

Sustainable Energy Action Plan

Aglantzia Municipality - Cyprus



15 October 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 **CO₂ 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 Aglantzia Municipality.

The Municipality of Aglantzia is one of the 11 municipalities of Nicosia District with a population of 21,018 residents basis the Population Census 2011. The Aglantzia occupies an area of 31 square kilometers, of which 14 are agricultural land and occupied by the Turkish army in 1974. Of the 17 square kilometers of free land, 9 are national forest parks (Park and Park Athalassa Teachers College).

The year 2009 was designated as the year of referencing/recording energy consumption and CO₂ 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 Larnaka was 464.121 MWh. The largest consumer of energy in the municipality is transport with 102.463 MWh followed by the tertiary sector with 175.624 MWh and less with the residential sector 81.797 MWh.

The CO₂ emissions in 2009 attributable to the overall energy consumption in the municipality are 178.357 tons. For the forecast of CO₂ 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 186.993 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 CO₂ emissions by at least 20% by 2020 with respect to the reference year 2009.

The proposed measures are split into the following categories:

Description	Number
Energy Saving in Municipality public buildings	7
Energy Saving via informational campaigns	9
Energy saving in transport	5
Energy saving in street lighting	2
Municipality investments in renewable energy sources	1
Development of green spaces	1

The estimated annual emissions reduction for 2020 by applying the above measures amounts to 16.466 tons. In addition, it was estimated that the impact on Aglantzia Municipality from the implementation of the national measures taken to reduce carbon dioxide emissions will result to an additional decrease of 31.249 tons.

Therefore, with the implementation of the Sustainable Energy Action Plan and a total reduction of 47.715 tons, annual emissions for 2020 will be limited to 139.278 tons. That is, **22%** lower with respect to those in the reference year 2009.

The budget of the Action Plan for the period 2011 to 2020 amounts to €1.468.400¹ while savings and income for the municipality of the project is estimated to amount to € 338.222 per year. 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 structural funds.
- Potential funding from the Fund created for Emissions Trading Scheme.
- Potential funding from other European programs.

¹ The Municipality has agreed to join the request for implementation of a large pilot lights replacement of street lighting in conjunction with the Energy Office and the EAC. Should obtain approval cooperation with EAC and funding from the European Energy Efficiency Fund, the Municipality will not incur the cost of the investment. The investment will be made by the EAC which after agreement will benefit from the energy savings from the investment. The only expense for the municipality will be the payment of 2.500 € about as financing (together with the mechanism Elena Facility) in order to prepare the necessary studies for the investment. In this case the total budget of the Action Plan will be reduced by 815.000 €.

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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 CO₂ 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 1st February 2010 until 31st 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.

1.1.1. 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 CO₂ 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.

1.2. 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	
Strovolos Municipality	Latsia Municipality
Agios Athanasios Municipality	Paralimni Municipality
Lakatomia Municipality	Idalion Municipality
Aglantzia Municipality	Lefkara Municipality
Larnaca Municipality	Geri Municipality
Aradippou Municipality	Ergates Community
Polis Chrysochous Municipality	Psimolofou Community



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

1.3. 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 Mayors, Presidents of Municipal Councils and the General Secretaries of Cyprus signed the Pact of Islands at the signing ceremony of the Covenant, in Brussels on 12 April 2010.



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



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



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



The Secretary of Latsia Municipality Michalis Sokratous (left) and the Mayor of Paralimni Andreas Evagelou (right)



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



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



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.

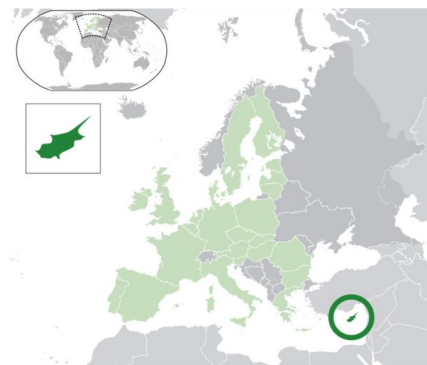
The main economic activities of the island are tourism, clothing and craft items exports and merchant shipping. Traditional crafts include embroidery, pottery and bronze.

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.



Πηγή: www.wikipedia.org

Year of EU entry:

2004

Political system:

Democracy

Capital:

Nicosia (Lefkosia)

Total area:

9.250 km²

Population:

0,8 million

Currency

euro

Source: <http://europa.eu>

3 Aglantzia Municipality

3.1 Introduction

The Aglantzia declared a municipality, following a referendum in May 1986. The City Council consists of the Mayor and 14 Councillors. In the last municipal elections in 2007, members of the City Council increased by two, according to the population growth. Main and sole objective of the municipal councils is the progress and development of the municipality. Development programs have created dozens of infrastructure projects that have marked the progress and development of the municipality.

The Municipality of Aglantzia gives special impetus to cultural development, protection and improvement of environment and social policy. The Municipality of Aglantzia employs 30 people permanent clerical staff, 50 permanent workers and about 25 seasonal. Staffing the departments located in the Municipal Building. The municipal services are the following:

- Secretariat
- Technical Services
- Financial Services
- Green and Environment Services
- Health and Cleaning and green spaces. It is built right and left of the road leading before the Turkish invasion from Nicosia to Larnaca. The landscape on both sides of the street is dominated by two trapezoidal hills. The hill to the left of the road is a hill Aronis, now Turkish occupied. The trapezoidal hill to the right of the road called Aronis of Athalassa or Leontari Mountain or LiontarovounosServices
- Cultural Services

The Municipality of Aglantzia touches the Municipality of Nicosia, capital of Cyprus. It is acritic municipality with an area of 31 square kilometers (km²), of which 14 are agricultural land (occupied by Turkish troops since 1974 and after). Of the 17 sq km land, located in the free areas, 9 are national forest parks - Athalassa National Forest Park, Park St George, National Forest Park Academy-which is the green lung of the whole Nicosia

It is the highest suburb of Nicosia since most are built either on hills or on hillsides or plateaus. It was built during the Middle Ages, before the Turks, strategically located (for defensive purposes, the existence of natural resources and for its healthy climate).

The natural environment of Aglantzia is unique, being endowed with great lung of Nicosia, Athalassa forest, but the park St. George, the Municipal Park of Aglantzia and other 72 small parks, and on which are the remains of a medieval castle La Cava.

3.2 History

The story begins, at least since 3888 BC since the trapezoidal hill Aronis (Mountain Leontari or Lontarouvounos) number of tombs of the Bronze Age was found. Around the hill there was an ancient settlement, which-perhaps-the Ledra was the successor city. In the region is also Kafizin (in the "dead zone") or Small Aronis, historical site with cave cult Nymph where found significant archaeological artifacts and inscriptions Cypro writing.

In the area of Aglantzia was, in medieval times, the settlement Lefkomiatis. The area appears to have been inhabited during the late Frank on Jacobs II (1468-1 1473) and its name is thought to come from the adjective Frankish family has owned the area.

After the conquest of Cyprus by the Turks, the settlement of Aglantzia decline. Starts up an independent agricultural settlement around the late 18 century. Its residents engaged in agriculture, animal husbandry and quarrying. By the late 18th century, the dragoman Chatzigeorgakis Kornesios erect the church of St. George in the area of the cemetery and St. George in Athalassa.

During the EOKA struggle Aglantzia was present with organized groups. One of the Aglantziotes heroes who sacrificed was the Kiriakos Karaolis. The events of 1964 volunteer militiamen were integrated in various battalions. Fighting fell Andreas Nicolaou Koutsou. During the Turkish invasion of 1974 Aglantzia not only bombed mercilessly but paid a heavy toll in lives of the residents and missing. About 45% of the territory occupied by the Turkish occupation forces.

3.3 Nicosia Local Plan

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 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: Nicosia Local Plan]

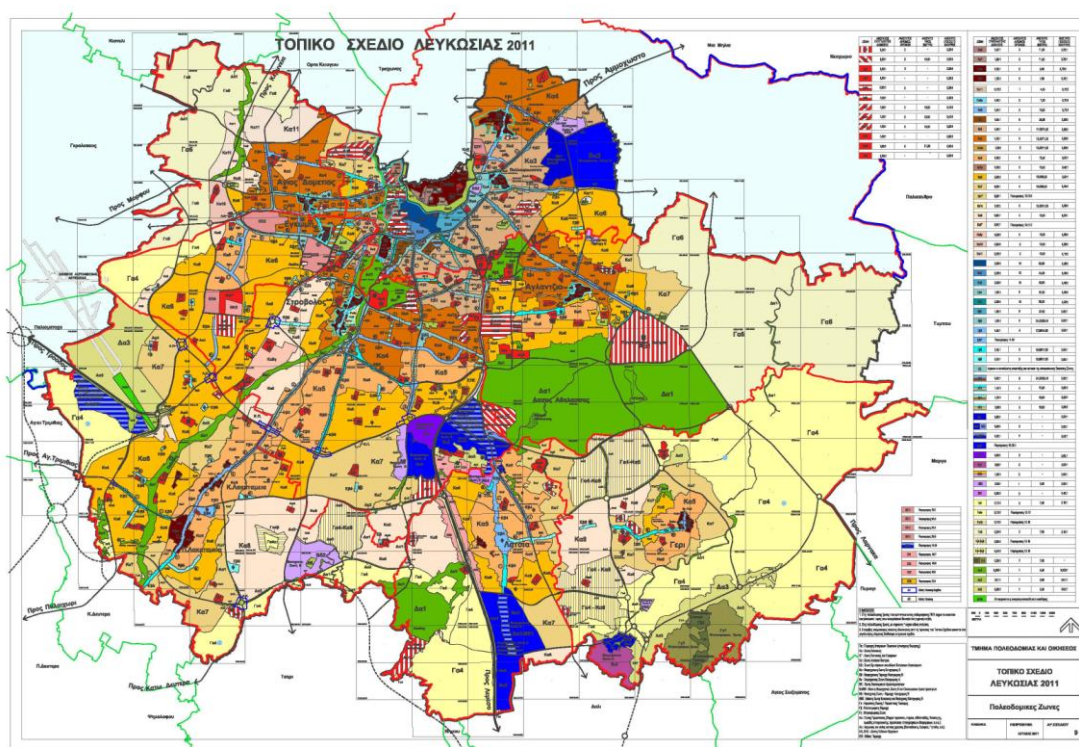


Figure 4 Τοπικό Σχέδιο Λευκωσίας

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: Nicosia Local Plan]



Figure 5 Municipal Sports Center of Aglantzia



Figure 6 Old Street of Aglantzia-Larnaca



Figure 7 Cycle Path in Kerynias Avenue



Figure 8 Agios Georgios Church



Figure 9 Old Aglantzia Square



Figure 10 Cultural Center "Scali"



Figure 11 Cultural Center



Figure 13 Natural History Museum



Figure 12 Apostolos Andreas Church



Figure 14 Municipal Children Choir of Aglantzia



Figure 15 Municipal Library



Figure 16 Municipal Choir of Aglantzia

3.6 Environmental policy – Green Spaces Development

The Municipality of Aglantzia considered one of the green Municipalities of Cyprus because the area is the only green lung area of Nicosia, the Athalassa Park.

The local authority of Aglantzia, bearing in mind that green and hence the environment means health, means civilization, beyond the size of 860 hectares Athalassa Park, the city steadily expand the green. Has created the Municipal Park, the Park of St. George, 40 parks and 40 small green spaces, trees and gardens, and plans to create six new parks. Also each year in the period of "Tree Week" issued by the municipality of Aglantzia voluntary tree planting when planted hundreds of trees.

Autonomous lighting with photovoltaic panels have been installed in some of the parks in the municipality reducing the electricity demand for lighting needs while is an example for awareness. The intention of the municipality is autonomous lighting usage policy to adopt for new parks or green spaces.

[Πηγή: <http://www.aglantzia.com>]

4 Current Status at Aglantzia Municipality

4.1 Description of the buildings of Aglantzia Municipality

4.1.1 Brief description

- Working hours for all City services are 7:30 to 14:00 for the summer season (1st June – 31st 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.

Table 1 Buildings in Aglantzia Municipality

Buildings in Aglantzia Municipality
Town Hall
Cultural Center («Scali»)
Municipal Swimming Pool
Municipal Cemetery
Elderly Housing
Municipal Sports Center
Municipal Kindergarten
Natural History Museum

4.1.2 Town Hall

The electricity consumption in the Town Hall of the Municipality of Aglantzia presented in the table below:

Table 1 Energy Consumption in the Town Hall

Month	2011		2012	
	kWh	€	kWh	€
January	7.471	1.677	7.753	2.270
February	7.485	1.787	9.078	2.778
March	9.147	1.729	8.525	2.636
April	6.129	1.627	6.379	2.162
May	4.943	1.169	6.379	1.409
June	6.139	1.617	5.393	1.743
July	9.285	2.453	8.061	2.781
August	6.435	1.976		
September	5.834	1.664		
October	7.412	2.139		
November	4.658	1.340		
December	5.652	1.678		
Total	80.590	20.859		

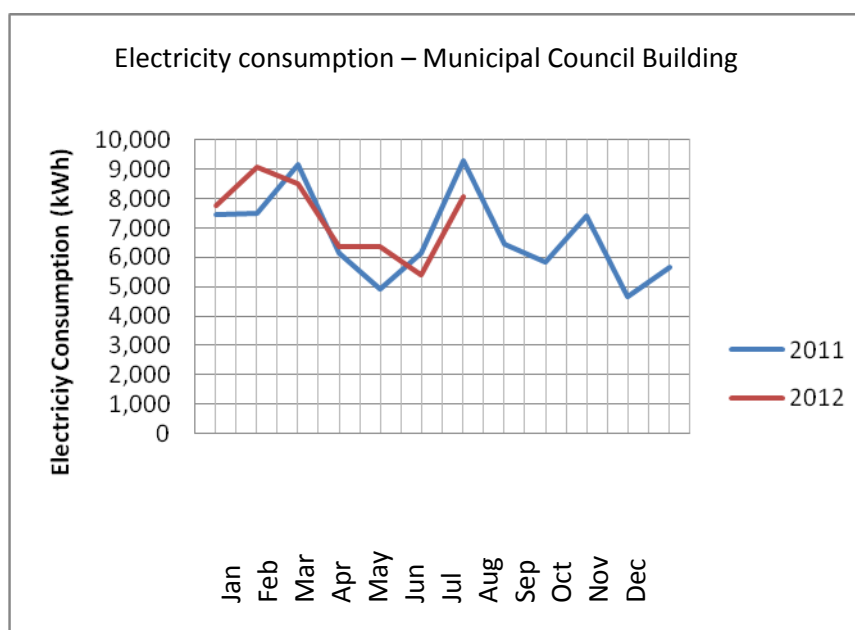


Figure 17 Energy Consumption in the Town Hall

4.1.3 Municipal Sports Center

The electricity consumption in the Municipal Sports Centre of the Municipality of Aglantzia presented in the table below:

Table 1 Electricity consumption in the Municipal Sports Centre

Month	2011		2012	
	kWh	€	kWh	€
Jan-Feb	1.793	308	1.655	393
Mar-Apr	1.915	318	1.856	439
May-June	1.753	316	1.436	362
July-Aug	1.186	225	1.345	359
Sep-Oct	1.397	284		
Nov-Dec	1.498	329		
Total	9.542	1.781		

4.1.1 Municipal Sports Center

Energy consumption in the Municipal Swimming Pool of Aglantzia for heating the swimming pool is shown in the table below:

Table 1 Gas consumption in the Municipal Swimming Pool

Month	2009		2010		2011	
	Liters	€	Liters	€	Liters	€
January	6.272	4.652	4.839	4.986	10.219	11.856
February	5.823	4.319	4.704	5.388	6.958	7.708
March	6.391	4.579	4.191	4.598	6.234	6.906

April	3.508	2.513	4.774	5.012	3.935	4.359
May	1.071	767	3.386	3.489	2.051	2.272
June	-	-	280	289	250	277
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	3.977	3.764	47	54	2.628	3.043
October	3.903	3.694	7.326	8.366	3.828	4.441
November	6.177	6.365	7.316	8.354	6.510	7.553
December	5.871	6.049	10.460	11.945	7.320	8.493
Total	30.331	36.702	52.481	52.481	49.933	56.908

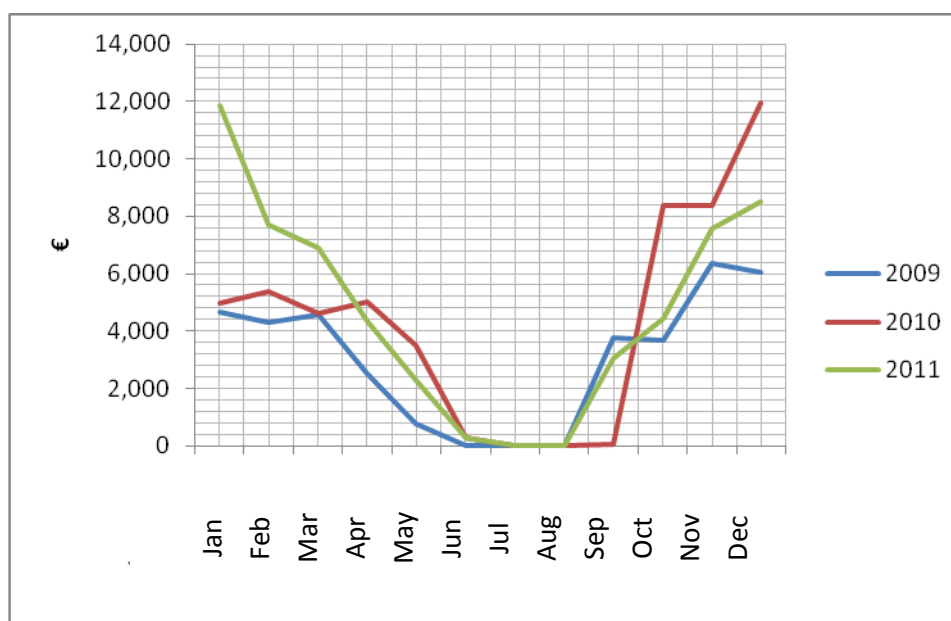


Figure 18 Expenditure profile for the consumption of LPG in Municipal Swimming Pool

4.1.2 A' Community Kindergarten of Aglantzia

The electricity consumption in the Community Kindergarten of the Municipality of Aglantzia presented in the table below:

Table 1 Electricity Consumption in the A' Community Kindergarten of Aglantzia

Month	2011		2012	
	kWh	€	kWh	€
Jan-Feb	2.496	520	4.533	1.262
Mar-Apr	2.605	580	4.831	1.413
May-June	2.271	524	1.837	570
July-Aug	6.999	1.699		
Sep-Oct	5.158	1.355		
Nov-Dec	3.329	897		
Total	22.858	5.575	11.201	3.245

4.1.3 Elderly Housing of Aglantzia

The electricity consumption in the Elderly Housing of the Municipality of Aglantzia presented in the table below:

Table 1 Consumptions in the Elderly Housing of Aglantzia

Month	2010				2011			
	Electricity		LPG		Electricity		LPG	
	kWh	€	Liters	€	kWh	€	Liters	€
Jan-Feb	8.765	1.702	6.725	3.400	9.451	1.953	8.331	5.187
Mar-Apr	8.598	1.692	4.796	2.320	7.057	1.561	6.273	3.831
May-June	9.273	1.913	1.210	570	8.055	1.845	2.932	1.809
July-Aug	28.094	6.051	901	423	19.999	4.845	515	321
Sep-Oct	26.777	5.751	1.266	644	18.270	4.782	805	505
Nov-Dec	7.718	1.656	3.903	2.348	6.919	1.857	2.453	1.682
Total	89.225	18.769	18.801	9.707	69.751	16.846	21.309	13.331

1.4. Aglantzia Municipality Street Lighting

The total energy consumption in 2009 for street lighting was equal to 1,977 MWh in 2009, 2,091 MWh in 2010 and 2,041 in 2011.

However, electricity consumption from lighting within the jurisdiction of the municipality (and invoiced the municipality) are:

Table 2 Consumption of electricity for street lighting in the municipality of Aglantzia (belonging to the Municipality)

Year	MWh	€
2008	1.300	221.391
2009	1.643	222.876
2010	1.732	292.346
2011	1.691	340.828

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

Table 3 Lamp Type in the street lighting of the Municipality of Aglantzia

Lamp Type	Power	Number (June 2012)
HPS *	250 W	499
HPS	150 W	147
HPS	70 W	1.982
HPS	50 W	559

* 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 Larnaka Municipality.

4.2 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.

In Figure below shows part of the bus route network of Aglantzia and identified three main routes passing through the Aglantzia.

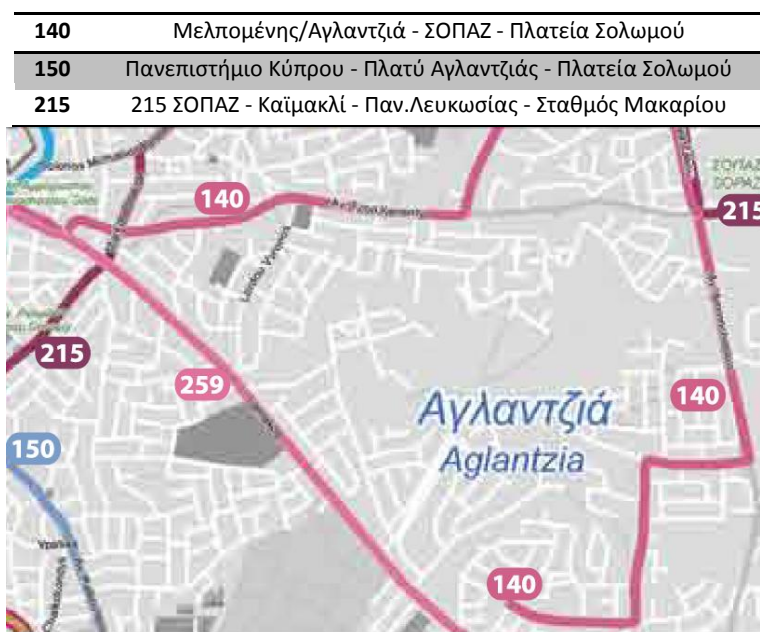


Figure 19 Route Network Map of Aglantzia (Source:www.osel.com.cy)

4.3 Aglantzia Road Network

The planning of the road network of Aglantzia is part of the local project of Nicosia. The following map shows the main road network for Single Nicosia.

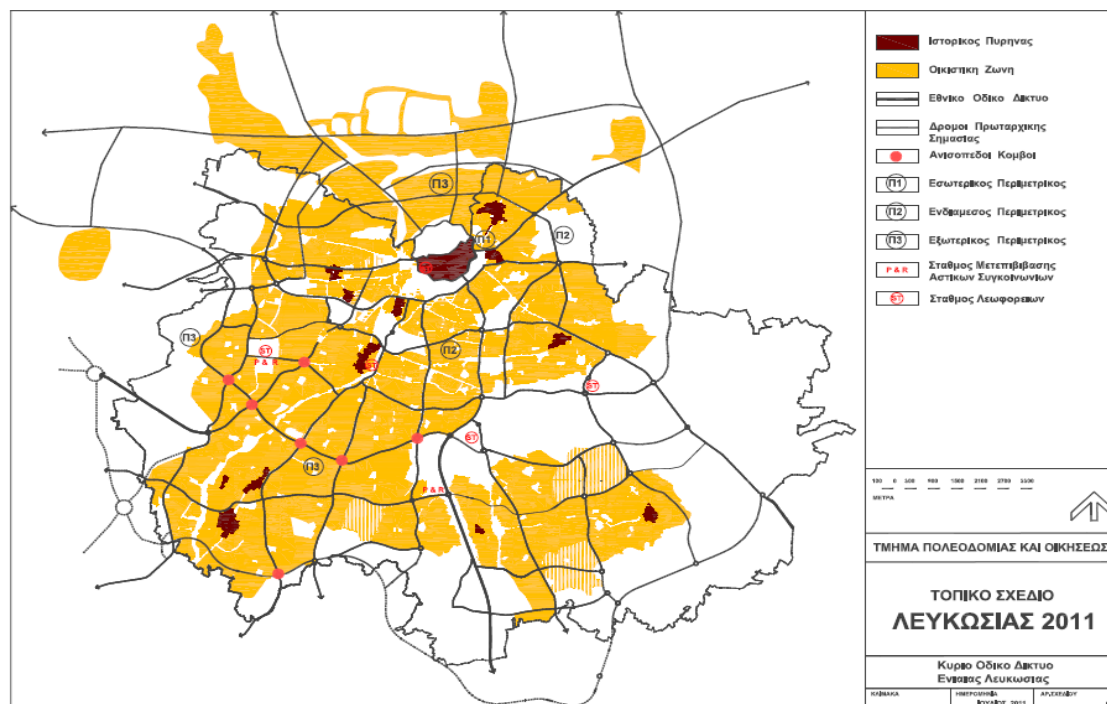


Figure 20 Nicosia Local Plan (Main Road Network for Single Nicosia)

4.4 Cycle Paths Network of Aglantzia Municipality

Aglantzia Municipality has one of the largest networks cycle paths in Cyprus along with more than 27km. Policy of the Municipality is to create a strong network of cycle paths by strengthening and maintenance of the existing network, to encourage the movement of citizens and tourists with friendly media environment, such as cycling and walking.

In June 2011 the construction of the bicycle in the forest of the Pedagogic Academy in Aglantzia, 2,3 km length which connects Aglantzia Avenue to Larnaca Avenue. Also underway is a project to improve the RIK Avenue, which includes cycle route. The northern part of this project reaches Larnaca Avenue for which prepares master plan envisages the construction of cycle path for connecting the historic city center, with the area of the University.

Additionally, the Municipality participates in the distribution of bicycles of major Nicosia together with the municipalities of Nicosia, Strovolos, Dhali, Latsia, Agios Dometios and Engomis. The Municipality of Aglantzia has placed 50 bicycles rent at four stations. The bike rental system is the same for the municipalities involved and the users can retrieve the bikes from one station of the system deliver it to any other station in the system they want. The cycle network which provides the Local Plan of Nicosia shown in map below:

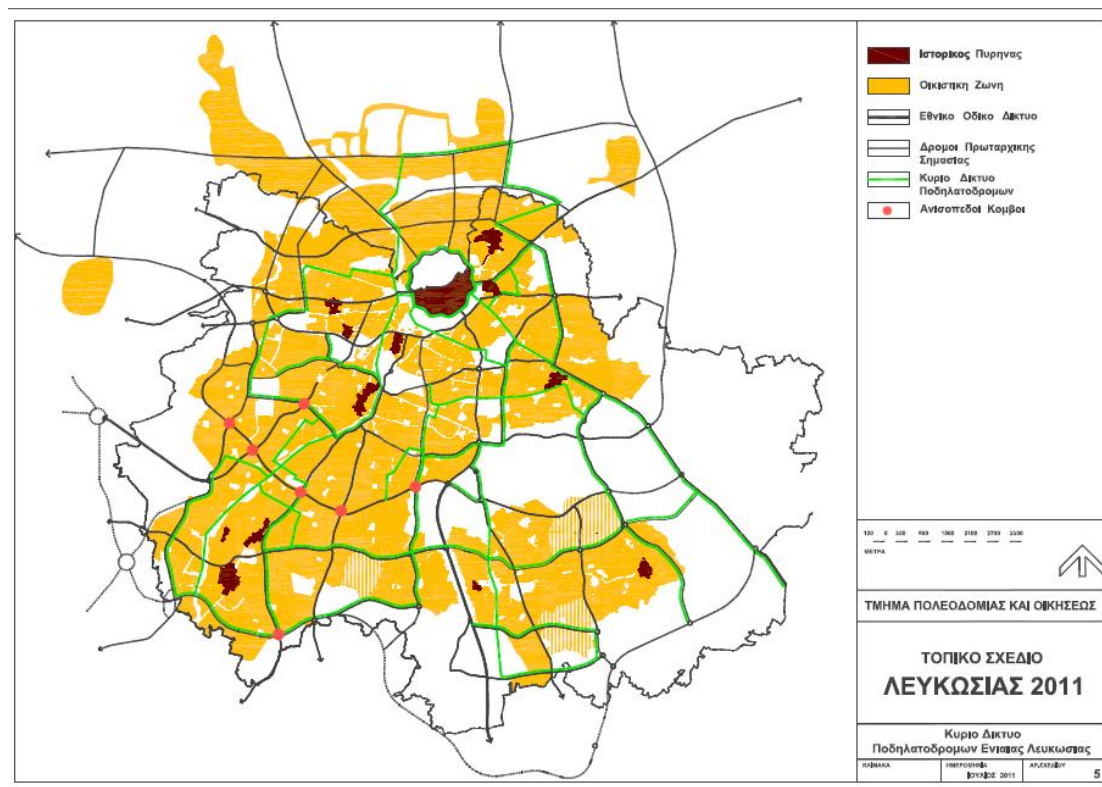


Figure 21 Principal cycle network of Nicosia

4.5 Projects on Road Network and Parking Lots in the Municipality of Aglantzia

The projects have been completed or planned in the municipality of Aglantzia are:

A.Larnaca Avenue

Has been modernized and still only bike paths and marking of parking spaces. The urban project lasted 24 months and cost a total of £ 1.600.000 (75% state, 25% of the municipality of Aglantzia).

B.Akadimia Avenue

It's a modern avenue an urban project that connects the two parts of our municipality. The work lasted 16 months and cost £ 1.200.000 (80% state, 20% of the municipality of Aglantzia).

C.Kyrenia Avenue

It is a modern innovative avenue characterized as the most human friendly way. The project lasted around 20 months and cost £ 2.100.000 (80% state, 20% of the municipality of Aglantzia).

D. A' Phase RIK Avenue

The completion of a phase of the avenue has been contribute decisively in improving the transportation network in the region. Its construction lasted 13 months and cost totaled £ 350.000 (80% state, 20% of the municipality of Aglantzia).

E. Aglantzia Avenue / Larnacos

The Municipal Council has decided the form of the road. The Department of Planning and

Housing and the Central Agency for Solving Traffic Studies have approved and submitted by August 2003 at the Department of Public Works master plan. The modernization of highways are expected to commence in October 2007.

G. Phase B RIK Avenue

The municipality of Aglantzia lobbied and succeeded to accelerate notice for construction projects and now the project is at the stage of award of tender.

Parking spaces

One of the major problems due to the traffic, not just Aglantzia, but the whole of Cyprus is insufficient parking lots.

In order to alleviate this problem the Aglantzia Municipality has taken and is taking the following measures:

1. Parking spaces on the right and left sides of the following streets:

a) Kyrenia Avenue

b) Homer / Lord Byron

2. Parking over the Cultural Center "Scali"

3. Four parking lots within the Old Aglantzia.

The Municipality of Aglantzia has provision for parking on the right / left side of the Avenue Aglantzia. Also identified vacant lots that will be expropriated for the purpose of creating additional parking spaces. The Municipality of Aglantzia recommended against amending of Nicosia Local Plan policy as applied to the area of the campus to create and parking lots right / left in of the road.

Source: www.aglantzia.com

4.6 Production and management of solid waste in the Municipality of Aglantzia

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 Communit

Based on the data in Table 3, 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 4: 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
Aglantzia Municipality	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	1.352	1.262	1.716
Klirou Improvement Council	332	286	754
Gouri-Kalo Chorio		317	369
Mathiatis			312
Palaichori			520
Arediou		260	
Ergates Industrial Area		478	
TOTAL	84.496	98.789	155.402

(Source: Cyprus Statistic Service)

4.7 Materials Recycling Program in the Municipality of Aglantzia

- The program garbage collection in the Municipality of Aglantzia performed by a contractor of the nonprofit organization Green Dot Cyprus.
- Within the boundaries of the Municipality of Aglantzia except recycling system" door to door" placed recycling bins, PMD (blue), paper (brown) and glass and the collection is done every week alongside the houses.
- In the municipality of Aglantzia glass containers are placed in 33 areas of the municipality in order to provide full coverage across the City.

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). 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 Clothes Recycling Program in the Municipality of Aglantzia

The Municipality of Aglantzia in collaboration with the nonprofit organization "ANAKYKLOS ENVIRONMENTAL" began collecting clothes in the municipality. After sorting, some clothes are offered free of charge to indigent persons in Cyprus. Another part of the clothing available to people with low income, shops second hand and in bazaars, in symbolic terms, to cover the cost. The clothing will be available for shipment to countries where there is an urgent need, such as natural disaster, war, etc. The largest percentage exported to reuse. Part of the material unsuitable for reuse clothes, recycled clothes cleaning up, tow, insulation and other materials. At various points in the municipality have installed metal warehouses for clothes collection.

4.9 Prune Collection in the Municipality of Aglantzia

The Municipality of Aglantzia publishes every year an annual collection program pruned, dirt, waste building materials, etc. The municipality has been divided into regions where 2 times a month on a rotation, organized the collection. Additionally the municipality of Aglantzia invites residents to follow the instructions below:

1. Cleaning and care of the gardens to be one to two days before the visit of meditation workshops in each region.
2. Placement of pruned or other impurities to be in front of the house and not in open spaces or plots.
3. Placement of pruned be done in such a way that facilitates the collection and not impede pedestrian and vehicular traffic.

In cases will determine the placement pruned, dirt, scrap building materials etc in open spaces or land outside the specified dates mentioned in the Annual Plan of the Municipality, the Municipality of Aglantzia applies strict setting of court as provided by law. (Fine extrajudicial € 85,43) as well as taking legal action against those who engage in this illegal and irresponsible act.

4.10 System "Pay as you throw"

The Pay As You Throw is the billing system of garbage management services based on the "polluter pays" principle. Basis of this system, with each bucket installed a microprocessor (microchip) which connects the bucket with an address, in which a resident individual. The garbage truck contains the weighting system and software installed on it. In the system (on board) recorded net weight of garbage, which is obtained by deducting the weight of the bucket with the trash and empty bucket. Along with the weight recorded person residing in the property, the day and time of collection.

The process will be implemented initially pilot in the municipality of Aglantzia the region defined by the Avenue Larnaca, Famagusta Avenue and the neutral zone.



4.11 Population of Aglantzia

Basis to the 2011 Census carried out by the Statistical Service of Cyprus, the population of the municipality of Aglantzia is 21,018 people. Also, there were 8,284 households with a

population of 20,862 people, while the total population recorded for institutions in the municipality is 156. Of the 10,683 residents of the Municipality, the homes are 8,166 residence while the rest are either vacant houses or houses for temporary stay.

4.12 European and International Programs

The European programs in which the Municipality of Aglantzia participates and energy-related are the following:

<p align="center">Covenant of Islands</p> <p>ISLE-PACT aims at developing Sustainable Energy Action Plans in Islands, in order to achieve the European objectives for a reduction of CO2 emissions by at least 20%</p>		<p align="center">www.islepact.eu</p>
<p align="center">Medeea</p> <p>The general scope of Meddea Project is to achieve the European goal “20-20-20” in the Mediterranean, through the involvement of local authorities in energy related matters by applying the energy planning tool, European Energy Award-eea®</p>		<p align="center">www.interregmedeea.eu</p>

5 Inventory of Energy Consumption in Aglantzia Municipality

5.1 Residential Sector

Table 1 Energy Demand in MWh in the Residential Sector in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Geothermal	Biomass	Total
Hot water	1.427	1.248	89	5.796	45	312	8.918
Heating and cooling	34.244	20.426	2.403	180	120	3.004	60.377
Lighting	1.902	-	-	-	-	-	1.902
Kitchen	1.427	-	611	-	-	0	2.038
Electrical appliances	8.561	-	-	-	-	-	8.561
Total	47.561	21.675	3.104	5.977	165	3.316	81.797

5.2 Primary Sector

Table 2 Energy Demand in MWh in the Primary Sector in 2009

Description	Electricity	Fuel Oil	Diesel	LPG	Wind	Biomass	Total
Agriculture, Forestries and Fisheries	200	144	0	61	240	80	485
Mining and Quarrying	0	0	0	0	0	0	0
Total	200	144	0	61	240	80	485

5.3 Secondary Sector

Table 3 Energy Demand in MWh in the Secondary Sector in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Processing	2.465	1.775	757	109	36	5.143
Water supply, wastewater treatment, waste management	25	18	8			51
Construction	64	46	20			130
Total	2.554	1.839	785	109	36	5.323

5.4 Tertiary Sector

Table 4 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	6.624	4.770	2.035	284	95	13.808
Hotels and restaurants	2.345	1.689	721	101	34	4.888
Public administration and social insurance	14.310	10.306	4.397	613	204	29.831
Defence, Justice, Police and Fire stations/departments	2.727	1.964	838	117	39	5.685
Education	6.120	4.407	1.881	262	87	12.758
Human Health and social care	1.919	1.382	590	82	27	4.000
Other Services	14.159	10.197	4.351	607	202	29.516
Public Lighting	1.977					1.977
Total	50.181	34.715	14.812	2.066	689	102.463

5.5 Transports

Table 5 Final Energy Consumption in MWh in Transports for the Year 2009

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transports	0	1.728	3.749		5.476
Other passenger transportation services (taxi, tourism, school buses, etc)	0	27.642	59.978		87.620
Commercial ground transportation services and removable services	0	0	0		0
Private Vehicles	0	57.012	123.704		180.717
Total	0	86.382	187.431		273.813

5.6 Total Final Energy Consumption in the Municipality of Aglantzia

Table 6 Final Energy Consumption in MWh in 2009

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Geothermal	Biomass	Total
Residential	47.561	21.675	-	-	3.104	5.977	165	3.316	81.767
Primary	200	144	-	-	61	-	-	80	725

Secondary	2.554	1.839	-	-	785	109	-	36	5.323
Tertiary	50.181	34.715	-	-	14.812	2.066	-	689	102.463
Transports	-	-	86.382	187.431	-	-	-	-	273.813
Total	100.496	58.373	86.382	187.431	18.762	8.151	165	4.121	464.121

Figure 22 Share of Final Energy Consumption by Sector in 2009

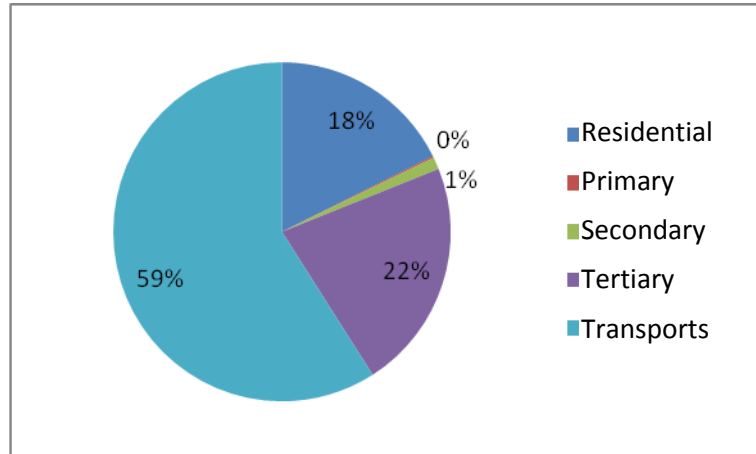
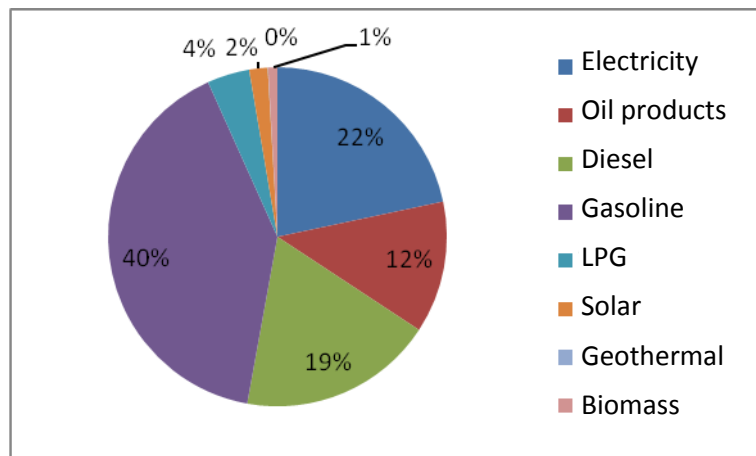


Figure 23 Share of Final Energy Consumption by Energy Source in 2009



6 INVENTORY OF CARBON DIOXIDE (CO₂) 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 7 Coefficients for Calculating CO₂ 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 8 CO₂ Emissions in tones in the Residential Sector of Aglantzia Municipality in 2009

Description	Electricity	Fuel Oil	LPG	SOLAR	Geothermal	Biomass	Total
Hot water	1.247	348	21	-	-	-	1.617
Heating and cooling	29.929	5.699	577	-	-	-	36.205
Lighting	1.663	-	-	-	-	-	1.663
Kitchen	1.247	-	147	-	-	-	1.394
Electrical appliances	7.482	-	-	-	-	-	7.482
Total	41.568	6.047	745	-	-	-	48.360

6.3 Primary Sector

Table 9 CO₂ Emissions in tones in the Primary Sector of Aglantzia Municipality in 2009

Description	Electricity	Fuel Oil	Diesel	LPG	Biomass	Total
Agriculture, Forestries and Fisheries	175	40	0	15	-	230
Mining and Quarring	0	0	0	0	-	0
Total	175	40	0	15	-	230

6.4 Secondary Sector

Table 10 CO2 Emissions in tones in the Secondary Sector of Larnaka Municipality in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Processing	2.154	495	182	-	-	2.831
Water supply, wastewater treatment, waste management	22	5	2	-	-	29
Construction	56	13	5	-	-	74
Total	2.232	513	188	-	-	2.934

6.5 Tertiary Sector

Table 11 CO2 Emissions in tones in the Tertiary Sector of Aglantzia Municipality in 2009

Description	Electricity	Fuel Oil	LPG	Solar	Biomass	Total
Wholesale and Retail trade, repair of motor vehicles and motorcycles	5.789	1.331	489	-	-	7.609
Hotels and restaurants	2.050	471	173	-	-	2.694
Public administration and social insurance	12.507	2.875	1.055	-	-	16.438
Defence, Justice, Police and Fire stations/ departments	2.383	548	201	-	-	3.132
Education	5.349	1.230	451	-	-	7.030
Human health and social care	1.677	386	142	-	-	2.204
Other services	12.375	2.845	1.044	-	-	16.264
Public lighting	1.728	-	-	-	-	1.728
Total	43.858	7.682	4.755	-	-	57.099

6.6 Transport

Table 12 CO2 Emissions in for Transports in Larnaka Municipality in 2009

Description	Electricity	Diesel	Gasoline	Biomass	Total
Urban and suburban passenger transports	-	461	933	-	1.395
Other passenger transportation services (taxi, tourism, school buses, etc)	-	7.380	14.935	-	22.315
Commercial ground transportation services and mobile services	-	-	-	-	-
Private vehicles	-	15.222	30.802	-	46.025
Total	-	23.064	46.670	-	69.734

6.7 Total CO2 emissions in Aglantzia Municipality

Table 13 Total CO2 emissions in Larnaka Municipality in 2009

Sector	Electricity	Fuel Oil	Diesel	Gasoline	LPG	Solar	Geothermal	Biomass	Total
Residential	41.568	6.047	-	-	745	-	-	-	48.360
Primary	175	40	-	-	15	-	-	-	230
Secondary	2.232	513	-	-	188	-	-	-	2.934
Tertiary	43.858	9.685	-	-	3.555	-	-	-	57.099
Transports	-	-	23.064	46.670	-	-	-	-	69.734
Total	87.834	16.286	23.064	46.670	4.503	-	-	-	178.357

Figure 24 Share of CO2 Emissions by Sector in 2009

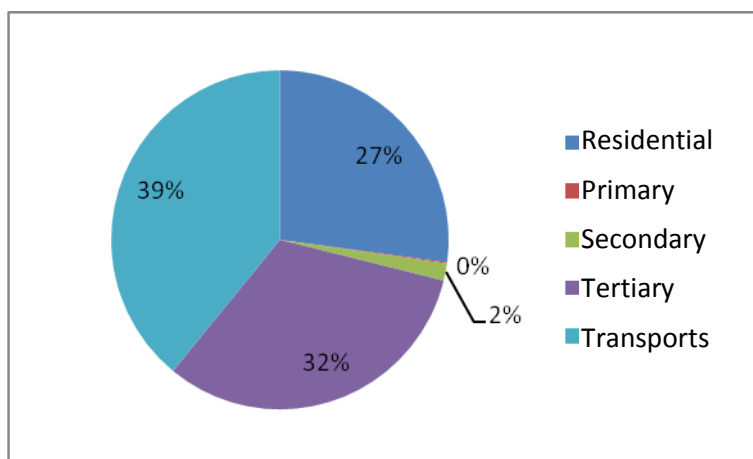
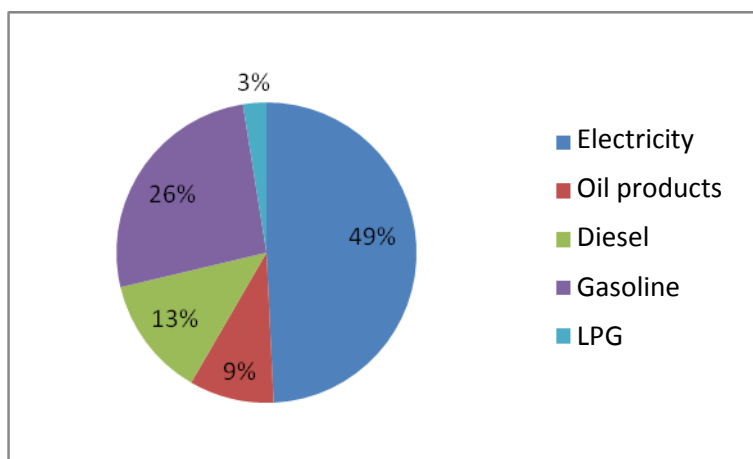


Figure 25 Share of CO2 Emissions by Energy Source in 2009



6.8 Forecasting/Projection Scenario of CO₂ Emissions

For the forecasting/projection of CO₂ emissions in the period 2010 to 2020, a scenario 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 statistics available during the preparation of the Energy Action Plan (see Table 17)
2. Use of annual growth rates of energy efficiency at the end-use due to the improvement of existing technologies (see Table 18)
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 19).
4. The gradual introduction, use and integration of natural gas into the power generating system.

Table 14 Growth Rates of Energy Consumption per Consumer used in the expected evolution scenario

Sector Description	Estimated annual energy consumption rate
Residential	
Hot water	3%
Heating and Cooling	3%
Lighting	3%
Cooking	3%
Refrigerators and freezers	3%
Washing and drying machines	3%
Dishwashers	3%
Televisions	3%
Other electrical appliances	3%
Primary Sector	
Agriculture, forestries and fisheries	1,5%
Mining and quarrying	0%
Secondary Sector	
Processing	2,5%
Water supply, wastewater treatment, waste management and remediation activities	1%
Construction	2,0%
Tertiary Sector	
Wholesale and retail trade, repair of motor vehicles and motorcycles	2,0%
Accommodation services activities and food services	1%
General public administration and social insurance	2%
Defense and justice services, police and fire stations/ departments	1%
Education	3%

Activities relatd to human health and social care	4,0%
Other services	2,0%
Municipal/ Public lighting	3,0%
Transports (vehicles)	
Private transports	1%
Urban and suburban passenger transports	2,0%
Other road transport services (taxi, tourism, school buses, etc.	0%
Freight road transports and removal services	3%
Activities relatd to human health and social care	
Other services	3,0%
Municipal/ Public lighting	1,0%
Transports (vehicles)	3,0%
Private transports	1,0%

Table 15 Increased Efficiency in Energy End-use (Reducing the Final Energy for the same Useful Energy)

Sector Description	Estimated annual energy consumption rate
Κατοικίες	
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%
Transprts (Vehicles)	
Private transports	0,5%

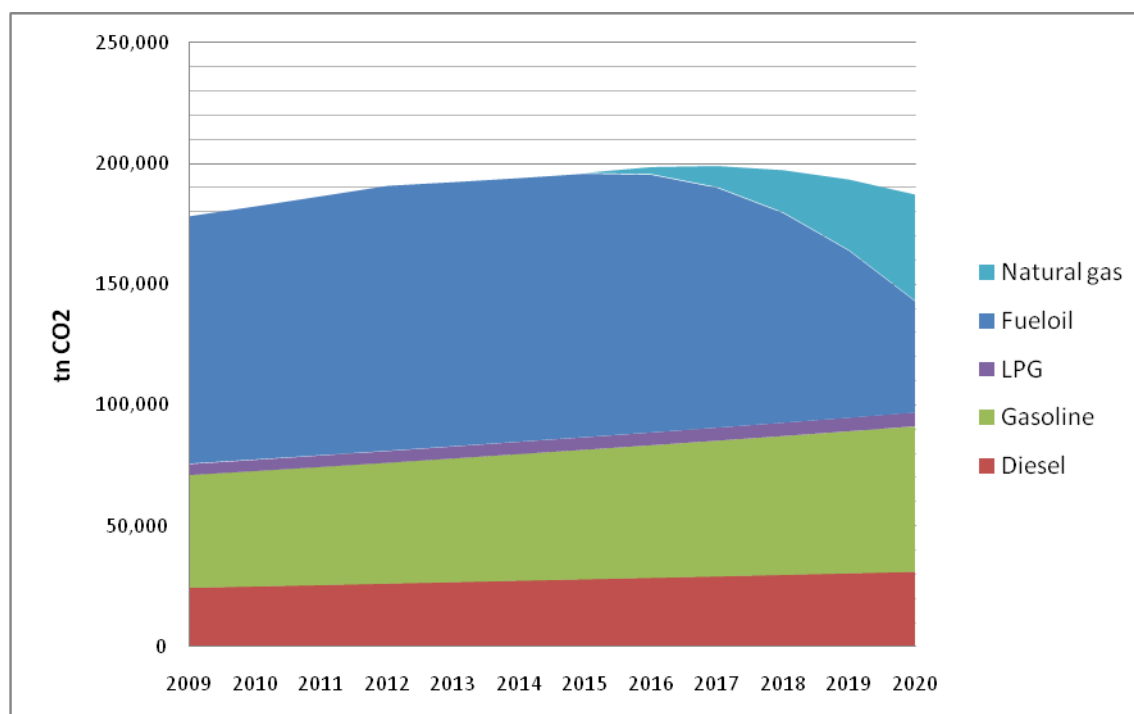
Table 16 Coefficients of Energy Performance of Electricity Generation

	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	-	-	-	-	-	43%	43%	43%	44%	44%	44%

Table 17 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
2009	102.617	24.567	46.670	4.503	0	178.357	0%
2010	104.977	25.132	47.744	4.601	0	182.454	2%
2011	107.394	25.710	48.842	4.701	0	186.648	5%
2012	109.870	26.302	49.967	4.804	0	190.942	7%
2013	109.540	26.908	51.117	4.909	0	192.474	8%
2014	109.311	27.528	52.295	5.017	0	194.150	9%
2015	109.235	28.096	53.500	5.127	0	195.958	10%
2016	106.829	28.682	54.733	5.240	2.894	198.377	11%
2017	99.436	29.283	55.995	5.355	8.708	198.777	11%
2018	86.940	29.902	57.286	5.473	17.471	197.073	10%
2019	69.222	30.538	58.608	5.594	29.213	193.175	8%
2020	46.159	31.192	59.961	5.717	43.964	186.993	5%

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



7 Aglantzia Municipality Sustainable Energy Action Plan From 2011 to 2020

7.1 Introduction

The Sustainable Energy Action Plan that has been prepared for Aglantzia 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 CO₂ emissions by at least 20% by 2020 compared to the reference year 2009.

Emissions Reference Year 2009 (tn CO ₂ /year)	Expected annual emissions in 2020 (tn CO ₂ /year)	Average growth rate in Emissions (tn CO ₂ /year)	Minimum emissions target in 2020 (tn CO ₂ /year)	Desired minimum (20%) emissions reduction (tn CO ₂ /year)
178.357	186.993	780	142.686	44.307

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
- Investments in Renewable Energy Sources (RES)
- Development of green spaces

7.2 Energy Saving in Public Buildings

Measure ENEF Upgrade Energy Efficiency in Municipal Buildings

Measure implementation period: 2013-2016

S/N	Building	Electr. (kWh)	Fuel (liters)	Suggested intervention	Saving.	Sav. electr. (KWh)	Sav. Fuel. (liters)	Reduction CO2 (kg/year) ²	Cost (€)	Cost Index (€/kgCO2)	Sav. of cost (€/year) ³	Year Imple.
1	Town Hall	82.000	-	roof insulation	20%	16.400		14.334	10.000	0,70	4.920	2014
2	Town Hall	82.000	-	upgrading of air conditioning system	15%	12.300		10.750	12.000	1,12	3.690	2014
3	Town Hall	82.000	-	lamp replacement	5%	4.100		3.583	500	0,14	1.230	2014
4	Elderly Housing	89.225	18.769 (LPG)	roof insulation	25%	22.306	4.692	32.558	17.000	0,52	13.730	2015
5	Elderly Housing	89.225	18.769 (LPG)	lamp replacement	5%	4.461		3.899	600	0,15	1.338	2015
6	Elderly Housing	89.225	18.769 (LPG)	4 solar panels installation to produce DHW	3%	2.677	563	3.907	3.500	0,90	1.648	2015
6	A' Kindergarten	22.858		roof insulation	20%	4.572		3.996	5.000	1,25	1.372	2015
7	Municipal Swimming Pool		52.481	solar panels installation to cover the needs of heat for pool heating	25%		13.120	36.526	45.000	1,23	19.680	2016
TOTAL						66.816	18.375	109.553	93.600	6,01	47.607	

² Emission factors of carbon dioxide based to Table on page 36 (Table 15)

³ Average kWh for the period 2012-2020: € 0,30 / kWh

Average price of gas for the period 2012-2020: € 1,50 / liter

7.3 Energy Saving with Awareness Campaigns

Measure ESAC Information, Education, Awareness

Measure implementation period: 2012-2020

S/N	Proposed Measure	Number partic.	Year Appl.	Percentage Aware.	Number of diffuse influence	Green Energy per person (kWh/year) (ESPP)	Energy Saving Function (KWh/year) ES=v*ε*n*vδ*ESSP	Reduction CO2 (kg/year) ⁴	Cost (€)	Cost Index (€/kgCO2)	Year Imple.
		(v)	(ε)	(n)	(vδ)						
1	Organization of an annual seminar on RES	50	3	30%	3	1.000	135.000	117.990	2.000	0,017	2013, 2015, 2017
2	ES annual seminar	50	3	25%	3	700	78.750	68.828	2.000	0,029	2014, 2016, 2018
3	RES and ES Day	250	8	20%	3	600	720.000	629.280	8.000	0,013	2012-2020
4	Educational presentations to students	350	8	40%	3	600	2.016.000	1.761.984	1.600	0,001	2012-2020
5	Day without lighting	2000	8	10%	3	80	384.000	335.616	4.000	0,012	2012-2020
6	Energy Information in the Municipality website and newspaper	1000	8	15%	3	400	1.440.000	1.258.560	0	0,000	2012-2020
7	Organization of "Cycling Day"	200	8	20%	3	700	672.000	179.424	4.000	0,022	2012-2020
8	Organization of "Eco-cars Day"	50	8	5%	3	9.500	570.000	152.190	2.800	0,018	2013-2020
9	Informational leaflets and messages	25.000	8	5%	1	250	2.500.000	2.185.000	11.500	0,005	2012-2020
TOTAL							8.515.750	6.688.872	35.900		

⁴ Emission factors of carbon dioxide based to Table on page 36 (Table 15)

7.4 Energy Saving in Transport

Measure EST: Saving energy in transport by promoting sustainable mobility

Measure implementation period: 2012-2018

S/N	Proposed Measure	Number	Year Appl.	Use (times per year)	Green Energy per person (kWh/year)	Energy Saving Function (KWh/year)	Reduction CO2 (kg/year) ⁵	Cost (€)	Cost Index (€/kgCO2)	Sav. of cost (€/year) ⁶	Year Imple.
		(v)	(ε)	(n)	(ESPP)	$ES=v*\epsilon*n*ESSP$					
1	Free parking in ecological vehicles	10	5	730	70	2.555.000	682.185	15.000	0,022		2014-2018
2	Electric vehicle charging points	5	1	800	80	320.000	85.440	5.000	0,059		2013-2014
3	Purchase of 2 electric vehicles for the Public Service	2	1	1095	10	21.900	5.847	24.000	4,104	2.832	2015-2016
4	Bicycle rental system	50	1	1095	40	2.190.000	584.730	80.000	0,137		2012
5	Upgrading and extending the network of cycle paths	10	1	90.000	30	27.000.000	7.209.000	100.000	0,014		2017-2018
					TOTAL	32.086.900	8.567.202	224.000			

⁵ Emission factors of carbon dioxide based to Table on page 36 (Table 15)

⁶ With fuel price € 1,50 per liter

7.5 Energy Saving in Street Lighting

Measure ESSL: Energy Saving in Street Lighting

Measure implementation period: 2013-2015

S/N	Suggested intervention	Current consumption (kWh)	Number of lamps	Saving	Sav. electr. (KWh)	Reduction CO2 (kg/year) ⁷	Cost ⁸ (€)	Cost Index (€/kgCO2)	Sav. of cost (€/year) ⁹	Year Imple.
1	Replacement of existing street lighting luminaires (HPS) with new, more efficient LED lights	1.691.000	3187	50%	845.500	738.967	815.000	1,103	253.650	2014-2015
2	Optimization of road lighting (Setting optimal working hours and non-lighting vacant land)	1.691.000	3187	5%	84.550	73.897	0	0	25.365	2013
TOTAL					930.050	812.864	815.000		279.015	

⁷ Emission factors of carbon dioxide based to Table on page 36 (Table 15)

⁸ The Municipality has agreed to join the request for implementation of a large pilot lights replacement of street lighting in conjunction with the Energy Office and the EAC. Should obtain approval cooperation with EAC and funding from the European Energy Efficiency Fund, the Municipality will not incur the cost of the investment. The investment will be made by the EAC which after agreement will benefit from the energy savings from the investment. The only expense for the municipality will be the payment of 2.500 € about as financing (together with the mechanism Elena Facility) in order to prepare the necessary studies for the investment.

⁹ If the investment takes place as described in Note 7, the Municipality will not benefit with the full amount of the savings. Part of the savings will be used for the repayment of the loan and required to meet the provisions of the agreement to provide energy services by the EAC.

7.6 Investments of Aglantzia Municipality in RES

Measure RES: Investments of Aglantzia Municipality in RES

Measure implementation period: 2015-2016

S/N	Suggested intervention	System power ¹⁰ (kW)	Number of system	Power Generation (kWh/KW).	Total power generation (KWh)	Reduction CO2 (kg/year) ¹¹	Cost (€)	Maintenance cost (€)	Cost Index (€/kgCO2)	Income from sale ¹² (€/year)	Year Imple.
1	Installation of photovoltaic systems in buildings and covered parking of the municipality	50	3	1.500	225.500	197.087	337.500	0 (negligible cost for cleaning frames)	1,712	56.375	2015-2016
				TOTAL	225.500	197.087	337.500	0		56.375	

¹⁰ The installation of a system for production of electricity with photovoltaic panels was examined. The total installed capacity will be 3 * 50 kW and will cover an area of approximately 3 * 500 m². The installation location of the systems will be in parking lots of the municipality where will offer artificial shading and on the roof of buildings in the municipality.

¹¹ Emission factors of carbon dioxide based to Table on page 36 (Table 15)

¹² Selling price of produced kWh € 0,25

7.7 Development of Green Spaces in Aglantzia Municipality

Measure DGS: Development of Green Spaces

Measure implementation period: 2012-2020

S/N	Suggested intervention	Number of trees	Capture of CO2 per tree (kg/year)	Total reduction CO2 (kg/year)	Cost (€)	Cost of care (€)	Total cost(€)	Cost Index (€/kgCO2)	Year Imple.
1	Tree planting	5000	40	200.000	10.000	10.000	20.000	0,10	2012-2020
			TOTAL	200.000	10.000	10.000	20.000		

7.8 Summary of the measures of the municipality of Aglantzia

Table 18 Summary of measures to be taken by the Municipality of Aglantzia and included in the Energy Action Plan

Measures category	Energy Saving or RES (kWh)	Reduction CO ₂ (kg/year)	Cost (€)	Savings and income (€)	2012	2013	2014	2015	2016	2017	2018	2019	2020
Upgrading of Energy Efficiency in Municipal Buildings	279.966	109.553	93.600	47.607									
Information, Education, Awareness	8.515.750	6.688.872	35.900	-									
Saving energy in transport by promoting sustainable mobility	32.086.900	8.567.202	224.000	2.832									
Energy saving in street lighting	936.050	812.864	815.000	279.015									
Municipal investments in renewable electricity	225.500	197.087	373.500	56.375									
Development of green spaces in the municipality	-	200.000	20.000	-									
TOTAL	41.764.200	16.466.025	1.468.400 €	338.222 €									

7.9 Contribution of National Measures on the Sustainable Energy Action Plan of Aglantzia 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 19 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)	1.927	1.913	103	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	925	918	49	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	324	321	17	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	231	230	12	0
5	Legislation on energy efficiency of appliances (Equation 1)	1.372	1.766	107	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	909	757	1.515	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	171	203	13	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m ² (Equation 1)	0	1.913	41	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	235	0
10	Plan of single urban transport system (Equation 3)	0	0	0	38.478
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	25.774
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	6.186
13	Grant Schemes for hybrid vehicles and vehicles with low CO ₂ emissions (Equation 3)	0	0	0	3.299
14	Discounts on vehicles registration for vehicles with low CO ₂ emissions (Equation 3)	0	0	0	4.124
TOTAL PER SECTOR		5.860	8.022	2.093	77.861
GRAND TOTAL		93.836			

Table 20 Brief Presentation of CO₂ Emissions Reduction from National Measures

NATIONAL MEASURES FOR ENERGY EFFICIENCY		Emissions Reduction (t CO ₂ /year)			
		Residential	Tertiary	Industry	Transports
1	Legislation on Energy Building Performance (Equation 1)	1.367	1.407	75	0
2	Legislation for the inspection of air conditioning and heating systems (Equation 1)	656	675	36	0
3	Grant Schemes for the installation of solar thermal systems (Equation 1)	230	236	13	0
4	Grant Schemes for the installation of geothermal systems (Equation 1)	164	169	9	0
5	Legislation on energy efficiency of appliances (Equation 1)	973	1.299	78	0
6	Grant Schemes for the installation of Photovoltaics Systems (Equation 2)	645	557	1.105	0
7	Legislation for mandatory integration of solar water heaters (Equation 1)	122	149	9	0
8	Legislation on energy efficiency of buildings with area larger than 1000 m ² (Equation 1)	0	1.407	30	0
9	Grant Schemes for cogeneration in Industry (Equation 1)	0	0	171	0
10	Plan of single urban transport system (Equation 3)	0	0	0	9.720
11	Mandatory inspection of Vehicles MOT (Equation 3)	0	0	0	6.511
12	Withdrawal Plan of old vehicles (Equation 3)	0	0	0	1.563
13	Grant Schemes for hybrid vehicles and vehicles with low CO ₂ emissions (Equation 3)	0	0	0	833
14	Discounts on vehicles registration for vehicles with low CO ₂ emissions (Equation 3)	0	0	0	1.042
TOTAL PER SECTOR		4.156	5.900	1.526	19.668
GRAND TOTAL		31.249			

Table 21 Equations Used for the Estimation of the Contribution of the National Measures to Energy Saving

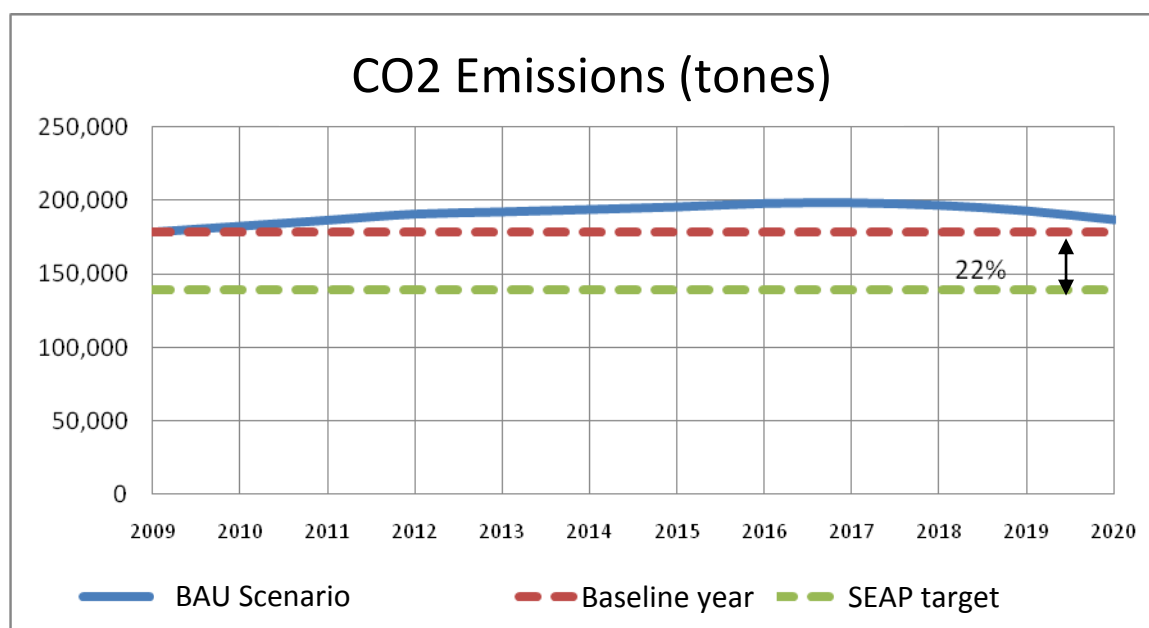
(1) $ES=EC*np*nc*ns$
ES: Energy Saving (MWh) EC: Energy Consumption (MWh) np: Number of Participation (0-100%) nc: Consumption rate per consumption category (0-100%) ns: Saving Percentage by applied measure (0-100%)
(2) $GE=N*P*np$
GE: Green Energy (MWh) N: Population P: Production per application (MWh)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

7.10 Description of Achieving CO2 Emission Reduction for 2020

The overall goal of reducing carbon dioxide emissions achieved by implementing the action plan for 2020, is 22% 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 ₂ /year)	178.357
Expected emissions for 2020 – Expected Development Scenario (tn CO ₂ /year)	186.993
Estimated emission reduction from national measures for 2020 (tn CO ₂ /year)	31.249
Estimated emission reduction by the Municipality for 2020 (tn CO ₂ /year)	16.466
Total estimated emission reduction for 2020 (tn CO ₂ /year)	47.715
Estimated emissions for 2020 through the application of the Action Plan (tn CO ₂ /year)	139.278
Emission reduction percentage by 2020 compared with 2009	22%

Figure 27 Schematic of the Expected Evolution Scenario of CO2 Emissions in Aglantzia Municipality and the Reduction Target for 2020 by 20%



Therefore by implementing the Sustainable Energy Action Plan, the Municipality of Aglantzia will reduce carbon dioxide emissions by **22%** compared to 2009, thus exceeding by 2% the overall objective of the project to reduce emissions by 20%.

Sources of energy data

- ▶ Consumption of fuels and heating fuels from oil companies within the administrative limits of Aglantzia Municipality.
- ▶ LPG consumption from the Statistical Service of Cyprus (Reduction at local level based on the population) [www.mof.gov.cy/cysta]
- ▶ Annual growth rates from the Statistical Service of Cyprus and estimates of scholars [www.mof.gov.cy/cysta]
- ▶ National Action Plan for reducing CO₂ 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]
- ▶ Electricity Consumption data in the Municipality of Aglantzia from the Electricity Authority of Cyprus [www.eac.com.cy]
- ▶ Energy consumption data in municipal buildings in Aglantzia
- ▶ Information concerning the installation of more efficient electricity generators (combined cycle) from EAC [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
savvas.vlachos@cea.org.cy
orestis.kyriakou@cea.org.cy
Web: www.cea.org.cy
- Supervision:** **Aglantzia Municipality**
Mayor Costas Kortas
Vice Mayor Evgenia Aletra
Municipal Energy Group:
Charis Tsaggarides (General Secretary)
Antri Eftixiou (Officer of municipal service)
Athina Giannaka (Officer of technical Service)
- Contact Details:
Aglantzia Municipality
Aikaterinis Kornaro 8,
20259, 2150 Aglantzia, Cyprus
Tel. +357- 22462194
Fax: +357- 22455799
Email: mail@aglantzia.org.cy
- Web: www.aglantzia.com
- ISLEPACT Project :** Web: <http://www.islepact.eu>
Tel. +32(0) 2 6121704



Prepared by:



Local Authority:



ΔΗΜΟΣ ΑΓΓΛΑΝΤΖΙΑΣ

Financial support:



Directorate-General
for Energy

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