

# SUSTAINABLE ENERGY ACTION PLAN

## *Geri Municipality - Cyprus*



**19 April 2012**

## Brief Summary

The “Pact of Islands” (ISLE-PACT project) is committed to developing **Local Energy Action Plans**, with the aim of achieving European sustainability objectives as set by the EU for 2020, that is of reducing **CO<sub>2</sub> emissions by at least 20% through measures that promote renewable energy, energy saving and sustainable transport.**

The Cyprus Energy Agency is a participating partner in the ISLE-PACT project and has invited Cyprus local authorities to demonstrate their political commitment by signing the “The Pact of Islands”; agreement in order to achieve the EU sustainability targets for 2020.

Cyprus participation involves 12 Municipalities and 2 Communities, including Geri Municipality.

The Municipality of Geri is 10 kilometers southeast of the capital of Cyprus, Nicosia, and is about 4 km from the campus, the Nicosia General Hospital and the National Park. Since 1974 part of the area of the municipality is occupied, while another, a smaller one, located in the "dead zone."

The year 2009 was designated as the year of referencing/recording energy consumption and CO<sub>2</sub> emissions in the Municipality’s territory. According to actual consumption data collected by the Electricity Authority of Cyprus (utility), the oil companies, the Statistical Service of Cyprus, etc, the total energy consumption in 2009 in Geri was 158.440 MWh. The largest consumer of energy in the municipality are the transport 91.499 MWh followed by the residential sector 24.869 MWh and less with the tertiary sector 16.681 MWh.

The CO<sub>2</sub> emissions in 2009 attributable to the overall energy consumption in the municipality are 60.871 tons.

For the forecast of CO<sub>2</sub> emissions in the period 2010 to 2020, the scenario of expected evolution was established, where it was estimated that without taking any measures emissions will amount to 62.009 tons.

The Sustainable Energy Action Plan that was prepared for the Municipality includes additional measures / actions to achieve at least the European goal of combating climate change. That is, the measures that will be taken by the Municipality in addition to national measures in order to overcome the goal of reducing CO<sub>2</sub> emissions by at least 20% by 2020 with respect to the reference year 2009.

The proposed measures are split into the following categories:

Description	Αριθμός
Energy Saving in Municipality public buildings	3
Energy Saving via informational campaigns	7
Energy saving in transport	2
Energy saving in street lighting	1
Development of green spaces	1

The estimated annual emissions reduction for 2020 by applying the above measures amounts to 2.296 tons. In addition, it was estimated that the impact on Geri Municipality from the

implementation of the national measures taken to reduce carbon dioxide emissions will result to an additional decrease of 11.771 tons.

Therefore, with the implementation of the Sustainable Energy Action Plan and a total reduction of 14.067 tons, annual emissions for 2020 will be limited to 47.942 tons. That is, **21,2%** lower with respect to those in the reference year 2009.

The budget of the Action Plan for the period 2011 to 2020 amounts to € 452.900. Funding for the implementation of the Energy Action Plan is expected to be taken from the following resources:

- Municipality budget
- Savings that will result from energy reduction measures in buildings, vehicles and street lighting in the Municipality.
- Revenues originating from Municipality investments on Renewable Energy technologies.
- Funding from the Grant Scheme of the Ministry of Commerce, Industry and Tourism for the promotion of Renewable Energy and Energy Conservation
- Potential funding from the Fund created for Emissions Trading Scheme.
- Potential funding from other European programs.
- Potential funding from the sustainable development and competitiveness program of the Planning Bureau.

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# 1. THE ISLE-PACT PROJECT

## 1.1. Introduction

The main objective of the ISLE-PACT project is the development of Local Sustainable Energy Action Plans, aiming at achieving European sustainability objectives as defined by the EU for 2020, namely a reduction of CO<sub>2</sub> emissions by at least 20% through measures promoting renewable energy, energy savings and sustainable transport. The duration of the project is set at 30 months, from 1<sup>st</sup> February 2010 until 31<sup>st</sup> July 2012.

The project coordinator is the organization Comhairle nan Eilean Siar (CnES) – The Outer Hebrides of Scotland. The project is funded by the European Commission, Directorate General for Energy.



Project participants are invited to demonstrate their political commitment by signing the "The Pact of Islands", a three-page document detailing all aspects and targets that will be set by the authorities of the islands in order to achieve the EU sustainability goals for 2020.

## 1.2. Commitments from signing the Covenant of Islands

The Covenant of Islands is a binding instrument on which the competent island authorities will adopt political commitments in order to achieve the Project objectives. The Covenant is a three-page text and is formatted in a similar way as the Covenant of Mayors, where the specificities of European island communities are taken into account. It signifies the start of a number of important objectives such as:

- Further implementation of EU targets for 2020, reducing CO<sub>2</sub> emissions by at least 20% in areas of implementation,
- The preparation of the Sustainable Energy Action Plan, which includes the original recording of emissions data (Baseline Emission Inventory), and outlines the methods for achieving the objectives,
- The preparation and submission of implementation reports at least every 2 years after the delivery of the final Sustainable Energy Action Plan for evaluation, monitoring and verification of individual goals,
- To organize Energy Days, in collaboration with the European Commission and other stakeholders (e.g. Cyprus Energy Agency), providing an opportunity for citizens to have direct contact with the subject and also to benefit directly from sustainable energy use, as well as informing the local media for individual developments in local action plans,
- Participation in various conferences and workshops organized by various European institutions in connection with the Covenant of Mayors and the Pact of Islands,
- Further implementation of energy investment in the project areas.

### 1.3. Participating Municipalities and Communities in Cyprus

In Cyprus, twelve (12) Municipalities and two (2) Communities have signed the Pact of Islands and therefore participate in the ISLE-PACT project:

Municipalities-Communities	
<b>Strovolos Municipality</b>	<b>Latsia Municipality</b>
<b>Agios Athanasios Municipality</b>	<b>Paralimni Municipality</b>
<b>Lakatamia Municipality</b>	<b>Engkomi Municipality</b>
<b>Aglantzia Municipality</b>	<b>Lefkara Municipality</b>
<b>Larnaca Municipality</b>	<b>Geri Municipality</b>
<b>Aradippou Municipality</b>	<b>Ergates Community</b>
<b>Polis Chrysochous Municipality</b>	<b>Psimolofou Community</b>



**Figure 1** Signing ceremony of the Pact of Islands on the 20th January 2011 in Nicosia



## 1.4. Signing Ceremony of the Pact of Islands

The signing ceremony of the Pact of Islands was performed in the building of the Committee of the Regions in Brussels on 12th April 2011. The event was part of the European Sustainable Energy Week, 11-15 April 2011, which brings together over 5000 participants each year in Brussels and many others elsewhere in Europe with multiple conferences, exhibitions and specialized conferences.



**Figure 2** Representatives of the EU islands, mayors of island communities and representatives of the island authorities along with Mercedes Bresso, President of the Committee of the Regions and Helen Mariano, General Secretary of CPMR (Conference of Peripheral and Maritime Regions)



**Figure 3** The Mayor of Agios Athanasios Kyriakos Chadjittofis (left) and the Mayor of Aglantzia Andreas Petrou (right)



**Figure 4** The Mayor of Aradippou Christakis Liperis (left) and the Mayor of Idalion Leontios Kallenos (right)



**Figure 5** The Mayor of Lakatamia Loukas Iatrou (left) and the Mayor of Larnaca Andreas Moyseos (right)



**Figure 6** The Secretary of Latsia Municipality Michalis Sokratous (left) and the Mayor of Paralimni Andreas Evaggelou (right)



**Figure 7** The Mayor of Polis Chrysochous Aggelos Georgiou (left) and the Mayor of Strovolos Savvas Iliofotou (right)



**Figure 8** The Secretary of Ergates Community Kyriakos Christodoulou (left) and the President of Geri Community (Municipality) Argyris Argyrou (right)



**Figure 9** The President of Psimolofou Community Ioannis Lazarides

## 2. CYPRUS

Cyprus is the largest island in the eastern Mediterranean and is located south of Turkey. The two main mountain ranges are Pentadactylos in the north and Troodos in the central and south-western part of the island. Between them lies the fertile plain of Mesaoria.

Cyprus has always been a crossroads between Europe, Asia and Africa and bears traces of many successive civilizations: Roman theatres and houses, Byzantine churches and monasteries, castles from the era of the crusades and prehistoric settlements.

The main economic activities of the island are tourism, clothing and craft items exports and merchant shipping. Traditional crafts include embroidery, pottery and bronze.

Traditional specialties include *mezedes* - appetizers served as a main course - *halloumi* cheese and the drink of *zivania*.

After the Turkish invasion in 1974 and the occupation of the northern part of the island, the Greek and Turkish communities of Cyprus have been divided by the so-called Green Line.

Cyprus is known as the island of Aphrodite, the goddess of love and beauty, as according to legend, Cyprus is the birthplace of the goddess.

In modern literature the names of Costas Montis (poet and writer) and Demetris Gotsis (writer) stand out, while Evagoras Karageorghis and Marios Tokas are distinguished composers.



**Year of EU entry:**

2004

**Political system:**

Democracy

**Capital:**

Nicosia (Lefkosia)

**Total area:**

9.250 km<sup>2</sup>

**Population:**

0,8 million

**Currency**

euro

Source: <http://europa.eu>

## 3. GERI MUNICIPALITY

### 3.1. Introduction

Geri is a large village which is located 10 kilometers southeast of the capital of Cyprus, Nicosia, and is about 4 km from the campus, the Nicosia General Hospital and the National Park. After a referendum in July 2011, announced the transformation of the community into of Geri municipality.

The origin of the name Geri according to the folklore tradition of the village has two versions:

First scenario: the village named Geri, because it is built on windswept hill. Agerin according to the Great Cyprus Encyclopedia is the windswept hill.

Second scenario: associated with the miraculous picture of Panagia of Chrysogeriotissas. Pregnant women in the village full of faith prayed to Panagia of Chrysogeriotissa to give birth strong children.

[Source: <http://www.yeri.org.cy/>]

### 3.2. History

During medieval times, the Ieri, as it is written in Venetian maps belonged to feudal lords. Florios Voustronios writes that during the period 1464-1468 Geri was the fief of Tagkrivarti, Polo and Zian Zappo. Probably, as stated in the Great Cyprus Encyclopedia, "due to the large area ... a part of it belonged to a feudal lord and the other part to a second feudal lord".

- Occupation

Geri, until the '90s, it was a small village, which occupied in agricultural and animal husbandry village. The residents were occupied in farming goats and cows, and less with the cultivation of cereals and olives. According to Gkontry, as rescues Karouzis, "Geri was famous for the production of pumpkins." Nowadays, most people work in Nicosia and very few are engaged in agriculture and animal husbandry.

It should be noted that since the 90s operated industrial zone, which is adjacent to the industrial area of Dali. The industries involved in the "production of bricks, plastics, animal feed and poultry."

- Education

Great Cyprus Encyclopedia noted that "there is no evidence for the existence of school before the British occupation."

Today there are two public kindergartens, two elementary schools and one junior high school, covering educational needs of the municipality. Important role in upgrading education plays the School Board. Caring for upgrading and improving the functioning of schools, promoting projects such as the construction of new classrooms, the construction of playgrounds and multipurpose room, and equipping them with all the modern teaching aids. Also in Geri located the Special School "Evangelismos."

- Churches

In Geri are the churches of Panagia of Chrysogeriotissas, Agios Minas, Agios Charalambos, the Chapel of Agios Stephanos and the chapel of Panagia of Paloura. The oldest church of Panagia Chrysogeriotissas, built in the 16th century, which indeed was renovated in 1814. Today, the church of Panagia Chrysogeriotissas is under the protection of the Department of Antiquities and will receive maintenance. The following are pictures of Geri from photographs of the website of the municipality (<http://www.yeri.org.cy/>).



**Figure 10** Church of Agios Charalambos



**Figure 11** Church of Agios Minas



**Figure 12** Chapel of Panagia of Paloura



**Figure 13** Church of Panagia Chrysogeriotissa



**Figure 14** Park to commemorate the victims of the air tragedy of August 14, 2005



**Figure 17** A Elementary School of Geri



**Figure 15** Heroes Monument



**Figure 18** Heroes Museum



**Figure 16** Museum of Folk Tradition



**Figure 19** Multifunctional Center of Geri

### 3.3. Local Plan of Nicosia

By 1990 the control of development in Cyprus, based on Public Roads and Building Law and Regulations. That legislation did not provide sufficient opportunities for effective control aspects of urban development, neither the means to allow the pursuit of locational policy or indirect interference in the workings of the land market. The role of the public sector was essentially regulatory and somewhat negative in character, and there was a possibility only in response to private sector initiatives.

Given the strong growth of development pressures caused by natural population growth, urbanization and the growth of industry, commerce, tourism and services, the Cyprus State decided to introduce planning and zoning law, so as to ensure rationalization of physical development. For this reason it was voted Urban and Regional Planning Law of 1972 and subsequent amendments, and came into full operation for the first time on December 1, 1990.

The Nicosia Local Plan prepared in accordance with the relevant provisions of the Urban and Regional Planning Law and launched by the Nicosia Master Plan , prepared by the Government in collaboration with the Municipality of Nicosia and Development Programme of the United Nations (UNDP). To Nicosia Local Plan was published for the first time on December 1, 1990. The first amendment of the Local Plan was published on October 4, 1996, and the Plan was finalized after consideration of the objections, which was completed and published in two phases (1999 and 2000). In the study of this amendment, consultations with the Joint Council Committee established pursuant to the provisions of Article 12 (1) of the Urban and Regional Planning Law

In Nicosia Local Plan specifying general principles upon which will be promoted, monitored and regulated development in the Local Plan. It is expected that the application of the provisions of the Plan will be achieved gradually balanced urban development and consolidation of the wider area of Nicosia.

In Local Plan areas include the municipalities of Nicosia, Ayios Dometios ,Engomis, Strovolos, Aglantzia ,Lakatamia and Latsia and the area of the **Community Council of Geri\***, as shown in Figure 4 Study Area and Administrative Structure. The extent of the area of the Local Plan is 19,000 hectares, according to the report of Statistics Census of Population (October 2001) - Population Data by District, Municipality and Community in October 2001 had a population of 198,200 people.

[Source: *Local Plan of Nicosia*]

\* After a referendum in July 2011 became a Municipality



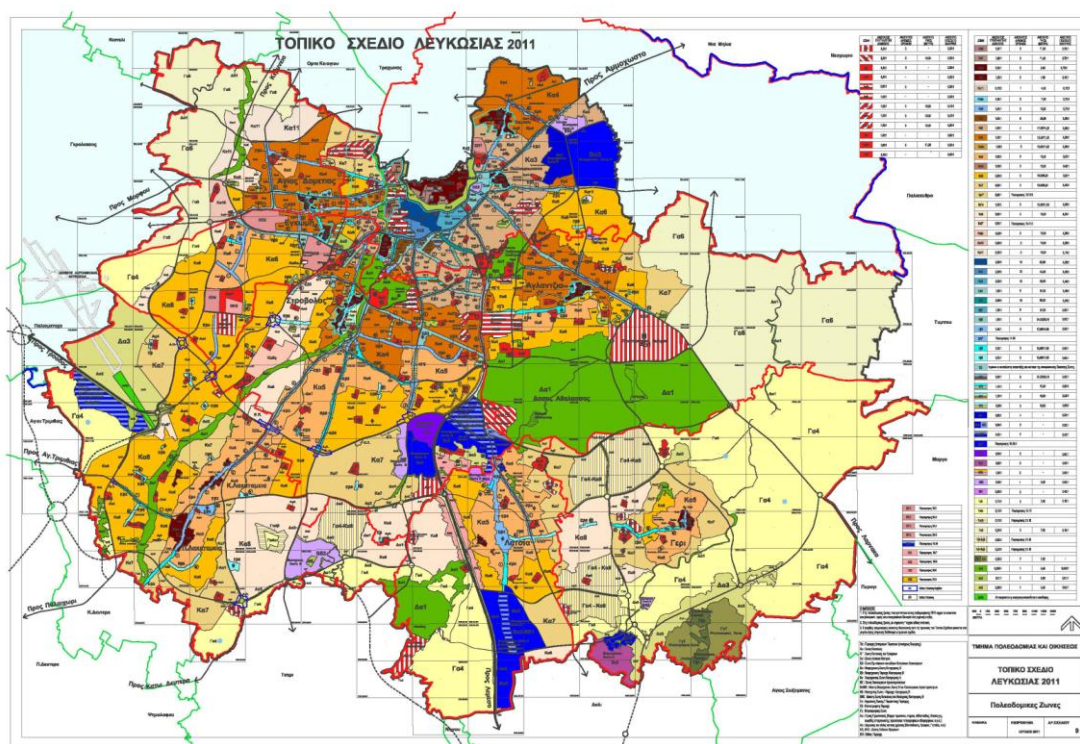


Figure 20 Local Plan of Nicosia

### 3.4. Local Plan Key Objectives

The Nicosia Local Plan is to define and implement the appropriate term planning policy framework that will allow the rational development of Nicosia until 2012, which is defined as the horizon year of this Local Plan.

In the study of this amendment to the Local Plan of Nicosia, the main targets set in the original publication of the Plan were reassessed and confirmed that they are the best choice for the gradual reorganization and planning of urban development. These objectives, enriched with modern town planning concepts, are summarized as follows:

- (a) The rational allocation of land uses in a way that ensures the best financial and functional organization of the city, separating as far as possible, incompatible uses, to protect the quality of life of the population, and to ensure a balanced variety compatible uses where this is desirable.
- (b) The conservation of natural resources and the natural environment of the Local Plan, for the benefit of current and future urban population, according to the principles of sustainable development.
- (c) Ensuring the planning and operational capabilities reunification of Nicosia after removing the Dead Zone, and to preserve the functioning of the broader perspective of Nicosia as a single, undivided city.
- (d) Upgrading of the organization and therefore the operation of the wider urban complex Nicosia as a unified whole town.

(e) The adoption of feasible solutions in relation to the current situation, and its application within the above framework, flexible and resilient policy measures which enable future changes and adapt to unexpected changes, if necessary by prevailing conditions.

(f) Ensuring the beneficial and efficient use of land 12 stocks available in areas designated for development, services and network infrastructure provided by the public sector (public schools across grades, road networks, water supply networks, telecommunications, electricity, drains, etc.).

(g) The gradual upgrading of amenities, quality of life and level of service of the entire urban population.

(h) The safeguarding and promotion of organized and integrated urban development through the application package provisions and incentives to encourage adoption of the designated growth areas.

(i) Ensuring the conditions for upgrading the Regional Growth Poles in substantial concentration of future physical development and, by extension, social and economic activity.

(j) The rationalization of residential areas so as to obtain the functional interrelationship of the distribution of the population with employment opportunities and services.

(k) The creation of conditions for the implementation of residential developments to meet the needs and capabilities of all income groups of population growth areas within the Local Plan, both through public and private sector, and to encourage single integrated design of residential developments.

(l) The adoption of measures that will contribute to a gradual but radical solution of operational or other problems encountered in sub-urban areas.

(m) The application of modern multidimensional traffic policy aimed balanced current and future operational needs of the entire city and all income groups of the population.

(n) The implementation of policy measures will help to protect and enhance the crucial role played by the Urban Center as the operational center of the whole of Nicosia, the wider region, but also of the whole of Cyprus.

(o) The equitable distribution of commercial activities and uses at strategic points in the urban fabric and prioritization of local commercial cores based on the population they serve.

(p) The preservation of data and areas of special or outstanding natural, historical, cultural and architectural interest. Specifically, the program seeks to adopt protection, preservation, restoration and revitalization of the walled town and other historical core, so that these areas be upgraded into attractive residential areas, business and cultural activities.

(q) The protection and gradual improvement of the natural environment of the area of the Local Plan, as this is a crucial factor for ensuring the quality of life and balance of uses and ecosystems.

(r) Enhancing opportunities for recreation and entertainment of the entire urban population, and the development and enrichment appropriate existing green spaces and ensuring young people for establishing an integrated and hierarchical system of free spaces.

### **3.5. General Development Strategy**

To achieve these goals, after evaluation of various alternatives chosen in 1990 and continues to adopt the following General Development Strategy and the individual provisions urban policy. Guiding principle of this Strategy will be assessed and confirmed in the present amendment of the Plan is the use of resources so that it could continue to produce and available for future generations, as well as effective organization and consolidation of development. The General Development Strategy of the Local Plan is based on the principle of organized and integrated development of the wider Nicosia and is crucial for the quality of the urban environment. The strategy is mainly based on the concept of sustainable development, combined with its stated policy to discourage the proliferation of various types of development in areas other than those specified, consistent with the goals and philosophy promoted by the European Union regarding the organization urban complexes. The General Development Strategy is the backbone of the Local Plan in Nicosia and is seated individual policy provisions mentioned specialized in different areas of development (eg, residential and commercial development).

[Source: *Local Plan of Nicosia*]

## 4. CURRENT STATUS AT GERI MUNICIPALITY

### 4.1. Description of the Buildings of Geri Municipality

#### 4.1.1. Brief Description

- Working hours for all City services are 7:30 to 14:00 for the summer season (1<sup>st</sup> June – 31<sup>st</sup> August) and 7:30 to 14:30 for the remaining months plus every Wednesday until 18:00.
- There is no central heating system therefore no consumption oil, gas, etc but split units are used in each office for both heating and cooling.
- All municipality buildings utilise solar panels for water heating. No building has a photovoltaic system installation.

### 4.2. Geri Municipality Street Lighting

The total energy consumption in 2009 for street lighting was equal to 781 MWh while the corresponding CO<sub>2</sub> emissions resulting from this consumption amounted to

The type and power of the lamps shown in the table below:

**Table 1 Lamp type in the buildings of the municipality**

HPS *	250 W
HPS	150 W
HPS	70 W
Compact	21 W

\* High Pressure Sodium

Street lighting operating Hours: According to the EAC, the bi-monthly tariff of street lighting is Code 35. Based on this tariff electricity for the lamps will be provided daily from half an hour after sunset until half an hour before sunrise.

The period of power supply can be increased from sunset to sunrise if requested by Geri Municipality.

### 4.3. Public Transport

Public transport in the Municipality conducted by the Transportation Organization of Nicosia District (O.S.E.L). Future goals are to strengthen O.S.E.L of public passenger transport and to increase the use of the bus by 2% are nowadays by more than 10%, which is the goal of the ministry until 2019. Aims by 2013 to install integrated fleet management system and machines issuing and cancellation of tickets to the traveling public can be better and easier movement of buses. Even to enhance a driver through frequent training of staff at all levels. We tried through various programs through the Department of Education and the Ministry of Communications to

promote and consolidate the use of the bus to the children, changing the culture of using public means of transport.

The urban routes conducted by the O.S.E.L and directly related to the municipality of Geri is route 160 (Geri / General Hospital / Makarios Avenue / Solomos Square) and route 259 (Geri / University of Cyprus / Solomos Square / University of Nicosia / Station Makarios). In the following Figure, shows the map of the route 259. Details of the routes available on the website of the Transportation Organization of Nicosia District, [www.osel.com.cy](http://www.osel.com.cy).

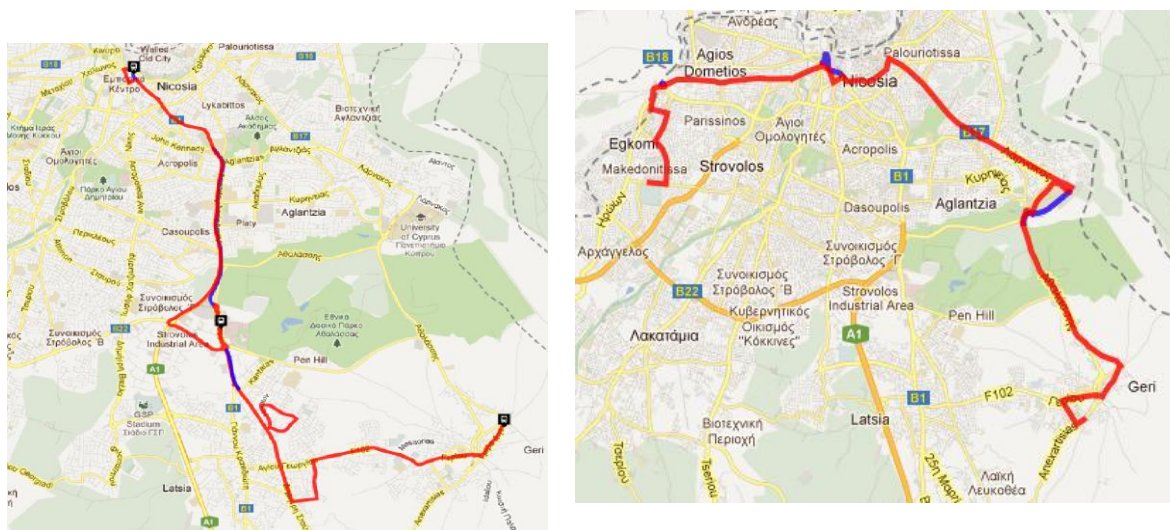


Figure 21 Routes 160 (left) και 259 (right) from and to the municipality of Geri  
(Source:www.osel.com.cy)

#### 4.4. Completed and under construction infrastructure projects

The Municipality of Geri is very active in various development projects in order to better serve of the residents and the quality of life in the Community.

Below briefly mentioned projects have been completed, are under construction and planned:

##### Completed projects:

- Upgrading of Community Clinic in Health Centre and its daily operation.
- Completion of several of the planned flood control projects in the municipality.

##### Under construction projects:

- Creation of park and monument honoring to the fighters of freedom and missing.
- Construction of flood protection works.
- Accelerate the creation of the sewerage system.
- Cleaning and landscaping of the Municipality.

## 4.5. Planned projects and measures in the municipality of Geri

### Planned projects and measures to support youth

- Establishment of Youth Institution.
- Support of unions and other organized groups involved in youth and sports.
- Operation Advisory Centre for Family and Youth.
- Development and improvement of the municipal court.
- Creation of leisure and entertainment parks.

### Planned projects and measures for cultural development

- Erection of the amphitheater.
- Support initiatives that promote and support the culture, history and traditions.
- Organized various cultural events.
- Establishment and operation of the municipal library.

### Development projects

- Urban planning and rational urban development.
- Construction of infrastructure projects in existing light industrial zones and industrial area.
- Record rural roads and repair of the existing road network in rural areas.
- Repair of road network and pavement construction. Fix roads to settlements
- Inclusion of the Municipality in the plan of remote areas. Expanding residential areas.
- Creating and expanding trade routes. Construction of the road Dali - Geri.

### Planned projects and measures to improve education

- Cooperation, support and promote the work of the Parents Association.
- Erection multipurpose hall. Full modern equipment of schools.
- Upgrading of sports facilities in schools.
- Provide the necessary infrastructure for the proper operation of all-day school.
- Erection of modern municipal kindergarten.

### Planned projects and measures for social welfare

- Supporting the Community Welfare Council.

- Collaboration and support of the Refugee Committee.
- Fair sharing of municipal taxation.
- Provide care and entertainment for the elderly.
- Support of the displaced persons who built in private plots to provide aid and upgrade their homes.
- Support for large families and poor families. For this purpose carried taxation.
- Infrastructure to support people in wheelchairs.

Planned projects and measures for a healthy environment

- Exploitation of purified water for the municipality.
- Undergrounding of high voltage cables of EAC
- Address the problem with dead animals in livestock area.

[Source: <http://www.yeri.org.cy>]

## 4.6. Production and management of solid waste in the municipality of Gerı

Concerning the production of household waste at municipal level, data are available in Nicosia area to the quantities produced in the municipalities of Nicosia, and driven to the place of disposal area Kotsiatis (data up to 1999). These data, available to the Statistical Service of Cyprus and from measurements made by the Municipality of Nicosia (daily weightings of garbage trucks who entered the disposal site, for one week).

The purpose of these measurements was to calculate the annual amount of waste resulting from the disposal area municipalities and communities in order to determine the fees disposal per Municipality and Community.

Based on the data in Table 2, it seems - as expected, that the amount of household waste, increasing over years and even have nearly doubled from year 1991 to year 1999. This is mainly due to the increase in population of Nicosia and the improvement of living standards.

**Table 2:** Quantities of household waste going to final disposal in Nicosia (tons / year)

Municipalities and wider area of Nicosia	1991	1994	1999
Nicosia Municipality	27.361	30.377	36.266
Strovolos Municipality	20.499	24.560	40.522
Engomi Municipality	4.730	6.544	10.534
Ag. Dometios Municipality	5.403	4.515	8.224
<b>Aglantzia Municipality</b>	5.663	6.490	14.451
Latsia Municipality	3.064	3.892	13.067

Lakatamia Municipality	5.047	8.614	12.839
Complex Deftera-Anthoupoli	4.472	1.565	2.361
Complex Dali-Pera Chorio Nisou	4.129	3.949	6.900
Complex Lithrodonta	2.444	3.028	3.427
Complex Ergates		1.940	1.970
Complex Kornos		712	1.170
Geri Improvement Council	<b>1.352</b>	<b>1.262</b>	<b>1.716</b>
Klirou Improvement Council	332	286	754
Gouri-Kalo Chorio		317	369
Mathiatis			312
Palaichori			520
Arediou		260	
Ergates Industrial Area		478	
<b>TOTAL</b>	<b>84.496</b>	<b>98.789</b>	<b>155.402</b>

(Source: Cyprus Statistic Service)

## 4.7. Materials recycling program in the municipality of Geri

The program garbage collection in the Municipality of Geri performed by a contractor of the nonprofit organization Green Dot Cyprus.

Within the boundaries placed recycling bins, PMD (blue), paper (brown) and glass and the collection is done every week. The collection of PMD and paper becomes in the municipality with the system from door to door and conducted Sunday starting at 8pm.

The Company Green Dot (Cyprus) Public Co Ltd (GDC), founded by the CCCI and number of obligated packaging managers on July 17, 2003, as a non-profit organization, in accordance with the provisions of Law 32 (I) / 2002. The creation of GDC stems from N.32 (I) / 2002 which sets out the framework responsibilities of business considered packaging managers should ensure the recovery and recycling of packaging.

Meanwhile, the organization is part of the largest global network of collecting societies packaging of Packaging Recovery Organisation Europe based in Brussels (PRO EUROPE) and includes 31 other similar systems around the world (more information on the organization's website [www.pro-e.org](http://www.pro-e.org)). With the above contribution, the system became the sole manager of the Green Dot mark in Cyprus.

Source: <http://www.csr-ccci.org.cy>

## 4.8. Population of the municipality of Geri

The largest population increase occurred after the Turkish invasion, because of the installation of a large number of refugees. While population of Geri before 1974 was just a few hundred in 1982 reached 2,500 thousand. Even more impressive is the population growth in recent years, due to the growth recorded in the region. According to the census conducted by the Statistical Service of Cyprus in 2001, the population of the Municipality of Geri was 6,443 while according to the 2011 Census, the population of the Municipality amounted to 8,450.



## 5. INVENTORY OF ENERGY CONSUMPTION IN GERI MUNICIPALITY

### 5.1. Residential Sector

**Table 3 Energy Demand in MWh in the Residential Sector in 2009**

Description	Electricity	Fuel Oil	LPG	Solar	Geothermal	Biomass	Total
Hot water	434	380	27	1.762	14	95	<b>2.711</b>
Heating and cooling	10.411	6.210	731	55	37	913	<b>18.357</b>
Lighting	578	-	-	-	-	-	<b>578</b>
Kitchen	434	-	186	-	-	0	<b>620</b>
Electrical appliances	2.603	-	-	-	-	-	<b>2.603</b>
<b>Total</b>	<b>14.460</b>	<b>6.590</b>	<b>944</b>	<b>1.817</b>	<b>50</b>	<b>1.008</b>	<b>24.869</b>

### 5.2. Primary Sector

**Table 4 Energy Demand in MWh in the Primary Sector in 2009**

Description	Electricity	Fuel Oil	Diesel	LPG	Wind	Biomass	Total
Agriculture, Forestries and Fisheries	1.527	847	0	556	240	611	<b>3.781</b>
Mining and Quarrying	2.690	1.492	4.035	980	-	-	<b>9.197</b>
<b>Total</b>	<b>4.217</b>	<b>2.339</b>	<b>4.035</b>	<b>1.536</b>	<b>240</b>	<b>611</b>	<b>12.978</b>

### 5.3. Secondary Sector

**Table 5 Energy Demand in MWh in the Secondary Sector in 2009**

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Processing	4.018	2.229	1.464	177	59	<b>7.947</b>
Water supply, wastewater treatment, waste management	2.046	1.135	745	-	-	<b>3.926</b>
Construction	281	156	102	-	-	<b>539</b>
<b>Total</b>	<b>6.345</b>	<b>3.520</b>	<b>2.311</b>	<b>177</b>	<b>59</b>	<b>12.413</b>

## 5.4. Tertiary Sector

**Table 6 Final Energy Consumption in MWh in the Tertiary Sector for the Year 2009**

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Wholesale and Retail trade, repair of motor vehicles and motorcycles	886	492	323	38	13	<b>1.751</b>
Hotels and restaurants	117	65	43	5	2	<b>231</b>
Public administration and social insurance	1.119	621	408	48	16	<b>2.211</b>
Defence, Justice, Police and Fire stations/departments	266	148	97	11	4	<b>526</b>
Education	157	87	57	7	2	<b>310</b>
Human Health and social care	69	38	25	3	1	<b>136</b>
Other Services	5.432	3.014	1.979	233	78	<b>10.735</b>
Public Lighting	781	-	-	-	-	<b>781</b>
<b>Total</b>	<b>8.827</b>	<b>4.464</b>	<b>2.931</b>	<b>345</b>	<b>115</b>	<b>16.681</b>

## 5.5. Transport

**Table 7 Final Energy Consumption in MWh in Transports for the Year 2009**

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transports	0	950	880	0	<b>1.830</b>
Other passenger transportation services (taxi, tourism, school buses, etc)	0	15.193	14.087	0	<b>29.280</b>
Commercial ground transportation services and removable services	0	0	0	0	<b>0</b>
Private Vehicles	0	31.335	29.055	0	<b>60.389</b>
<b>Total</b>	<b>0</b>	<b>47,477</b>	<b>44.022</b>	<b>0</b>	<b>91.499</b>

## 5.6. Total Energy Consumption in the Municipality of Geri

Table 8 Final Energy Consumption in MWh in 2009

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Geothermal	Biomass	Total
Residential	14.460	6.590	-	-	944	1.817	50	1.008	<b>24.869</b>
Primary	4.217	2.339	4.035	-	1.536	-	-	611	<b>12.978</b>
Secondary	6.345	3.520	-	-	2.311	177	-	59	<b>12.413</b>
Tertiary	8.827	4.464	-	-	2.931	345	-	115	<b>16.681</b>
Transports	-	-	47.477	44.022	-	-	-	-	<b>91.499</b>
<b>Total</b>	<b>33.849</b>	<b>16.913</b>	<b>51.512</b>	<b>44.022</b>	<b>7.722</b>	<b>2.339</b>	<b>50</b>	<b>1.793</b>	<b>158.440</b>

Figure 22 Share of Final Energy Consumption by Sector in 2009

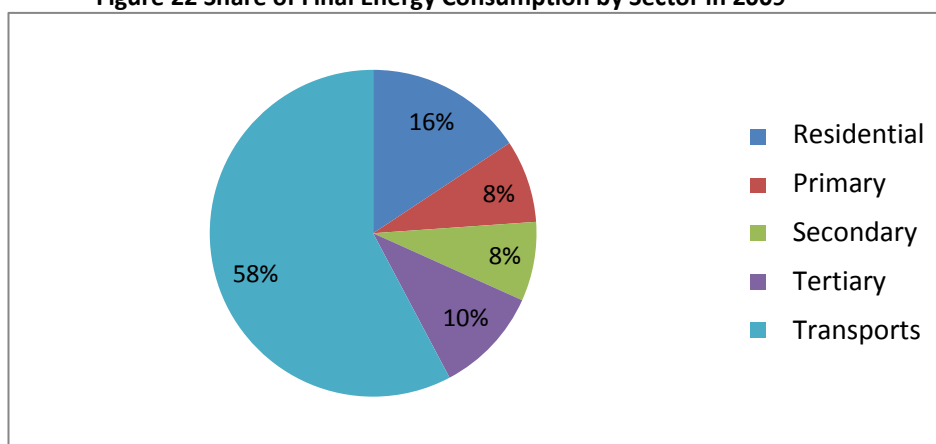
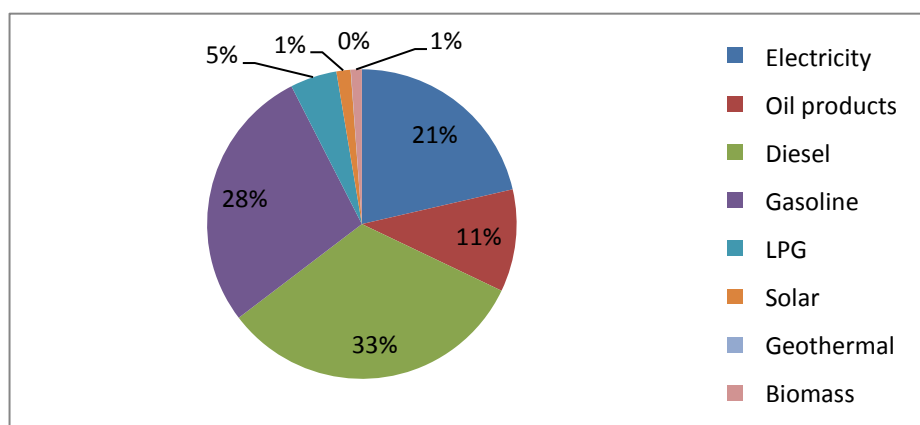


Figure 23 Share of Final Energy Consumption by Energy Source in 2009



## 6. INVENTORY OF CARBON DIOXIDE (CO<sub>2</sub>) EMISSIONS AT AGLANTZIA MUNICIPALITY

### 6.1. Introduction

For calculation of the emissions of carbon dioxide used fixed rates (standard emission factors) on consumption as the energy source and use. Renewable energy based on these rates is considered to have zero carbon emissions.

**Table 9 Coefficients for Calculating CO<sub>2</sub> Emissions**

	Energy Source	IPCC emission factors
FOSSIL FUELS	Fuel oil	0,279
	Diesel	0,267
	Gasoline	0,249
	Natural Gas	0,202
	LPG	0.240
	Electricity	0,874
RENEWABLE ENERGY SOURCES	Wind	0
	Hydro	0
	Solar	0
	Geothermal	0
	Biomass	0

### 6.2. Residential Sector

**Table 10 CO<sub>2</sub> Emissions in tones in the Residential Sector of Geri Municipality in 2009**

Description	Electricity	Fuel Oil	LPG	SOLAR	Geothermal	Biomass	Total
Hot water	379	7	1	-	-	-	<b>492</b>
Heating and cooling	9.099	175	35	-	-	-	<b>11.007</b>
Lighting	506	-	-	-	-	-	<b>506</b>
Kitchen	379	45	9	-	-	-	<b>424</b>
Electrical appliances	2.275	-	-	-	-	-	<b>2.275</b>
<b>Total</b>	<b>12.638</b>	<b>226</b>	<b>45</b>	-	-	-	<b>14.703</b>

## 6.3. Primary Sector

**Table 11 CO2 Emissions in tones in the Primary Sector of Geri Municipality in 2009**

Description	Electricity	Fuel Oil	Diesel	LPG	Biomass	Total
Agriculture, Forestries and Fisheries	1.335	236	0	133	-	<b>1.704</b>
Mining and Quarring	2.351	416	1.077	235	-	<b>4.080</b>
<b>Total</b>	<b>3.686</b>	<b>653</b>	<b>1.077</b>	<b>369</b>	-	<b>5.784</b>

## 6.4. Secondary Sector

**Table 12 CO2 Emissions in tones in the Secondary Sector of Geri Municipality in 2009**

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Processing	3.512	622	351	-	-	<b>4.485</b>
Water supply, wastewater treatment, waste management	1.788	317	179	-	-	<b>2.284</b>
Construction	246	43	25	-	-	<b>314</b>
<b>Total</b>	<b>5.546</b>	<b>982</b>	<b>555</b>	-	-	<b>7.082</b>

## 6.5. Tertiary Sector

**Table 13 CO2 Emissions in tones in the Tertiary Sector of Geri Municipality in 2009**

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Wholesale and Retail trade, repair of motor vehicles and motorcycles	774	137	77	-	-	<b>989</b>
Hotels and restaurants	102	18	10	-	-	<b>131</b>
Public administration and social insurance	978	173	98	-	-	<b>1.249</b>
Defence, Justice, Police and Fire stations/ departments		41	23	-	-	<b>297</b>
Education	137	24	14	-	-	<b>175</b>
Human health and social care	60	11	6	-	-	<b>77</b>
Other services	4.748	841	475	-	-	<b>6.063</b>
Public lighting	683	-	-	-	-	<b>683</b>
<b>Total</b>	<b>7.715</b>	<b>1.245</b>	<b>703</b>	-	-	<b>9.664</b>

## 6.6. Transport

**Table 14 CO2 Emissions in for Transports in Geri Municipality in 2009**

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transports	-	254	219	-	<b>473</b>
Other passenger transportation services (taxi, tourism, school buses, etc)	-	4.056	3.508	-	<b>7.564</b>
Commercial ground transportation services and mobile services	-	0	0	-	<b>0</b>
Private vehicles	-	8.366	7.235	-	<b>15.601</b>
<b>Total</b>	-	<b>13.754</b>	<b>10.961</b>	-	<b>23.638</b>

## 6.7. Total CO2 emissions in the municipality of Geri

**Table 15 Total CO2 emissions in Geri Municipality in 2009**

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Geothermal	Biomass	Total
	Residential	12.638	1.839	-	-	226	-	-	-
Primary	3.686	653	1.077	-	369	-	-	-	<b>5.784</b>
Secondary	5.546	982	-	-	555	-	-	-	<b>7.082</b>
Tertiary	7.715	1.245	-	-	703	-	-	-	<b>9.664</b>
Transports	-	-	12.676	10.961	-	-	-	-	<b>23.638</b>
<b>Total</b>	<b>29.584</b>	<b>4.719</b>	<b>13.754</b>	<b>10.961</b>	<b>1.853</b>	-	-	-	<b>60.871</b>

Figure 24 Share of CO2 Emissions by Sector in 2009

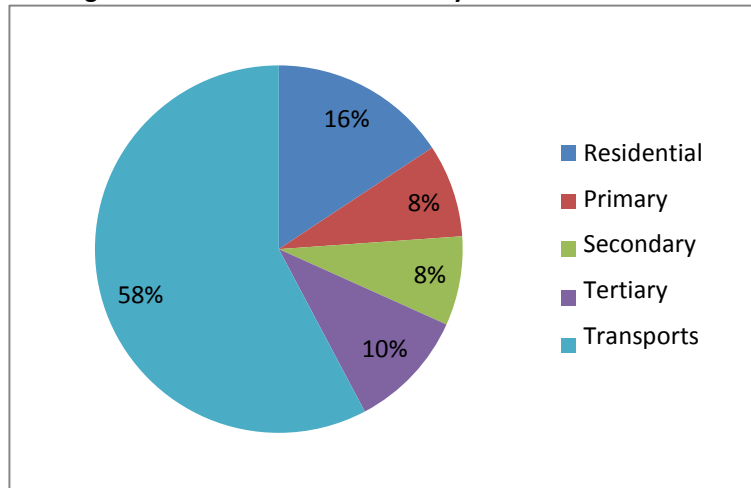
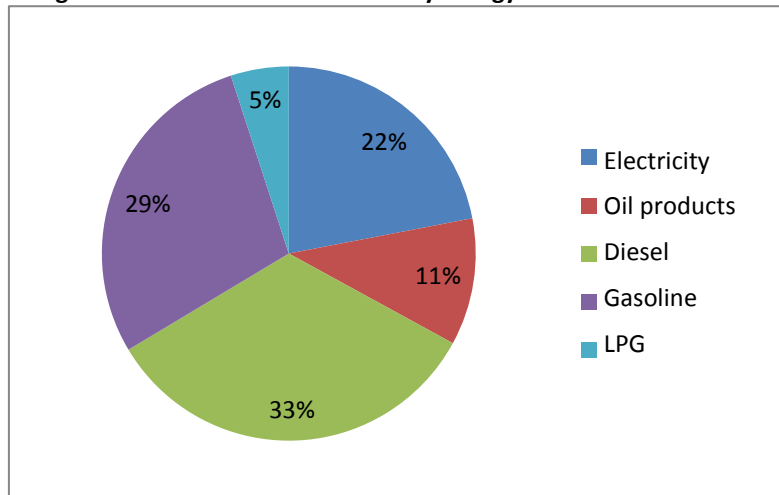


Figure 25 Share of CO2 Emissions by Energy Source in 2009



## 6.8. Forecasting/projection scenario of CO2 emissions

Residential

For the forecasting/projection of CO<sub>2</sub> emissions in the period 2010 to 2020, a set of expected evolution was compiled, which includes the following main assumptions:

1. Use of annual growth rates of energy consumption per sector based on the data available during the preparation of the Energy Action Plan (see Table 16)
2. Use of annual growth rates of energy efficiency at the end-use due to the improvement of existing technologies (see Table 17)
3. Estimation of the coefficient of performance of Cyprus Power Plants in subsequent years, taking into account the technology improvement and the modernization of the existing equipment (see Table 18).
4. The gradual introduction, use and integration of natural gas into the power generating system.

**Table 16 Growth Rates of Energy Consumption per Consumer used in the expected evolution scenario**

Sector Description	Estimated annual energy consumption rate
<b>Residential</b>	
Hot water	3,5%
Heating and Cooling	3,5%
Lighting	3%
Cooking	3%
Refrigerators and freezers	3%
Washing and drying machines	3,5%
Dishwashers	3%
Televisions	3%
Other electrical appliances	3%
<b>Primary Sector</b>	
Agriculture, forestries and fisheries	1,0%
Mining and quarrying	0,0%
<b>Secondary Sector</b>	
Processing	2,0%
Water supply, wastewater treatment, waste management and remediation activities	1,0%
Construction	2,0%
<b>Tertiary Sector</b>	
Wholesale and retail trade, repair of motor vehicles and motorcycles	3,0%
Accommodation services activities and food services	2,0%
General public administration and social insurance	2,5%
Defense and justice services, police and fire stations/ departments	1%
Education	2,0%
Activities relatd to human health and social care	2,5%
Other services	2,0%
Municipal/ Public lighting	1,5%
<b>Transports (vehicles)</b>	
Private transports	1,0%
Urban and suburban passenger transports	1,0%
Other road transport services (taxi, tourism, school buses, etc.	3%
Freight road transports and removal services	0,0%
<b>Secondary energy production</b>	
Solar energy for electricity generation	3,0%
Wind energy for electricity generation	1,0%
Solar energy for heating and cooling	2,0%
Geothermal energy for heating and cooling	1,0%
Biomass energy for heating and cooling	2,5%



**Table 17 Increased Efficiency in Energy End-use (Reducing the Final Energy for the same Useful Energy)**

Sector Description	Estimated annual energy consumption rate
<b>Residences</b>	
Hotwater	0,5%
Heating and cooling	0,5%
Lghting	0,5%
Cooking	0,5%
Refrigerators and heaters	0,5%
Washing and drying machines	0,5%
Dishwashers	0,5%
Televisions	0,5%
Other electrical appliances	0,5%
Other services	0,5%
Municipal/ Public lighting	0,5%
<b>Transperts (Vehicles)</b>	
Private transports	0,5%

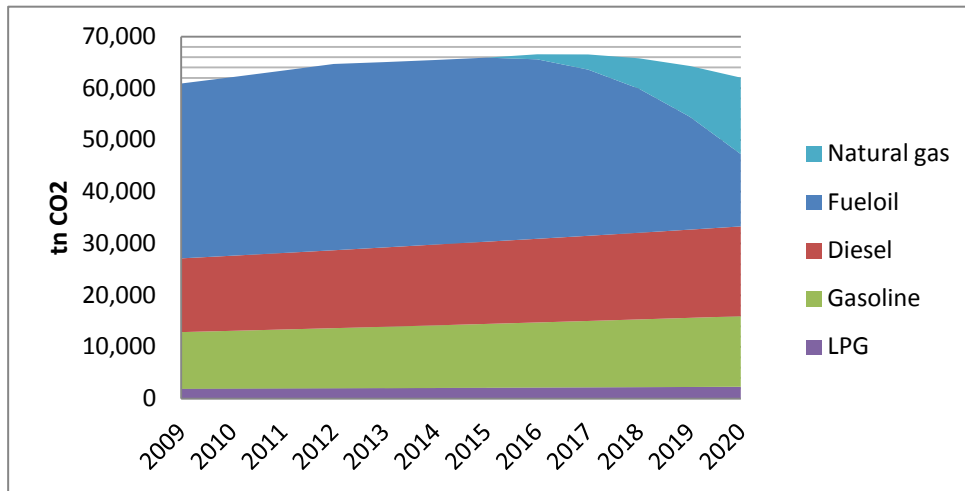
**Table 18 Coefficients of Energy Performance of Electricity Generation**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fuel Oil	32%	32%	32%	33%	34%	35%	35%	35%	35%	35%	35%
Diesel	25%	25%	25%	25%	25%	26%	27%	28%	29%	30%	31%
Natural Gas	32%	32%	32%	33%	34%	43%	43%	43%	44%	44%	44%

**Table 19 Expected Evolution Scenario for Forecasting CO2 Emissions for the Period 2009 - 2020**

Year	Fuel Oil	Diesel	Gasoline	LPG	Natural Gas	Total	Percentage increase based on 2009
<b>2009</b>	33.797	14.260	10.961	1.853	0	<b>60.871</b>	0%
<b>2010</b>	34.515	14.522	11.179	1.886	0	<b>62.101</b>	2%
<b>2011</b>	35.252	14.789	11.400	1.919	0	<b>63.360</b>	4%
<b>2012</b>	36.007	15.063	11.627	1.952	0	<b>64.650</b>	6%
<b>2013</b>	35.823	15.343	11.859	1.987	0	<b>65.012</b>	7%
<b>2014</b>	35.675	15.629	12.096	2.022	0	<b>65.422</b>	7%
<b>2015</b>	35.580	15.899	12.339	2.058	0	<b>65.876</b>	8%
<b>2016</b>	34.691	16.177	12.587	2.095	975	<b>66.524</b>	9%
<b>2017</b>	32.125	16.462	12.840	2.132	2.932	<b>66.491</b>	9%
<b>2018</b>	27.843	16.755	13.099	2.171	5.879	<b>65.747</b>	8%
<b>2019</b>	21.808	17.055	13.364	2.210	9.826	<b>64.263</b>	6%
<b>2020</b>	13.980	17.362	13.635	2.250	14.781	<b>62.009</b>	2%

Figure 26 Expected Evolution Scenario for Forecasting CO2 Emissions for the Period 2009 -2020



## 7. GERI MUNICIPALITY SUSTAINABLE ENERGY ACTION PLAN FROM 2011 TO 2020

### 7.1. Introduction

The Sustainable Energy Action Plan that has been prepared for Geri Municipality includes additional measures/actions so as to achieve at least the European goal of combating climate change. This includes measures taken by the Municipality, in addition to national measures, to overcome the goal of reducing CO<sub>2</sub> emissions by at least 20% by 2020 compared to the reference year 2009.

<b>Emissions Reference Year 2009</b> (tn CO <sub>2</sub> /year)	<b>Expected annual emissions in 2020</b> (tn CO <sub>2</sub> /year)	<b>Average growth rate in Emissions</b> (tn CO <sub>2</sub> /year)	<b>Minimum emissions target in 2020</b> (tn CO <sub>2</sub> /year)	<b>Desired minimum (20%) emissions reduction</b> (tn CO <sub>2</sub> /year)
<b>60.871</b>	62.009	103	48.697	13.312

Although the contribution of national measures is estimated and included in the Sustainable Energy Action Plan, the municipality cannot determine the achievement of National Goals. However, several of the measures proposed to be implemented at a local level, will support and complement national measures, in order to enable the achievement of the main objectives.

The measures are divided in the following main areas:

- Energy saving in public buildings
- Energy saving through awareness raising campaigns
- Energy saving in transports
- Energy saving in street lighting
- Development of green spaces

## 7.2. Energy saving in public buildings

### Measure ENEF1: Energy Saving in the Town Hall

The indirect cost of the measure is not very significant as required purchase and replacement of the bulbs with technical and financial criteria.

Implemented period: 2012

Measure Code	<b>ENEF1</b>		
Measure Name	<b>Bulbs replacing</b>		
<b>APPLICATION COST</b>			
Investment cost	<b>Cost (€)</b>		
<b>Bulbs replacing (100)</b>	<b>500</b>		
Operation cost			
<b>Bulbs replacing</b>	<b>0 €</b>		
Indirect cost			
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low		
<b>APPLICATION BENEFITS</b>			
Energy	<b>Energy Saving (kWh/year)</b>		
	<b>5.742</b>		
Financial	Energy saving (kWh/year)	Average electricity price (€/kWh)	<b>Saving (€/year)</b>
	<b>1.000</b>	0.25	<b>250</b>
Environmental	<b>Emissions Saving (kg<sub>CO2</sub>/ year)</b>		
	<b>874</b>		
<b>RESULTS – EVALUATION</b>			
Estimated Unit Cost (€/kg CO <sub>2</sub> )	<b>0,29 €/ kg<sub>CO2</sub> annual saving</b>		<b>Proposed for Implementation</b>
			<input checked="" type="checkbox"/>
<b>DELIVERABLE</b>			
<b>Total Cost</b> 500 €	<b>Saving</b> 250 €	<b>Emissions Reduction</b> 874 Kg <sub>CO2</sub> / year	<b>Depreciation</b> 2 years

### Measure ENEF2: Maintenance of air conditioning systems

The indirect application cost is considered small as it includes the maintenance equipment and the required spare parts for the air conditioning systems. It is required to attribute responsibilities to the technical staff of the municipality regarding the maintenance of heating and air conditioning of municipal buildings, every 6 months.

Measure implementation period: 2012 - 2020

Measure Code	<b>ENEF 2</b>		
Code Name	<b>Maintenance of air conditioning systems</b>		
<b>APPLICATION COST</b>			
Investment Cost	<b>Cost (€)</b>		
<i>Maintenance of air conditioning systems</i>	<b>0</b>		
Operation Cost			
<i>Maintenance of air conditioning systems</i>	<b>500 €/year</b>		
Indirect Cost			
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low		
<b>APPLICATION BENEFITS</b>			
Energy	<b>Energy Saving (kWh/year)</b>		
	<b>3.000</b>		
Financial	Energy Saving (kWh/year)	Average electricity price (€/kWh)	<b>Saving (€/year)</b>
	<b>3.000</b>	0.25	<b>750</b>
Environmental	<b>Emissions Saving (kg<sub>CO2</sub>/ year)</b>		
	<b>1.730</b>		
<b>RESULTS - EVALUATION</b>			
Estimated unit cost (€/kg CO <sub>2</sub> )	<b>0,29€/ kg<sub>CO2</sub> annual saving</b>		<b>Proposed for Implementation</b>
			<input checked="" type="checkbox"/>
<b>DELIVERABLE</b>			
<b>Estimated Cost</b> 500 €	<b>Saving</b> 750 €	<b>Emissions Reduction</b> 7.350 Kg <sub>CO2</sub> / year	<b>Depreciation</b> 0,67 years

### **Measure ENEF3: Renewable Electricity from Photovoltaic Systems on Municipal Buildings**

The installation of electricity generating systems with Photovoltaic panels was studied. The total power from the PV installation will be 20 kW and will cover an area of approximately 200 m<sup>2</sup>.

The indirect cost of the measure application is not particularly important, as the following requirements must first be fulfilled: (a) preparation of call for tenders, (b) evaluation of the tenders by specific technical and financial criteria, (c) completion of form (application) to ensure the subsidy from the 2009-2013 Grant Scheme of the Ministry of Commerce, Industry and Tourism. Additionally, the process of connecting the PV systems with the electricity network grid of EAC should be performed. Photovoltaic Systems receive a subsidy on the sold kWh (selling price is €0,35)

Measure implementation period 2013-2016

Measure Code	<b>ENEF 3</b>		
Measure Name	<b>Renewable Electricity on Municipal Buildings</b>		
<b>APPLICATION COST</b>			
Investment Cost	<b>Total (€)</b>		
<i>Photovoltaic Systems 20 kW</i>	<b>50.000</b>		
Operation Cost			
<i>Photovoltaic Systems 20 kW</i>	<b>0 € (negligible cost for the periodical cleaning of the frames)</b>		
Indirect Cost			
	<input type="checkbox"/> – High <input checked="" type="checkbox"/> – Average <input type="checkbox"/> – Low		
<b>APPLICATION BENEFITS</b>			
Energy	Power (kW)	Electricity Generation (kWh/kW.year)	<b>Green Energy (kWh/year)</b>
<i>Photovoltaic Systems 20 kW</i>	20	1500	<b>30.000</b>
Financial	Green Energy (kWh/year)	Subsidized price of electricity (€/kWh)	<b>Income (€/year)</b>
<i>Photovoltaic Systems 20 kW</i>	30.000	0.25	<b>7.500</b>
Environmental	Emission Reduction Factor (kg <sub>CO2</sub> /kW.year)	Power (kW)	<b>Emissions Saving (kg<sub>CO2</sub>/ year)</b>
<i>Photovoltaic Systems 20 kW</i>	1.183	20	<b>23.660</b>
<b>RESULTS - EVALUATION</b>			
Unitary Cost (€/kg CO <sub>2</sub> ) <i>Photovoltaic Systems 20 kW</i>	2.11 €/ kg <sub>CO2</sub> annual saving		<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>
<b>DELIVERABLE</b>			
<b>Total Cost</b> 50.000 €	<b>Income</b> 7.500 €	<b>Emissions Reduction</b> 23.660 Kg <sub>CO2</sub> / year	<b>Depreciation</b> 6,7 years

## 7.3. Energy saving through awareness raising campaigns

### Measure ESAC1: Organization of an annual seminar on Renewable Energy Sources

The organization of an annual seminar on Renewable Energy Sources (RES) in Geri Municipality was examined. The all-day seminar will be held at the Town Hall, annually for a total of 3 years.

The indirect cost for the application of this measure can be considered high as apart from the organization of the seminar (speakers, invitations, space, catering etc), interested parties will have to bear the costs of implementing RES at home on their own.

Measure implementation period: 2012 - 2014

Measure Code	<b>ESAC 1</b>	
Measure Name	Organization of an annual seminar on Renewable Energy Sources	
<b>APPLICATION COST</b>		
Cost of Measure	<b>2.000 €</b>	
Indirect Cost	<input checked="" type="checkbox"/> – High <input type="checkbox"/> – Average <input type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>54.000 kWh/year</b>	
Financial (Green Energy €/year)	The financial benefits for interested parties	
Environmental (kg CO <sub>2</sub> -eq)	<b>42.606 kg<sub>CO2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0.047€/ kg<sub>CO2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES: Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 20*3*0.3*3*1000kWh/year= 54.000$ kWh/year

### Measure ESAC2: Organization of annual seminar on Energy Saving

The organization of an annual seminar on Energy Saving in Geri Municipality was examined. The all-day seminar will be held at the Town Hall, annually for a total of 3 years.

The indirect cost for the application of this measure can be considered high as apart from the organization of the seminar (speakers, invitations, space, catering etc), interested parties will have to bear the costs of implementing energy saving technologies at home on their own.

Measure implementation period: 2012 - 2014

Measure Code	<b>ESAC 2</b>	
Measure Name	<b>Organization of annual seminar on Energy Saving</b>	
<b>APPLICATION COST</b>		
Cost of Measure	<b>2.000 €</b>	
Indirect Cost	<input type="checkbox"/> – High <input checked="" type="checkbox"/> – Average <input type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>31.500 kWh/year</b>	
Financial (Energy saving. €/year)	The financial benefits for interested parties	
Environmental (kg CO <sub>2</sub> -eq)	<b>20.283 kg<sub>CO2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0,10€/ kg<sub>CO2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES:Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 20*3*0.25*3*700kWh/year= 31.500 kWh/year$



**Measure ESAC3:** Organization of educational presentations to students

The organization of educational presentations to students on renewable energy sources and energy saving was examined. The measure includes a set of four (4) presentations.

The indirect cost of the measure can be considered as high as apart from the organization of the presentations, the interested party (who will become aware of the measure through their children) should bear the costs of implementing energy saving measures or renewable energy sources in their home, on their own.

Measure implementation period: 2010

Measure Code	<b>ESAC 3</b>	
Measure Name	<b>Organization of educational presentations to students</b>	
<b>APPLICATION COST</b>		
Cost of Measure	<b>1.200 €</b>	
Indirect Cost	<input checked="" type="checkbox"/> – High <input type="checkbox"/> – Average <input type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>504.000 kWh/year</b>	
Financial (Energy saving. €/year)	The financial benefits for interested parties	
Environmental (kg CO <sub>2</sub> -eq)	<b>357.336kg<sub>CO2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0.003€/ kg<sub>CO2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES: Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 350*1,5*0.4*3*800kWh/year= 504.000 kWh/year$

**Measure ESAC4:** Organization of “Day without lighting”

The organization of an annual day without lighting in Geri Municipality was examined. The measure will apply for a period of 7 years.

The indirect cost of the measure application can be considered as high as, apart from the event organization, the interested party should bear their own costs of implementing energy saving measures or renewable energy sources at home.

Implementation on 30 March 2013 (and every following year for 10 years)

Measure Code	<b>ESAC 4</b>	
Measure Name	<b>Organization of “Day without lighting”</b>	
<b>APPLICATION COST</b>		
Cost of Measure	<b>2000 €</b>	
Indirect Cost	<input checked="" type="checkbox"/> – High <input type="checkbox"/> – Average <input type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>100.800 kWh/year</b>	
Financial (Energy saving. €/year)	The financial benefits for interested parties	
Environmental (kg CO <sub>2</sub> -eq)	<b>88.100kg<sub>CO2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0.023€/ kg<sub>CO2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES: Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 200*7*0.20*3*120kWh/year= 108.800 kWh/year$

**Measure ESAC5:** Energy Information in the Municipality website and e-newsletter

The posting of information on Renewable Energy Sources (RES) and Energy Saving (ES) in the Municipality of Geri website was examined. In addition, there will be a special article on energy in the Municipality e-newsletter. The measure will apply for a period of 8 years.

The indirect cost of the measure application can be considered as high as the interested party should bear the costs of implementing energy saving measures or renewable energy sources at home, on their own.

Start of Implementation: 2012

Measure Code	<b>ESAC 5</b>	
Measure Name	<b>Energy Information in the Municipality website and e-newsletter</b>	
<b>APPLICATION COST</b>		
Cost of Measure	<b>0 €</b>	
Indirect Cost	<input checked="" type="checkbox"/> – High <input type="checkbox"/> – Average <input type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>1.590.000 kWh/year</b>	
Financial (Energy saving. €/year)	The financial benefits for interested parties	
Environmental (kg CO <sub>2</sub> -eq)	<b>1.125.000 kg<sub>CO2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0.00 €/ kg<sub>CO2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES: Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 530*8*0.25*3*500kWh/year= 1.590.000 kWh/year$

**Measure ESAC6:** Organization of “Cycling Day”

The organization of an annual “Cycling Day” in Geri Municipality was examined. The measure will apply for 8 years.

The indirect application cost of this measure is considered to be low as apart from the organization of the event, the participants will not be burdened with further costs.

Start of Implementation: September 2012

Measure Code	<b>ESAC 6</b>	
Measure Name	<b>Organization of “Cycling Day”</b>	
<b>APPLICATION COST</b>		
Cost of Measure	<b>1200 €</b>	
Indirect Cost	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>276.300 kWh/year</b>	
Financial (Energy saving. €/year)	The financial benefits for interested parties in terms of fuel saving	
Environmental (kg CO <sub>2</sub> -eq)	<b>69.904 kgCO<sub>2</sub>/year</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )	<b>0.017€/ kgCO<sub>2</sub> annual saving</b>	<b>Proposed for Implementation</b> <input checked="" type="checkbox"/>

<b>Equation: <math>ES=v*\epsilon*n*v\delta*ESPP</math></b>
ES: Energy Saving (kWh) v: participation number ε: application years n: Awareness Percentage (0-100%) vδ: number of diffuse influence ESPP: Green Energy per person (kWh)
Calculation: $ES= 50*10*0.2*3*921kWh/year= 276.300 kWh/year$

**Measure ESAC7:** Informational leaflets and messages

The preparation of information material to be used for updating, information and public awareness was examined.

The indirect application cost of this measure can be considered high, as apart from the preparation and distribution of informational material the interested party should bear their own cost for any investment or saving they proceed to.

Measure Implementation Period: June 2012-2020

Measure Code	<b>ESAC 7</b>			
Measure Name	<b>Informational leaflets and messages</b>			
<b>APPLICATION COST</b>				
Measure Cost	<b>Total (€)</b>			
<i>(a) Leaflets on RES and ES</i>	<b>2.000 €</b>			
<i>(b) Leaflets on sustainable mobility</i>	<b>1.000 €</b>			
Indirect Cost				
	<input checked="" type="checkbox"/> – High <input type="checkbox"/> – Average <input type="checkbox"/> – Low			
<b>APPLICATION BENEFITS</b>				
Energy	Number/ receivers	Awareness Percentage	Energy Benefit (kWh/person.year )	<b>Energy Saving (kWh/year)</b>
<i>(a) Leaflets on RES and ES</i>	3.000	5%	1000	<b>300.000</b>
<i>(b) Leaflets on sustainable mobility</i>	3.000	5%	500	<b>150.000</b>
Financial				
	The financial benefits for interested parties in terms of energy saving			
Environmental	<b>Emissions Saving (kg<sub>CO2</sub>/ year)</b>			
<i>(a) Leaflets on RES and ES</i>	212.700			
<i>(b) Leaflets on sustainable mobility</i>	37.950			
<b>RESULTS - EVALUATION</b>				
Unitary Cost (€/kg CO <sub>2</sub> )			<b>Proposed for Implementation</b>	
<i>(a) Leaflets on RES and ES</i>	0.009 €/ kg <sub>CO2</sub> annual saving		<input checked="" type="checkbox"/>	
<i>(b) Leaflets on sustainable mobility</i>	0.026€/ kg <sub>CO2</sub> annual saving		<input checked="" type="checkbox"/>	
<b>DELIVERABLE</b>				
<b>Total Cost 3.000 €</b>		<b>Emission Reduction 250.650 Kg<sub>CO2</sub>/ year</b>		<b>Unitary cost (€/kg CO<sub>2</sub>) 0,012</b>

## 7.4. Energy saving in Transport

### Measure EST1: Energy saving in the Municipality's fleet

The possibility of purchasing to vehicles with low CO<sub>2</sub> was examined.

The indirect application cost of the measure can be considered low since interested parties (to be aware of the eco-car market) would bear the cost of purchase on their own.

The indirect application cost of the measure is not particularly important, as the following requirements must first be fulfilled: (a) preparation of the call for tenders (b) Evaluation of offers by specific technical and financial criteria (c) completion of form (application) to ensure the subsidy from the 2009-2013 Grant Schemes of the Ministry of Commerce, Industry and Tourism.

The purchase of low emissions vehicles is sponsored by the Scheme of the Ministry of Commerce, Industry and Tourism. 700 € for low emissions vehicle and 1200€ for a hybrid.

Measure Implementation Period: 2013-2020

Measure Cost	<b>EST 1</b>	
Measure Name	<b>Energy saving in the Municipality's fleet</b>	
<b>APPLICATION COST</b>		
Cost of measure	<b>Total (€)</b>	
<i>Purchase of 2 eco-cars</i>	<b>35.000 €</b>	
Indirect Cost		
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Energy	<b>Energy Saving (kWh/year)</b>	
<i>Purchase of 2 eco-cars</i>	<b>18.420</b>	
Financial	<b>Saving (€/year)</b>	
<i>Purchase of 2 eco-cars</i>	<b>2000</b>	
Environmental	<b>Emissions saving (kg<sub>CO2</sub>/ year)</b>	
<i>Purchase of 2 eco-cars</i>	<b>4.660</b>	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )		<b>Proposed for implementation</b>
<i>Purchase of 2 eco-cars</i>	<b>7.5 €/ kg<sub>CO2</sub> annual saving</b>	<input checked="" type="checkbox"/>
<b>DELIVERABLE</b>		
<b>Total Cost</b> 35.000 €	<b>Emissions Reduction</b> 4.660 Kg <sub>CO2</sub> / year	

## Measure EST2: Energy Saving in Transport by New Cycle Path Network in Geri

The possibility of promoting the bicycle through the creation of new bike lanes in the municipality of Geri was examined. The application period is for 6 years starting in 2014.

The indirect cost of the measure can be considered limited.

Measure Code	<b>EST 2</b>			
Measure Name	<b>New Cycle Path Network</b>			
<b>APPLICATION COST</b>				
Cost of measure	<b>Total (€)</b>			
<b>New Cycle Path Network</b>	<b>200.000 €</b>			
Indirect Cost				
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low			
<b>APPLICATION BENEFITS</b>				
Energy	New Cycle Paths (km)	Traffic per Year (Number of routes)	ES per Km + ES from diffuse information (kWh/ year)	<b>Energy Saving (kWh/year)</b>
<b>New Cycle Path Network</b>	2	40.000	20	<b>800.000</b>
Financial	The financial benefits for interested parties from fuel saving			
Environmental	<b>Emissions Saving (kg<sub>CO2</sub>/ year)</b>			
<b>New Cycle Path Network</b>	<b>202.400</b>			
<b>RESULTS - EVALUATION</b>				
Unitary Cost (€/kg CO <sub>2</sub> )				<b>Proposed for implementation</b>
<b>New Cycle Path Network</b>	<b>0.99 €/ kg<sub>CO2</sub> annual saving</b>	<input checked="" type="checkbox"/>		
<b>DELIVERABLE</b>				
<b>Total Cost</b>	<b>200.000 €</b>			<b>Emissions Reduction</b>
				<b>202.400kg<sub>CO2</sub>/ year</b>

## 7.5. Energy saving in street lighting

### Measure ESSL1: Energy Saving in Street Lighting

The possibility of energy saving in street lighting was examined. Street lighting is one of the major expenses of the Municipality. The electricity consumption for street lighting in Geri Municipality in 2009 was 683MWh.

Two cases were examined: (a) replacement of current lamps with economic LED lamps and (b) optimization study of street lighting operating hours.

The indirect application cost can be considered low.

Year of Measure Implementation: 2013

Measure Code	<b>ESSL 1</b>			
Measure Name	<b>Energy Saving in Street Lighting</b>			
<b>APPLICATION COST</b>				
Cost of measure	<b>Total (€)</b>			
<i>(a) Replacement of current lamps with economic LED lamps</i>	<b>150.000 €</b>			
<i>(b) Optimization of Street Lighting operation hours</i>	<b>1.500 €</b>			
Indirect Cost				
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low			
Maintenance Cost				
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low			
<b>APPLICATION BENEFITS</b>				
Energy	Number	Electricity consumption per lamp (kWh/year)	ES per lamp per year (%)	<b>Energy Saving (kWh/year)</b>
<i>(a) Replacement of current lamps with economic LED lamps</i>	500	800	50	<b>200.000</b>
<i>(b) Optimization of Street Lighting operation hours</i>	500	800	5	<b>20.000</b>
Financial	Energy Saving (kWh/year)	Average Electricity Price (€/kWh)	<b>Saving (€/year)</b>	
<i>(a) Replacement of current lamps with economic LED lamps</i>	200.000	0.25	<b>50.000</b>	
<i>(b) Optimization of Street Lighting operation hours</i>	20.000	0.25	<b>5.000</b>	
Environmental	<b>Emissions Saving</b>			



	(kg <sub>CO2</sub> / year)		
<i>(a) Replacement of current lamps with economic LED lamps</i>	43.700		
<i>(b) Optimization of Street Lighting operation hours</i>	4.370		
<b>RESULTS - EVALUATION</b>			
Unitary Cost (€/kg CO <sub>2</sub> )	Proposed for implementation		
<i>(a) Replacement of current lamps with economic LED lamps</i>	34,3 €/ kg <sub>CO2</sub> annual saving <input checked="" type="checkbox"/>		
<i>(b) Optimization of Street Lighting operation hours</i>	0,34 €/ kg <sub>CO2</sub> annual saving <input checked="" type="checkbox"/>		
<b>DELIVERABLE</b>			
Total Cost 151.500 €	Saving 55.000€	Emissions Reduction 48.070kg <sub>CO2</sub> / year	Depreciation 2,7 years

## 7.6. Development of green spaces in the municipality of Geri

### Measure DGS1: Development of green spaces

Regarding the development of green spaces in Geri Municipality, two cases were examined: (a) planting of trees and (b) care of green spaces.

The indirect application cost can be considered low.

Measure Code	<b>DGS 1</b>	
Measure Name	<b>Development of green spaces in Geri Municipality</b>	
<b>APPLICATION COST</b>		
Cost of measure	Total (€)	
<i>(a) Planting of trees (1000 trees)</i>	2000 €	
<i>(b) Care of Green Spaces</i>	2000 €	
Indirect Cost		
	<input type="checkbox"/> – High <input type="checkbox"/> – Average <input checked="" type="checkbox"/> – Low	
<b>APPLICATION BENEFITS</b>		
Environmental	Emissions Saving (kg <sub>CO2</sub> / year)	
<i>(a) Planting of trees (1000 trees)</i>	40.000	
<i>(b) Care of Green Spaces</i>	20.350	
<b>RESULTS - EVALUATION</b>		
Unitary Cost (€/kg CO <sub>2</sub> )		Proposed for Implementation
<i>(a) Planting of trees (1000 trees)</i>	0.05 €/ kg <sub>CO2</sub> annual saving	<input checked="" type="checkbox"/>
<i>(b) Care of Green Spaces</i>	0.10 €/ kg <sub>CO2</sub> annual saving	<input checked="" type="checkbox"/>
<b>DELIVERABLE</b>		
Total Cost 4.000 €	Emission Reduction 60.175 Kg <sub>CO2</sub> / year	

## 7.7. Summary of measures of Geri municipality

**Table 20** Brief Presentation of Measures Taken by Geri Municipality and Included in the Sustainable Energy Action Plan

Measure/ Action	Application	Cost (€)	Emissions Reduction (Kg <sub>CO2</sub> /year)	Depreciation (years)
<b>Energy Saving in Public Buildings</b>				
ENEF1: Bulbs replacing in the public buildings	2012	500	874	2 years
ENEF2: Maintenance of Air Conditioning Systems	2012-2020	500	1.730	0,67 years
ENEF3: Renewable Electricity from Photovoltaic Systems on Municipal Buildings	2012-2015	50.000	23.660	6,7 years
<b>Energy Saving through Awareness Raising Campaigns</b>				
ESAC1: Organization of an annual seminar on Renewable Energy Sources	2012-2014	2.000	42.606	-
ESAC2: Organization of an annual seminar on Energy Saving	2012-2014	2.000	20.283	-
ESAC3: Organization of educational presentations to students	2010-2020	1.200	357.336	-
ESAC4: Organization of "Day without lighting"	2012-2020	2.000	88.100	-
ESAC5: Information about energy in the Municipality website and e-newsletter	2012-2020	0	1.125.000	-
ESAC6: Organization of "Cycling Day"	2012-2020	1.200	69.904	-
ESAC7: Raising awareness through informational leaflets and messages	2012-2020	3.000	250.650	-
<b>Energy Saving in Transports</b>				
EST1: Energy saving in the Municipality's fleet	2013-2020	35.000	4.660	-

EST2: Energy Saving in Transport by New Cycle Path Network in Geri	2014-2020	200.000	202.400	-
<b>Energy Saving in Street Lighting</b>				
ESSL1: Energy saving in street lighting	2013	151.500	48.070	2,7 years
<b>Development of Green Spaces in Geri Municipality</b>				
DGS1: Development of Green Spaces	2012-2020	4.000	60.175	-
<b>TOTAL</b>		<b>452.900</b>	<b>2.295.448</b>	

## 7.8. Contribution of National Measures on the Sustainable Energy Action Plan of Geri Municipality

Energy saving and carbon dioxide emissions reduction for 2020 from the contribution of national measures, were calculated and are presented in the tables below.

**Table 21** Brief Presentation of Energy Saving from National Measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Energy Saving (MWh/year)			
		Residential	Tertiary	Industry	Transports
1	Legislation on Energy Building Performance (Equation 1)	613	304	373	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	294	146	179	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	103	51	63	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	74	36	45	0
5	Legislation on energy efficiency of appliances (Equation 1)	437	281	388	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	488	406	813	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	55	32	45	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m <sup>2</sup> (Equation 1)	0	304	149	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	850	0
10	Plan of single urban transport system (Equation 3)	0	0	0	13.901
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	9.146
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	2.195
13	Grant Schemes for hybrid vehicles and vehicles with low CO <sub>2</sub> emissions (Equation 3)	0	0	0	1.171
14	Discounts on vehicles registration for vehicles with low CO <sub>2</sub> emissions (Equation 3)	0	0	0	1.463
TOTAL PER SECTOR		2.063	1.561	2.905	27.876
<b>GRAND TOTAL</b>		34.404			

**Table 22** Brief Presentation of CO<sub>2</sub> Emissions Reduction from National Measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Emissions Reduction (t CO <sub>2</sub> /year)			
		Residential	Tertiary	Industry	Transports
1	Legislation on Energy Building Performance (Equation 1)	435	224	272	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	209	107	131	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	73	38	46	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	52	27	33	0
5	Legislation on energy efficiency of appliances (Equation 1)	310	206	283	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	346	299	593	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	39	24	33	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m <sup>2</sup> (Equation 1)	0	224	109	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	620	0
10	Plan of single urban transport system (Equation 3)	0	0	0	3.511
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	2.310
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	554
13	Grant Schemes for hybrid vehicles and vehicles with low CO <sub>2</sub> emissions (Equation 3)	0	0	0	296
14	Discounts on vehicles registration for vehicles with low CO <sub>2</sub> emissions (Equation 3)	0	0	0	370
TOTAL PER SECTOR		1.463	1.148	2.119	7.041
<b>GRAND TOTAL</b>		11.771			

**Table 23** Equations Used for the Estimation of the Contribution of the National Measures to Energy Saving

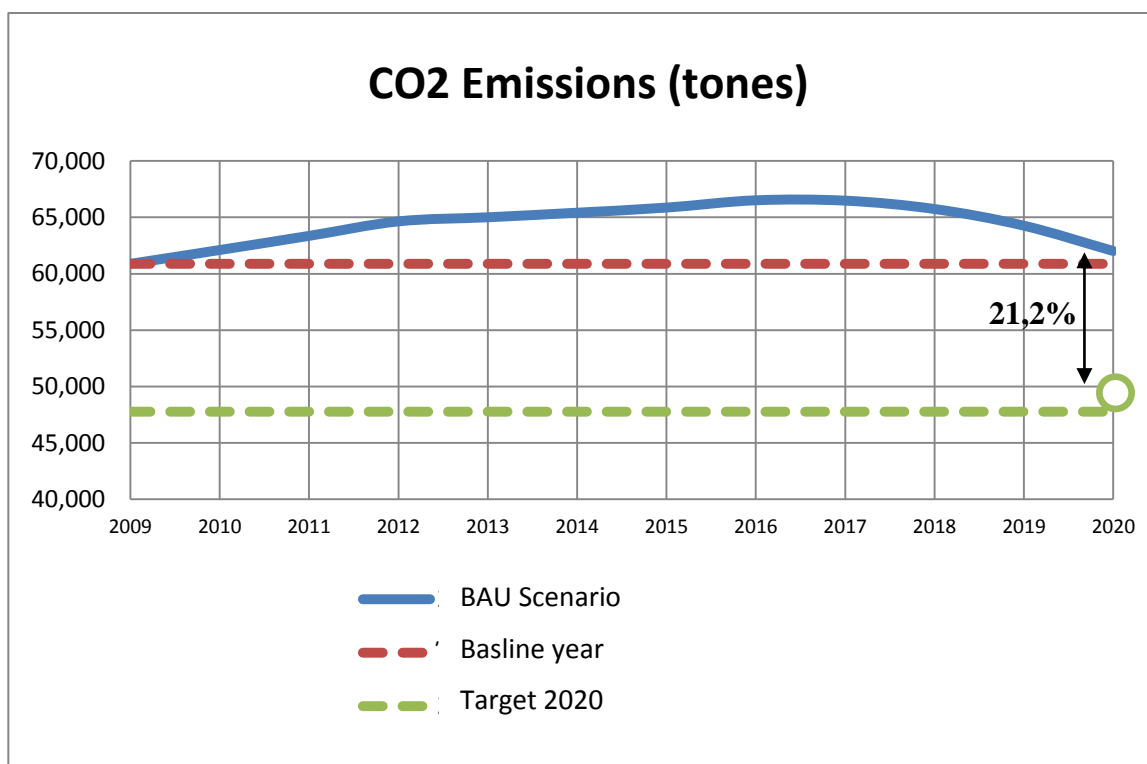
<b>(1) <math>ES=EC*np*nc*ns</math></b>
ES: Energy Saving (MWh) EC: Energy Consumption (MWh) np: Number of Participation (0-100%) nc: Consumption rate per consumption category (0-100%) ns: Saving Percentage by applied measure (0-100%)
<b>(2) <math>GE=N*P*np</math></b>
GE: Green Energy (MWh) N: Population P: Production per application (MWh) np: Participation percentage (rate) (0-100%)
<b>(3) <math>EOS=(N*FO*np)+(\Delta O*FO*np)</math></b>
EOS: Energy Saving in terms of Fuel (MWh) N: Population FO: Fuel Saving per person (MWh) np: Participation percentage (rate) (0-100%) $\Delta O$ : Passing Vehicles

## 7.9. Description of achieving CO<sub>2</sub> emissions reduction for 2020

The overall goal of reducing carbon dioxide emissions achieved by implementing the action plan for 2020, is 21,2% reduction compared to the reference year 2009. The achievement of this objective is presented in the table below.

Emission inventory for reference year 2009 (tn CO <sub>2</sub> /year)	60.871
Expected emissions for 2020 – Expected Development Scenario (tn CO <sub>2</sub> /year)	62.009
Estimated emission reduction from national measures for 2020 (tn CO <sub>2</sub> /year)	11.771
Estimated emission reduction by the Municipality for 2020 (tn CO <sub>2</sub> /year)	2.296
Total estimated emission reduction for 2020 (tn CO <sub>2</sub> /year)	14.067
Estimated emissions for 2020 through the application of the Action Plan (tn CO <sub>2</sub> /year)	47.942
<b>Emission reduction percentage by 2020 compared with 2009</b>	<b>21,2%</b>

**Figure 27 Schematic of the Expected Evolution Scenario of CO<sub>2</sub> Emissions in Geri Municipality and the Reduction Target for 2020 by 21,2%**



Therefore with the implementation of the Energy Action Plan the Municipality of Geri will reduce by **21.2%** of carbon dioxide emissions compared to 2009 (47,942 tons reaching CO<sub>2</sub>), thus exceeding by 1.2% the overall objective of the project reduce emissions by 20%.



## **7.10. Financing the sustainable energy action plan**

Funding for Energy Action Plan implementation is expected to be derived from the following resources:

- Municipality budget
- Savings that will result from energy reduction measures in buildings, vehicles and street lighting in the Municipality
- Incomes from the investments of the Municipality in Renewable Energy Sources
- Funding from the Grant Scheme of Ministry of Commerce, Industry and Tourism for Renewable Energy Sources and Energy Saving promotion.
- Possible funding from the Sustainable Development and Competitiveness Program of the Planning Bureau.
- Potential funding from the Fund created for Emissions Trading Scheme.
- Possible funding from other European Programmes.

## Sources of energy data

- ▶ Consumption of fuels and heating fuels from oil companies within the administrative limits of Geri Municipality.
- ▶ LPG consumption from the Statistical Service of Cyprus (Reduction at local level based on the population) [[www.mof.gov.cy/cysta](http://www.mof.gov.cy/cysta)]
- ▶ Annual growth rates from the Statistical Service of Cyprus and estimates of scholars [[www.mof.gov.cy/cysta](http://www.mof.gov.cy/cysta)]
- ▶ National Action Plan for reducing CO<sub>2</sub> emissions from the Department of Environment [<http://www.cyprus.gov.cy/moa/agriculture.nsf>]
- ▶ National Action Plans for the share of RES from the Energy Service. [<http://www.mcit.gov.cy/mcit/mcit.nsf>]
- ▶ National Action Plans for Energy Saving at end-use from the Energy Service. [<http://www.mcit.gov.cy/mcit/mcit.nsf>]
- ▶ Grant Schemes for RES and ES from the Energy Service [<http://www.mcit.gov.cy/mcit/mcit.nsf>]
- ▶ Development of Public Transport Plans from the Department of Road Transport [[www.mcw.gov.cy/mcw/rtd/rtd.nsf](http://www.mcw.gov.cy/mcw/rtd/rtd.nsf)]
- ▶ Electricity Consumption data in the Municipality of Geri from the Electricity Authority of Cyprus [[www.eac.com.cy](http://www.eac.com.cy)]
- ▶ Energy consumption data in municipal buildings in Geri
- ▶ Information concerning the installation of more efficient electricity generators (combined cycle) from EAC [[www.eac.com.cy](http://www.eac.com.cy)]
- ▶ Information about the advent of Natural Gas from the Energy Service [<http://www.mcit.gov.cy/mcit/mcit.nsf>]

**Prepared by:**

**Cyprus Energy Agency**

Anthi Charalambous  
Savvas Vlachos  
Orestis Kyriakou

Contact Details:

10-12 Lefkonos Street, 1011 Nicosia, Cyprus

Tel. +357-22667716, +35722667736

Fax: +357-22667736

Email: [anthi.charalambous@cea.org.cy](mailto:anthi.charalambous@cea.org.cy)

[savvas.vlachos@cea.org.cy](mailto:savvas.vlachos@cea.org.cy)

[orestis.kyriakou@cea.org.cy](mailto:orestis.kyriakou@cea.org.cy)

Web: [www.cea.org.cy](http://www.cea.org.cy)

**Supervision:**

**Geri Municipality**

Mayor Argyris Argyrou  
Municipal Officer Michalis Michael

Contact Details:

Geri Municipality

P.C. 2200 Geri, Cyprus

Tel. +357-22481755

Fax: +357-22480157

Email: [info@yeri.org.cy](mailto:info@yeri.org.cy)

Web: [www.yeri.org.cy](http://www.yeri.org.cy)

**ISLEPACT Project :**

Web: <http://www.islepact.eu>

Tel. +32(0) 2 6121704

***Prepared by:***



***Local Authority:***



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Directorate-General  
for Energy

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