓	
B.11. Tram construction		✓		
B.12. Eco-driving	✓	✓	✓	✓
B.13. Car pooling	✓	✓	✓	✓





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C. WATER SUPPLY AND SANITATION				
C.1. Reduction of water consumption through advertising campaigns and/or billing policy, which will result in energy demand reduction of the following services: (a) exploitation of water resources (water wells) & operation of water distribution network and (b) operation of sewage conveyance and pumping system & operation of sewage treatment plant		✓ (DEYAMV)		
C.2. Leakage minimisation in water distribution network and residential connections		✓ (DEYAMV)		
C.3. Reduction of water supply share coming from water wells (especially deep wells) by the utilisation of surface water resources		✓ (DEYAMV)		
C.4. Optimisation of water supply system through the installation of "smart" valves, division of water network into additional distribution zones, etc.		✓ (DEYAMV)		
C.5. Installation of electromagnetic water meters of direct reading to improve leakage monitoring		✓ (DEYAMV)		
C.6. Changes in the electromechanical equipment (pumps, etc) / upgrading of the water pumping stations to increase operating equipment efficiency		✓ (DEYAMV)		
C.7. Minimisation of parasitic inflow into the sewer system that causes operational problems in transporting and treating sewage		✓ (DEYAMV)		
C.8. Upgrading of the electromechanical equipment of sewage treatment plant with the aim of reducing local and linear losses		✓ (DEYAMV)		
C.9. Changes in the electromechanical equipment (pumps, etc) / upgrading of the sewage pumping stations to increase operating equipment efficiency		✓ (DEYAMV)		
C.10. Optimisation of sewage treatment plant (STP); the measures to be specified by energy audit (resetting of control system, put switch 'off' when not in operation, leakage repair, etc)		✓ (DEYAMV)		





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C.11. Shift electrical load to off-peak, improve power factor (STP)		✓ (DEYAMV)		
C.12. Simple control systems (STP)		✓ (DEYAMV)		
C.13. Further sludge treatment – possible further energy recovery (STP)		✓ (DEYAMV)		
C.14. Utilisation of potential energy in surface waters to produce electricity– application of renewable energy systems, autonomous and interconnected		✓ (DEYAMV)		
D. MUNICIPAL SOLID WASTE MANAGEMENT				
D.1. Extension of paper recycling		✓	✓	✓
D.2. Biodegradable waste recycling		✓	✓	✓
E. CITY OPERATION				
E.1. Replacement of low efficiency bulbs in street lighting	✓			
E.2. Automation in street lighting	✓			
E.3. Tree planting/ green spaces	✓			
F. OTHER				
F.1. Mediterranean Games’ Infrastructure – Mediterranean Village	✓	✓	✓	
F.2. Rehabilitation of Glavani land property	✓	✓		
F.3. Rehabilitation of fish market	✓	✓		



List guide in brief

The list is the result of the completing efforts to identify the measures for the reduction of GHG emissions at the greater Volos area. A variety of approaches were used to develop the list of options for consideration, including brain-storming, experience on LAPs of other cities, talking with various professionals and experts, and round discussions among project partners. To this end, an initial list was developed and introduced for consultation with local decision makers and key stakeholders: a dedicated conference took place in the premises of Municipality of Volos which enabled the active participation of local key players. There was an overwhelmingly positive reaction to the proposed measures from the attendance. Minor comments were eventually received that do not alter the initial list. Accordingly, the initial list was adopted without modifications to be the final list of measures under consideration.

The measures are presented per sector/emission source in the first column of the list. The next four columns refer to the actors responsible for implementing the measures, classified in four broad categories:

- **local government:** municipality of Volos and potentially other adjacent municipalities where feasible
- **public sector:** public utilities such as DEYAMV (Municipal Enterprise for Water Supply & Effluent Treatment and Discharge in the greater Volos area), DEMEKAV (Volos Municipal Enterprise for Urban Studies, Construction & Development) and other utilities such as the University of Thessaly and the General Hospital of Volos
- **private sector:** enterprises of the tertiary sector such as banks, hotels, offices, etc
- **residents:** households and citizen transport

The measures are grouped in six sectors/emission sources, these being:

(A) Buildings	The measures aim at enhancing the energy efficiency of the buildings through energy saving, energy recovery and renewable energy applications
(B) Transportation	The measures focus on three action targets (i) vehicle fleet of municipality and public sector (ii) construction of transportation infrastructure where feasible and (iii) initiatives to citizens
(C) Water supply and sanitation	The measures mostly relate to the operation of DEYAMV (except buildings and vehicles). The activities under consideration are the water supply system, the sewage treatment plant and the energy production from renewable energy sources.
(D) Municipal solid waste management	This sector provides measures to increase paper and biodegradable waste recycling. These two solid waste fractions contribute to methane emissions when disposed to landfills.
(E) City operation	This sector involves measures to reduce energy consumption in public lighting and adaptation measures (urban tree planting, green spaces).
(F) Other	This sector includes measures that could be applied to the infrastructure of Mediterranean Games that will take place in 2013, including land rehabilitation